CINEMA 4D XL

Version 6

Tutorial Manual

Tutorial Manual

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Introduction

Contents:

- How to use this Tutorial Manual
- What is Animation?
- The Elements of 3D Animation
- Mastering the Skills of a 3D Animator
- How Long Does it Take to Learn 3D Animation?

How to use this Tutorial Manual

Knowing that everyone approaches learning a new software package in their own way, and most will not even read the manual, we have designed this tutorial manual to be somewhat flexible in teaching you how to use CINEMA 4D. We've included basic information for beginners and tutorials that you can work on at any stage.

In the section "How to Approach your 3D Animation Projects", there is an overview of how many 3D artists, animators and production companies might approach a project. This is a basic outline of the whole production process for those getting into 3D for the first time.

The section "Introduction to CINEMA 4D Tools" gives you a quick overview of some of the tools in CINEMA 4D. If you are a fan of quick keys, keyboard shortcuts, and customizing your workspace, they are covered here. In addition, there is a detailed explanation of some features of CINEMA 4D which improve production flow: Browser, Spreadsheet, Pop-up Menus, Expressions, etc.

The next five chapters contain the tutorials. They are broken into five different areas of focus: Modeling, Materials, Lighting, Animation, and Rendering. Each chapter has three different tutorials: a Flying Logos project, an Indoor scene and a SciFi scene.

You can choose to do all the tutorials in one chapter; say, focus just on modeling in each project. Or you can work through each scene in actual production flow: first modeling, then materials, lighting, animation and rendering. Please remember that each subsequent tutorial assumes you have done the previous one. So if you jump past the first modeling tutorial, something explained in detail there may not be as clearly explained in the next.

The project for each tutorial is available to you on CD at every stage of completion. The projects in the Modeling folder depict what your scene should look like at the end of the modeling tutorial, and so on. So, if you wish to jump right to learning lighting in CINEMA 4D, just open the scene of your choice in the Materials folder. Now you can begin the lighting tutorial with the project completed up to the materials stage.

IMPORTANT: There are many ways to accomplish tasks in 3D. In some cases, we have chosen to use a method that teaches you how to use a particular tool. That does not mean it is the best way to go about it. The idea is to learn the tools and figure out what works best for you.

Don't forget to check our web site on a regular basis, as we are always adding tutorials for new techniques and solutions to production problems.

If all else fails, contact our Technical Support through the online support form. We're always willing to help.

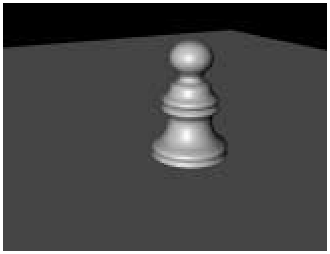
What is Animation?

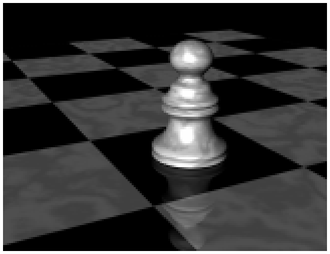
Animation is the illusion of movement created by flipping through a sequence of still images. As the images quickly replace each other on the screen, it creates the illusion that the figures are moving. Each medium flashes the pictures before our eyes at a specific rate (24 frames per second for film, 29.97 frames per second for television, etc.).

In traditional 2D animation each and every image is hand drawn in order to portray movement. The artist pictures the movement in his mind and plans out each drawing to create that action. As each picture is drawn, movement is shown through the change of the objects in the scene and their position in the drawing. The number of images and the rate in which they are viewed controls the speed of the action.

Stop Motion is used for animating puppets, clay (Claymation), cutouts, and sand or paint. The animation is created by recording each frame, one-by-one, while moving or changing the elements in the scene. The result is the illusion of fluid change or movement.

In 3D animation, models are created in the 3D environment, materials are applied, and lighting is added to the scene. To create motion, the artist has only to create the key moments or keyframes of action, and the software creates or interpolates the movement in between the keyframes. In the end, this 3D action is rendered to 2D images, which are sequenced to create the illusion of movement.


Modeling


Texturing


Lighting


Animation

3D animation gives you the ability to be producer, scriptwriter, director, actor, set designer, lighting technician, editor and more all rolled into one.

The Elements of 3D Animation

There are four main components when working in 3D. The freelance artist working on his own will need to become at least proficient in all four areas. In a design firm of three or more 3D artists, some may be better in one area or another, but it is still best to have an understanding of all. There are few environments where an artist will only work in one specific discipline.

The four areas of 3D animation are:

- Modeling: Building the objects that will be in your scene.
- Texturing: Defining the surface properties of all objects.
- Lighting: Adding illumination, like lighting a stage for a theatre production.
- Animation: Creating motion with keyframes.

There are also related elements which can be essential:

- Special Effects: Explosions, Melting, etc.
- Sound: Music, Effects or Voice.
- Post Production and/or Editing.

Mastering the Skills of a 3D Animator

Being a successful 3D artist means utilizing a variety of disciplines: painting, sculpting, architecture, engineering, architectural or stage lighting techniques, photography, cinematography, choreography, acting, mathematics/physics, sound design and others. You don't have to be an expert in all of these areas, but having an understanding of one or a few is helpful.

The act of observation and visual study is the most important skill. Without a discerning eye you cannot even begin to recreate the world around you.

To model an object you have to look at the world as a sculptor, architect or engineer. You have to examine an object in terms of how it is structured, the shapes and parts used to define it, and how you might go about building it in the most efficient manner.

Adding materials to an object means knowing how to define how an object looks using a variety of surface elements — color, bump, reflection, transparency, etc. Not just, "is it blue or red?" but understanding the textures of an object, and how its surface reacts to light. Not only making it reflective, but also defining how much reflection it casts. Not just making something transparent, but how refractive the transparency, thus changing the way objects appear behind it. These are the skills of a fine artist.

The best lighting in animation is almost subliminal; present but not obtrusive. Lighting should enhance what you've done with the materials and modeling in your scene. It also creates the mood of your piece. One of the most talented 3D artist/animators I know studied architectural lighting. Lighting skills can also be learned through photography and cinematography.

Animating is the most complex task in 3D. It requires the skills of an actor, mathematician, physicist and choreographer. Creating smooth and logical motion can take twice as long as all the other elements of 3D combined. Of course, creating realistic character animation increases that complexity ten-fold.

How Long Does it Take to Learn 3D Animation?

This question is asked all the time. Strangely, no one ever asks how long it takes to become an artist or how long it takes to become a proficient musician. The real question is, how long will it take to become competent in the program so you can create the type of animation you want to do? The answer depends upon the skill set of each individual and the type of animation you choose to do.

It is worth noting that there is a difference between someone who is more technician and someone who is more traditional artist.

Those who are technically inclined and have experience with other digital graphics tools tend to pick up a 3D program more quickly. However, the technician also tends to have less artistic training. They are able to move through the program and complete projects faster, but tend to struggle more to achieve a specific "look" or "style" for an animation. If you are more technically inclined, you should make an effort to learn more traditional artistic skills.

For the artist trained in traditional methods, digital tools are a new challenge. It tends to take someone relatively new to digital tools a bit longer to understand the concept. However, once learned, the artist shows a greater ability to deliver realistic looking imagery and more imaginative animation. If you are a classically trained artist, it would be to your benefit to have a better understanding of digital tools and how you can use them to achieve your desired result.

Best of all is to be a traditionally trained artist who is technically inclined. This person is able to master the technical challenges while still maintaining a critical eye towards the finished artistic needs of the project.

The bottom-line is, even the world's best animators today are challenged every day by what the available tools can and cannot do. Any of them will tell you they are still learning and have much more to learn.

In short, learning CINEMA 4D can take 2 weeks or three months depending on your skill set and background in graphics programs. Mastering 3D takes a lifetime.

How to Approach Your 3D Animation Projects

Contents:

- Dancing with a Muse
- Structure
- Storyboarding
- Production Flow
- Project Structure
- Post Production

Dancing with a Muse

Everyone has creative ideas or concepts. That's how it all begins ... and ends for some. The tough part is doing all the hard work required to see your creative vision through to completion. Nothing can or will do all the work for you. Of course, few things worth doing are ever easy.

Graphics applications are nothing more than digital versions of brushes, paints and canvas. No one would ever buy these traditional art tools believing they will be able to paint a masterpiece in days. But that's just what some people buying 3D animation software nowadays tend to think.

No matter what tool or medium you use to tell your story, make sure you have a plan of attack:

- Create an outline of how you will approach your project using one or both of the methods below. Even rough sketches on a cocktail napkin are better than nothing at all. Have all the elements in place when you get started, so you don't end up wasting time on things you hadn't planned for, or worse, have to go back and redo because they were done incorrectly.
- Learn and know the tools you are going to use well enough to accomplish the task. There's nothing worse than having to learn as you go when you are under a tight deadline. It also raises the possibilities that you will make a mistake and have to redo something later.
- Don't forget the finishing touches on a project. Some people are so happy to be finished and get so burned out on a project towards the end that they skimp on the finer details. Presentation is everything.

Structure

Every animation includes an underlying sequence of events that tells a story. Even still image tells a story. To create an interesting animation, it is important to have a narrative structure or pattern. It helps clarify your message and the specific actions that will arise from the theme you have chosen.

Once you have an idea, it is best to work out the structure of the story. A good example is a simple fairytale:

- Establish Story: Little Red Riding Hood is sent to her grandmother's house with a basket of goodies. She is strictly instructed not to talk to strangers or wander off the main path.
- Introduce Conflict: Little Red Riding Hood runs into the Wolf, who convinces her to go off the path to pick some flowers for her grandmother. He races ahead to set the trap.
- Develop Conflict: The Wolf eats grandmother, and disguises himself to trick Little Red Riding Hood.
- Climax: Little Red Riding Hood arrives at her grandmother's house. She questions the Wolf about his appearance. The Wolf prepares to pounce. The chase begins.

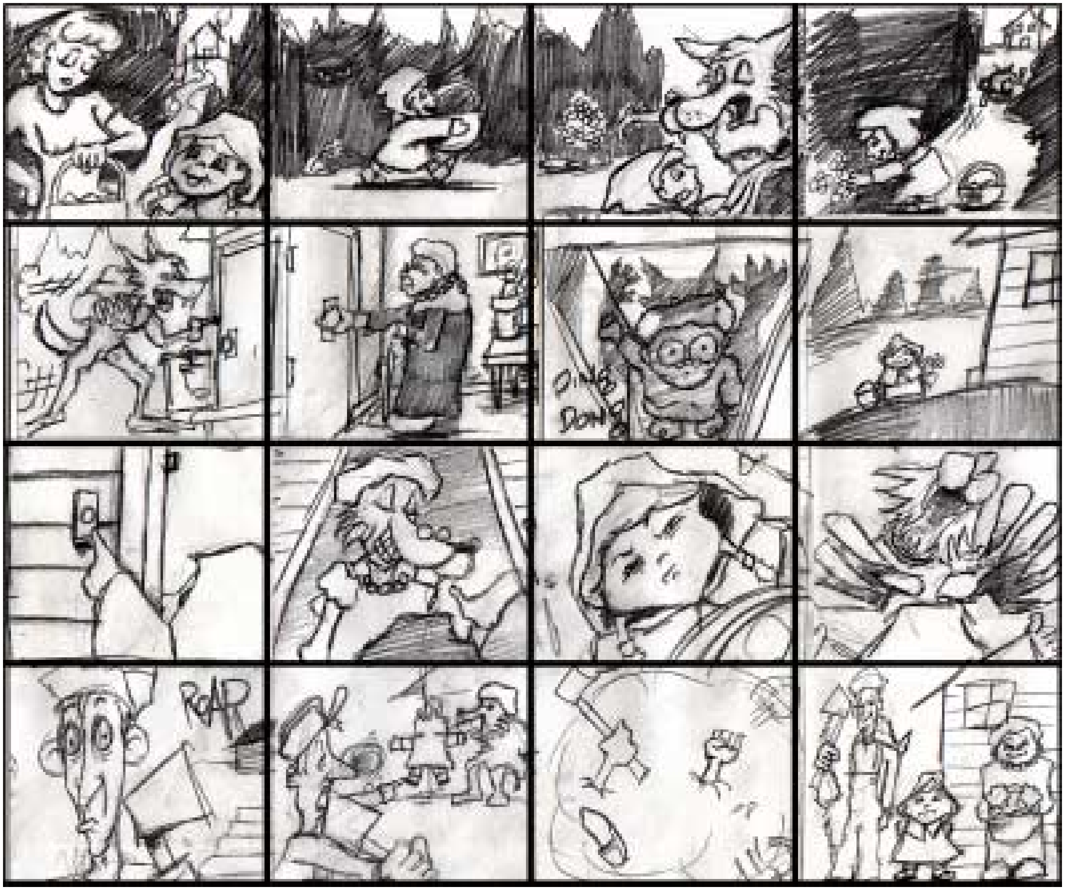


Illustration by Chris Broeska

- Resolution: The wood cutter arrives in time to save Little Red Riding Hood and miraculously retrieves the grandmother from the Wolf's stomach unscathed.
- Moral/Message (if needed): Little Red Riding Hood learns not to talk with strangers and to obey her mother in the future.

Even a flying logo project has a theme or structure. Here is the structure for the font tutorial in this manual:

- Establish Story: An object with rotating rings and elements in the empty expanse of outer space.
- Introduce Conflict: The camera with dramatic affect slowly drifts closer to the object. You can now recognize it as a logo.
- Develop Conflict: As the camera moves closer, the movement of the rings slows and the object turns towards the audience, revealing the client's logo.
- Climax: The rings slow to a stop. The rings begin to glow. The glow builds until the rings explode.
- Resolution: The explosion sets the logo and elements spinning. The fragments of the rings appear to reform below the logo as text revealing the name of the company.
- Moral/Message: The company represented is modern, ahead of its time and promises explosive performance.

Storyboarding

Now that you have an idea, and have mapped out the structure of your story, it is time to create a storyboard. A storyboard is the way you, the animator, develop the action of your animation and map out the steps of production. Even a basic animation project has structure which needs to be outlined. A storyboard is used to depict the key moments of your story, like a comic strip. It clarifies the action for each scene, camera angles and scene framing, change of scene or location, and more. It also serves as an illustration for a client or investor, and a blueprint for a team of animators.

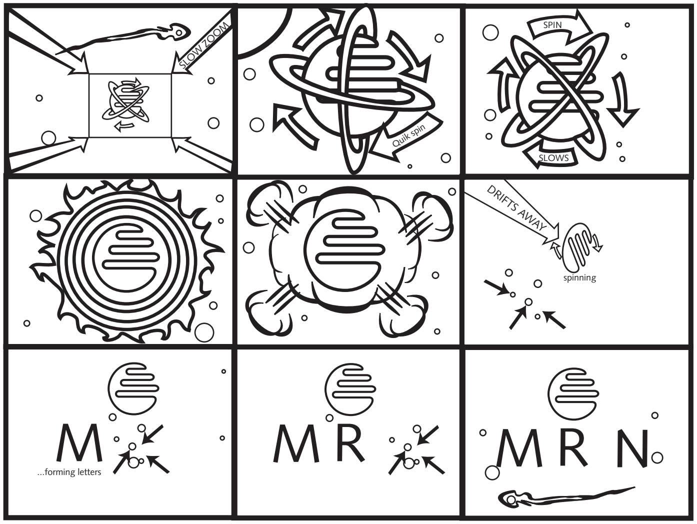


Illustration by Chris Broeska

Production Flow

Now that you've got your project planned and the client's approval, what should you do first? Depending on the project, you can approach it many ways.

For a simple logo project you might:

1. Model all elements that will be in your scene.
2. Add the Materials to your objects.
3. Choreograph the Animation.
4. Add Lighting to the scene.
5. Add Special Effects.
5. Render the scene.
6. Add Sound in post production.

Or you might:

1. Model all elements that will be in your scene.
2. Add the Materials to your objects.
3. Add Lighting to the scene.
4. Choreograph the Animation.
5. Add Special Effects.
6. Render the scene.
7. Add Sound in post production.

However, if your client already has a soundtrack for the timing of the animation, you might:

1. Model all elements that will be in your scene.
2. Add Sound.
3. Choreograph the Animation to cues in the soundtrack.
4. Add the Materials to your objects.
5. Add Lighting to the scene.
6. Add Special Effects.
7. Render the scene.
8. Post Production.

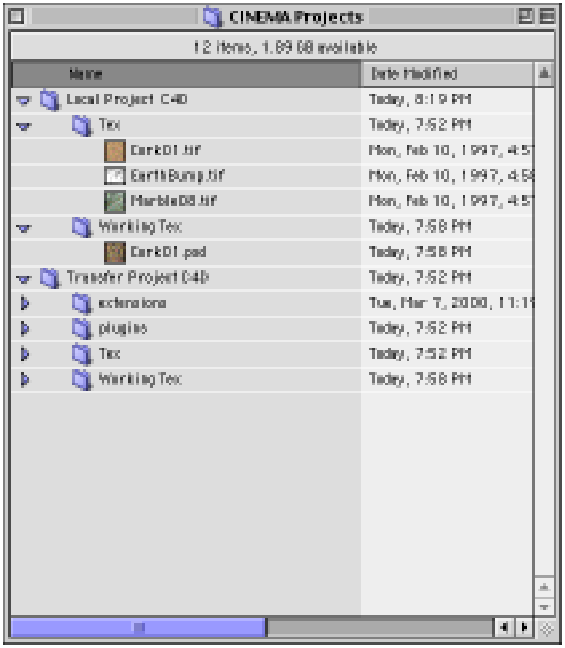
Or you might do it differently from any of the above. It all depends on the project, the elements you have to create and the ones you already have.

Project Structure

Organization skills will come in handy when managing an animation project. It's best to define a folder system to keep all elements of your project in one place. CINEMA 4D projects include everything but textures and plug-ins. So this makes it easy to manage projects.

Inside your project, it is recommended to establish naming conventions to maintain project management. It is a very good habit is to start naming objects as soon as you create them. The more complex the project, the more difficult it can be to keep track of the elements in your scene. When working with a team of animators, prescribed methods for project structure and files names are essential.

Maintaining object hierarchies can also save lots of time. A hierarchy is like a family tree. You group related objects together so that all you need to do is to animate or move the parent or top object and all the others will follow.



An example of good project management

Post Production

This is where you bring all the elements together (sound, live action, animations, etc.) and deliver to the medium of your choice (film, video, etc.). For final delivery to a still image, you would use a 2D image editing program. For video or film, a Non-Linear Editing (NLE) program or compositing software would be utilized. Multimedia, Internet and game delivery can be done through a variety of multimedia authoring programs.

It's important to know through what medium your animation will finally be shown. It affects many aspects of how you build and render your projects. In addition, there are many techniques you can use when rendering your project to better facilitate the post production process. These techniques will be covered in Chapter 6: Rendering.

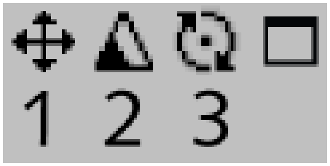
CINEMA 4D Tools

How to Navigate in 3D

CINEMA4D XL Version 6 has quick navigation tools for ease of moving about the 3D environment. Knowing these shortcuts will save you a tremendous amount of time.

Navigating Your Views

In the upper right corner of every view window are four buttons: move, scale, rotate and switch views. They can also be accessed by using the keyboard shortcuts: 1 for move, 2 for scale, 3 for rotate and Page Up to toggle views.



The move, scale and rotate tools are used to manipulate the view in the editor window. To use each of these buttons, click down and hold on the button you wish to use. Drag the mouse and the view will update in real time.

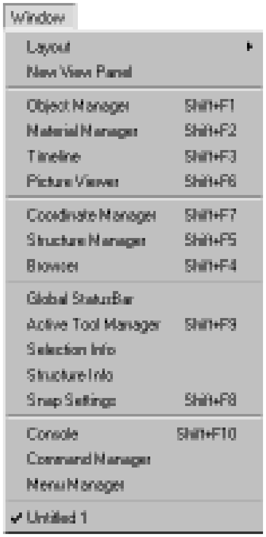
Your mouse only moves in 2 directions in the real world, so to get the third direction, such as moving into and out of the scene, click and hold with the right mouse button. Mac users need to Command-Click to use the Right Mouse button effects.

Mac users: When using Command-Click to take advantage of Right Mouse commands, you may run into conflicts. For example trying to hold down the one key for movement and holding the Command key for z movement doesn't work. To get around this, hold down 1 and click. Then release 1 and hold down the Command key to dolly in and out. The move tool will not be deactivated until the mouse is released.

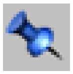
The view toggle will switch between a multi-panel view (the last one used) and the single panel view of the currently active view.

Navigating Your Objects

There are similar shortcuts for manipulating the objects. Holding down 4 will move an object. Holding down 6 will rotate the object. Holding down 5 will scale the object using the Object Tool and holding down 7 will scale the object using the Model tool.



Window Menu



Thumbtack

Thumbtack Menu

Customizing Your Interface

In CINEMA 4D XL Version 6, any dialog or view with a pin can be docked anywhere in the program or be allowed to float above the application or placed into a second monitor, or tabbed with other windows.

If a window or dialog is not in the current layout, you can access it from the Editor Menu: Windows or its keyboard shortcut.

Moving and docking windows is very easy. Just place the mouse on the Thumbtack icon at the upper left of the dialog. Then click and drag the window to the location you want it in the interface. To dock it with other tabbed dialogs, click on the thumbtack icon at the top left of the window where you want to add it. When you see the little hand, let go and the dialog will be indexed with the others.

For other options, place the mouse on the Thumbtack icon at the upper left of the dialog and click once. A menu of options will open:

- Undock: Disconnects a window or dialog from its current location.
- Rename: Allows you to give the window or dialog a new title caption.
- Make Tab: Creates a floating window with a tabbed dialog, so you can combine other dialogs.
- New Icon Palette: Creates a new icon palette where you can place the tools of your choosing.
- Close: Closes the window.

Customizing Your Menus

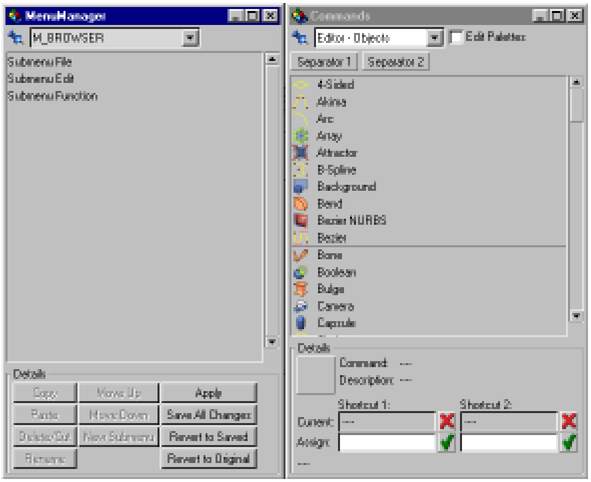
Menus in CINEMA 4D are another part of the user customizable interface. Every menu that you can access in CINEMA 4D can be renamed, rearranged, replaced or reorganized. Menus give you access to functions of the program without large icons taking up screen space or having to memorize keyboard commands. In addition to the standard menus such as file, selection and edit, you also have a number of contextual menus that you can access (by right mouse clicking on Windows or Command Clicking on Mac.)

To customize your menus, you'll need to have two managers open, the Menu Manager and the Command Manager. These can both be found under the Window menu.

Select the menu you want to customize from the dropdown. You now have access to that series of menus. To view the commands within a menu, just double-click on it. You can add, remove, copy, paste or reorganize the menus and commands. The menu manager works in a similar fashion to the Object Manager. Commands can be dragged around and dropped in new location, or placed underneath another item in a hierarchy. Commands can only be placed under submenus as children, but a submenu can be a child of another submenu and so on.

To add a command to a menu, simply drag it from the Command Manager and drop it in the menu. To add a separation between commands, simply drag a separator from the Command Manager to the menu.

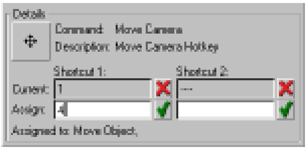
To review your new menu changes, be sure to hit the Apply button. This updates CINEMA 4D to reflect the changes you have made. If you like the changes, hit Save to store them permanently. If you don't like them, hit Revert to Saved. If after you've saved the menus you decide you want the factory settings back, just hit Revert to Original. If you forget to save your menu changes and quit CINEMA 4D, it will ask you if you want to save the menus or return to the previously saved menus.



Customizing Your Keyboard Shortcuts

Keyboard Shotcuts allow you to use your keyboard to execute common commands. A well known keyboard shortcut is Control-C (Command-C on Macintosh) to execute the copy command. Keyboard shortcuts also include the new navigation tools, such as holding down 1 to move the camera. Best of all, these keyboard commands are completely customizable.

To change your keyboard shortcuts, you first need to open the Command Manager. This can be found in the Editor Menu: Window=>Command Manager.



Customizing you Keyboard Shortcuts

To change the keyboard shortcut of a command, or to add one to a command that doesn't have it, click on the command in the Command Manager. At the bottom of the Command Manager is a group of four input boxes. The top row has a red X by it and the bottom row has a green checkmark next to it. The reason for the two sets of boxes is to allow you to map two keyboard commands to the same function. Why might you want to do this? For example on the Mac, Command-C is copy, but on Windows it is Control-C. By mapping both keyboard shortcuts to the Copy command, Mac and Windows users can both work comfortably on the Macintosh.

To actually change a keyboard shortcut, simply click into either box marked “Assign” followed by a green checkmark, then type your new shortcut on the keyboard. CINEMA 4D will automatically record your keyboard combination as a new keyboard shortcut. However, because it is possible to have two commands assigned the same shortcut, the shortcut must be explicitly saved, by pressing the green checkmark next to the input box.

CINEMA 4D will warn you if the keyboard shortcut is already assigned to another command with a message at the bottom of the Command Manager. You'll have to determine if it is safe to have two commands assigned to the same keyboard shortcut. For example it is okay to have Control-N assigned to the New command in the editor and the material manager because the command is context sensitive. If the Material Manager is active, it will create a new material, but if the view window is active it will create a new scene. It would be a bad idea to assign the same keyboard shortcut to extrude and extrude inner because they are both available at the same time.

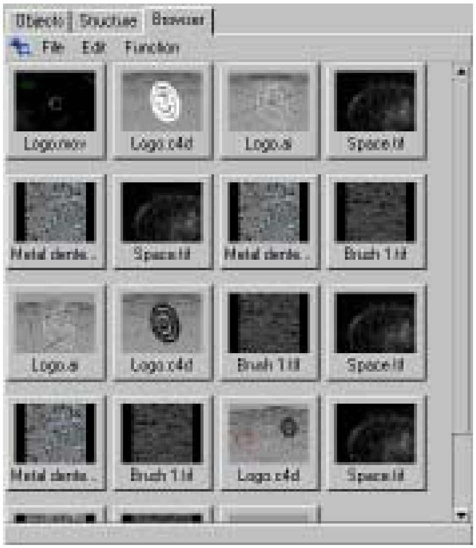
Using The Browser

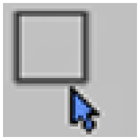
The browser can be a very helpful tool for organizing files for quick retrieval. You can store collections of scenes, movies, pictures, models, sounds, coffee files and almost anything else you might need in CINEMA 4D.

The Browser works by importing directories or single files. The best way to make use of the browser is to create a directory with specific items, such as the models for a particular scene; each saved out into its own file. Then import the entire directory and save a catalog into the directory.

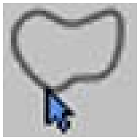
Then when you want to access that collection of models, just open the catalog file in the Browser. Add the model to the scene by dragging it from the Browser to the scene and drop it in. This works for anything you can store in the browser. Make CDs with models, textures or anything else and burn their catalog files onto the CD as well. Then when you want to check the contents of the CD you can quickly load the Catalog and browse through it rapidly.

We have created catalogs for each of the tutorial sections. For instance in the Tutorials=>Modeling folder, you can open the modeling.cat file to see all the projects for the modeling chapter.

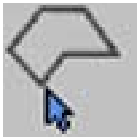




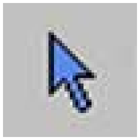
Rectangular Selection



Freehand Selection



Polygon Selection



Live Selection

Selection Tools

While modeling, you will need to select groups of points or polygons. The following is a brief tutorial on how to use the point and polygon selection tools:

Rectangular Selection allows you to draw a box or marquis around the points or polygons you wish to select. Click and hold with this tool to set one corner, then drag and let go of the mouse to set the opposite corner.

Freehand Selection allows you to draw an outline on the screen to select points or polygons. This outline can be any shape you wish to draw. When you let go, the shape will be closed off, connecting the first and last points in a straight line.

Polygon Selection allows you to click out straight lines to define a polygonal shape to select points or polygons. The selection will end when you click near (or onto) the first point you created.

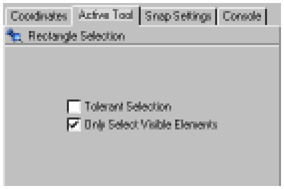
Live selection allows you to paint your selection. By pressing and holding the mouse button you drag the mouse over the points or polygons you wish to select. Live selection works only in tolerant selection mode. Any polygon touched by the live selection tool will be selected. Live selection has a radius control. This determines the size of the paintbrush for live selection. The larger the radius, the more points or polygons you can select at once, but it is harder to get fine control. The opposite is true of a small radius, you have more control but it takes longer to select polygons and you might miss some.

Selection Controls

All selection tools have three things in common:

Holding down SHIFT while using the tool will add the points or polygons you select to your selection set.

Holding down CONTROL while using the tool will remove the points or polygons you select from your selection set.



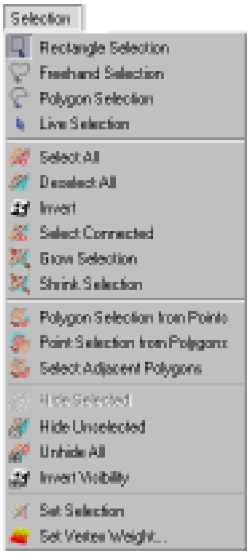
Active Tool Dialog

Active Tool Dialog

Only Select Visible Elements: When checked, it restricts your selection to the frontmost polygons or points. When unchecked, it selects through an object so all polygons or points in the path of the selection tool are selected. Tip: In point mode, sometimes a point is behind a polygon, but is still visible because points are drawn with a radius. These points will not be selectable if Only Select Visible Elements is on.

Tolerant Selection: Allows you to select points or polygons not fully within the borders of the selection tool. So, with tolerant selection turned on, a polygon that is halfway within the border will be selected, with it off, it will be left unselected.

Preserve Groups Checkbox: Many tools have a checkbox called preserve groups and an angle limit. When the checkbox is turned on, CINEMA 4D will treat any polygons that are in a connected selection, and within the breaking angle, as one large polygon. For example, this would be useful to extrude one side of a subdivided cube as if it were one face. Turn the checkbox off and each polygon is treated as an independent unit.



Selection Menu

Selection Modifiers

Selection Modifiers help you to modify your current selection of points or polygons. With a series of points or polygons selected, you can choose any one of these modifiers from the Editor Menu: Selection.

Select All: Selects all of the active type. For example, in Polygon mode it selects all polygons.

Deselect All: Deselects everything that is currently selected.

Invert: Selects everything that is not currently selected.

Select Connected: This will select anything that is connected to the current selection. Connected means that the polygons share points. This is true for both polygons and points. For an example of how this works, create a cylinder and make it editable. Select one point on the top or one polygon. Choose select connected and only the top will be selected. This is because the edge of the top does not share the edge with the body. Select all the polygons and choose Optimize. Now repeat the first steps and you'll see that all the polygons are now selected.

Grow Selection: This takes the current selection and selects everything that is one ring out, just like the tool in Photoshop, only it works on Polygons and Points.

Shrink Selection: This works the opposite of Grow Selection. It deselects the outermost ring of points or polygons.

Polygon Selection from Points: This takes a group of points that are selected and selects all the polygons that are completely defined by the points. Note: this will also switch from Point Mode to Polygon Mode automatically.

Point Selection from Polygons: This takes a group of polygons that are selected and selects all the points that define the polygons. Note: This will automatically switch to Point Mode from Polygon Mode.

Select Adjacent Polygons: This works very similarly to Polygon Selection from Points. The difference is that this will take a group of selected points and select all the polygons that contain at least 1 of the points. Note: this will also switch from Point Mode to Polygon Mode automatically.

Hide Selected: This will make the selected points or polygons disappear from the Editor. This is useful when you want to be sure not to select certain polygons, or when you need to see through a portion of your model.

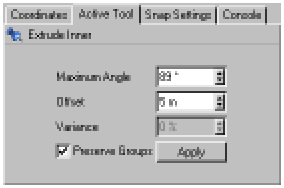
Hide Unselected: This will make unselected polygons or points disappear from the Editor. This is useful when you want to work on a specific portion of a model without the distraction of other pieces.

Unhide All: This will make everything that you have hidden visible again. This is the fast way to retrieve hidden points and polygons.

Invert Visibility: This will make everything that is currently visible, invisible and everything that is currently invisible, visible.

Set Selection: This saves the currently selected set. This is so you can retrieve a selection set at a later time. Note: If you are working with a selection that has already been saved and is currently active in the Object Manager, this will update that selection set to reflect the current selection.

Set Vertex Weight: Defines the weighting of the current selection for later use with deformers and bones. This works relatively the same as Set Selection.



Preserve Groups Checkbox

Structure Tools

A Note About the Preserve Groups Checkbox: Many of the tools covered in this chapter have a checkbox called preserve groups and an angle limit. When the checkbox is turned on, CINEMA 4D will treat any polygons that are in a connected selection, and within the breaking angle, as one large polygon. For example, this would be useful to extrude one side of a subdivided cube as if it were one face. Turn the checkbox off and each polygon is treated as an independent unit.

Make Editable: Make editable converts a Parametric surface (Primitives, NURBS) or Parametric spline (Spline Primitives) into a surface that can be edited by moving points. For example, if you create a cube primitive, all you can do is scale it, or fillet the edges. If you wanted to reshape it into a wedge, you would need to make it editable and move the points and polygons that define it.

Add Points: This tool behaves slightly differently depending on whether or not a spline is selected or a polygonal object is selected. Control clicking with a Polygon object selected will create a point free floating in space, not attached to any polygons in the object. Control clicking with a spline object selected will add a point in space that will be connected to the end of the spline. With a Polygon object selected a clicking on the surface of a polygon will add a point to that polygon. With a Spline object selected, clicking anywhere on the screen will add a point to the spline nearest the point that was clicked. Shift clicking with a polygon object selected will allow you to create a point along the edges of the object. The point will appear on the closest edge of the object that is clicked on.

Bevel:

This tool performs a simultaneous extrude and normal scale.

To use this tool, make a polygon selection. Clicking and dragging will perform the operation. Dragging to the left performs the operation along the normal of the polygon selection; dragging right performs the operation in the opposite direction.

Bridge:

In Polygon Mode: This tool will connect two selections of polygons with a tunnel and delete the original selections. This is really useful for punching holes from one side of an object to another.

In Point Mode: This tool can be used to quickly create polygons, with a lot of control. You click on the first point and drag to the second. Then click on the third point and drag to the fourth point you want opposite the first pair. Then create the next polygon by dragging from the fifth point to the sixth point opposite the third and fourth. This is very useful for stitching edges between polygon groups together.

Create Polygon: This tool will allow you to create polygons from points. It can be used to create a single polygon by clicking around in a circle on three or four points. However, you can also make a larger circle of more than three or four points and CINEMA 4D will determine the best polygon configuration to close the shape.

Extrude: This tool pulls a selection of faces off the surface of the model and connects them back to the surface. The extruded faces move along their normal, or in other words stay parallel to their original position.

To use this tool, make a polygon selection. Clicking and dragging will perform the operation. Dragging to the left performs the operation along the normal of the polygon selection; dragging right performs the operation in the opposite direction.

Extrude Inner: This tool pulls the edges of the selection in or out. A good way to visualize it is like a drawing of a picture frame. You have one rectangle inside another connected at the corners by diagonal lines.

To use the tool, create a polygon selection. Clicking and dragging right will extrude the polygon outside of its original boundaries and dragging left will extrude it inwards within the original boundaries.

Knife: This tool breaks polygons based on a line drawn in the editor. You knife a polygon by clicking once in the editor to set the start point, dragging and clicking again to set the end point. The knife will break the polygons where the knifing line crosses the edges of the polygon. The Constrain Angle setting allows you to force the knife tool to cut along a multiple of this angle. If you set it to 90 you can only knife up and down or left and right for example. The Restrict to Selection checkbox causes the knife to only break selected faces. With it off the knife will cut all the way through the object.

Normal Move: This tool moves the selected polygons along their normals. In other words the polygons are moved in or out, but kept parallel to their original position. Clicking and dragging to the right will move the polygon in the direction the normal faces, dragging left will move it the other way.

Normal Scale: This tool scales each polygon with the normal as the axis of the scaling operation. Select the polygons, click and drag right to make them scale up and left to scale down.

Normal Rotate: This tool rotates the selected polygons around their normal. Clicking and dragging to the left will rotate the polygon to the right, or clockwise. Clicking and dragging to the right will rotate the polygon to the left, or counter clockwise.

Magnet: This tool effects the points of a polygon with a field of influence. The tool has various radius and function settings to control the nature of this field. To use the magnet tool, select points or polygons and click and drag to pull them around. If nothing is selected, the magnet will affect any points or polygons within its radius.

Mirror: This tool will create a mirrored copy of the selected polygons. The polygons can be mirrored across many planes, including relative to the screen. To use the tool, select polygons. Then, click and drag to set the plane of the mirror.

Smooth Shift: This tool performs an extrusion on the polygon selection. However, it also evaluates the angle between polygons. If the angle is greater than the breaking angle that is set, an intermediate polygon will be created between the two polygons.

Align Normals: This tool attempts to get all the normals of the selected polygons facing the same direction. To use it, simply select the polygons you want to align and choose Align Normals. All the polygons should point the same direction. You may need to run reverse normals to get them to face out of your object.

Reverse Normals: This tool reverses the normals of the selected polygons so that they face the opposite direction from where they are now. To use it, simply select the polygons you want to reverse and choose Reverse Normals.

Optimize: Optimize removes unused and duplicate points and polygons. It will also seal up holes between connected caps and edges. The tolerance parameter determines how close the points or polygons have to be to be considered duplicate. Small numbers mean they must be incredibly close together, large numbers mean they can be farther apart. To use the tool, simply select the points or polygons you wish to optimize and choose optimize. Set your tolerance and hit ok.

Subdivide: This tool breaks polygons into multiple polygons. The number of subdivisions determines how many pieces each polygon will be broken into. The polygon will be broken into this many pieces in each direction. The hypersubdivide checkbox will break the polygons and smooth them, similarly to the Hyber NURBS object. The breaking angle determines whether to subdivide or hypersubdivide when the checkbox is on. To use this tool, select the polygons and choose Subdivide. If no polygons are selected the entire object will be subdivided.

Triangulate: This tool will break all selected four-point polygons into a pair of triangles. Select all the polygons you wish to triangulate and choose triangulate.

Untriangulate: This tool will combine triangle into quadrangles. If the evaluate angle checkbox is on, it will only make quadrangles from triangles that lie in the same plane (are flat). To use this tool, select the triangles you want to untriangulate and run the tool.

Hyper NURBS

A Hyper NURBS object is a type of NURBS object that takes polygonal data and "smooths" the underlying polygon model (or "cage"). It does this similar to the way a B-spline interpolates between the control points to get intermediate points. To use Hyper NURBS place a polygonal object as a child of the Hyper NURBS object. The Hyper NURBS will affect the first object under it and all of that objects' children, so to affect multiple objects, you can group them and place the group inside the Hyper NURBS. Hyper NURBS is a common tool used in character and organic modeling as well as complex surfaces.

CINEMA's Hyper NURBS are highly useful in animation because the cage points can be animated, and the resulting Hyper NURBS mesh changes to reflect the changes to the underlying cage. So one could create a low-polygon character cage, attach bones to the cage for simple control, and the Hyper NURBS will output a high-resolution smoothed model when rendered.

A Hyper NURBS mesh will typically be smaller and softer than the cage. The more extreme control point locations, the further the mesh will be pulled towards the point. Pyramid points become bulges. Cubes become spheres. Sharp corners get rounded off.

Hyper NURBS and Tags

Tags should be applied to the object or object groups under the Hyper NURBS that you want to affect (Smoothing, Rendering, IK, etc.) Texture tags can be applied to Hyper NURBS that are subsequently applied down to children.

Hyper NURBS and Make Editable

Hyper NURBS made editable becomes a group of polygonal objects maintaining the original hierarchy. The Hyper NURBS algorithm is applied to each individual object under the first child and the Hyper NURBS object itself becomes a null object. Make Editable uses the Rendering Hyper NURBS subdivision parameter to create the geometry. See Hyper NURBS and Rendering for polygon count info.

Hyper NURBS and Rendering

All renders in the editor and gouraud mode previews of the Hyper NURBS use the Editor Hyper NURBS subdivision setting. Renders to the Picture Viewer use the rendering setting. Keep in mind that Hyper NURBS are converted to polygons before each frame of rendering, and the smooth geometry will use more memory than the mesh. As a rule, the method for calculating the final number of polygons (all quadrangles) generated by a Hyper NURBS object is as follows:

H = n^2(4q+3t)

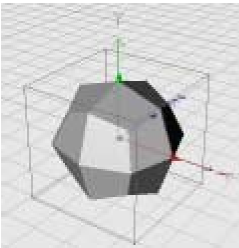
Where:

H is the final number of quadrangles

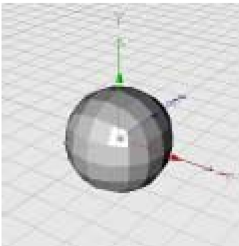
n is the rendering or editor subdivision setting

q is the number of quadrangles in the cage

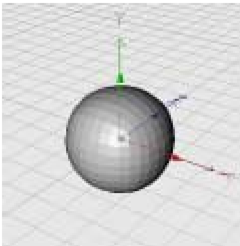
t is the number of triangles in the cage



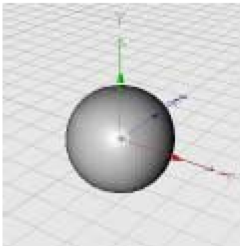
Hyper NURBS Subdivide 1



Hyper NURBS Subdivide 2



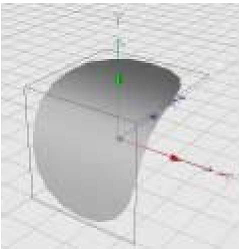
Hyper NURBS Subdivide 4



Hyper NURBS Subdivide 8

Hyper NURBS and Generators

Hyper NURBS are generators like other NURBS object. The generator checkbox in the Object Manager, when turned off, causes the original cage object(s) to be displayed and rendered. If "Use Generators" is turned off in your scene, all Hyper NURBS objects will revert to their cages in the editor, but will still be rendered.

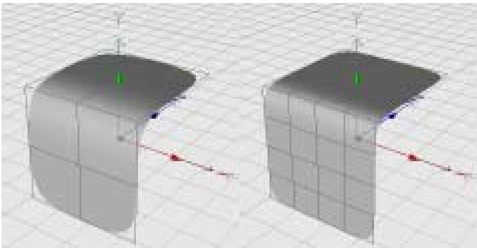


Original Shape

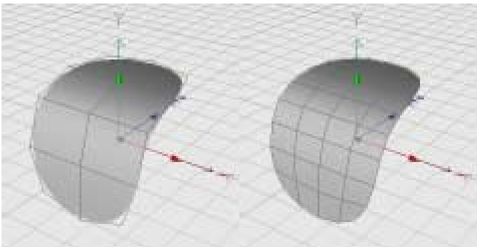
Using Structure Tools with Hyper NURBS

Here is a brief outline of how the Structure Tools affect a Hyper NURBS cage.

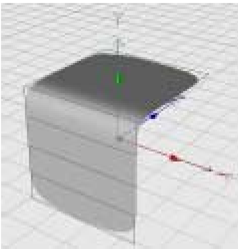
Subdivide: Increases the numbers of points and faces that you can manipulate. The more subdivided the cage, the sharper the angles (i.e. closer to the cage) the mesh becomes. This is similar to the effect of increasing the number of control points along a B-Spline. When using Hyper NURBS Subdivide, the resulting Hyper NURBS mesh will remain practically unchanged. This is useful to get more control points, without losing the previous Hyper NURBS shape. Hyper NURBS Subdividing specific selections of polygons however, will change the final mesh, as CINEMA 4D must divide the adjacent polygons outside of the subdivision to account for the newly added points along the edges.



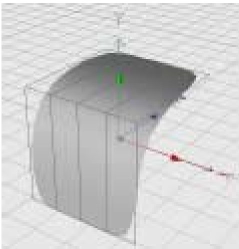
Regular Subdivision hardens corner



Hyper Subdivide provides more control



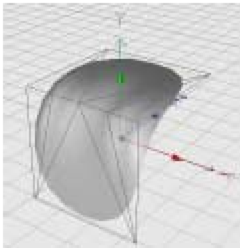
Knife X



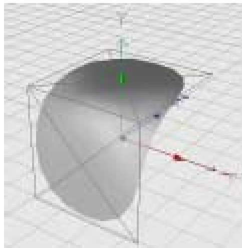
Knife Z

Knife: Using the knife tool, you can create more control points across a plane or group of planes. Cutting a selected polygon with the Knife tool sharpens the angle of the final mesh along that line. Using the Knife tool, you can finely tune placement of control points to maintain a low-polygon mesh. Be aware that knifing of a selected group of polygons will often have a similar effect that Hyper NURBS Subdivide has on selections, that is splitting polygons to counteract the added control points. Knife is also a convenient way to add points across multiple edges.

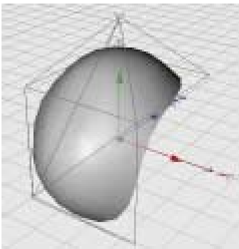
Add Point: Add point to edge (the SHIFT modified version) will create an additional control point along an edge, spurring off edges to the adjacent polygon corners. This has the effect of hardening the edge while creating organic triangular bulges because of the spurred edges. Add point to polygon (non-modified) will strengthen the weighting of a particular polygon, hardening its effect on the Hyper NURBS in that area. One can move points added with these tools as a way of adding a pyramid shape to a polygon, creating a soft bulge in the Hyper NURBS.



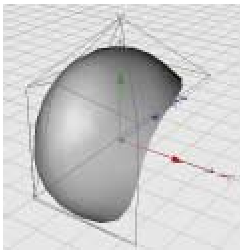
Add Point to Edge



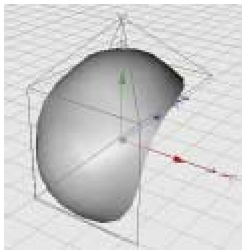
Add Point to Polygon



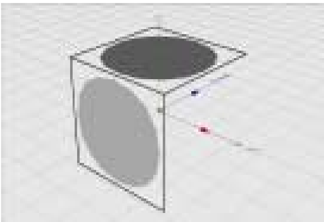
Add Point to Polygon and Edge



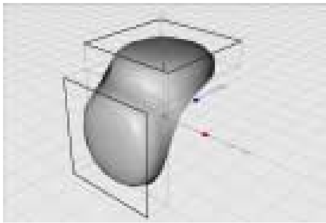
Add Point to Poly and Edge with pull



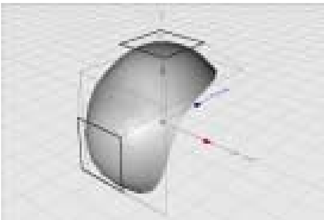
Add Point to Polygon with pull



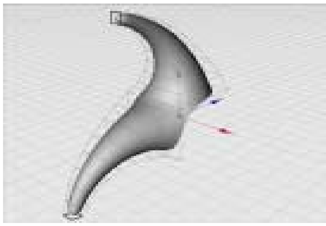
Disconnect



Extrude



Bevel



Matrix Extrude

Disconnect: Where polygons do not share points there is no interpolation. So polygon groups that are disconnected from each other will each end as if they were the edge of the cage.

Extrude: Extrude creates a "bubble" from the surface that is extruded, similar to what happens to one half of a cube when placed inside a hyper NURBS. Extrude will create steeper sides to the bubble/bulge than other methods.

Bevel: Beveling a polygon creates a ridged edge. The bulge created will not be as steep as an extrude, but the top of it will be more defined. Sharp Bevels (i.e. Extrusion greater than Inner Offset) will be much sharper than point pyramids (described in Add Point to Polygon), because the 3 or 4 points at the top of the bevel will weight the mesh further out than a single point.

Matrix Extrude: Matrix extrude is a multiple extrusion which forms piping in a Hyper NURBS mesh. Matrix Extrude is a great way to do horns, claws, tentacles, and tendrils of all sorts.

Hyper NURBS and Weld/Bridge/Create Poly

One of the main advantages of Hyper NURBS over other forms of NURBS modeling is the ease of stitching separately built or oriented parts together. For example, you can build an arm and a body and then connect the shoulder joint together. Some methods of doing this:

Weld: Using the Arm/Shoulder example, you can build up both models so that the points are near co-existent, basically duplicating the location of the points. You can then select each pair and use weld to connect them.

Bridge/Create Poly: Use this after you have connected two separate objects that are a small distance apart. Using the bridge tool you can create a new set of faces connecting two edges of the objects.

Make Editable

Takes non-polygonal objects (parametric objects, instances, metaballs, symmetries, booleans, arrays, NURBS, spline primitives, and emitters) and in most cases makes a polygonal version of it. Here is how it affects each of these individually:

Instance: Becomes an actual copy of the instanced object.

Symmetry: Symmetry object becomes a null, and the children become editable, creating actual geometry for the symmetrical objects. In the case of parametrics in a symmetry object, make editable creates duplicate parametric objects.

Metaball: Collapses the whole chain into one polygonal object. It will use the render subdivision (not the editor setting subdivision setting) to define the shape of the object.

Boolean: Boolean becomes a null, and each child becomes editable, after performing the boolean.

Array: Array object becomes a null, and the child is duplicated and named uniquely. In the case of parametrics in a array object, make editable creates duplicate parametric objects.

NURBS: Extraneous objects are left alone. The whole NURBS minus caps is collapsed into polygonal data. Any caps or roundings are made polygonal and made a child of the NURBS.

Hyper NURBS: Hyper NURBS object becomes a null, and all children are hyper subdivided by the rendering subdivision level.

Parametric Objects: Made into polygonal objects.

Figure: Made into a hierarchy of polygonal objects.

Emitter: Emitter becomes a parent null object and where each particle is currently, a copy of the emitted object is placed. In the case of parametrics in an emmiter object, make editable creates duplicate parametric objects.

Parametric Splines: Becomes an editable spline.

Text Splines: Creates one spline object in different segments. If "Create Separate Letters" is checked, it creates a text group with individual spline objects for each letter.

Current State to Object

It runs Make Editable down a hierarchy of objects until it has converted every aspect and child into a polygonal object. For example an array of a boolean would create an exact hierarchy of polygonal objects. Hierarchies with a deformation are converted into the deformed polygonal geometry of its current state.

Deformation Objects

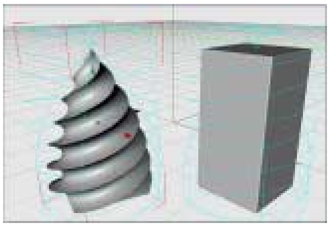
Deformation objects offer a tremendous amount of power and flexibility. Applying a deformation to an object changes the geometric shape of the object but does not change its basic topology. To apply a deformation to an object in CINEMA 4D, just drag and drop it onto the object you want to deform. When the deformation becomes a child of the object, the deformation is applied. You can then change the parameters of the deformation and see the results on the object.

Deformations can be applied as Within Box, Limited or Unlimited:

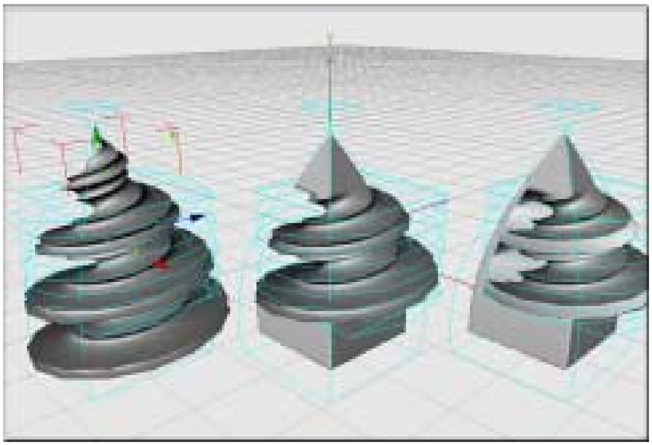
Within Box: The deformation only occurs to geometry that is contained within the deformation cage. This can result in tears in geometry if the deformation does not completely encompass the object.

Limited: Limits the deformation along the axes of influence. For instance, a twist deformation occurs along the Y axis by default. When moving a twist deformation along the Y axis, if the deformation moves above or below the object the deformation ceases to influence it.

Unlimited: Applies the deformation to the object no matter where it is located in the scene, whether the geometry is inside or outside the deformation cage.



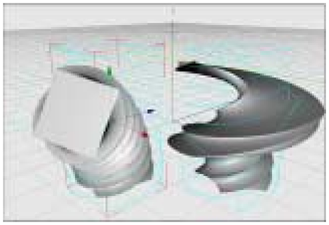
Modeling a Drill Bit with Deformations



Unlimited Deformation Limited Deformation Within Box Deformation

Deformations for Modeling

Deformations can be a quick and easy modeling solution. For instance, you can apply a twist deformation to a cube to create a drill bit. Or you could apply a bulge deformation to a cylinder to create a vase.



Layering Deformation Results

Deformations for Animation

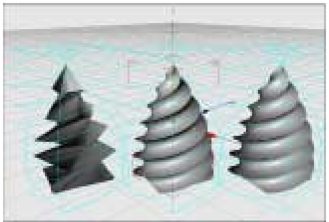
Using a Parameter animation track deformations can be used to animate objects. For the second tutorial, the Indoor Scene, you will use several deformations on a television remote model to bring it to life.

Multiple Deformations

Yes, you can apply multiple deformations to the same object. The order in which deformations are applied to an object does make a difference. You can apply a twist and a bend deformation for one result, or a bend then a twist deformation for another.

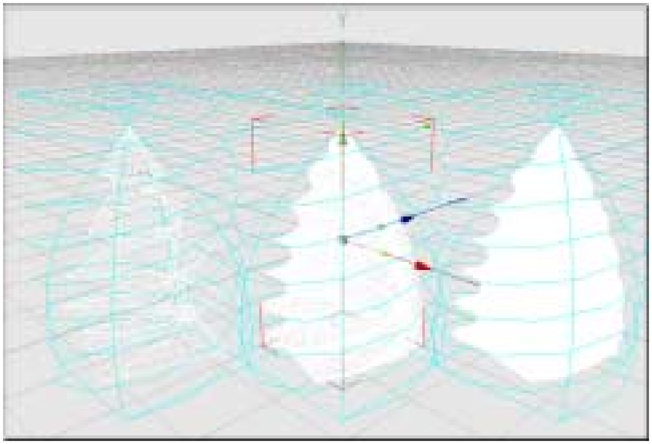
Mesh Density and Deformations

Applying a deformation to an object with too little subdivision will result in "tearing" geometry. The deformation pulls the geometry past its tolerance point resulting in jagged and unattractive edges. How much to increase the density of an object depends upon 1. The type and strength of deformation attached, 2. The approximate motion of the object or camera and 3. The resolution of your final output.



Mesh Density Differences (Shaded)

Mesh Density Differences (Wireframe)



Expressions

Expressions allow you to program custom behavior for objects in your scene. Writing an expression requires some basic knowledge of programming. CINEMA 4D's expressions are written in C.O.F.F.E.E., MAXON's own cross-platform programming language.

Rather than go into an in-depth explaination of how to program expressions, we have included 32 basic expressions (written by our friends at BhodiNUT) with detailed descriptions included in the code. These scenes can be found in the Tutorials folder..

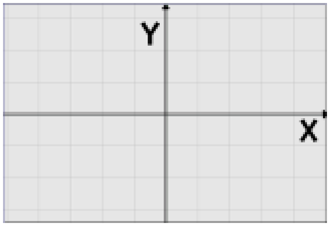
You should (if you feel you're ready for this) open the scenes, and take a look at all the fun hidden beneath the Expressions Coffee Cup icon in the Object Manager. All of them have modifiable parameters, so you'll certainly be able to find a use for many of them.

Also, visit PluginCafe - MAXON's one-stop C.O.F.F.E.E. shop - on a regular basis to download other Expressions as well as plugins, shaders, custom objects and import/export filters. A full SDK and C.O.F.F.E.E. help forum is also available at the site - http://www.plugincafe.com

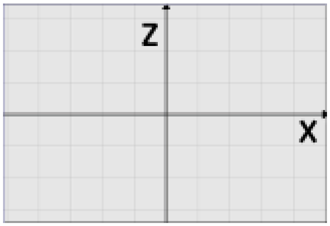
Modeling

Contents:

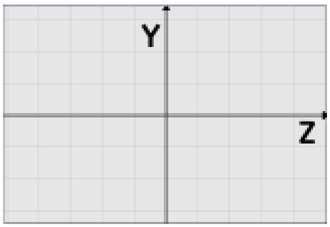
- Working in a 3D Environment
- Importing Models
- Using Hierarchies
- Economical Modeling
- The Building Blocks of 3D Modeling
- Tools you Will use While Modeling
- Modeling with Deformations
- Hyper NURBS
- Displacement Modeling
- Normals



Front View



Top View

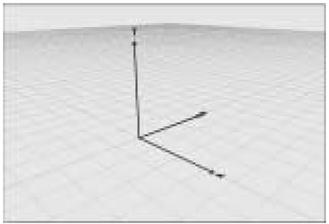


Side View

Working in a 3D Environment

Modeling is where the 3D process begins. In order to successfully build attractive and accurate models, you have to understand how to navigate within the 3D space that is represented on your computer screen.

The Grid

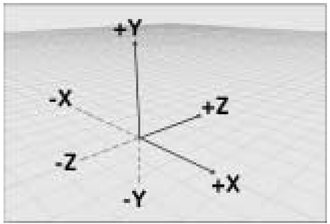


If you were building a physical model you would place it on a table or work surface. In your CINEMA 4D workspace you have a theoretical surface called "the Grid." The center of the Grid in CINEMA 4D is where the X, Y and Z axes intersect.

- When viewed in the Perspective view, the Grid lies on the X and Z axes. The centermost position for X and Z are at the center of the grid.
- When viewed in the XY or Front view, the Grid lies on the X and Y axes. The centermost position for X and Y are at the center of the grid.
- When viewed in the XZ or Top view, the Grid lies on the X and Z axes. The centermost position for X and Z are at the center of the grid.
- When viewed in the YZ or Side view, the Grid lies on the Y and Z axes. The centermost position for Y and Z are at the center of the grid.
- Negative and Positive Positions:
  - A positive position on the X axis is to the right of center, a negative to the left.
  - A positive position on the Y axis is above center, a negative below.
  - A positive position on the Z axis is to the rear of center, a negative to the front.

CINEMA 4D allows you to change the unit of measurement represented on your grid. For all the tutorials in this manual we will use the default: meters. However, you can change that to anything from nanometers all the way up to miles. You would choose to work within a specific unit of measurement when creating accurately sized or scaled models for engineering, architecture, the sciences or when working with motion capture data. In addition, for exact results when modeling you can turn on the snapping function, which locks points and vertices to the user defined subdivisions of lines and intersections on the grid or objects.

Coordinate System



In the physical world we think of things in terms of width, height and depth. In CINEMA 4D these are defined by a 3D graph using X (width), Y (height) and Z (depth) axes. Being able to visualize using the X, Y and Z axes is the key to working in 3D. Everything from object positions, animation paths and more can be expressed in terms of an X, Y and Z coordinate. In CINEMA 4D (and many other 3D software packages) the X axis represents left (-) and right (+) position, the Y axis represents up (+) and down (-) position, and the Z axis represents forwards (-) and backwards (+) position.

Axes

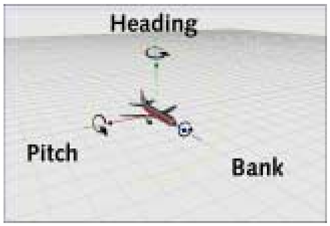
In CINEMA 4D you have the option of manipulating objects using World Coordinates or its own Object Coordinates. The World Coordinates are fixed and cannot be changed. However, each object's own axis can be moved to any location within the object or anywhere in your scene, and rotated to any degree.

It is important to define the axis of an object before animating it. If you make changes to an object's axis after creating its animation, there is a good chance it will also change all the work you have done.

Locking Axes

While you are working in your scene, you can lock any axis by clicking on its icon in the tool palette, or by the keyboard shortcut for each (X, Y and Z). This restricts the movement, rotation or scaling of an object to only the active axis or axes.

Rotation



Modifying an Object's Axis Position is plotted with X, Y and Z and Rotation is plotted using H, P and B. Think of H as Heading, P as Pitch, and B as Bank.

- Heading or H represents a rotational value about the Y axis.
- Pitch or P represents a rotational value about the X axis.
- Bank or B represents a rotational value about the Z axis.

It may help to imagine an airplane when thinking and working in terms of the H, P and B rotational coordinates. Positive rotational values for X and Y correspond to counter-clockwise rotation about a given axis, positive rotation about Z corresponds to clockwise rotation. A value of 90° rotation is the same as a value of –270° rotation. The only difference is which way the object traveled to get there. This really only matters when it comes time to animate your models.

Importing Models

CINEMA 4D allows you to bring in models of many different file formats. In some cases you can even bring in whole scenes from other programs including textures, lighting and animation tracks. This gives you a variety of resources when looking for models.

Most formats supported by CINEMA 4D will import into or open in the program with few adjustments necessary. Some file formats or formats from specific software packages can take some extra effort. When challenges arise with a specific format, we try to devise a technique for importing and put up a tutorial on our web site as soon as possible. These tutorials will take you step-by-step through the process.

Free Models

The Internet is a great resource for free models. Many artists are willing to share the work they have already done. Check out our web site for a list of current resources.

Buying Models

There are numerous companies that sell 3D models. The quality ranges from professional to low end depending on how much you want to spend and what kind of quality you are looking for. Again, check out our web site for a list of current resources.

Using Hierarchies

We've already talked about establishing naming techniques for each part of your model. But how do you handle all of the pieces and parts of a model? A single model can contain hundreds of separate parts. Obviously, it's best to keep them all together. There are two ways to do that: by Grouping or by Linking.

Grouping is used when you want to organize elements into one related set. You can move and manipulate the objects within a group individually or as a group. While each object has its own axis, the group will also have an axis that is initially defined by the position and orientation of the objects within it.

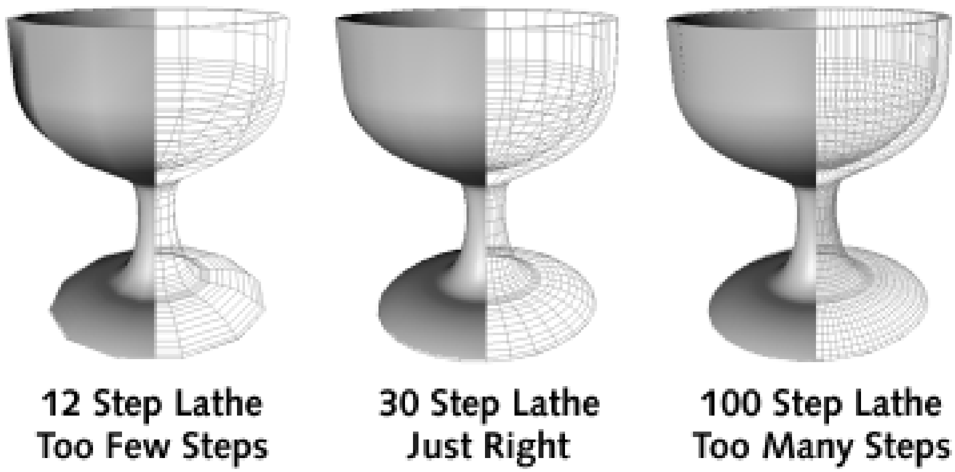
Linking is used when you want to create and define related motion between objects. Linking puts objects into a family tree (hierarchy) and defines the way they move in relation to each other. Just like, "the toe bone connected to the foot bone, the foot bone connected to the ankle bone…" When using the Inverse Kinematics (IK) tool to move objects that are linked together, they will move as if chained together. You can also add constraints to the movement between these objects to create a certain type of joint or connection.

Economical Modeling

When it comes to building a scene in 3D, it is important to remember that Complexity = Time. The less information your computer has to deal with the better. The rule of thumb is, always use the least amount of information to create the highest degree of detail. The best 3D modelers are judged by their ability to create complex-looking models with very low polygon counts. The best animators are judged by their ability to create complex scenes economically.

Low Polygon Modeling

Each object is different. Some will require low polygon counts, and others extremely high. You will be able to tell the difference by how the model looks in shaded mode or in test renders whether it needs a higher degree of detail.

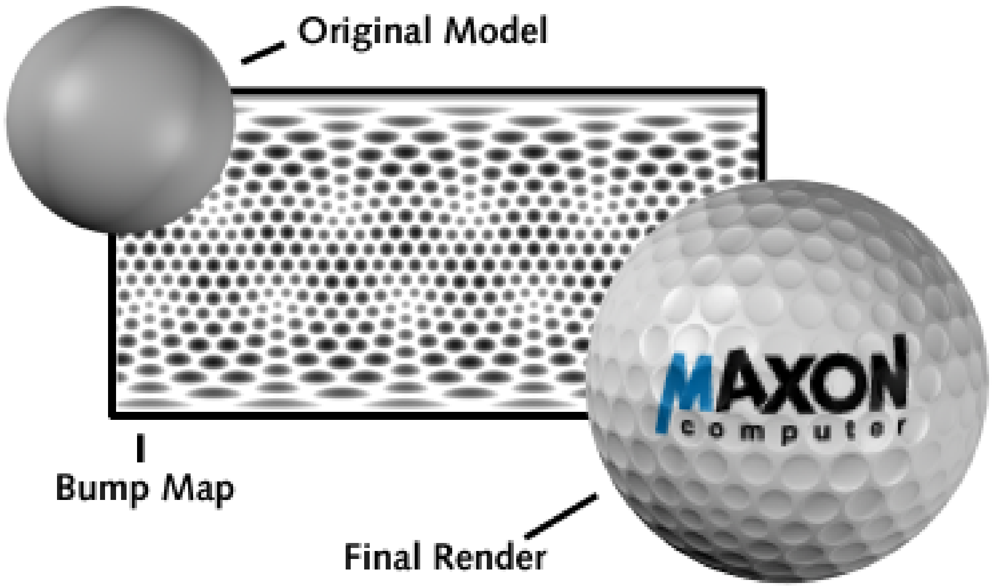


Object Instancing

Many scenes can contain elements that are identical but are in different locations. For example trees on a hill, petals of a flower, blades of grass, etc. Rather than bog down your scene with multiple copies of the object, you can create an instance. Whatever happens to the master copy happens to the instance.

Creating Details with Materials or Textures

Not every detail has to be modeled. Consider using materials and texture maps to "finish" your models. A great example is a golf ball. Imagine the tedious job of having to cut each and every dimple out of your golf ball. And, to achieve the degree of detail you would need, the resolution of the ball would have to be extremely high making it overly complex. For this, you would use a bump map to create the dimples.



Background Elements

In many cases, you can use a photograph to finish out the background of your scene. If you need an entire mountain range with trees and clouds in the background, and the camera is not moving enough to give away the illusion, you can use an actual photograph in the background.

In the 40s and 50s, most movies were shot in sound studios using minimal set structures with huge panoramic backdrops. Nowadays, the same method is done only the background is replaced with a digital backdrop or matte painting.

Many studios today use a technique called Camera Mapping. The idea is to take an image and project it across a group of geometry that suits the image. Camera mapping creates the illusion of depth. When the camera moves, the background appears three-dimensional. The other advantage is the ability to put parts of the matte painting into motion or add animated elements to the background, making it look all the more realistic. Of course, this only works from a distance with limited camera movement.

Modeling rules to live by:

- Build only what you need and what will be seen. If you are not going to see it in the finished animation – don't model it.
- If you are not going to ever get close to a model or it doesn't need it, don't make it overly complex or detailed.
- Don't model more objects than necessary. Use Instancing if you can.
- Don't forget to use backdrops or camera mapping for backgrounds.

The Building Blocks of 3D Modeling

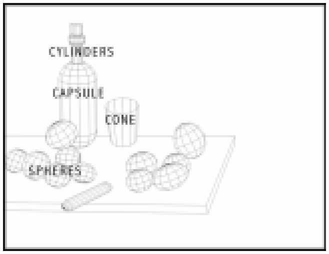
Building a complex model can be a daunting task to approach. However, when broken down into its component parts it starts to get easier. Even the most complex object is made up from simpler objects. There are patterns in everything. Look around you and examine some of the objects near you. Can you see how they might be made up of primitive shapes?

You can approach building objects using many methods. As with any form of visual art, achieving the results you want begins with interpretation. The modeling tools in CINEMA 4D are outlined below.

Primitives

Primitives are the basic building shapes for many models. Using Primitives to create models is the simplest form of additive modeling. Of course, you could build a cube easily; it's only an extruded square. However, the equations that describe primitives have been optimized internally and so are more efficient, utilizing less RAM and disk space. In addition, all primitives in CINEMA 4D are parametric and therefore editable from a number of control points. This makes it very easy to create the shapes you need for modeling.

Still Life with Onions and Bottle by Paul Cézanne



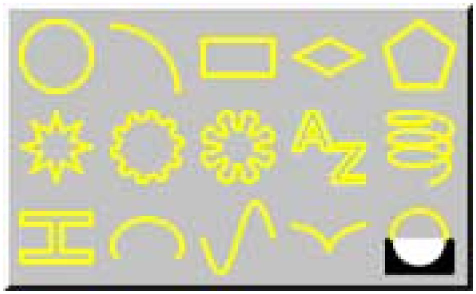
Primitives found in Still Life

Primitives comped over Still Life

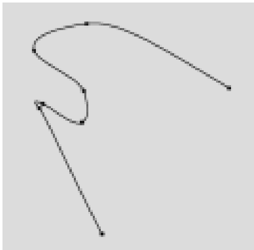
Splines

Splines are simply lines that are used to create models. Each spline is defined by a number of control points. The way these control points define the curves of a spline is different for each type of spline. For instance, the control points of a B-Spline make sure the curves of the spline are continuous and smooth from one to the next. By comparison, a Bezier Spline includes control handles for each of its points that can be manipulated to affect the curve of your spline. You can even modify handles to "pinch" the curve of a spline. Each type of spline has its own advantages in specific modeling situations.

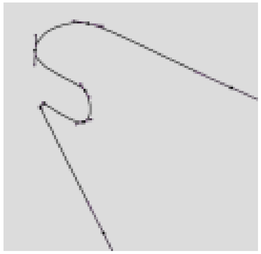
CINEMA 4D includes numerous Spline Profiles for you to use in modeling or you can easily draw your own.



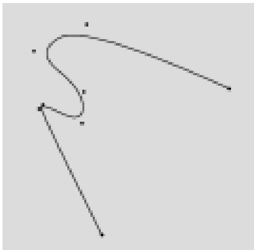
Built-in Spline Primitives



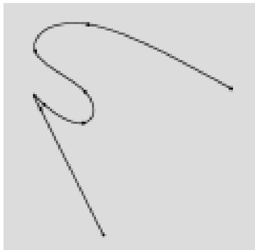
Akima Spline Interpolation



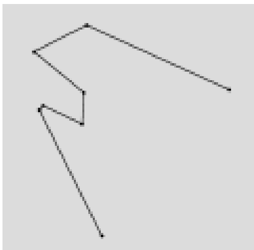
Bezier Spline Interpolation



B-Spline Interpolation



Cubic Spline Interpolation



Linear Spline Interpolation

Notice that the same spline points result in different splines depending on the mathematical interpolation model.

Vector Art

Vector Art is just another form of spline which has been imported from another program. You can take a drawing from Adobe Illustrator (.ai) format and bring it into CINEMA 4D. This artwork will appear as a spline in your scene that can be used in the creation of models. This is how logos can be transformed into a 3D model. CINEMA 4D can also create Vector Art from bit map images with the Vectorizer.

Type

3D type and logos are one of the most cliché uses for a 3D application. It also pays the bills of 3D animators more often than any other type of work. In CINEMA 4D, you simply type in the text you want to create, choose your desired font and it creates the splines for you.

Extrude

An extrusion is when a 2 dimensional shape or outline is extended along one axis to create a solid object.

Lathe

Lathing takes a spline profile and rotates it on one axis. It's just like placing wood on a lathe or clay on a potter's wheel. However, unlike wood or clay, you can choose to partially rotate a 2D outline (e.g. less than 360 degrees).

Loft

Lofting (also known as skinning) is like stretching plastic over two or more 2D profiles like the ribs of a boat or airplane wing.

Sweep

Sweeping (also known as path extrusion) takes the profile of one object and extrudes it along the path of another.

Bézier Objects

Bézier Objects are like a piece of cloth. You can move and control points to reshape the cloth.

Boolean

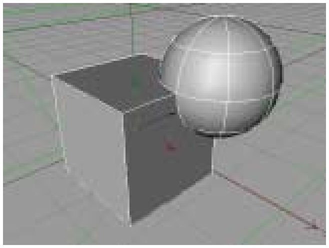
A Boolean takes the combination of two overlapping objects and, based on the type of Boolean you wish to perform, creates a new model.

Union: Takes two objects and merges them into a single form.

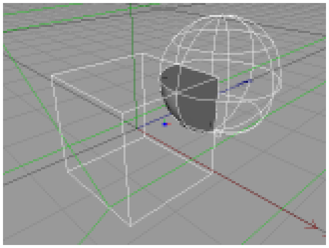
Subtraction: Lets you carve the shape of one object out of another.

Intersection: Leaves the remainder of two intersecting shapes.

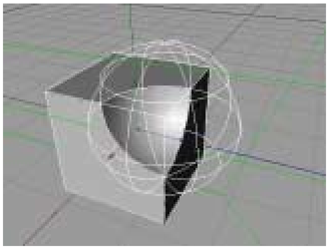
Without: Lets you carve the shape of one object out of another while leaving no replacement edge geometry.



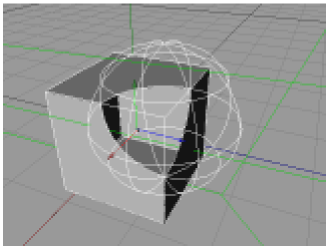
Union Boolean



Intersect Boolean



Subtraction Boolean



Without Boolean

Fractals

Fractal geometry is used to create coastlines, mountain scapes and cloud formations.

Modeling with Deformations

You can manipulate objects with many different types of deformation objects to create the type of shape you want. For instance, you can apply a twist on a cuboid to create a licorice stick. Add a taper and you have a drill bit. Add a bend and you have an antler.

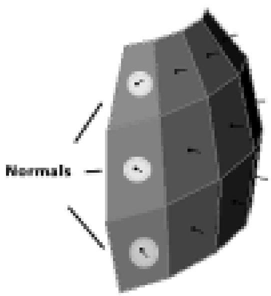
HyperNURBS™

Technically described as subdivision surfaces, HyperNURBS is the most advanced form of freeform modeling in CINEMA 4D. It gives you a tremendous amount of freedom when creating objects. HyperNURBS takes an object and subdivides it to create a smooth mesh. While using HyperNURBS, you are manipulating a much lower resolution cage, to define a highly meshed surface. HyperNURBS is the most efficient way to create organic shapes.

Displacement Modeling

Displacement mapping is like bump mapping on steroids. Here, a grayscale image is used to alter the geometry of a model when it is rendered. This requires a highly tesselated, subdivided or detailed model. The white in the image pulls the geometry away from its axis to the greatest degree you specify, the black pushes inward and the grays in-between pull away from the model in varying degrees based on the shade of gray. Gravel is a good example of where you would use a displacement map rather than modeling. You can also use animated displacement maps to make surfaces ooze, ripple or breathe.

Normals



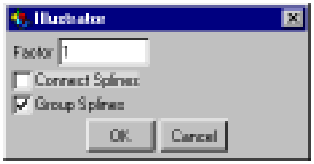
Every model is composed of polygons. Each polygon has a normal. The normal is a perpendicular vector that is used by the rendering algorithm to determine the direction or orientation of the polygon. The direction of the Normal determines the shading for the polygon - how the light hits it, affects its surface properties (materials and textures) and delivers the resulting image back to the rendering camera.

When modeling it can sometimes be necessary to Fix or Reverse the Normals of a model to achieve proper shading. This will also commonly occur when importing models from other formats or programs.

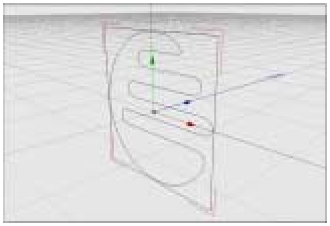
Modeling the 3D Logo Project

Flying logos are the bread and butter production jobs for 3D animators. It's not always the most glamorous work, but it certainly pays the bills. We thought it very appropriate to open the tutorial manual with a flying logo project to help get you started.

For this project, imagine your client has provided an Illustrator file of the company's logo. You will create an explosive broadcast-quality 3D representation.

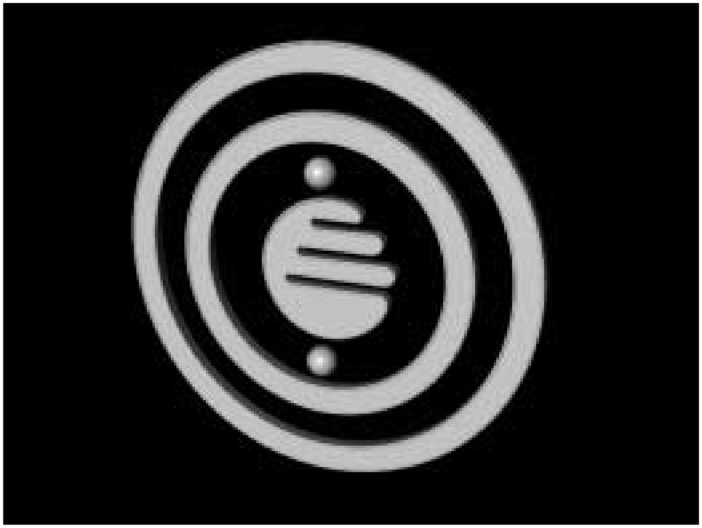


Step 1. Illustrator Import Settings



Step 1. Imported Spline

Step2. Drag Path 2 out of hierarchy



Modeling the Logo

Here you'll bring in the client's 2D Illustrator artwork and extrude it to make a three dimensional version.

Step 1: You will be importing an Illustrator file of a logo. Before you bring it into CINEMA 4D, you will need to modify your Illustrator import preferences.

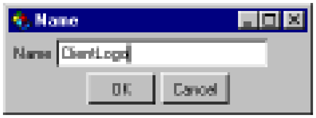
Editor: File=>Import/Export Settings=>Illustrator
Shortcut: None

Uncheck Connect Splines and make sure Group Splines is selected. This will import Illustrator lines as separate grouped splines, rather than a complex spline. Click OK.

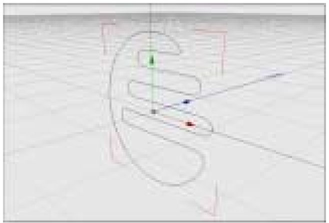
Bring in the Adobe Illustrator logo file we supplied for you on the CD in the Tutorials Folder:Modeling:Logo. Load the logo.ai file.

Editor: File=>Open
Shortcut: Ctrl+O (pc) / Cmd+O (mac)

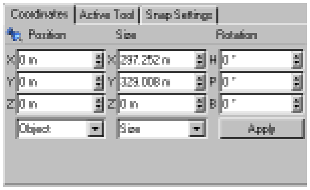
It will retain the name given to it when saving out of Illustrator.



Step 2. Rename



Step 2. ClientLogo Spline



Step 3. Coordinates Manager

Step 4. Extrude NURBS - General

Step 2: You'll need to make some minor changes to the imported logo spline. First, open the hierarchy by clicking the plus sign to the left of the logo in the Object Manager. Notice the logo is defined by two splines - the logo itself and a square spline defining the outer edge of the Illustrator file.

Remove Path 2 from the hierarchy by clicking its name in the Object Manager and dragging it out. When you see the mouse cursor change to an arrow pointing left, let go.

Next, delete the Logo spline as it is the outer square. Click its name in the Object Manager and hit backspace or delete.

Double click on the text "Path 2" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "ClientLogo."

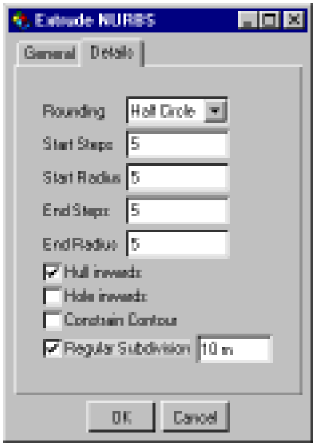
Step 3: When you import Illustrator files, CINEMA 4D positions them with the lower left corner of the page at 0,0,0. This logo was saved out of Illustrator with the artwork centered around the bottom left corner so that it would import properly. If your logo is not centered, move it to X=0, Y=0, Z=0.

CINEMA positions all splines initially based on the plane you're currently viewing. When viewing top or bottom, the spline is created on the XZ plane. When viewing left or right it is created on the ZY plane. When viewing front or back, the spline is created on the XY plane. Any other camera view creates the spline on the XY plane.

Step 4: Create an Extrude NURBS Object

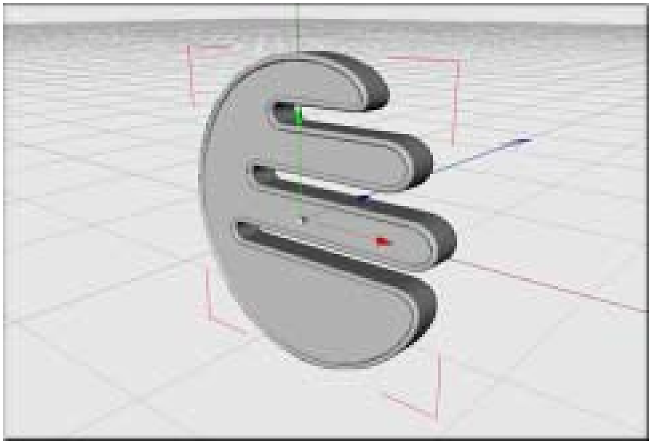
Editor: Objects=>NURBS=>Extrude NURBS
Shortcut: None

Double click on the Extrude NURBS icon in the Object Manager to change the settings. On the General page, change the Start and End settings to Cap and Rounding. On the Details page, change the Rounding setting to Half Circle. Then, set Start Steps, Start Radius, End Steps and End Radius to 5. This will make the logo look punched in with a ridged edge. Also, make sure to click the checkbox for Regular Subdivision.



Step 4. Extrude NURBS - Details

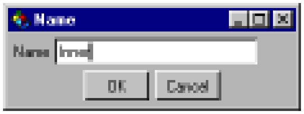
Double click on the text "Extrude NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Logo."



Step 5: Drag and drop the ClientLogo spline on top of the Logo object. The ClientLogo will become a child of the Logo object. Immediately you will see the results in the editor window.

Modeling Rings

The focus of the animation is the logo. To make it more interesting, you will create some additional elements. This first step will be to create some rings to rotate around the logo.



Step 1. Rename

Step 1: Create a Circle Spline

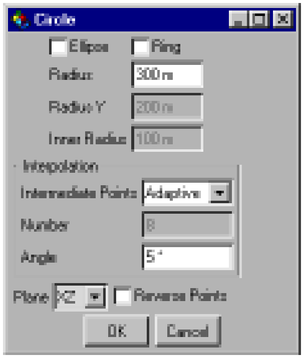
Editor: Objects=>Spline Primitive=>Circle
Shortcut: None

Double click on the text "Circle" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Inner." Click OK.

Step 2: Copy Inner

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Step 2. Copy Circle

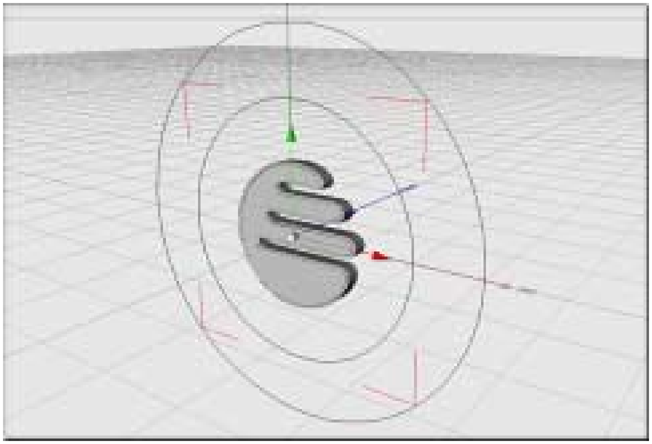


Step 3. Circle - 300 m

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Step 3: Make the second Circle a bit larger. Double click on the Circle icon in the Object Manager and change the Radius to 300m.

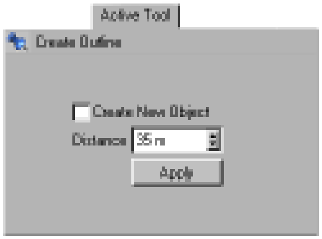
Your second ring should be slightly larger than the first.



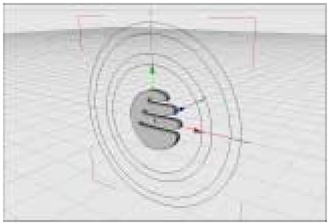
Double click on the text of the new circle in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Outer." Click OK.

Step 4: Make both the Inner and Outer spline objects editable. While each is highlighted separately, choose

Step 5: Select the Inner circle and use the Create Outline tool to make an additional segment for this spline.

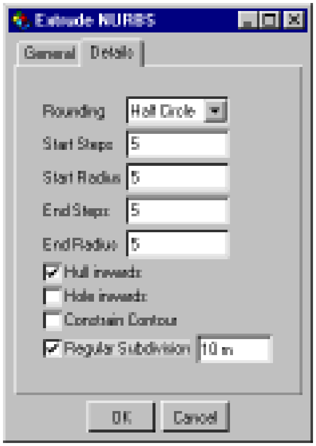


Step 5/6. Create Outline Active Tool



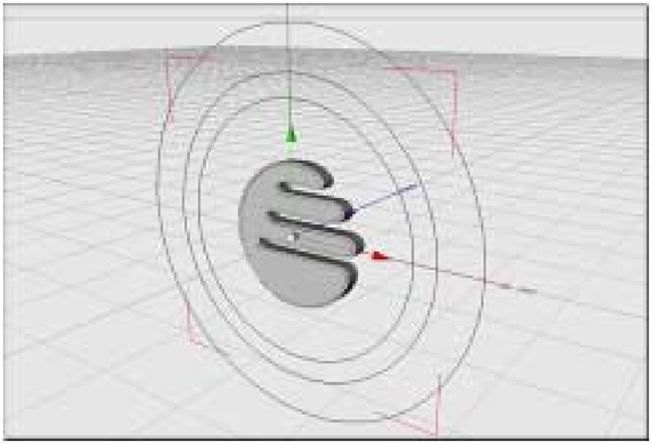
Step 6. Create Outline

Step 7. Extrude NURBS - General



Step 7. Extrude NURBS - Details

This tool creates a new segment of your circle that is part of the Inner circle object. Click-drag to the right to create and scale a new circle outline on the outside of the original.



You can scale it out by hand to the position as shown, or enter 35m in the Offset of the Active Tools Window.

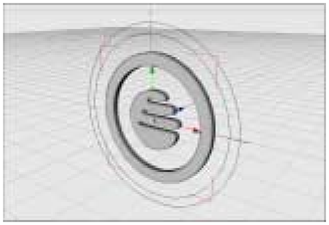
Step 6: Select the Outer circle and, with the Create Outline tool still active, make an additional segment for this spline.

Again, you can scale it out by hand to the position as shown, or enter 35m in the Offset of the Active Tools Window.

Step 7: Create an Extrude NURBS Object

Double click on the Extrude NURBS icon in the Object Manager and change the settings. On the General page, change the Start and End settings to Cap and Rounding. On the Details page, change the Rounding setting to Half Circle. Then, set Start Steps, Start Radius, End Steps and End Radius to 5. This will make the

rings look punched in with a ridged edge. Also, make sure to click the checkbox for Regular Subdivision. Later when you add an explosion to the Ring in the Animation chapter it will fragment the caps a little nicer. Click OK.



Step 8. Inner Ring

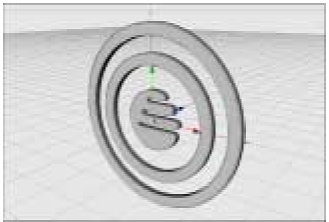
Double click on the text "Extrude NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Inner Ring." Click OK.

Step 8: Drag and drop the Inner spline on top of the Inner Ring object. The Inner spline will become a child of the Inner Ring object. Immediately, you will see the results in the editor window.

Since NURBS objects are always live, you can still go back and tweak your spline until you are happy with the shape of your ring.

Step 9: Create another Extrude NURBS Object

Editor: Objects=>NURBS=>Extrude NURBS
Shortcut: None

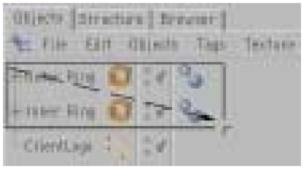


Step 10. Outer Ring

Double click on the Extrude NURBS icon in the Object Manager and change the settings so they are the same as the previous.

Double click on the text "Extrude NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Outer Ring." Click OK.

Step 10: Drag and drop the Outer spline on top of the Outer Ring object. The Outer spline will become a child of the Outer Ring object. Immediately, you will see the results in the editor window.



Step 11. Group the rings

Step 11: To make it easy to animate later, Group the Rings together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around all the objects and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Rings Group." Click OK.

At this point the workspace is getting a bit busy. You can hide other objects by clicking the top gray dot to the right of the icon in the Object Manager until it turns red. This hides the object in the Editor window. The bottom gray button hides the object from the camera when rendering.

Hide the Logo and Ring Group now to clean up your scene.

Add Protons

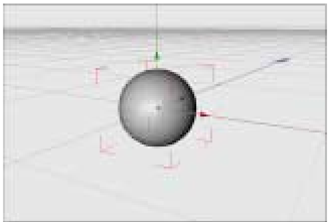
Add some flying protons to enhance the scene.

Step 1. Sphere

Step 1: Add a Sphere

Editor: Objects=>Primitive=>Sphere
Shortcut: None

Double click on the Sphere icon in the Object Manager and change the radius settings to 25m.



Step 1. Sphere

Step 2: Create a Symmetry Object.

Editor: Objects=>Modeling=>Symmetry
Shortcut: None

Double click on the Symmetry icon in the Object Manager to change the settings. Change the Mirror Plane to XZ. Click OK.

A Symmetry object is a great way to save processing time and energy. The computer only need calculate the one object and mirror it. In addition, this will make it easier later to animate the two spheres uniformly. As you animate one, the Symmetry object will mirror the movement.

Step 2. Symmetry

Step 3: Drag and drop the Sphere object on the Symmetry object. This will create a mirror object of the sphere.

Step 4: Move the sphere to X=0, Y=150, Z=0. You'll see the mirrored proton below the original sphere.

Step 5: Since you are going to animate the Symmetry object and Sphere as a group, you have to place the Symmetry object into a Null Object.

Editor: Objects=>Null Object
Shortcut: None

Drag and drop the Symmetry object on the Null Object.

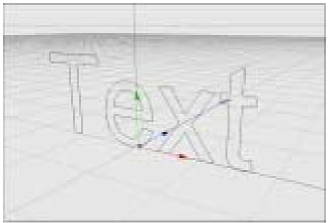
Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Protons." Click OK.

Modeling Text

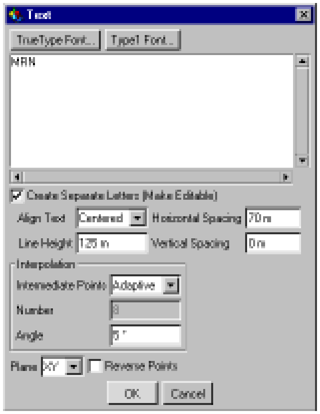
At the end of the animation, text will be added to identify and brand the company logo.

Step 1: Create a Text Spline

Editor: Objects=>Spline Primitive=>Text
Shortcut: None


Step 1. Text Object

Double click on the Text icon in the Object Manager. Highlight the "Text" in the live area and change it to "MRN."



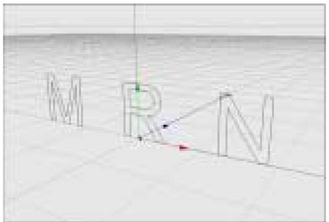
Step 1. Text

Click on the True Type font button at the top-left corner of the dialog and choose either Arial or Helvetica font if one of these is available to you. If that font is not available on your system, you can always choose another font. However, some adjustment in scale and spacing may be necessary.

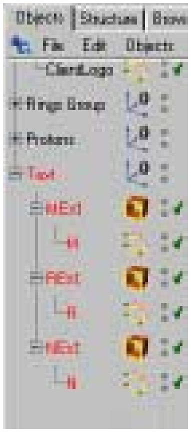
Click the checkbox to activate Create Separate Letters (Make Editable). This will create three separate text splines later when you make the splines editable.

Adjust the Line Height to 125m to create text that fits in your rings. Set the Horizontal Spacing to 70m for Helvetica or 40m for Arial. so there is a bit of breathing room between the letters. Click OK.

You will see the splines defining the letters in the Editor window.


Step 1. Text Object

Step 2. Object Manager



Step 3. Object Manager

Step 2: Later when you animate the scene, you will need the letters to be separate models. Because you chose Create Separate Letters when you created the text spline, this will be done for you when you make editable.

With the Text object selected in the Object Manager, click the Make Editable button.

Editor: Structure=>Make Editable
Shortcut: C

If you open the hierarchy of the Text, you will see that you now have three separate spline elements for the text.

Step 3: Create an Extrude NURBS Object

Editor: Objects=>NURBS=>Extrude NURBS
Shortcut: None

Double click on the Extrude NURBS icon in the Object Manager and change the settings so they are the same as Logo and Rings.

Duplicate the Extrude NURBS object twice, so you now have three.

Rename the Extrude NURBS objects by double clicking on the text in the Object Manager. This opens a dialog that allows you to change the name of the object. Change them to "MExt," "RExt," and "NExt," respectively.

Drag and drop all three on the Text parent object.

Drag and drop the Spline elements into the respective Extrude NURBS as shown.

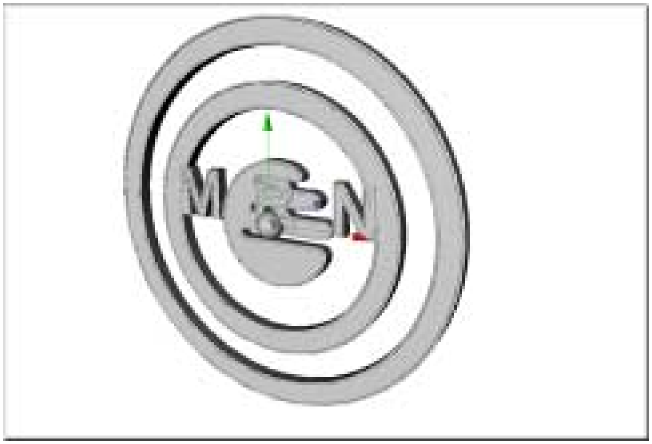
Your text objects are ready.

Add a Background

Add a background to create the feeling that the logo is drifting in the expanse of outer space.

Step 1: Add a Sky object to the scene for your background.

Editor: Objects=>Scene=>Sky
Shortcut: None

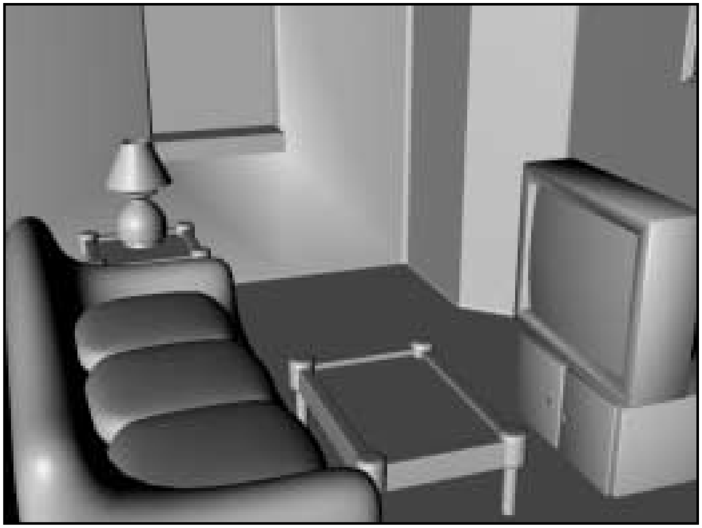


Make sure to save your project. Save it as Logo.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

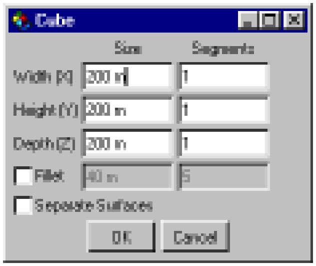
Modeling the Indoor Scene

Here you will model an entire living room scene. Creating this eclectic collection of furniture will expose you to a wide range of modeling tools and challenges. This scene will later become the setting as you bring an inanimate object to life.

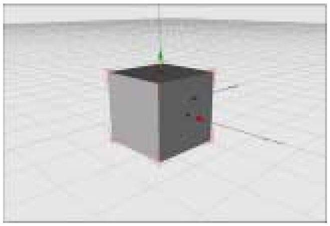


Modeling the Couch

Here, you will start off with a primitive cube and use Hyper NURBS to model a couch.



Step 1. Cube Parameters


Step 1. Cube

Step 1: Create a Cube.

Editor: Objects=>Primitive=>Cube
Shortcut: None

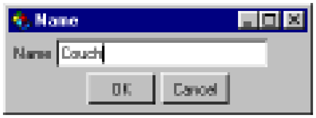
Double click on the Cube icon in the Object Manager to see the default parameter settings. It should be 200m in width, height and depth, one segment each.

Step 2: Before you can modify the Cube (other than its parametric parameters), you have to make it editable.

Editor: Structure=>Make Editable
Shortcut: C

Step 3: Add a Hyper NURBS object to your scene.

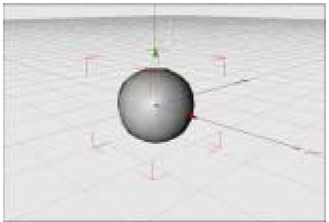
Editor: Objects=>NURBS=>Hyper NURBS
Shortcut: None



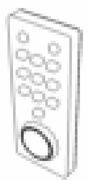
Step 3. Rename Hyper NURBS

Step 4. Drag and Drop Cube into Couch

Step 4. Object Manager



Step 4. HyperNURB Cube



Double click on the text "Hyper NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Couch."

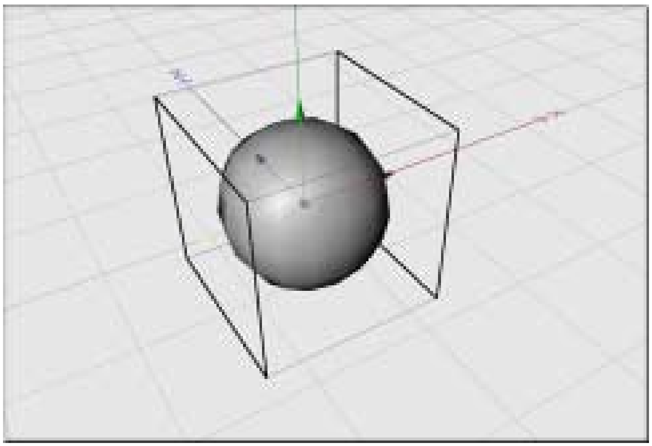
Step 4: Drag and drop the Cube on top of the Hyper NURBS object. The Cube will become a child of the Hyper NURBS object. You will notice that the Cube appears to have changed in the Editor Window and now looks more like a sphere.

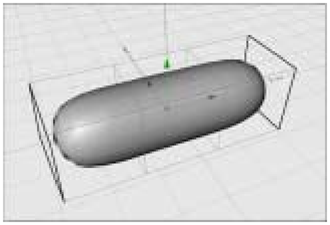
Step 5: To create the couch shape, you are going to modify the Cube by adding and pulling on polygons. Make sure the Cube is selected in the Object Manager and activate the polygon tool.

Editor: Tools=>Polygons
Shortcut: None

Select the Cube's left and right faces (which lie along the X axis) as shown. Select one face and then hold down the shift key while clicking on the other face to select both. You may need to rotate your view by holding down the 3 key and dragging the mouse or using the quick buttons in the upper-right corner of the view window.

Editor: Selection=>Live Selection
Shortcut: None

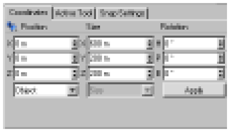




Step 5. Extrusion

With those two polygons selected, choose the extrude tool. Click and drage to extrude both polygons outward so that the total size is about 600m along the X axis.

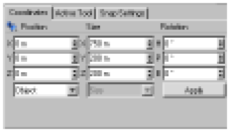
Editor: Structure=>Extrude
Shortcut: D



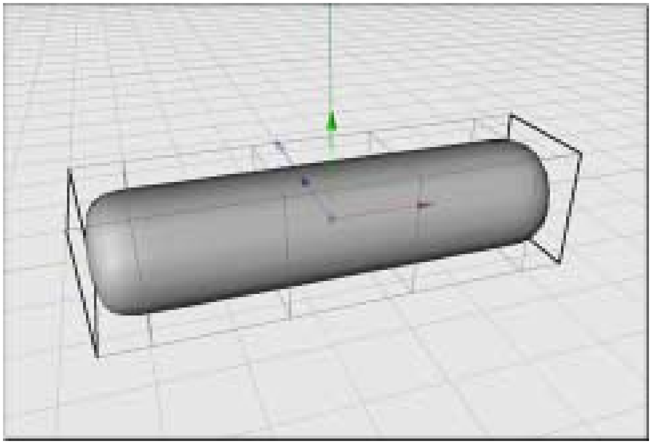
Step 5. Extrusion

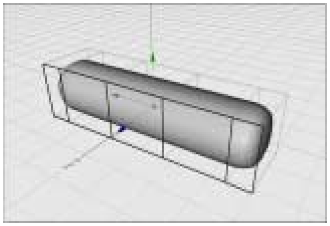
You can extrude it by approximation, or you can size it exactly by dragging out the extrusions and then entering 600m into the Size X field in the Coordinates Manager. This separates the two selected polygons 600m apart from each other. Or you can enter 200m in the Offset of the Active Tools Window. This offsets the faces you have selected 200m from the original object.

Step 6: So that you have something to create the arms of the couch with, extrude the selected faces again about 75m so that the object size is about 750m total along the X axis.



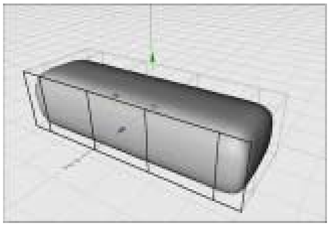
Step 6. Extrusion





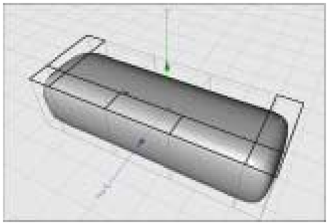
Step 7. Selection

Step 7: Switch back to the Live Selection tool by hitting Space Bar. Space Bar quickly toggles between the most recent selection and most recent modeling tool. Select all the polygons on the backside of the Cube (the side facing towards positive Z) and extrude them out to about 175m. Again, you can use the Coordinates Manager to make this exact. After extruding by approximation, you can type 175m into the Position Z field or you can type 75 for the Offset in the Extrude Active Tool. This will move those faces to that exact position.



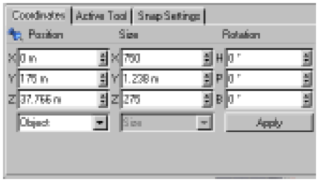
Step 7. Extrusion

MODELING

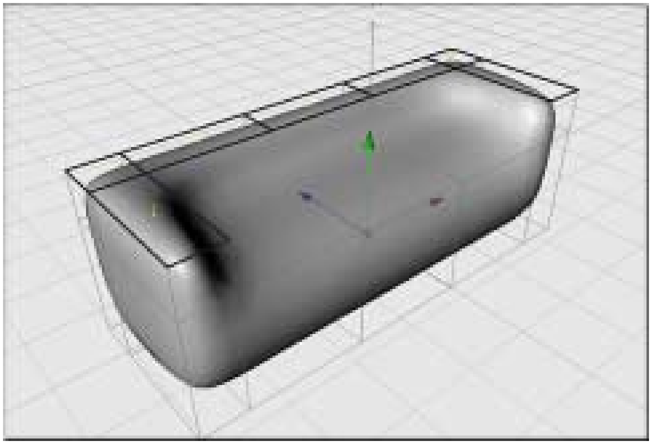


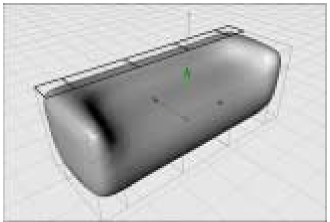
Step 8. Selection

Step 8: Select all polygons along the top back and side of the object so as to form a U-shape as shown. These polygons will form the couch arms and backrest. Extrude the selected faces upward along the Y axis to about 175m or enter 75m for the Offset in the Active Tools Dialog and click Apply.



Step 8. Extrusion

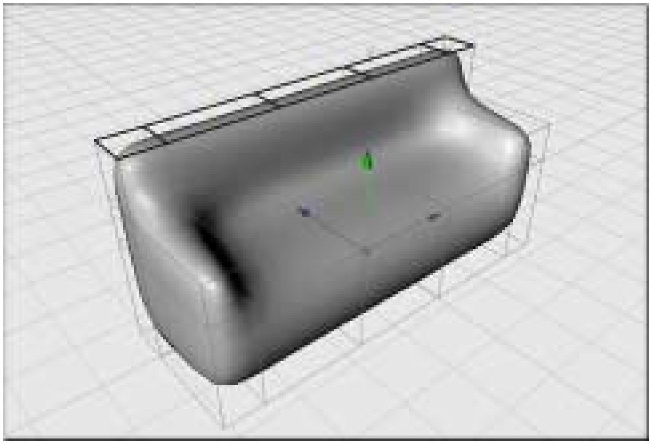


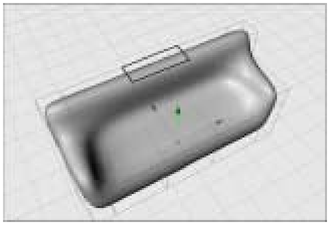


Step 9. Selection

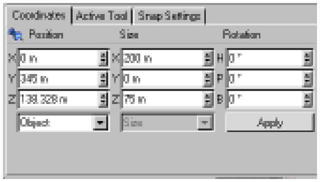
Step 9: Deselect the 2 polygons that define the arms of the couch and extrude just the back of the couch again on the Y axis up to about 275m or enter 100m for the Offset in the Active Tools Dialog and click Apply.

Step 9. Extrusion





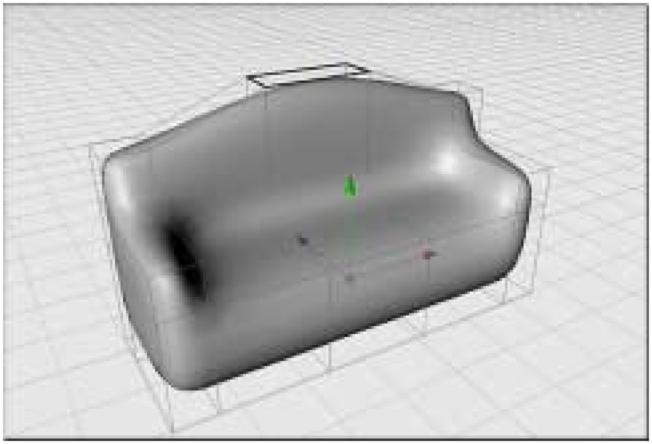
Step 10. Selection

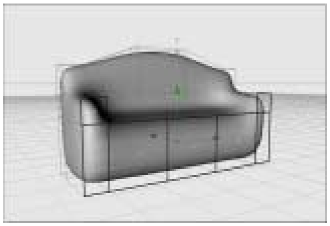


Step 10. Coordinates

Step 10: Now deselect all but the centermost polygon that makes up the top back of the couch and move it on the Y axis up to 345m to create a hump in the center of the backrest.

Editor: Tools=>Move
Shortcut: E

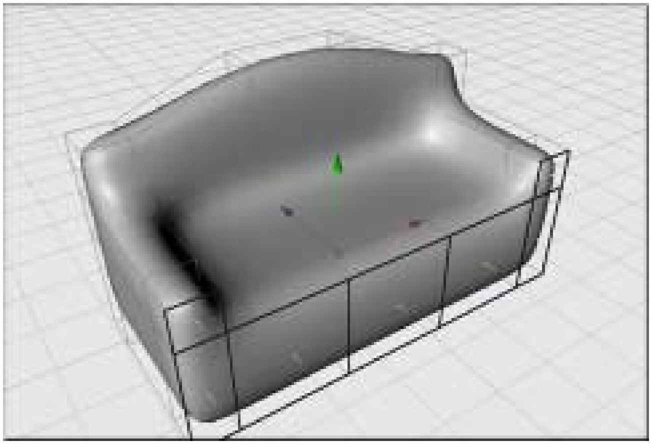


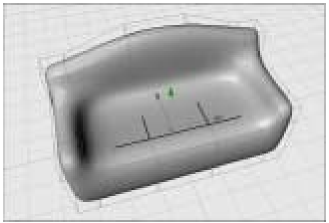


Step 11. Selection

Step 11. Extrusion

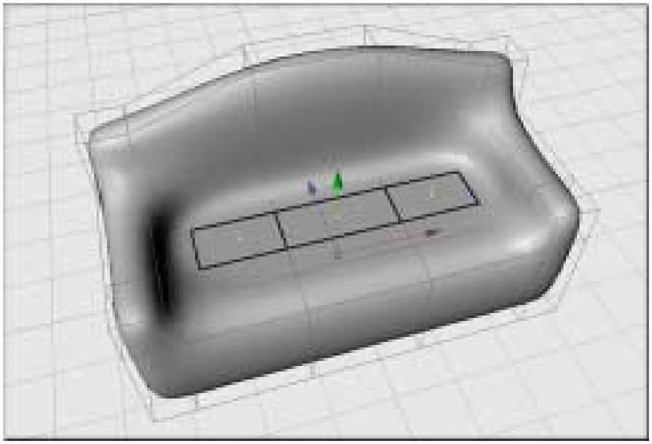
Step 11: Select the front polygons of the couch as shown and extrude them forward on the Z axis to give the model some depth. Here it is moved forward to about Z=-175m. You could also enter 75m for the Offset in the Active Tools Dialog and click Apply.

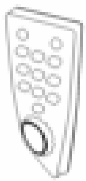


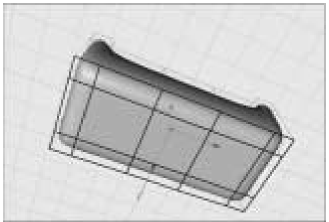


Step 12. Selection

Step 12: To flatten the couch bed a bit, select the 3 top square polygons and use Extrude Inner tool to extrude this group of faces inwards.

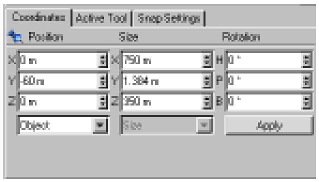




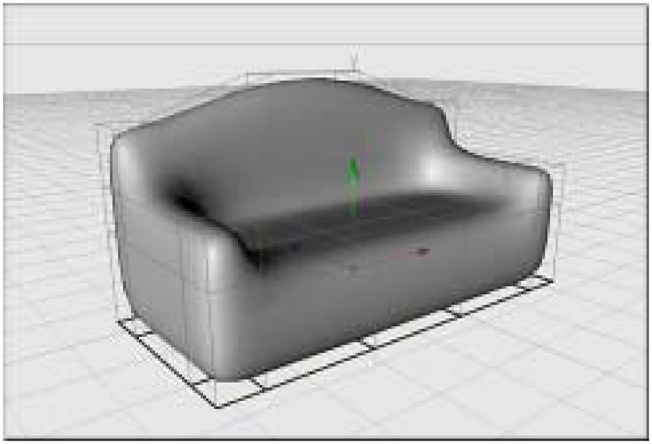


Step 13. Selection

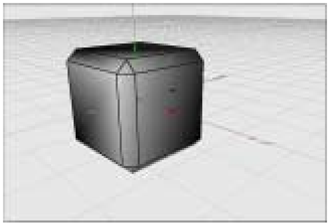
Step 13: In order to make the base a bit more uniform, select the bottom faces of the couch and move them up along the Y axis to -60m.

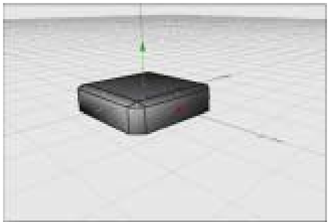


Step 13. Coordinates



Step 14. Hide Couch


Step 14. Smooth Shift


Step 15. Scale

Step 14: Now you will create the cushions for the couch. Hide the Couch by clicking the top gray dot to the right of the Couch icon in the Object Manager until it turns red.

Add a new Cube to the scene and make it editable. Activate the Smooth Shift Tool

Editor: Structure=>Smooth Shift
Shortcut: None

and Smooth Shift the faces of the Cube by entering 25 as the offset in the Active Tool dialog and clicking apply.

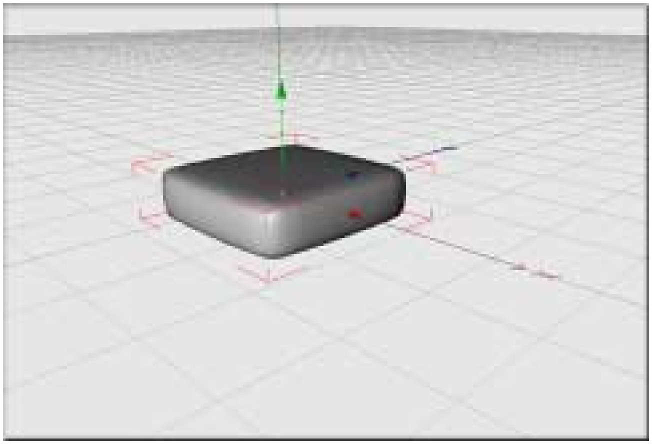
Step 15: Change to the Model Tool

Editor: Tools=>Model
Shortcut: None

Then scale the Cube on the Y axis to about 50m.

Editor: Tools=>Scale
Shortcut: T

Step 16: Add a new Hyper NURBS object to the scene and rename it Cushion. Drag and drop the Cube you have just made onto the Hyper NURBS object. Now you have your first Cushion.



Step 17. Copy Cushions

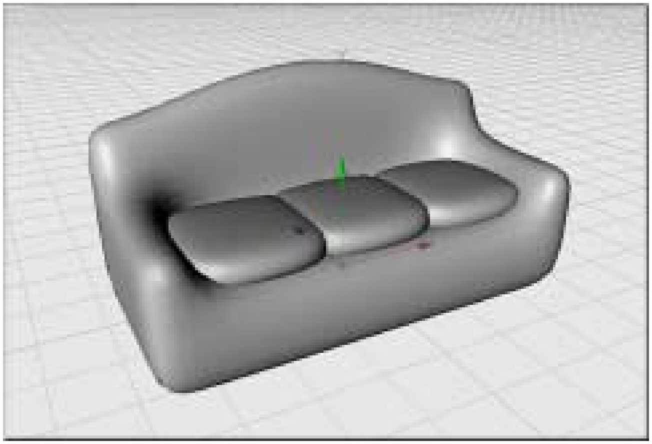
Step: 17: Duplicate the Cushion so that there are 3 total.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

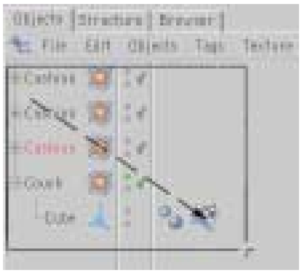
Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Step 18. Show Couch

Step 18: Restore the visibility of the Couch by clicking the top gray dot to the right of the Couch icon in the Object Manager until it turns green or gray.



Tweak the size and position of your Cushions until they fit into the Couch the way you like. The size shown of each cushion is X=210, Y=50, Z=250. The position shown of the cushions is X=-200 for leftmost cushion, X=0 for the center cushion and X=200 for the rightmost cushion. Y=125 and Z=-30 for all three cushions.



Step 19. Group Couch Models

Step 19: Group all of the Couch models into a single group.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around all the objects and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Couch."

Step 20: Make sure to save your project. Save it as Couch.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling the Lamp Body

Step 1: Open a new project and change to the Front or Back (XY) view so you are looking straight on your scene.

View: View=>View 4
Shortcut: F4

This ensures that as you draw your profile spline for the lamp, you are only making changes on the X and Y axes. That way when you lathe the spline, it will be created evenly around the Y axis.

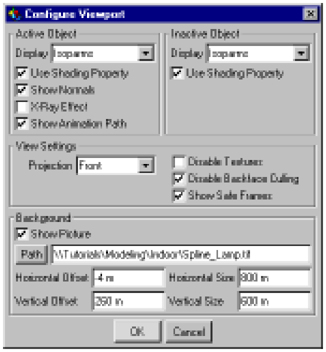
Step 2: First you will draw the outside profile of the lamp. Create a new Bezier Spline.

Editor: Objects=>Create Spline=>Bezier
Shortcut: None

CINEMA 4D will automatically switch you to the Points tool. While holding the Control key, click and drag to add points with handles to create the Spline as shown.

Once you have created a rough outline, you can go back and manipulate the Bezier handles to refine the outline. If you need a template to work from, we have included one on the CD. It is located in the Tutorials Folder: Modeling: Indoor: Spline_Lamp.gif.

To add a tracing template into your view, go to your view Editor Menu: Edit=>Configure. Click on Path to choose the image you want to have as a background picture. Enter -4 m for the Horizontal Offset, 260 m for the Vertical Offset. The default size values will look fine. Make sure Show Picture is checked and hit OK. The picture you have chosen will show up in the view and you can use it as a template.



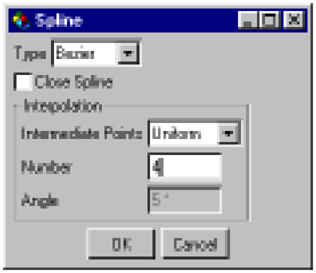
Step 2. Configure Background

Step 2.Spline Template

Your spline does not have to look exactly the same for the tutorial to work. Feel free to use some creativity and design your own lamp profile.

Resize the final spline to X=150m, Y=425m by choosing Size from the drop down and entering these numbers in the Coordinates Manager.

Double click on the Spline icon in the Object Manager and change the Interpolation settings to Uniform and the Number to 4. This makes the interpolation of the points an equal distance from each other along the spline, to minimize kinks. The setting 4 is based on the shape suggested. If yours has more dramatic curves, you may need to use a higher number to get a smoother profile.

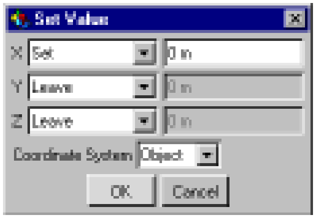


Step 2. Spline Settings

Double click on the text "Spline" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Lamp Profile."

Step 3: Now you will need to make sure both the first and the last points are located at X=0. If they are not, there will be a hole in the middle of your lamp.

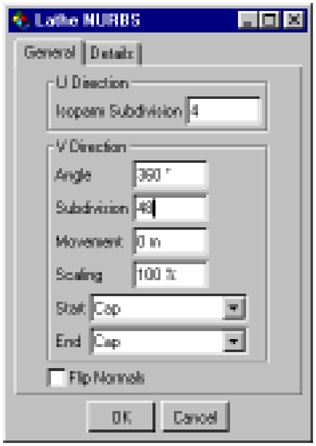
To do this, first select both the first and last points.



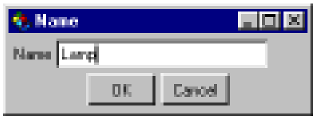
Step 3. Set Value

Make sure to hold the Shift key to facilitate selecting multiple points.

Then, with the two points selected, use the Set Value tool and set the X value to Set and 0.

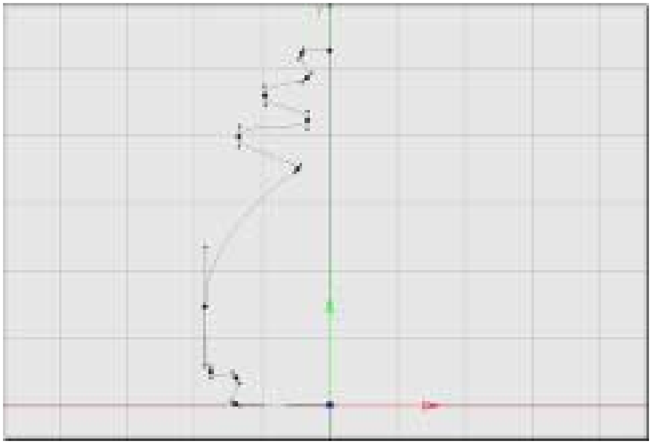


Step 4. Lathe Nurbs



Step 4. Rename

Step 5. Lamp Object



Step 4: Create a Lathe NURBS

Editor: Objects=>NURBS=>Lathe NURBS
Shortcut: None

Double click on the text "Lathe NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Lamp."

Double click on the Lathe NURBS icon in the Object Manager and change the V Subdivision to 48. This will give you a smooth mesh for your model, eliminating any jagged edges. If it does not, try using a higher setting or adjusting the number of subdivisions in the profile spline.

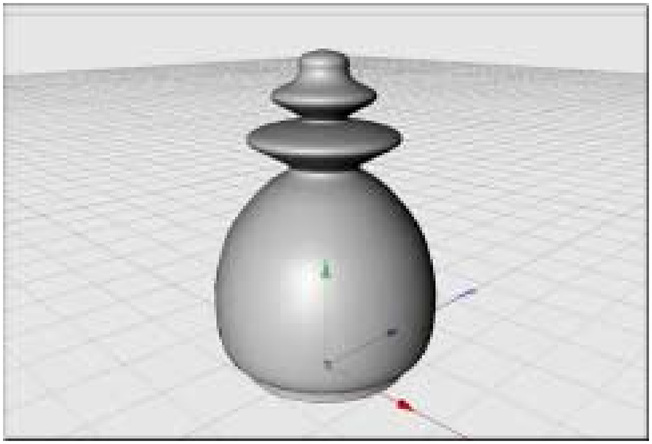
Step 5: Drag and drop the Lamp Profile on top of the Lathe NURBS object. The Lamp Profile will become a child of the Lathe NURBS object. You will immediately see your Lamp model in the Editor window.

Since NURBS objects are always live, you can still go back and tweak your spline until you are happy with the shape of your lamp model.

Step 6: Make sure to save your project as Lamp.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

You can open a new project to make the Lamp Shade or you can hide the Lamp body by clicking the top gray dot to the right of the Lamp icon in the Object Manager until it turns red. This hides the object in the Editor window. The bottom gray button hides the object from the camera when rendering.

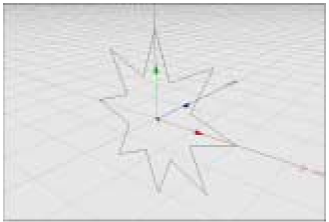


Modeling the Lamp Shade

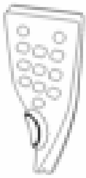
Step 1: Open a new project and create a Star Spline.

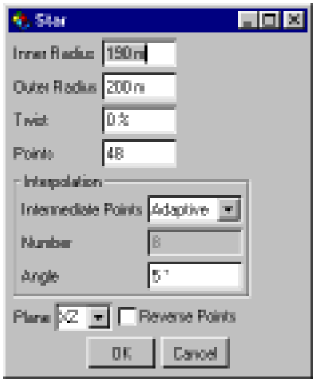
Editor: Objects=>Spline Primitive=>Star
Shortcut: None

Double click on the Star icon in the Object Manager and set the Inner Radius to 190m and the Points to 48. Make sure Plane is set to XZ. This will give you a great profile to create the Lamp Shade.

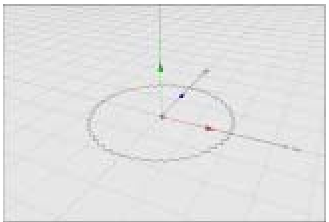


Step 1. Star Spline





Step 1. Star Spline



Step 1. Star Spline

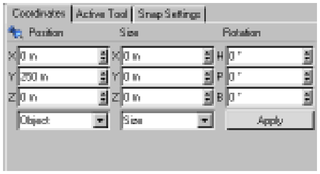
Double click on the text “Star” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “ShadeSpline1.”

Step 2: Duplicate the ShadeSpline1 object.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

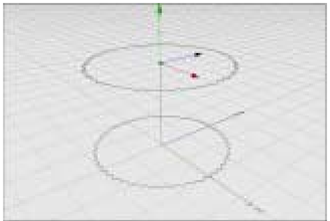
Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Step 3: Move one of the shade splines up to 250m on the Y axis.

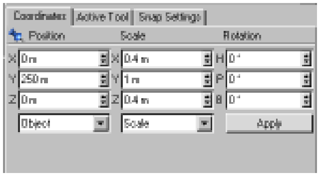


Step 3. Move to 250m on the Y axis

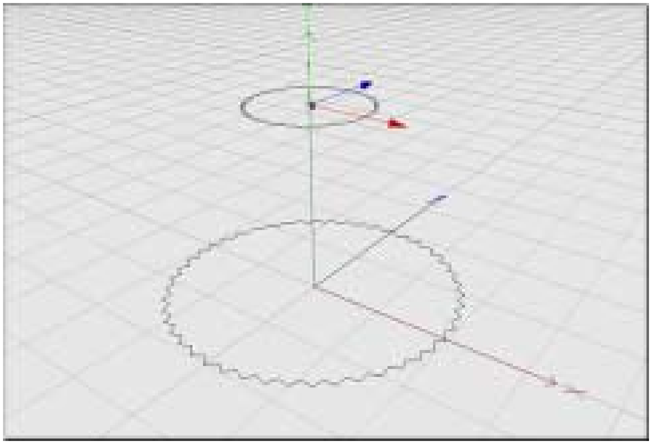
Double click on the text “ShadeSpline1” of the object you just moved in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “ShadeSpline2.”

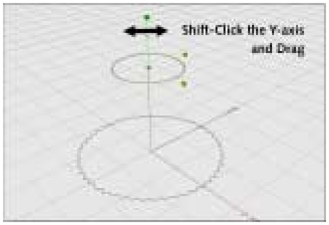

Step 3. Profile Splines

Resize ShadeSpline2 so that it is 40% of its current size. The easiest way is to, while ShadeSpline2 is still selected, go to the Coordinates Manager, change Size to Scale mode and enter .4 in Scale X and Scale Z.



Step 3. Scale 40%





Step 3. Scaling by hand

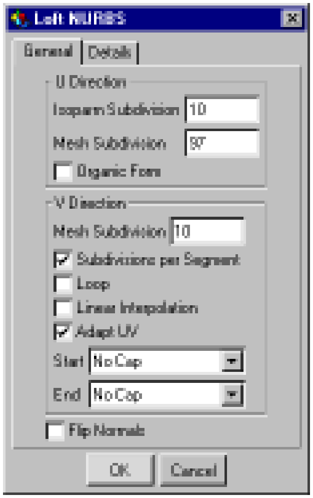
You can also do this artistically, by approximation using the Scale Tool.

Editor: Tools=>Scale
Shortcut: T

Scale the spline by shift-clicking and dragging on the Y-axis.

Step 4: Create a Loft NURBS

Editor: Objects=>NURBS=>Loft NURBS
Shortcut: None



Step 4. Loft NURBS

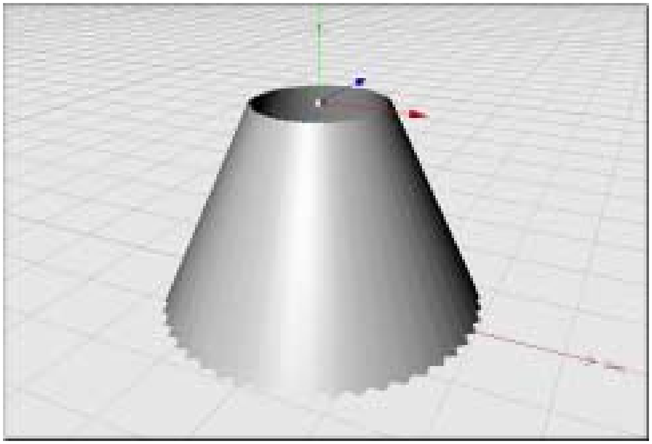
Double click on the text "Loft NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Lamp Shade."

Double click on the Loft NURBS icon in the Object Manager and change the U Mesh Subdivision to 97. You will need a relatively high number to get a smooth mesh for this model. Also set the caps to No Cap. Click OK to exit the dialog and save your settings.

Step 5: Drag and drop the two ShadeSplines onto the Lamp Shade. The ShadeSplines will become children of the Loft NURBS object. You will immediately see your Lamp Shade model in the Editor window.

Since NURBS objects are always live, you can still go back and tweak your splines until you are happy with the shape of your lamp model.

In the next step, you'll merge the Lamp and Lamp Shade models into the same scene. If you chose to create both objects in the same scene, you can skip this step and instead just unhide the lamp object.



Step 6: Next, Cut and Paste the Lamp Shade Model.

Editor: Edit=>Cut
Shortcut: Ctrl+X (pc) / Cmd+X (mac)

Go to your Lamp scene.

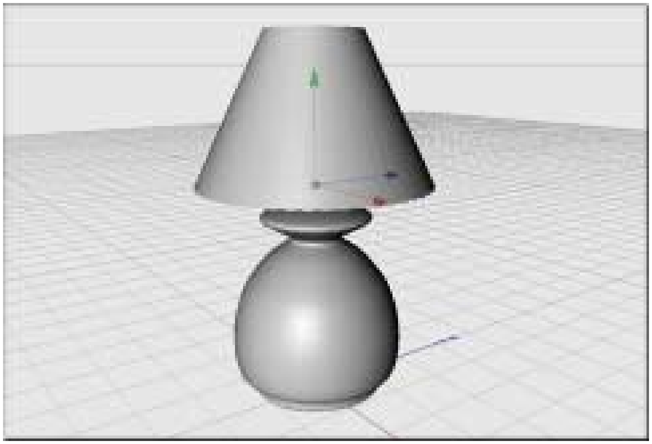
Editor: Window=>Lamp.c4d
Shortcut: None

Paste the Lamp Shade into your Lamp scene.

Editor: Edit=>Paste
Shortcut: Ctrl+V (pc) / Cmd+V (mac)

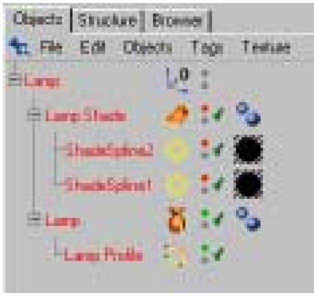
Step 7: Move the Lamp Shade model up on the Y axis into position at the top of your lamp model.

You'll notice that you did not model the light bulb or the hardware that holds the light bulb. That's because the camera will never see that part of the lamp. As stated in the Introduction Chapter on modeling, there is no need to model what the camera will not see. This saves you a lot of time and processing power.



Step 8: To make it easy to load the objects together into the scene later, Group them together.

Object Manager: Objects=>Group Objects
Shortcut: G



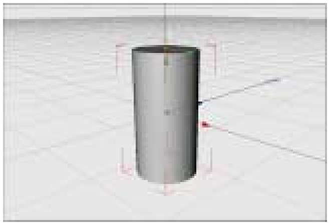
Step 8. Lamp Group

When the crosshairs appear click and drag a marquis (rectangle) around all the objects and let go. You will have a Null Object group.

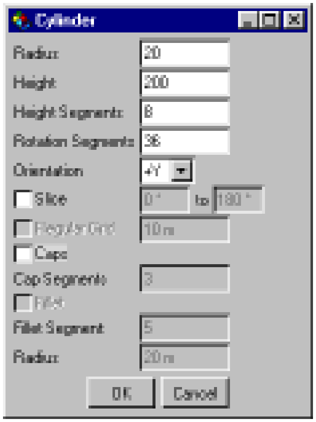
Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Lamp."

Step 9: Make sure to save your Lamp project again with the shade.

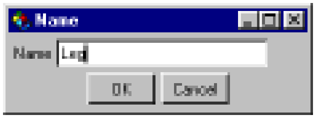
Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)



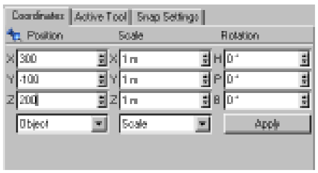
Step 1. Cylinder



Step 1. Cylinder Parameters



Step 1. Rename Cylinder



Modeling the Coffee Table

For this model, you will only have to create one corner of the table. You will use two Symmetry objects to complete the table model.

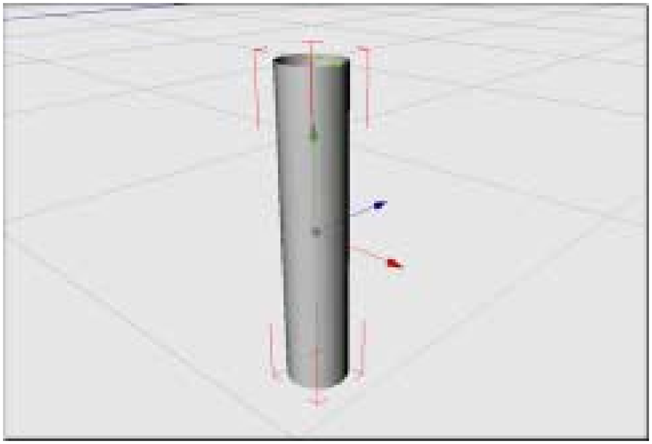
Step 1: Open a new project and create a Cylinder.

Editor: Objects=>Primitive=>Cylinder
Shortcut: None

Double click on the Cylinder icon in the Object Manager to change the settings. Change it to Radius=20m, Height=200m and turn off Caps. Click OK.

Double click on the text “Cylinder” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “Leg.” Click OK.

Move the Cylinder to X=300m,Y=-100m, Z=200m in the scene.



Step 2: Create a Symmetry Object.

Editor: Objects=>Modeling=>Symmetry
Shortcut: None

Double click on the Symmetry icon in the Object Manager to change the settings. Change the Mirror Plane to XY. Click OK.

Double click on the text “Symmetry” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “LegsF2B.” Click OK.

Step 3: Create another Symmetry Object.

Editor: Objects=>Modeling=>Symmetry
Shortcut: None

Double click on the text “Symmetry” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “LegsL2R.” Click OK.

Step 4: Drag and drop the “LegsL2R” symmetry object on the “LegsF2B” symmetry object. This will create a double or corner Symmetry.

Step 5: Drag and drop the Leg on top of the LegsL2R Symmetry object. You will now see four legs. That’s because the LegsL2R Symmetry object mirrors the object one way and the LegsF2B mirrors both the other.

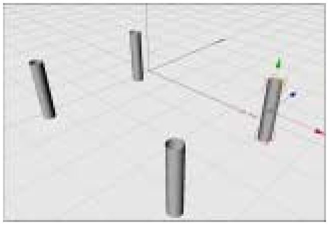
Step 6: Make a copy of the Leg object.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

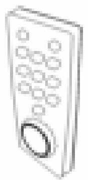
Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

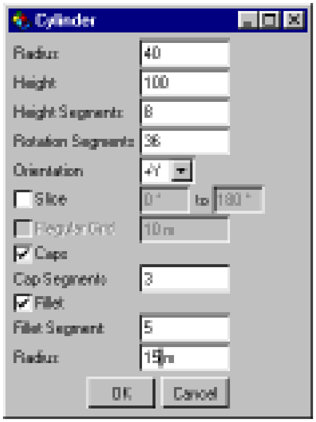
Double click on the new Cylinder icon in the Object Manager to change the settings. Change it to Radius=40m, Height=100m. Turn on Caps with 3 Cap Segments. Turn on the Fillet with 5 Fillet Segments and a Radius of 15m. Click OK.

Double click on the text of the new Leg in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “TopLeg.” Click OK.



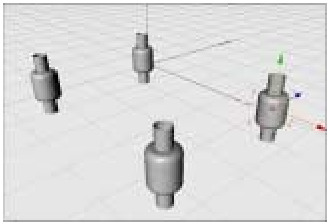
Step 5. Table Legs





Step 6. Cylinder Parameters

Step 6. TopLeg Cylinder

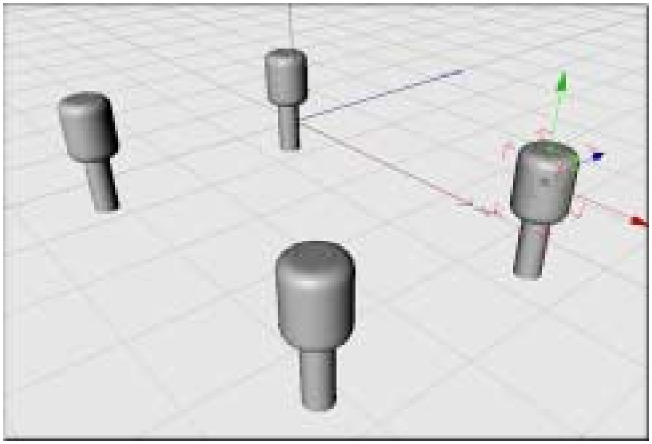

Step 7. Table Legs

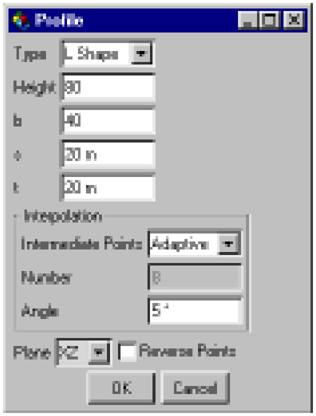
Step 7: Drag and drop the TopLeg on top of the Leg object. Select the Move Tool.

Editor: Tools=>Move Shortcut: E

Then, move the TopLeg up to Y=100.

This simple addition creates a little variety in the leg, so it doesn't look just like a plain cylinder leg.





Step 8. Profile Spline

Step 8: Create a Profile Spline to define the edge of the table.

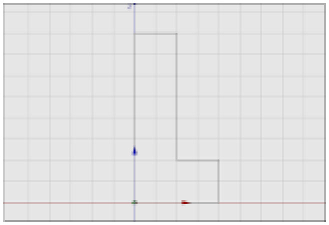
Editor: Objects=>Spline Primitive=>Profile Shortcut: None

Double click on the Profile icon in the Object Manager to change the settings. Change it to an "L" profile. Change its size to Height=80, b=40, s=20, t=20. Make sure Plane is set to XZ and click OK.

Double click on the text "Profile" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Edge Profile." Click OK.


Step 8. Profile Spline

MODELING



Step 9. Top View

Step 9: Change to the Top (XZ) view so you are looking straight on your scene.

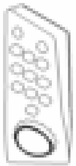
View: View=>View 2
Shortcut: F2

You will see the profile spline at the center of your scene.

Step 10: Now add a tiny bit of rounding to the corners. In 3D, everything has a sharp corner and thus is not realistic looking unless you soften it.

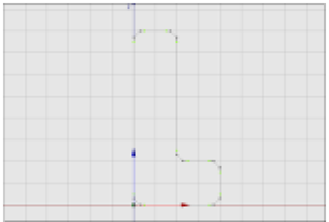
First you will have to make the spline editable. With the EdgeProfile selected, choose Make Editable.

Editor: Structure=>Make Editable
Shortcut: C



Next, select all the points of the spline. First, make sure the Points Tool is selected.

Editor: Tools=>Points
Shortcut: None



Step 10. Select All Points

Then, use Select All to select all of the points.

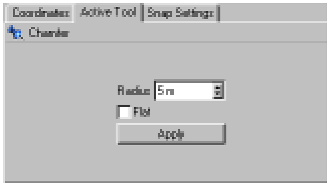
Editor: Edit=>Select All
Shortcut: Ctrl+A (pc) / Cmd+A (mac)

With all the points selected, choose the Chamfer Tool.

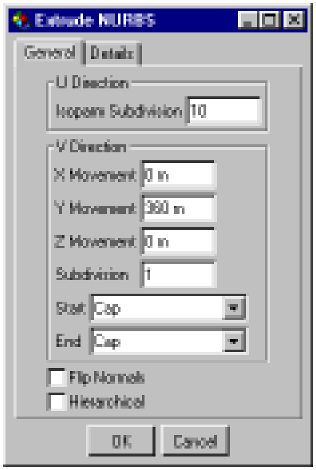
Editor: Structure=>Edit Spline=>Chamfer
Shortcut: None

Use the Active Tools dialog to apply (Click Apply) a 5m radius chamfer to the spline. This will give the spline slightly rounded (realistic) looking edges.

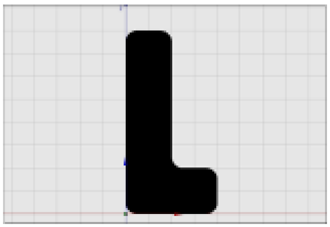
You will notice the spline change in the Editor window.



Step 10. Chamfer



Step 11. Extrude NURBS



Step 12. Short Table Edge

Step 11: Create an Extrude NURBS Object.

Double click on the Extrude NURBS icon in the Object Manager to change the settings. On the General page, enter an extrusion of 360m on the Y axis. Make sure Z=0, and leave the rest of the settings at default. Click OK.

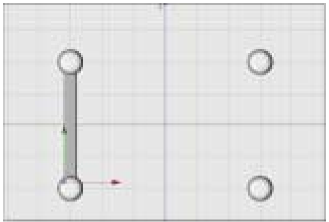
Double click on the text "Extrude NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "ShrtTableEdge." Click OK.

Step 12: Drag and drop the EdgeProfile spline on top of the ShrtTableEdge object. If you switch to Perspective view (F1), you will see the results in the editor window.

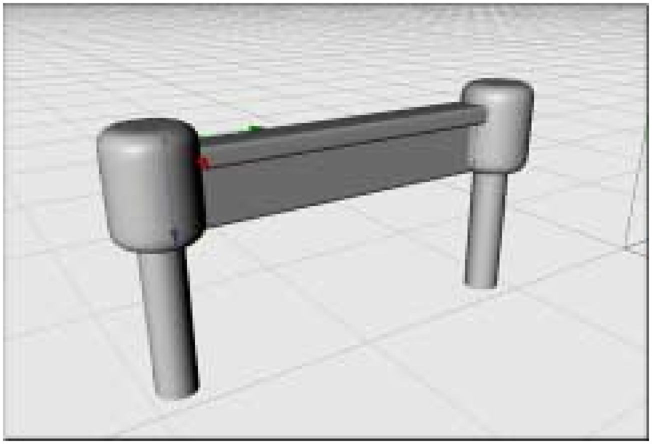
Since NURBS objects are always live, you can still go back and tweak your spline until you are happy with the shape of your edge.

Use the Coordinates Manager to move the ShrtTableEdge into place. The settings used here are X=-320m,Y=30m, Z=-180m and Rotation P=-90 degrees. Click Apply.

Step 12. Move ShrtTableEdge

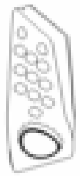


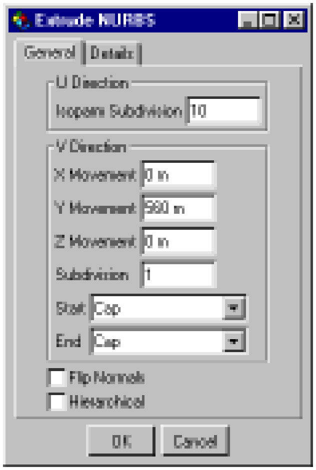
Step 12. ShrtTableEdge



Step 13: Duplicate the ShrtTableEdge object.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)





Step 13. Extrude NURBS

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

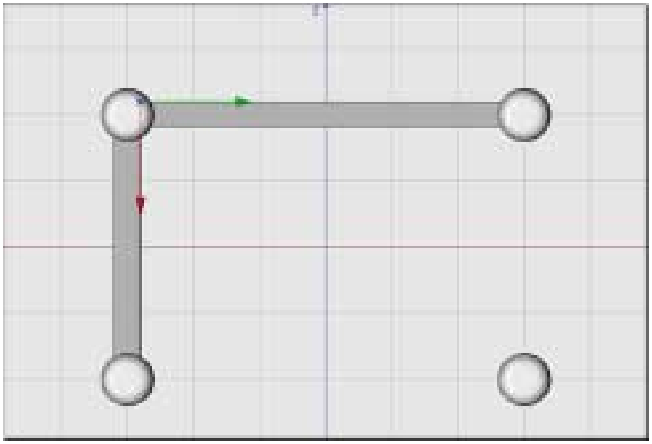
If you use the Control Key to Copy and Paste, the resulting object will have the same name as the original. If you use copy and paste, a numeral will be added to the object name.

Double click on the new ShrtTableEdge icon in the Object Manager to change the settings. On the General page, enter an extrusion of 560m on the Y axis. Leave the rest of the settings at default. Click OK.

Double click on the text "ShrtTableEdge" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "LngTableEdge." Click OK.

Use the Coordinates Manager to move the LngTableEdge into place. The settings used here are X=-280m,Y=30m, Z=220m and Rotation P=-90 degrees and B=90. Click Apply.

Step 13. LngTableEdge

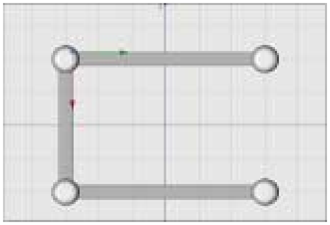


Step 14: Create a Symmetry Object.

Editor: Objects=>Modeling=>Symmetry
Shortcut: None

Double click on the Symmetry icon in the Object Manager to change the settings. Change the Mirror Plane to XY. Click OK.

Double click on the text "Symmetry" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "EdgeF2B." Click OK.



Step 15. Two Edges

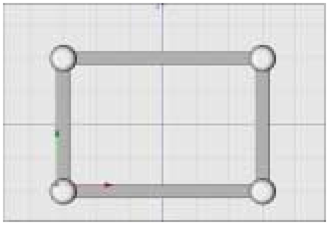
Step 15: Drag and drop the LngTableEdge on top of the EdgeF2B Symmetry object. You will now see two long edges.

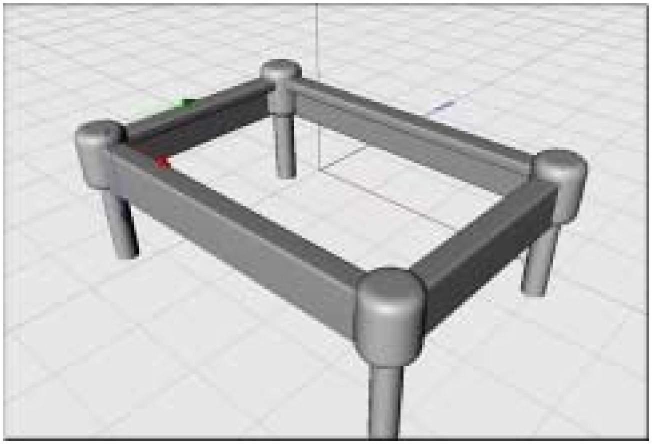
Step 16: Create another Symmetry Object.

Editor: Objects=>Modeling=>Symmetry
Shortcut: None

Double click on the text "Symmetry" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "EdgeL2R." Click OK.

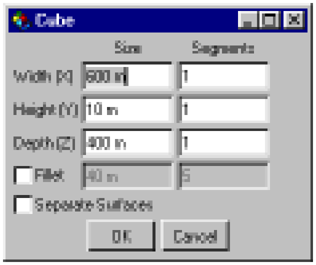
Step 17: Drag and drop the ShrtTableEdge on top of the EdgeL2R Symmetry object. You will now see two short edges.


Step 17. Top View

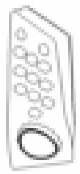


Step 18: The last part will be creating the glass top. Add a Cube to the scene.

Editor: Objects=>Primitive=>Cube
Shortcut: None



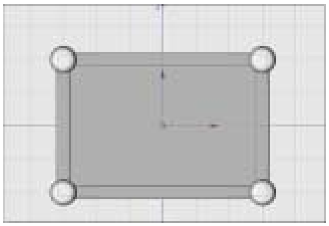
Step 18. Cube Parameters



Double click on the Cube icon in the Object Manager and change the settings. It should be Width=600m, Height=10m, and Depth=400, one segment each.

Double click on the text "Cube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "GlassTop." Click OK.

It should end up in the correct location by default. If it does not, move it to directly under the table edges centered in the coffee table.


Step 18. Top View

Step 19: Group all the objects together.

Object Manager: Objects=>Group Objects
Shortcut: G

Draw a marquis around all the objects to group them together. A Null Object with all the Objects contained within will appear.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "CoffeeTable."

Step 20: Make sure to save your project. Save it as Tables.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling the Side Table

For this table, you will only have to duplicate the table you have just created and make some modifications.

Step 1: Make a copy of the CoffeeTable object.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

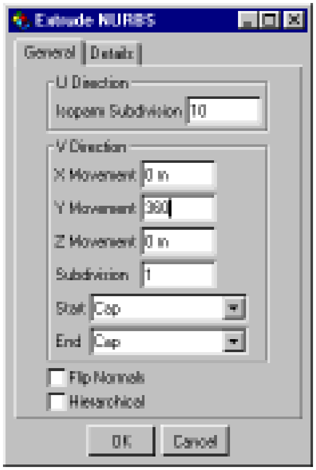
Double click on the text of the new CoffeeTable in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "SideTable." Click OK.

Hide the CoffeeTable by clicking the top gray dot to the right of the Couch icon in the Object Manager until it turns red.

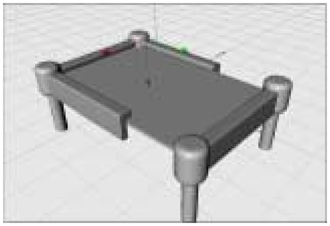
Step 2: This table will be square. It will have the Lamp on top of it and will sit on one side of the Couch. So the first step will be to shorten the long side of the table.

Double-click on the LngTableEdge object (within the EdgeF2B hierarchy) in the Object Manager to change the settings. On the General page, change the extrusion from 560m to 360m on the Y axis. Click OK.

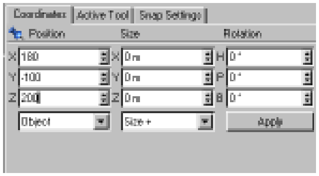
Now the four sides are all the same size. However, you will need to adjust the rest of the model.



Step 2. Extrude Nurbs



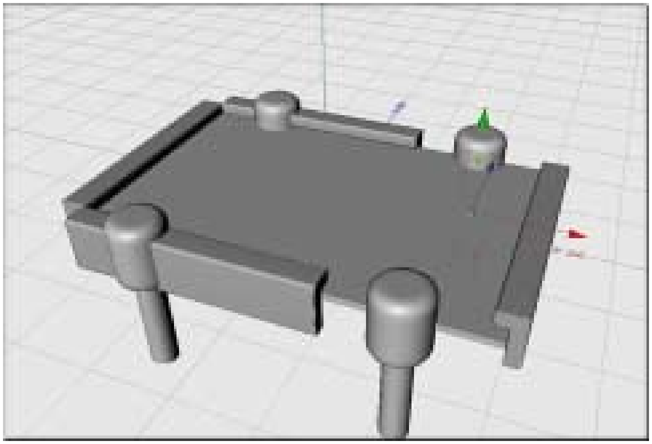
Step 2. Change Extrusion

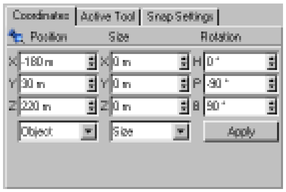


Step 3. Move Leg

Step 3: Select the Leg, under the LegsF2B=>LegsL2R and move it in towards the middle of the table. Move it to 180m on the X axis.

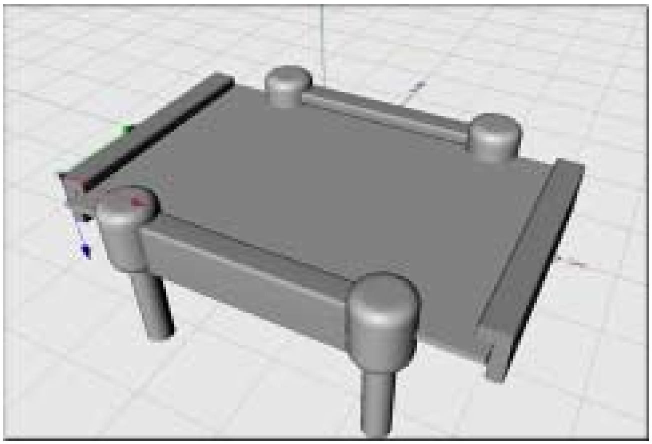
Use the Coordinates Manager to move the Leg into place. The settings used here are X=180m,Y=-100m, Z=200m. Click Apply.





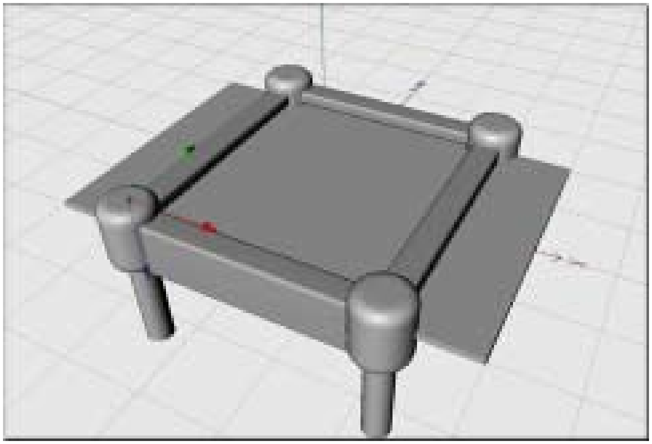
Step 4. Move LngTableEdge

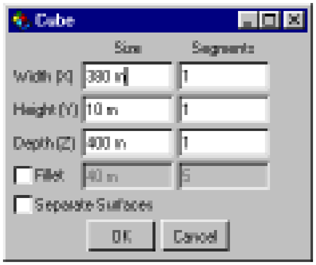
Step 4: Now move the LngTableEdge to a position in-between the legs. Use the Coordinates Manager to move it into place. The settings used here are X=-180m,Y=30m, Z=220m. Click Apply.



Step 5. Move ShrtTableEdge

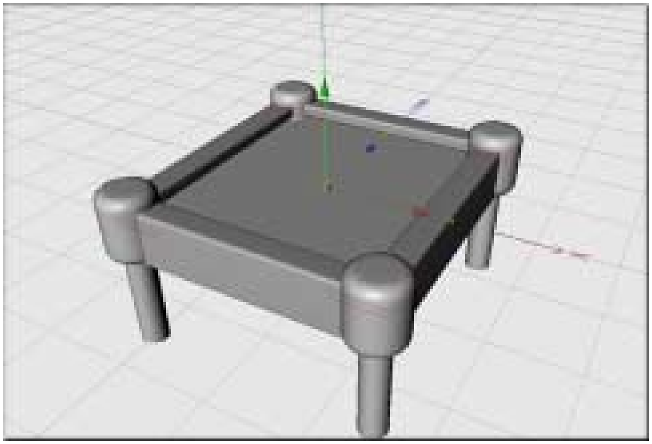
Step 5: Next, move the ShrtTableEdge (within the EdgeL2R hierarchy) into place. Use the Coordinates Manager to move it into place. The settings used here are X=-200m,Y=30m, Z=-180m. Click Apply.

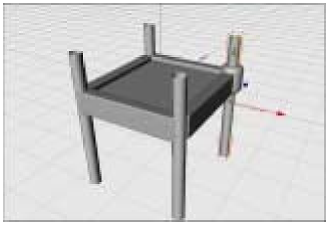




Step 6. Glass Top Parameters

Step 6: Now, resize the GlassTop so it fits inside the frame. Double-click on the GlassTop object in the Object Manager to change X size to 380m. Click OK.



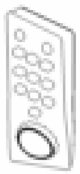

Step 7. Scale Legs

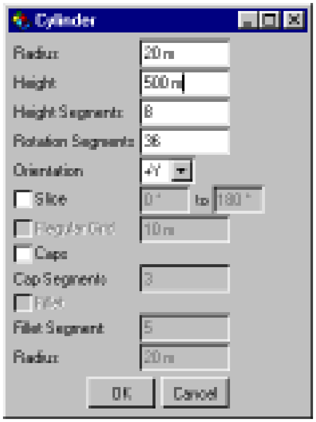
Step 7: So the Lamp sits at reading level, you will need to make the legs a bit longer.

First, remove the TopLeg object from the Leg so you don't modify it as well.

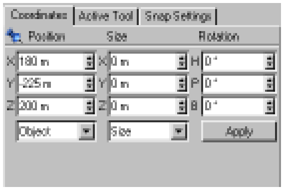
Double-click on the Leg object in the Object Manager to change its Height to 500m. Click OK.

Move the Leg down into position (Y=-225m) and put the TopLeg back into the leg hierarchy.

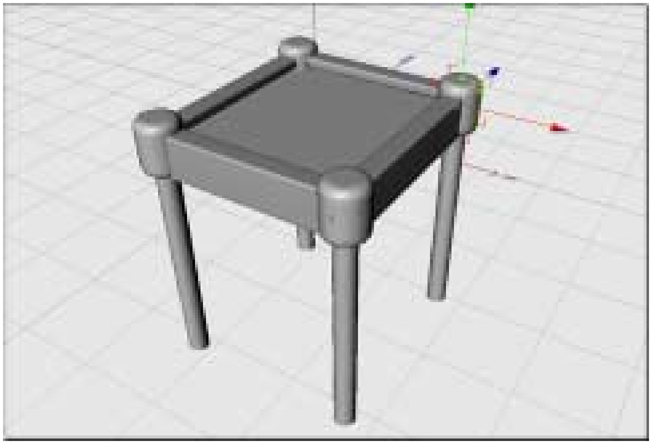




Step 7. Cylinder Parameters



Step 7. Move TopLeg

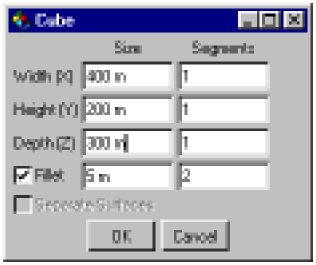


Step 8: Make sure to save your project. Save it as Tables.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling the TV Cabinet

This will be a basic two door television stand cabinet. It doesn't have to be modeled in great detail as the camera will not be moving extremely close to it.

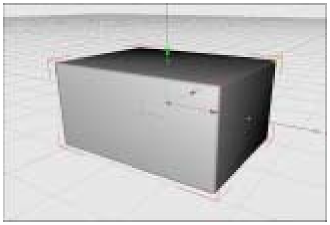


Step 1. Cube Parameters

Step 1: Create a Cube. This will be the cabinet.

Editor: Objects=>Primitive=>Cube
Shortcut: None

Double click on the Cube icon in the Object Manager and change its size to X=400, Y=200, Z=300. Add a fillet to round the edges by clicking the Fillet checkbox and change the settings to 5m with 2 segments. There is no need for a more defined edge, which would cause a higher geometry count. Click OK.



Step 1. Cabinet

Double click on the text "Cube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Cabinet."

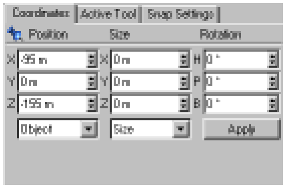
Step 2: Create another Cube. This will be modeled into the doors of the cabinet.

Editor: Objects=>Primitive=>Cube
Shortcut: None

Double click on the Cube icon in the Object Manager and change its size to X=180, Y=200, Z=10. Add a fillet to round the edges by clicking the Fillet checkbox and change the settings to 2m with 2 segments. There is no need for a more defined edge, which would cause a higher geometry count.

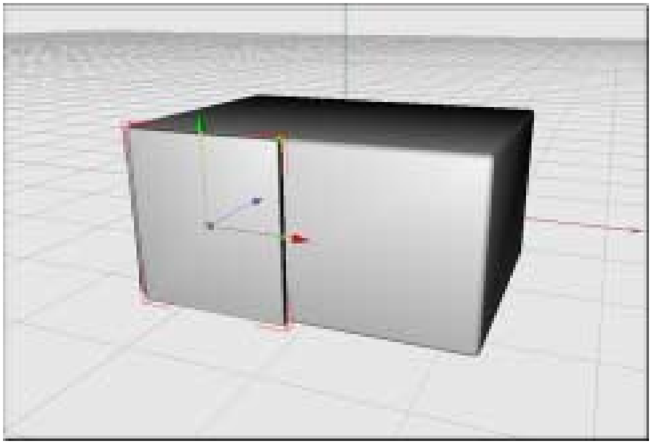
Step 2. Cube Parameters

Double click on the text "Cube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Door."



Step 3. Move Door

Step 3: Move the door to the front-left of the cabinet. The exact coordinates of the position shown are X=-95, Y=0, Z=-155.



Step 4: Create a Symmetry Object.

Editor: Objects=>Modeling=>Symmetry
Shortcut: None

Step 4. Doors

Drag and drop the Door on top of the Symmetry object. The Door will become a child of the Symmetry object, thus creating an exact mirror duplicate. Since the default settings of the Symmetry object Mirror the object on the ZY planes, you will now see two doors on the front of the Cabinet.

Double click on the text "Symmetry" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Doors."

Step 5: Next, you will draw the outside profile of the handles for the doors. First, hide the Cabinet and Doors by clicking twice on the top gray dot to the right of the object in the Object Manager. This will make the objects hidden in the editor window.

Next, change to the Front or Back (XY) view so you are looking straight on your scene.

View: View=>View 4 Shortcut: F4

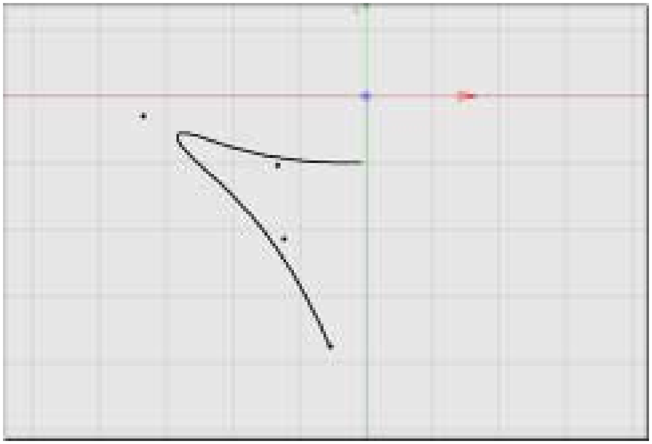
This ensures that as you draw your profile spline for the door handle, you are only making changes on the X and Y axes. That way when you lathe the spline, it will be created evenly around the Y axis.

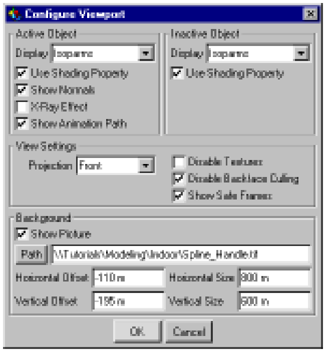
Create a new B-Spline

Editor: Objects=>Create Spline=>B-Spline Shortcut: None

While holding the Control key, click to add points to create the Spline as shown. Make sure to draw your spline as close to the 0, 0, 0 World Coordinate as possible.

The snapping tool might help you create the spline. Once you have created a rough outline, click on the Move Tool to avoid creating additional points. You can now go back and manipulate the points to refine the outline. If you need a template to work from, we have included one on the CD. It is located in the Tutorials Folder: Modeling: Indoor: Spline_Handle.gif.



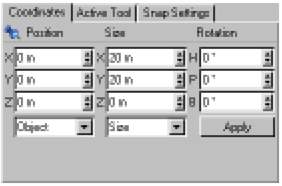


Step 5. Configure Background

To add a tracing template into your view, go to your view Editor Menu: Edit=>Configure. Click on Path to choose the image you want to have as a background picture. Enter -110m for the Horizontal Offset and 195 for the Vertical Offset. Make sure Show Picture is checked and hit OK. The picture you have chosen will show up in the view and you can use it as a template.

Your spline does not have to look exactly the same for the tutorial to work. Feel free to use some creativity and design your own handles.

Resize the final spline to X=20m, Y=20m by choosing Size from the drop down and entering these numbers in the Coordinates Manager.

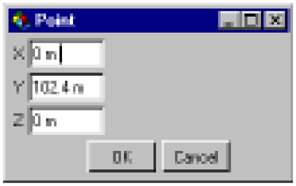


Step 5. Spline Size

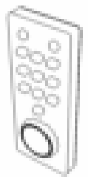
Double click on the text "Spline" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Handle Profile."

Step 6: Now you will need to make sure the top end point is located at X=0. If it is not, there will be irregularities in the middle of your handle.

To do this, double click on the first point. In the X field enter 0.



Step 6. First Point



Step 7: Create a Lathe NURBS

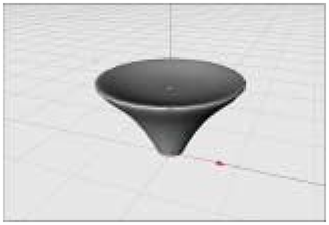
Editor: Objects=>NURBS=>Lathe NURBS
Shortcut: None

Double click on the text "Lathe NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Handle."

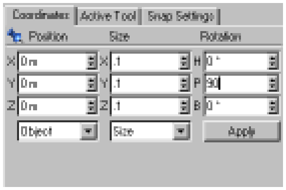
Step 8: Drag and drop the Handle Profile on top of the Lathe NURBS object. The Handle Profile will become a child of the Handle object. You will immediately see your Handle model in the Editor window.

Step 8. Lathe NURBS

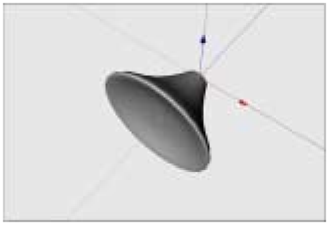
Since NURBS objects are always live, you can still go back and tweak your spline until you are happy with the shape of your handle.



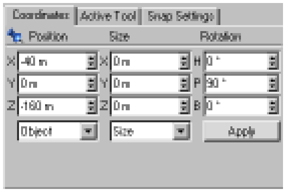
Step 8. Handle Lathe NURBS



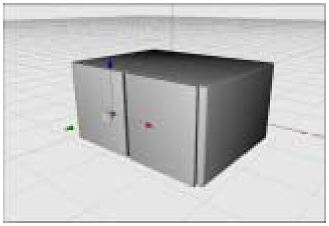
Step 9. Rotate Handle



Step 9. Positioning Handle



Step 10. Move Handle



Step 10. Handle on Door

Step 9: Rotate the Handle 90 degrees on the P axis. The easiest way is, while the Handle is still selected, go to the Coordinates Manager, change the Rotation to 90 degrees and Apply.

You can also do this by approximation using the Rotate Tool

Editor: Tools=>Rotate
Shortcut: R

Rotate the object by clicking and dragging on the scene.

Step 10: Lastly, move the Handle into position. You will want to click once on the red dot to the right of the cabinet and Doors in the Object Manager. This will make the objects appear in the editor window. Now you can use the Move Tool to put the handle into position.

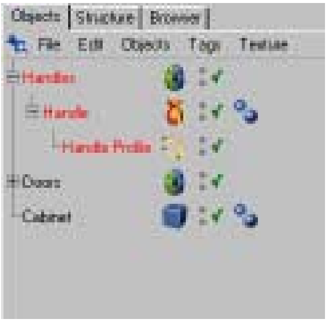
Editor: Tools=>Move
Shortcut: E

The exact coordinates of the position shown are X=-40, Y=0, Z=-160.

Step 11: Create a Symmetry Object.

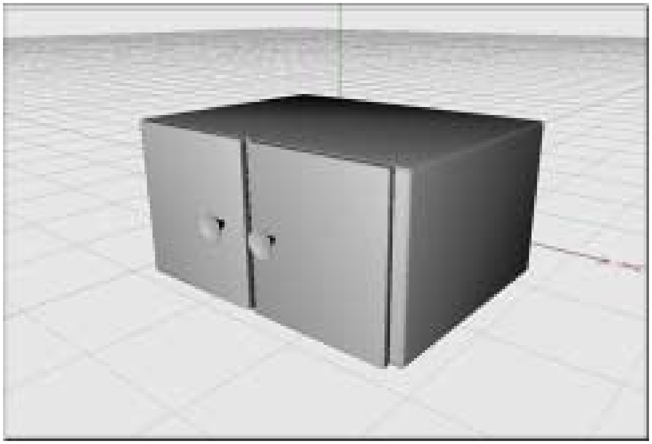
Editor: Objects=>Modeling=>Symmetry
Shortcut: None

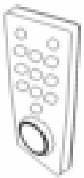
Drag and drop the Handle on the Symmetry object in the Object Manager. The Handle will become a child of the Symmetry object. Since the default settings of the Symmetry object mirror the object on the YZ planes, you will now see two handles on the doors of the Cabinet.



Step 11.Object Manager

Double click on the text "Symmetry" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Handles."





Step 12. Object Manager

Step 12: To make it easy to transfer this model in one piece to the final scene, Group all of the objects together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around all the objects and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "TVCabinet."

Step 13: Make sure to save your project as TV Cabinet.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling the Television

The television will not be a real focal point of the scene, so there is no need to make it highly detailed.

Step 1: Open a new project and create a Cube.

Editor: Objects=>Primitive=>Cube
Shortcut: None

Double click on the Cube icon in the Object Manager to change the settings. It should be 200m in width, height and depth, ten segments each. Click OK.

This will be the screen of the television.

Step 2: Create a Wrap Deformation. A Wrap deformation wraps the geometry being affected around an imaginary cylinder or sphere. When you add it to the scene, you will see a flat plane representing how and where the geometry will be stretched and wrapped.

Editor: Objects=>Deformation=>Wrap
Shortcut: None

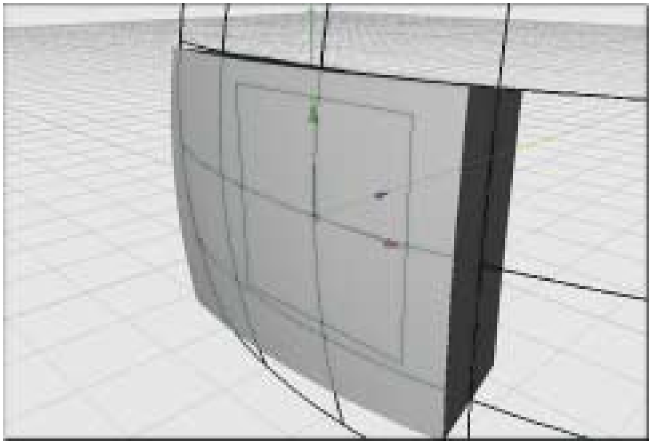
Double click on the text "Cube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Screen."

Double click on the Wrap icon in the Object Manager to change the settings. Leave the size to the default Width=400m, Height=400m. Set the Radius to 800m. This is the size of the imaginary object you are wrapping on. Choose a Spherical Wrap. This is the shape you are wrapping on.

Change the Longitude settings to Start=225 degrees and End=315 degrees. Change the Latitude settings to Start=-35 degrees and End=35 degrees. Just like a globe, these settings define the actual location of the corner points of the plane defining the wrap.

Leave the Movement 0m and Scale Z=100% as default. Change the Tension to 50%. This causes a fade between what is deformed and not deformed. Click OK.

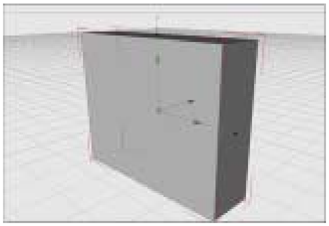
Step 3: Drag and drop the Wrap deformation on top of the Screen object. The Wrap will become a child of the Screen. You will notice that the Screen appears to have changed in the Editor Window as the Wrap deformation affects it.



Hide the Screen by clicking the top gray dot to the right of the Screen icon in the Object Manager until it turns red.

Step 4: Create another Cube.

Editor: Objects=>Primitive=>Cube
Shortcut: None

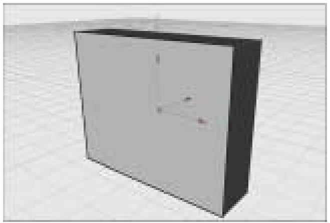


Step 4. Body Cube

This will be the body of the television. Double click on the text "Cube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Body."

Double click on the Cube icon in the Object Manager to change the settings. Change the Width to 750m, the Height to 600m and leave the Depth at 200m. One segment for each is fine.

Delete the smoothing tag on the Body cube.



Step 5. Select Front Face

Step 5: Before you can modify the Body (other than its parametric settings), you have to make it editable.

Editor: Structure=>Make Editable
Shortcut: C

Make sure the Body is selected in the Object Manager and activate the polygon tool.

Editor: Tools=>Polygons
Shortcut: None

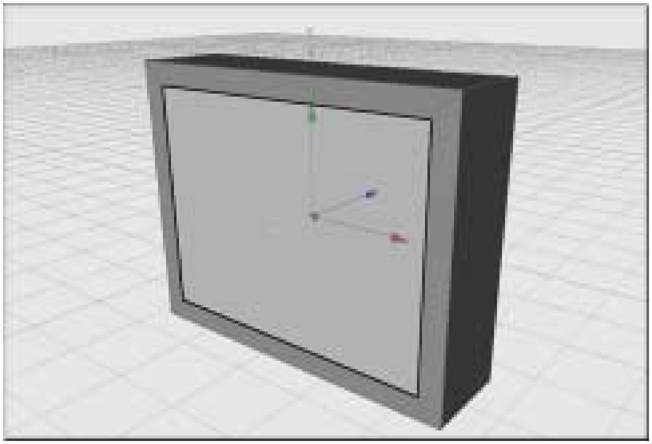
Select the Body's front face as shown.

Editor: Selection=>Live Selection
Shortcut: None

Step 6: With that polygon selected, choose the extrude inner tool and create a new smaller polygon on its face.

Editor: Structure=>Extrude Inner
Keyboard Shortcut: I

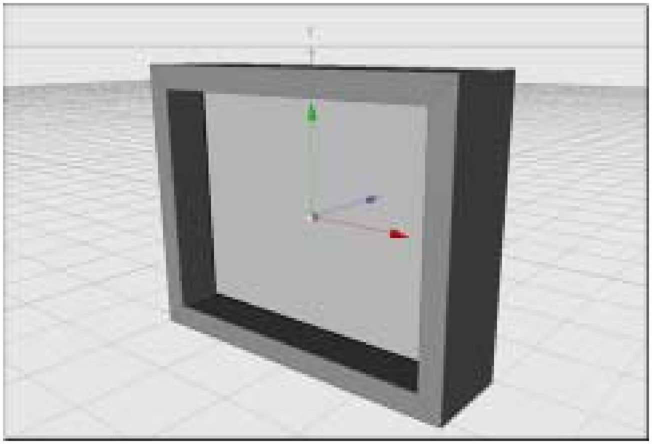
You can extrude it by approximation by clicking and dragging. You can enter 50m in the Offset of the Active Tools Window. This insets the face you have selected 50m from the original edge.

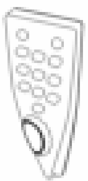


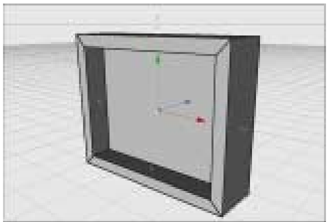
Step 7: Now create an inward extrusion where the screen will go. With that polygon still selected, choose the extrude tool and move it in.

Editor: Structure=>Extrude
Shortcut: D

You can extrude it by approximation by clicking and dragging. You can enter -100m in the Offset of the Active Tools Window. This offsets the face you have selected -100m from the object.







Step 8. Select All

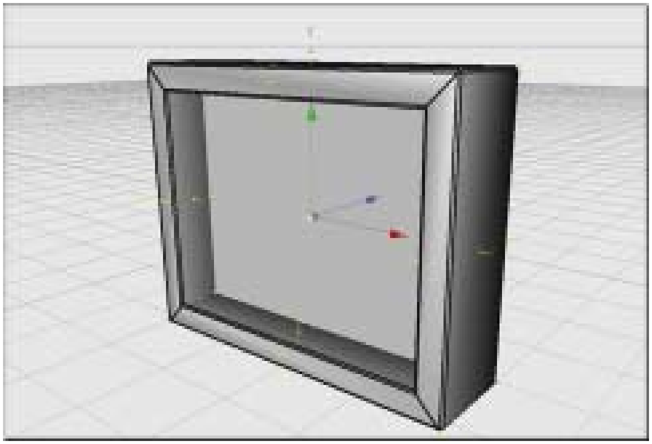
Step 8: Next you will add a nice beveled edge between all the faces. Select all the polygons that make up the object.

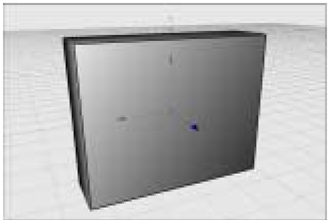
Editor: Edit=>Select All
Shortcut: Ctrl+A (pc) / Cmd+A (mac)

Use the Smooth Shift tool to spread the polygons apart while creating edges.

Editor: Structure=>Smooth Shift
Shortcut: None

You can smooth shift it by approximation via clicking and dragging. You can enter 5m in the Offset of the Active Tools Window. This shifts the faces you have selected 5m from the object.





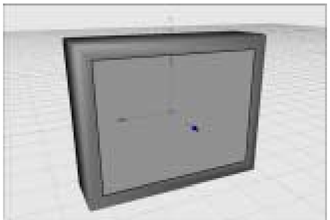
Step 9. Select Back Face

Step 9: Now add the tube and components that normally stick out the back of the television. The first thing you'll need to do is deselect all the polygons.

Editor: Edit=>Deselect All
Shortcut: Ctrl+Shift+A (pc) / Shift+Cmd+A (mac)

Select the back face polygon and choose the extrude inner tool and create a new smaller polygon on its face.

Editor: Structure=>Extrude Inner
Keyboard Shortcut: I



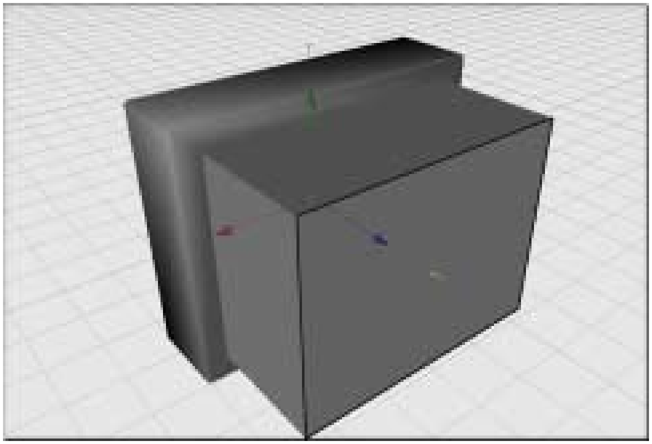
Step 9. Extrude Inner

You can extrude it by approximation via clicking and dragging. You can enter 50m in the Offset of the Active Tools Window. This insets the face you have selected 50m from the original edge.

Step 10: With that polygon still selected, choose the extrude tool and move it out 300m.

Editor: Structure=>Extrude
Shortcut: D

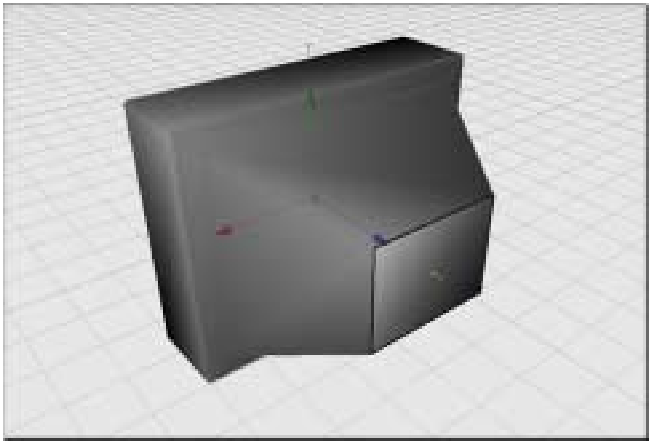
You can extrude it by approximation by clicking and dragging. You can enter 300m in the Offset of the Active Tools Window. This offsets the face you have selected 300m from the object.



Step 11: Scale this polygon to about half of its current size. You can do this a few different ways depending on what you are trying to accomplish. You can select the Scale Tool, and scale the polygon down by hand. Or you can add "/2" after the current value into the Size X and Y fields of the Coordinates Manager. The program will do the math for you when you click Apply or hit Enter. However, the easiest way to do it, if it is a uniform scale on all axes, is to use the Normal Scale Tool.

Editor: Structure=>Normal Scale
Shortcut: None

In the dialogue enter 50% and click Apply.

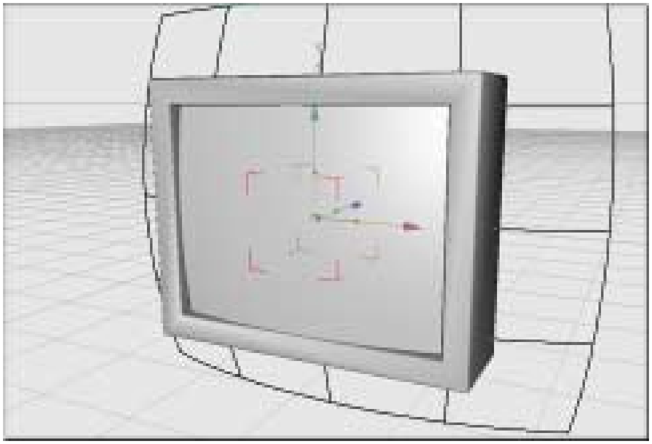


Step 12.

Step 12: Move that selected polygon down slightly. You can do this easily by adding -50m to the Position Y field and again CINEMA 4D will make the adjustment for you.

Step 13: Lastly, bring the two elements together. Unhide the Screen. Just click the top dot to the right of the Remote icon in the Object Manager until it changes from red back to gray.

Move the Screen -10m on the Z axis.



Step 14: Group the Body and Screen together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the buttons and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "TV."

Step 15: Make sure to save your project as TV.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling a Framed Picture

Step 1: Open a new project and change to the Front or Back (XY) view so you are looking straight on your scene.

View: View=>View 4
Shortcut: F4

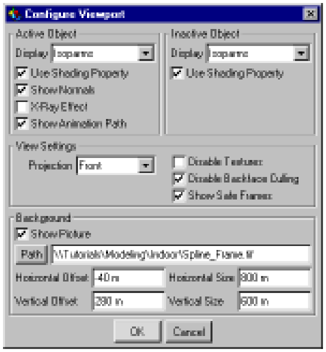
This ensures that as you manipulate the object, you are only making changes on the X and Y axes.

Step 2: First you will draw the profile of the frame. Create a new Bezier Spline

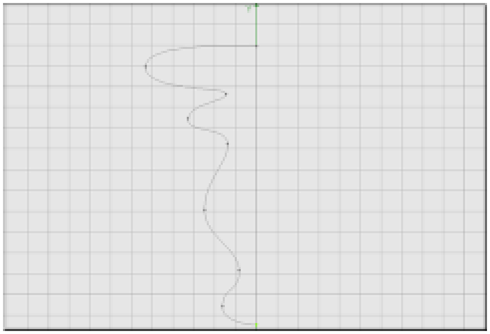
Editor: Objects=>Create Spline=>Bezier
Shortcut: None

You'll notice the program automatically switches your active tool to the Points Tool. Next, while holding the Control key, click and drag to add points with handles to create the Spline as shown on the facing page.

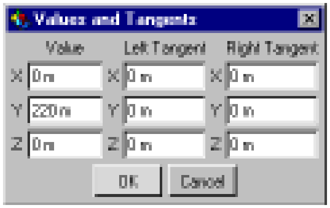
Once you have created a rough outline, you can go back and manipulate the Bezier handles to refine the outline. If you need a template to work from, we have included one on the CD. It is located in the Tutorials Folder: Modeling: Indoor: Spline_Frame.gif.



Step 2. Configure Background



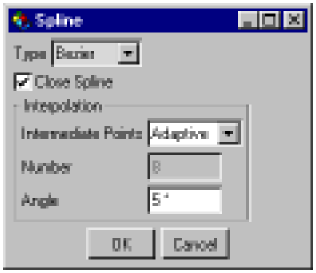
Tip: To add a tracing template into your view, go to your view Editor Menu: Edit=>Configure. Click on Path to choose the image you want to have as a background picture. Enter -40m for Horizontal Offset and 280m for the Vertical Offset. Make sure Show Picture is checked and hit okay. The picture you have chosen will show up in the view and you can use it as a template.



Step 3. First Spline Point

Your spline does not have to look exactly the same for the tutorial to work. Feel free to use some creativity and design your own picture frame profile.

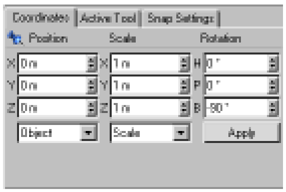
Step 3: When you are happy with the shape, choose the Move Tool and double-click on the first spline point. In its dialog, make sure the X value and the Tangents are all set to 0 . This will ensure that the profile will remain flat on the backside of the frame. Then repeat this for the last point of the spline.



Step 4. Spline Parameters

Step 4: Double-click on the Spline object in the Object Manager. In its dialog, click Close Spline. This closes the profile, so that there is a flat back to your frame.

Resize the Spline by choosing size from the Coordinates Manager and entering X=50m Y=150m.



Step 5. Rotate Profile

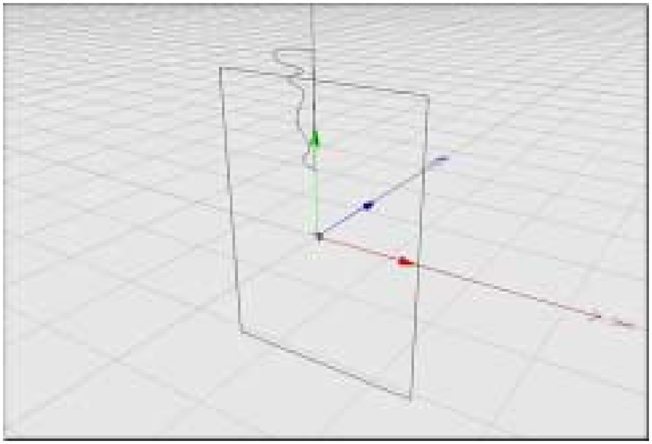
Step 5: To make sure the profile is facing the right direction, you need to rotate it on its B axis. Choose the Axis Tool and enter -90 degrees on the B axis in the Coordinates Manager and click Apply.

Step 6. Rectangle Parameters

Step 6: Now that you have the picture profile, run it along a rectangle path. Create a Rectangle Spline.

Editor: Objects=>Spline Primitive=>Rectangle
Shortcut: None

Double-click on the Rectangle in the Object Manager and change its size to Width 275 and Height 375. This makes it in relative proportion to the image we will be using.



Step 7: Create a Sweep NURBS object

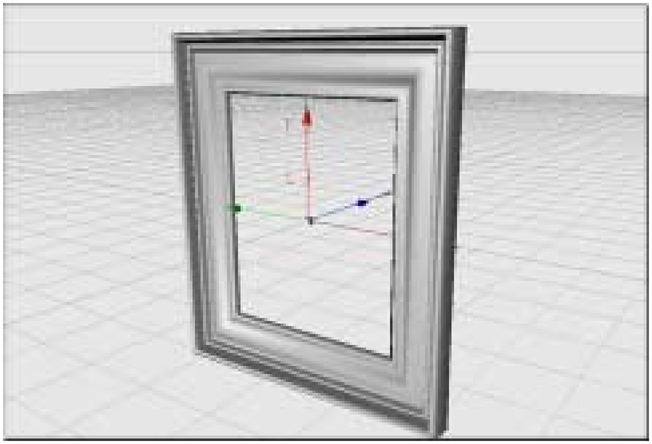
Editor: Objects=>NURBS=>Sweep NURBS
Shortcut: None

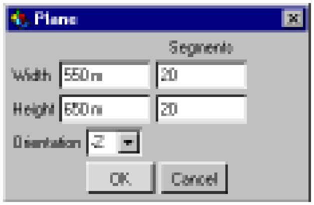
Step 8: Drag and drop the Rectangle and the Spline on top of the Sweep NURBS. For the expected results, the objects have to be in the correct order — first Spline, then Rectangle — underneath the Sweep NURBS object. You will immediately be presented with your frame.

Tip: A good rule to remember the order objects should be in when using a Sweep NURBS is, the top object is being swept along the bottom object(s).

Step 8. Sweep Nurbs

Anytime you want to resize or reshape the frame, you can do so by changing the rectangle within.



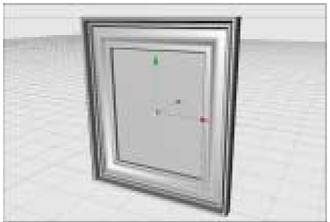


Step 9. Plane Properties

Step 9: Lastly, you'll put the backing on the frame where the picture will be placed. Create a new plane primitive.

Editor: Objects=>Primitive=>Plane
Shortcut: None

Double-click on its icon in the Object Manager, and change its width and height to the suit the frame (Width 550, Height 650). Make sure orientation is set to -Z and click OK.

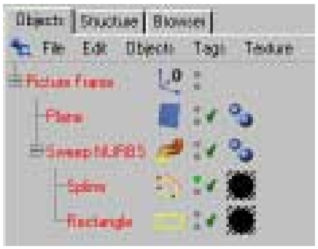


Step 10. Position Plane

Step 10: Position the Plane onto the back of the Sweep NURBS.

Step 11: Group all the objects together.

Object Manager: Objects=>Group Objects
Shortcut: G



Step 11. Object Manager

Draw a marquis around all the objects to group them together. A Null Object with all the Objects contained within will appear.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Picture Frame."

Step 12: Save your project as Picture Frame.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling the Room

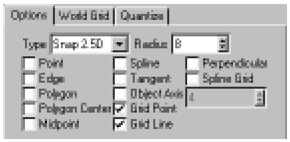
Step 1: Open a new project and change to the Top (XZ) view so you are looking straight down on your scene.

View: View=>View 2
Shortcut: F2

This ensures that, as you create the spline that defines the walls of the room, you are only making changes on the X and Z axes.

Zoom out on this view so you can see a grid of 16x16 squares.

Editor: Tools=>Magnify
Shortcut: None



Step 2. Snap Settings

Step 2: Turn on the Snapping Tools by going to the Snap Settings and clicking the Enable Snapping checkbox. You can leave the other settings at default as we do wish to snap to the grid and grid points for this project.

Step 3: First you will draw splines to define the walls of the room. Create a new Spline

Editor: Objects=>Spline Object
Shortcut: None

Double click on the Spline icon in the Object Manager and change the Type of spline to Linear. This will enable you to create a spline with straight lines and sharp edges.

Double click on the text "Spline" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Top Spline."

Switch to the Points tool. While holding the Control key, click to add points to create the Spline as shown. The snapping tool will automatically make sure you are locking the points to the intersections in the grid.

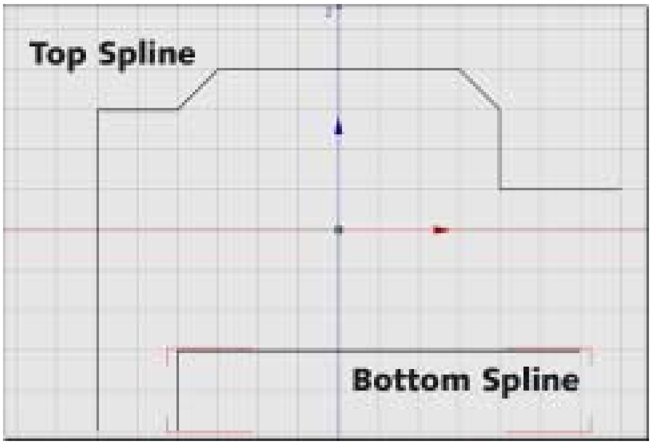
Step 4: Create another Spline

Editor: Objects=>Spline Object
Shortcut: None

Double click on the Spline icon in the Object Manager and change the Type of spline to Linear. This will enable you to create a spline with straight lines and sharp edges.

Double click on the text "Spline" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Bottom Spline."

While holding the Control key, click to add points to create the Spline as shown. The snapping tool will automatically make sure you are locking the points to the intersections in the grid.



It's best to create the two splines in a circular fashion. If you start from the left for the top spline, you will need to start from the right with the bottom spline. Later, when we connect the two splines you will see why.

Step 5: Drag and drop the Top Spline on top of the Bottom Spline object. The Top Spline will become a child of the Bottom Spline object.

Step 6: Now you will connect the two splines together as one object. With the Bottom Spline selected, use the Connect Tool.

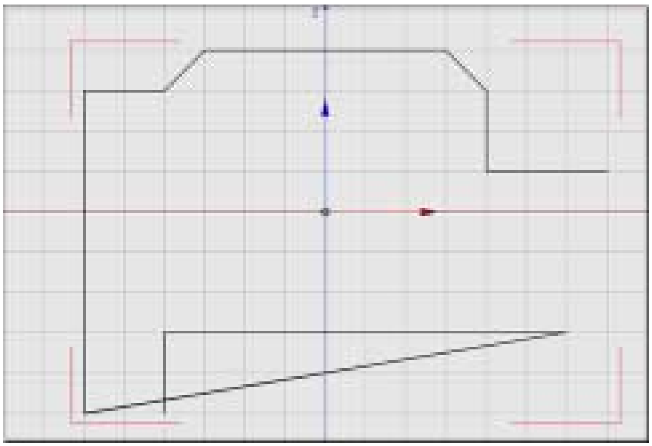
Editor: Functions=>Connect
Shortcut: None

In the Object manager, you can see a new Spline based on the other two.

To hide the original Top and Bottom Splines, just click on the top gray dot in the Object Manager just to the right of the Bottom Spline twice. It will change to Red indicating it is now hidden in the Editor Window.

Step 7: Next, join the segments of this new spline. With the new Spline selected, select all (Ctrl-A) and use the Join Segment tool.

Editor: Structure=>Edit Spline=>Join Segment
Shortcut: None



If you did not create your splines in a circular fashion, the results of your join will look like this. Both of these two splines were created from left to right. When you join the two segments, it connects the last point on the first segment to the first point on the next segment.

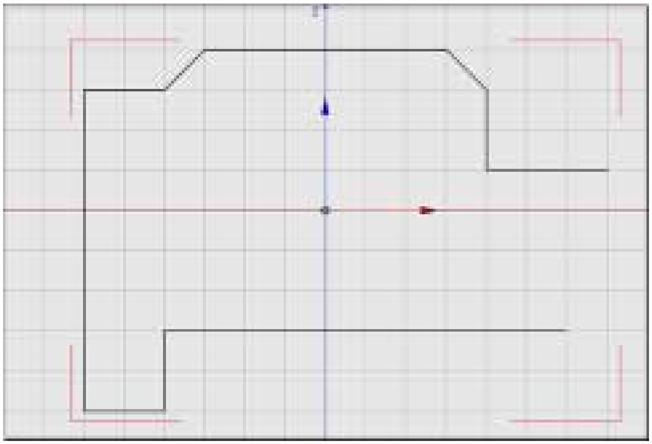
Don't worry, if this happens. It's easy to fix. Delete the new spline created when you connected the two together. Go back to the original Bottom Spline and select all the points. The Points Tool should still be active.

> Editor: Edit=>Select All
> Shortcut: Ctrl+A (pc) / Cmd+A (mac)

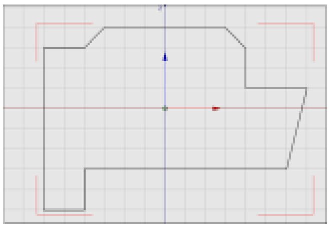
With all the points selected, reverse the order of the points with the Reverse Sequence tool.

> Editor: Structure=>Edit Spline=>Reverse Sequence
> Shortcut: None

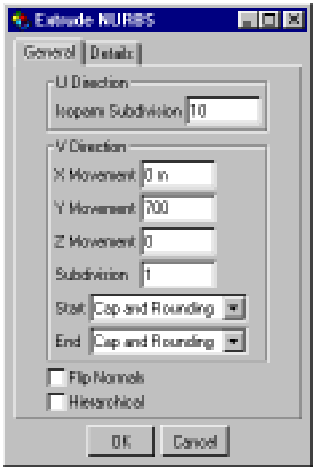
Now repeat Steps 6 and 7 and you should get the correct results.



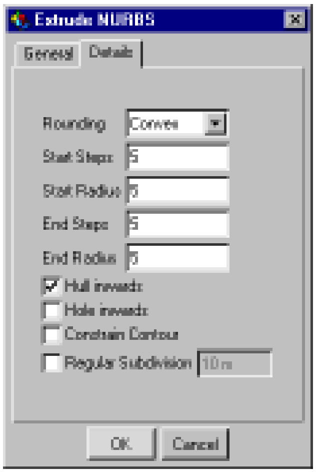
Step 8: Double click on the icon for the new Spline in the Object Manager and click Close Spline. Click OK and you have a closed spline defining the shape of your room.



Step 8. Close Spline



Step 9. Extrude Nurbs General



Step 9. Extrude Nurbs Detail

Double click on the text "BottomSpline.1" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Room Profile."

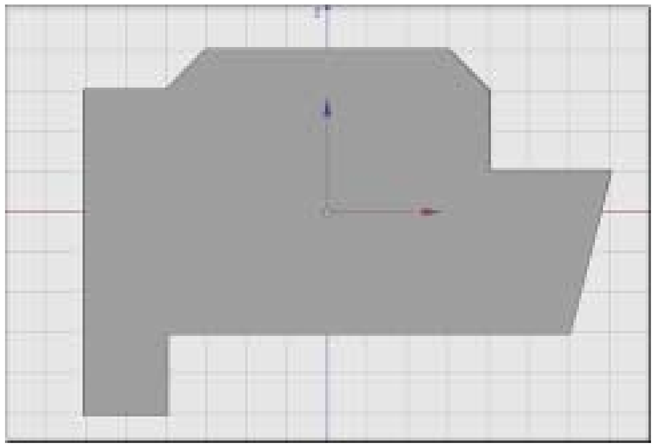
Step 9: Create an Extrude NURBS Object

Editor: Objects=>NURBS=>Extrude NURBS
Shortcut: None

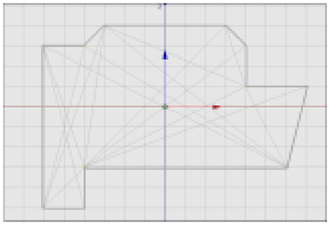
Double click on the Extrude NURBS icon in the Object Manager to change the settings. On the General page, enter an extrusion of 700m on the Y axis. Change the Start and End settings to Cap and Rounding. On the Details page, set Start Steps, Start Radius, End Steps and End Radius to 5. Click OK.

Double click on the text "Extrude NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Room."

Step 10: Drag and drop the Room Profile spline on top of the Room object. Immediately you will see the results in the editor window.



Since NURBS objects are always live, you can still go back and tweak your spline until you are happy with the shape of your room.



Step 11. Select all points

Step 11: Now add a tiny bit of rounding to the corners of the walls. In 3D, everything has a sharp corner and thus is not realistic looking unless you soften it.

First, select all the points of the Room Profile spline. First, make sure the Points Tool is selected.

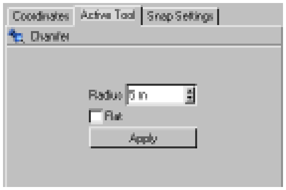
Editor: Tools=>Points
Shortcut: None

Then, use Select All to select all of the points.

Editor: Edit=>Select All
Shortcut: Ctrl+A (pc) / Cmd+A (mac)

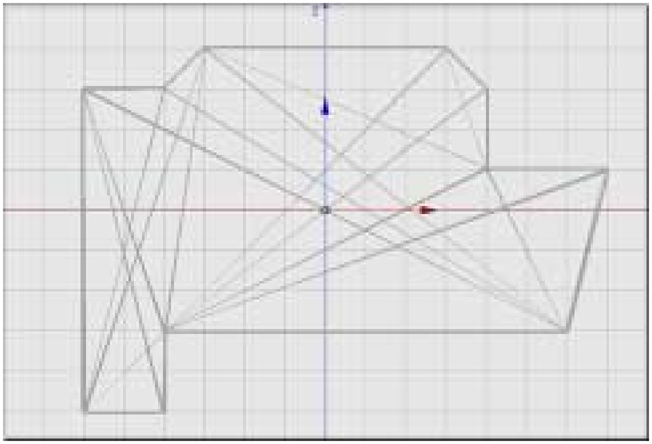
With all the points selected, choose the Chamfer Tool.

Editor: Structure=>Edit Spline=>Chamfer
Shortcut: None



Step 11. Chamfer Active Tool

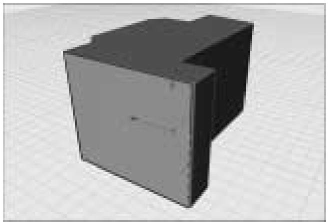
Use the Active Tools dialog to apply (Click Apply) a 5m radius chamfer to the spline. This will give the walls slightly rounded (realistic) looking edges on the corners.



You will notice the walls change slightly in the Editor window.

Step 12: Now to create a window in the room. First you will have to make the Room model editable. With the Room model selected, choose Make Editable.

Editor: Structure=>Make Editable
Shortcut: C


Step 13. Select this polygon

Step 13: Activate the Polygon Tool.

Editor: Selection=>Live Selection
Shortcut: None

You may want to switch to a four-view mode or two views using Perspective and Left as your views.

View: View=>Panels=>2 Views Side by Side
Shortcut: None

Then, select the wall on the left of the room (or furthest position on -X) as shown.


Step 14. Knife the wall

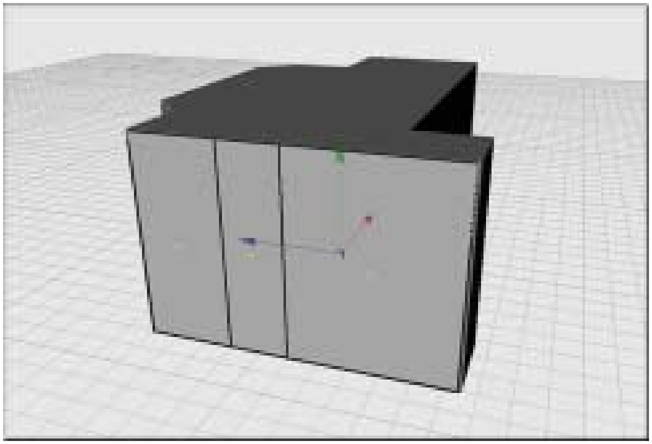
Step 14: Now cut this polygon with the knife tool to create a window. First, activate the Snapping Tool so you will make straight cuts. Go to the Snap Settings dialog and click on the Enable Snapping checkbox. You can leave the other settings at default. As before, you want to snap to the grid.

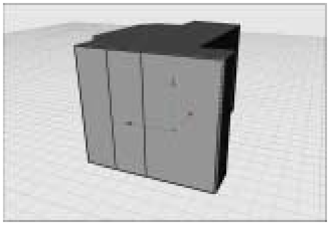
With that single wall polygon selected, choose the Knife Tool.

Editor: Structure=>Knife
Shortcut: K

Make sure in the Active Tool settings the Constrain Angle is still at the default 45 degree and the Restrict to Selection checkbox is still active.

Make two straight vertical cuts on the polygon, both 100m (one grid line) on either side of the World Coordinates axes.




Step 15. Select center polygon

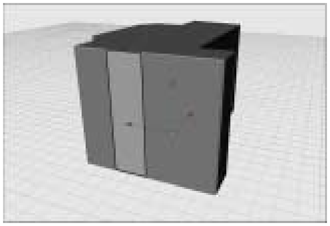
Step 15: Go back to your Live Selection Tool.

Editor: Selection=>Live Selection
Shortcut: None

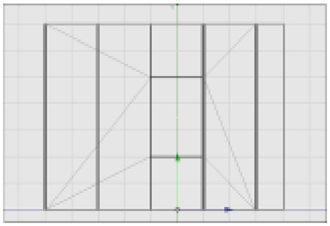
Select the center polygon you have just created. You can deselect the two outside polygons by holding the Control key while clicking on the outside polygons. This removes them from the selection set.

Choose the Knife Tool again.

Editor: Structure=>Knife
Shortcut: K

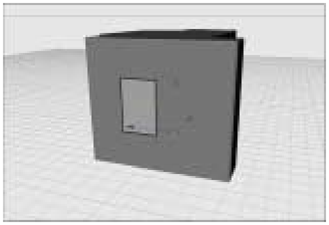

Step 16. Two horizontal cuts

Make two straight horizontal cuts on the center polygon, 200m (two grid lines) from the top and 200m from the bottom.


Step 16. Knife results

Step 16: Go back to your Live Selection Tool.

Editor: Tools=>Polygons
Shortcut: None



Step 16. Select the centermost polygon

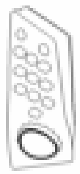
Select the new centermost polygon you have just created. You can do this by deselecting the two outside polygons by holding the Control key while clicking on the outside polygons to remove them from the selection set.

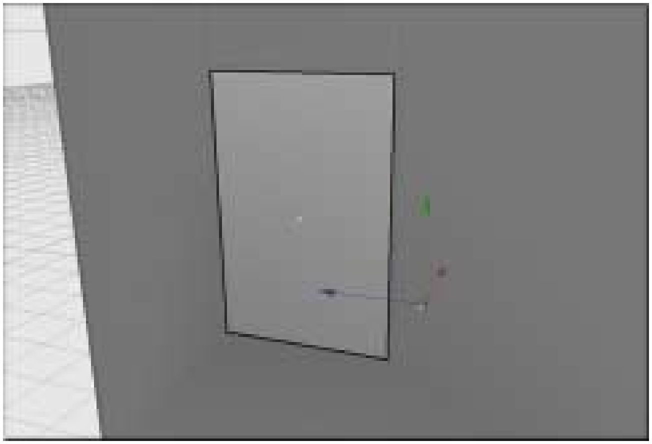
With that polygon selected, choose the Bevel Tool.

Editor: Structure=>Bevel
Shortcut: None

Use the Active Tools dialog to apply the default settings (Click Apply) of 5m. This will indent the window slightly.

Step 16. Bevel Active Tool Dialog





Step 17: Now to define the window and window ledge. Turn off the Snapping Tool — go to the Snap Settings dialog and click off Enable Snapping. At this point, you do not want it to snap to the grid.

Step 17. Knife again

Choose the Knife Tool again.

Editor: Structure=>Knife
Shortcut: K

Make two straight horizontal cuts on the center polygon, roughly 30m (one-third of a grid line) from the top and bottom of the polygon.

To make sure your cuts are straight, you can hold the Shift key. This will lock your cuts to the angle defined in the Active Tools setting (45 degrees by default).

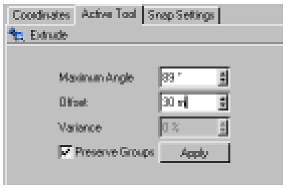
Step 18. Select this polygon

Step 18: Choose your Live Selection Tool.

Editor: Selection=>Live Selection
Shortcut: None

Again, select the new centermost polygon you have just created. You can do this by deselecting the top and bottom polygons by holding the Control key while clicking on the outside polygons to remove them from the selection set.

The new cuts are a bit smaller, so you may need to zoom in so you can deselect them without losing your whole selection.

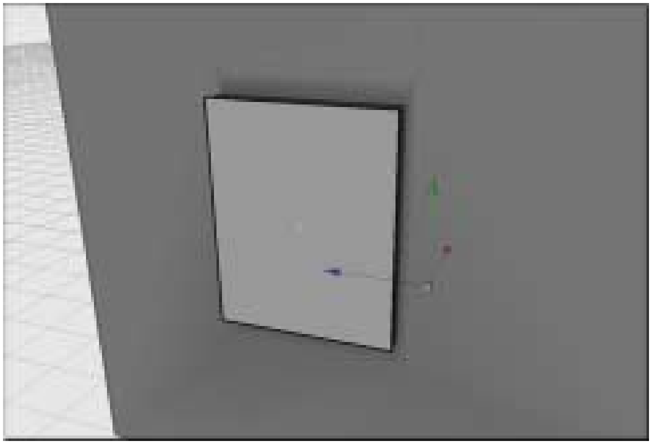


Step 18. Extrude Active Tool

Extrude this selection out approximately 30m

Editor: Structure=>Extrude
Shortcut: D

You can extrude it by approximation by clicking and dragging. Or you can enter 30m in the Offset of the Active Tools Window. This offsets the polygon you have selected 30m from the object.



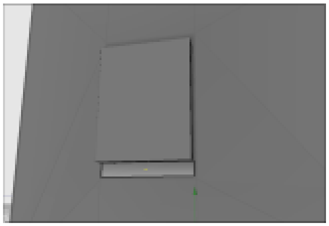
Step 19. Set Selection

Step 19: With this polygon still selected, save it so you can later place a window material on it.

Editor: Selection=>Set Selection
Shortcut: None

Certainly you could cut a hole in the wall to make a window, but you would have to later put geometry back into the hole to make it look like there is glass in the hole. So it is best just to save the polygon as a separate selection and later attach a glass material to it.

Double click on the triangle icon to the right of the Room model and give the selection a name … Window.

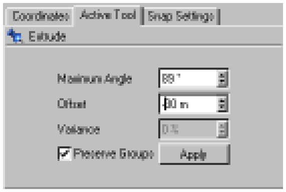


Step 20. Select this polygon

Step 20: Now to finish off with the window ledge. With your Live Selection Tool still active, select the polygon just below the window polygon.

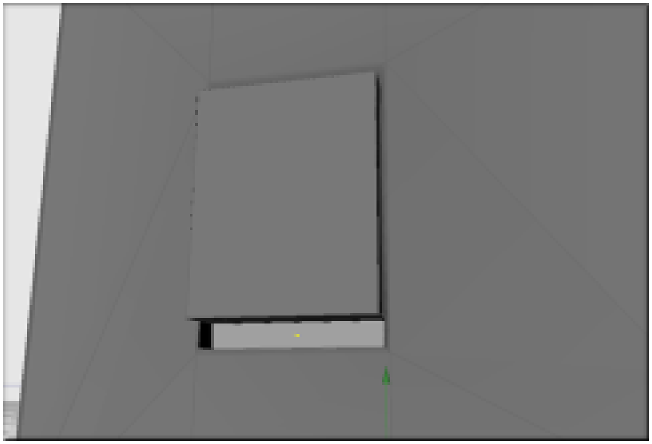
Extrude this selection in approximately -30m

Editor: Structure=>Extrude
Shortcut: D



Step 20. Extrude Active Tool

You can extrude it by approximation by clicking and dragging. Or you can enter -30m in the Offset of the Active Tools Window. This offsets the polygon you have selected -30m from the object.



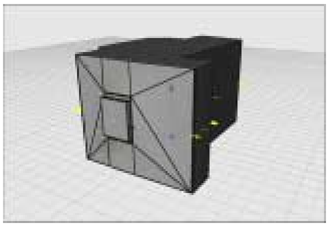
Step 21: Lastly, you're going to have to fix the normals of the Room model so the scene shades properly. By default, the normals of the model point outwards. However, since you will be rendering this scene from inside the Room model, you're going to have to switch those normals around.

Make sure your Polygon Tool is active.

Editor: Tools=>Polygons
Shortcut: None

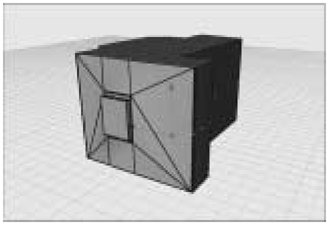
Select all the polygons of the Room model. Make sure the Room model is selected in the Object manager and use Select All to select all of the polygons.

Editor: Selection=>Select All
Shortcut: None



Step 21. Select all Polygons

You'll notice that the yellow lines indicating the direction of the normals are pointing outward.



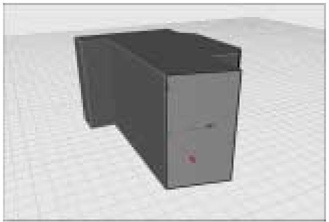
Step 21. Normal point inwards

Reverse the normals.

Editor: Structure=>Reverse Normals
Shortcut: None

The yellow lines indicating the direction of the normals will now point inwards.

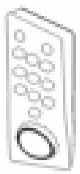
Step 22: You can always move your camera inside the room, but to make it easier, you're going to remove a wall that is not needed (e.g. will not be seen by the camera). In your perspective view rotate your scene until you can easily access the right wall (the one parallel to the window).



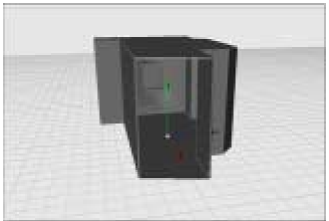
Step 22. Select this polygon

Choose the Live Selection Tool.

Editor: Selection=>Live Selection
Shortcut: None



Select just the polygon that defines that wall and delete it. You will instantly be able to see into the room.



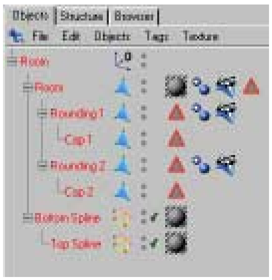
Step 22. Delete polygon

Step 23: Group all of the Room models into a single group.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around all the objects, except the Camera and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Room."



Step 23. Object Manager

Step 24: Save your project as Indoor Scene.

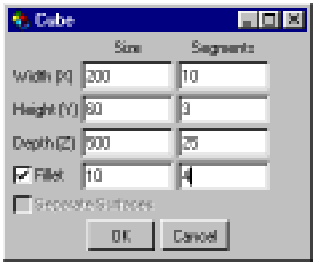
Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling the TV Remote

It's important to know that you will be animating this remote later. How you model it affects how well it looks when animated. If the subdivisions are not high enough, it may tear when manipulating. If the subdivisions are too high, it might be too difficult to work with practically.

Step 1: Open a new project and create a Cube.

Editor: Objects=>Primitive=>Cube
Shortcut: None

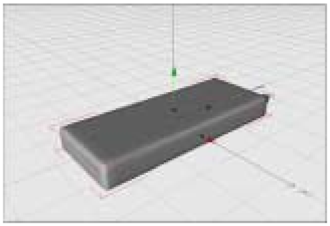


Step 1. Cube Parameters

Double click on the text "Cube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Body."

Double click on the Cube icon in the Object Manager to change the settings. It should be 200m in width, 60m in height and 500m in depth. So that it deforms well for animation later, change the Segments to W=10, H=3, D=25. Last, add Fillet to smooth the edges — Fillet=10m, with 4 Segments.

An object with one Segment, after made editable, has only one polygon defining that surface. If you apply a deformation to an object with one Segment on each axis and deform it, the geometry will tear. So if you know you will be modifying the shape of a parametric, it's best to increase the Segments. How many Segments depends on how much you will be changing it.



Step 1. Remote Body

The more Segments a model has in it, the more complex it becomes. On a Fillet, the more Segments that are in it, the smoother the transition from one edge to the next.

Step 2: Before you can modify the Body (other than its parametric settings), you have to make it editable.

Editor: Structure=>Make Editable
Shortcut: C

Step 3: The next step is to create the inset area where the buttons are located. Make sure the Body is selected in the Object Manager and activate the polygon tool

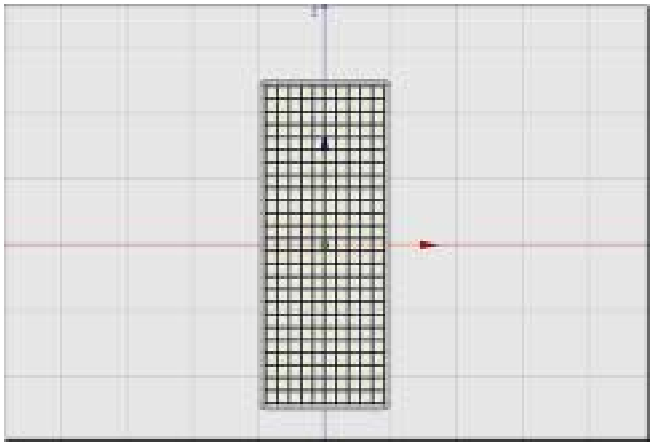
Editor: Tools=>Polygons
Shortcut: None

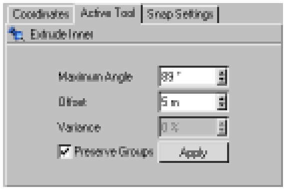
Change to the Top or XZ view.

View: View=>View 2
Shortcut: F2

Select all the polygons that define the top face of the remote right up to the edge of the Fillet as shown. One easy way of doing this is to use the Rectangle Selection tool with Tolerant Selection turned on in the Active Tool dialog. Make sure Select Only Visible is still active.

Editor: Selection=>Rectangle Selection
Shortcut: None



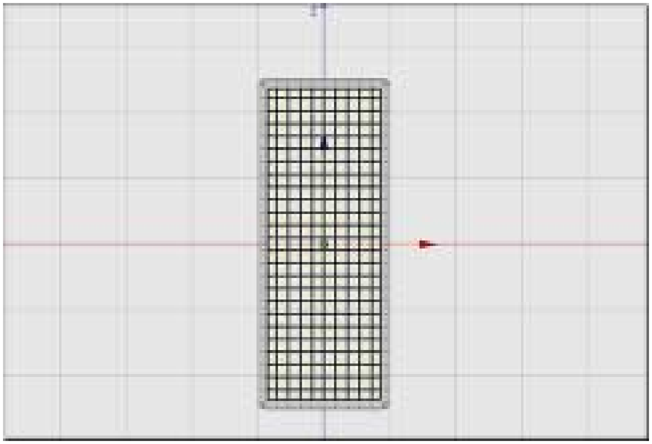


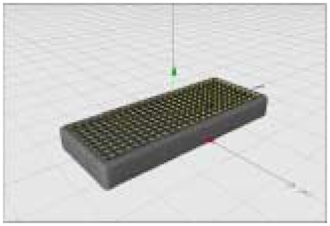
Step 4. Extrude inner Active Tool

Step 4: With those polygons selected, choose the Extrude Inner tool and extrude them in as a group about 5m.

Editor: Structure=>Extrude Inner
Keyboard Shortcut: I

You can extrude it by approximation, or you can enter 5m in the Offset of the Active Tools Window. This insets the group of polygons selected 5m.

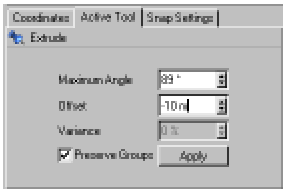




Step 5. Extrude

Step 5: Now you will want to inset that face a bit. With that group of polygons still selected, use the Extrude tool to move the polygon group in a bit.

Editor: Structure=>Extrude
Shortcut: D



Step 5. Extrude Active Tool

You can extrude it in by hand, or you can enter -10m in the Offset of the Active Tools Window. This moves the whole group of polygons down 10m.

Step 6. Set Selection

Step 6: With this group of polygons still selected, save it so you can later place a faceplate material on it.

Editor: Selection=>Set Selection
Shortcut: None

Double click on the triangle icon to the right of the Body model and give the selection a name … FacePlate.

Step 7: Next, you will put a groove along the edge of the Body, where the front and back faceplates would meet. Make sure the Polygon Mode is still selected.

Editor: Tools=>Polygons
Shortcut: None

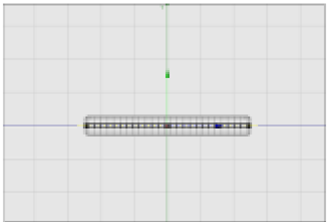
Change to the Side or YZ view.

View: View=>View 3
Shortcut: F3

Step 7. Rectangle Selection Tool

Use the Rectangle Selection tool with Tolerant Selection and Select Only Visible turned off in the Active Tool dialog.

Editor: Selection=>Rectangle Selection
Shortcut: None

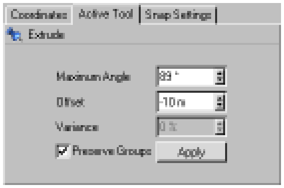

Step 7. Selection

Select the center row of polygons all the way around the side of the Body.

If you want to make sure you have all the polygons you need selected, you can turn off the visibility of all unselected polygons with the Hide Unselected tool.

Editor: Selection=>Hide Unselected
Shortcut: None

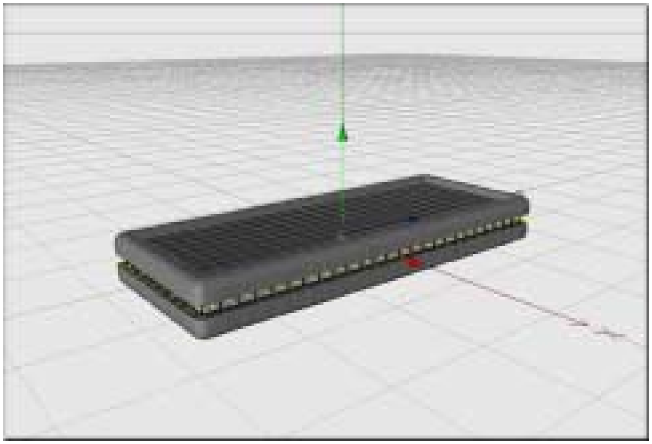
When you‘re satisfied with your selection, you can use Unhide all to view all the polygons again.



Step 8. Extrude Active Tool

Step 8: Now extrude this group in to create a ridged valley.

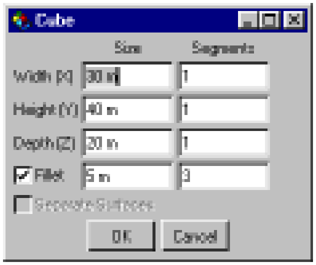
Editor: Structure=>Extrude
Shortcut: D



You can extrude it in by hand, or you can enter -10m in the Offset of the Active Tools Window. This moves the whole group of polygons in 10m.

Step 9: Now to make the buttons. Create another Cube.

Editor: Objects=>Primitive=>Cube
Shortcut: None

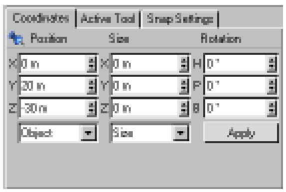


Step 9. Cube Parameters

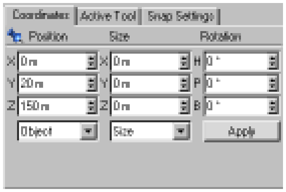
Double click on the text “Cube” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “SquareButton.”

Double click on the Cube icon in the Object Manager to change the settings. It should be 30m in width, 40m in height and 20m in depth. Add a Fillet — Fillet=5m, with 3 Segments.

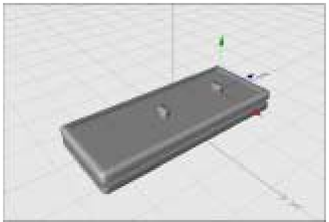
Move the SquareButton to a typical position for the “0” on a remote. The settings shown are X=0m, Y=20m, Z=-30m. Use the Coordinates Manager to input this exact position and click Apply.



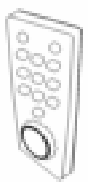
Step 9. Move SquareButton

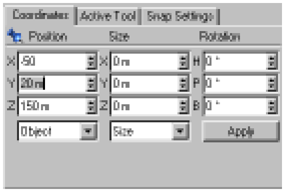


Step 10. Move Row1b button

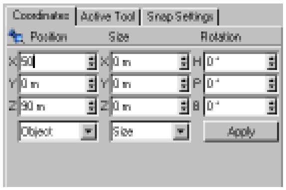


Step 10. Move Row1b Button





Step 11. Move Row1a



Step 11. Move Row1c

Step 10: Instead of making all the buttons, you are going to create nine Instances of the one you created and move them into position. With the SquareButton selected, create an Instance of it.

Editor: Objects=>Modeling=>Instance
Shortcut: None

Double click on the text "Instance" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Row1b."

Move the Row1b button to a typical position for the "2" on a remote. The settings shown are X=0m, Y=20m, Z=150m. Use the Coordinates Manager to input this exact position and click Apply.

Instancing objects not only saves you a tremendous amount of modeling time, but also makes it easier to move through a complex scene. The less actual objects there are in a scene, the less processing power it takes your computer to generate images in the screen. This will help you move through your scene more easily.

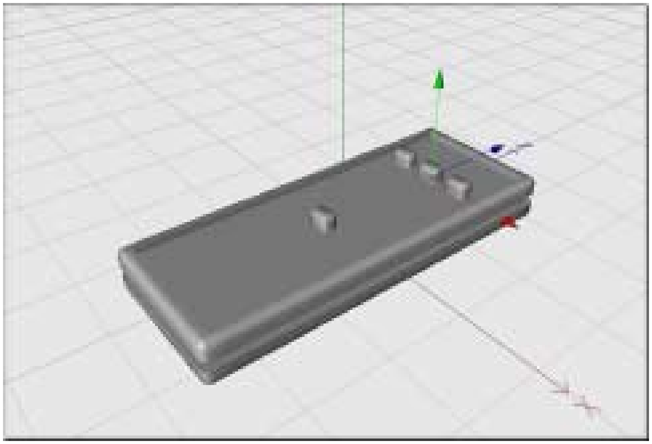
Step 11: Make two copies of the Row1b button so that there are 3 total.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Change the names of the two new Instances to "Row1a" and "Row1c."

Move the Row1a button to the left of Row1b by changing its X position to -50m. Move the Row1c button to the right of Row1b by changing its X position to 50m. Again, use the Coordinates Manager to input their exact position and click Apply.



Step 12. Row1 Group

Step 12: So that you can copy and move this set of buttons, group the three Row1 buttons together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the buttons and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Row1."

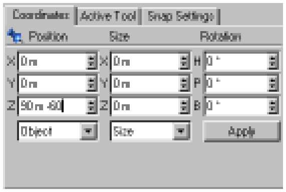
Step 13: Make two copies of the Row1 button group so that there are 3 total.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or, you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Change the names of the two new groups of buttons to "Row2" and "Row3."

Step 13. Row2 & Row3



Step 13. Move Row3

Move Row2 and Row3 into position. To make sure they are evenly separated, place them 60m apart. You can do the math yourself or you can subtract 60m from the Z position of Row2 and 120m from the Z position of Row3. With Row2 selected in the Object Manager, go to the Coordinates Manager and enter -60m after the current position in the Z field. When you click Apply, the program does the math for you. Subtract 120m from the Z position of Row3 in the same manner.

If you click on each in the Object manager, they should be located at 30m, 90m and 150m on the Z axis respectively.

Step 14. Buttons Group

Step 14: Group all of the buttons together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around all three Row groups and the SquareButton, and let go. You will have a Null Object group.

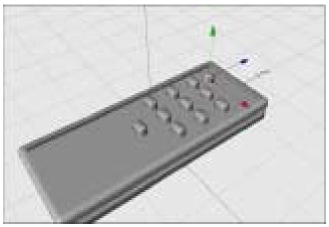
Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Buttons."

Step 15. Sphere Parameters

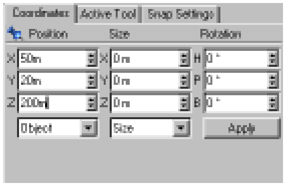
Step 15: To give the Remote some personality, you will add a couple of round buttons at the top. First, create a Sphere.

Editor: Objects=>Primitive=>Sphere
Shortcut: None

Double click on the Sphere icon in the Object Manager to change the settings. It should have a Radius of 15m, with 18 segments.


Step 15. Sphere

Move the Sphere above the first row on the remote. The settings shown are X=-50m, Y=20m, Z=200m. Use the Coordinates Manager to input this exact position and click Apply.

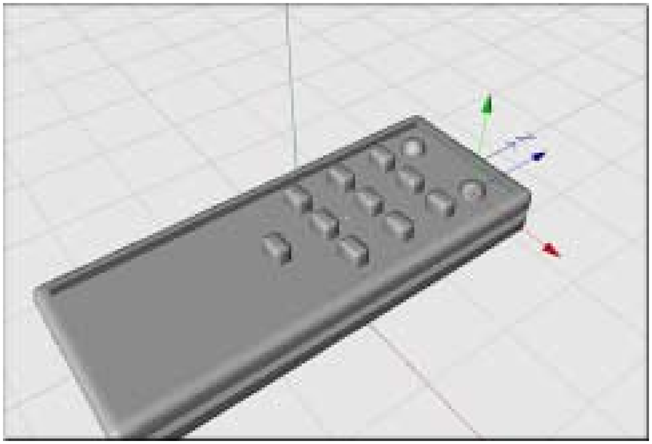


Step 16. Move Sphere

Step 16: With the Sphere selected, create an Instance of it.

Editor: Objects=>Modeling=>Instance
Shortcut: None

Move the Instance Sphere to the opposite side of the Remote. The settings shown are X=50m, Y=20m, Z=200m. Use the Coordinates Manager to input this exact position and click Apply.



Step 17. Round Group

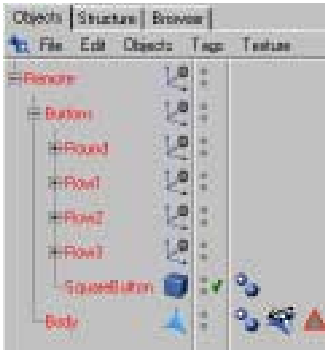
Step 17: Group these Spheres together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the Sphere and its Instance, and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Round."

Drag and Drop this group into the Buttons group.



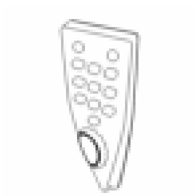
Step 18. Remote Group

Step 18: Group all objects in the Object Manager — Body and Buttons.

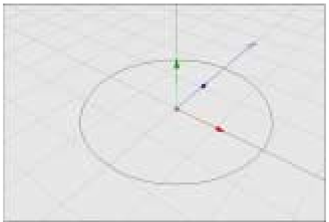
> Object Manager: Objects=>Group Objects
> Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the Body and Buttons, and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Remote."

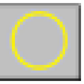


Step 19: During the next few steps, you will be building the Jog/Shuttle Wheel on the Remote. It would be best to hide the Remote so you have a clean working space. Just click the top gray dot to the right of the Remote icon in the Object Manager until it turns red. This hides the object in the Editor window, but it will still show up when rendering. The bottom gray button hides the object from the camera when rendering.


Step 20. Circle

Step 20: Begin creating the Jog/Shuttle by creating a Circle Spline.

> Editor: Objects=>Spline Primitive=>Circle
> Shortcut: None

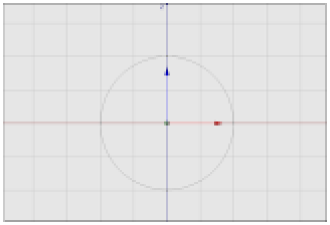


Double click on the Circle icon in the Object Manager to change the settings. Make sure the Plane is set to XZ and click OK.

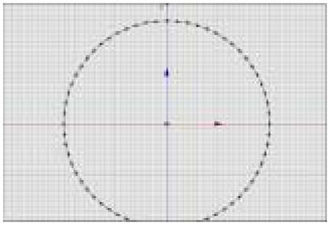
Double click on the text "Circle" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Bottom."

Step 21: Before you can modify the Bottom circle (other than its parametric settings), you have to make it editable.

> Editor: Structure=>Make Editable
> Shortcut: C



Step 22. Bottom - 4 Points



Step 22. Bottom - 64 Points

Step 22: Now you will select some of the points to extrude out to create the ridged edge of the Jog/Shuttle. Make sure the Bottom circle is still selected in the Object Manager and activate the Points tool

Editor: Tools=>Points
Shortcut: None

Change to the Top or XZ view.

View: View=>View 2
Shortcut: F2

You'll notice there are only four points defining the Bottom circle. You will need to increase this amount to get the detail you need. With Bottom selected, use the Subdivide tool to add points.

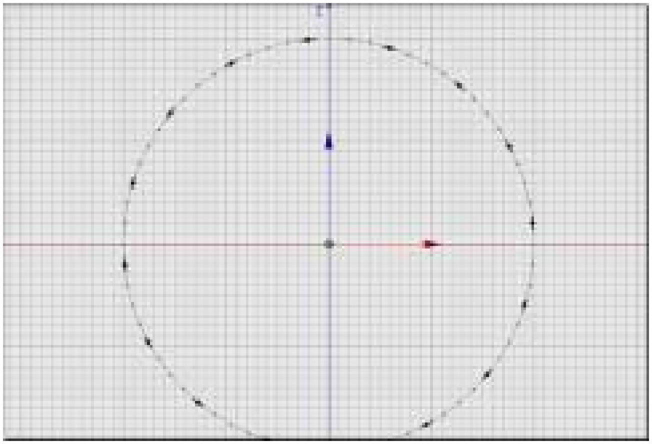
Editor: Structure=>Subdivide
Shortcut: None

Enter 16 in the dialog box and click OK. Your spline now has 64 points.

Step 23: You will be selecting every fourth point to pull away from the circle. When you switched to the Points tool and Subdivided, all the points are already selected, so you can deselect the ones you don't want to modify. First activate the Live Selection tool.

Editor: Selection=>Live Selection
Shortcut: None

In the Active Tool dialog, set the Radius to around 10. While holding the Control key, start at the noon position, then click and ctrl-drag to deselect the three points in between every fourth as shown.

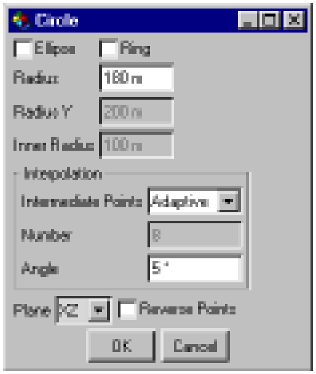


Step 24. Scale points

Step 24: With those points selected, scale them out from the rest of the Bottom object.

Editor: Tools=>Scale
Shortcut: T

You can choose the scale tool and move them out by hand. Keep your eye on the Coordinates Manager and move the points out to about 450m on the X and Z axis.



Step 25. Circle Settings

Step 25: Create another Circle Spline.

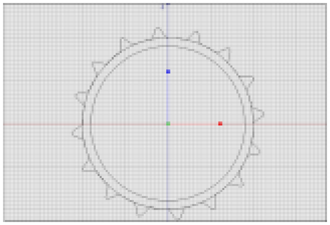
Editor: Objects=>Spline Primitive=>Circle
Shortcut: None

Double click on the Circle icon in the Object Manager to change the settings. It should have a 180m Radius.

Make it editable.

Editor: Structure=>Make Editable
Shortcut: C

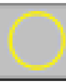
Finally, drag and drop the Circle on top of the Bottom object.



Step 26. Circle Spline

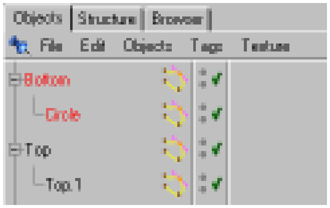
Step 26: Create another Circle Spline.

Editor: Objects=>Spline Primitive=>Circle
Shortcut: None



Double click on the text "Circle" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Top."

Leave it at its default size.



Step 27. Shuttle Splines

Step 27: Make a copy of the Top circle.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager. If you use this method, the copy won't automatically be renamed Top.1, so just make the changes below to the resulting Top spline.

Double click on the the Top.1 icon in the Object Manager to change the settings. It should have a 180m Radius.

Make both Top and Top.1 editable.

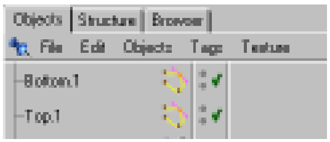
Editor: Structure=>Make Editable
Shortcut: C

Step 28. Connect

Then, drag and drop Top.1 on top of the Top object.

Step 28: Now you will connect both groups of splines together as one object. This will make it easier to loft them into a model later. With the Top circle selected, use the Connect Tool.

Editor: Functions=>Connect
Shortcut: None



Step 28. Delete Extra Splines

In the Object manager, there will be a new Spline based on the other two — Top.1. You can delete the old splines. This new circle spline includes both.

Repeat the process with the Bottom spline group.

You should only have the newly derived Top.1 and Bottom.1 circle splines.

Step 29: Now let's put them together to create the Jog/Shuttle. Create a Loft NURBS

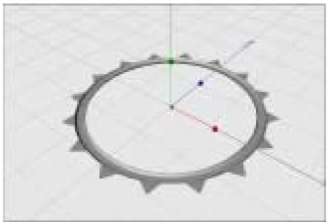
Editor: Objects=>NURBS=>Loft NURBS
Shortcut: None

Step 29. Loft NURBS

Double click on the text "Loft NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Shuttle."

Double click on the Loft NURBS icon in the Object Manager and change the U Mesh Subdivision to 129 and the V Mesh Subdivision to 2. You will need a relatively high number to get a smooth mesh for this model.

Set the Start Caps to "Cap and Round." Set the End Caps to "No Cap." In the Details setting, make sure the Rounding is set to Convex, with Start Steps set to 3 and Start Radius set to 5. In addition, make sure to click the checkbox for Constrain Contour. This will keep the object from getting bigger than the original splines. Click OK to exit the dialog and save your settings.

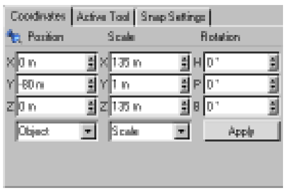


Step 30. Jog Shuttle Loft

Step 30: Drag and drop the two circle splines (Bottom.1 and Top.1) onto the Shuttle object. Make sure in the hierarchy that Top.1 is first and Botom.1 is below it. You will immediately see your Shuttle model in the Editor window.

However, you will need to move the Bottom.1 spline down to create the shape. Make sure you're in the Object Tool mode and use the Move tool.

Editor: Tools=>Move
Shortcut: E



Step 30. Move Bottom.1 Spline

Select the Bottom.1 spline inside the Shuttle and move it down on the Y axis -80m. Now you can see the model.

Since NURBS objects are always live, you can move your splines until you are happy with the shape of your model.

Step 30. Move Copied Spline

However, it still looks a bit clunky. Seems like the jagged edge of the Bottom.1 spline should go a bit higher. So copy the Bottom.1 spline inside of the Shuttle object.

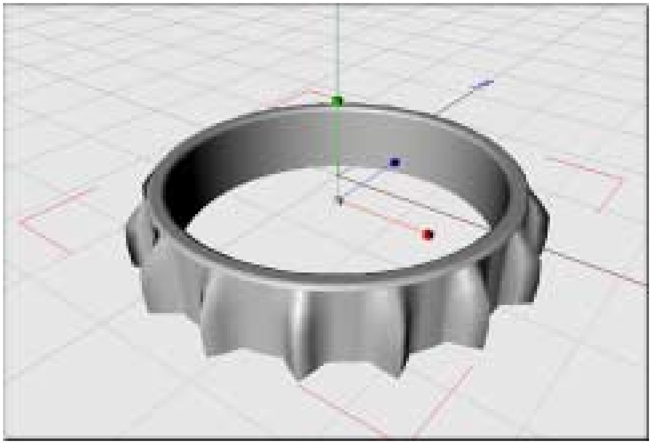
Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Make sure this new spline is above the original in the Loft NURB.

Then move the new spline up on the Y axis to about Y= -30m. It should look like the image.

Step 30. Before duplicating spline

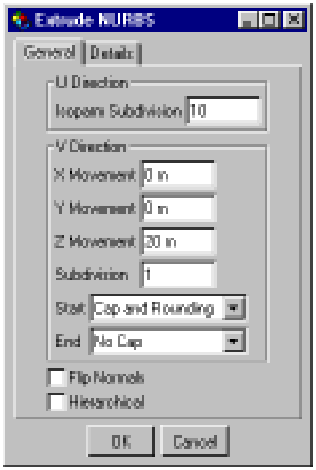


Step 31: The last part of the Shuttle is the Jog disc on the top. Create another Circle Spline.

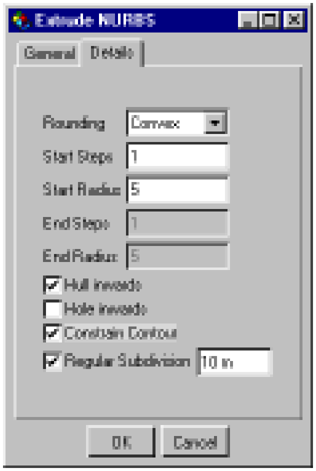
Editor: Objects=>Spline Primitive=>Circle
Shortcut: None

Double click on the Circle icon in the Object Manager to change the settings. It should have a 180m Radius. Make sure Plane is set to XZ and click OK.

Step 31. Circle Parameters



Step 32. Extrude NURBS - General



Step 32. Extrude NURBS - Detail

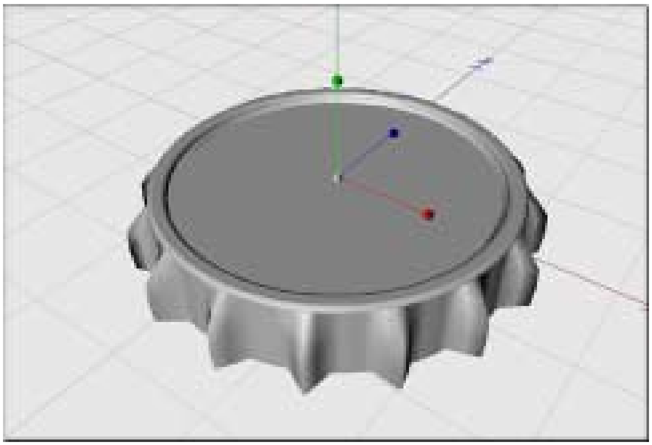
Step 32: Create an Extrude NURBS

Editor: Objects=>NURBS=>Extrude NURBS
Shortcut: None

Double click on the text "Extrude NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Jog."

Double click on the Extrude NURBS icon in the Object Manager and change the settings. Set the Start Caps to "Cap and Round." Set the End Caps to "No Cap." In the Details setting, make sure the Rounding is set to Convex. Make sure to click the checkbox for Constrain Contour. This will keep the object from getting bigger than the original splines. Also, select Regular Subdivision with 10m. Click OK to exit the dialog and save your settings.

Drag and drop the Circle on top of the Jog object.



Step 33: You actually only need the top part of this model, so you can delete the edges. First make the Jog object editable.

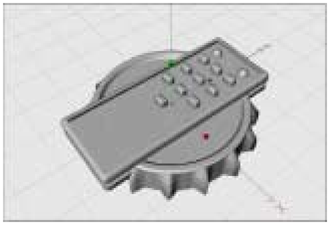
Editor: Structure=>Make Editable
Shortcut: C

Open the hierarchy by clicking on the little plus next to the Jog object. Remove the Rounding from the hierarchy and delete the Jog object (edges). You will be left with the Rounding object.

Double click on the text "Rounding" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Jog."

Step 34: Group these two objects, Jog and Shuttle, together.

Object Manager: Objects=>Group Objects
Shortcut: G

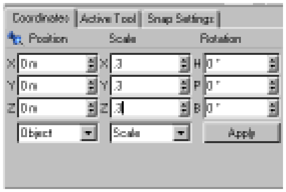


Step 35. Remote and Jog Shuttle

When the crosshairs appear click and drag a marquis (rectangle) around the Jog and Shuttle and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Jog/Shuttle."

Step 35: Now, put the two parts together. Unhide the Remote. Just click the top dot to the right of the Remote icon in the Object Manager until it changes from red back to gray.

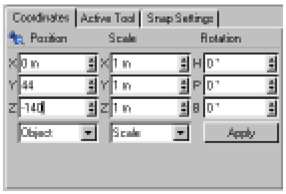


Step 35. Scale Jog Shuttle

Resize the Jog/Shuttle so that it fits with the Body of the Remote — about 30% of its current size. The easiest way to do this is, while the Handle is still selected, go to the Coordinates Manager, change from Size to Scale mode and enter .3 or the size you desire in Size X, Y and Z.

You can also do this artistically, by using the Scale Tool

Editor: Tools=>Scale
Shortcut: T

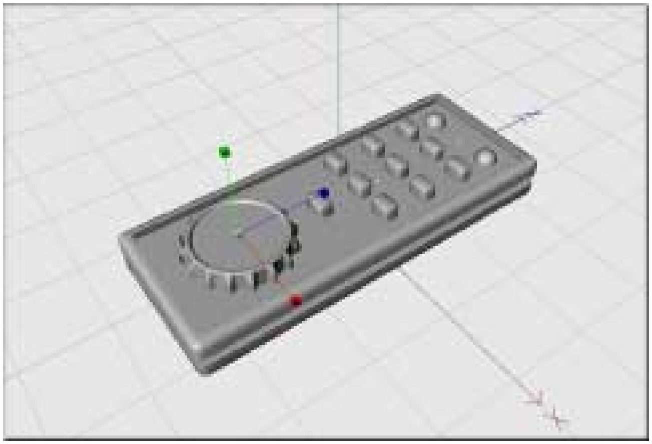


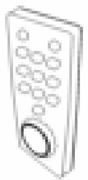
Step 36. Move Jog Shuttle into position

And scale the Handle by clicking a dragging on the scene.

Step 36: Once you are happy with the size, move the Jog/Shuttle into place. The coordinates for the position shown are X=0, Y=44, Z=-140.

Then drag and drop the Jog/Shuttle onto the Remote group.



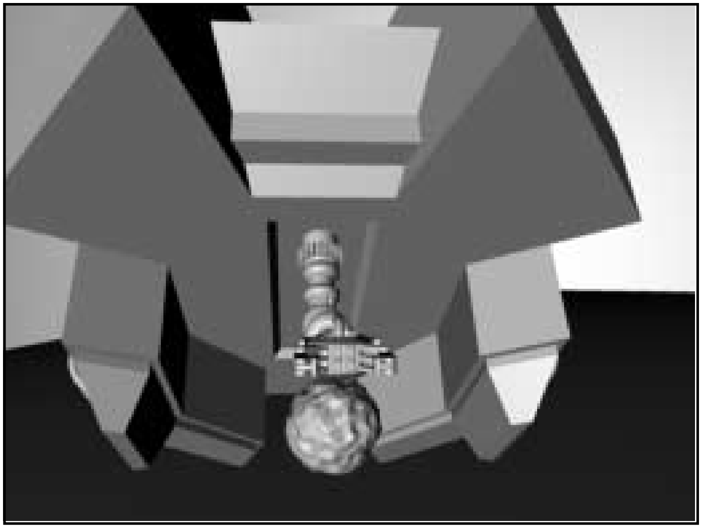


Step 37: Make sure to save your project as TV Remote.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling the SciFi Scene

Since Star Wars and Star Trek have inspired so many animators it seemed more than appropriate to include a SciFi related scene. In this tutorial, you will build everything from a sleek fighter ship to a clunky, mechanical cargo ship. We cover a lot of modeling tools in this one.

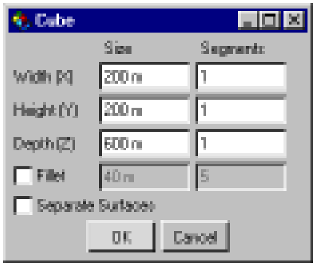


Modeling the Stingray Spaceship

Body

Step 1: Open a new project and create a Cube.

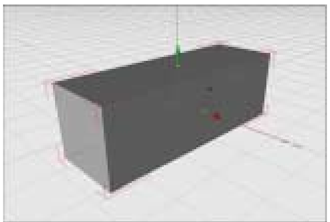
Editor: Objects=>Primitive=>Cube
Shortcut: None



Step 1. Cube Parameters

Double click on the Cube icon in the Object Manager and change the width and height settings to 200m, and depth to 600m, one segment each. Click OK.

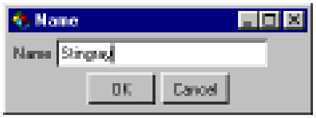
Double click on the text “Cube” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “Stingray Cage.”



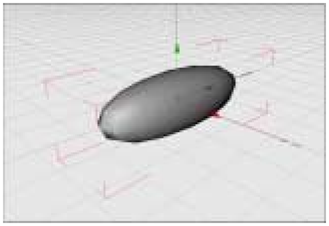
Step 1. Stingray Cage

Step 2: Before you can modify the Stingray Cage (other than its parametric parameters), you have to make it editable.

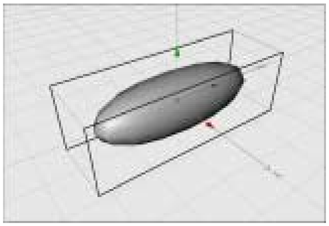
Editor: Structure=>Make Editable
Shortcut: C



Step 3. Rename Hyper NURBS



Step 4. Stingray Object



Step 5. Select these faces

Step 3: Add a Hyper NURBS object to your scene.

Editor: Objects=>NURBS=>Hyper NURBS
Shortcut: None

Double click on the text "Hyper NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Stingray."

Step 4: Drag and drop the Stingray Cage on top of the Hyper NURBS object. The Stingray will become a child of the Hyper NURBS object. You will notice that the Stingray appears to have changed in the Editor Window and now looks more like an elongated sphere.

Step 5: To create the Stingray, you're going to modify the Stingray Cage by adding and pulling polygons. Make sure the Stingray Cage is selected in the Object Manager & activate the polygon tool .

Editor: Tools=>Polygons
Shortcut: None

Select the Stingray Cage's left and right faces (which lie along the X axis) as shown.

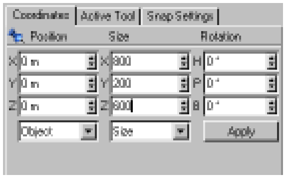
Editor: Selection=>Live Selection
Shortcut: None

Select one face and then hold down the shift key while clicking on the other face to select both. You may need to rotate your view by holding down the 3 key and dragging the mouse or using the quick buttons in the upper-right corner of the view window.

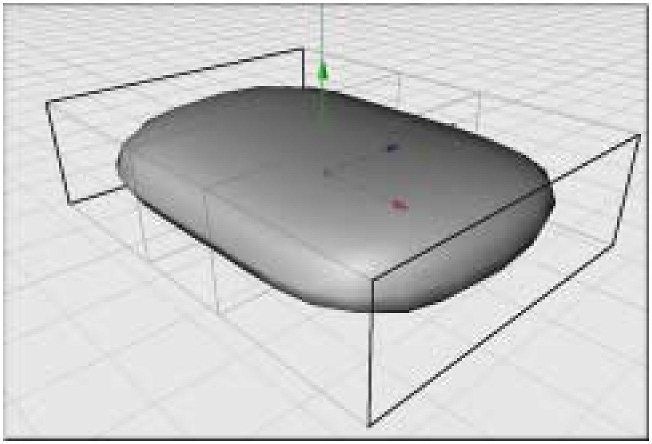
Step 6: With those two polygons selected, choose the extrude tool and extrude both polygons outward so that the size is about 800 along the X axis.

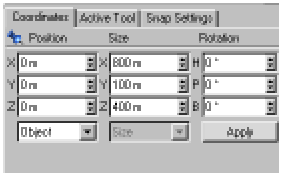
Editor: Structure=>Extrude
Shortcut: D

You can extrude it by approximation by clicking and dragging. You can also size it exactly by dragging out the extrusions and then entering 800m into the Size X field in the Coordinates Manager. This extrudes the polygons selected 800m apart. Or you can enter 300m in the Offset of the Active Tools Window. This offsets the faces you have selected 300m from the object.

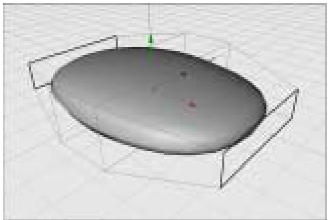


Step 6. Coordinates





Step 7. Outside Polygons Coordinates



Step 7. Outside Polygons

Top Wings

Step 7: To create wings, you are going to want to taper these polygons. The easiest way is to, while the outside polygons are still selected, go to the Coordinates Manager and enter 100m in Size Y and 400 in Size Z).

You can also do this artistically, by approximation, using the Scale Tool

Editor: Tools=>Scale
Shortcut: T

Lock the X Axis

Editor: Tools=>X-Axis / Heading
Shortcut: X

And, scale the faces by hand by clicking and dragging on the scene.

Step 8: Now you will create thin wings from the top edge of the model. Change your view to the YZ, or Left or Right view.

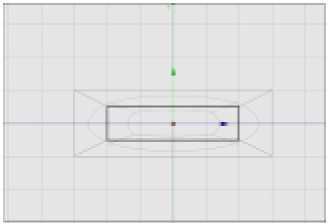
View: View=>View 3
Shortcut: F3

Step 8. Snap Settings

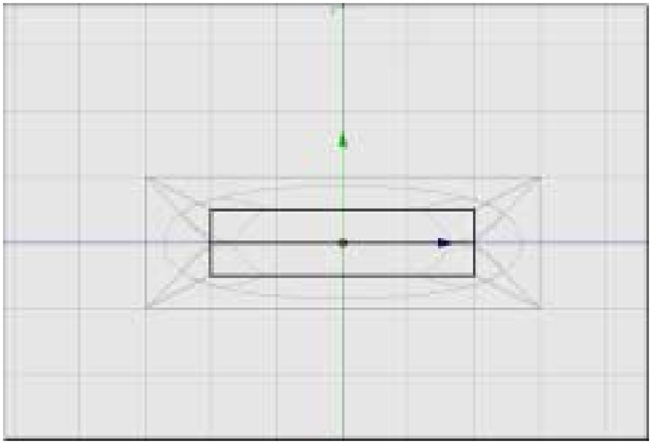
Make sure the same two polygons are still selected and cut them in half horizontally with the knife tool.

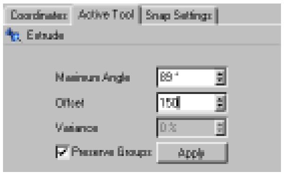
Editor: Structure=>Knife
Shortcut: K

It will be easier to cut a straight line if you use Snapping Tools. Recommended settings are Snap: 2.5D and Radius: 15. Make sure to check the box next to "Enable Snapping".



Step 8. Polygon Selection



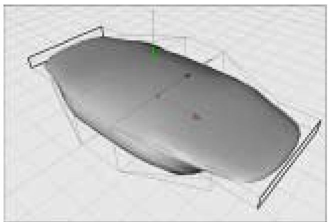


Step 9. Extrude Active Tool

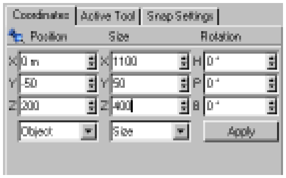
Step 9: You may want to switch back to perspective view (F1). Switch to live selection and deselect the bottom two polygons on both sides (Control-Click) and extrude the remaining upper two polygons 150m using the Offset in the Active Tools dialog.

Editor: Structure=>Extrude
Shortcut: D

Step 8. Polygon Selection

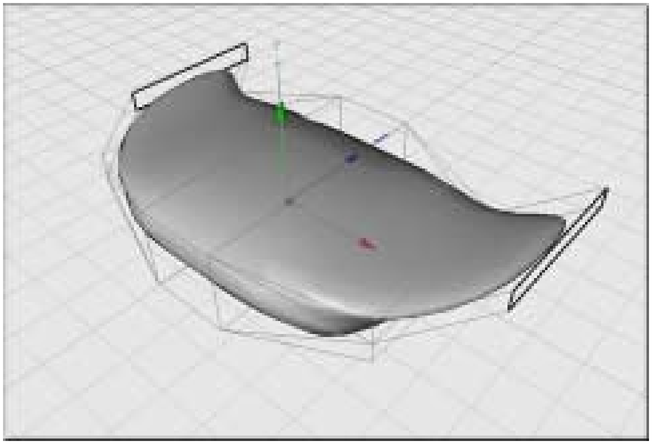


Step 8. Polygon Extrusion



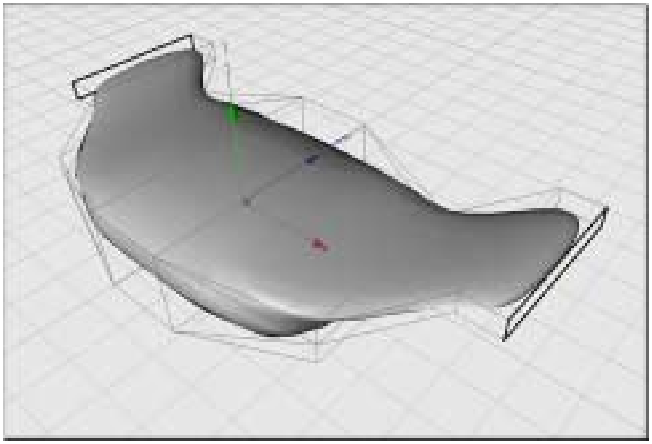
Step 10. Coordinates

Step 10: To give the wings an aerodynamic feel, swing them back and angle them down. You can do this by hand using the move tool, or you can use the Coordinates Manager to enter -50m in Position Y and 200m in Position Z.



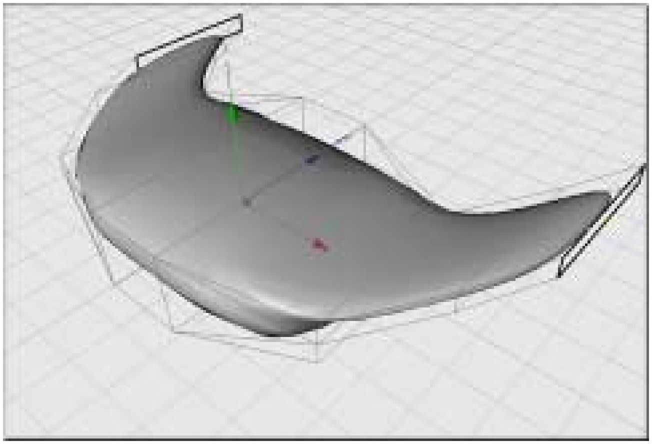
Step 11. Coordinates

Step 11: Now you will add a bit of a spoiler to the wings. With the same polygons selected, Extrude them again by entering 100m for the offset in the Active Tools Dialog.



Step 12. Coordinates

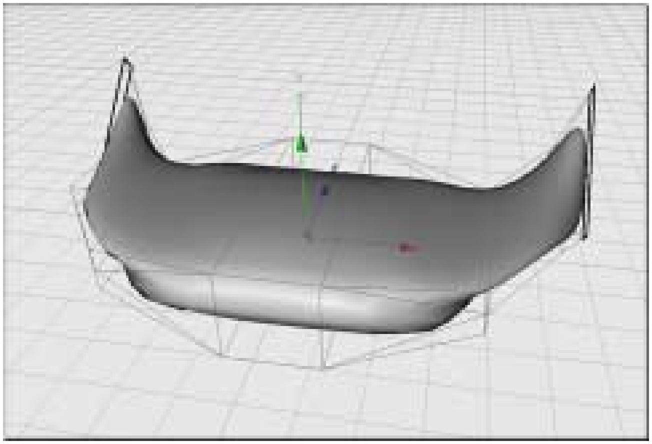
Step 12: Then, move them back using the move tool, or in the Coordinates Manager enter 400m in Position Z.

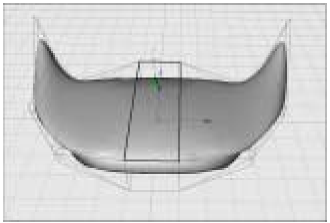


Step 13. Coordinates

Step 13: Finally, add a little "swoop" to the wing by Rotating the polygons on the P axis. The easiest way to do this is to type 45 degrees into the Rotation P field in the Coordinates Manager. Or you can do it by hand by locking the H and B axes, and using the Rotation Tool.

Editor: Tools=>Rotate
Shortcut: R





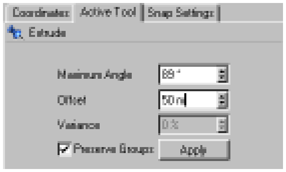
Step 14. Polygon Selection

Tail Fin

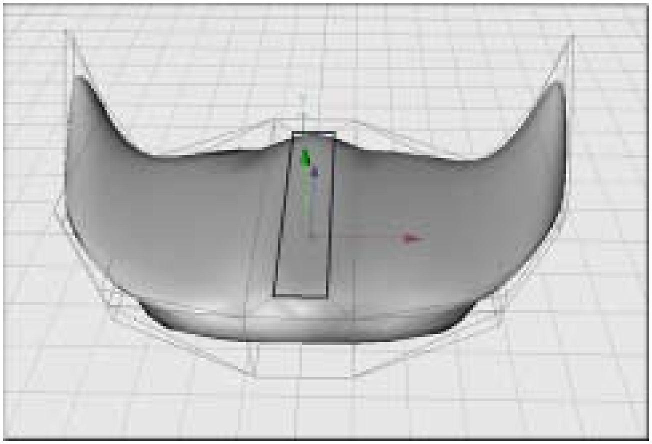
Step 14: Now create the base for the center fin tail. Use the Live Selection tool to select the top center polygon on the object and use the Extrude Inner tool to create a new, smaller polygon face.

Editor: Structure=>Extrude Inner Keyboard Shortcut: I

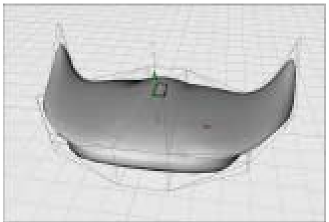
Again you can Extrude by hand or enter 50m in the Offset of the Active Tools Window.



Step 14. Extrude Inner Active Tool



Step 15: Reduce the size of this polygon to X=50m and Z=100m, and move it towards the back of the model to about 100m on the Z axis.

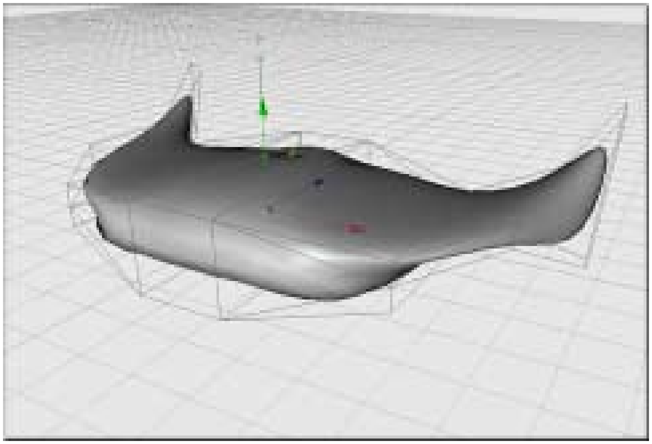


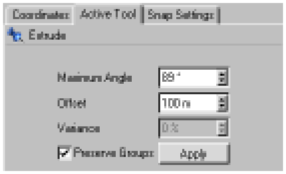
Step 15. Scale Polygon

Step 15. Polygon Coordinates

Step 16. Polygon Rotation

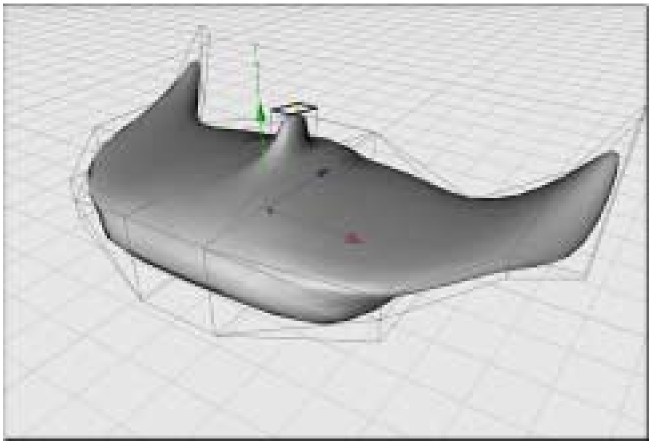
Step 16: Then, angle this polygon about -10 degrees on the P axis, so that it points slightly backward.





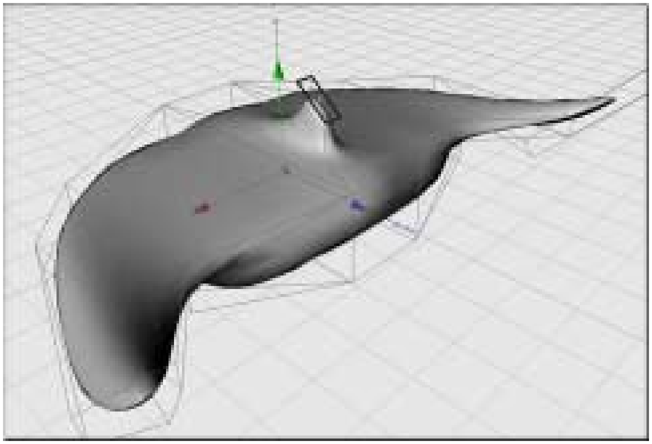
Step 17. Extrude Active Tool

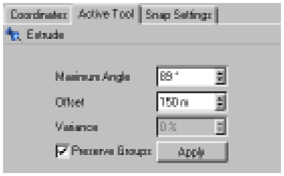
Step 17: To create the fin tail, Extrude the polygon about 100m.



Step 18. Polygon Rotation

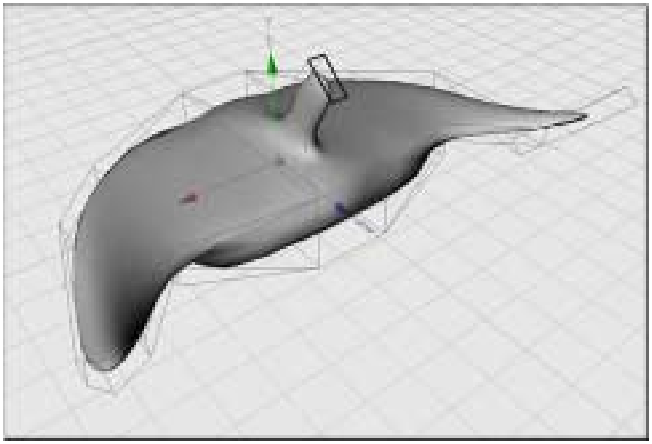
Step 18: Rotate the new polygon about -30 degrees along P so it angles back and size it down to 40 on the X axis.

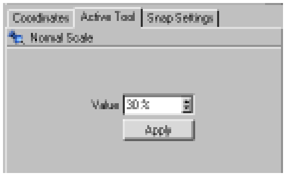




Step 19. Extrude Active Tool

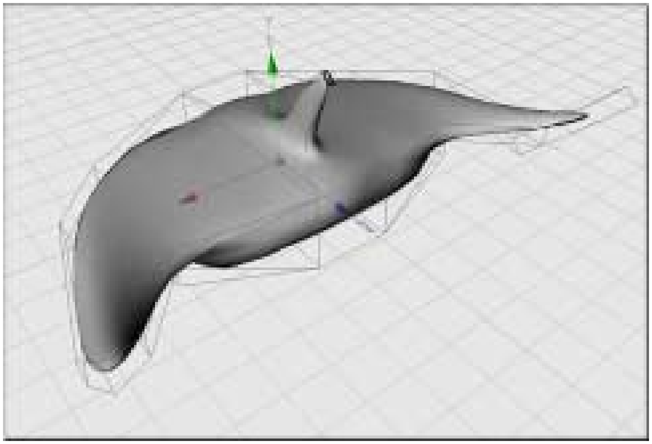
Step 19: Extrude it again, about 150m this time.

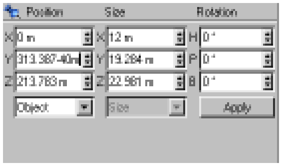




Step 20. Normal Scale Active Tool

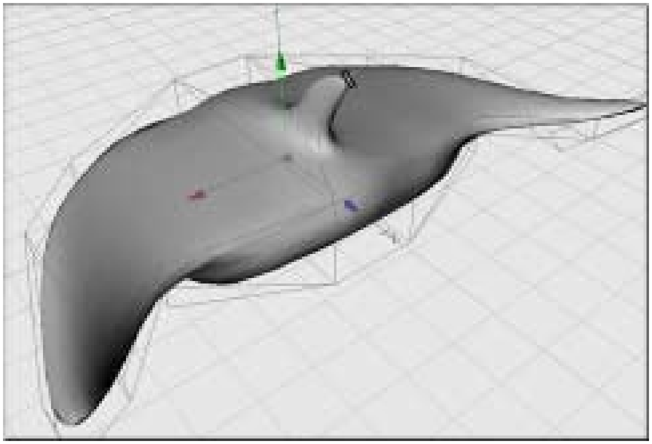
Step 20: Now scale this polygon to about a third of its current size. You can do this a few different ways depending on what you are trying to accomplish. You can select the Scale Tool, and scale the polygon down by hand. Or you can add "/3" after the current value into the Size X, Y and Z fields of the Coordinates Manager. The program will do the math for you when you click Apply or hit Enter. However, the easiest way to do it, if it is a uniform scale on all axes, is to use the Normal Scale Tool.

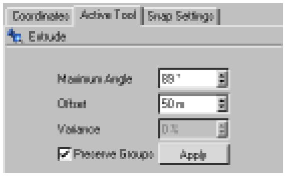




Step 21. Move Polygon

Step 21: Move this polygon down 40m on the Y axis. You can do this easily by adding -40 to the Position Y field and again CINEMA 4D will make the adjustment for you.

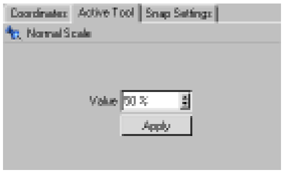




Step 22. Extrude Active Tool

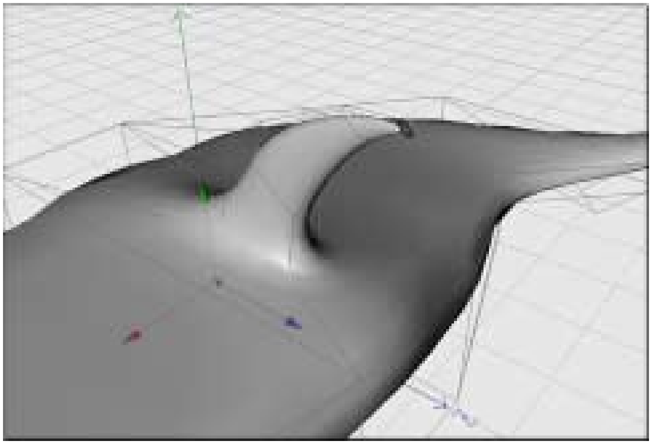
Step 22: Extrude the polygon 50m and scale it down by half by using the Normal Scale tool (enter 50% and click Apply). Move it down and back slightly (approximately down 30m (Y-30m) and back 20m (Z+20m)).

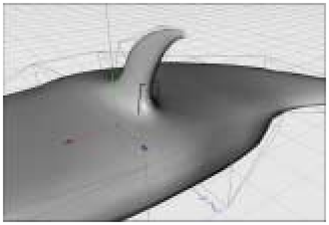
You should now have a dorsal fin-like wing for the ship.



Step 22. Normal Scale Active Tool

Step 22. Extrusion




Step 23. Selection

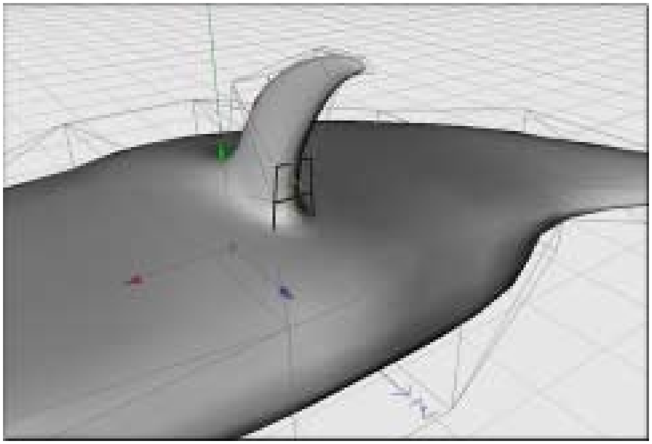
Fin Detail

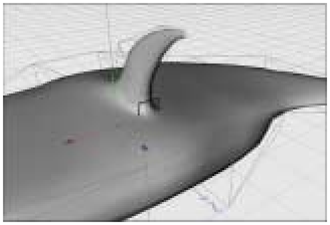
Step 23: Now to add a bit of detail to the fin. Select the back bottom polygon of the fin.

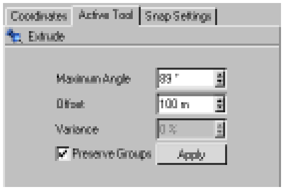
If you want to make sure you only have that one polygon selected, you can hide all but the selected polygons (Selection=>Hide Unselected) to double check your selection set.

Next, cut it in half horizontally with the knife tool. It's best to do this in the Back View to get the straightest cut.

Editor: Structure=>Knife
Shortcut: K

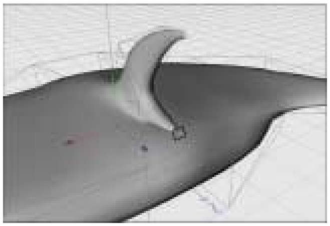


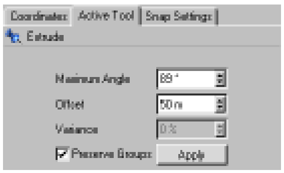

Step 24. Polygon Selection



Step 24. Extrude Active Tool

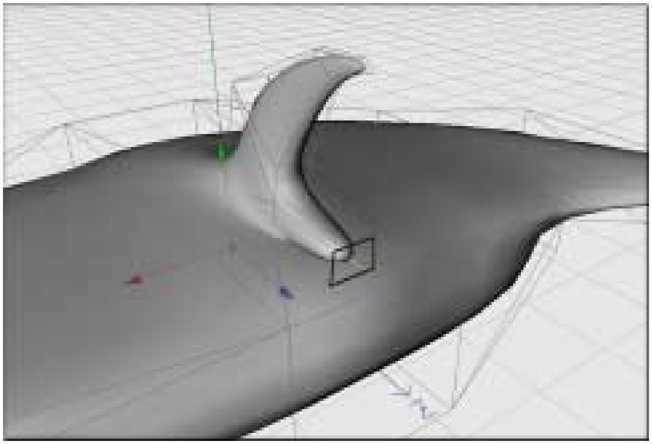
Step 25. Polygon Coordinates


Step 25. Scale & Rotate Polygon



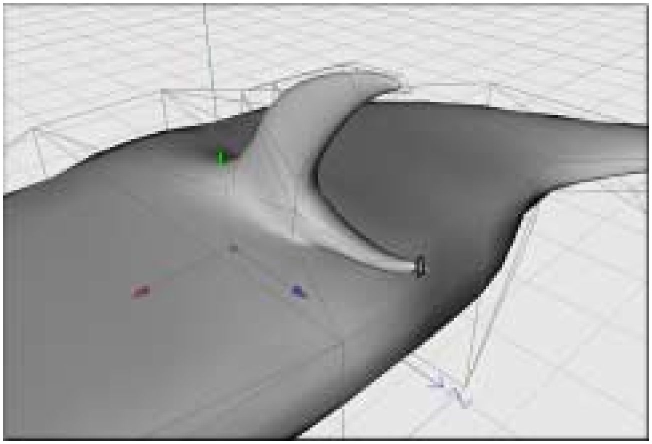
Step 26. Extrude Active Tool

Step 24: Select the bottom of the two new polygons and Extrude it 100m.



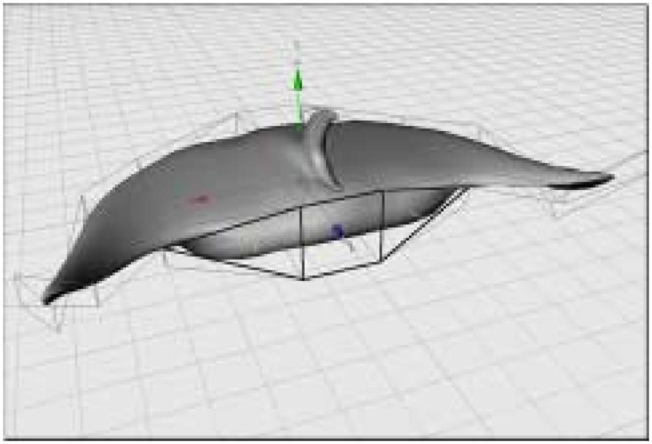
Step 25: Scale down the resulting polygon by half and Rotate it upward about 30 degrees on the P axis.

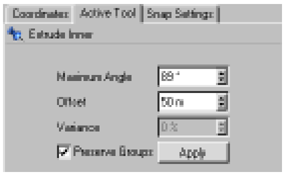
Step 26: Extrude it 50m and scale down the resulting polygon by a third on the X and Z. You can do this quickly by adding "/3" after the number in the X & Z size fields. This gives the tail a shark-like, sinister look.



Engine Area

Step 27: Time to add engines to the back of the ship. Select the three main polygons that make up the back of the ship.

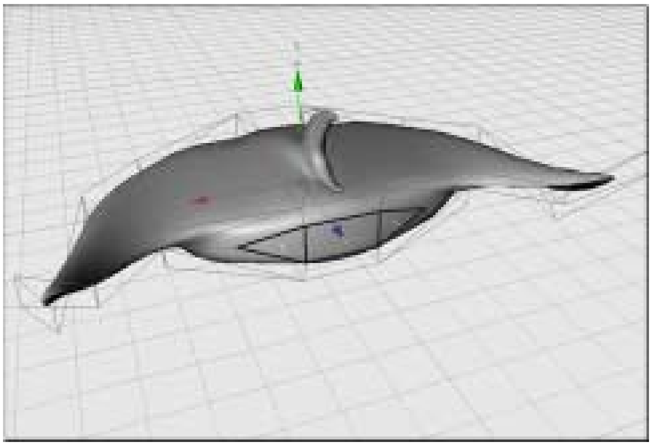


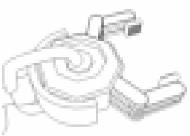


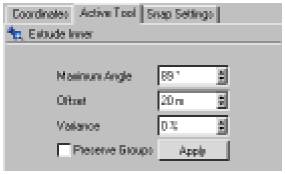
Step 28. Extrude Inner Active Tool

Step 28: Extrude Inner these polygons, making sure that Preserve Groups is checked in the Active Tool dialog. This ensures that they shrink down as a group. Extrude Inner about 50m.

Editor: Structure=>Extrude Inner
Keyboard Shortcut: I

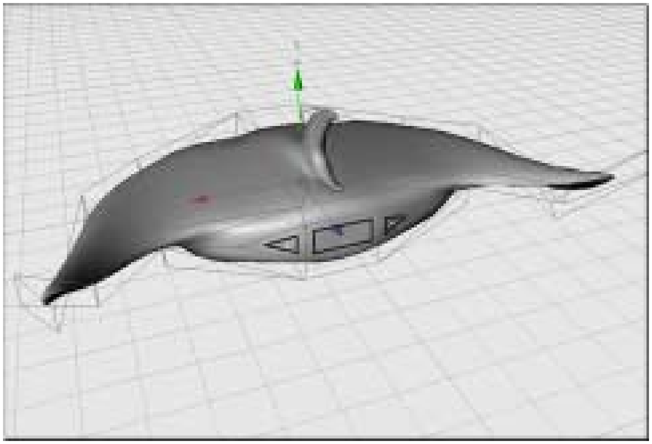


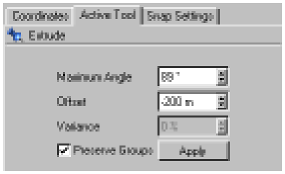




Step 29. Extrude Inner Active Tool

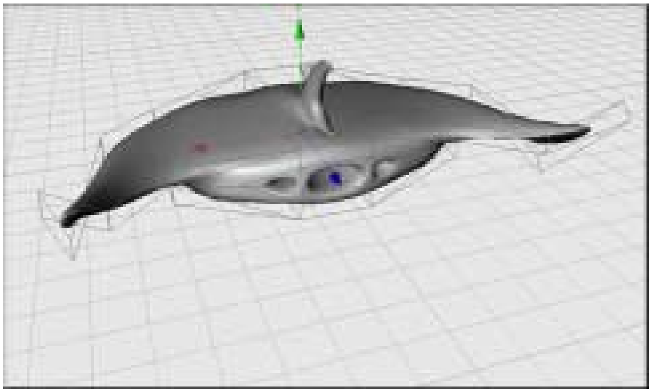
Step 29: Extrude Inner again, only this time make sure Preserve Groups is unchecked in the Active Tools dialog. This will shrink the selected polygons separately. Extrude Inner about 20m.





Step 30. Extrude Active Tool

Step 30: Last, Extrude those polygons into the object to create where the engines are located. Extrude them in about 200m by setting an offset of -200m and clicking Apply. Later we will put lights into the holes to simulate the glow of working engines.



Bottom Wings

Step 31: Go to the Front/Back or XY view so you are looking at the Stingray straight on. Activate the Points Tool

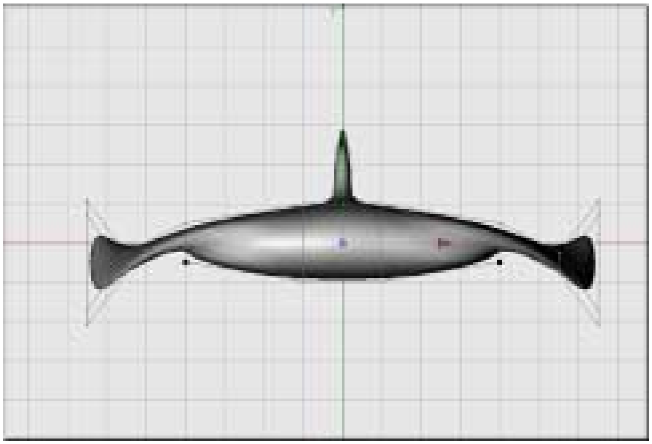
Editor: Tools=>Points
Shortcut: None

Step 32: Now select the bottom corners of the ship. Choose the Rectangle Selection tool.

Editor: Selection=>Rectangle Selection
Shortcut: None

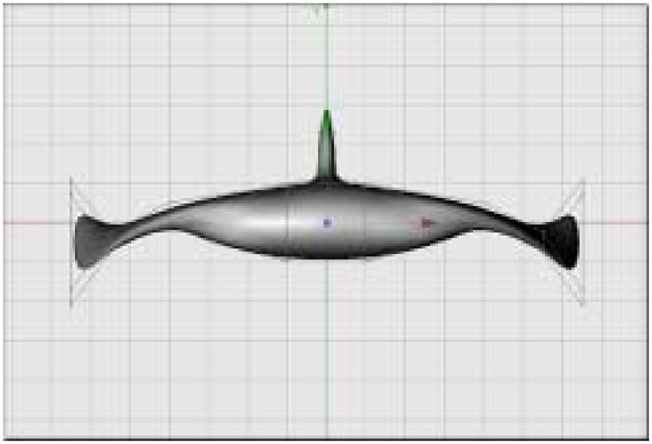
Change the Active Tool settings to Tolerant Selection on (defining the selection as what is contained within) and Only Select Visible Elements to off (so that you can select elements both in front and back of the object at the same time).

Select the bottom corner points on both sides of the ship as shown. You will need to select one side. Then, hold the Shift key down while you select the other so that both sets are selected at the same time.



Step 33. Scale Selection

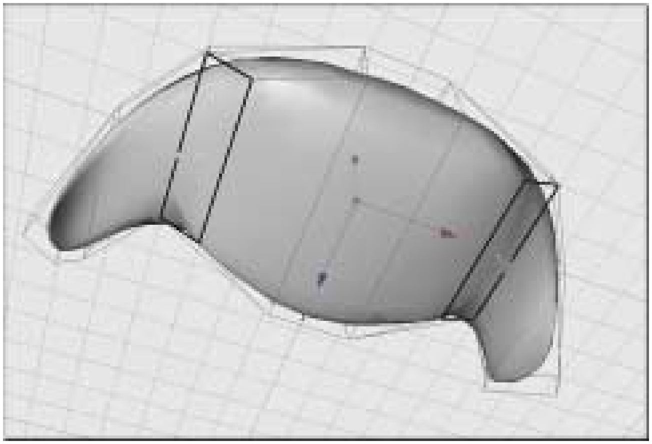
Step 33: Next, Scale this selection down to approximately 600m on the X axis. Either use the Scale Tool or enter 600m in the Size X field in the Coordinates Manager.

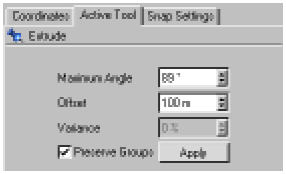


Step 34: You may want to switch back to perspective view now. Go back to your Polygon Tool

Editor: Tools=>Polygons
Shortcut: None

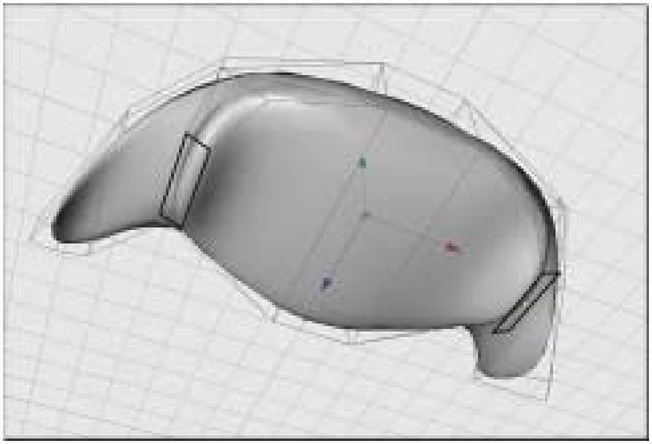
and select polygons just outside of the points previously selected.

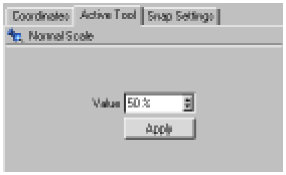




Step 35. Extrude Active Tool

Step 35: Extrude these polygons out and down about 100m. Then, use the Normal Scale Tool to size them down to 50% of their current size.

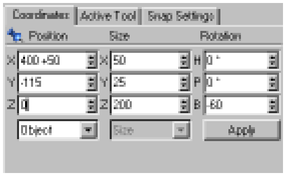




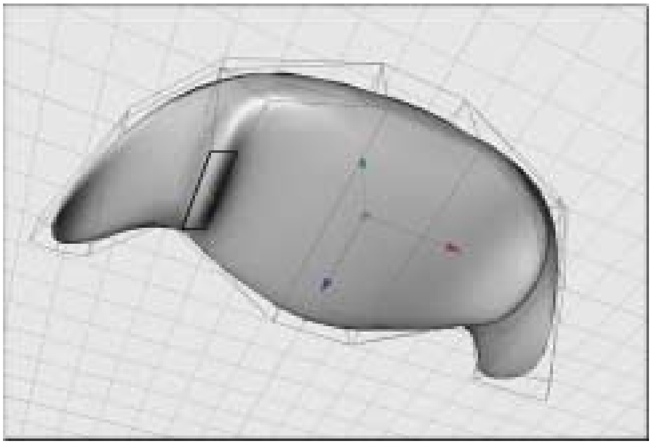
Step 35. Normal Scale Active Tool

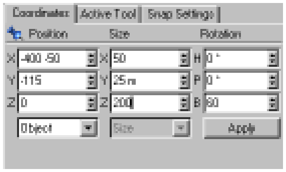
Step 36: Make sure you're in polygon mode and activate the live selection tool. Deselect the right side polygon (Control-Click), so that only the left side is selected.

Step 37: Rotate that polygon -60m on the B axis and move it in 50m on the X axis by entering +50 after the X position in the coordinates manager.



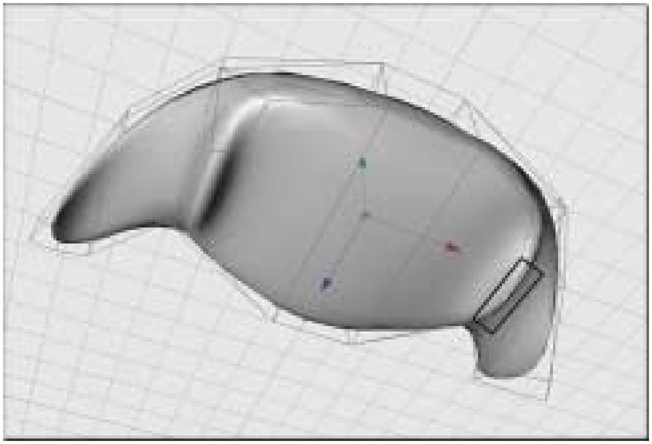
Step 37. Rotate Polygon

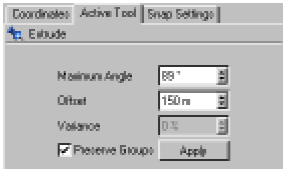




Step 38. Rotate Polygon

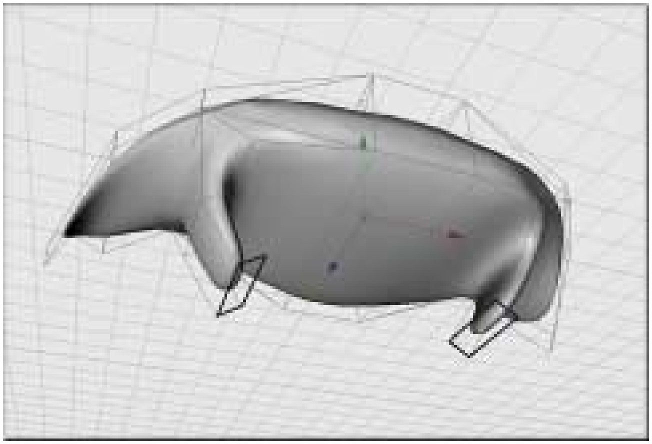
Step 38: Now do the opposite to the right side — rotate the right side 60m on the B axis and move it in 50m on the X axis by entering -50 after the X position in the Coordinates Manager.

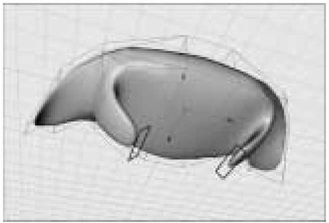




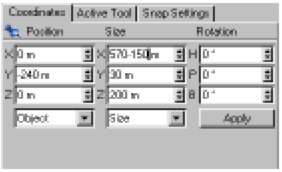
Step 39. Extrude Active Tool

Step 39: Reselect the left side and with both polygons selected Extrude them both 150m.

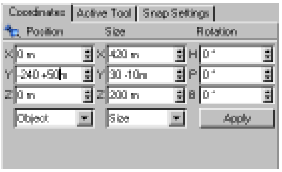




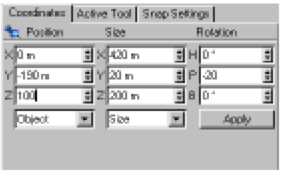
Step 40. Scale Polygons



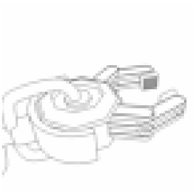
Step 40. Polygon Coordinates

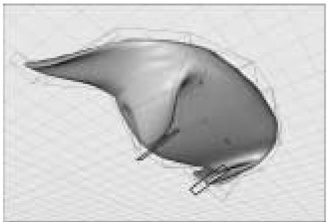


Step 41. Polygon Coordinates



Step 42. Polygon Coordinates





Step 42. Scale Polygons

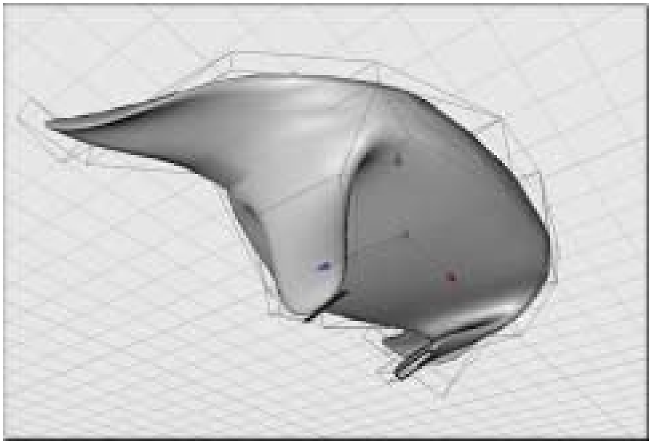
Step 40: Scale down the polygon set on the X axis by subtracting 150m from the Size X field in the Coordinates Manager.

You'll notice this not only shrinks them slightly, but also moves them inward. That is because the size you are adjusting is the size of the whole group, not the individual polygons.

Step 41: To make a tighter edge, type -10m into the Size Y field in the Coordinates Manager. Now, move them up 50m on the Y axis (add 50m to Position Y in the Coordinates Manager).

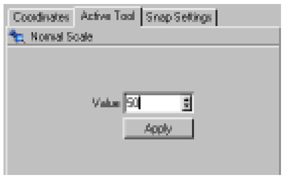
Step 42: Now you will make the bottom wings sweep back and curve out, matching the style of the top wings. First, rotate the polygons -20 along the P axis, and move them back 100m on the Z plane (add 100m to Position Z in the Coordinates Manager).

Step 43: Extrude the polygons 50m and apply a Normal Scale of 50% to curve out again.

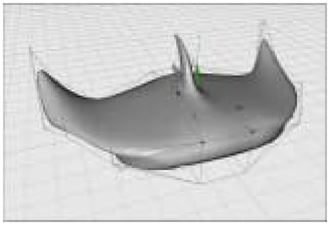


Nose

Step 43. Extrude Active Tool

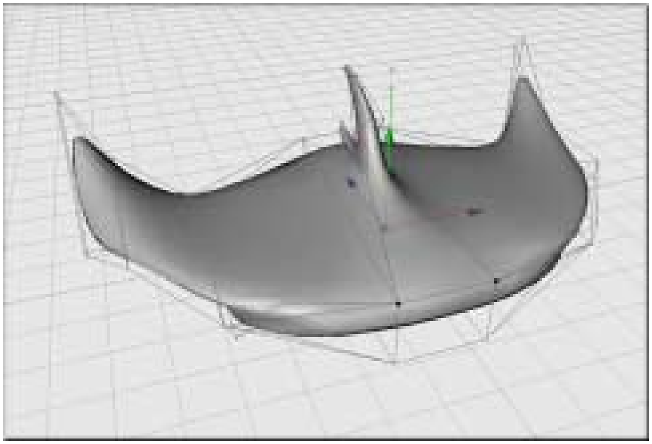


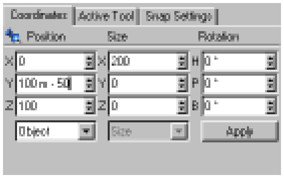
Step 43. Normal Scale Active Tool



Step 44. Selection

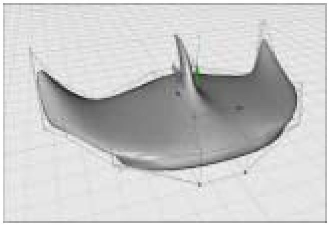
Step 44: Activate the Point Tool and select the top front two points of the Stingray model. Move these points down 50m on the Y axis.



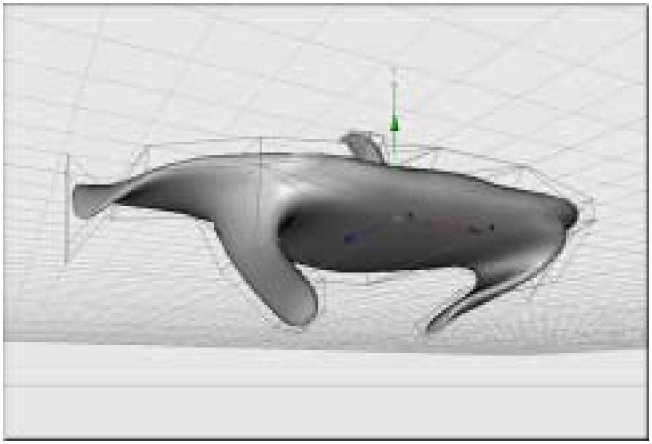


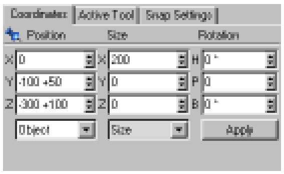
Step 44. Point Coordinates

Step 45: Select the two points directly below those and move them back 100m on the Z axis (add 100m to Position Z in the Coordinates Manager) and up 50m on the Y axis (add 50m to Position Y in the Coordinates Manager).



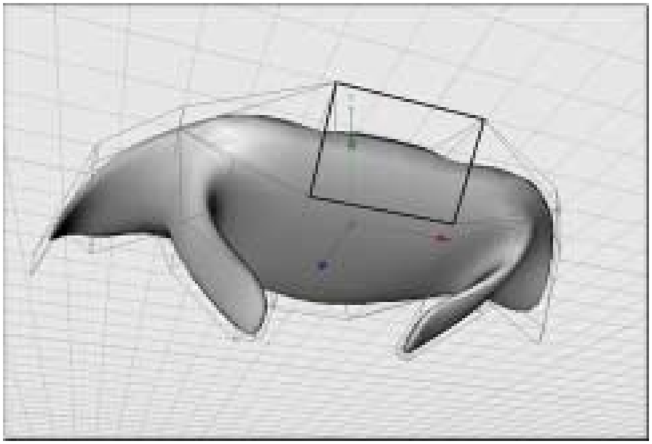
Step 45. Selection

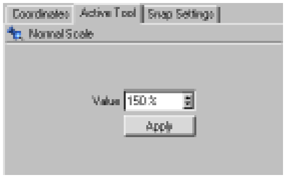




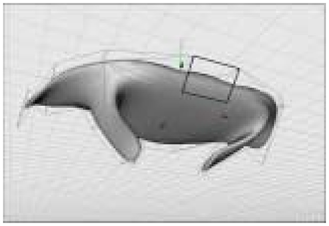
Step 45. Point Coordinates

Step 46: Switch to the Polygon Tool and select the middle front face of the model. Apply a Normal Scale of 150%



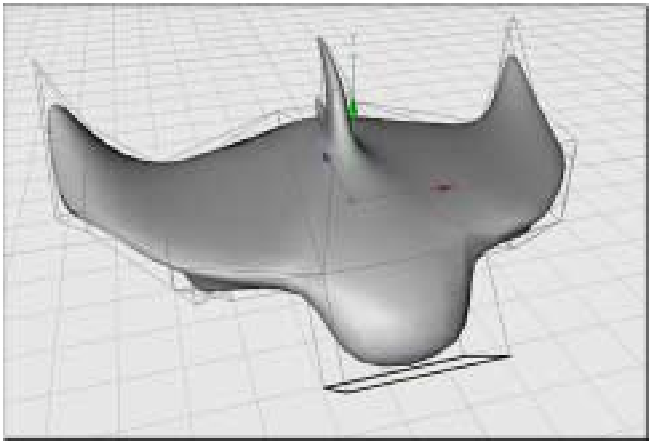


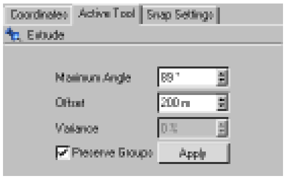
Step 46. Normal Scale Active Tool



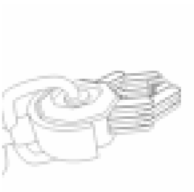
Step 46. Selection

Step 47: Then Extrude it 200m.

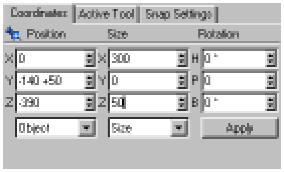




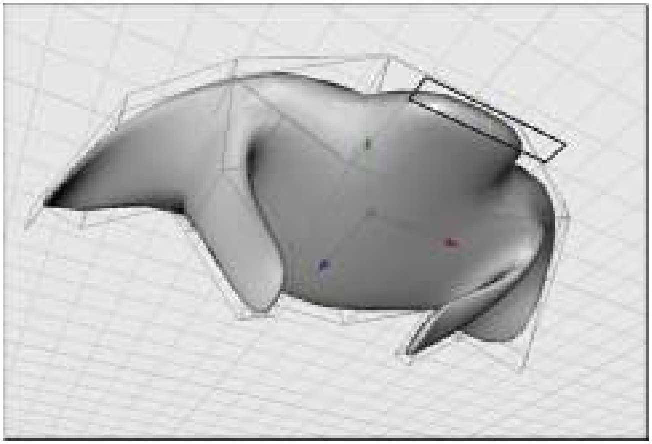
Step 47. Extrude Active Tool



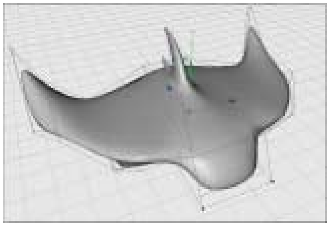
Step 48: Using the Coordinates Manager, change the Size Y to 0 and Size Z to 50. Then, move the polygon up 50m on the Y axis (add 50m to Position Y in the Coordinates Manager).



Step 48. Polygon Coordinates

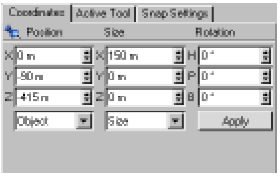


Step 49: Switch back to Points Mode and select the two front points.

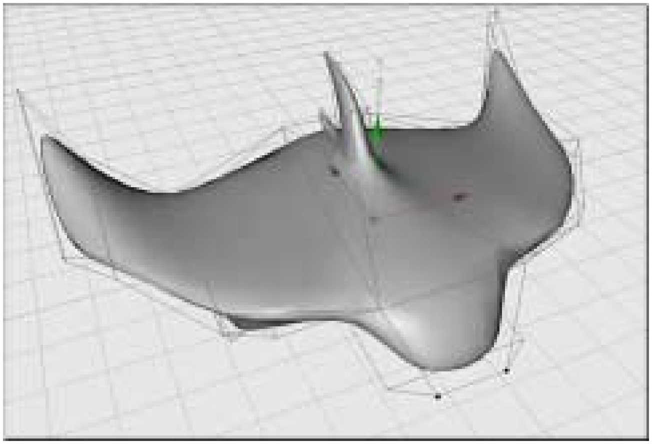


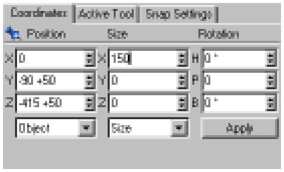
Step 49. Selection

Step 50: Scale those points down 50% on the X axis (divide Size X in the Coordinates Manager by 2).



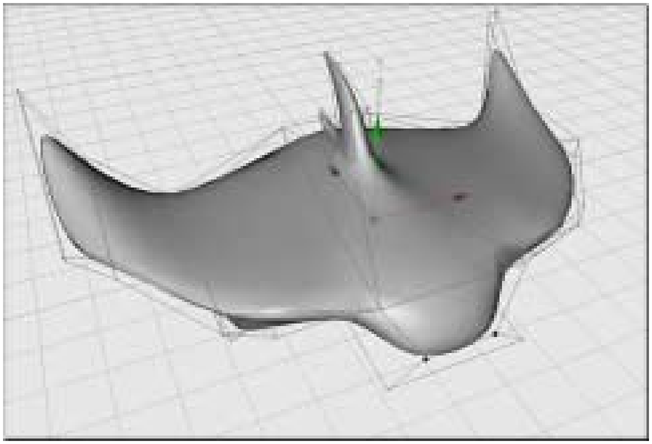
Step 50. Point Coordinates

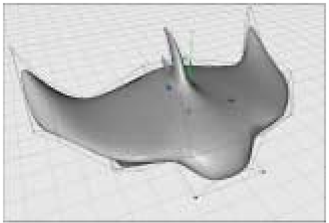




Step 51. Point Coordinates

Step 51: Move those points up 50m and back 50m (add 50m to Position Y and Position Z in the Coordinates Manager).

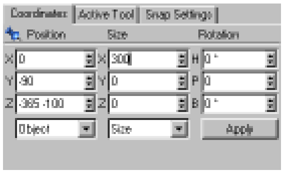




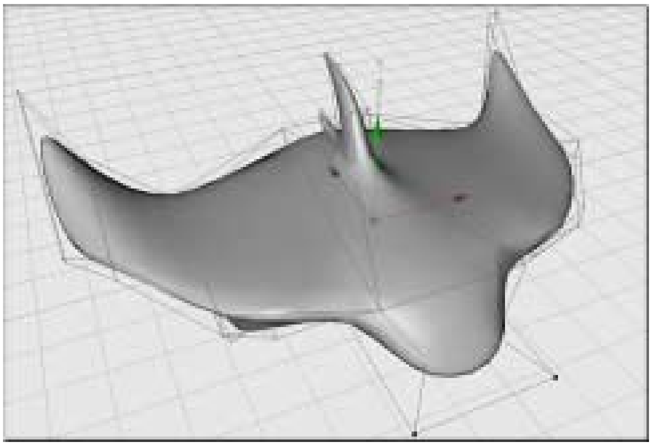
Step 52. Selection

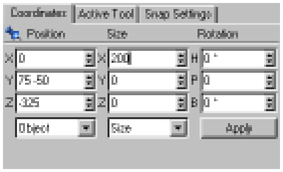
Step 52: Select the two points below those selected.

Step 53: Move them forward (-100m on the Z axis) to pull out the nose.



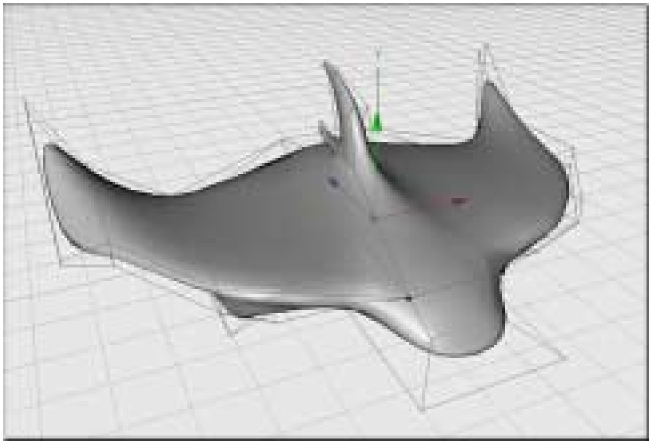
Step 53. Point Coordinates





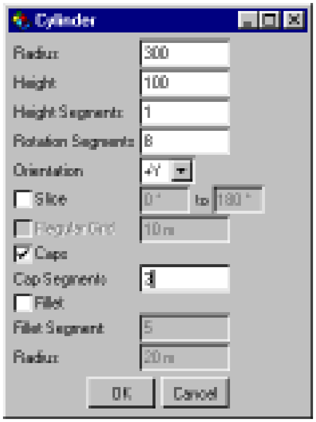
Step 54. Point Coordinates

Step 54: Lastly, select the two points on the top of where the nose started. Change the Size X in the Coordinates Manager to 200m and move them down approximately 50m (subtract 50m from Position Y in the Coordinates Manager).

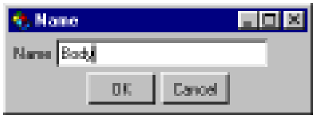


Step 55: Make sure to save your project as Stingray.

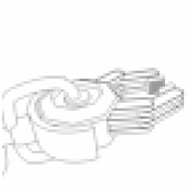
Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)



Step 1. Cylinder Parameters



Step 1. Rename Cylinder



Modeling the Cargo Spaceship

Body

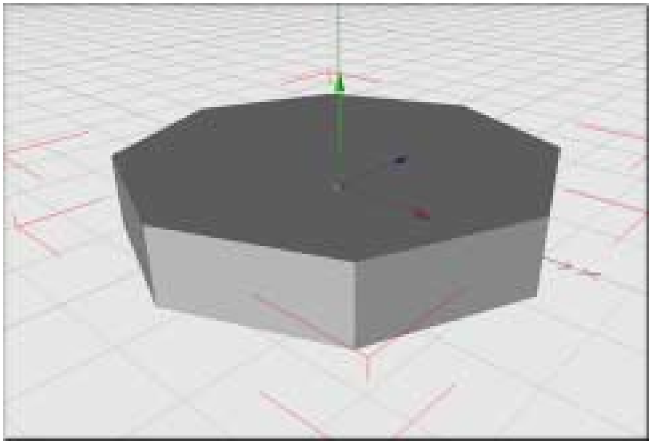
Step 1: Open a new project and create a Cylinder.

Editor: Objects=>Primitive=>Cylinder
Shortcut: None

Double click on the Cylinder icon in the Object Manager to change the parametric settings.

The settings to use: Radius=300m, Height=100m, Height Segments=1, Rotation Segments=8, Cap Segments=3. Click OK.

Double click on the text "Cylinder" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Body."



Step 2: Before you can modify the Body (other than its parametric settings), you have to make it editable.

Editor: Structure=>Make Editable
Shortcut: C

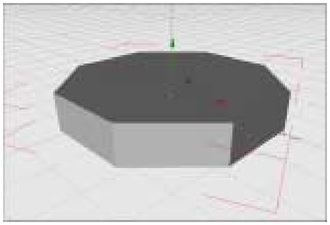
You will want this object to have sharp edges from polygon to polygon, so delete the smoothing tag from the object in the Object Manager

Step 3: Rotate the Body 22.5 degrees on the H axis. This will turn the body so it has a flat face forward.

Editor: Tools=>Rotate
Shortcut: R

Enter 22.5 degree in the Rotation H field in the Coordinates Manager. Click Apply. The ship will rotate accordingly.

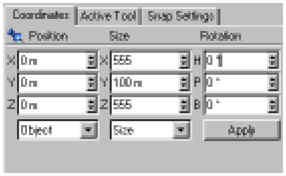
Step 3. Body Coordinates


Step 3. Rotate Body

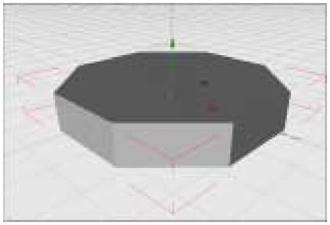
Step 4: You will be scaling the body on the X axis, so you will need to reset the Body axis. Choose the Axis tool.

Editor: Tools=>Object Axis
Shortcut: None

Enter 0 degrees in the Rotation H field in the Coordinates Manager. Click Apply. The ship will not turn, but the axis will.



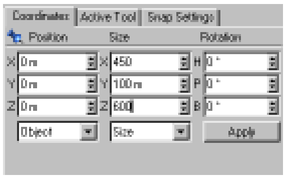
Step 4. Body Axis Coordinates


Step 4. Reset Axis

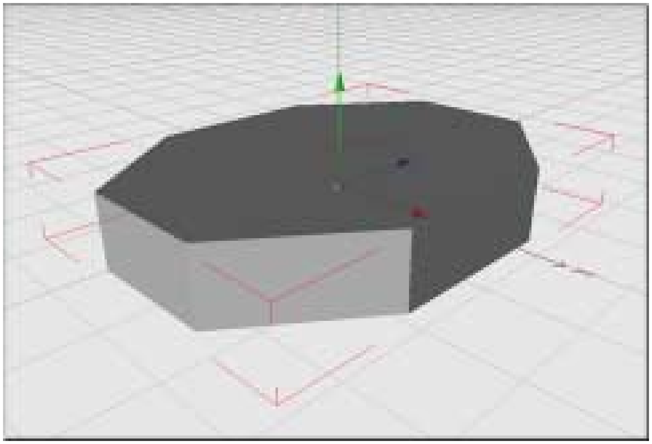
Step 5: Switch back to the Object Tool mode in order to narrow the width of the body. You can do this with the Scale tool.

Editor: Tools=>Scale
Shortcut: T

You can grab the X Scale handle and move the side of the Body in. Alternatively, you can input the exact size into the Coordinates Manager. The size shown is x=450m, Y=100m, Z=600. Click Apply.



Step 5. Body Coordinates



Step 6: Before you do anymore modeling on the Body, you will need to Optimize the model. When a Cylinder is created the Caps are separate objects. You use the Optimize tool to combine the parts together. With the Body selected in the Object Manager.

Editor: Structure=>Optimize
Shortcut: None

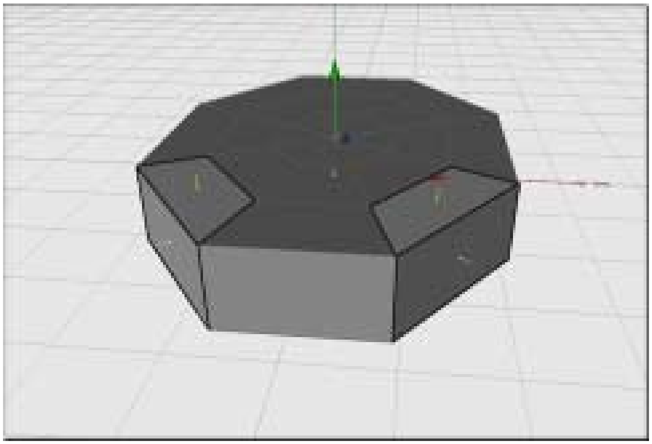
The default settings are fine. Click OK.

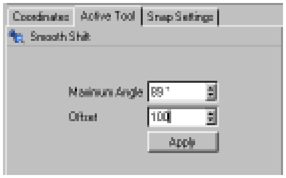
Step 7: Now you can begin modifying the Body. Make sure the Body is selected in the Object Manager. Activate the Polygon tool.

Editor: Tools=>Polygons
Shortcut: None

Use the Polygon Tool to select the two front top corners of the Body as shown.

Editor: Tools=>Polygons
Shortcut: None



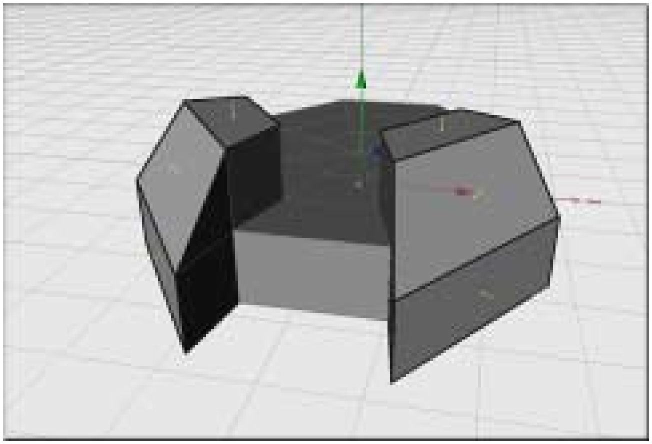


Step 8. Smooth Shift Active Tool

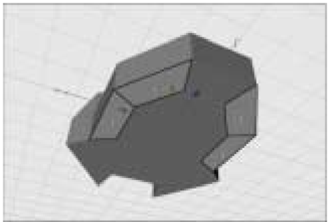
Step 8: Activate the Smooth Shift Tool and move the selected faces out 100m.

Editor: Structure=>Smooth Shift
Shortcut: None

You can Smooth Shift it by approximation, or you can size it exactly by entering 100m in the Offset of the Active Tools Window. Click Apply. This offsets the faces you have selected 100m from the original object.

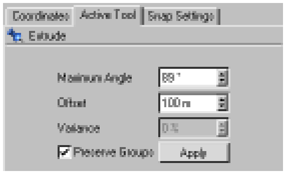


Step 9. Selection



Step 9: Rotate your view, so you are looking at the back underside of the Body. Select the two bottom back sides as shown. You will have to re-activate the Live Selection tool.

Editor: Selection=>Live Selection
Shortcut: None



Step 9. Extrude Active Tool

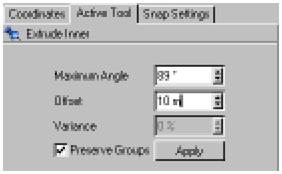
Extrude them approximately 100m.

Editor: Structure=>Extrude
Shortcut: D

Again, enter 100m in the Offset of the Active Tools Window. Click Apply. This extrudes the faces you have selected 100m.

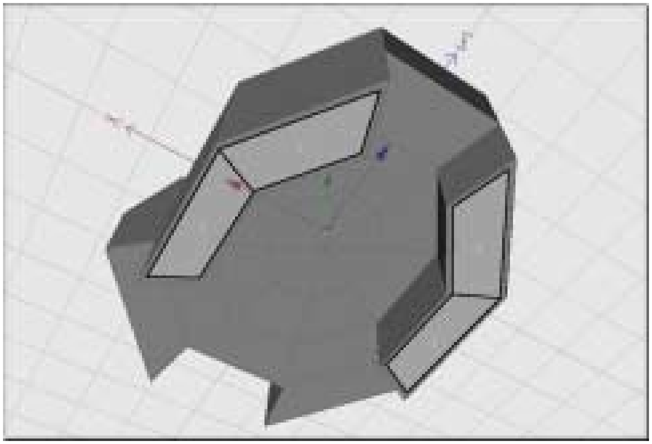
Step 10: With these faces still selected, Extrude Inner the faces.

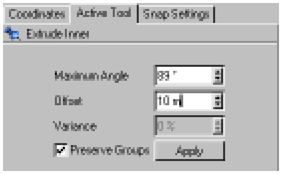
Editor: Structure=>Extrude Inner
Keyboard Shortcut: I



Step 10. Extrude Inner Active Tool

Enter 10m in the Offset of the Active Tools Window. Click Apply. This will create a new inner face selection of polygons.

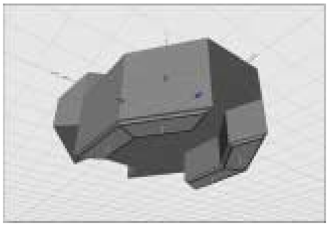




Step 11. Extrude Active Tool

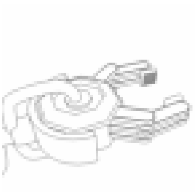
Step 11: Now, Extrude these faces just a little.

Editor: Structure=>Extrude
Shortcut: D


Step 11. Extrude Faces

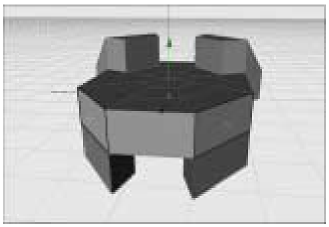
Enter 10m in the Offset of the Active Tools Window. Click Apply. This will extrude the selection of polygons 10m.

As you can see you are starting to add some detail to the ship.



Step 12: Now you will create cargo bays. Select the back face sides of the Body as shown. You will have to re-activate the Live Selection tool.

Editor: Selection=>Live Selection
Shortcut: None

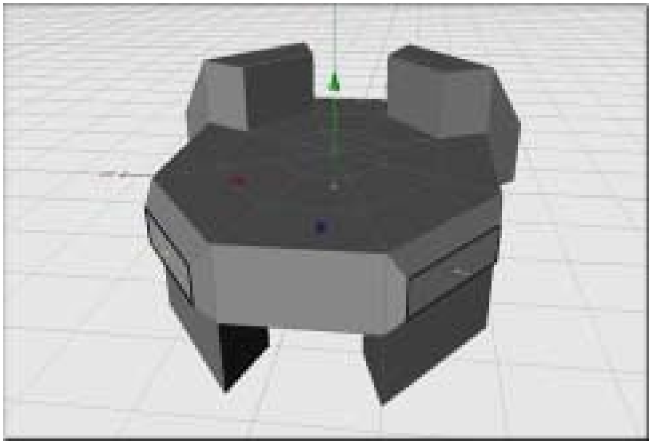

Step 12. Selection

Step 12. Bevel Active Tool

Bevel them slightly.

Editor: Structure=>Bevel
Shortcut: None

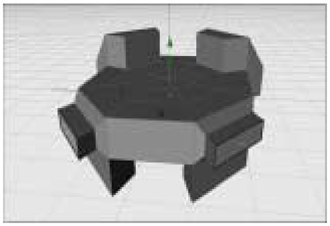
Enter 25m in the Extrusion field and 25m in the Inner Offset field of the Active Tools Window. This will create an even Bevel away from the Body.



Step 13. Extrude Active Tool

Step 13: Now, Extrude these faces.

Editor: Structure=>Extrude
Shortcut: D

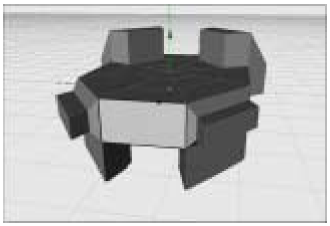


Step 13. Extrusion

Enter 50m in the Offset of the Active Tools Window. Click Apply. This will extrude selection of polygons 50m.

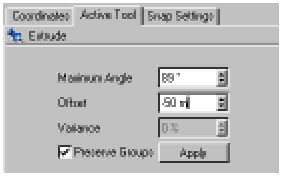
Step 14: Now to create an area where the engine glow will be located. Select the back face of the Body as shown. You will have to re-activate the LiveSelection tool.

Editor: Selection=>Live Selection
Shortcut: None

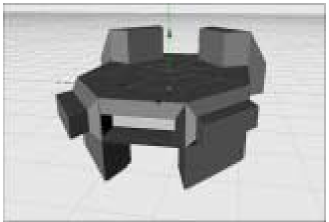


Step 14. Select Back Polygon

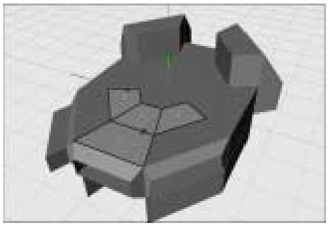
Step 14. Bevel Active Tool



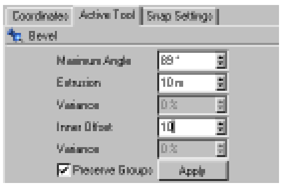
Step 15. Extrude Active Tool



Step 15. Extrusion



Step 16. Selection

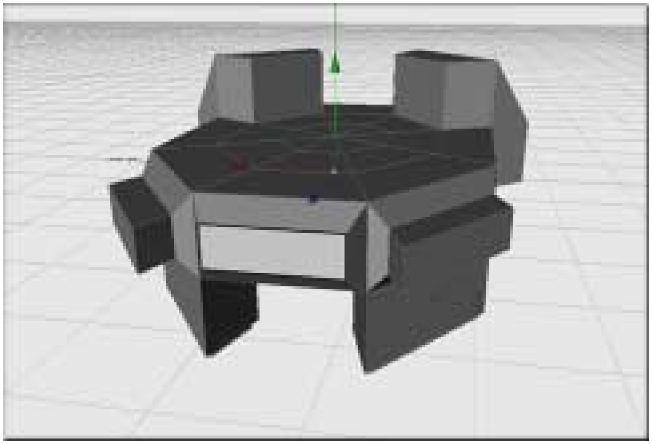


Step 16. Bevel Active Tool

Bevel it like the previous selection.

Editor: Structure=>Bevel
Shortcut: None

Enter 25m in the Extrusion field and 25m in the Inner Offset field of the Active Tools Window. This will create an even Bevel away from the Body.



Step 15: Now, Extrude this face inward.

Editor: Structure=>Extrude
Shortcut: D

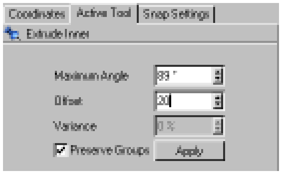
Enter -50m in the Offset of the Active Tools Window. Click Apply. This will extrude selection of polygons -50m.

Step 16: Select a pattern of polygons on the top back as shown. You will have to re-activate the Live Selection tool.

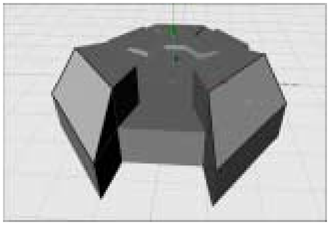
Editor: Selection=>Live Selection
Shortcut: None

Bevel the selection slightly.

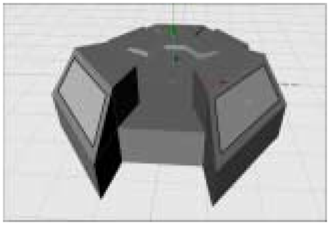
Editor: Structure=>Bevel
Shortcut: None



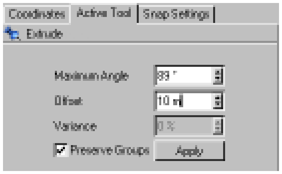
Step 17. Extrude Inner Active Tool



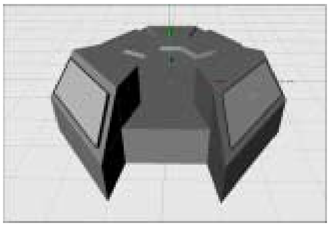
Step 17. Selection



Step 17. Extrude Inner

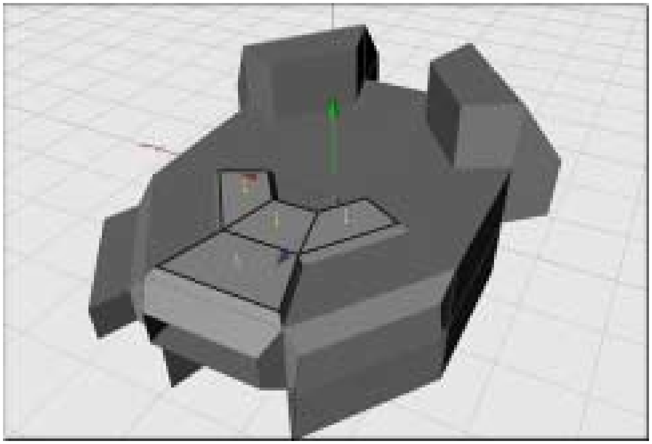


Step 18. Extrude Active Tool



Step 18. Extrude

Enter 10m in the Extrusion field and 10m in the Inner Offset field of the Active Tools Window. This will create an even Bevel away from the Body.



Step 17: Select the front angled faces of the Body as shown. You will have to re-activate the Live Selection tool.

Editor: Selection=>Live Selection
Shortcut: None

Now, Extrude Inner this face.

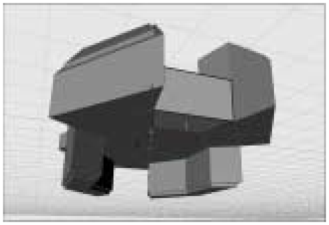
Editor: Structure=>Extrude Inner
Keyboard Shortcut: I

Enter 20m in the Offset of the Active Tools Window. Click Apply. This will create a new face with an inward extrusion of 20m.

Step 18: Now, Extrude these faces.

Editor: Structure=>Extrude
Shortcut: D

Enter 10m in the Offset of the Active Tools Window. Click Apply. This will extrude the selection of polygons 10m.



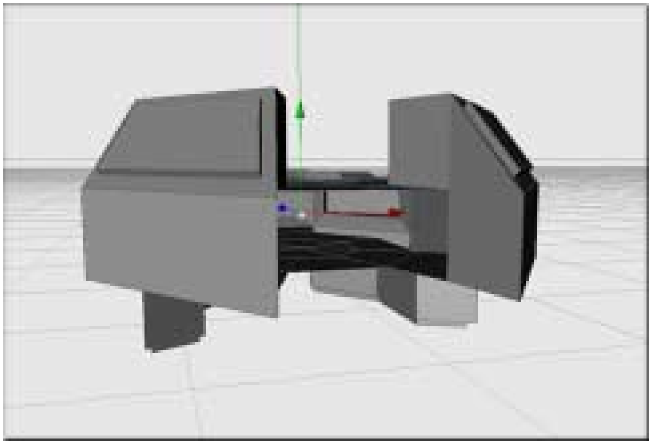
Step 19. Selection

Step 19: Next, you will streamline the front of the Body. Re-activate the Live Selection tool.

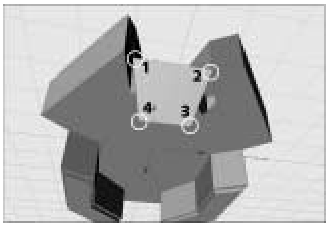
Editor: Selection=>Live Selection
Shortcut: None

Select the front most face of the Body and the polygon just underneath it as shown.

Delete these polygons. You can now see into the Body as there are no faces there anymore.



Step 20: Now you will build new polygons in place of the ones you removed to create a new look for the front. Change to the Points tool.

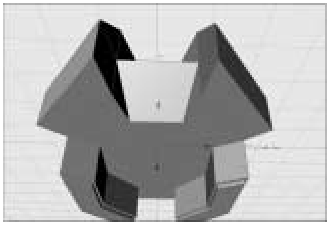


Step 20. Create Polygon

Next, use the Create Polygon tool to create three new polygons in the area where you deleted two.

Editor: Structure=>Create Polygon
Shortcut: None

With this tool activated, you click on one point until you see the crosshairs. Then drag the crosshairs to the next point to connect them together.



Step 21. Create Polygon

You do the same with the second point to the third.

And, the third to the fourth.

Click the original point to close the polygon and you will see that it has been created.

Always build polygons clockwise from the outside of the model so the normals face the right direction. If for some reason they don't, just run reverse normals.

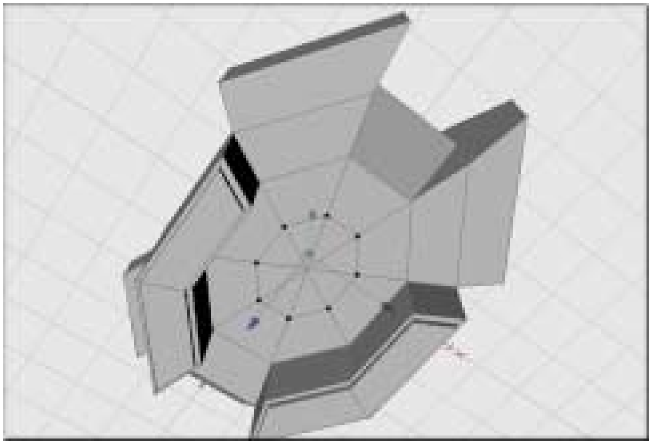
Step 21: Repeat the process with the two sides still left open. However, both of these are defined by only three points this time.

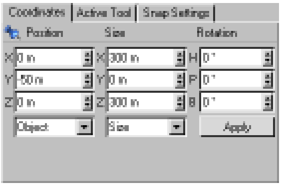
Step 22: Now you will create a cargo door on the bottom of the body. Rotate your view so you are looking at the bottom of the Body as shown. You can see that the center polygons are all pie shaped. In order to create a rectangular door opening, you will have to change this.

Reactivate the Live Selection tool.

Editor: Selection=>Live Selection
Shortcut: None

And, select the center circle of points as shown.

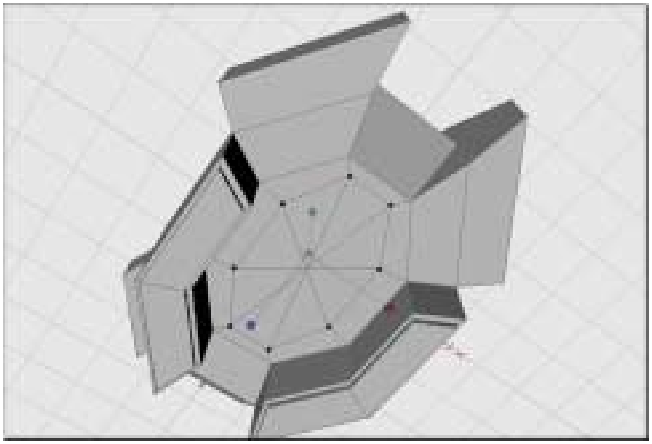




Step 23. Coordinates

Step 23: Next, select the scale tool.

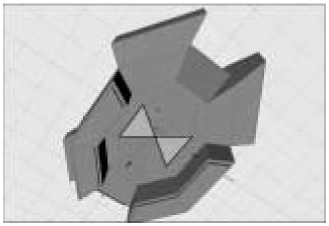
You can scale them artistically or by hand. You could also enter the new size of the selection in the Coordinates Manager. The setting shown indicates the latter with X=300m, Y=0m, Z=300m.



Step 24: Now you will use the Knife tool to create a new rectangle shape in the middle. Re-activate the Live Selection tool and the polygon tool.

Select the polygons positioned at the three and nine o'clock positions as shown.

Choose the Knife tool.



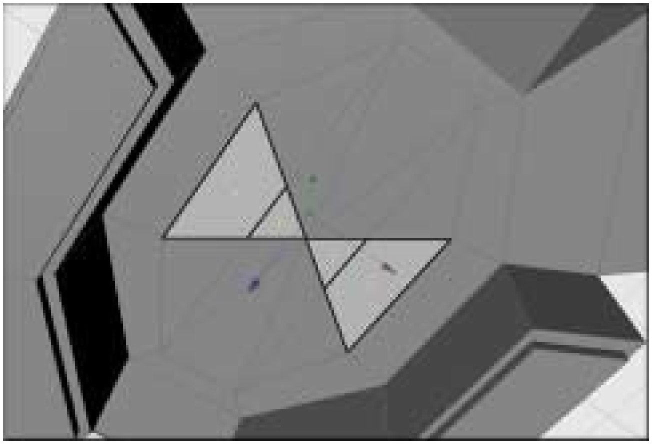
Step 24. Selection

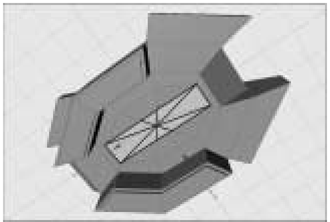
Step 24. Snap Settings

In order to cut a straight line, use the Snapping tools. Go to the Snap Settings dialog Turn on Point snapping and Turn off Grid Point and Grid Line snapping. Snap: 2.5D and the default Radius are fine. Make sure to click the checkbox to Enable Snapping.

Cut a straight line through each of the selected polygons, using the points of the adjacent polygons as shown.

Now you have a square shape where there was only pie shaped wedges before.

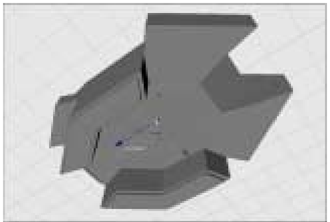




Step 25. Selection

Step 25: Select all the polygons that define the rectagular shape in the middle.

Editor: Selection=>Live Selection
Shortcut: None

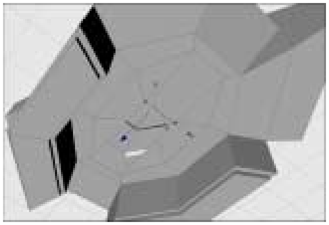


Step 25. Delete

Delete these polygons. You are going to rebuild them with simpler geometry so you can create the cargo doors.

Step 26: Re-activate the Points tool.

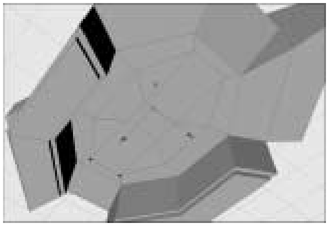
Editor: Tools=>Points
Shortcut: None


Step 26. First Bridge

Choose the Bridge tool.

Editor: Structure=>Bridge
Shortcut: B

With this tool activated, you click on the top left of the hole on the corner point until you see the crosshairs. Then drag the crosshairs to the point horizontally across from it bridging them together.


Step 26. Third Bridge

Repeat it with the next horizontal pair and the first polygon will appear.

Repeat it with the next horizontal pair and a second polygon will appear.

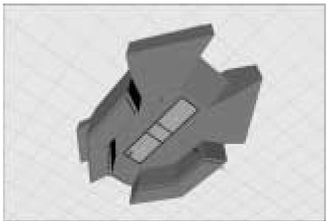
Repeat it with the last horizontal pair and a third polygon will appear.

You have now created three square polygons where before there were eight irregularly shaped polygons. This will make it much easier to create the cargo bay doors.

Step 27. Bevel Active Tool

Step 27: Now you can add a little detail to the door. Go back to the Polygon tool and select the three new polygons that define the rectangular shape in the middle.

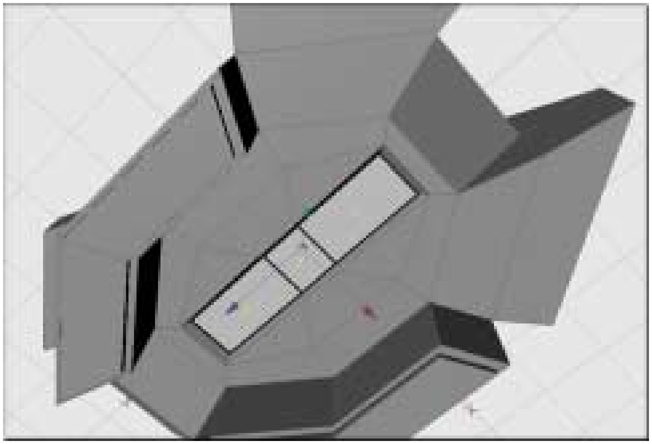
Editor: Selection=>Live Selection
Shortcut: None


Step 27. Selection

Bevel them in slightly.

Editor: Structure=>Bevel
Shortcut: None

Enter -10m in the Extrusion field and 10m in the Inner Offset field of the Active Tools Window. This will create an inward bevel.

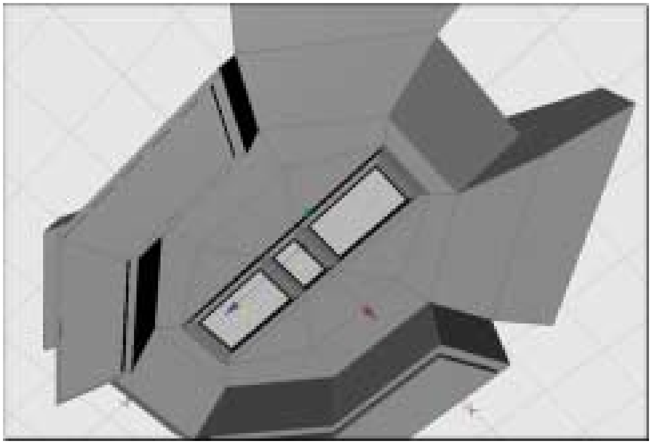


Step 28. Bevel Active Tool

Step 28: Turn off Preserve Groups in the Active Tools dialog and Bevel again.

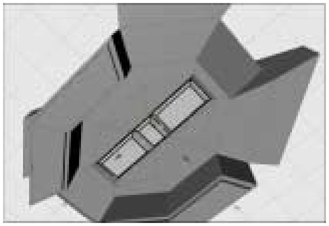
This time enter 10m in the Extrusion field and 10m in the Inner Offset field of the Active Tools Window. This will create an outward bevel.

This makes the door look a bit more interesting.



Step 29: The next step will be to make the door a separate object so you can open the door later. With the three polygons you beveled still selected, increase the size of your selection to encompass the entire door area.

Editor: Selection=>Grow Selection
Shortcut: None


Step 29. Selection

You should have all the polygons that define the door selected. Split them off from the rest of the object.

Editor: Structure=>Edit Surface=>Split
Shortcut: None

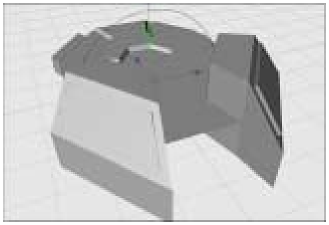
A new object will appear in the Object Manager called Body.1. This is the new door selection.

Delete the selected polygons from the Body. Nothing has really changed, the new door object is in the same place as the one you deleted.

Double click on the text "Body.1" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Door."

Step 30: Now you will add some piping to the ship to take away some of the boxiness of the ship. Create a Circle spline.

Editor: Objects=>Spline Primitive=>Circle
Shortcut: None


Step 30. Circle Spline

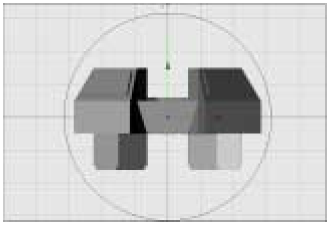
Double click on the text "Circle" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Pipeline."

Step 31: Change your view to the XY, or Front view.

View: View=>View 4
Shortcut: F4

Select the Object Tool.

Editor: Tools=>Object
Shortcut: None


Step 31. Scale Circle Spline

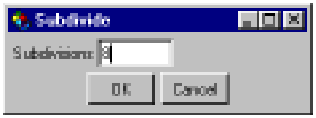
Now scale, the Pipeline until it is encircles the entire ship.

> Editor: Tools=>Scale
> Shortcut: T

Click and drag on the scene to make it larger. Exact size does not matter.

Before you can modify the Circle any further (other than its parametric settings) you have to make it editable.

> Editor: Structure=>Make Editable
> Shortcut: C



Step 32. Subdivide Spline

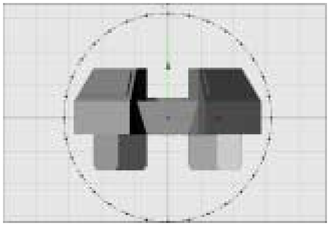
Step 32: For the next step you will need the Pipeline to have more than just its default four points. Select the Points tool.

> Editor: Tools=>Points
> Shortcut: None

With the Pipeline selected you can see it is defined by only four points.

Subdivide the Spline.

> Editor: Structure=>Subdivide
> Shortcut: None


Step 32. Spline Subdivision

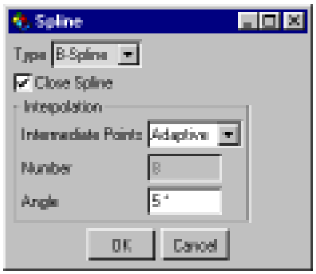
Use a setting of 8 Subdivisions. This Subdivides the 4 points into 32.

Step 33: Next you will project the Pipeline onto the Body so that the spline essentially hugs the ship on the outside.

First double click on the Spline icon to the right of the Pipeline in the Object Manager to change the Spline Type. Change it to B-Spline. Click OK. This will make for a smoother projection.

Then, project the spline onto the ship.

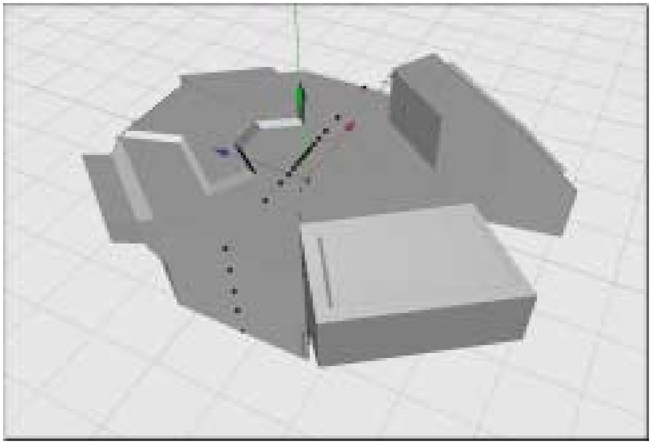
> Editor: Structure=>Edit Spline=>Project
> Shortcut: None

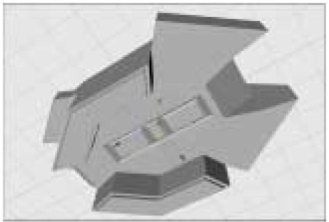


Step 33. Spline Settings

Step 33. Project Dialog

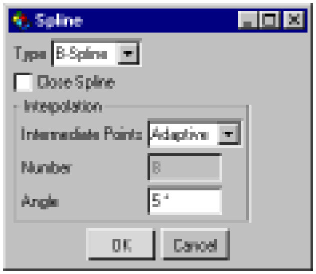
In the dialog, choose a Radial projection (all the way around the Body). You will now see the Pipeline has adapted itself to the Body shape.





Step 34. Delete Selection

Step 34: The piping will only run on the outside edge of the ship. Use the Points tool to select the points at the direct underbelly of the Body and delete them.

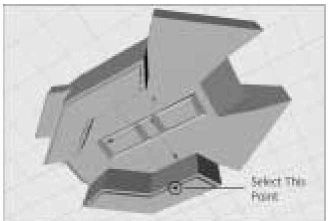


Step 34. Spline Settings

Next change the Pipeline to an open spline. Double click on the Spline icon to the right of the Pipeline in the Object Manager and click on Close Spline. Click OK.

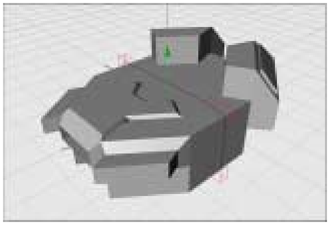
Step 35: You'll notice that the spline is open now, but not in the right location. So you will have to fix this. Select the bottom right point as shown. Then use the Set First Point tool to make your selection the new first point.

Editor: Structure=>Edit Spline=>Set First Point
Shortcut: None



Step 35. Delete Selection

The opening will now be at the bottom where you want it.



Step 36. Scale Pipeline Spline

Step 36: Projecting the Circle spline initially places it right on the surface of the object. In order to create piping you will need to scale the Pipeline out a little so it floats around the surface of the Body.

Change to the Object tool.

Editor: Tools=>Object
Shortcut: None

Select Scale.

Editor: Tools=>Scale
Shortcut: T

Click and drag on the scene so it runs just outside the surface of the Body. You may need to scale on the X and Y axis separately to get a nice distance. And you may have to tweak the two bottom points in a bit after scaling.

Step 37: Now to make the pipes. Create a new Circle Spline.

Editor: Objects=>Spline Primitive=>Circle
Shortcut: None

Step 37. Circle Parameters

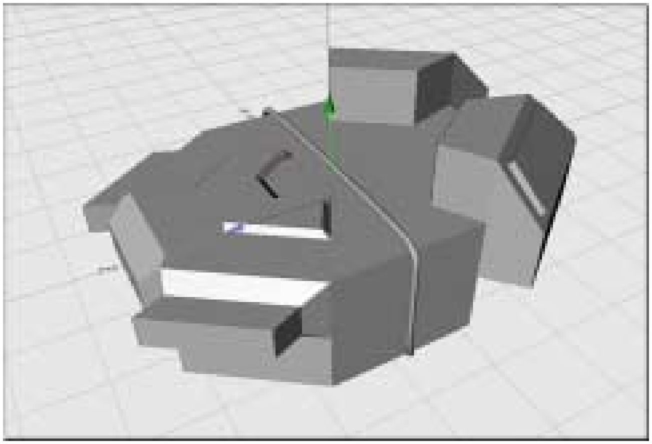
First double click on the Circle icon to the right of the Circle in the Object Manager to change the settings. Change the Radius to 5m. This will be the thickness of the pipe. Change the Interpolation=>Intermediate Points to Uniform and a Number 1. This is so the pipe does not over subdivide making it more complex than it needs to be. Click OK.

Step 38: Create a Sweep NURBS.

Editor: Objects=>NURBS=>Sweep NURBS
Shortcut: None

Double click on the text "Sweep NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Pipe."

Drag and drop the Pipeline and the Circle on top of the Sweep NURBS. For the expected results, the objects have to be in the correct order — first Circle, then Pipeline — underneath the Sweep NURBS object. You will immediately be presented with your piping.



Tip: A good rule to remember the order objects should be in when using a Sweep NURBS is, the top object is being swept along the bottom object(s).

NURBS are always "live." Anytime you want to resize or reshape the pipe, you can do so by changing the circle within.

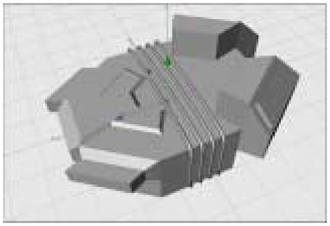
Step 39: Now duplicate the pipe to create a series of pipes. First, go back to your Perspective View.

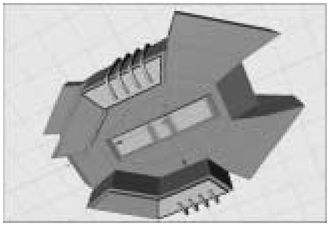
View: View=>View 1
Shortcut: F1

Now, move the Pipe back to where the slight bevel detail starts on the top as shown. You'll need to have the Object and Move tools active.

Editor: Tools=>Object
Shortcut: None

Step 40. Duplicate Settings


Step 40. Four Pipes


Step 41. Selection

Step 41. Bevel Active Tool

Select Move.

Editor: Tools=>Move
Shortcut: E

Step 40: Now use the Duplicate function to create clones of the Pipe.

Editor: Functions=>Duplicate
Shortcut: None

Make 3 copies. Make sure to make them Instances by clicking the Generate Instance checkbox. Using Instances as often as possible saves time, disk space, RAM requirements and speeds up workflow. To offset them along the Z plane enter X=0, Y=0, Z=-100 in the Move fields. Click OK.

Rename the Null Object to “Instance Pipes”.

Now you have four pipes encircling your ship.

Step 41: Now you need to hide the ends of the pipes.

Rotate the view so you are looking at the bottom of the ship. Especially where the pipes end. Select the Polygon Tool.

Editor: Tools=>Polygons
Shortcut: None

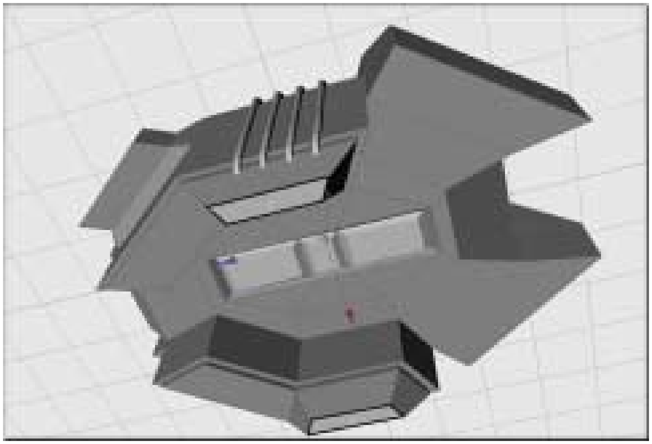
Activate the Live Selection tool.

Editor: Selection=>Live Selection
Shortcut: None

Make sure the Body is selected in the Object Manager and select the two polygons directly beneath where the pipes end. Bevel them out.

Editor: Structure=>Bevel
Shortcut: None

Enter 50m in the Extrusion field and 25m in the Inner Offset field of the Active Tools Window. This new element will finish off the pipe effect.



Step 42: Group the parts of the ship together.

First drag and drop the Door onto the Body.

Group just the Body object.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the Body and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Cargo Ship."

Drag and Drop the Pipe and the Instance Pipes into the Cargo Ship group.

Save your project as Cargo Ship.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Adding Nernies

Nernies, Greeblies or just plain Stuff. It's the little details added to a model or scene to make them look more interesting. The pipes you created above are a good example of nernies. It's the stuff that looks like it has some purpose on the object or in the scene. If you can come up with a good mechanical reason for it being there, more power to you.

The following are some ideas for nernies you can add to the Cargo Ship. The finished cargo ship model on the CD has lots of these examples on it and more. You can add whatever you want. Just remember, the more geometry on the ship, the more complex. So do your best to remain efficient in your modeling.

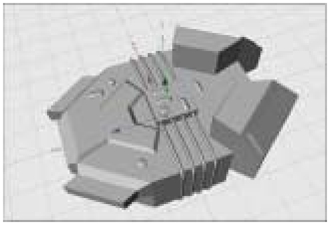
Spline Nernies

Like the pipes above you can draw a spline and project it across any part of the ship. You can sweep any shape along the path of the spline (like a cog wheel, star, etc.) to create interesting pipes.

Some tips for making nernies with splines:

- Use a few points as possible to define your spline.
- For subtle curves, use a Bezier spline and adjust the tangents.
- For fillet-style curves, use Linear splines. Then, use the chamfer tool to curve corners to the desired amount.
- Make sure that piped objects end somewhere.

Primitive Nernies



Primitive Nurnies

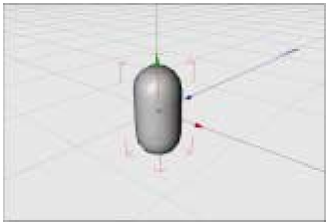
Something as simple as a cube placed in the middle of the top of the ship where the pipes are located would make a great housing for the pipes. This is where the cooling system of the ship is housed. Other primitives like oil tanks, capsules, etc. can be placed around the outside of the ship's hull to make it a bit more interesting looking.

Light Nernies

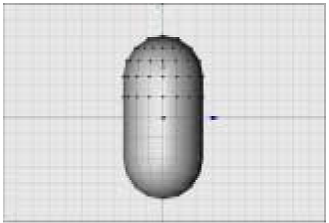
It's really easy to add warning lights to the outside edges of the ship.

Step 1: Make a capsule primitive, lower its polygon count to about half the default setting and make it editable.

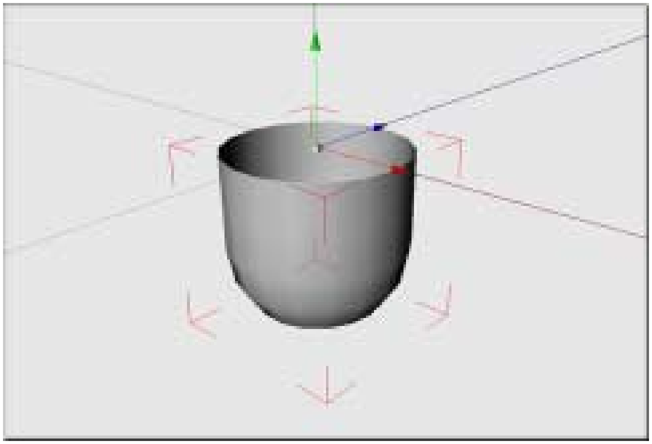
Step 2: Use the points tool and select half of the points (the top or bottom half). Delete those points.

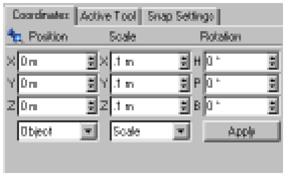


Step 1. Light Nernies



Step 2. Light Nernies

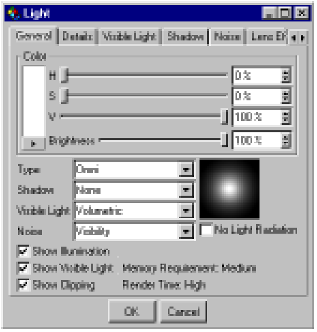




Step 3. Scale

Step 3: Scale the size of the capsule down until it is an appropriate size for a warning light. Size shown is Scale .1 or 10%.

Step 4: Create a new material. Use only the Luminance channel. Make it the color of the light you wish to create. Put it on the capsule.



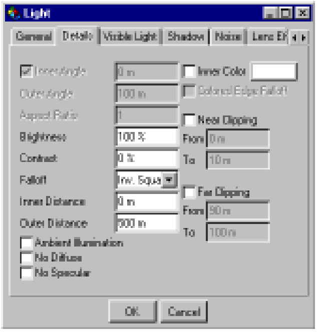
Step 5. Light - General Settings

Step 5: Create a light. Use an Omni light, make it visible volumetric, add visible noise to the light.

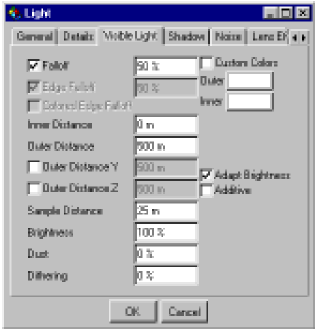
Step 6: In the Detail Tab, Make its illumination Falloff Inverse Square with an outer distance of 500m.

Step 7: In the visible tab, make the visible Falloff 50%.

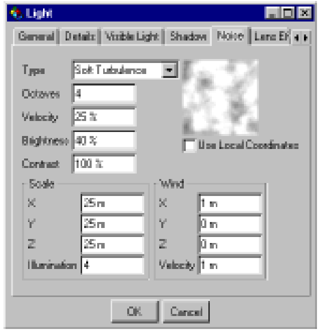
Step 8: In the noise tab set the brightness to 40, turn Local Coordinates off, scale it to 25m on all axes and set the wind velocity to X=1m.



Step 6. Light - Details



Step 7. Light - Visible



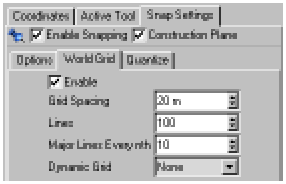
Step 7. Light - Noise

If you do add detail to your ship, make sure to save your changes.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Modeling a Robotic Arm for the Cargo Ship

Modeling the Finger Joints



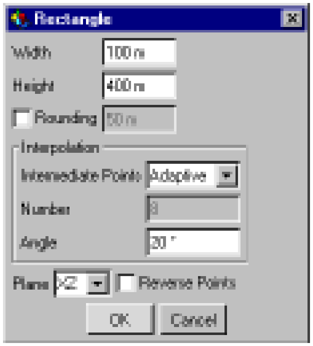
Step 1. Snap Settings

Step 1: Open a new project. While making this Robotic Arm, you are going to need more grid subdivisions in your workspace. Go to the Snap Settings dialog, the World Grid tab and change the Grid Spacing to 20m. This will give you a grid line every 20m rather than every 100m. Change the Dynamic Grid to None. Dynamic Grid changes the number and size of the grid squares as you zoom in. Turning it to None fixes it at 20m no matter how close you zoom in.

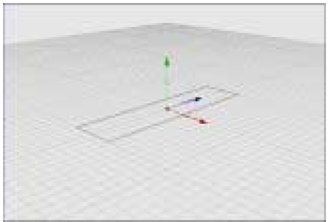
In addition, enable snapping. Snap: 2.5D, Grid Point and Line enabled and the default Radius are fine.

Step 2: Add a Rectangle Spline.

Editor: Objects=>Spline Primitive=>Rectangle
Shortcut: None



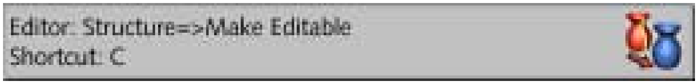
Step 2. Rectangle Setitngs



Step 2. Rectangle

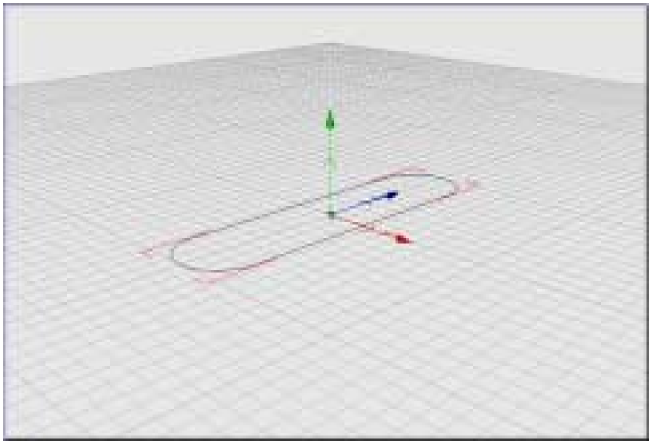
Double click on the Rectangle icon in the Object Manager to change the settings. Change the Width to 100m and the Interpolation Angle to 20 degrees. This makes a point every 20 degrees. Set Plane to XZ so the rectangle is created parallel to the ground plane. Click OK.

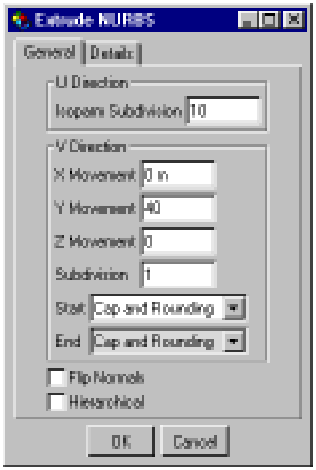
Step 3: Now you're going to round it. First make it editable.



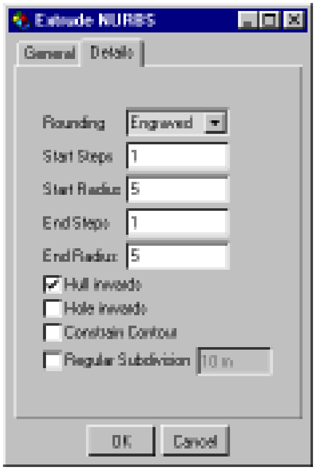
Then Chamfer the Rectangle.

Then, click and drag (to the right) until the Rectangle is completely oval as shown.

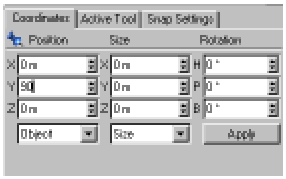




Step 4. Extrude NURBS - General



Step 4. Extrude NURBS - Details



Step 4. Coordinates

Step 4: Create an Extrude NURBS

Editor: Objects=>NURBS=>Extrude NURBS
Shortcut: None

Double click on the text "Extrude NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Finger Joint."

Double click on the Extrude NURBS icon in the Object Manager to change the settings. Extrude on the Y axis 40m. Make sure Z Movement is 0. Set the Start and End Caps to "Cap and Rounding."

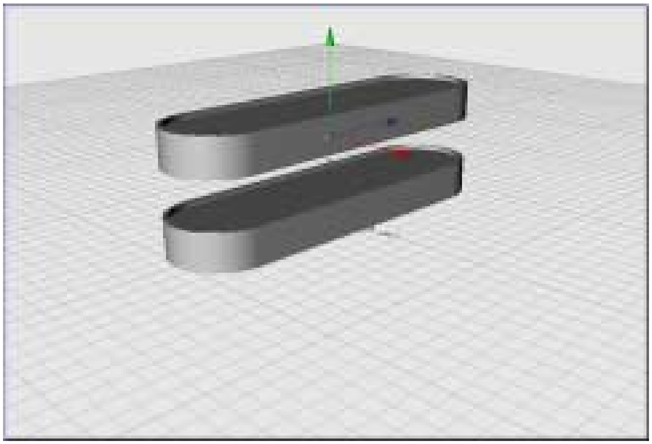
In the Details setting, make sure the Rounding is set to Engraved. Click OK to exit the dialog and save your settings.

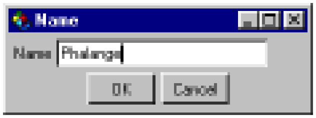
Drag and drop the Rectangle on top of the Finger Joint object. You will see the model.

Step 5: Make sure the Finger Joint is selected, and make an Instance of the Finger Joint.

Editor: Objects=>Modeling=>Instance
Shortcut: None

Move the Instance to Y=90m. Use the Coordinates Manager to input this exact position and click Apply.





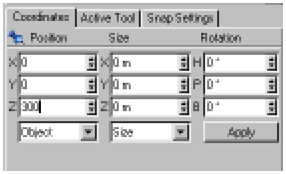
Step 5. Rename Null Object

Group these two objects together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the objects and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Phalange."

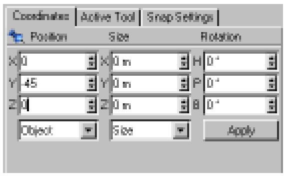


Step 6. Metacarpal Coordinates

Step 6: Copy the Instance three times.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

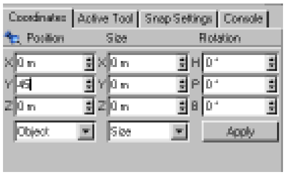


Step 6. Bottom Coordinates

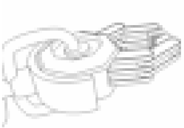
Group these new three Instances together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the objects and let go. You will have a Null Object group.

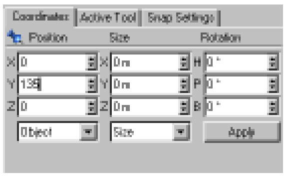


Step 6. Middle Coordinates



Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Metacarpals."

Move the Metacarpal group to X=0m, Y=0m, Z=300m. Use the Coordinates Manager to input this exact position and click Apply.



Step 6. Top Coordinates

Move the Instances in the group so they stack between the others. The Coordinates are Bottom Instance X=0m, Y=-45m, Z=0m; Middle Instance X=0m, Y=45m, Z=0m; Top Instance X=0m, Y=135m, Z=0m.

Modeling the Finger Joint Connector

Now you will create the joint connector for the fingers. For a cleaner workspace, hide the Phalange and Metacarpals by clicking the top gray dot to the right of their icons in the Object Manager until they turn red.

Step 1: Copy the original Finger Joint object located inside the Phalange group.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Double click on the text of the new "Finger Joint" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Joint Connector."

Step 2: Now cut the spline to create a heel-shaped model. Make sure the Points tool is active.

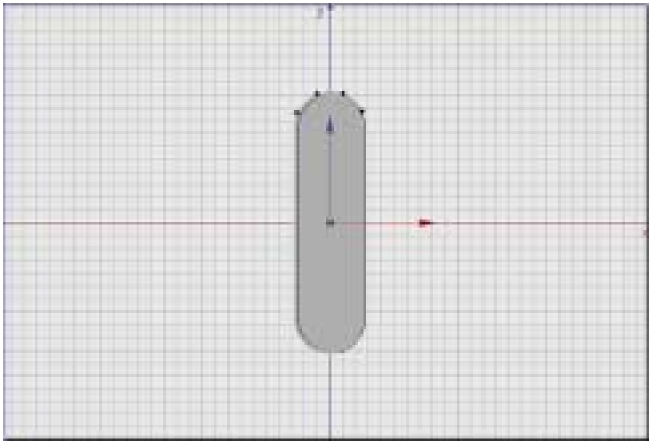
Editor: Tools=>Points
Shortcut: None

Change your view to the XZ, or Top view.

View: View=>View 2
Shortcut: F2

Make sure the Rectangle under the Joint Connector is selected in the Object Manager. Select the Knife Tool and cut horizontally across the object. Cut along the -80m line. Remember your grid is set to 20m distances apart, so that is the fourth line down from the 0 axis. Also, snapping should still be on, so the Knife will lock to the line.

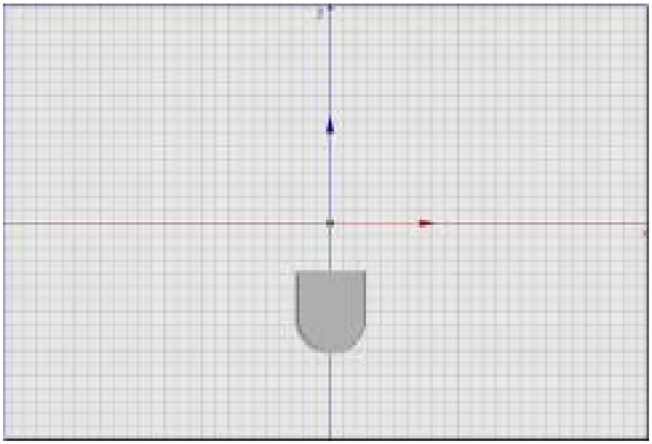
Editor: Structure=>Knife
Shortcut: K



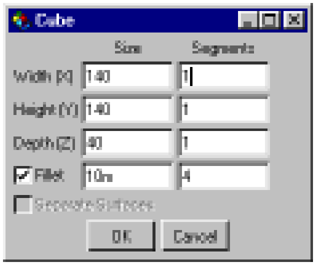
Step 3: Use the Live Selection tool to select all the points at the top of the rectangle in this view as shown.

Editor: Selection=>Live Selection
Shortcut: None

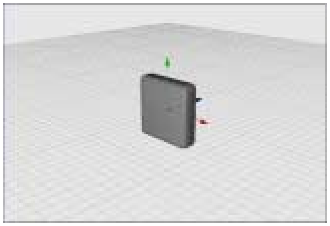
Delete them. You should now have a heel-shaped object.



Hide this object in the Editor window. Click the top gray dot to the right of its icon in the Object Manager until it turns red.



Step 1. Cube Settings


Step 1. Cube

Modeling the Finger Pad

This is the pad of the finger object.

Step 1: Create a Cube.

Editor: Objects=>Primitive=>Cube
Shortcut: None

Double click on the Cube icon in the Object Manager to change the parametric settings.

The settings to use: X=140m, Y=140m, Z=40m. Activate the Fillet with 10m and 4 Segments.

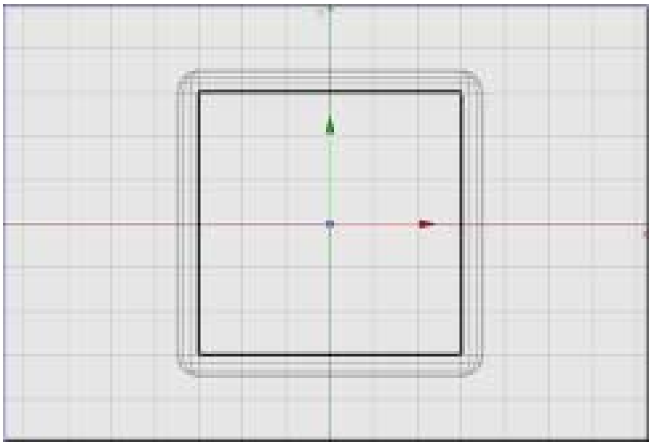
Double click on the text "Cube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Finger Pad."

Make it editable.

Editor: Structure=>Make Editable
Shortcut: C

Step 2: Now you will cut slices into one of its faces. Use the Polygon Tool to select the front face as shown.

Editor: Tools=>Polygons
Shortcut: None

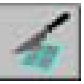


Before you cut the face, switch to the XY View for accuracy.

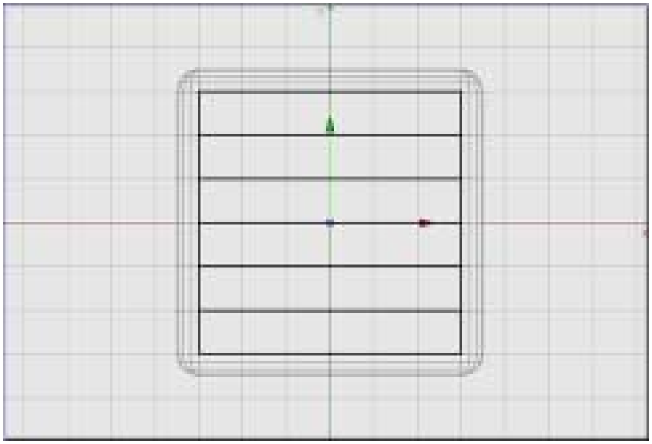
View: View=>View 4
Shortcut: F4

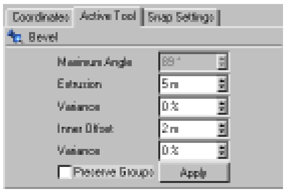
Select the Knife Tool.

Editor: Structure=>Knife
Shortcut: K

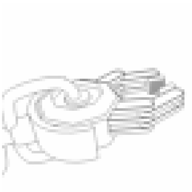


Cut horizontally across every grid line as shown.



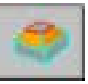


Step 3. Bevel Active Tool



Step 3: Now create the pad grooves. Make sure the six inside rectangles of the face you just cut are selected and Bevel them.

Editor: Structure=>Bevel
Shortcut: None

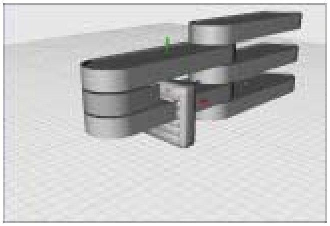


Step 3. Bevel Active Tool

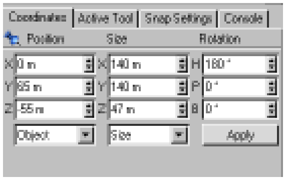
Enter 5m in the Extrusion field and 2m in the Inner Offset field of the Active Tools Window. Make sure to turn off Preserve Groups. You want them to bevel individually. Click Apply.

Bevel again, with Extrusion set to 2m and 2m in the Inner Offset field of the Active Tools Window. Make sure Preserve Groups is still off. Click Apply.

Step 1. Joint Connector Coordinates



Step 1. Finger Pad



Step 2. Finger Pad Coordinates

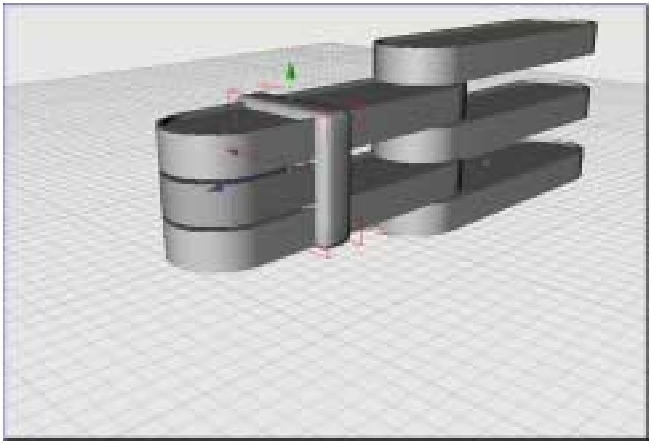
Modeling the Fingertip

Now put together all of the objects that make up the extreme end of the Robotic Arm. First unhide all hidden objects. Click the top red dot to the right of the icons in the Object Manager until they turn green or gray.

Step 1: Activate the Object Tool and move the Joint Connector up on the Y axis 45m. Enter 45m into the Position Y field in the Coordinates Manager. Click Apply.

Step 2: Rotate the Finger Pad 180 degrees on the H axis. Enter 180 degrees in the Rotation H field in the Coordinates Manager. Click Apply.

Then move it to X=0m, Y=65m, Z=-55m using the Coordinates Manager.

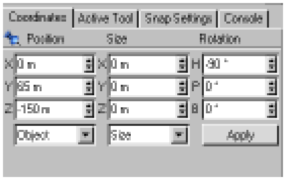


Step 3: Group the Finger Pad and Joint Connector objects together.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the objects and let go. You will have a Null Object group.

Double click on the text “Null Object” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “Finger Tip.”

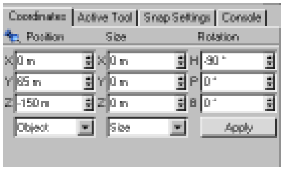


Step 4. Axis Coordinates

Step 4: Move the axis of this group. Select the Object Axis Tool.

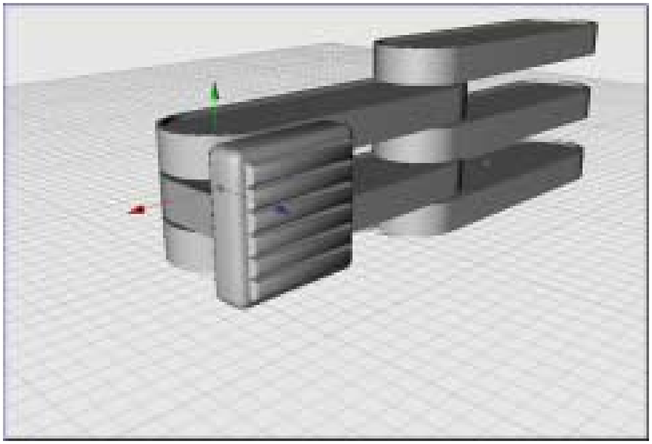
And move the axis to X=0m, Y=65m, Z=-150 using the Coordinates Manager.

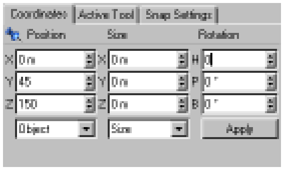
Select the Object Tool and rotate the object.



Step 4. Finger Tip Coordinates

Rotate this group -90 degrees on the H axis using the Coordinates Manager.

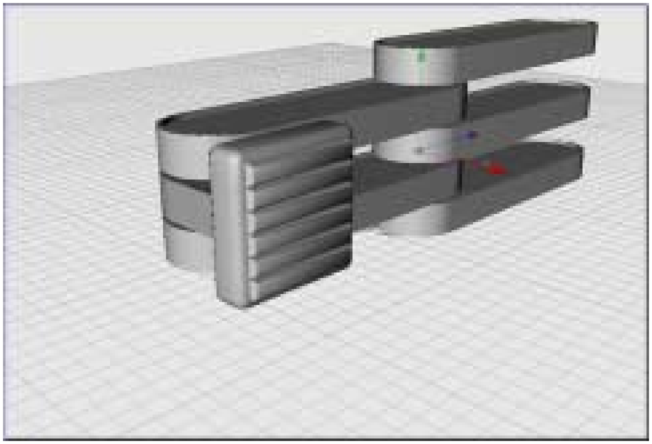


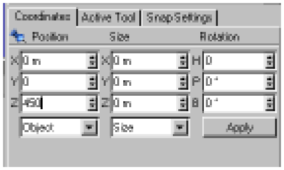


Step 5. Phalange Axis Coordinates

Step 5: Some of the axes need to be adjusted so later the pieces will articulate as you would expect. In movement, the models will always pivot from their axis. Select the Phalange in the Object Manager. Select the Object Axis Tool.

Move the axis to X=0m, Y=45m, Z=150 using the Coordinates Manager. You can see now the axis is located at the intersection of the Phalange and Metacarpals.





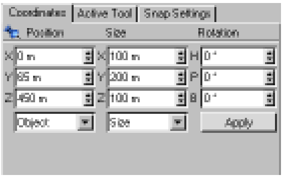
Step 5. Metacarpal Axis Coordinates

Step 6: Select the Metacarpals in the Object Manager and change its axis location.

Move the axis to X=0m, Y=0m, Z=450 using the Coordinates Manager.

Step 7: In order to make them pivot on each other they will need to be in a hierarchy. So, drop the Finger Tip into the Phalange.

Then drop the Phalange into the Metacarpals.



Step 8. Knuckle Coordinates

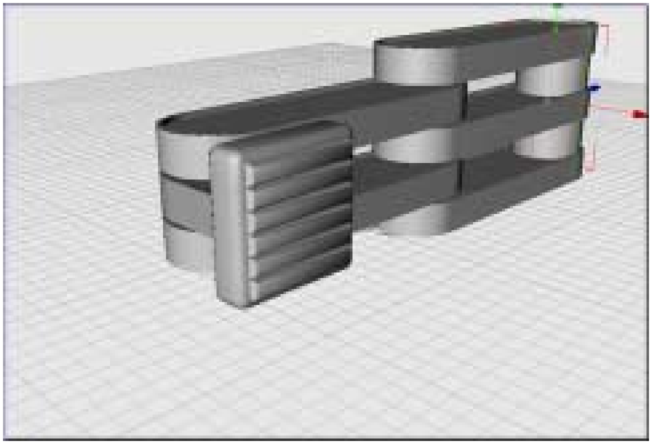
Step 8: Create a Cylinder.

Editor: Objects=>Primitive=>Cylinder
Shortcut: None

The default settings for the Cylinder are fine.

Double click on the text "Cylinder" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Knuckle."

Move the Knuckle to X=0m, Y=65m, Z=450m. This will complete the finger.

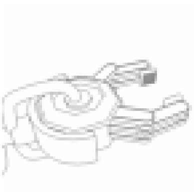


Step 9: The last step is to create one group for the Finger. First group just the Knuckle.

Object Manager: Objects=>Group Objects
Shortcut: G

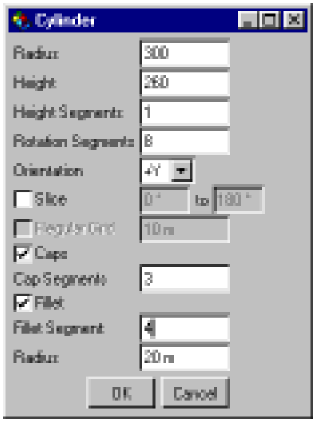
Then drag and drop the Metacarpal into the Null Group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Finger."



Why group just the Cylinder first and move the other objects in later? When grouping, the group's new axis is based on the position of all the objects. Since you will want the Finger to rotate from the location of the Cylinder, grouping the Cylinder first and dropping the other object on later fixes the group axis at the Cylinder's position. This way you avoid having to adjust the group axis later when animating.

Before you go on to build the hand, hide this object in the Editor window. Click the top gray dot to the right of its icon in the Object Manager until it turns red.



Step 1. Cylinder Parameters

Modeling the Hand

The hand will be a cylindrical chamber from which the fingers are controlled.

Step 1: Create a Cylinder.

Editor: Objects=>Primitive=>Cylinder
Shortcut: None

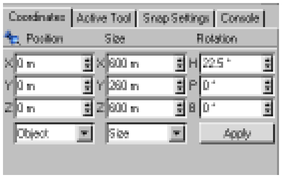
Double click on the Cylinder icon in the Object Manager to change the parametric settings.

The settings to use: Radius=300m, Height=260m, Height Segments=1, Rotation Segments=8, Cap Segments=3, Fillet Segments=4 and Radius=20m.

Double click on the text "Cylinder" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Hand Hull."

Make it editable.

Editor: Structure=>Make Editable
Shortcut: C

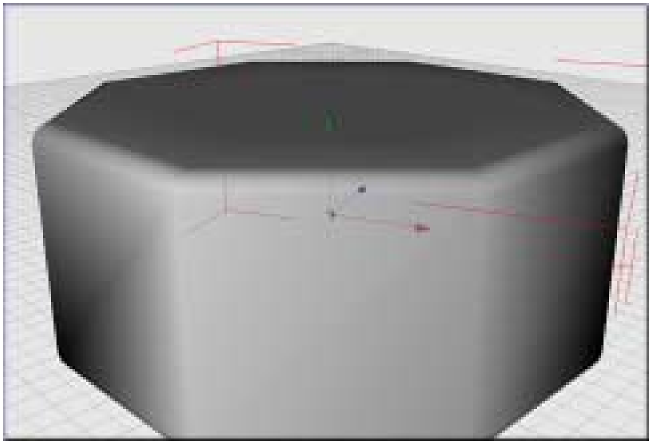


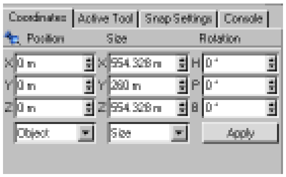
Step 2. Hand Hull Coordinates

Step 2: Make sure the object tool is activated and rotate the Hand Hull 22.5 degrees on the H axis. This will turn the body so it has a flat face forward.

Editor: Tools=>Rotate
Shortcut: R

Enter 22.5 degree in the Rotation H field in the Coordinates Manager. Click Apply. The object will rotate accordingly.





Step 3. Body Axis Coordinates

Step 3: For uniformity, reset the Body axis. Choose the Axis tool.

Editor: Tools=>Object Axis
Shortcut: None

Enter 0 degrees in the Rotation H field in the Coordinates Manager. Click Apply. The object will not turn, but the axis will.

Step 4: Select all the polygons that make up the middle of the top and bottom of the Hand Hull. The easiest way to do it is to change to the Top View.

View: View=>View 2
Shortcut: F2

Activate the Polygon Tool.

Editor: Tools=>Polygons
Shortcut: None

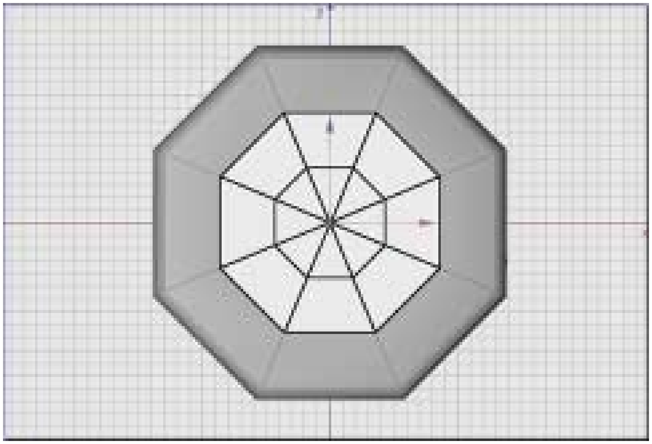
Choose the Live Selection Tool.

Editor: Selection=>Live Selection
Shortcut: None

Step 4. Selection

In the Active Tool dialog, make sure to turn off Only Select Visible Elements by clicking the checkbox. This way you can select the top and bottom faces at the same time.

Select the polygons that make up the top face as shown.



Step 5. Normal Move Active Tool

Step 5: Use the Normal Move tool to brings those faces out 50m.

Editor: Structure=>Normal Move
Shortcut: None

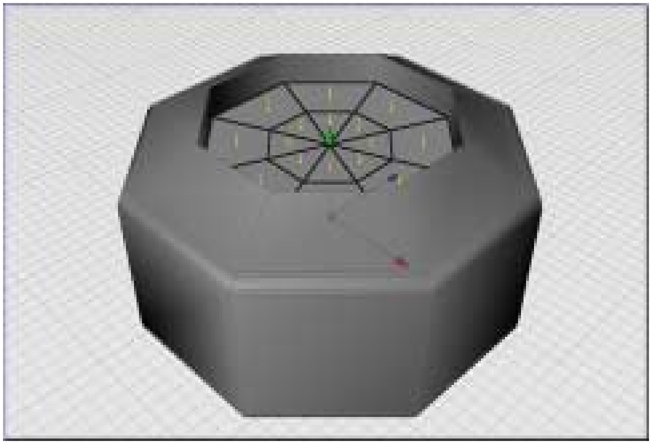
In the dialogue enter 50m and click Apply. This moves the selected faces out from the object without creating a new face.

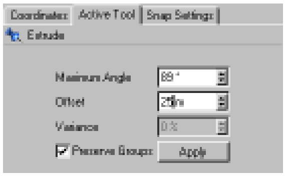
Step 6. Extrude Active Tool

Step 6: Extrude this same selection inwards.

Editor: Structure=>Extrude
Shortcut: D

Enter -50m in the Offset of the Active Tools Window. Click Apply.This pushes in the faces you have selected -50m from the object.





Step 7. Extrude Active Tool

Step 7. Extrusion

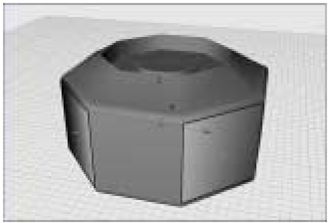
Step 7: Use the Shrink Selection tool to change your selection only the center polygons of the top and bottom.

Editor: Selection=>Shrink Selection
Shortcut: None

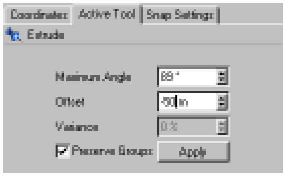
Extrude this group of polygons 25m.

Editor: Structure=>Extrude
Shortcut: D

Enter 25m in the Offset of the Active Tools Window. Click Apply.This offsets the faces you have selected 25m from the object.



Step 8. Selection



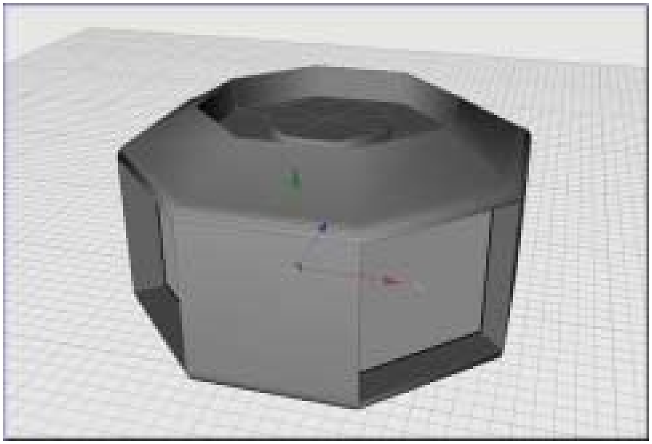
Step 8. Extrude Active Tool

Step 8: Select the front flanks of the Hand Hull as shown. Make sure to activate your Polygon Tool again, Live Selection and turn Only Select Visible Elements back on. Remember to hold the Shift key to select multiple polygons.

Now Extrude them inwards 50m.

Editor: Structure=>Extrude
Shortcut: D

Enter -50m in the Offset of the Active Tools Window. Click Apply.



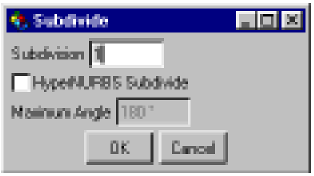
Step 9: Delete the selected polygons after extruding them inward. The Fingers will come out of these holes. The extruded sides give the illusion of thickness.

Step 10: Now add some detail to the front panel. Make sure to go back to the Selection tool. Select the front middle polygon, between where you just made the two holes.

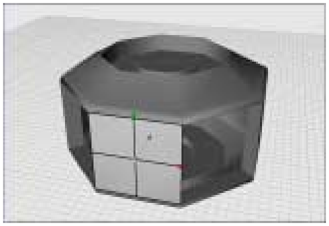
Editor: Selection=>Live Selection
Shortcut: None

Then subdivide that polygon.

Editor: Structure=>Subdivide
Shortcut: None

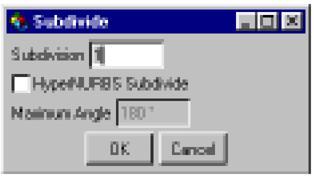


Step 10. Subdivide

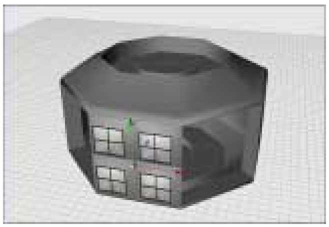


Step 10. Subdivide

Step 11. Bevel Active Tool



Step 12. Subdivide



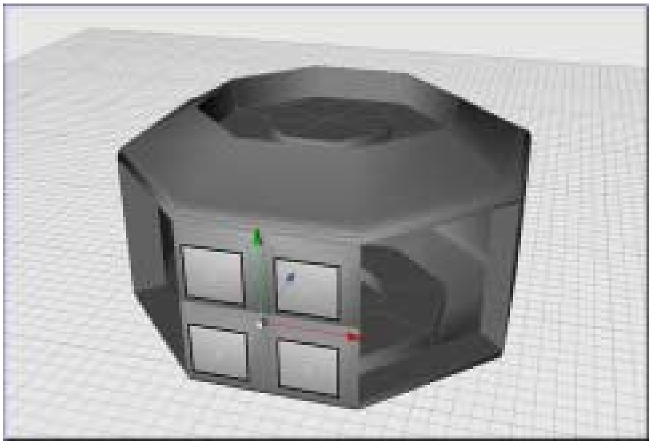
Step 12. Subdivide

In the dialog make sure the Subdivisions are set to 1. Click OK. You will see it has subdivided that one polygon into four equal parts.

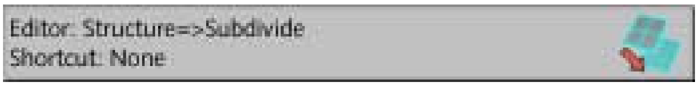
If you had used 2 subdivisions, it would have divided it into 16 equal parts. If you have used 3, it would have created 32 equal parts. And, so on.

Step 11: With those faces still selected, Bevel them.

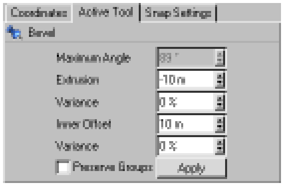
Enter 20m in the Extrusion field and 20m in the Inner Offset field of the Active Tools Window. Make sure Preserve Groups is still off. You want them beveled individually. Click Apply.



Step 12: Subdivide the new beveled faces that are active.



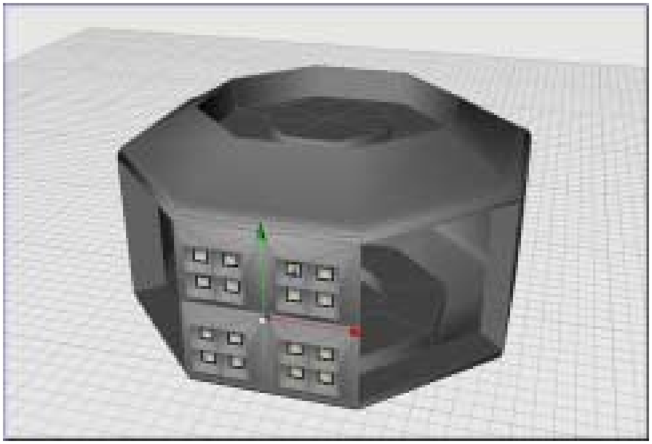
In the dialog make sure the Subdivisions are set to 1. Click OK.

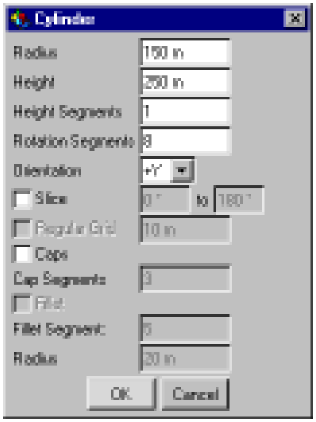


Step 13. Bevel Active Tool

Step 13: Bevel again. The Bevel tool should still be active so you only need set Extrusion to -10m and Inner Offset to 10m in the Active Tools Window. Make sure Preserve Groups is still off. Click Apply.

See how simple it is to create minute details in a hurry?



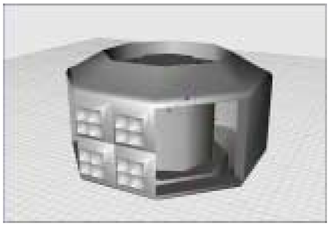


Step 14. Cylinder Parameters

Step 14: Create another Cylinder for the inside of the hand so it doesn't look hollow.

Double click on the Cylinder icon in the Object Manager to change the parametric settings.

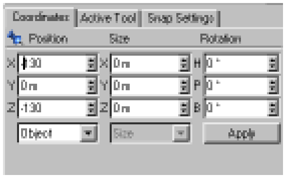
The settings to use: Radius=150m, Height=250m, Height Segments=1, Rotation Segments=8. No need for caps, you won't see them.Click OK.



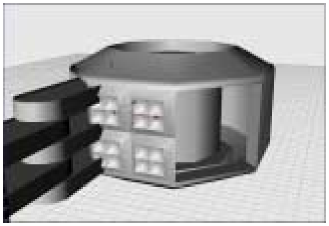
Step 14. HandInt

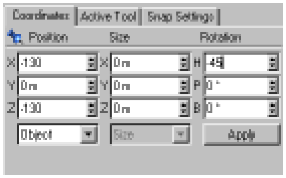
Double click on the text "Cylinder" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "HandInt."

It should be positioned right in the middle of the Hand Hull.

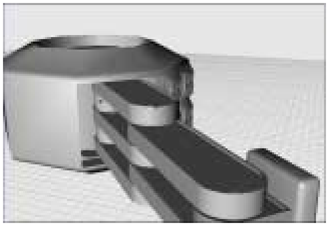


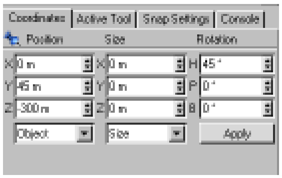
Step 15. Finger Position


Step 15. Finger Sticking out



Step 15. Finger Rotation


Step 15. Finger After Rotation



Step 16. Phalange Position

Step 15: Now move the Finger into position. First make the Finger visible again, by clicking on the Red dot next to the Finger object in the Object Manager until it turns Green or Gray.

Activate the object tool.

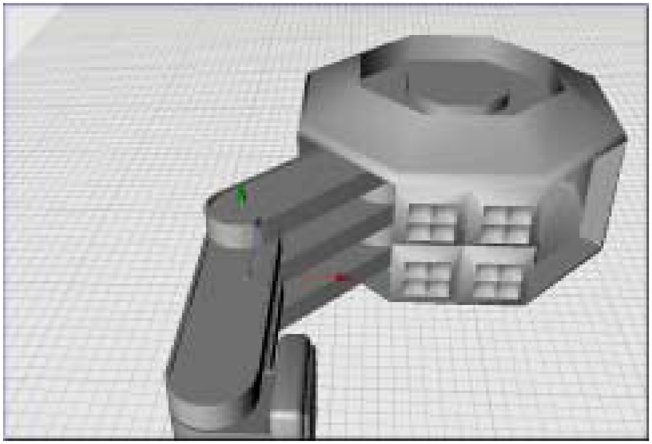
Use the Coordinates Manager to move the Finger to X=-130m, Y=0m, Z=-130m.

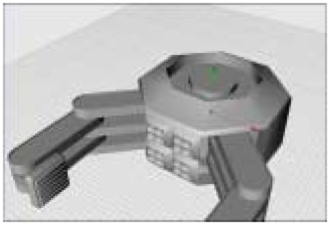
It should be sticking straight out from the Hand Hull. But as you can see, it is going right through the geometry of the Hand Hull as well.

Use the Coordinates Manager to rotate the Finger -45 degrees on the H axis. Make sure to click Apply.

Step 16: Open the hierarchy of the Finger group and select the Phalange in the Object Manager.

Use the Coordinates Manager to rotate the Phalange back 45 degrees on the H axis. Now you can see it looks more like the beginnings of a bent robotic claw.





Step 1. Mirror Finger

Mirroring the Finger

Since the robotic hand should have symmetrical movement and appearance, you will use a Symmetry object to create the other finger.

Step 1: Create a Symmetry Object.

Editor: Objects=>Modeling=>Symmetry
Shortcut: None

Drag and drop the Finger on top of the Symmetry object. The Finger will become a child of the Symmetry object, thus creating an exact mirror duplicate. Since the default settings of the Symmetry object Mirror the object on the YZ planes, you will now see two fingers protruding from the Hand Hull.

Double click on the text "Symmetry" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Fingers."

Step 2: Now bring all the parts together. Drag and drop the HandInt into the Hand Hull object.

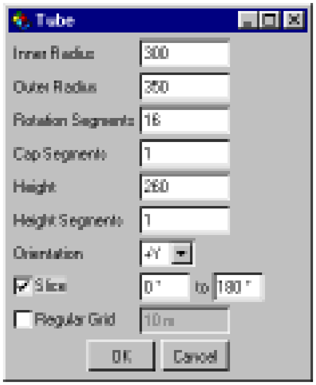
Group just the Hand Hull.

Object Manager: Objects=>Group Objects
Shortcut: G

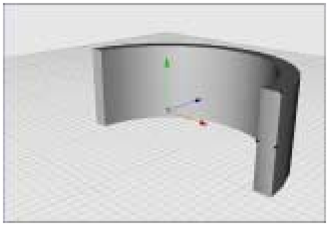
Then drag and drop the Fingers into the Null Group.

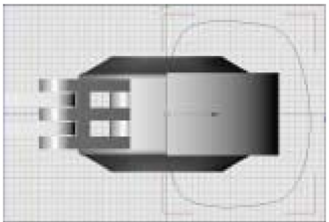
Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Hand."

Give yourself a clean workspace. Hide the Hand object in the Editor window. Click the top gray dot to the right of its icon in the Object Manager until it turns red.



Step 1. Tube Parameters


Step 1. Tube


Step 2. Control Bar Spline

Modeling the Wrist

The wrist will have a piston-like appearance giving the impression of mechanical control over the fingers.

Step 1: Create a Tube object.

Editor: Objects=>Primitive=>Tube
Shortcut: None

Double click on the Tube icon in the Object Manager to change the parametric settings.

The settings to use: Inner Radius=300m, Outer Radius =350m, Rotation Segments=16, Cap Segments=1, Height=260m, Slice 0-180 degrees.

Double click on the text "Tube" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Glove."

This will give you an outer shell on the backside of the hand.

Step 2: Create a control bar bridging from the wrist to the hand. Make the Hand visible again, by clicking on the Red dot. You'll notice the Glove sits right in place next to the hand. Now create the shape for the Control Bar.

Switch to Right View, or VIew 3.

View: View=>View 3
Shortcut: F3

Create a Bezier Spline.

Editor: Objects=>Create Spline=>Bezier
Shortcut: None

While holding the Control key, click and drag to add points with handles to create the Spline as shown.

Once you have created a rough outline, click on the Move Tool to avoid creating additional points. You can now go back and manipulate the points to refine the outline. It's okay if it is not perfect.

Double click on the Spline icon in the Object Manager to its settings. Click on the Close Spline box to make it active. Click OK.

Step 3. Circle Parameters

Step 3: Add a Circle spline to the scene.

Editor: Objects=>Spline Primitive=>Circle
Shortcut: None

Double click on the Circle icon in the Object Manager to change the parametric settings.

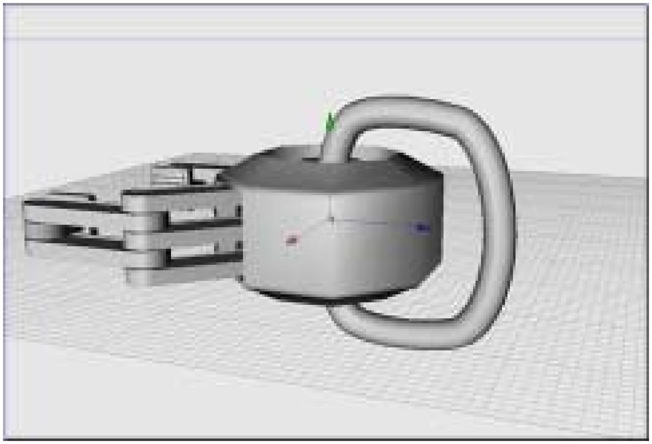
Set the Radius to 40m, change the Interpolation to Intermediate Points:Uniform with Number set to 2. Make sure Plane is set to XY and click OK.

Step 4: Create a Sweep NURBS object.

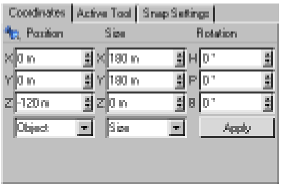
Editor: Objects=>NURBS=>Sweep NURBS
Shortcut: None

Double click on the text "Sweep NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Control Bar."

Drag and drop the Spline and the Circle on top of the Sweep NURBS. For the expected results, the objects have to be in the correct order — first Circle, then Spline — underneath the Sweep NURBS object. You will immediately be presented with your bar.



Step 5. Circle Parameters



Step 5. Circle.1 Position

Step 5: Next create the wrist connector. First hide the other scene objects in the Editor window. Click the top gray dot to the right of its icon in the Object Manager until it turns red.

Change your view to the XY, or Front view.

View: View=>View 4 Shortcut: F4

Create a Circle spline

Editor: Objects=>Spline Primitive=>Circle Shortcut: None

Double click on the Circle icon in the Object Manager to change the parametric settings.

Set the Radius to 100m, Intermediate Points: Uniform, Number 1. You use Uniform and 1 intermediate point to greatly decrease the polygon count of the object

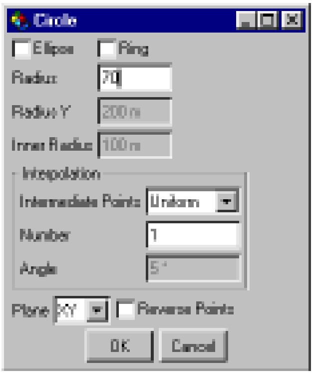
Activate the object tool.

Copy the Circle spline, change its Radius to 90m and move it to Z=-120

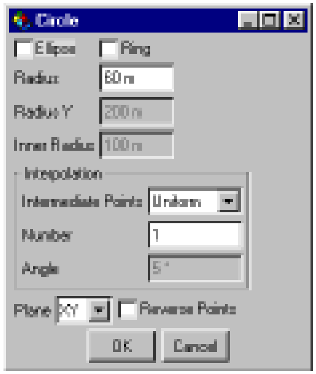
Copy the Circle spline, change its Radius to 70m and move it to Z=-140

Copy the Circle spline, change its Radius to 60m and move it to Z=-100

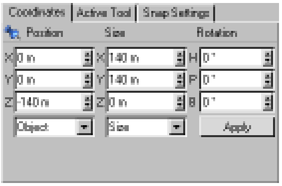
Step 5. Circle.1 Parameters



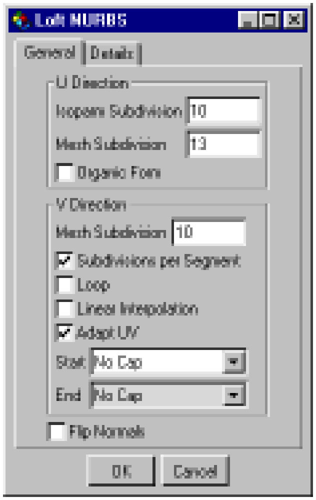
Step 5. Circle.2 Parameters



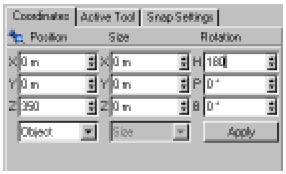
Step 5. Circle.3 Parameters



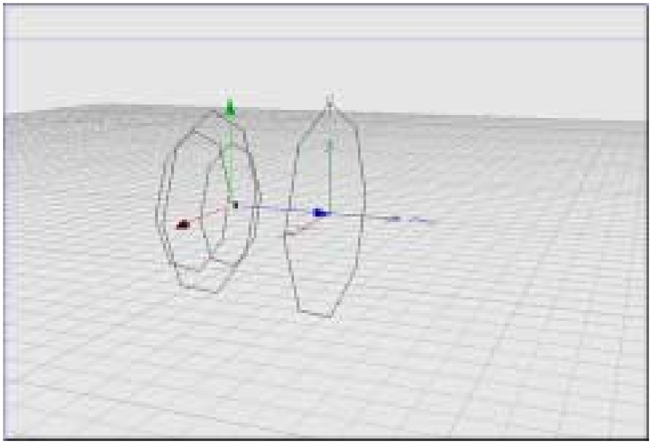
Step 5. Circle.2 Position



Step 6. Loft NURBS



Step 7. Wrist Connector Coordinates



Step 6: Create a Loft NURBS

Editor: Objects=>NURBS=>Loft NURBS
Shortcut: None

Double click on the text "Loft NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Wrist Connect."

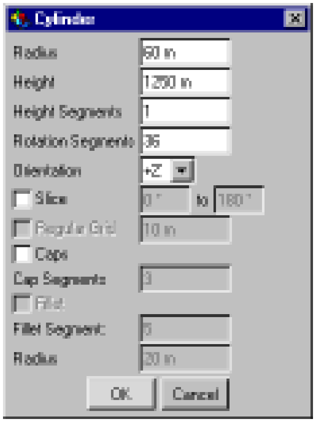
Double click on the Loft NURBS icon in the Object Manager and change the U Mesh Subdivision to 13 and No Caps. Click OK to exit the dialog and save your settings.

Drag and drop the four Circle splines onto the Wrist Connect. The Circles will become a child of the Loft NURBS object. You will immediately see your new model in the Editor window.

Make sure they are in the correct order — Circle, Circle.1, Circle.2, Circle.3 — underneath the Loft NURBS object.

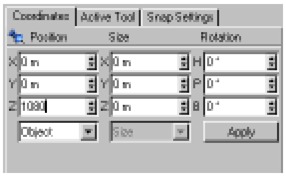
Step 7: To move the Wrist Connector into position, make the other objects visible again, by clicking on the Red dots.

Make sure the Wrist Connect is selected and move it to Z=350m and rotate it 180 degrees on the H axis.



Step 1. Cylinder Parameters


Step 1. Cylinder



Step 1. Forearm Coordinates

Modeling the Forearm

The Forearm will be a hydraulic piston mechanism. Give yourself a clean workspace. Hide the everything else in the Editor window. Click the top gray dot to the right of its icon in the Object Manager until it turns red.

Step 1: Again, hide the other objects in your scene for a clean workspace. Create a Cylinder.

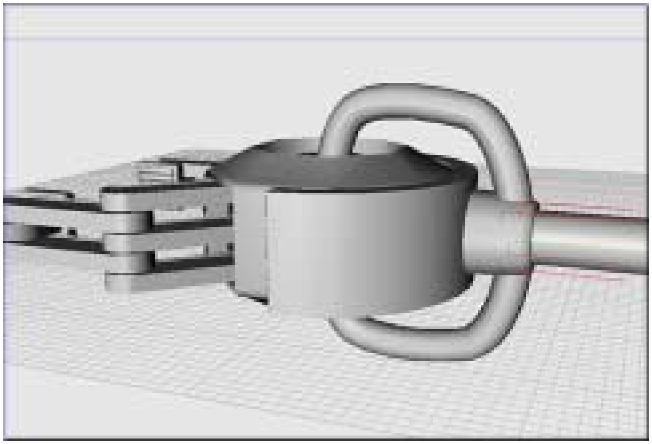
Editor: Objects=>Primitive=>Cylinder
Shortcut: None

Double click on the Cylinder icon in the Object Manager to change the parametric settings.

The settings to use: Radius=60m, Height=1250m, Height Segments=1, Rotation Segments=36, Orientation: +Z and Caps off.

Double click on the text "Cylinder" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "ForearmBar."

Make all the other objects visible again and move the Forearm to Z=1080m



Step 2. Now you will group them all together … carefully. First group all objects except for the Hand. Change the name of this new group to "Wrist."

Then drag and drop the Hand group onto the Wrist group. This makes the Hand the first object in the hierarchy. This will give you easier access when animating later.

Step 3: Now add a sleeve to the Forearm so later when animating the Forearm can extend like a hydraulic lift.

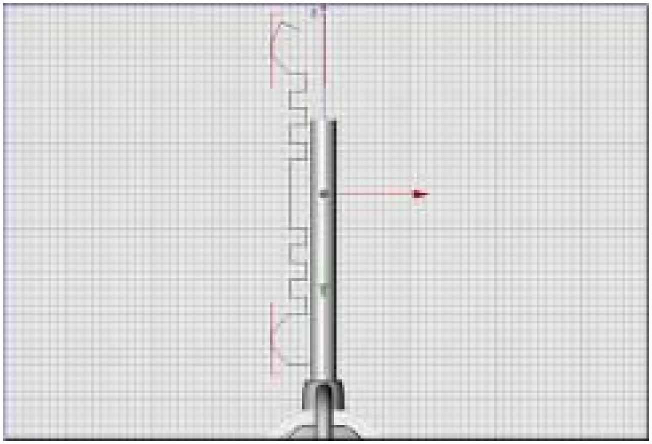
Change your view to the XZ, or Top View.

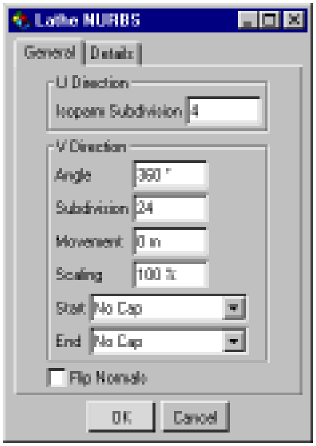
View: View=>View 2
Shortcut: F2

Draw a spline that will be the profile of the forearm sleeve.

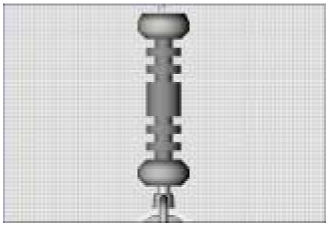
Editor: Objects=>Create Spline=>Bezier
Shortcut: None

While holding the Control key, click and drag to add points with handles to create the Spline as shown.





Step 4. Lathe Settings


Step 4. Sleeve


Step 4. Sleeve Position

Once you have created a rough outline, click on the Move Tool to avoid creating additional points. You can now go back and manipulate the points to refine the outline. It's okay if it is not perfect.

Double click on the Spline icon in the Object Manager to open its settings. If the Close Spline box is active, turn it off. Change Bezier to Linear. Click OK.

Step 4: Create a Lathe NURBS

Editor: Objects=>NURBS=>Lathe NURBS
Shortcut: None

Double click on the text "Lathe NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Sleeve."

Double click on the Sleeve icon in the Object Manager to change the settings. The only thing you need to change is No Caps. They are not needed here.

Rotate the Sleeve 90 degrees on the P axis because Lathe NURBS also lathes around the Y axis. This will line the axes up properly to lathe the spline.

Drag and drop the Spline on top of the Sleeve object. The Spline will become a child of the Sleeve object. You will immediately see your Sleeve model in the Editor window.

Go back to your perspective- view.

View: View=>View 1
Shortcut: F1

Move the Sleeve into position on top of the Forearm. First unhide all the other objects in the Editor window. Click the top red dots until they turn green or gray.

Double click the smoothing tag and activate angle limit with a setting of 89.5 degrees.

Modeling the Elbow

Again give yourself a clean workspace by hiding all other objects in the Editor window.

Change your view to the XY, or Front View.

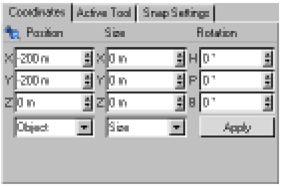
View: View=>View 4
Shortcut: F4

Step 1: Create a Circle spline. Make it editable.

Editor: Structure=>Make Editable
Shortcut: C

Activate your Points tool.

Editor: Tools=>Points
Shortcut: None

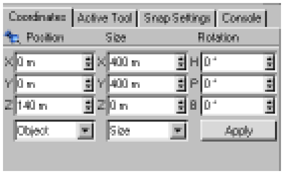


Step 1. Bottom Point Position

Select the bottom point on the Circle.

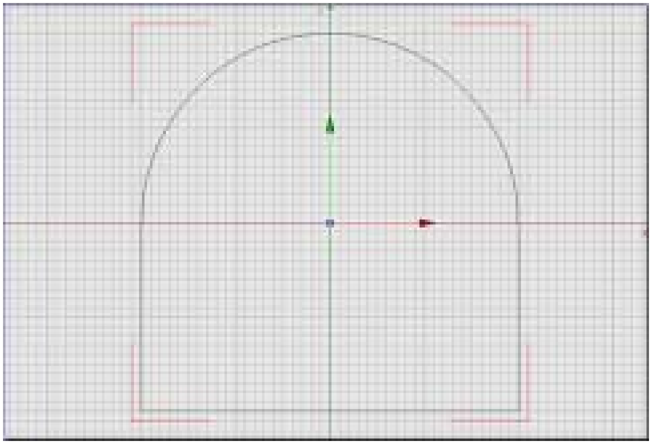
Activate the move tool if necessary, and move it to X=-200m, Y=-200m, Z=0m as shown.

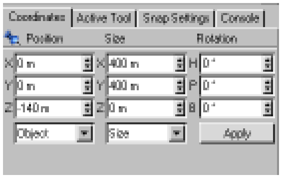
Double click on this point and in the dialog, make sure all the tangent settings are 0.



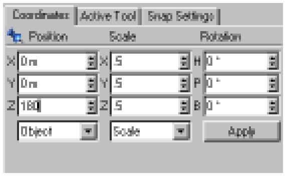
Step 1. Circle Position

Hold the Control Key and click on the grid at X=200m, Y=-200m. A new point will appear. The spline should look like the example. Move the Circle spline to X=0m, Y=0m, Z=140m

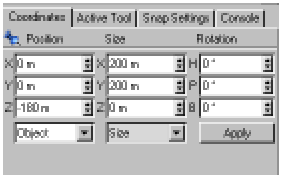




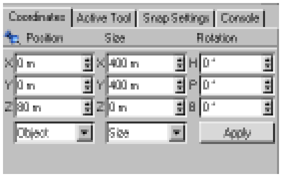
Step 2. Circle.1 Coordinates



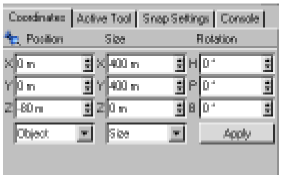
Step 2. Circle.2 Coordinates



Step 2. Circle.3 Coordinates



Step 2. Circle.4 Coordinates



Step 2. Circle.5 Coordinates

Step 2: Make a copy of the Circle. It will appear as Circle.1 in the Object Manager. Move it to X=0m, Y=0m, Z=-140m.

Make another copy of the Circle (It will appear as Circle.2), Scale it 50% and move it to X=0m, Y=0m, Z=180m.

Make a copy of the Circle.2 (It will appear as Circle.3), and move it to X=0m, Y=0m, Z=-180m.

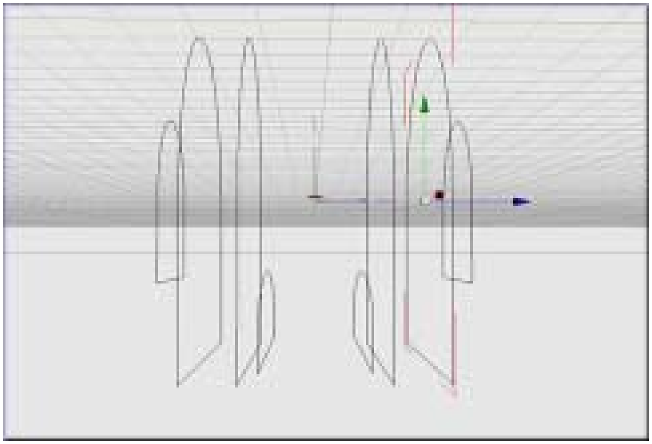
Make another copy of the Circle (It will appear as Circle.4), and move it to X=0m, Y=0m, Z=80m.

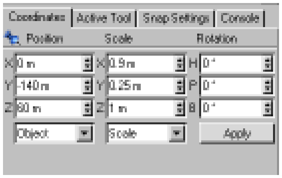
Make another copy of the Circle (It will appear as Circle.5), and move it to X=0m, Y=0m, Z=-80m.

Make another copy of the Circle (It will appear as Circle.6). Scale it to 90% on the X axis and 25% on the Y axis. Move it to X=0m, Y=-140m, Z=60m.

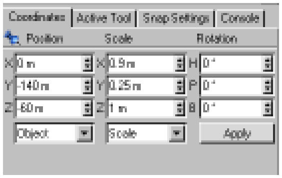
Make a copy of the Circle.6 (It will appear as Circle.7), and move it to X=0m, Y=-140m, Z=-60m.

You should have eight Circle splines lined up as shown.

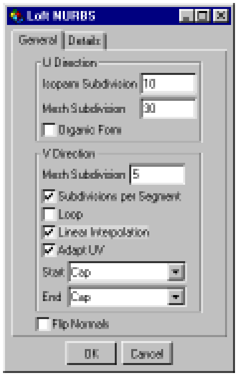




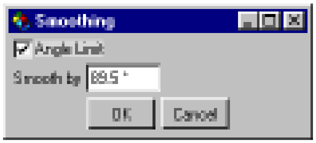
Step 2. Circle.6 Coordinates



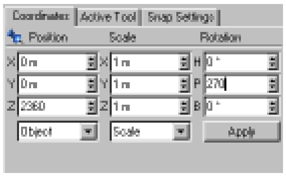
Step 2. Circle.7 Coordinates



Step 3. Loft Settings



Step 3. Smoothing Tag



Step 3. ElbowLow Coordinates

Step 3: Create a Loft NURBS

Editor: Objects=>NURBS=>Loft NURBS
Shortcut: None

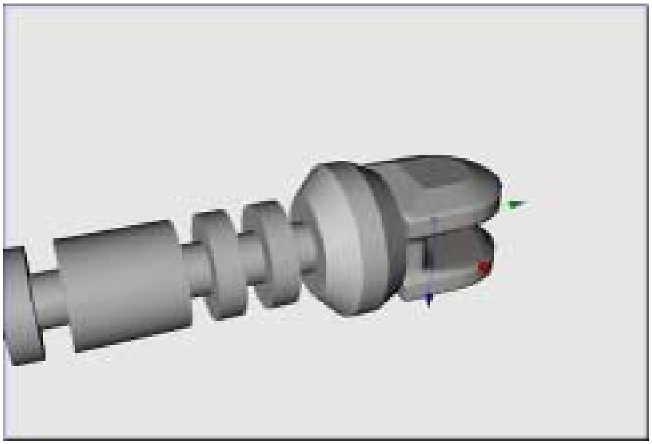
Double click on the text "Loft NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "ElbowLow."

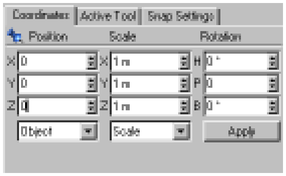
Double click on the Elbow's icon in the Object Manager to change the settings. The settings to use: U Mesh Subdivisions=30, V Mesh Subdivisions=5, and make sure Linear Interpolation is selected. Double click on the smoothing tag next to the Elbow object and enable Angle Limit. This and the Linear Interpolation will give you sharper edges.

Drag and drop the Circle splines on top of the ElbowLow object. The splines should be in the following order or the complete reverse: Circle.3, Circle.1, Circle.5, Circle.7, Circle.6, Circle.4, Circle, Circle.2

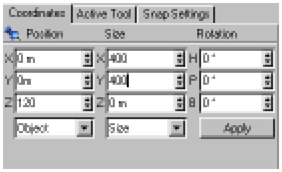
Move the ElbowLow object to Z=2360m and rotate it 270 degrees on the P axis.

Double click the smoothing tag and activate angle limit with a setting of 89.5 degrees.

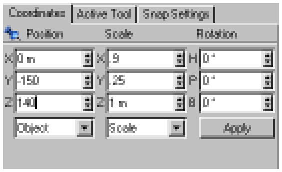




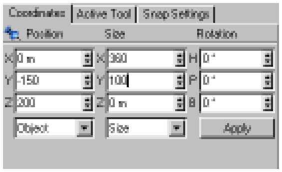
Step 4. Circle Coordinates



Step 5. Circle.1 Coordinates



Step 5. Circle.2 Coordinates



Step 5. Circle.3 Coordinates

Step 4: Now you will create the upper part of the elbow joint. Hide all the objects in the Editor window.

Make a copy of the original Circle located inside the ElbowLow object. It will appear as Circle in the Object Manager. Move it to X=0m, Y=0m, Z=0m. Set Rotation P=0.

Step 5: Make a copy of the Circle. It will appear as Circle.1 in the Object Manager. Move it to X=0m, Y=0m, Z=120m. Set Rotation P=0.

Make another copy of the Circle (It will appear as Circle.2). Scale it to 90% on the X axis and 25% on the Y axis. Move it to X=0m, Y=-150m, Z=140m. Set Rotation P=0.

Make a copy of the Circle.2 (It will appear as Circle.3), and move it to X=0m, Y=-150m, Z=200m.

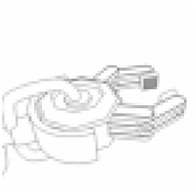
Make a copy of the Circle.3 (It will appear as Circle.4), and move it to X=0m, Y=-150m, Z=-20m.

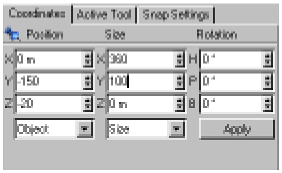
Make a copy of the Circle.4 (It will appear as Circle.5), and move it to X=0m, Y=-150m, Z=-80m.

Make another copy of the original Circle (It will appear as Circle.6). Scale it to 50% on the X axis and 12.5% on the Y axis. Move it to X=0m, Y=-170m, Z=240m. Set Rotation P=0.

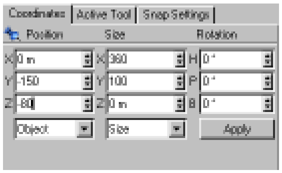
Make a copy of the Circle.6 (It will appear as Circle.7), and move it to X=0m, Y=-170m, Z=-140m.

You should have eight Circle splines lined up as shown.

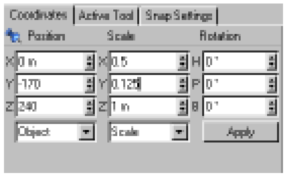




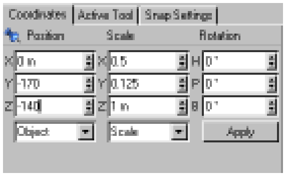
Step 4. Circle.4 Coordinates



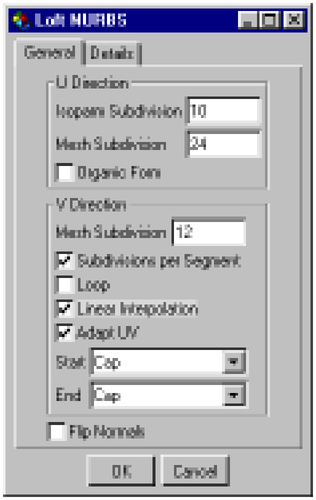
Step 4. Circle.5 Coordinates



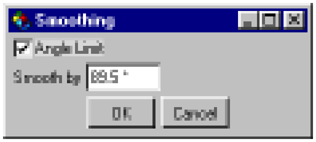
Step 4. Circle.6 Coordinates



Step 4. Circle.7 Coordinates

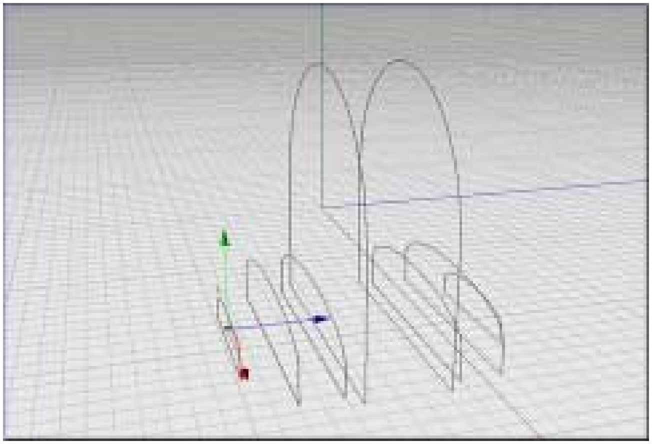


Step 6. ElbowHi Loft



Step 6. Smoothing

Step 6. ElbowHi Coordinates



Step 6: Create a Loft NURBS

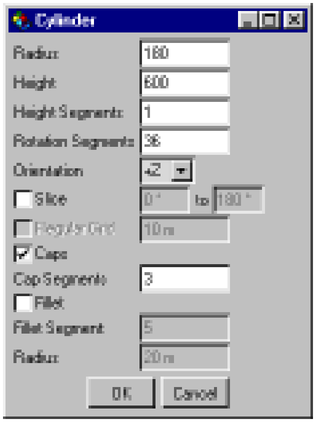
Editor: Objects=>NURBS=>Loft NURBS
Shortcut: None

Double click on the text "Loft NURBS" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "ElbowHi."

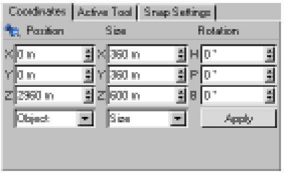
Double click on the Elbow icon in the Object Manager to change the settings. The settings to use: U Mesh Subdivisions=24, V Mesh Subdivisions=12, and make sure Linear Interpolation is selected. Click OK. Double click on the smoothing tag next to the Elbow object and enable Angle Limit. This and the Linear Interpolation will give you sharper edges.

Drag and drop the Circle splines on top of the ElbowHi object. The splines should be in the following order or the complete reverse: Circle.7, Circle.5, Circle.4, Circle, Circle.1, Circle.2, Circle.3, Circle.6

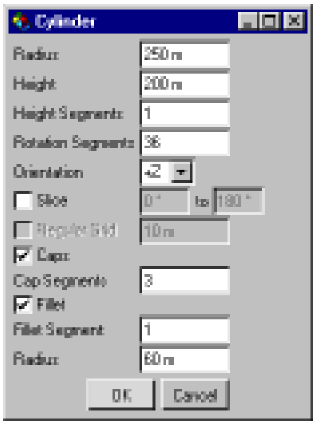
Unhide the objects in the Editor window so you can place the elbow pieces together. Move the ElbowHi object to X=0, Y=60m, Z=2460m and rotate it 270 degrees on the P axis and 180 degrees on the B axis.



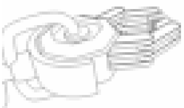
Step 1. Cylinder Parameters



Step 1. Cylinder Position



Step 2. Cylinder.1 Parmeters



Step 7: Now group some of these objects together. Unhide anything that is hidden. First group only the ElbowLow. Then drag and drop the Wrist and the Sleeve objects into the new Null Group.

Rename that Null Group, "Forearm."

Modeling the Upper Arm

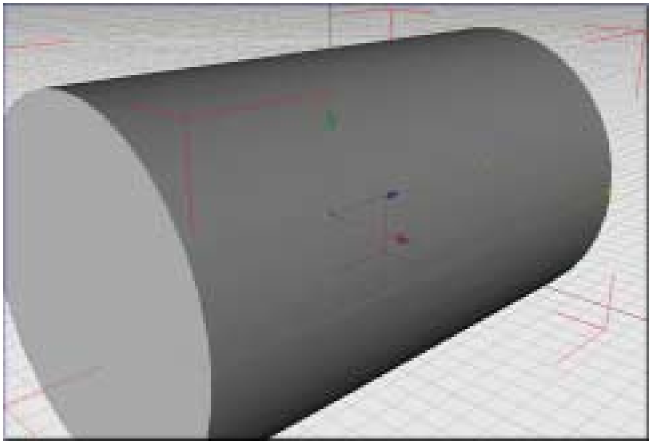
This is the last part of the arm to create. It will include a rotation segment. First, hide all the other objects in the Editor window.

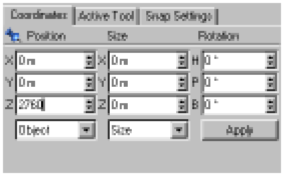
Step 1: Make a Cylinder.

Editor: Objects=>Primitive=>Cylinder
Shortcut: None

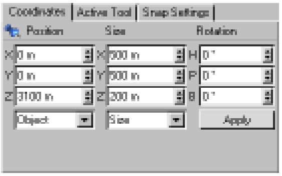
Double click on the Cylinder icon in the Object Manager to change the parametric settings. The settings to use: Radius=180m, Height=600m, Height Segments=1, Rotation Segments=36, Orientation: +Z.

Move it to X=0m, Y=0m, Z=2960m.

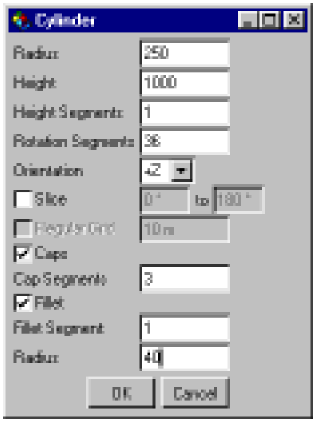




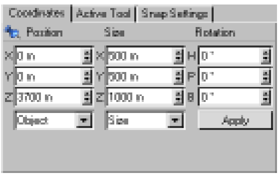
Step 2. Cylinder.1 Position



Step 3. Cylinder.2 Position



Step 4. Cylinder Parameters



Step 4. UpperArm Position

Step 2: Make a copy of the Cylinder (It will appear as Cylinder.1). Double click on the Cylinder icon in the Object Manager to change the parametric settings. The settings to use: Radius=250m, Height=200m, Height Segments=1, Rotation Segments=36, Orientation: +Z. Also enable Filleting with 1 Fillet Segment and a Radius of 60m.

Move it to X=0m, Y=0m, Z=2760m.

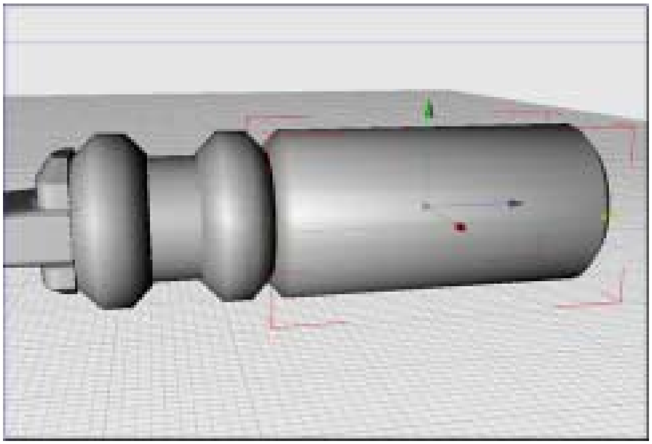
Step 3: Make a copy of Cylinder.1 (It will appear as Cylinder.2). Move it to X=0m, Y=0m, Z=3100m.

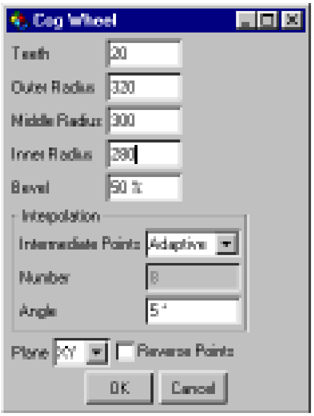
Group these three Cylinders together and rename the Null Group “Rotator Cuff.”

Step 4: Make a new Cylinder.

Double click on the Cylinder icon in the Object Manager to change the parametric settings. The settings to use: Radius=250m, Height=1000m, Height Segments=1, Rotation Segments=36, Orientation: +Z. Also enable Filleting with 1 Fillet Segment and a Radius of 40m.

Change its name to “UpperArm” and move it to X=0m, Y=0m, Z=3700m.





Step 5. Cogwheel Parameters

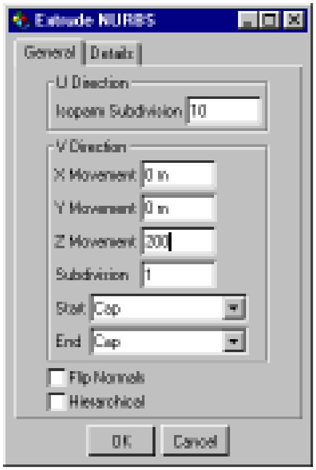
Step 5: Now to add a little detail. Make a Cogwheel.

Editor: Objects=>Spline Primitive=>Cog Wheel
Shortcut: None

Double click on the Cogwheel icon in the Object Manager to change the settings. Change the Outer Radius to 320m, the Middle Radius to 300m and the Inner Radius to 280m. Click OK.

Add an Extrude NURBS to the scene.

Editor: Objects=>NURBS=>Extrude NURBS
Shortcut: None

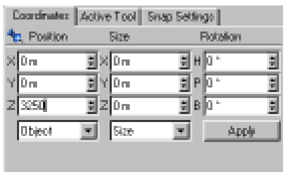


Step 5. Extrude NURBS

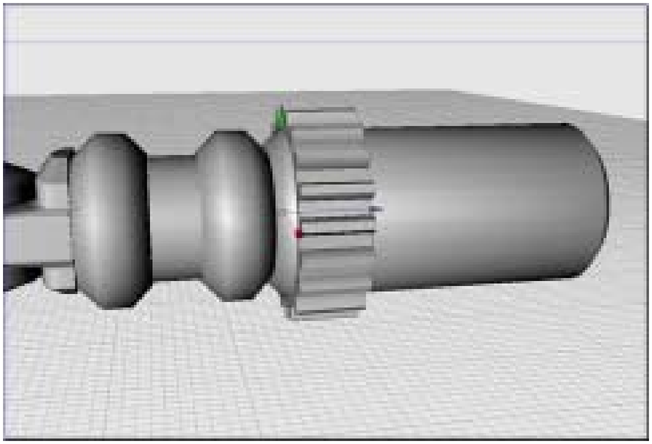
Double click on the Extrude NURBS icon in the Object Manager to change the settings. Extrude it 200m on the Z axis.

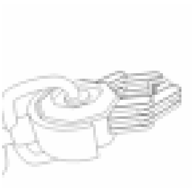
Drag and drop the Cog Wheel spline on top of the Extrude NURBS in the Object Manager. You will see your model. Move it to X=0m, Y=0m, Z=3250m.

Double Click on the text Extrude NURBS in the Object Manager to rename it. Give it the name ArmDetail and click OK. Make ArmDetail a child of UpperArm by drag and dropping it onto the UpperArm in the Object Manager.

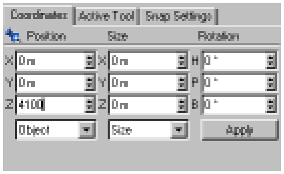


Step 5. Cog Wheel Coordinates

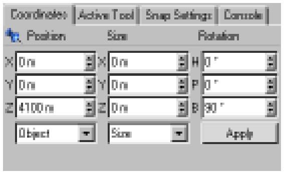




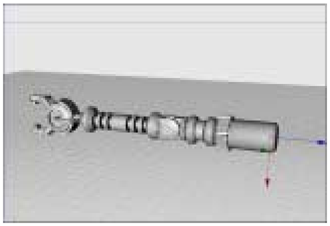
Step 6. Robotic Arm Hierarchy



Step 7. Robotic Arm Axis Coordinates



Step 7. Robotic Arm Rotation



Step 7. Robotic Arm Rotated

Step 6: Now group all the robot arm elements into one group with the correct hierarchy.

First group the Rotator Cuff element by itself.

Rename the Null Group "Robotic Arm."

Drag and drop the ElbowHi into the Robotic Arm.

Drag and drop the UpperArm into the Robotic Arm.

Drag and drop the Forearm into the Rotator Cuff.

Your hierarchy should look like the example.

Step 7: Move the axis of this whole group. Select the Object Axis Tool.

Editor: Tools=>Object Axis
Shortcut: None

Move the axis to X=0m, Y=0m, Z=4100m using the Coordinates Manager.

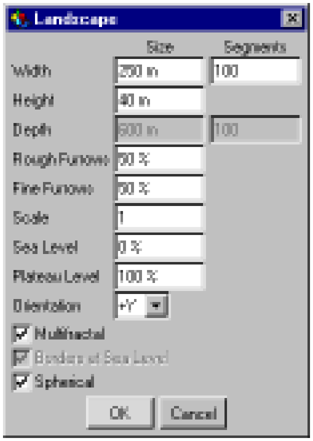
Select the Object Tool and rotate the object.

Editor: Tools=>Object
Shortcut: None

Rotate this group 90 degrees on the B axis using the Coordinates Manager.

Step 8: Save your project as Robotic Arm.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)



Step 1. Landscape Parameters

Modeling an Asteroid

Step 1: Open a new project and create a Landscape.

Editor: Objects=>Primitive=>Landscape
Shortcut: None

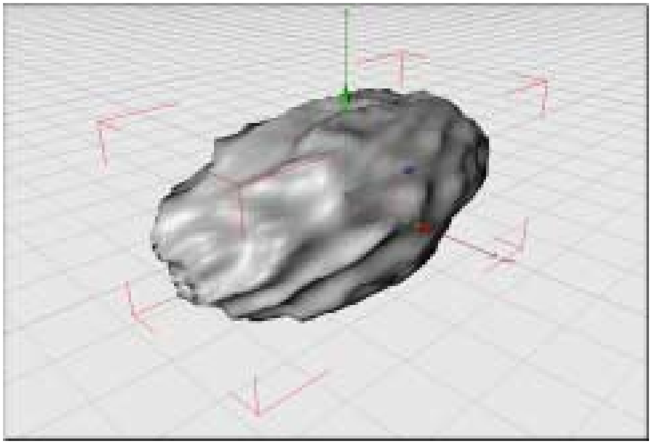
Open the Landscape dialogue by double-clicking on the Landscape icon in the Object Manager and change it to a spherical landscape by activating the Spherical checkbox. Set Width=250, Height=40. Click OK.

Double click on the text "Landscape" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Asteroid."

Step 2: Change to the Scale tool.

Editor: Tools=>Scale
Shortcut: T

Pull on the X and Y axes handles of the Asteroid and scale it down by 50% on these axes. This will make it look less perfectly round/ more realistic.



Step 3: To adjust size and roughness of the Asteroid, you can pull on the orange dots. Pulling on the inside dot changes the overall size of the Asteroid. Pulling on the outside orange dot defines the height of the peaks. Dragging the outside dot inwards creates little difference between peaks and valleys making the surface smoother; dragging it out creates dramatic differences between peaks and valleys, making it more jagged.

Step 4: Make sure to save your project as Asteroid.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Materials

Contents:

- Applying Materials to Models
- Material Channels in CINEMA 4D
- Texture Maps
- Texture Mapping Methods
- Decal Mapping

Applying Materials to Models

Once a model is built, the next step is to define its surface properties and add detail. Materials and texture maps convey lots of information even the best modeling can't provide.

Styles

More than anything else, the type of material you apply to your object defines the type of image you are creating, from cartoon-like to photorealistic. There's no substitute for a good artistic eye when creating materials for an object. Do some research, know the intricacies of the style you want to achieve. If it is photorealism, look at the world around you and analyze what surfaces really look like. Practice and learn how each channel of a material affects the look of a surface and how to get the results you want.

Imperfections

No real surface is absolutely without imperfection; even glass has dimples and variation. One of the first giveaways that something was created in 3D is the fact that it looks too "clean." Adding some dirt and grime to create the illusion of wear and tear to a material's texture map will usually make it look more photorealistic and believable.

The Finishing Touch

A bump map and associated color maps can look the same as modeled geometry (depending on where the camera ends up) and will take less time to do (usually). Not every detail has to be modeled. Consider using materials and texture maps to "finish" your models. As mentioned before, a great example is a golf ball. Imagine the tedious job of having to cut each and every dimple out of your golf ball. In addition, to achieve the degree of detail you would need the resolution of the ball would have to be extremely high making it overly complex. For this, you would use a bump map to create the dimples.

Adding Materials to Complex Models

Try to create your models so that they are in easy-to-map pieces. For example, placing materials on a model of a car is easier if the glass, mirror, chrome, rubber, and metal parts are all separate objects. This also makes it easier to go back and make changes to the scene later.

Economical Texturing

Like modeling, too many high-resolution bitmap textures can slow rendering times greatly. A bitmap need only be as large as it will appear in the final output. Whenever possible try to use procedurals instead of bitmaps or use tiling. These techniques require less RAM and rendering time. A nice reflection map applied to the environment property of a material can provide an inexpensive rendering solution for metallic and reflective objects.

Layering Materials

More complex texture effects can be achieved by layering multiple materials on an object. For example, having a base water material and adding several other materials, which only use bump or displacement properties, can create convincing water. These additional bump or displacement materials can be mixed with the main material and achieve a much more realistic effect.

Material Channels in CINEMA 4D

Materials in CINEMA 4D are made up of 13 different properties. They are: Color, Diffuse, Luminance, Transparency, Reflectivity, Environment, Fog, Bump, Alpha, Specular, Specular Color, Glow and Displacement. You can assign a color to each of the different properties using RBG or HSV sliders, or the Color Table. The Brightness slider controls the brightness of a color. There are also property specific parameters where you can add a texture map to a given property channel and make other adjustments to how the results are applied at render time. In most cases texture maps can be influenced/adjusted through the use of the strength slider and mixing modes. This allows you to mix color and texture together, offering a wide range of control over the final appearance of materials.

Color

As one would imagine this is what determines the general color of a material. Your choice of color can be picked with the R, G, B sliders using percentages (0-100%) or the RGB/web editing range (0-255). You can also use your operating system's available color pickers. The Brightness slider defines the value of color. An image, animation (AVI and QuickTime), or procedural texture can be used on this channel. The value of color and texture can be adjusted to use one or both together.

Diffusion
Restricts the influence of lighting on the surface of an object by subtracting color. A pure white Diffusion channel will do nothing, pure black stops light from affecting the surface altogether. This channel can be configured to also affect the luminance, specular and reflection channels. It also will affect an environment map when reflection is turned on.

Luminance
This is used to make an object appear luminant (e.g. have its own internal glow). Examples of luminant objects include glowing coals, a television screen and molten lava. Luminance does not give off light but does decrease shadow density.

Transparency
This property makes objects transparent. There are settings to adjust the color and amount of transparency. You can also enable refraction which affects how light and objects appear when looking through the object. For example, water, glass and plastic refract at different rates.

Reflection
This property controls the reflectivity of a material and the color of reflection. Objects with highly reflective materials will act like a mirror, having surrounding objects reflected on them.

Environment
Sometimes you do not need to have objects reflect other objects, but you still want them to appear to be reflective. Under these circumstances an environment may save lots of render time and still look good. A technical illustration of a car engine would benefit from an environmental property – the parts would look reflective without actually reflecting each other. Sometimes this actually makes for clearer illustrations. This property is used to control the color and the strength of the environment map.

Fog
This is a property that is useful for adding atmosphere to objects and scenes. An object with a Fog material will look like a bank of fog matching the object's shape. Fog and Transparency are mutually exclusive and a Material should use one or the other. This property is used to adjust the color and distance at which the fog becomes opaque.

Bump
This property is used to control the appearance of bumps or differences in surface height. You can use the bump property to simulate the surfaces of things like leather, water, concrete and more. Bump properties do not actually change the geometry of the model – see Displacement below.

Alpha

Use this property when you want portions of the model removed or clipped. Where the selected color range lies on the object, geometry will disappear. This is useful for creating models that look very complex, but are actually very simple. You can use a texture map to provide the complexity. A leaf would be a good place to use an alpha map. The model would be a simple rectangle and all the detail would be provided – including the shape of the leaf – with color and alpha properties.

Specular

This property controls how shiny (and sometimes wet) an object appears. It represents the highlight that a light source creates when it is shining on an object. A small, hot specular highlight can make an object look very shiny – and almost wet, whereas a large, diffuse specular highlight can make an object appear dull and worn. An example of a bright specular highlight could be the surface of a new car, and an example of a dull specular highlight would be the asphalt that the car is parked on. Use the interactive sliders to set the intensity and fall off of the specular property.

Specular Color

This property controls the color for the Specular channel. Some materials in the real world have specular colors that are very different from the objects actual color. Brass for example which is yellowish in color, has a greenish specular color.

Glow

This property adds a glowing region around objects. There are controls for glow color, radius and frequency (for flickering glow effects). Glow is a post process effect and therefore not reflected in other objects.

Displacement

This property is very much like Bump. The difference is that Displacement actually modifies the geometry of the object. A model with few polygons will not show the results of a displacement map as clearly as a model with many polygons.

With careful planning you can use combinations of materials to achieve effects that one material alone could never provide.

Texture Maps

A texture map is a two-dimensional image used as surface decoration for your models. Adding a texture to your models is literally like applying an image to the surface of the object. The type of map used, the channel the texture is on and the method by which the image is applied defines the look of your object. You can use three different types of texture maps in CINEMA 4D to create realistic looking surfaces: Image-Based Texture Maps (Bitmaps), 2D Procedural Textures and 3D Procedural Textures.

Image-Based Texture Maps

Any two-dimensional image, whether scanned or created in an image-editing program, can be used as a texture. For example, you could take a picture of a cement surface, scan the image and use it as a texture. Texture maps can be applied to an object in many ways (see Texture Mapping Methods below).

How Big Should an Image Texture Map be?

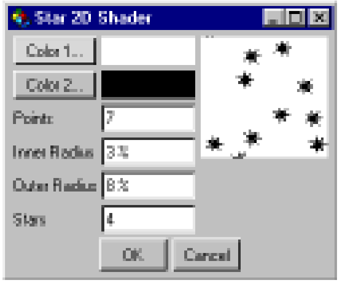
The destination of the finished work (e.g. the type of output) will determine the resolution of the texture for any given project. A good rule of thumb is make your texture maps the same size or larger than it will appear based on the resolution of the finished image. Texture maps that are not of a high enough resolution display pixelation, or blockiness when they are too close to the camera in 3D imagery. The only solution for pixelation is to use a higher resolution texture map. It is generally advisable to create your texture maps of a higher resolution than you will require. By working with a copy of the master texture you can always go smaller and still have your original to go back to if the need arises.

The placement of objects in the scene determines how large or small your textures need to be. If the final output of your work will be video (640x480 NTSC) and the textured object will fill the screen, then you should not use textures that are smaller than 640x480 pixels. If you have an object that fills one-quarter of the screen then the texture should be no smaller than 320x240, or one-quarter of the size of the screen. But if you have a central object that gets very close to the camera you may find that you need to use a larger texture (1024x768 or greater pixels). However, textures used for video or screen resolution never need to be greater than 72 dpi.

If, on the other hand, your final output is for a printed image, then you need to take into account the high resolution of printed images. You will need to work with textures that are significantly larger than for video work. For example, a printed piece that is at 300 dpi and is 8 inches across is 2400 pixels wide. That means a texture filling the screen would need to be 2400 pixels or larger! At 600 dpi you would need even larger textures (a 600 dpi image 8 inches across = 4800 pixels).

If you have a very large surface area that needs to be covered by a uniform texture, you can also “tile” the texture so it is stepped and repeated across the surface. Tiling can be applied horizontally, vertically or in both directions simultaneously at any frequency and size you choose. There are two ways to tile maps – by mirroring the edges of the adjacent tile or by simply repeating the pattern. Mirroring the pattern will tend to hide any seams. Use the Seamless check box to enable or disable mirroring of tiles. Most ready-made textures are pre-set to be seamlessly tiled, so that you cannot see seams where it connects. You can also create your own seamless tiled images using most image-editing programs. Be careful when creating tiled texture maps though – when done poorly they can look very unrealistic.

2D Procedural Textures



Procedurals are not based on real images. They are 2D images derived from a mathematics formula. Procedurals often give you a variety of editable parameters to change the look of the texture. Great examples are a few of the procedural textures that come with the program, like marble, checkerboard, etc. Procedurals can sometimes look artificial despite the fact that they generate a random pattern. However, procedurals usually render faster and require less RAM than scanned images of surfaces or bit maps.

3D Procedural Textures

Like 2D Procedurals, these are also derived from mathematics formulas. However, 3D Procedurals apply the texture pattern all the way through the objects as opposed to only its surface. When cutting into an object using a Boolean, the texture pattern (like wood grain) will flow correctly through the object.

Texture Map Interpolation

High frequency texture maps can sometimes end up looking pixilated or stair-stepped when rendering. By using special anti-aliasing algorithms it is possible to blur textures to hide pixelation. SAT and MIP mapping are two commonly used methods for this. SAT or Summation Area Table mapping provides very nice texture map anti-aliasing, but generally requires more RAM than other methods at render time. MIP or Multi In Parvo mapping (Latin for many small parts) is similar to SAT mapping, but is not so RAM intensive and is a great way to get texture maps to look very nice.

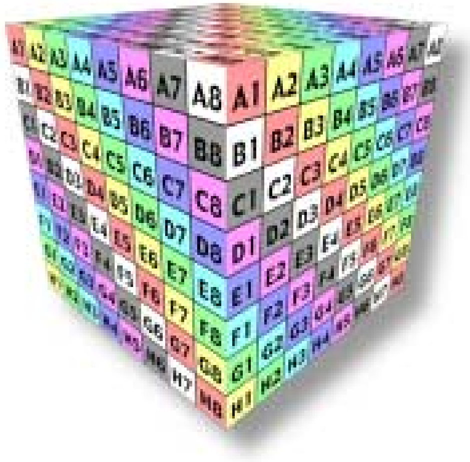
Texture Mapping Methods

There are several ways to apply materials to objects. These different methods provide ways to wrap and place materials on models so they look more convincing when rendered. In some cases, there are special techniques to prepare textures before bringing them into CINEMA 4D and using them as materials. Each mapping method takes the material's textures and projects them onto objects. Understanding how this works helps you achieve the results you desire. The basic mapping modes are flat, cubic, cylindrical, and spherical mapping. CINEMA 4D adds several other modes that allow for greater flexibility. These are frontal, spatial, shrink-wrap, and UVW mapping. You can have more than one material assigned to an object in CINEMA 4D with different mapping modes. See layering materials above.

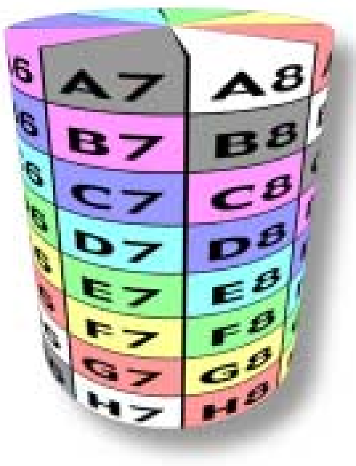
Flat Mapping

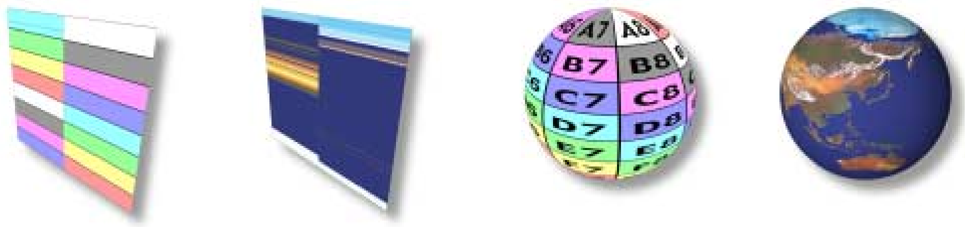
Flat Mapping is like projecting a slide image onto an object. The image plane is always flat and you can either have the source be perpendicular to your object or at almost any angle, scale and direction. With flat mapping the material is projected through the object and is visible on the backside of the object as well.

Cubic Mapping
Cubic Mapping is like having a slide projected onto each face of a cube. The same image is used for each face of the cube. The cube can be oriented and scaled in any way you want.



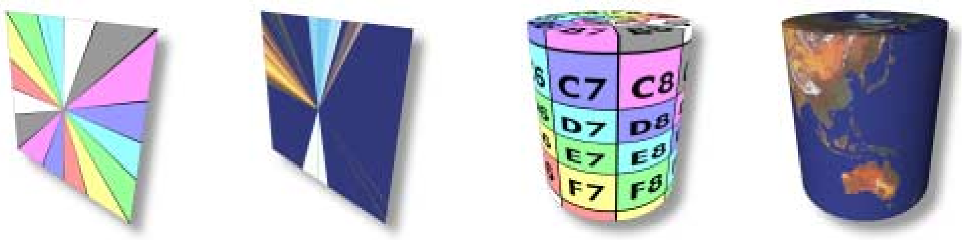
Cylindrical Mapping
Cylindrical Mapping is like a label on a can of soup. A flat image is wrapped around and projected onto virtual cylinder. This virtual cylinder can be oriented and scaled in any way you want.



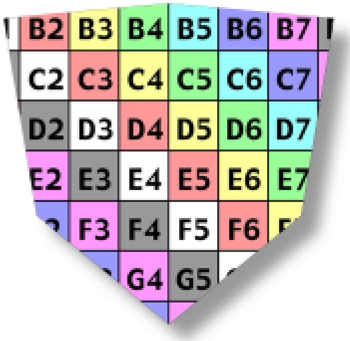


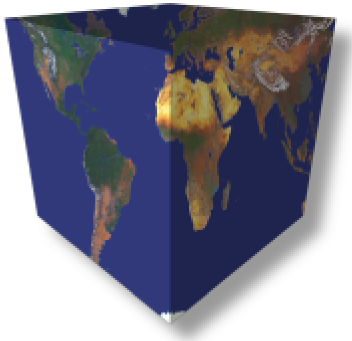
Spherical Mapping

Spherical Mapping is like an elastic map of the world being stretched onto a globe. It is a little like cylindrical mapping, but to get the map to "fit" onto the virtual sphere it must be "bunched or pinched" at the poles since it all comes together at a point. This sphere can be oriented in any way you want – and there are special techniques to minimize the "bunching and pinching" that are inherent to this method.

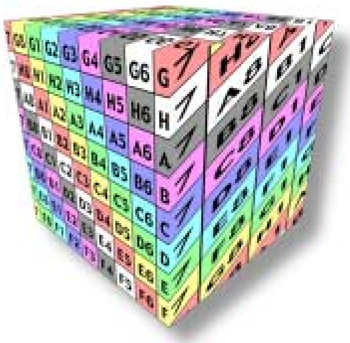


Frontal Mapping
Frontal Mapping is like flat mapping except that it is applied only from the point of view of the active camera being used to render in CINEMA 4D. This means that there are some limits to the adjustments that can be made to how the map is projected. This technique is useful for certain special effects, but is generally not widely used.

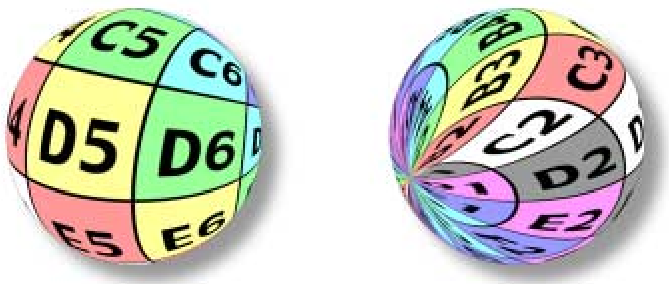




Spatial Mapping
Spatial Mapping is also like flat mapping except that it applied in a specific manner – skewed through 3D space so that the "smearing" that one might associate with flat mapping is minimized. This is handy for applying stone and other organic materials to objects.

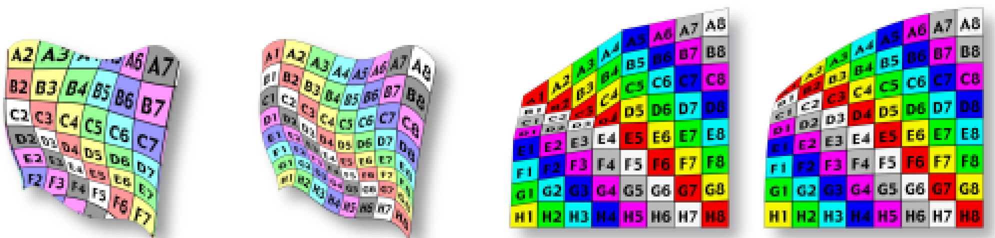



Shrink-wrap Mapping
Shrink-wrap Mapping is a special way to map a material onto a virtual sphere. Unlike spherical mapping which pinches at both poles and along the top and bottom edges of the material, shrink-wrap mapping gathers the four corners of the map at one pole – rather like wrapping a square piece of cloth onto a ball. There is some distortion to the map, but only at one of the poles.



North Pole   South Pole

UVW Mapping
UVW Mapping is a way to "pin" a material onto an object. The material or texture is actually attached to the points of the object. So, if the object is deformed, the material moves and stretches with the points on the object. Since the material's distortion is directly linked to the underlying geometry of the object there is a direct relationship between the complexity of the model and the quality of the mapped results. In other words, a denser mesh on your model will result in better UVW mapping. This is perfect for skin and other organic surfaces.



UV off   UV on   2*2 Mesh   32*32 Mesh

Decal Mapping

Typically materials are projected through objects and can be seen on both sides. By using the Front, Back, and Front & Back options you can control how materials are displayed. Generally Front & Back is fine – and this choice is the default setting. For decals on an object – use the Front or Back controls to apply materials. For example, if you wanted to make a playing card (made from a plane primitive) – you would use front mapping for the front face of the card showing the value of the card, and back mapping for the back face of the card. This way you can have two separate materials on an object, without them interfering with each other.

Materials for the 3D Logo Project

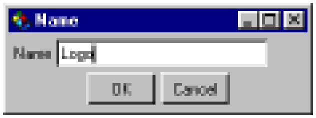
The materials for the logo and complementary objects for this project will be relatively simple. As is usually requested by clients, we have chosen to use metallic materials for the scene. You are welcome to expand upon our basic materials to create your own feel.

The Logo Material

The goal for this material will be a high tech, sci-fi look.

Step 1: Open the Logo project and create a new material.

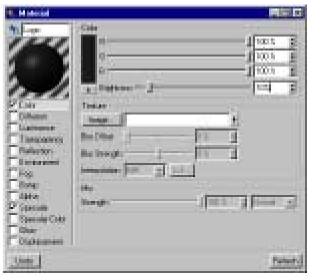
Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)



Step 1: Rename Material

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Logo." Click OK.

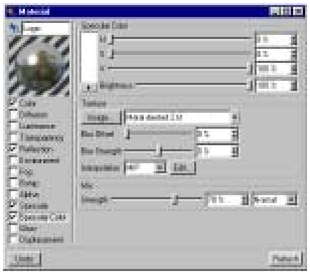
Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.



Step 2: Color Channel

Step 3: Reflection Channel

Step 4: Specular Channel



Step 5: Specular Color Channel

Step 2: Go to the Color channel of the material by clicking on the text “Color” on the left side of the dialog.

For this channel, you will define the actual color of the object’s surface. Change the color settings to R=100%, G=100%, B=100%, Br=10%. This will give you a black color.

Step 3: Go to the Reflection channel of the material by clicking on the text “Reflection” on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

To imitate the reflection of a brushed metal material you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Logo: Tex. Click on the Image button to load the Brush 1.tif texture into the Reflection channel. When the dialog appears asking if you want to copy the texture to your document path, click Yes. This copies the texture into the folder where your project is located.

To make the texture map a bit more reflective, you’re going to add a bit of color to mix into this texture. Change the color settings to R=100%, G=100%, B=100%, Br=35%. You’ll be adding gray to the texture.

Change the Mode to Add, using the Mix dialog at the bottom. You will see the material become more reflective.

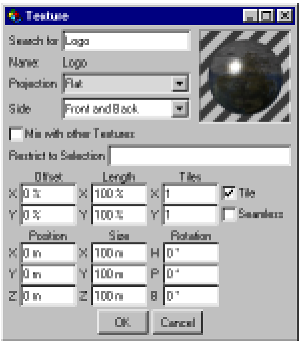
Step 4: Go to the Specular channel of the material by clicking on the text “Specular” on the left side of the dialog.

The highlight (or specular) of metal is very tall and thin, so we recommend the settings; Mode: Plastic, Width: 10, Height: 200. You will have to key in 200 into the height dialog by hand.

Step 5: Go to the Specular Color channel of the material by clicking on the text “Specular Color” on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you need to use a similar texture to the one used on the Reflection channel to create an uneven highlight. Click on the Image button to load the Metal Dented 2.tif texture from the same location on your CINEMA 4D CD.

You're going to want to bring up the intensity of this texture as it is a bit too dark. You can easily add a bit of white by using the Mix dialog. First change the color settings to R=100%, G=100%, B=100%, Br=100% for a bright white color. Then, using Normal Mode, drag the slider to the left and lower the strength of the texture to around 70% and you will see the specular brighten up slightly.



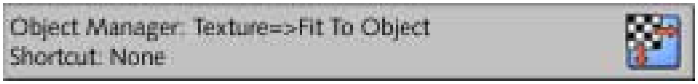
Step 6: Projection

Click Refresh when you are satisfied with the settings to save this material. Close the floating material window.

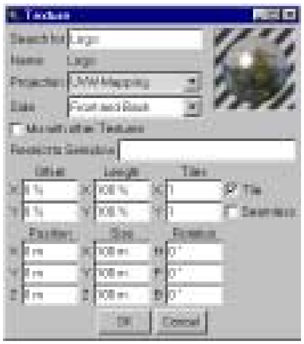
Step 6: Apply the Material by dragging the material to the Object Manager and dropping it onto the Logo object in the Object Manager. When you drop the material, a dialog will open with options for how the material is to be applied to the model.

You will want to use a Flat projection for this model. Click OK.

Next, with the material still active in the Object Manager, fit the material to the object.



The program will ask you, "Do you want sub-objects to be included?" Click Yes. This will reduce the seams of the tiling material.

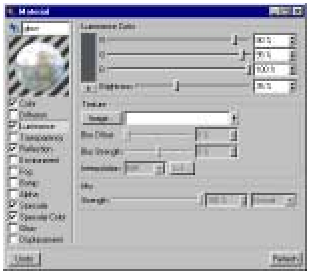


Step 8: Projection

Step 7: Repeat the same application of the material for the Outer Ring, Inner Ring and the Proton Group.

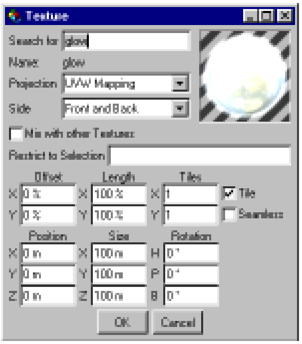
Once you have applied the material to one of the objects, you can always copy it and its projection settings to the others. Just hold the Control key while dragging the material to other objects in the Object Manager. However, since you are using "Fit to Object" you do not want to use that here, as it will retain the settings for application to the first object.

Step 8. Double click the texture icon next to the Proton group and change its projection to UVW.



Step 2: Luminance

Step 2: Glow



Step 3. Projection

The Text Material

For the Text, you want the same high tech look but with a glow. You will see why later when it is animated.

Step 1: Create new material very close to the same settings as the Logo material but with a Luminance and Glow. To do that, just duplicate the Logo material. With the Logo material selected

Material Manager: Edit=>Copy
Shortcut: Ctrl+C (pc) / Cmd+C (mac)

or hold the Control key while you click and drag on the Logo material. When you see the little plus sign, let go.

Double click on the text "Logo.1" just under the sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Glow." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: You'll only need to add Luminance and Glow settings.

Go to the Luminance channel of the material by clicking on the text "Luminance" on the left side of the dialog. Make sure to activate this channel by clicking on the check box. Change the color settings to R=90%, G=95%, B=100%, Br=35%. This adds a slight gray luminance.

Go to the Glow channel of the material by clicking on the text "Glow" on the left side of the dialog. Make sure to activate this channel by clicking on the check box. You can leave the settings at their default.

Step 3: Apply the Material by dragging the material to the Object Manager and dropping it onto each of the Text objects. When you drop the material a dialog will open with options for how the material is to be applied to the model.

The default UVW projection will work fine for the Text objects.

The Background Material

To create a complex-looking galactic background, you'll will use two materials.

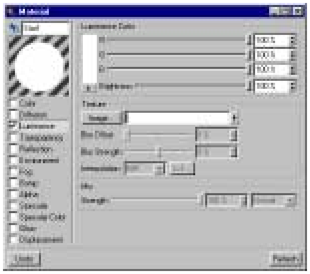
Step 1: Create a new material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Star1." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: You will only use the Luminance channel for this material. Turn off the Color and Specular channels of the material by clicking on the check box next to these channels.



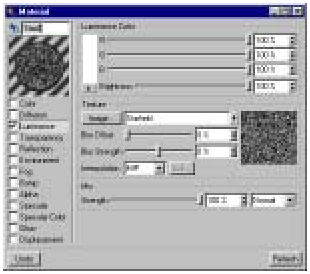
Step 3: Luminance Channel

Step 3: Go to the Luminance channel of the material by clicking on the text "Luminance" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this first material you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Logo: Tex. Click on the Image button to load the Space.tif texture into the Luminance channel. You can leave all the other settings at default.

Click Refresh when you are satisfied with the settings to save this material.

You'll notice it will add a colorful galaxy into the background, but there are few stars in the image. So we'll use another material to add some.



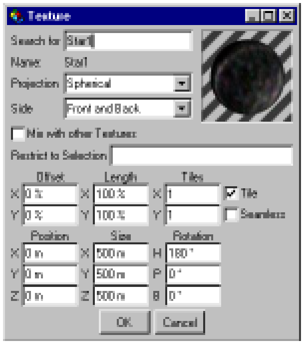
Step 6. Luminance Channel

Step 4: Create another new material.

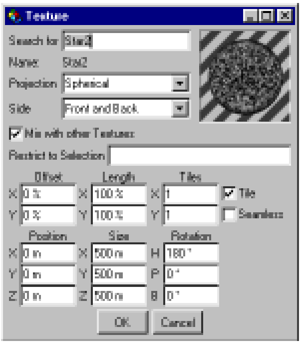
Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Star2." Click OK.

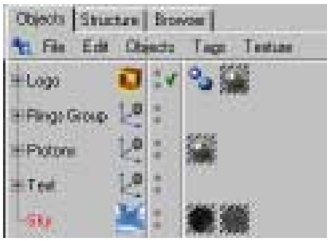
MATERIALS



Step 7. Star1 Projection



Step 8. Star2 Projection



Step 8. Object manager with materials applied

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 5: You will only use the Luminance channel for this material as well. Turn off the Color and Specular channels of the material by clicking on the check box next to these channels.

Step 6: Go to the Luminance channel of the material by clicking on the text "Luminance" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this material you will use one of CINEMA 4D's built-in procedural textures. Click on the triangle next to the Image dialog and choose the Starfield shader. You can leave all the other settings at default.

Click Refresh when you are satisfied with the settings to save this material.

Step 7: Now you will apply both materials to the Sky Background. Apply the Star1 material you created by dragging the material to the Object Manager and dropping it onto the Sky object. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Spherical projection will work best for the Sky. However, when you are setting up the camera later, you will want to avoid the seam where both sides of the texture meet in the sky. So rotate the texture 180 degrees by entering 180 into the H rotation. Click OK.

Step 8: Apply the second material you created (Star2) by dragging the material to the Object Manager and dropping it onto the Sky object. A second material icon will appear to the right of the first. Using multiple materials is like using layers. The material furthest to the right has the most influence. If you want both materials to influence the look of the surface, you need to click the Mix with Other Textures box and CINEMA 4D will mix the two textures together. Click OK to close the Texture dialog.

Step 9: Use the Save Project command to save your project. This differs from the Save command because it creates a Tex directory with the project file that includes all the textures for the scene.

Materials for the Indoor Scene

Creating realistic materials for everyday objects is one of the most challenging tasks. Often you know what an object is supposed to look like, the difficulty lies in how to recreate that look. The materials developed here for the indoor scene provide a great starting point, but are by no means the best possible solution. We encourage you to exercise your artistic skills to achieve the look you desire.

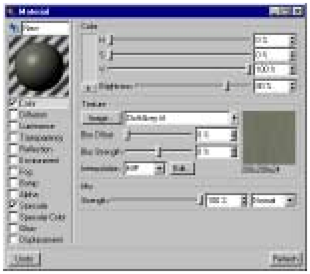
Creating a Material for the Couch

Creating the look of a leather or fabric couch is extremely complex. There are some great commercial texture CD's available as well as freebies on the Internet. For simplicity, you're going to give this couch a "simulated fabric" look.

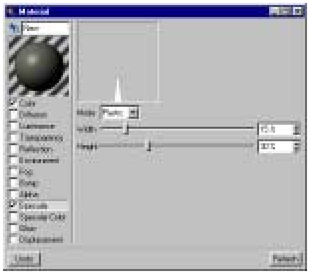
Step 1: Open the Couch project and create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

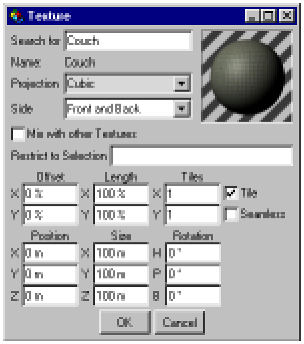
Double click on the text "New" in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to Couch.



Step 2. Color



Step 3. Specular



Step 4. Couch Material Projection

Double click on the sphere icon in the Material Manager, to open the material dialogue.

Make sure only the Color and Specular channels of the material are activated.

Step 2: Go to the Color channel of the material by clicking on the text “Color” on the left side of the dialog.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the ClothGrey.tif texture into the Color channel. When the dialog appears asking if you want to copy the texture, choose Yes. This will copy the texture file to the same location as the scene file.

Step 3: Go to the Specular channel of the material by clicking on the text “Specular” on the left side of the dialog.

On the Specular Channel, change the Height setting to 15% and Width to 30%. This will give the surface of the couch a short, but wide specular highlight, making it look like a synthetic material.

Click Refresh when you are satisfied with the settings to save this material.

Step 4: Apply the material by dragging and dropping it onto the Couch model in the Object Manager. The Texture placement dialog will open automatically.

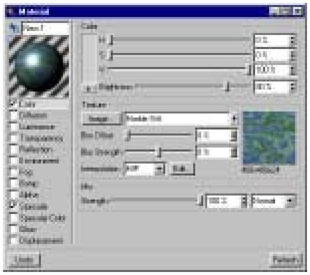
Make sure the material is being projected onto the object Cubically. Leave all the rest of the settings at default and click OK. This will give the appearance of fabric seams around the edges of the model.

Step 5: Don’t forget to save your project.

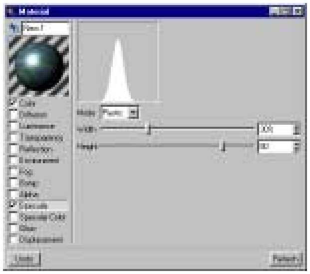
Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

The Lamp Material

The idea here is to create a porcelain material for the Lamp body (actually this is going to end up being one of those ugly artsy lamps from the 70s, but don't worry, the camera won't see it much). For that you will only need to use the default Color and Specular channels of the material.



Step 2. Lamp Color



Step 3. Lamp Specular

Step 1: Open the Lamp project and create a new material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Lamp." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

For this channel, you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor:Tex. Click on the Image button to load the Marble9.tif texture into the Color channel. You can leave all the other settings at default.

Step 3: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

The highlight or specular of porcelain would be relatively hot, so we recommend the settings Mode: Plastic, Width: 30, Height: 80.

No Specular

Metal: 30 W, 80 H

Plastic: 80W, 80H

Plastic: 30W, 30H

Plastic 30W 80H

Click Refresh when you are satisfied with the settings to save this material.

Step 4: Apply the Material by dragging the material to the Object Manager and dropping it onto the Lamp model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Cylindrical projection will work best for the shape of this model. The camera won't see the top or bottom of the model so there is no need to worry about the pinching that occurs to the top and bottom of textures applied cylindrically.

The Lamp Shade Material

The goal for the lamp Shade material is to make it look like a simulated fabric shade that's gotten a bit old. You also have to be concerned with the simulated lighting that will come from the lamp and the shadow that the Shade will cast. For that you will need to use the Color, Transparency, Bump and Specular channels of the material.

Step 1: Create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Shade." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

To give the Shade a bit of a dingy, antique look use a slightly yellow color. The settings used here are R=100%, G=100%, B=90%, Br=80%.

Step 3: Go to the Transparency channel of the material by clicking on the text "Transparency" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor:Tex. Click on the Image button to load the ClothGrey.tif texture into the Transparency channel.

Go to the Mix dialog at the bottom and change the mixing mode to Subtract. This subtracts the Channel Color from the Channel Texture. In this case, subtracting white from the ClothGrey.tif texture makes the Shade more transparent. Lower the Mix strength to around 20% and you will see the material become more transparent.

Step 4: Go to the Bump channel of the material by clicking on the text “Bump” on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Canvas.tif texture into the Bump channel. The 20% default on the strength setting is enough to give the Shade that simulated fabric look.

Step 5: Go to the Specular channel of the material by clicking on the text “Specular” on the left side of the dialog.

The highlight or specular of a shade should be small, so we recommend the default settings Mode: Plastic, Width: 20, Height: 20.

Click Refresh when you are satisfied with the settings to save this material.

Step 6: Apply the Material by dragging the material to the Object Manager and dropping it onto the Shade model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Cylindrical projection will work best for the shape of this model. There is no geometry on the top or bottom of this model.

Step 7: Don’t forget to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

The Coffee Table Materials

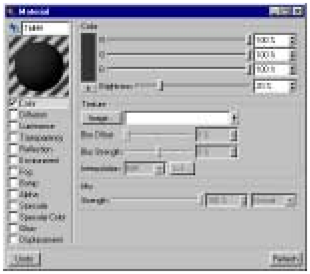
The look for the Coffee Table will be a black metal frame and clear glass top.

Step 1: Open the CoffeeTable project and create a new material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "TblMtl." Click OK.

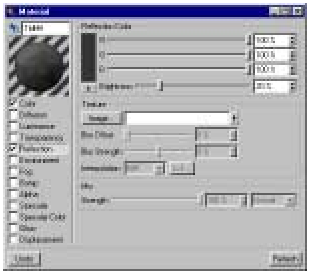
Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.



Step 2. TblMtl Color

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

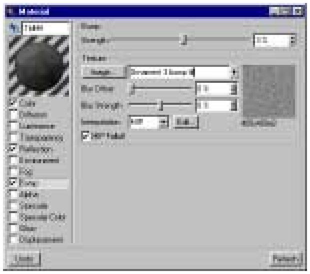
You are going to want a black metallic color. Change the color settings to R=100%, G=100%, B=100%, Br=20%.



Step 3. TblMtl Reflection

Step 3: Go to the Reflection channel of the material by clicking on the text "Reflection" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

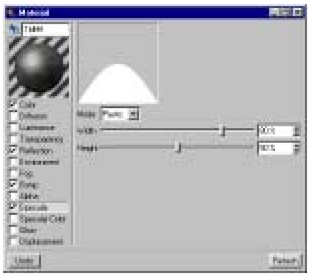
Set the Brightness setting to 20%. This will give you the reflection of a dull black metallic finish.



Step 4. TblMtl Bump

Step 4: Go to the Bump channel of the material by clicking on the text "Bump" on the left side of the dialog. This is the channel that defines how light will affect the surface.

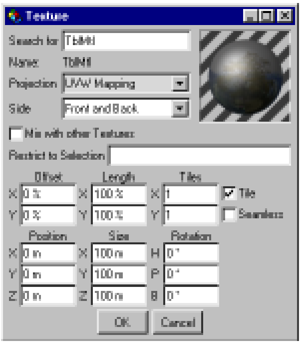
For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor:Tex. Click on the Image button to load the Ornament 3 Bump 2.tif texture into the Color channel.



Step 5. TblMtl Specular

Step 5: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

The highlight or specular of dull black metal material is big and diffused. The settings shown here are Mode: Plastic, Width: 80, Height: 50.



Step 6. TblMtl Projection

Click Refresh when you are satisfied with the settings to save this material.

Step 6: Apply the Material by dragging the material to the Object Manager and dropping it onto the Coffee Table model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

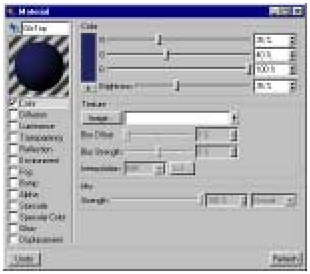
The default UVW projection will work fine for this model. Repeat this for the Side Table.

The Glass Top Material

You want this glass to be transparent but not invisible.

Step 1: Create another material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)



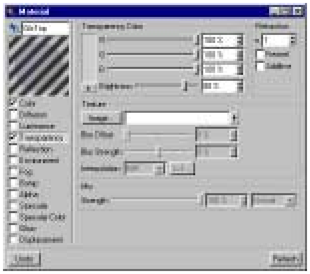
Step 2. GlsTop Color

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "GlsTop." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

For this channel, you'll just need a little color to add a blue tint to the glass. Change the color settings to R=35%, G=40%, B=100%, Br=35%.

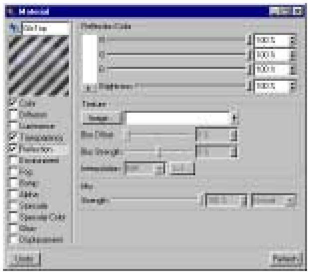


Step 3. GlsTop Transparency

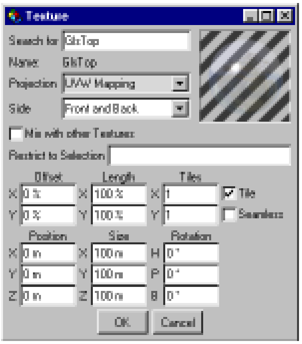
Step 3: Go to the Transparency channel of the material by clicking on the text "Transparency" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For glass, you are going to want it almost completely transparent with some reflection, so set the Brightness setting to approximately Br=80%.

Step 4: Go to the Reflection channel of the material by clicking on the text "Reflection" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.



Step 4. GlsTop Reflection



Step 6. GlsTop Projection

Leave the Brightness at 100% and because the Transparency is set to 80%, this will only leave 20% for color and reflection.

Step 5: Go to the Specular channel of the material by clicking on the text "Specular" at the left side of the dialog.

The highlight (specular) of glass is thin, sharp and tall, so we recommend the settings Mode: Plastic, Width: 2, Height: 100.

Click Refresh when you are satisfied with the settings to save this material.

Step 6: Apply the Material by dragging the material to the Object Manager and dropping it on the GlassTop object when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

The default UVW projection will work fine for the shape of this model.

Repeat this to apply the material to the Side Table Top object as well.

Step 7: Don't forget to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

The TV Cabinet Material

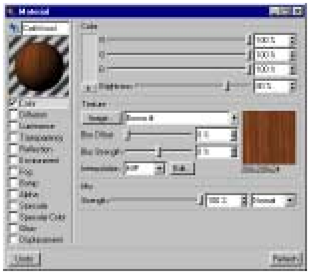
A simple wood texture for the cabinet and a basic black plastic texture for the handle would be perfect for this model.

Step 1: Open the TVCabinet project and create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

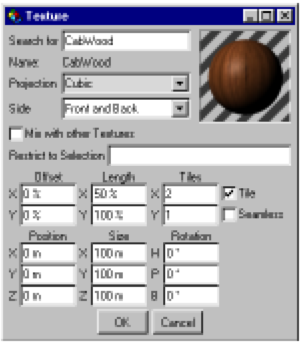
Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "CabWood." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.



Step 2. CabWood Color

Step 3. CabWood Specular



Step 2. CabWood Projection

Step 2: Go to the Color channel of the material by clicking on the text "Color" at the left side of the dialog.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor:Tex. Click on the Image button to load the Burma.tif texture into the Color channel.

Step 3: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

The highlight (specular) of wood is small, so we recommend the default settings Mode: Plastic, Width: 20, Height: 20.

Click Refresh when you are satisfied with the settings to save this material.

Step 4: Apply the Material by dragging the material to the Object Manager and dropping it onto the TV Cabinet model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Cubic projection will work best for the shape of this model.

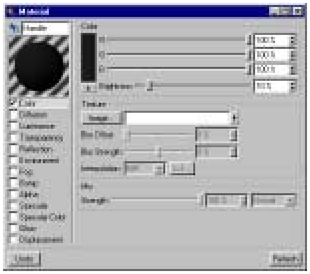
You'll notice after applying the texture that the wood grain pattern looks a bit too large. To fix that open the dialog again by double clicking in the Object Manager on the material you applied. Now change the tiles on the X axis to 2. This will cause the texture to tile twice as much along the X axis. Click OK. You will see the wood pattern is not as wide. You may want to run Fit to Object here, though the TV will cover any seams later.

Step 5: Now for the Handle material. Create another material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Handle." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

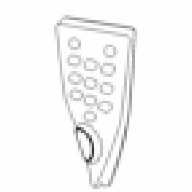


Step 3. Handle Color

Step 6: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

For this channel, you'll just need color. Change the color settings to R=100%, G=100%, B=100%, Br=10%. This will give you a black color.

Step 3. Handle Specular



Step 7: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

The highlight or specular of plastic is wide and sharp, so we recommend the default settings Mode: Plastic, Width: 100, Height: 20.

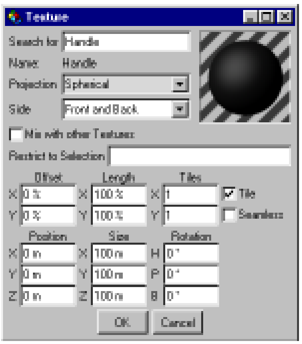
Click Refresh when you are satisfied with the settings to save this material.

Step 8: Apply the Material by dragging the material to the Object Manager and dropping it onto the Handles object when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A UVW projection will work fine for the shape of this model.

Step 9: Don't forget to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)



Step 3. Handle Projection

The Frame Material

Here you will create a basic antique gold frame material and a texture for the painting inside the frame.

Step 1: Open the Frame project and create a new material.

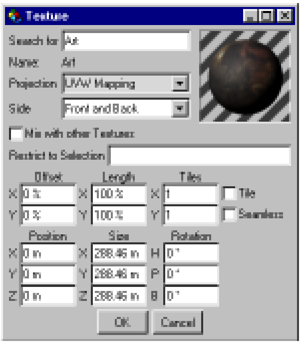
Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Art." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.


Step 2. Art Color


Step 3. Art Specular



Step 4. Art Projection

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

For this channel you will use an image of a simple image of a painting. This texture is included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Painting01.tif texture into the Color channel.

Step 3: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

The highlight (specular) of canvas is very wide and dull, so we recommend the settings Mode: Plastic, Width: 80, Height: 10.

Click Refresh when you are satisfied with the settings to save this material.

Step 4: Apply the Material by dragging the material to the Object Manager and dropping it onto the Plane model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

The default projection (UVW) will work fine for the painting.

Step 5: Create a new material.

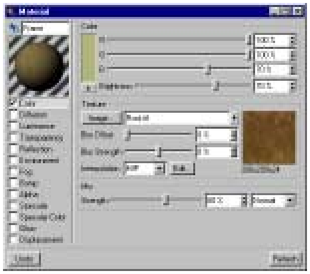
Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Frame." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 6: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

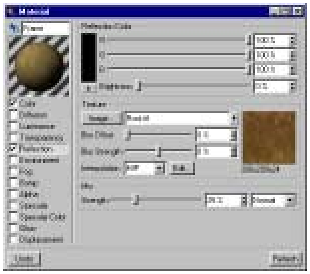
For this channel you will use an image of a simple image of a painting. This texture is included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Root.tif texture into the Color channel.



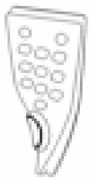
Step 6. Frame Color

You're going to want to add a little of color to mix into this texture. The color of this texture is a too dark, so you can use the Mix dialog at the bottom to bring it up a bit. Change the color settings to R=100%, G=100%, B=70%, Br=70%.

Using Normal Mode, drag the slider to the left and lower the strength of the texture to around 60% and you will see the material become less apparent. This will add a bit of pale yellow color to the texture. Essentially the color has a 40% strength and the texture a 60% strength.



Step 6. Frame Reflection



Step 7: Go to the Reflection channel of the material by clicking on the text "Reflection" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you need to use the same texture you used for the color channel so the reflection matches the pattern of the texture. Click on the triangle next to the image dialog and load the Root.tif texture into the Reflection channel.

You're going to want to add a little color to mix into this texture. The color of this texture is a too light for reflections, so you can use the Mix dialog at the bottom to bring it down a bit. Change the color settings to R=100%, G=100%, B=100%, Br=0%.

Using Normal Mode, drag the slider to the left and lower the strength of the texture to around 25% and you will see the material become less apparent. This will add a black to the texture. Essentially the color has a 75% strength and the texture a 25% strength.

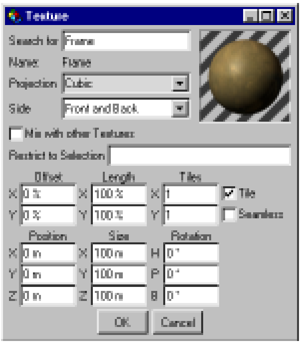
Step 6. Frame Specular

Step 8: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog. You can leave these settings at their default.

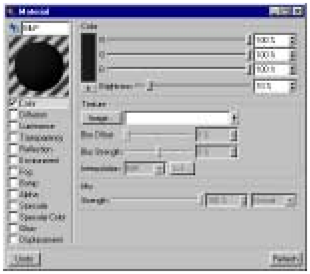
Click Refresh when you are satisfied with the settings to save this material.

Step 9: Apply the Material by dragging the material to the Object Manager and dropping it onto the Picture Frame model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Cubic projection will work best for the shape of this model.



Step 9. Frame Projection



Step 2. BlkP Color

Step 2. BlkP Specular

Step 10: Don't forget to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Creating Materials for the Television

You will need to create two materials for the Remote. You will need a matte black plastic material for the body and an animated material for the television screen.

Television Body

Step 1: Open the TV project and create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to BlkP.

Double click on the sphere icon in the Material Manager, to open the material dialogue.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

This will be the matte black plastic material. It should be a little darker than the shiny black. The settings used here are R=100%, G=100%, B=100%, Br=10%.

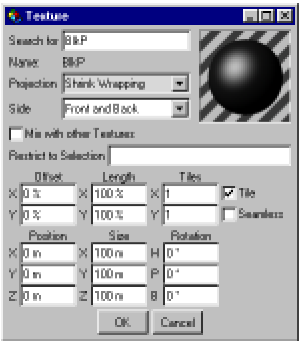
Step 3: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

On the Specular Channel, change the Width setting to 65% and Height to 65%. This will give the surface a wide soft Specular highlight.

Click Refresh when you are satisfied with the settings to save this material.

Step 4: Apply the material by dragging and dropping it onto the body of the Television in the Object Manager. The Material placement dialogue will open automatically.

The default UVW projection will work fine, as there are no textures in this material.



Step 4. BlkP Projection

Television Screen

Step 1: Create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to Scrn.

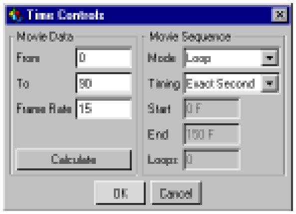

Step 4. Scrn Color

Double click on the sphere icon in the Material Manager to open the material dialogue.

Make sure only the Color and Specular channels of the material are activated.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

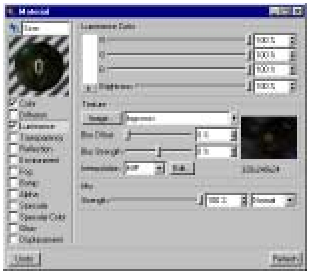
For this channel, you will use QuickTime movie of the first tutorial scene to simulate something playing on the television set. This texture is included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Logo_Small.mov texture into the Color channel.



Step 2. Calculate animated texture properties

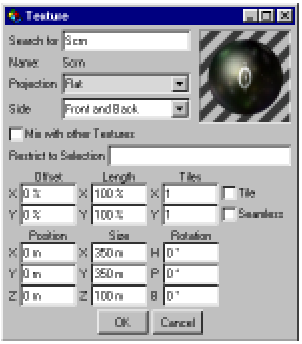
Click on the Edit button to edit the movie texture. In the dialog click on Calculate. This will calculate the length and frame rate of your movie texture map. Change Mode to Loop as you will want the movie to run through your animation.

Step 3: Go to the Luminance channel of the material by clicking on the text "Luminance" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.



Step 3. Scrn Luminance

Step 3. Scrn Specular



Step 3. Scrn Projection

For this channel, you need to use the same texture you used for the color channel so the Luminance matches the pattern of the texture. Click on the triangle next to the image dialog and load the Logo_small.mov texture into the Luminance channel. You can leave the rest of the settings at default.

Click on the Edit button to edit the movie texture. In the dialog click on Calculate. This will calculate the length and frame rate of your movie texture map. Change Mode to Loop as you will want the movie to run through your animation.

Step 4: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

On the Specular Channel, change the Width setting to 65% and Height to 65%. This will give the surface a wide soft Specular highlight.

Click Refresh when you are satisfied with the settings to save this material.

Step 5: Apply the material by dragging and dropping it onto the TV Screen model in the Object Manager. The Material placement dialogue will open automatically.

Use Flat projection for this material. Later you will add a light effect to create the glow from the television. Use Fit to Object to make the logo texture fill the TV screen.

Step 6: Don't forget to save your project.

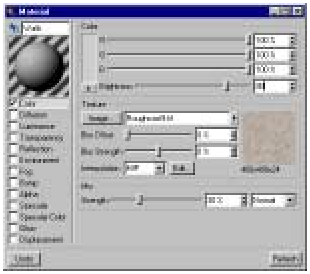
Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

The Wall Material

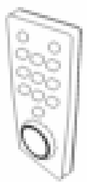
To avoid that plain, flat, unrealistic looking (obviously 3D) wall, you will create a material that looks like an uneven spackled and painted surface. For that you will need to use the Color, Bump and Specular channels of the material.

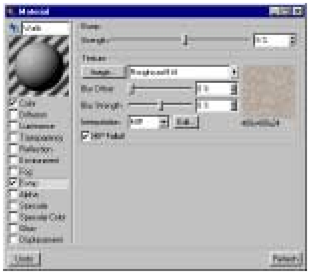
Step 1: Open the Room project and create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)



Step 2. Walls Color





Step 3. Walls Bump

Step 3. Walls Specular

Double click on the text “New” just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to “Walls.” Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: Go to the Color channel of the material by clicking on the text “Color” on the left side of the dialog.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor:Tex. Click on the Image button to load the Roughcast 9.tif texture into the Color channel.

The color of this texture is a bit strong, so you can use the Mix dialog at the bottom to tone it down a bit. Using Normal Mode, drag the slider to the left and lower the strength of the texture to around 30% and you will see the material become less apparent. This adds white to the channel fading the texture to white. Essentially the color has a 70% strength and the texture a 30% strength.

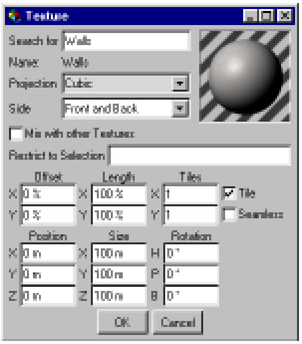
Step 3: Go to the Bump channel of the material by clicking on the text “Bump” on the left side of the dialog. Make to activate this channel by clicking on the check box.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Roughcast 9.tif texture into the Bump channel. Alternatively, you can click on the triangle just to the right of the image dialog and select Roughcast 9.tif from the list. Turn down the strength setting to 5%. You only want a little bump to simulate that spackled look.

Step 4: Go to the Specular channel of the material by clicking on the text “Specular” on the left side of the dialog.

The highlight (specular) of a wall is small, so we recommend the default settings Mode: Plastic, Width: 20, Height: 20.

Click Refresh when you are satisfied with the settings to save this material.



Step 6. Walls Projection

Step 5: Apply the Material by dragging the material to the Object Manager and dropping it onto the Room model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Cubic projection will work best for the shape of this model.

But you're not done with this model yet.

The Floor Material

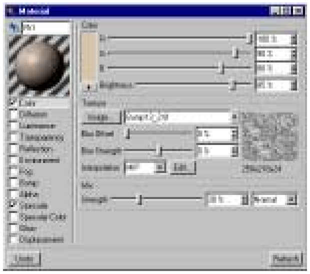
The goal here is to create what will look like a carpeted floor. Trying to recreate thick or shag carpeting would be an arduous task, not to mention extremely complex, so you will be recreating a low-pile indoor/outdoor carpet. You're going to use two textures to achieve this look.

Step 1: Create a new material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Flr1." Click OK.

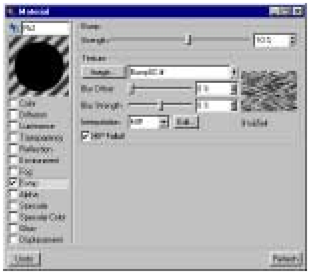
Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.


Step 2. Flr1 Color

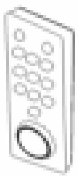
Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

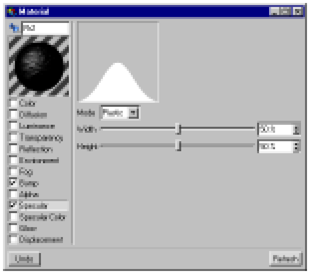
For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Bump13_2.tif texture into the Color channel.

You're going to want to add a bit of color to this texture. Change the color settings to R=100%, G=90%, B=80%, Br=85%. This adds a neutral color to the texture. Use the Mix dialog at the bottom to tone down the strength of the texture. Using Normal Mode, drag the slider to the left and lower the strength of the texture to around 30% and you will see the

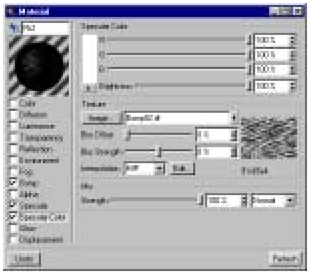


Step 5. Flr2 Bump





Step 5. Flr2 Specular



Step 5. Flr2 Specular Color

material become less apparent. This adds color to the channel fading the texture to the color. Essentially the color has a 70% strength and the texture a 30% strength.

Click Refresh when you are satisfied with the settings to save this material.

Step 3: Create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Flr2." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 4: Turn off the Color channel of the material. The color of the carpeting will come from the first material you created.

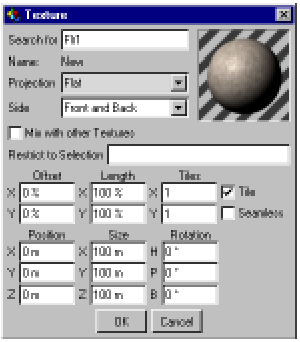
Step 5: Go to the Bump channel of the material by clicking on the text "Bump" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Bump02.tif texture into the Bump channel. Turn down the strength setting to 10%. You are looking for a subtle, but noticeable bump quality for the carpeting.

Step 6: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

The highlight (specular) of carpeting is rather large and diffused, so we recommend the settings Mode: Plastic, Width: 50, Height: 50.

Step 7: Go to the Specular Color channel of the material by clicking on the text "Specular Color" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.



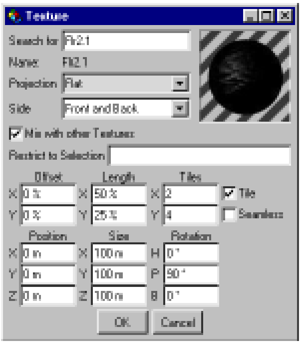
Step 8. Flr1 Projection

For this channel you need to use the same tileable texture you used for the bump channel. That way, when light hits the floor object the specular and bump of the model will match. Click on the triangle next to the image dialog and load the Bump02.tif texture into the Specular Color channel. You can leave the rest of the settings at default.

Click Refresh when you are satisfied with the settings to save this material.

Step 8: Now you will apply both materials to the floor. First, go to the Object Manager and toggle open the triangle to the left of the Room model. The hierarchy will open revealing round edge and cap parts of the model. Apply the first floor material you created (Flr1) by dragging the material to the Object Manager and dropping it onto Cap 1. This is the bottom or floor part of the room model. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Flat projection will work best for the floor. Since you want it to project straight onto the floor, you will need to adjust the rotation of the projection by changing the P rotation to 90 degrees.

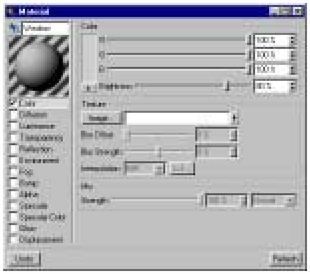


Step 9. Flr2 Projection

Step 9: Apply the second floor material you created (Flr2) by dragging the material to the Object Manager and dropping it onto Cap 1. A second material icon will appear to the right of the first. Using multiple materials is like using layers. The material furthest to the right has the most influence. If you want both materials to influence the look of the surface, you need to click the Mix with Other Textures box and CINEMA 4D will mix the two textures together. Click Refresh and close the Material dialog.

When you drop the material a dialog will open with options for how the material is to be applied to the model. Again use Flat projection with a P rotation of 90 degrees. However, you will want this material to tile a little different from the first. That is why you used two textures for the floor; so you could apply different tiling to each.

This texture creates the bump pattern in the carpeting. If you apply it without changing the quality of the tiling and do a test render, you will see it makes the floor look a bit too “pillowy” and uneven. Open the dialog again by double clicking in the Object Manager on the second material you applied. Now change the tiles to X=2 and Y=4. This will cause the texture to tile twice as much along the X axis and four times as much along the Y. Click OK. If you test render again, you will see the bump is not as drastic and doesn't stretch along the Y axis.



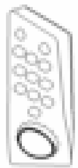
Step 2. Window Color

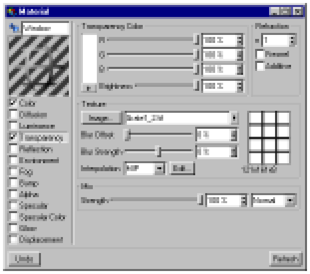
The Window Material

Still working with the same model, you are now going to create a material for the window polygon you saved when modeling the room.

Step 1: Create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)





Step 2. Window Transparency

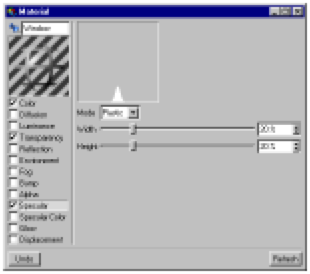
Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Window." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog. You can leave this channel at its default settings.

Step 3: Go to the Transparency channel of the material by clicking on the text "Transparency" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

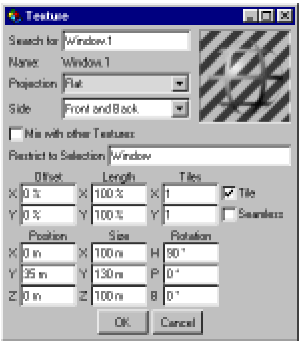
For this channel, you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the Grate1_2.tif texture into the Bump channel. You can leave all the other settings at default.



Step 2. Window Specular

Step 4: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

The highlight or specular should be small and sharp, so we recommend the default settings Mode: Plastic, Width: 20, Height: 20.



Step 5. Window Projection

Click Refresh when you are satisfied with the settings to save this material.

Step 5: Apply the Material by dragging the material to the Object Manager and dropping it onto the Room model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

First off you are going to want to restrict this material to the selected polygon that defines the window. You do this by entering the name of the selection set into the Restrict to Selection dialog. Type "Window" into the dialog.

A Flat projection will work best for the window. Since you want it to project straight onto the window geometry, you will need to adjust the rotation of the projection by changing the H rotation to 90 degrees.

How the texture is placed on the window defines the number of panes. In order to create a 3x4 panel configuration, You will need to stretch the material on the Y axis and move it up a bit. The settings used here are Size Y=130, Position Y=35m. Click OK.

Step 2. Object Manager

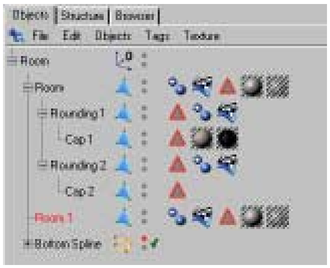
Light from Outside

Rather than add a light source outside of the window to simulate day or night outside, you are going to do a little trick to get the same results. First, you'll define the environment model and then you'll be creating two textures for it; one bright and one dark.

Step 1: First make sure your Polygon Tool is selected.

Editor: Tools=>Polygons
Shortcut: None

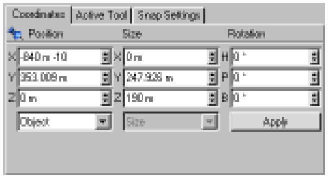
Next double-click on the Window Selection Tag of the Room. The Selection Tag dialog will open. Click on Restore Selection. This will activate that selection set.



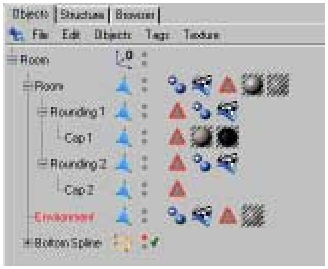
Step 2. Object Manager after splitting

Step 2: Split off a duplicate selection with the Split Tool.

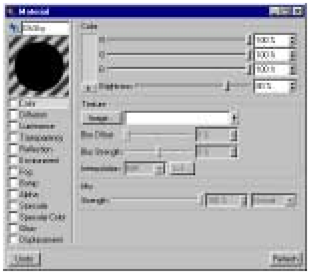
Editor: Structure=>Edit Surface=>Split
Shortcut: None

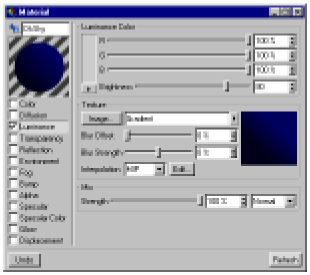


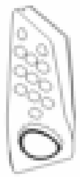
Step 2. Coordinates



Step 2. Environment Object


Step 4. Turn off Color & Specular


Step 5. DkSky Luminance



This will create a separate model based on the selection set.

Double click on the text "Room.1." This opens a dialog that allows you to change the name of the material. Change it to "Environment." Click OK.

Move the new Environment model, 10 meters away from the window. To do this, you can add -10 to Position X in the Coordinates Manager and click apply, or you can select the move tool and do it by hand.

Then, delete the first or leftmost texture applied to the Environment in the Object Manager. Only the Window material should be left.

Step 3: Create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "DkSky." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

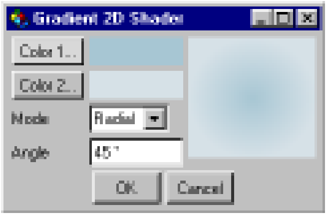
Step 4: Turn off the Color and Specular channels of the material by clicking of the checkboxes. To create a glow from outside you will only need to use the Luminance channel.

Step 5: Go to the Luminance channel of the material by clicking on the text "Luminance" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

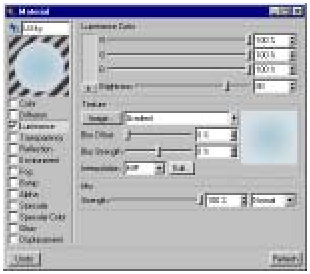
For this channel you will use one of C4D's built-in procedural textures. Click on the triangle next to the image dialog and select the Gradient procedural.

Next, click on the Edit button to modify the procedural. In the dialog, change Color 1 to a black and Color 2 to a dark blue as shown. Leave the Mode as Axial and the Angle at 45 degrees. Click OK and Refresh.

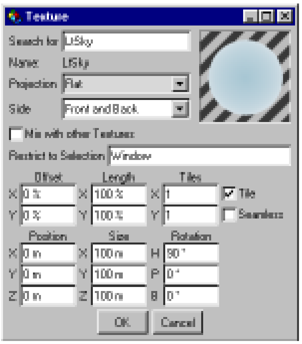
Step 5. DkSky Gradient



Step 7. LtSky Gradient



Step 7. LtSky Luminance



Step 8. LtSky Projection

This material will simulate the night sky as seen out the window of a room with lights on.

Step 6: Duplicate this material.

Material Manager: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Double click on the text "DkSky" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "LtSky." Click OK.

Double click on the sphere icon in the Material Manager to open its dialog and change the settings.

Step 7: Go to the Luminance channel of the material by clicking on the text "Luminance" on the left side of the dialog.

For this material, you will use the Gradient procedural again. However, you will change it slightly. Click on the Edit button to modify the procedural. In the dialog, change Color 1 to a light blue and Color 2 to a close to white blue as shown. Change the Mode to Radial and leave the Angle at 45 degrees. Click OK and Refresh.

This material will simulate the night sky as seen out the window of a room without lights on.

Click Refresh when you are satisfied with the settings to save this material.

Step 8: Apply the LtSky material by dragging it to the Object Manager and dropping it right on top of the Window material still there. The LtSky material will take its place and utilize its projection settings.

Step 9: Don't forget to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Later, in the Animation Chapter, you'll animate the material of the Environment so that as the light turns on, the DkSky material takes the place of the LtSky material.

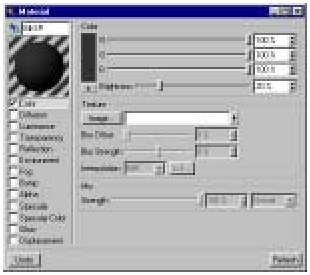
Creating Materials for the Remote

You will need to create 4 materials for the Remote. You will need a shiny black plastic material for the faceplate, a matte black plastic material for the Jog/Shuttle and two materials for the different styles of buttons.

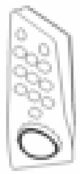
Faceplate

Step 1: Open the Remote project and create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)



Step 2. BlkSP Color



Double click on the text "New" in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to BlkSP.

Double click on the sphere icon in the Material Manager, to open the material dialogue.

For this material you will use the Color, Reflection and Specular channels.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

This will be the black shiny plastic material. Make the color black. The settings used here are R=100%, G=100%, B=100%, Br=20%.

Step 3. BlkSP Reflection

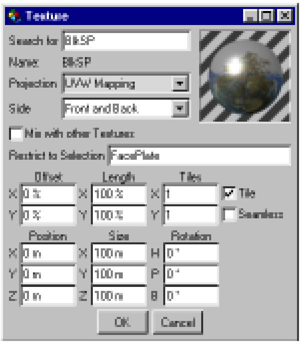
Step 3: Go to the Reflection channel of the material by clicking on the text "Reflection" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

The faceplate should have a slight reflection, so change the Brightness setting to 40%.

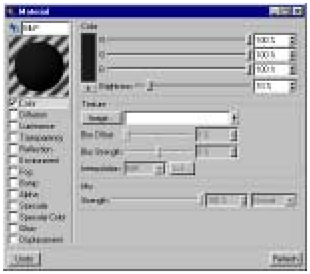
Step 4. BlkSP Specular

Step 4: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

On the Specular Channel, change the Width setting to 20% and Height to 90%. This will give the surface a tall, thin Specular highlight, making it look like shiny plastic.



Step 5. BlkSp Projection


Step 2. BlkP Color


Step 3. BlkP Specular

Click Refresh when you are satisfied with the settings to save this material.

Step 5: Apply the material by dragging and dropping it onto the Body part of the Remote model in the Object Manager. The Material placement dialogue will open automatically.

The default UVW projection will work fine as there are no textures in this material. You are going to want to restrict this material to the selected polygon(s) that define the faceplate. You do this by entering the name of the selection set into the Restrict to Selection dialog. Type "FacePlate" into the dialog.

Jog/Shuttle and Body

Step 1: Create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to BlkP.

Double click on the sphere icon in the Material Manager, to open the material dialogue.

Make sure only the Color channel of the material is activated.

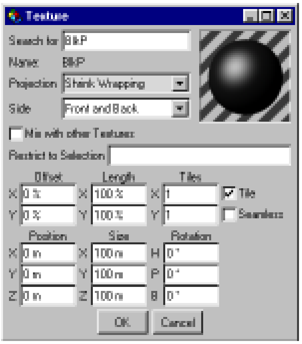
Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

This will be the matte black plastic material. It should be a little darker than the shiny black. The settings used here are R=100%, G=100%, B=100%, Br=10%.

Step 3: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

On the Specular Channel, change the Width setting to 65% and Height to 65%. This will give the surface a wide soft Specular highlight.

Click Refresh when you are satisfied with the settings to save this material.



Step 4. BlkP Projection

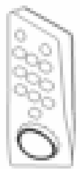
Step 4: Apply the material by dragging and dropping it onto the Jog/Shuttle and Body parts of the Remote model in the Object Manager. The Material placement dialogue will open automatically.

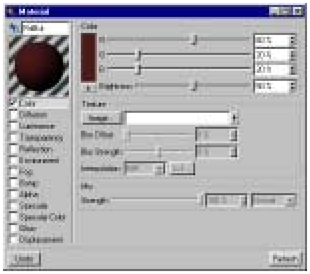
The default UVW projection will work fine, as there are no textures in this material. Make sure that this material is the leftmost texture on the Body model.

Square Buttons

Step 1: Create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)





Step 2. RdBut Color

Double click on the text “New” in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to RdBut.

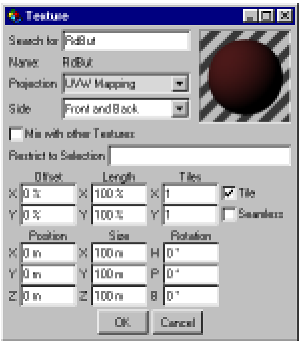
Double click on the sphere icon in the Material Manager, to open the material dialogue.

Step 2: Go to the Color channel of the material by clicking on the text “Color” on the left side of the dialog.

This will be a red plastic material for the square buttons. The settings used here are R=60%, G=20%, B=20%, Br=50%.

Step 3: Make sure to de-activate the Specular channel by clicking on the check box.

Click Refresh when you are satisfied with the settings to save this material.



Step 2. RdBut Projection

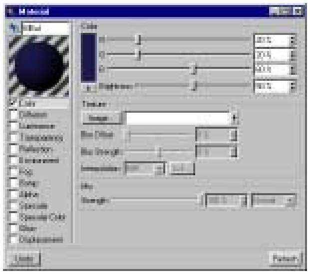
Step 4: Apply the material by dragging and dropping it onto the Buttons group of the Remote model in the Object Manager. The Material placement dialogue will open automatically.

The default UVW projection will work fine, as there are no textures in this material.

Round Buttons

Step 1: Create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)



Step 2. RdBut Color

Double click on the text "New" in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to BlBut.

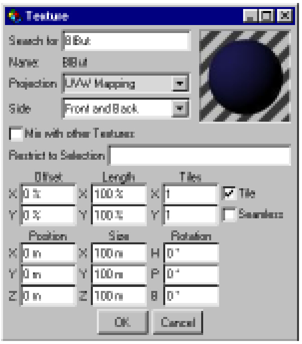
Double click on the sphere icon in the Material Manager, to open the material dialogue.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

This will be a red plastic material for the square buttons. The settings used here are R=20%, G=20%, B=60%, Br=50%.

Step 3: Make sure to de-activate the Specular channel by clicking on the check box.

Click Refresh when you are satisfied with the settings to save this material.



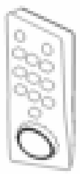
Step 4. RdBut Projection

Step 4: Apply the material by dragging and dropping it onto the Round group in the Buttons group of the Remote model in the Object Manager. The Material placement dialogue will open automatically.

The default UVW projection will work fine as there are no textures in this material.

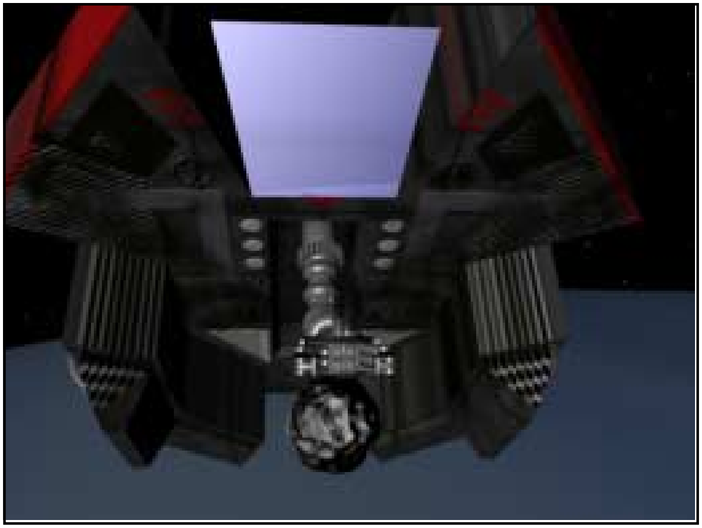
Step 5: Don't forget to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)



Materials for the SciFi Scene

Most materials created for 3D utilize bitmap images. Of course, creating or finding the right images is the trick. In this tutorial you'll learn one technique for creating custom textures for a specific model.



The Stingray Material

The model already has a sleek and stealth style. The material for this ship should enhance that feeling.

Step 1: Open the Stingray project and create a new material.

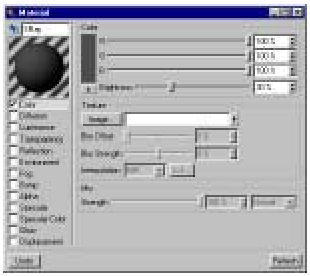
Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "SRay." Click OK.

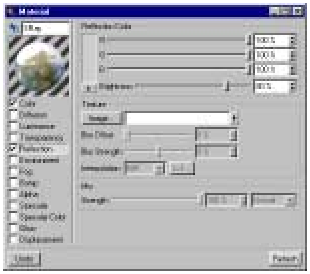
Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

You are going to want to keep the basic color black. Change the color settings to R=100%, G=100%, B=100%, Br=30%. This will give you a black color.



Step 2. SRay Color



Step 3. SRay Reflection

Step 3: Go to the Reflection channel of the material by clicking on the text “Reflection” on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

To imitate a smooth uniform reflected metal, you only need to sent the Brightness setting to 80%.

Step 4. SRay Environment

Step 4: Go to the Environment channel of the material by clicking on the text “Environment” on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

You don’t want the ship to only reflect the stars. This would make it look muddy and busy. So attach a texture map that will imitate swirling reflections. There is a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: SciFi: Tex. Click on the Image button to load the Hackle.tif texture into the Environment channel. When you‘re asked whether to copy the image to the document path, click Yes. CINEMA 4D will copy your texture to the same directory as your scene file.

If you look at the image you’ll see it has uniform light and dark patches. Since the geometry is curved, this will create swirling changes on the surface of the ship.

To remove some of the white influence of the texture map, you’re going to subtract a 35% of white from this texture. Change the color settings to R=100%, G=100%, B=100%, Br=100%. Using the Mix dialog at the bottom, change the Mode to Subtract and move the slider to 35%.

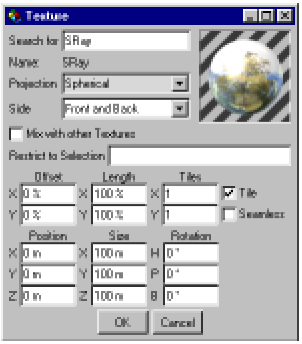
Step 5. SRay Specular

Step 5: Go to the Specular channel of the material by clicking on the text “Specular” on the left side of the dialog.

You are going to want a very tall and thin Specular, so we recommend the settings Mode: Plastic, Width: 20, Height: 100.

Step 6: Apply the Material by dragging the material to the Object Manager and dropping it onto the Stingray object. When you drop the material a dialog will open with options for how the material is to be applied to the model.

A Spherical projection will work great for the Stingray model. Click OK.



Step 6. SRay Projection

Step 7: Use the Save Project function to save your project. This way, all associated materials will be saved in a Tex directory within the project folder.

Editor: File=>Save Project
Shortcut: None

The Cargo Ship Materials

This model should look like a rough and weathered cargo ship. You can use an overall generic gray metal weathered look for the entire ship. Or you can create a texture with panels and added detail the suits your model perfectly. Included in this section are some techniques for creating custom textures for your model.

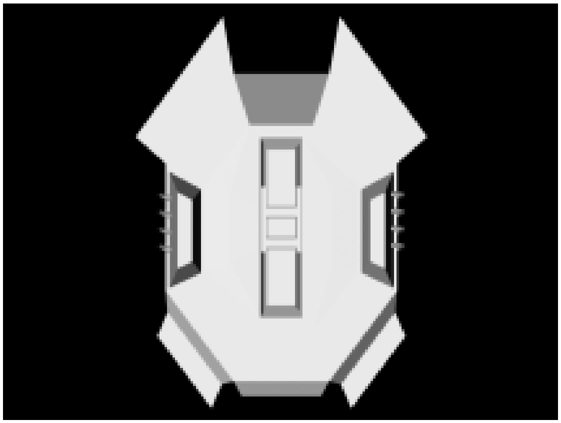
Creating Custom Textures

Step 1: Open the Cargo Ship project and change your perspective view to the Bottom view.

View: Cameras=>Bottom
Shortcut: None

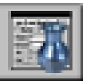
Position the view so you are looking straight at the bottom of the ship. With the Cargo Ship selected you can use Frame Active Object to make sure the view is focused on the bottom of the ship.

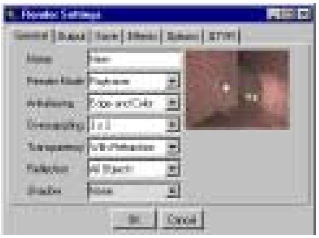
View: Edit=>Frame Active Object
Shortcut: O



Step 2: Render the ship from this view and use the rendered image as a template for creating a texture. Open your Render Settings to set up a single image render.

Editor: Render=>Render Settings
Shortcut: Ctrl+B





Step 2. Render Settings - General

For the General settings use:

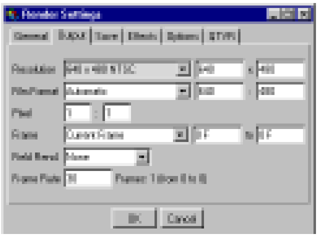
Render Mode: Raytracing

Antialiasing: Edge and Color. This ensures that the edges of geometry and color transitions on surfaces will be smoothed.

Oversampling: 3x3 if the final output of your scene will be screen resolution, 4x4 or more if you are planning to render a print resolution image for final.

Shadows: None

All other settings can be left at their defaults.



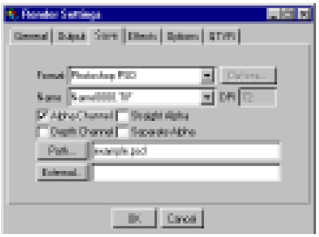
Step 2. Render Settings - Output

In the Output settings:

Resolution: 640x480 would be a good general size to use. If you will eventually be printing a high-resolution image, you would want to make that higher.

Frame: Current Frame. You only need a still image.

All other settings can be left at their defaults.



Step 2. Render Settings - Save

In the Save settings:

Format: TIFF or Photoshop PSD if you will be using this program.

Path: Don't forget to set where you want to save this file on your computer.

Make sure to render the image with an alpha by checking the Alpha Channel box.

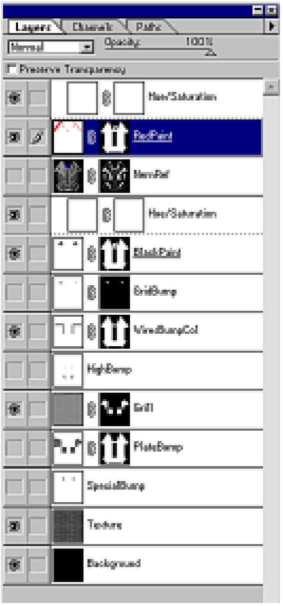
All other settings can be left at their defaults.

Click OK to close the Render Settings dialog.

From the active view's edit menu, choose Use as Render View to make sure the external renderer uses this view.

Render the image.

Editor: Render=>Render To Picture Viewer
Shortcut: Shift+R



Step 3: Once rendered, you can take the picture into an image-editing program like Photoshop and create your custom texture. Open the rendered image in Photoshop or other program.

Add three new layers to the image so that you can build a Color Texture and Bump Texture separately. The original image should be on the bottom and another general gray background image.

Some other texture creation techniques:

- Name your layers. This will make it easier to save them as separate textures later.
- When creating bump textures remember that black is no bump, white is maximum bump, all the grays in between are gradations of bump. A good base bump color is 30% gray. For inset grooves use a darker gray or black. For raised edges use lighter grays or white.
- For the best results, build each Bump level as a separate layer. Keep the most raised edges, the lighter or white portions on the top layer, with darker layers subsequently below.
- To create dirty edge maps for the bump textures, load the selection from the highest-level bump layer (lightest) and invert the selection. The selection will act as a mask, masking out the actual bump level, and making dirt conglomerate around the base and the "nooks." In a new layer, paint black around the bump features. Use the paintbrush with a soft edged brush of moderately large size. Make sure all the dirt painting you do is in either this layer or separate new layers, not in any original bump layers.
- You can use a selection or wand tool to map out and create guides for regions of the ship.

- You can paint or fill areas with bright colors for more obvious results while you are working. Later just apply a grouped adjustment layer to decrease the saturation and color values.
- Use Layer Masks to maintain painting within areas and to paste in patterns or textures from elsewhere.
- For dirtying textures, after painting dirt onto a texture map, use the noise or cloud filers on a layer mask to make the dirt patches uneven.
- When saving images for later use in CINEMA 4D, make sure to flatten all the layers that make up the particular texture you are creating. Save each texture as a separate image file.

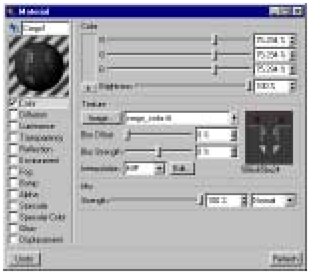
Adding Materials to the Cargo Ship

Step 1: Create a new material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Cargo1." Click OK.

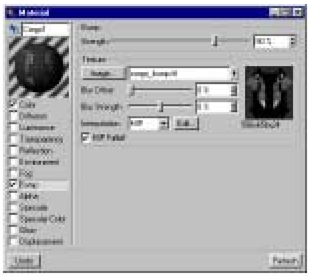
Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.



Step 2. Cargo1 Color

Step 2: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

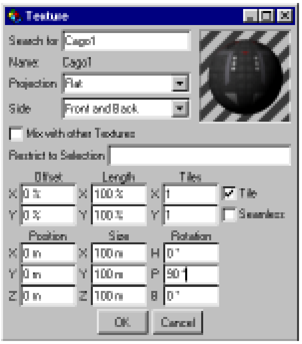
For this channel, you will use one of the custom textures created for the ship. It's included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: SciFi: Tex. Click on the Image button to load the cargo_color.tif texture into the Color channel. You can leave all the other settings at default. When the dialog appears asking if you want to copy the texture, click Yes.



Step 3. Cargo1 Bump

Step 3: Go to the Bump channel of the material by clicking on the text "Bump" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you will use one of the custom textures included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: SciFi: Tex. Click on the Image button to load the cargo_bump.tif texture into the Bump channel. When the dialog appears, click Yes. Set the bump strength 50%.



Step 5. Cargo1 Projection

Step 4: Turn off the Specular channel by clicking on the check box.

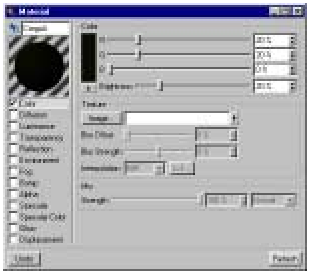
Click Refresh, to save these settings.

Step 5: Apply the Material by dragging the material to the Object Manager and dropping it onto the Body object when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

Make sure the material is being projected onto the object using Flat Projection. Rotate the texture 90 degrees on the P axis. Leave all the rest of the settings at default and click OK.

In the Object Manager, make sure this material is selected and use Fit to Object to adapt the texture to the object.

Object Manager: Texture=>Fit To Object
Shortcut: None



Step 7. CargoA Color

Step 6: Create a new material.

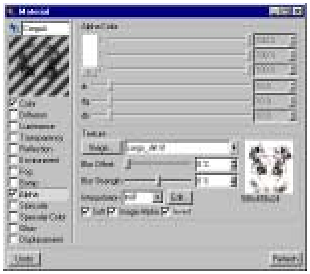
Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "CargoA" for Cargo alpha. Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

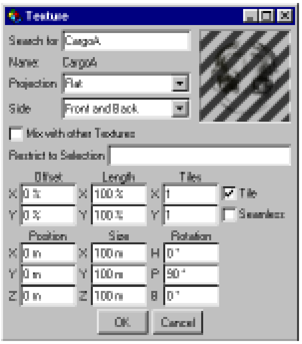
Step 7: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

You'll only need color for this channel. Change the color settings to R=20%, G=20%, B=0%, Br=20%.



Step 8. CargoA Alpha

Step 8: Go to the Alpha channel of the material by clicking on the text "Alpha" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.



Step 10. CargoA Projection

Step 11. Selection

Step 11. Name Selection Set

For this channel, you will use one of the custom textures created for the ship. It's included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: SciFi: Tex. Click on the Image button to load the cargo_dirt.tif texture into the Color channel. When the dialog appears asking if you want to copy the texture, click Yes.

Before you leave this dialog, activate Invert by clicking the check-box.

Step 9: Turn off the Specular channel by clicking on the check box.

Click Refresh, to save these settings.

Step 10: Apply the Material by dragging the material to the Object Manager and dropping it onto the Body object when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

Make sure the material is being projected onto the object using Flat Projection. Rotate the texture 90 degrees on the P axis. Leave all the rest of the settings at default and click OK.

In the Object Manager, make sure this material is selected and use Fit to Object to adapt the texture to the object.

Object Manager: Texture=>Fit To Object
Shortcut: None

Step 11: Change to Polygon Mode.

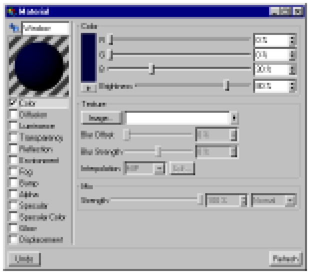
Editor: Tools=>Polygons
Shortcut: None

Choose the Live Selection tool.

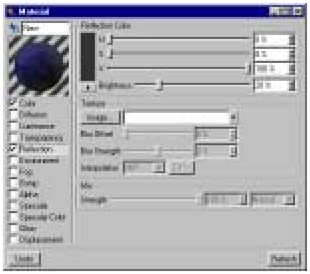
Editor: Selection=>Live Selection
Shortcut: None

With the Body of the Cargo Ship selected in the Object Manager, select the slanted polygon group in the front of the Cargo Ship as shown.

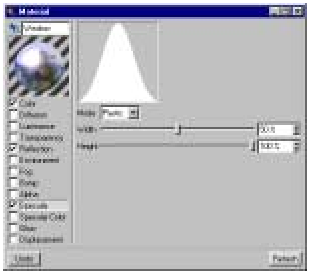
Set this selection.



Step 13. Window Color



Step 14. Window Reflection



Step 15. Window Specular

Editor: Selection=>Set Selection
Shortcut: None

Then name it "Window" by double clicking on the selection set icon in the Object Manager.

Step 12: Create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Window." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 13: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

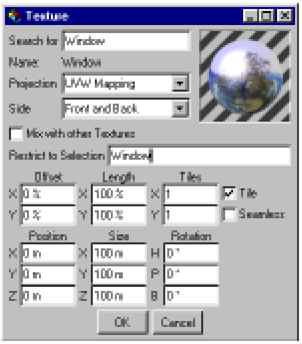
You'll only need color for this channel. Change the color settings to R=0%, G=0%, B=30%, Br=80%.

Step 14: Go to the Reflection channel of the material by clicking on the text "Reflection" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

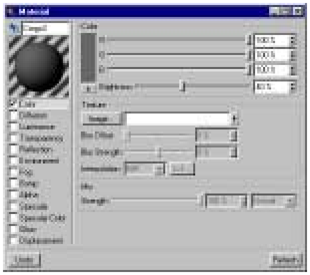
Give this window a 20% reflectivity factor. Change the color settings to R=100%, G=100%, B=100%, Br=20%.

Step 15: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

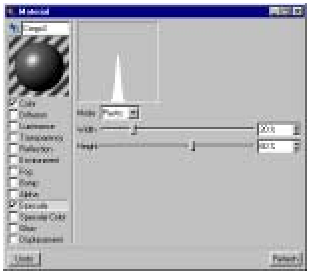
You are going to want a fairly big Specular, so we recommend the settings Mode: Plastic, Width: 50, Height: 100.



Step 16. Window Projection



Step 18. Cargo2 Color



Step 19. Cargo2 Specular

Click Refresh when you are satisfied with the settings to save this material.

Step 16: Apply the Material by dragging the material to the Object Manager and dropping it onto the Body model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

First off you are going to want to restrict this material to the selected polygon(s) that define the window. You do this by entering the name of the selection set into the Restrict to Selection dialog. Type "Window" into the dialog.

The default UVW projection will work fine for this model.

Step 17: Create a new material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Cargo2." Click OK.

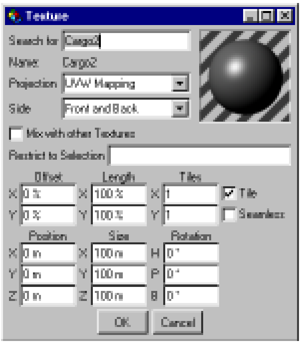
Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Step 18: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

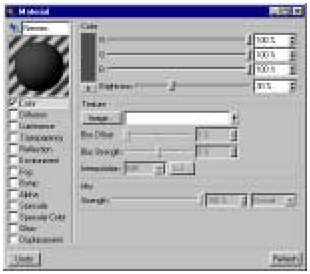
You'll only need color for this channel. Change the color settings to R=100%, G=100%, B=100%, Br=40%.

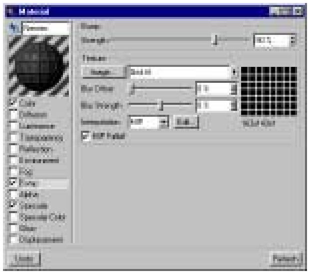
Step 19: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

You are going to want a medium sized Specular, so we recommend the settings Mode: Plastic, Width: 20, Height: 60.



Step 20. Cargo2 Projection


Step 22. Nernies Color


Step 23. Nernies Bump

Click Refresh when you are satisfied with the settings to save this material.

Step 20: Apply the Material by dragging the material to the Object Manager and dropping it onto the Cargo Ship model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

The default UVW projection will work fine for this model.

Step 21: Create a new material.

Material Manager: File=>New Material Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Nernies." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

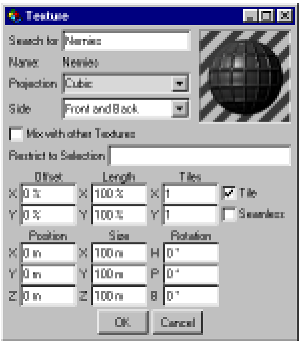
Step 22: Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

You'll only need color for this channel. Change the color settings to R=100%, G=100%, B=100%, Br=30%.

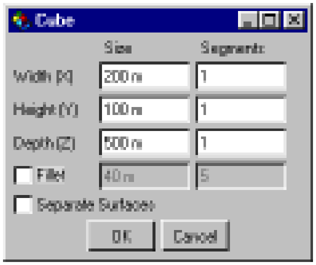
Step 23: Go to the Bump channel of the material by clicking on the text "Bump" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you will use one of the custom textures included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: SciFi: Tex. Click on the Image button to load the grid.tif

Step 23. Nernies Specular



Step 25. Nernies Projection



Step 26. Cube Parameters

texture into the Bump channel. When the dialog appears asking if you want to copy the image, click Yes. Set the bump strength 50%.

Step 24: Go to the Specular channel of the material by clicking on the text "Specular" on the left side of the dialog.

You are going to want a medium sized Specular, so we recommend the settings Mode: Plastic, Width: 20, Height: 60.

Click Refresh when you are satisfied with the settings to save this material.

Step 25: Apply the Material by dragging the material to the Object Manager and dropping it onto any "boxy" shaped part of the model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

Use Cubic projection for any square shaped nernie on the model.

Step 26: The last thing you need to do is create an object that will hide the inside of the Cargo Ship. When the Robotic Arm comes out of the Door, you want to avoid it looking like it is not attached to anything. So you will create a fog object. Create a Cube.

Editor: Objects=>Primitive=>Cube
Shortcut: None

Double click on the Cube icon in the Object Manager to make sure it was created using the default settings. It should be Width=200m, Height=100m, Depth=500m.

Place the material at the center of the Cargo Ship — X=0, Y=20, Z=0. It should be located just inside the Door.

Rename the Cube to Fog and drop it in the Cargo Ship group.

Step 27: Create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)


Step 28. Fog

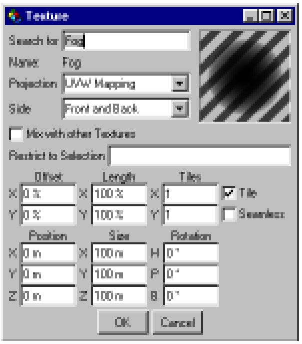
Double click on the text “New” just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to “Fog.” Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings. Turn off the color and specular channels by unchecking the boxes next to their names.

Step 28: Go to the Fog channel of the material by clicking on the text “Fog” on the left side of the dialog. Make sure Fog is activated (checked). You can leave these settings at their default.

Change the Brightness to 0% and set the Distance to 400m.

Click Refresh when you are satisfied with the settings to save this material.



Step 29. Fog Projection

Step 29: Apply the Material by dragging the material to the Object Manager and dropping it onto the Cube model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

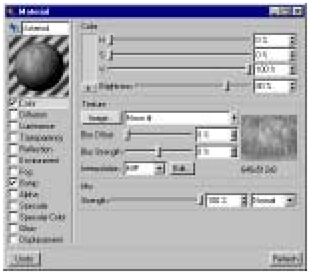
The default UVW projection will work fine, as there are no textures in this material.

This prevents anyone from seeing that there isn’t anything inside the ship.

Creating a Materials for the Asteroid

Step 1: Open the Asteroid scene and create a New Material

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)



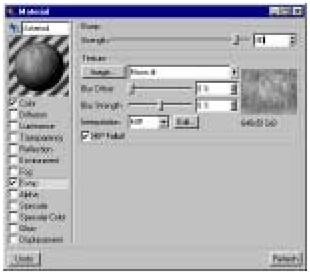
Step 1 Asteroid Color

Double click on the text "New" in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to Asteroid.

Double click on the sphere icon in the Material Manager, to open the material dialogue.

Activate only the Color and Bump channels of the material.

Step 2: In the Color channel load "moon.tif" from the Tutorials Folder: Materials: SciFi: Tex directory on your Tutorial CD.

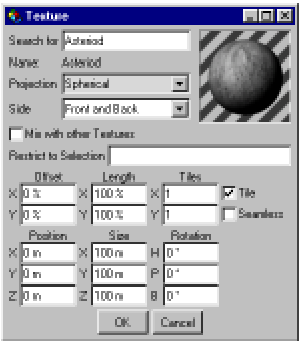


Step 1 Asteroid Bump

Step 3: Go to the Bump channel of the material by clicking on the text "Bump" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel you will use a tileable texture included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: SciFi:Tex. Click on the Image button to load the moon.tif texture into the Bump channel. Since you have already loaded it, the texture is also easily added from the pulldown menu in the texture dialogue. Set the bump strength 80. This will give the surface a very rough appearance.

Click Refresh, to save these settings.



Step 4. Asteroid Projection

Step 4: Apply the material by dragging and dropping it onto the Asteroid model in the Object Manager. The Material placement dialogue will open automatically.

Make sure the material is being projected onto the object Spherically. Leave all the rest of the settings at default and click OK.

Step 5: Don't forget to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Lighting

Contents:

- Lighting Basics
- Creating Depth
- Key, Fill and Back Lighting
- Intensity and Diffusion
- Positioning Your Lights
- Color
- Mixing Colors
- Visibility
- Shadows
- Animating Lights
- Gobos
- Be Creative

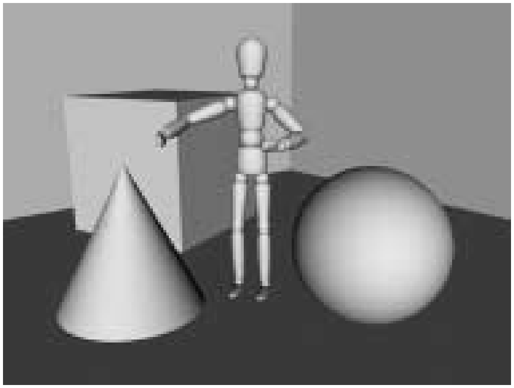
Lighting Basics

Once you have built your objects and applied materials, it is time to light the scene. This is very much like lighting the set and stage for a theatre production. When reaching for photorealism, the best lighting illuminates a scene subliminally, communicating mood, setting and emotion without the audience ever knowing it. For the surrealistic, lighting may be a key element in your scene, like a blast of light from behind an object or the shockwave of an explosion. A light can even be the subject of your scene, as in an animated lens flare to create a fairy or firefly. And sometimes, what you don't light is as important as what you do light.

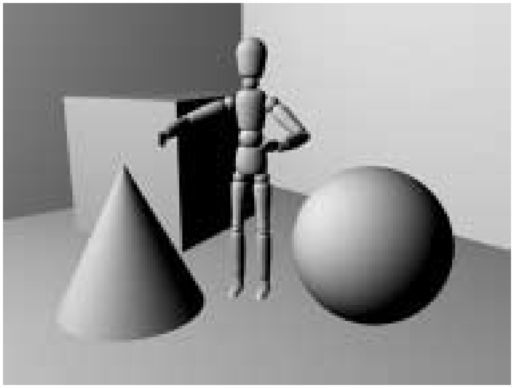
Creating Depth

The key to creating depth in a 3D scene is the lighting. In the end, 3D animation is rendered into sequential 2D images. The trick is to maintain that perception of depth and dimension after rendering. Lighting plays a major role in creating the illusion of this third dimension.

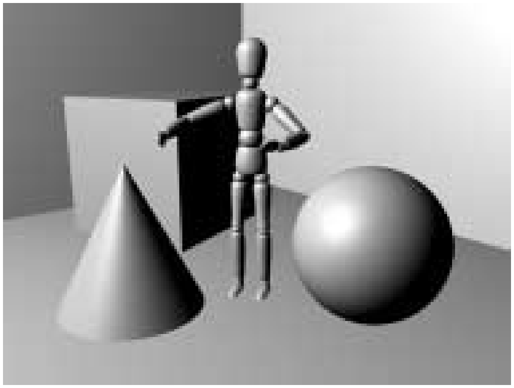
The renaissance master painters used a technique called Chiaroscuro to establish a sense of space and focus in their paintings. Chiaroscuro means "light and dark." They made the subjects in their paintings seem more dimensional by having the shadowed edge of a foreground object placed over a lighter background element. They were able to control the focus – point of interest – in their paintings by placing the area of greatest contrast where they wanted the viewer's eye to be drawn. Two well known American illustrators Howard Pyle and N.C. Wyeth used these techniques to make some amazing illustrations.



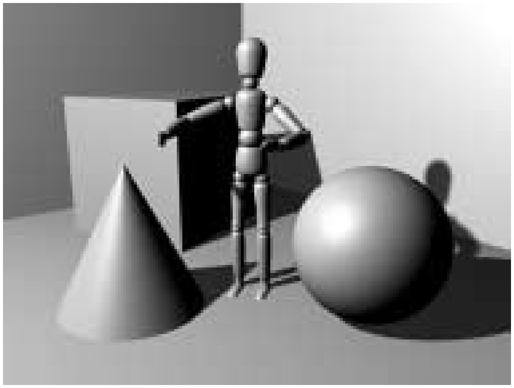
This image illustrates how stark, direct lighting on an object with no other lighting attributes makes it appear flat and uninteresting.



Change the angle of the light source and it creates dark and light sections on the object's surface. The lighter portions appear closer and the darker appear farther away, creating depth.



The addition of specularity or highlight brings life to the surface texture of that object. Like the depth angled lighting creates, the highlight creates transition from the object's base color value to the brightest portion of the highlight.



Adding shadows defines the spatial relationship to the world around the object. A shadow gives the impression the object is sitting on a surface. The lack of an object shadow, as in figure three, gives the impression the object is floating in space without any relationship to its surroundings.

Key, Fill and Back Lighting

These are the three basic elements of lighting that all animators should learn. The idea is to use these three types of light to direct the audience' eye without being obvious or destroying the reality of the lighting.

- Key lights are used to direct focus. The Key light defines your scene by creating the main shadows and specular highlights. The Key light is often placed to one side of the camera, in the eight, six or four o'clock position, to create depth.
- Fill lights are used to fill out the rest of the scene "realistically" and to soften shadows, but not to pull focus.
- Back lighting, placed in the back of the scene, helps to separate objects from the background and create depth. The back light can also highlight objects, like the shoulders and the hair of a character.

Note that you can use more than one light to create Key, Fill or Back lighting. However, it is unusual to have more than one shadow or specular casting Key light.

Intensity and Falloff

Intensity and Falloff define the character of a light. Intensity is the brightness of the light. Falloff is the distance it takes for a light to transition from its full intensity to total darkness. The combination of these two settings, the quality and angle of the light, and the shape and size of objects covered by the light define the distribution of light in the scene.

Positioning Your Lights

Like all other aspects of lighting, the angle of the lighting affects the mood and look of your scene. The distance and angle of your light changes the way shading and highlights are created by the light source.

The following series of images shows the effect of a single hard light source placed at various angles. Here we relate the position of the light source to the hour positions on a clock face when looking straight at your scene.

Twelve O'clock Position

Placing a light in the twelve o'clock position creates a harsh or stark look. However, it can be used with key and fill light to create dramatic effect.

Ten and Two O'clock Positions

When projected at an angle, light enhances the curves and angles of objects in your scene, giving them depth. The ten o'clock and two o'clock positions are most commonly used.

Five and Seven O'clock Position

Although not widely used for key lighting, bringing a light source from below an object at an angle offers a much different feel.

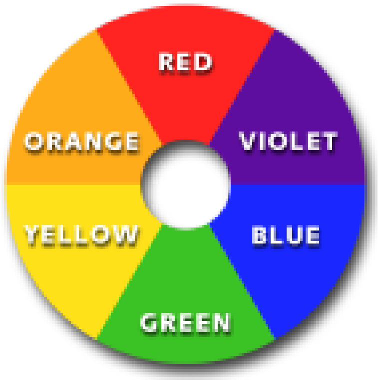
Six O'clock Position

Just like when you were a kid and put a flashlight below your chin to scare someone, this technique produces sharp angles and a bit of a sinister look.

Color

Color is a very important aspect of lighting. Although all lights in CINEMA 4D default to pure white, lights in the real world are rarely 100% white. So it's up to you to choose a color for your light that suits the scene, sets the tone and elicits emotion. The color of the Key light will set the overall feeling of the scene. The color of Fill lights not only brings out the darker areas of your scene and softens shadows; it enhances the color scheme and adds depth.

Color also enhances the materials and textures of your objects, especially when using materials with bump and specular textures. Your choice of one color over another can bring out the nuances of a material.



A standard color wheel is made up of primary colors (red, blue, and yellow) and tertiary colors (orange, green, and purple). The compliment of any color is the color that is opposite it on the color wheel. So green compliments red, blue compliments orange, violet compliments yellow and so on.

Incandescent light is very yellow-orange so the shadows would be blue-purple. Fluorescent light is bluish so its shadows would be warmish orange. Summer daylight has a hotter "feel" than the cool winter light. All these different qualities of light are achieved with color. In general, red, orange and yellow are warm lights, and blue, purple and green are cool.

Mixing Colors

A white light source is actually all colors of the spectrum in combination. This is known as Additive Color. A red light is light that has excluded all other colors of the spectrum but red. If you incorporate three light sources in your scene that use all three primary colors, the result where they overlap will be white light. As you combine two or more light sources, of varying colors, they will add together. The more light sources of varying color, the closer to white.

Models and surfaces are the exact opposite. They use the subtractive process to appear their specific color. For instance, a blue ball receiving white light will only reflect the blue range of light waves, while absorbing the other light waves of the spectrum. This is important to remember when selecting the color of light you choose to light an object. For instance, shining a red light on a blue ball will make it appear black.

There are many books on basic color theory and the results of mixing colors. Check our web site for an updated list of stage lighting books that include in depth descriptions on the use of colored lights and their combinations.

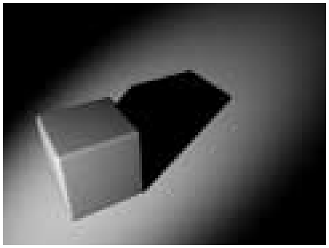
Visibility

When discussing the visibility of a light in 3D animation, we're referring to light phenomenon that you can actually see: the cone of a spotlight, the flash of an explosion, a candle flame, lens flares, a firefly, rays of light through window blinds, etc. Each of these can be recreated using a visible light in CINEMA 4D. This type of light can be visible with or without adding illumination to your scene. Visible lights can even be emitted as particles to create fire or candle light.

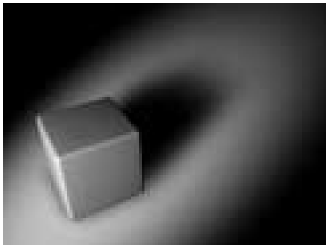
Shadows

Shadows add dimension and depth to a scene. An object sitting on a table without casting a shadow looks as if it is floating above it. In general, its best to have only one light source - the Key light - casting shadows, unless you have multiple light sources which are visible in your scene, like two lamps. Every light in CINEMA 4D can be set to cast shadows or not, and each can use a different type of shadow.

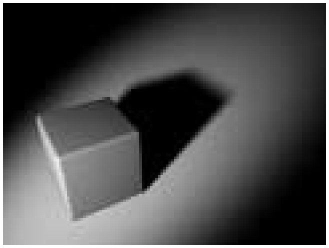
There are three different types of shadows in CINEMA 4D: Hard, Soft and Area. Hard and Soft refers to the edge density of the shadow. Hard shadows will have very sharp edges with little drop-off. Soft will offer a soft edge with some small drop off. Area shadows give you the most realistic shadow, calculating the distance of the light from the objects in the scene and their relation to each other. Area shadows give you true shading drop off; meaning the edge of the shadow will be harder where the object casting and the object catching the shadow are closest together, and softer the further they are apart. When using multiple shadow casting lights, try mixing the different kinds of shadows together.



Hard Shadow



Soft Shadow



Area Shadow

Animating Lights

Animating the location and parameters of lights can add a whole new dimension to your scenes. This is not limited to someone carrying a candle or lamp through your scene. In 3D animation, you're not hampered by the limitations of physical lights. You can employ lights that have no visible source anywhere in your scene.

Gobos

This is the technique of placing a texture map or gel onto a light, much like projecting the image of a slide from a slide projector. Essentially, it restricts and enhances the way the light appears in the scene. Gobos can be used to create shadows or lighting effects created by off-camera physical/environment elements (window blinds, the shadow of a blowing tree, the murkiness of an underwater scene, etc.). Rather than modeling an entire tree with leaves outside of a window, an animated gobo/texture could be placed on a light for the same effect. It saves an artist modeling and rendering time.


Spotlight with Gobo Applied

Be Creative

Early in his career, an animator (who is now working at a very prominent production studio), developed a technique whereby he would create his Key light and then place numerous little lights throughout to "fill" the scene. He would go as far as placing dozens of very dim different colored lights in areas he wanted to bring out more. He worked for hours on creating clusters of multi-parameter lights that he could use for different settings and results. Tedious work - but his images were quite dazzling and award winning. You would never know this is how he accomplished it. You were never aware of the many lights used, but his imagery had amazing depth and photorealism.

Lighting the 3D Logo Project

This scene utilizes the basic key and fill lighting philosophy. To accent the highlights of the metallic objects, we include an extra light.

Composing the Scene

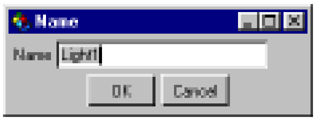
Before you can set up the lighting, you need to know where objects will be located in your scene. For the Logo project, all of the objects you have created are already in one scene. So you only need set up your scene.

Step 1: Open the Logo scene saved with materials. At this point, the Logo, Rings and Text are all pretty much where they need to be. You are ready to light the scene.

Step 1. Composing

Adding Lighting

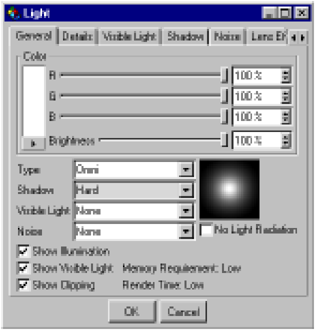
Step 1: Add a key light to illuminate the objects from the front. Add a new Light to the scene.



Step 1. Rename Light

Double click on the text “Light” in the Object Manager. This opens a dialog that allows you to change the name of the light. Change it to “Light1.” Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.



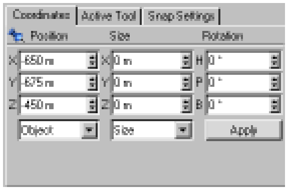
Step 1. Light1 - General

The default Omni light will work fine for this light. The only thing to change is the Shadows. Lights do not cast shadows by default. In this scene, the only elements casting and receiving shadows are the Rings, Protons and Logo models. Hard Shadows will work best for noticeable, hard edged variation on the surfaces of these objects. Click OK.

Step 2: Placing a light directly in front of the Logo objects will make them look flat and uninteresting. You are going to want to come from an angle so the reflective edges of the objects will glisten and cast shadows on each other.

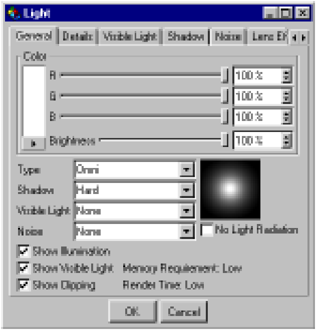
For this scene it will be easiest to position lights from the Top View. So change to that view.

View: View=>View 2
Shortcut: F2



Step 2. Light1 Position

Now, place this first key light to front-left and just below of the Logo elements. The coordinates for the position shown are X=-650, Y=-675, Z=-450. You can enter these numbers into the Position fields of the Coordinates Manager with Light1 selected in the Object Manager.



Step 3. Light2 - General

Step 3: Add another key light to illuminate the objects from the other side. Since the scene is very dark and the materials of the objects are very dark, an extra key light is needed to see the elements and add highlights to the edges. Add a new Light to the scene.

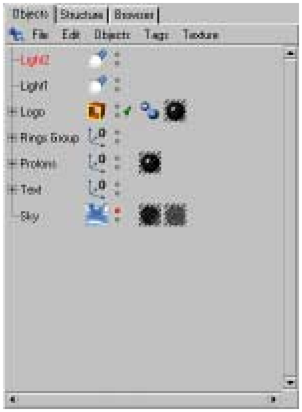
Editor: Objects=>Scene=>Light
Shortcut: None

Double click on the text "Light" in the Object Manager. This opens a dialog that allows you to change the name of the light. Change it to "Light2." Click OK.

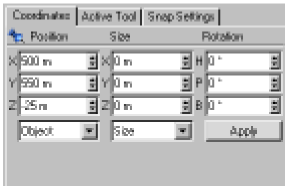
Double click on the light icon in the Object Manager to open its dialog and change the settings.

Again, the default Omni light will work fine for this light. Hard Shadows will work best for noticeable, hard edged variation on the surfaces of these objects. Click OK.

Step 4: You will want this light to come from the opposite angle as that of the first to add illumination and enhance the reflective edges of the objects. Place this one a little closer to create a bit of variation.

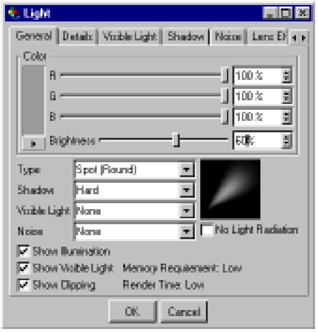


Step 4. Object Manager

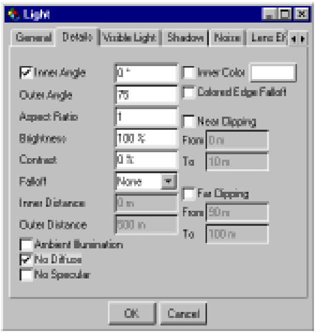


Step 4. Light2 - Position

LIGHTING

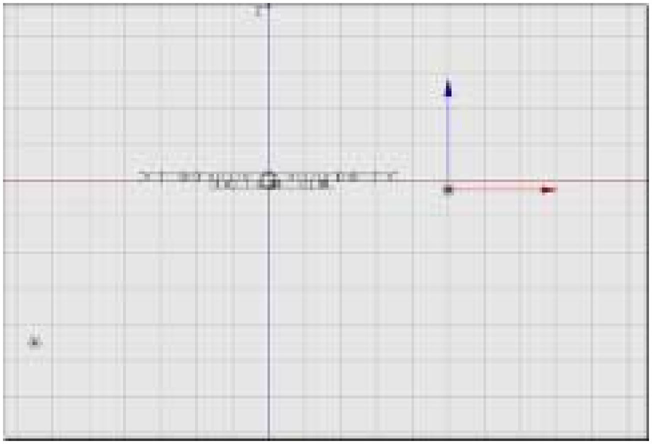


Step 5. Hotspot - General



Step 5. Hotspot - Details

Place this key light to front-right and just above of the Logo elements. The coordinates for the position shown are X=500, Y=550, Z=-25. You can enter these numbers into the Position fields of the Coordinates Manager with Light2 selected in the Object Manager.



Step 5: As the Rings turn and the Camera moves around to the front, the reflective edges are going to shine and sparkle. To make this more dramatic, add a hot spot. Add a new Light to the scene.

Editor: Objects=>Scene=>Light
Shortcut: None

Double click on the text "Light" in the Object Manager. This opens a dialog that allows you to change the name of the light. Change it to "HotSpot." Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

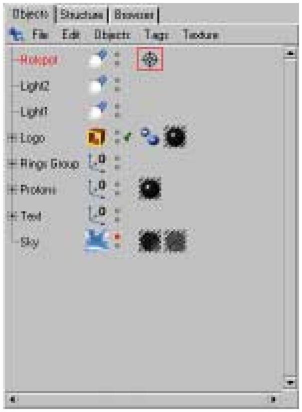
To get sharp highlights, you are going to want to use a round Spot Light. There is no need for shadows from this light source. Best to turn down the brightness a bit as well so it doesn't over illuminate. The settings used here are 60%.

Next go to the Details tab of the light dialog. In order to influence all the objects, you will need to increase the Outer Angle of the light. Change it to 75°. Since this light is only to add to the highlights of the object, you do not want it adding Diffuse light into the scene, so activate the "No Diffuse" checkbox at the bottom of this dialog as well. Click OK.

Step 6. Target Expression

Step 6: To really target the Logo and Rings, you are going to want to make sure that no matter where you place the HotSpot in the scene, it will be targeted at them. So you will need to add a Target Expression to the HotSpot. With the HotSpot selected, add the Target Expression.

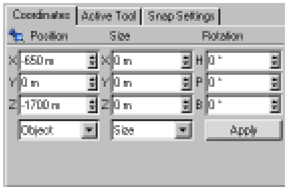
Object Manager: File=>New Expression=>Target Expression
Shortcut: None



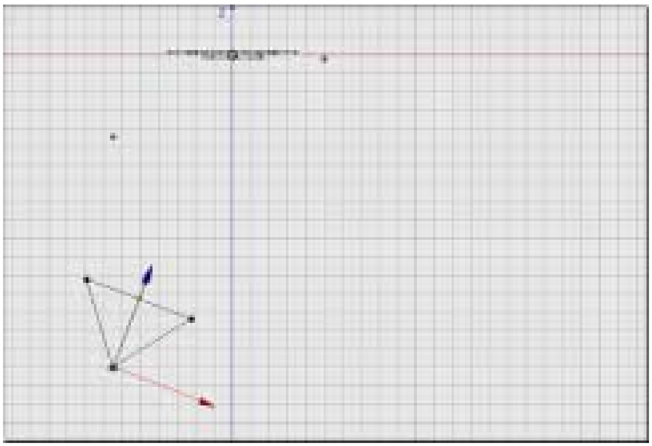
Step 6/7. Object Manager

When the dialog appears enter, "Logo" into the field. This tag will ensure that the light will always point at the Logo, no matter where the light or the Logo move. There is no need to create animation for this, the tag takes care of it for you.

Step 7: You will want this light to come from an angle as well. The coordinates for the position shown are X=-650, Y=0, Z=-1700. You can enter these numbers into the Position fields of the Coordinates Manager with HotSpot selected in the Object Manager.



Step 7. Hotspot - Position



Step 8. Save your scene.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

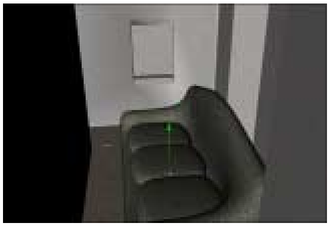
Lighting the Indoor Scene

This scene will feature two different kinds of lighting - dimly lit with moonlight pouring in through a window and brightly lit from a single household lamp. You will also use materials to create the illusion of outside lighting as seen through the window.

Composing the Scene

Before you can set up the lighting, you need to know where objects will be located in your scene. So the first step will be to place all the objects you have modeled into one scene.

Step 1: Open the Indoor Scene (Room). What you will do is Merge all of the other projects you have created into this one. See the template.



Step 1. Couch

Add the Couch

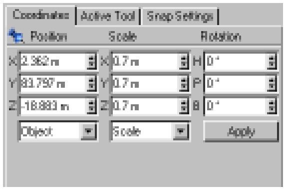
Step 1: Add the Couch to your scene. Use Merge file.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

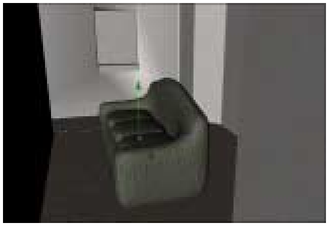
Choose the Couch scene. Once added, you will need to resize and reposition the Couch in the scene.

Step 2: Scale the Couch so it fits appropriately in the scene.

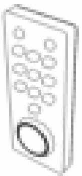
Editor: Tools=>Scale
Shortcut: T

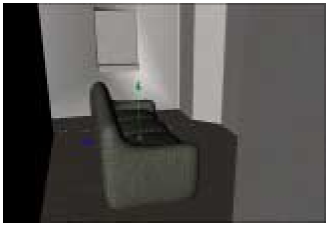


Step 2. Couch Scale

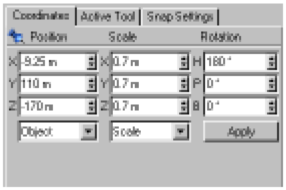


Step 2. Couch Scale





Step 3. Caouch Rotate



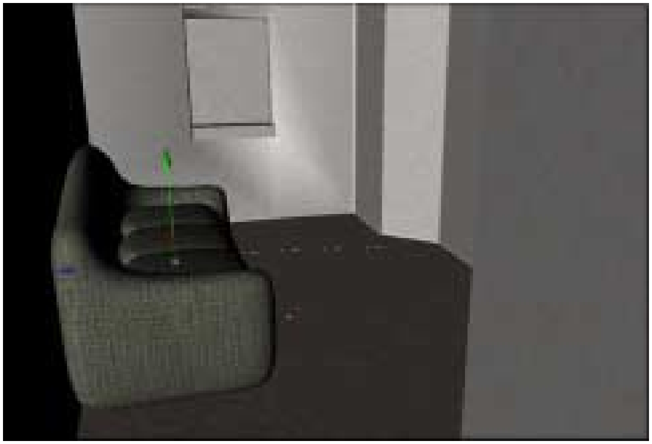
Step 4. Couch Coordinates

You can Scale it by approximation, or you can size it exactly using the Coordinates Manager. The Scale used here was 70% (.7 in the Scale settings in the Coordinates Manager).

Step 3: You are going to want to place it against the long straight wall. So, first you will need to rotate it so it faces the opposite direction.

With the Couch selected in the Object Manager, use the Coordinates Manager to rotate it 180 degrees. Enter 180 into the H rotation in the Coordinates Manager.

Step 4: Position the Couch in the scene. Place it against the wall and closer to the window side of the room. The settings shown are X=-9.25m, Y=110m, Z=-170m.

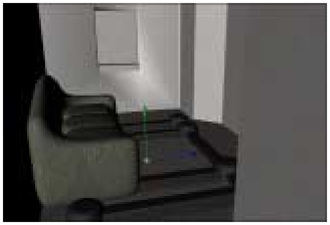


Add the Coffee and Lamp Tables

Step 1: Add the Tables to your scene. Use Merge file.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

Choose the Tables scene. Again, you will need to resize and reposition the objects in the scene.



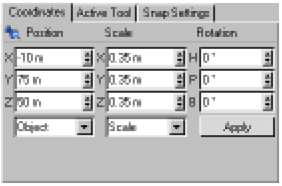
Step 3. Merged Tables

Step 2: Scale the Coffee Table so it fits appropriately in the scene.

Editor: Tools=>Scale
Shortcut: T

You can Scale it by approximation, or you can size it exactly using the Coordinates Manager. The Scale used here was 35% (.35 in the Scale settings in the Coordinates Manager).

Step 3: Position the Coffee Table centered in front of the Couch. The settings shown are X=-10m, Y=75m, Z=50m.



Step 3. Coffee Table Coordinates

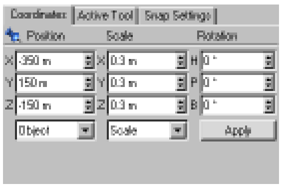
Step 4: Scale the Lamp Table so it fits appropriately in the scene.

Editor: Tools=>Scale
Shortcut: T

You can Scale it by approximation, or you can size it numerically using the Coordinates Manager. The Scale used here was 30% (.3 in the Scale settings in the Coordinates Manager).

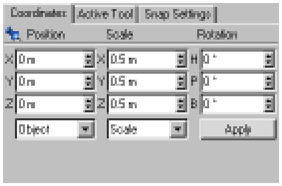
Step 5: Position the Lamp Table on one side of the Couch. The settings shown are X=-350m, Y=150m, Z=-150m.

Step 3. Coffee Table Position



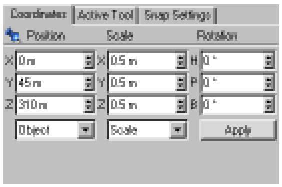
Step 5. Lamp Table Coordinates


Step 1. TV Cabinet Merged



Step 2. TV Cabinet Scale


Step 2. TV Cabinet Scaled



Step 2. TV Cabinet Position

Add the TV Cabinet

Step 1: Add the TV Cabinet to your scene. Use Merge file.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

Choose the TV Cabinet scene. Again, you will need to resize and reposition the object in the scene.

Step 2: Scale the TV Cabinet so it fits appropriately in the scene.

Editor: Tools=>Scale
Shortcut: T

You can Scale it by approximation, or you can size it numerically using the Coordinates Manager. The Scale used here was 50% (.5 in the Scale settings in the Coordinates Manager).

Step 3: Position the TV Cabinet against the wall opposite the Couch. The settings shown are X=0m, Y=45m, Z=310m.

Add the Lamp

Step 1: Add the Lamp to your scene. Use Merge file.

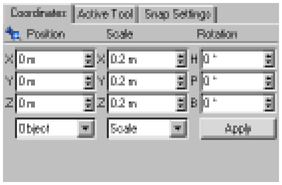
Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

Step 1. Lamp Merged

Choose the Lamp scene. Again, you will need to resize and reposition the object in the scene.

Step 2: Scale the Lamp so it fits appropriately in the scene.

Editor: Tools=>Scale
Shortcut: T

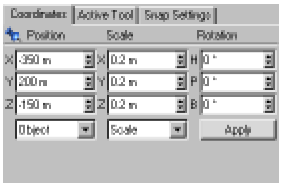


Step 2. Lamp Scale

You can Scale it by approximation, or you can size it exactly using the Coordinates Manager. The Scale used here was 20% (.2 in the Scale settings in the Coordinates Manager).

Step 2. Lamp Scale

Step 3: Position the Lamp Table on top and in the middle of the Lamp Table. The settings shown are X=-350m, Y=200m, Z=-150m.



Step 3. Lamp Position

LIGHTING

Add the TV

Step 1: Add the TV to your scene. Use Merge file.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

Choose the TV scene. Again, you will need to resize and reposition the object in the scene.

Step 2: Scale the TV so it fits appropriately in the scene.

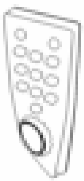
Editor: Tools=>Scale
Shortcut: T

Step 2. TV Scale

Step 2. TV Scale

You can Scale it by approximation, or you can size it exactly using the Coordinates Manager. The Scale used here was 30% (.3 in the Scale settings in the Coordinates Manager).

Step 3: Position the TV on top of and centered on the TV Cabinet. The settings shown are X=0m, Y=195m, Z=260m.



Step 3. TV Position

Step 1. Merged Picture

Add the Picture

Step 1: Add the Picture to your scene. Use Merge file.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

Choose the Picture scene. Again, you will need to resize and reposition the object in the scene.

Step 2. Picture Scale

Step 2: Scale the Picture so it fits appropriately in the scene.

Editor: Tools=>Scale
Shortcut: T

You can Scale it by approximation, or you can size it exactly using the Coordinates Manager. The Scale used here was 20% (.2 in the Scale settings in the Coordinates Manager).

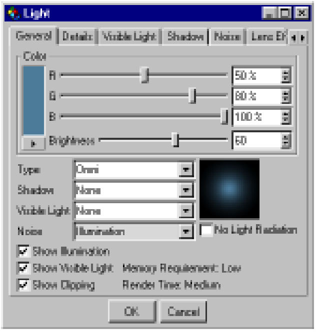
Step 3. Picture Position

Step 3: Position the Picture over the TV in the middle of the wall. The settings shown are X=0m, Y=450m, Z=400m.

Now you are ready to light the scene.

Adding Lighting

There are several things to consider when lighting this scene. First off you have an open window, so you are going to have to simulate the time of day outside. You have the lamp to consider and during the scene, it will be turned on so its lighting will change in the scene. The television puts out light related to the programming. There will also be a light source coming from the next room. Finally, you will add a bit of radiance to the floor to simulate how objects also reflect light adding to the illumination of the scene.



Step 1. MoonI General

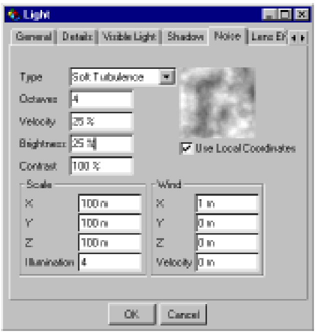
Moon Light

It will take two lights to simulate the moonlight — one will illuminate with noise and one will cast shadows. Why two? One light will have noise to simulate hazy moonlight and the other will cast shadows.

Step 1: Add a light to the scene. This first light will create the hazy blue moonlight.

Double click on the text “Light” just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to “MoonI” for Moon Illumination Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.



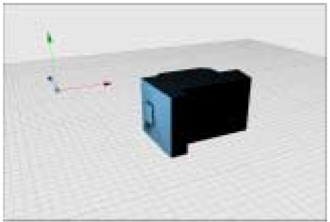
Step 1. MoonI Noise

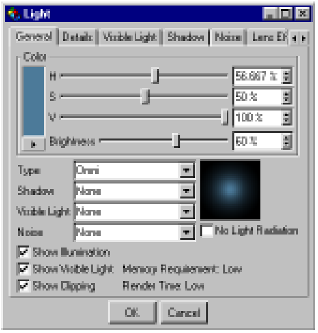
The default Omni light will work fine for this light. Make the color of the light a dark blue. The settings used are R=50%, G=80%, B=100%, Br=60%. Make sure to enable noise and choose Illumination only.

Go to the Noise settings. From this distance the noise will be hard to see, so you will want to turn up the brightness of the noise to 25%. This will add a lot of variation to the illuminance of the light.

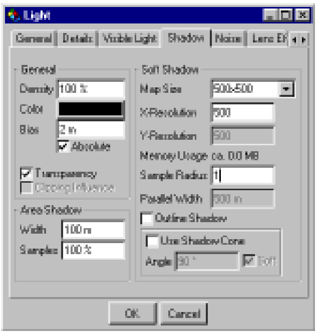
All the other settings can be left the same. Click OK.

Step 2. MoonI Position


Step 2. MoonI Position



Step 3. MoonS General



Step 3. MoonS Shadows

Step 2: Position the light outside of the room on the left side with the window. You will want to place it at some distance away from and above the window.

The coordinates for the position shown are X=-1650 m, Y=875 m, Z=-275 m. You can enter these numbers into the Position fields of the Coordinates Manager with MoonI selected in the Object Manager.

Step 3: The second light will cast a subtle shadow. Add a light to the scene.

Editor: Objects=>Scene=>Light
Shortcut: None

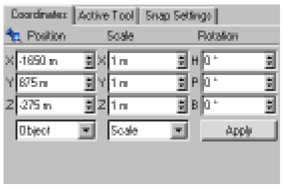
Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "MoonS" for Lamp Shadows Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

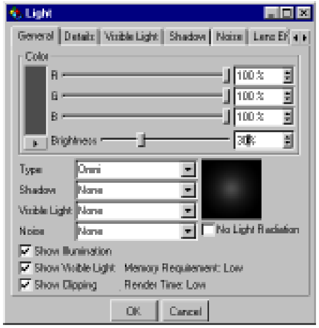
Again the default Omni light is fine. Use the same settings as the other moonlight — R=50%, G=80%, B=100%, Br=60%.

Lights do not cast shadows by default. In this scene, you will want to use Soft Shadows for a nice diffused effect.

Go to the Shadows page and change the shadow map to 500x500. Also change the Sample Radius to 1. This will give you more high quality results so the shadow of the panes of the window will be apparent. Click OK.

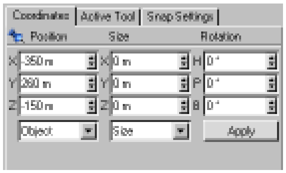


Step 4. MoonS Position



Step 1. LampI General

Step 1. LampI Details



Step 2. LampI Position

Step 2. LampI Position

Step 4: Place the light in the same position as the other moonlight. The coordinates for the position shown are X=-1650m, Y=875m, Z=-275m. You can enter these numbers into the Position fields of the Coordinates Manager with MoonS selected in the Object Manager.

Lamp Light

It will take two lights to simulate the Lamp light. One to illuminate and one to cast lamp shade shadows. Why two? The shadows cast by a single bright light source would be too strong. So the illumination is divided into two lights and only one will cast shadows.

Step 1: Add a light to the scene. This first light will create the illumination coming from the Lamp.

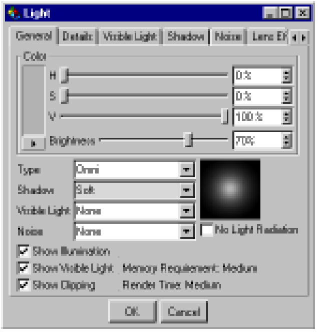
Editor: Objects=>Scene=>Light
Shortcut: None

Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "LampI" for Lamp Illumination Click OK.

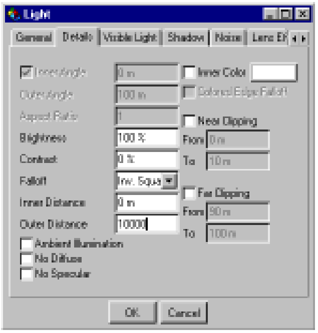
Double click on the light icon in the Object Manager to open its dialog and change the settings.

Since you are going to want light radiating outward in all directions, the default Omni light will work fine for this light. Lower the brightness to 30%. This light will be illuminating the scene, but you don't want it to overwhelm.

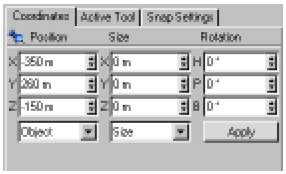
Go to the Details page and change the Falloff to Inverse Square. Basically, this means the illumination drops off exponentially. This is the way real light works. As opposed to Linear Falloff, the illumination drops off quickly getting exponentially dimmer and dimmer until it reaches the Outer Distance. Set the Outer Distance to 10000m. Click OK.



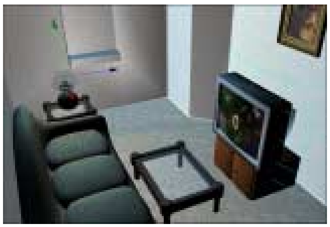
Step 3. LampS General



Step 3. LampS Details



Step 4. LampS Position


Step 4. LampS Position

Step 2: Position the light right where the light bulb would be located. For this scene, it will be easiest to position lights from the Top View.

View: View=>View 2
Shortcut: F2

The coordinates for the position shown are X=-350m, Y=260m, Z=-150m. You can enter these numbers into the Position fields of the Coordinates Manager with LampI selected in the Object Manager.

Step 3: Since the shade is semi-transparent, you would assume it would cast a shadow into the scene. For this effect you will use another light. Add a light to the scene.

Editor: Objects=>Scene=>Light
Shortcut: None

Double click on the text “Light” just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to “LampS” for Lamp Shadows Click OK.

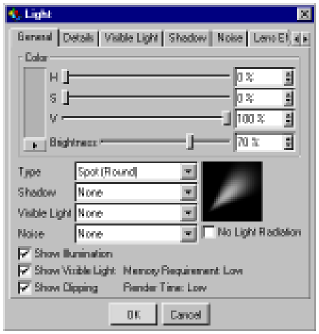
Double click on the light icon in the Object Manager to open its dialog and change the settings.

Since you are going to want the shadow projected in all directions, use the default Omni light. Lower the brightness to 70%. You are going to need it stronger than the illumination light to project the shadows.

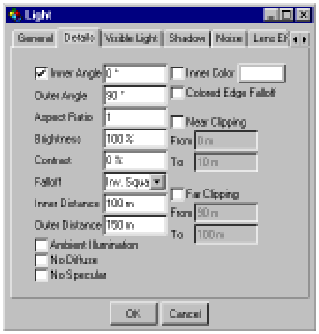
If you want to cast softer or harder shadows, make sure to change the illumination setting of the LightI accordingly so you don’t lighten or darken the scene too much.

Lights do not cast shadows by default. In this scene, you will want to use Soft Shadows for a nice diffused effect.

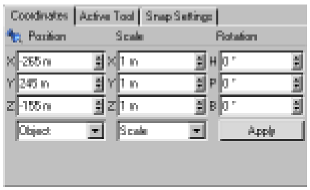
Go to the Details page and use the same settings as before for the previous light — change Falloff to Inverse Square and set the Outer Distance to 10000m. Click OK.



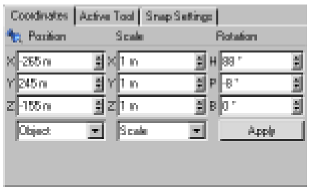
Step 2. LampF General



Step 3. LampF Details



Step 4. LampF Position



Step 4. LampF Rotation

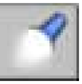
Step 4: Position the light right where the light bulb would be located. The coordinates for the position shown are X=-350m, Y=260m, Z=-150m. You can enter these numbers into the Position fields of the Coordinates Manager with LampS selected in the Object Manager.

Lampfill Light

You need to add one more light to illuminate the lamp. This light will direct illumination at the lamp so you can see it better.

Step 1: Add a light to the scene.

Editor: Objects=>Scene=>Light
Shortcut: None



Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "LampF" for Lamp Fill. Click OK.

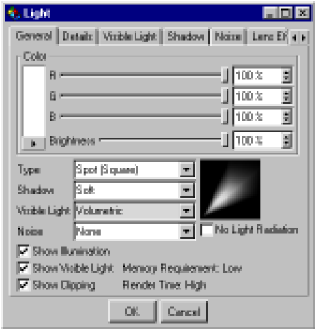
Double click on the light icon in the Object Manager to open its dialog and change the settings.

Step 2: To focus this light right on the lamp, use a Spot (Round). Lower the brightness to 70%.

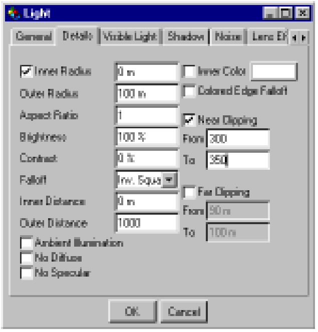
Step 3: On the Details page, change the outer angle to 90 degrees. This will keep it tight on the Lamp.

Change the Falloff to Inverse Square for a more pronounced dropoff.

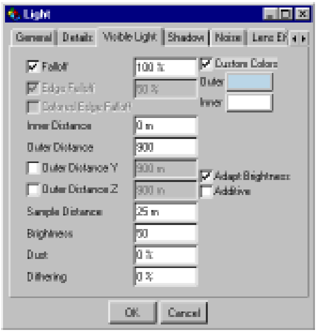
Lastly, change the Inner Distance to 100m and the Outer Distance to 150m. The ensures the light is only illuminating the Lamp.



Step 1. TV Light General



Step 1. TV Light Details



Step 1. TV Light Shadow

Step 4: Position the light so it is focused on the Lamp. The coordinates for the position shown are X=-265, Y=245, Z=-155. You can enter these numbers into the Position fields of the Coordinates Manager with LampS selected in the Object Manager.

Also, rotate the light so the spot is pointing at the Lamp. The settings shown are H=88 degrees, P=-8 degrees, B=0 degrees.

TV Light

Since the television is on, it will emit some light. This light should match the images playing on the screen.

Step 1: Add a light to the scene.

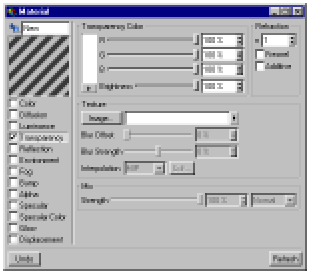
Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "TV Light." Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

A television projects light like a soft spotlight, so you will use a Square Spotlight. Make sure to turn on Soft Shadows and the Volumetric setting. This will give you the beams of light emitting from the TV.

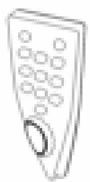
Go to the Details page and change the Falloff to Inverse Square so it drops off quickly. Set the Outer Distance to 1000m. Since you want the light to project like it is coming from the screen (not a pin point), you will have to place the light behind the television. However, if you place the light behind the television, it won't illuminate through it. So you will have to use Clipping to tell the light where to start illumination. Activate Near Clipping by clicking the checkbox and Set the From=300m and the To=350m. That means the light will not start illuminating until 300m away from its source position.

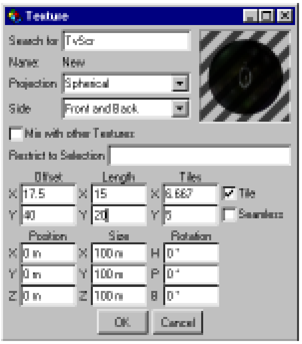
Go to the Visible Light tab. Change the Outer Distance to 900m and the Brightness to 50%. You need to turn down the brightness because you will be placing a QuickTime movie on the light as a



Step 2. TvScr Transparency

Step 2. TvScr Time Controls





Step 3. TvScr Material Projection

gobo. Also enable Custom Colors and change the Outer cone to a very light blue (this softens the outer cone a bit giving it a slight blue glow).

Go to the Shadow tab and make sure to activate Clipping Influence by clicking the checkbox. This will ensure that the light will cast shadows according to its Clipping setting.

Click OK.

Step 2: Now you will need to add a Material to the light to simulate the programming that is on the screen. Create a new material.

Material Manager: File=>New Material
Shortcut: Ctrl+N (pc) / Cmd+N (mac)

Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "TVScr." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

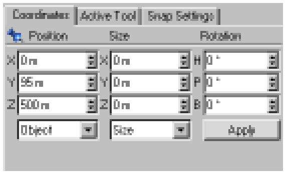
First, you can turn off every channel except for Transparency.

Go to the Transparency channel of the material by clicking on the text "Transparency" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

For this channel, you are going to use the same QuickTime as you used on the screen. It is located in the Tutorials Folder: Materials: Indoor:Tex. Click on the triangle next to the image dialog and load the Logo_small.mov texture.

Click on the Edit button to edit the movie texture. In the dialog click on Calculate. This will calculate the length and frame rate of your movie texture map. Change Mode to Loop as you will want the movie to run through your animation. Click OK and Refresh the Material.

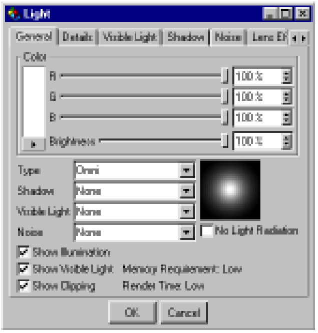
Step 3: Apply the material by dragging and dropping it onto the TV Light in the Object Manager. The Material placement dialog will open automatically.



Step 4. TV Light Position

Change the projection to Spherical. The next settings will change the map to a conical shape simulating the shape of the screen. Change the Offset to X=17.5%, Y=40%. Change the Length to X=15%, Y=20%.

Step 4: Position the light behind the TV, at a point where the cone is the same size as the screen. The coordinates for the position shown are X=0m, Y=195m, Z=500m. You can enter these numbers into the Position fields of the Coordinates Manager with TV Light selected in the Object Manager. Set the P rotation to 180.



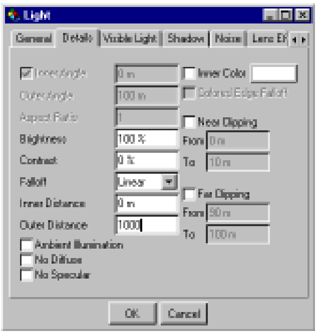
Step 1. Kitchen General

Kitchen Light

The purpose of this light is to make it look like there is light coming from the next room, the kitchen.

Step 1: Add a light to the scene.

Editor: Objects=>Scene=>Light
Shortcut: None



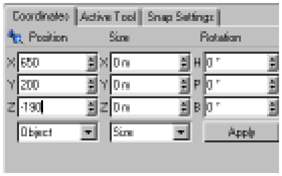
Step 1. Kitchen Detail

Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Kitchen." Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

Once again the default Omni light will work fine for this light. You can leave all the settings the same on the General page.

Go to the Details page and change the Falloff to Linear. This makes a light drop off evenly from its Inner to Outer settings. Set the Outer Distance to 1000m. Click OK.



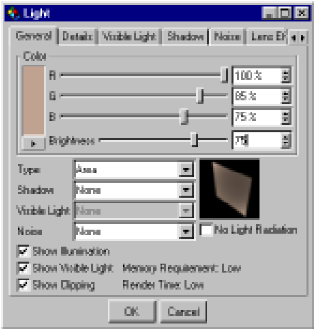
Step 2. Kitchen Position

Step 2: Position the light behind the camera, so it looks like there is light coming from a room behind the Camera.

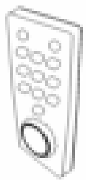
The coordinates for the position shown are X=650m, Y=200m, Z=-190m. You can enter these numbers into the Position fields of the Coordinates Manager with Kitchen selected in the Object Manager.

Ambient Floor Light

When light is cast on the floor and walls, it also illuminates the room based on its own color and texture. This is called Radiosity. One quick and easy way to fake radiosity is to use an Area Light. Since the walls are not directly lit, you will only create an Area Light for the floor as it is washed in moonlight.



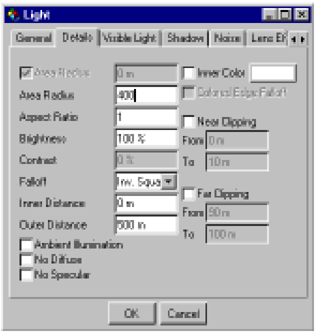
Step 1. Floor General



Step 1: Add another light to the scene.

Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Floor." Click OK.

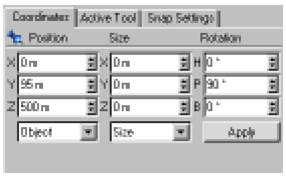
Double click on the light icon in the Object Manager to open its dialog and change the settings.



Step 1. Floor Detail

Change the type of light to Area. This is a very subtle effect. You do not want the audience to see the light. The color chosen here is a very dark version of the floor's color. The settings used are R=100%, G=85%, B=75%, Br=75%.

Go to the Details page. Change the Area Radius to 400 and the Falloff to Inverse Square. Click OK.

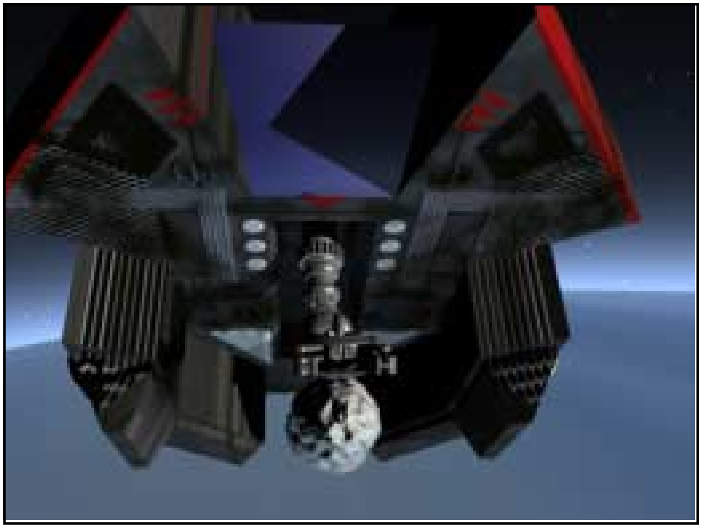


Step 2. Floor Position

Step 2: You can leave the light in its default position as it is placed in the middle of the room at 0,0,0. However, you will need to rotate it on the P axis 90 so it is flat with the floor.

Lighting the SciFi Project

Lighting space accurately is a bit tricky. Traditional lighting techniques only work to a certain extent. The sun, by default, is a key light. However, for the best results you'll have to do some tricks like using atmospheric illumination from the planet. In addition, you'll add lights as engine effects to the Stingray Ship.



Composing the Scene

Before you can set up the lighting, you need to know where objects will be located in your scene. So the first step will be to place all the objects you have modeled into one scene.

First you need to arrange the scene. The first thing to note is that the scene is not built to scale. Although CINEMA 4D could certainly render the scene at full scale, there is no need to build things this way. In 3D it is often easier to fake things than to create them to a realistic scale and that is what you'll do in this scene.

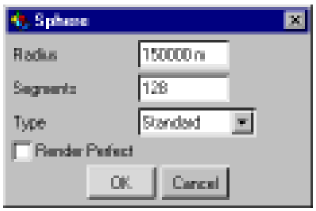
The first thing you will need to do is create the planet and sun objects, then add a background before you bring the spaceships into the scene.

Creating a Planet

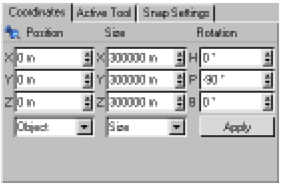
Step 1: Start with a new scene. Create a Sphere.

Editor: Objects=>Primitive=>Sphere
Shortcut: None

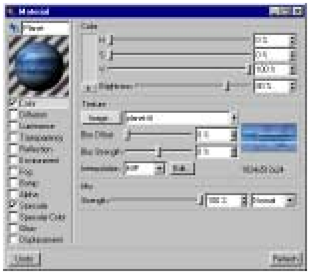
Double click on the Sphere icon in the Object Manager to change the settings. It should have a Radius of 150000m. Enter 128 for input segments to make the sphere smoother. Click OK.



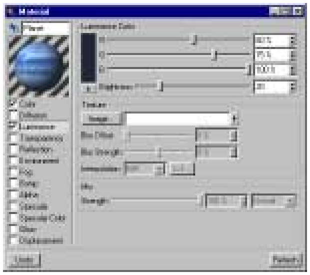
Step 1. Sphere Parameters



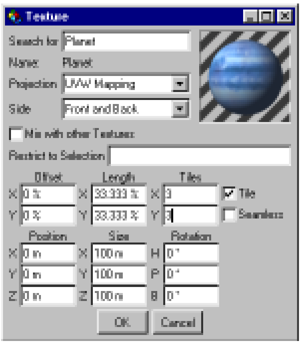
Step 1. Planet Rotation



Step 2. Planet Color



Step 2. Planet Luminance



Step 2. Planet Projection

Rotate the planet -90 degrees on the P axis. This will help you avoid those annoying texture seams later

Double click on the text "Sphere" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Planet."

You will need to zoom out a lot to see the Sphere in your window.

Step 2: Create a material for the Planet. Create a new material in the Material Manager Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Planet." Click OK.

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings.

Go to the Color channel of the material by clicking on the text "Color" on the left side of the dialog.

For this channel you will use an image for the planet surface. This texture is included on your CINEMA 4D CD. It is located in the Tutorials Folder: Materials: Indoor: Tex. Click on the Image button to load the planet.tif texture into the Color channel.

Go to the Luminance channel of the material by clicking on the text "Luminance" on the left side of the dialog. Make sure to activate this channel by clicking on the check box.

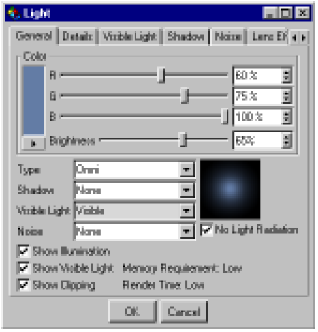
You're going to want the planet to emit its own glow. Change the color settings to R=60%, G=75%, B=100%, Br=20%.

Turn off the Specular channel by clicking on the check box.

Click Refresh when you are satisfied with the settings to save this material.

Apply the Material by dragging the material to the Object Manager and dropping it onto the Planet model when you see the little plus sign. When you drop the material a dialog will open with options for how the material is to be applied to the model.

The default UWV Mapping projection will work fine. Set the tiling to 3 for both the X and Y axes.


Step 3. Atmosphere Light

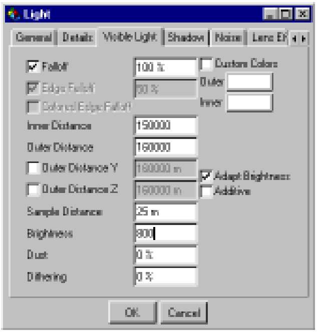
Step 3: Use a light to define the Planet's atmosphere glow. Create an Omni light.

Editor: Objects=>Scene=>Light
Shortcut: None

Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Atmosphere." Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

The default Omni light will work fine for this light. The color chosen here is a dark blue. The settings used are R=60%, G=75%, B=100%, Br=65%. Make sure to enable visible light and check No Light Radiation. You don't want it casting light.


Step 3. Atmosphere Light

Go to the Visible Light settings. Change the Inner Distance to 150000m (the size of the planet) and the Outer Distance to 160000m. This will give you a 10000m glow around the outer edge of the planet. Change the Visible Brightness to 800%.

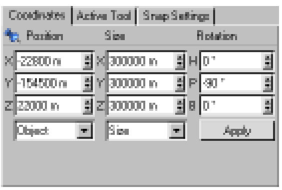
All the other settings can be left the same. Click OK.

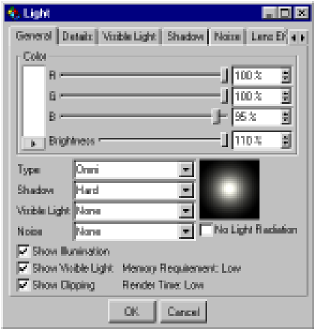
You may notice that when inputting large numbers in some dialogs CINEMA 4D will change the number to something less than round. For instance, entering 150,000m, may change to 149,999.9998m. This has to do with the nature of floating point calculation, which can be different for each processor. It only affects the final result by minute fractions. It's nothing to be concerned about.

Step 4: Create a new light to simulate atmospheric illumination from the planet.

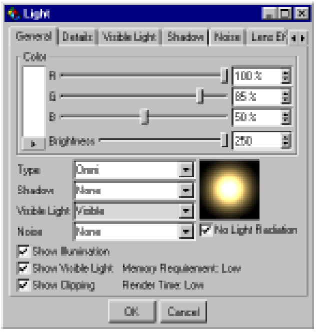
Editor: Objects=>Scene=>Light
Shortcut: None

Set R=75%, G=90%, B=100%, Br=80%. This will give your light a slight bluish tinge. You can leave all the other settings at their default.

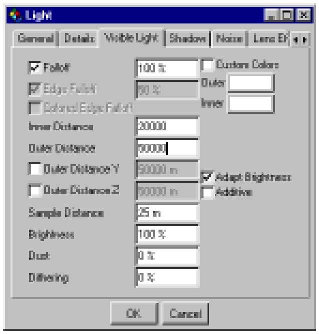

Step 5. Planet Coordinates



Step 1. SunLum Light - General



Step 1. SunGlow Light - General



Step 1. SunLum Light - Visible

Step 5: Drag and drop the Atmosphere Lights onto the Planet so they are grouped. Move this group into position.

The Planet will be a major background piece in this shot. Move it to X=-22800m, Y=-154500m and Z=22000m. The rest of the scene will be designed around this.

Creating a Sun

Step 1: Create a new light in the scene.

Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "SunLum." This light will cast illumination from the sun's point of view. Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

The default Omni light will work fine for this light. The settings used are R=100%, G=100%, B=95%, Br=110%. The Brightness is set to over 100% for an overexposed feeling. Make sure to enable Hard Shadows.

All the other settings can be left the same. Click OK.

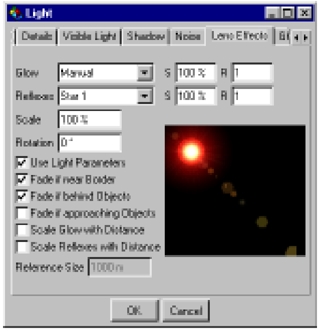
Step 2: Create another light in the scene.

Double click on the text "Light" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "SunGlow." This light will create the glow and effects of the sun. Click OK.

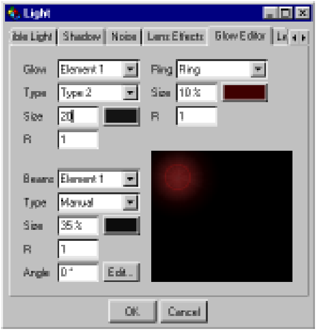
Double click on the light icon in the Object Manager to open its dialog and change the settings.

The default Omni light will work fine for this light. The settings used are R=100%, G=85%, B=50%, Br=250%. The Brightness is set to 250% will create a white-yellow gradient. Make sure to enable No Light Radiation and turn Visible light on.

Go to the Visible Light settings. Change the Inner Distance to 20000m and the Outer Distance to 50000m.



Step 3. SunLum - Lens Effect



Step 3. SunLum - Glow Editor Element 1

Now add some glow and lens effects. Go to the Lens Effects tab. Choose Glow: Manual, Reflexes: Star 1, and make sure to click Fade if Near Border. You can see the effect it creates and the fade stops the lens reflections if anything comes near the borders.

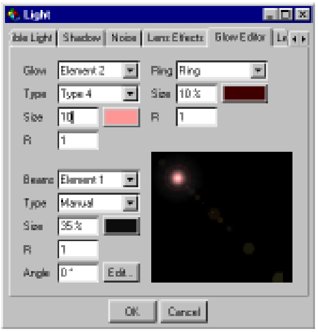
Go to the Glow Editor tab.

For Glow, Element 1, use Type 2 and a 20% size. Click on the Color Box to change the color of this element. Slide down to the RGB picker and enter 20 in the Red, Green and Blue fields for Windows and 8% in each for Mac. Click OK.

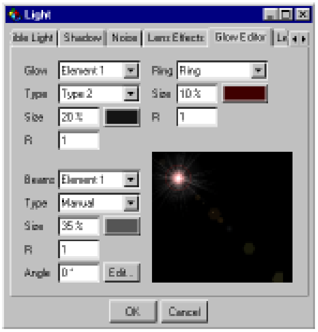
For Glow, Element 2, use Type 4 and a 10% size. Click on the Color Box to change the color of this element. Slide down to the RGB picker and enter 255 in the Red, 150 in the Green and 150 in the Blue field for Windows. Mac users enter Red=100%, Green=60% and Blue=60%. Click OK.

For Beams, Element 1, use Manual. Click on the Color Box to change the color of this element. Slide down to the RGB picker and enter 85 in the Red, 85 in the Green and 85 in the Blue field for Windows. Mac users enter Red=30%, Green=30% and Blue=30%. Click OK.

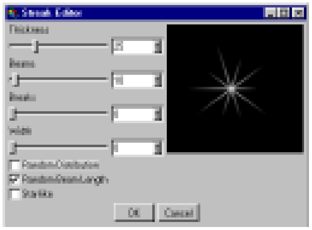
Click on the Edit button below color, to modify the number, shape and size of the beams. Move the sliders so that the Thickness is about 25%, have it create about 10 Beams, and slide Breaks and Width to 0. Uncheck Random Distribution so the rays eminate uniformly from the center. Click OK.



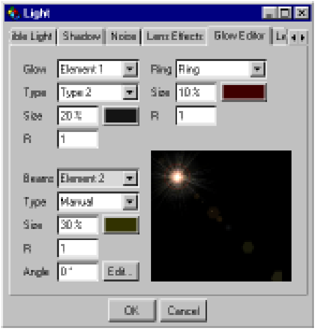
Step 3. SunLum - Glow Editor Element 2



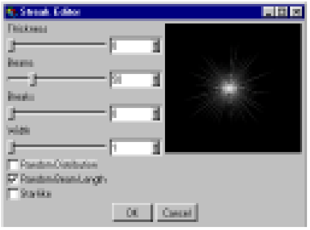
Step 3. SunLum - Glow Editor Beam Element 1



Step 3. SunLum - Streak Editor Beam Element 1



Step 3. SunLum - Glow Editor Beam Element 2



Step 3. SunLum - Streak Editor Beam Element 2

Step 1. Sphere Parameters

For Beams, Element 2, use Manual. Click on the Color Box to change the color of this element. Slide down to the RGB picker and enter 50 in the Red, 50 in the Green and 0 in the Blue field for Windows. Mac users enter Red=20%, Green=20% and Blue=0%. Click OK.

Click on the Edit button below color, to modify the number, shape and size of the beams. Move the sliders so that there are about 50 Beams, and move Thickness, Breaks and Width to 0. Click OK.

Make the Rings on the upper left of the Glow Editor dialog inactive. Click OK to close the Light dialog.

Group these two lights together, name the group "Sun."

Place the Sun Group at X=707200m, Y=150500m, and Z=452000m. These numbers are large, but they certainly aren't anywhere close to true galactic scale (The sun is 150 million kilometers from the Earth). Of course, you are only trying to create the impression of distance.

Make a Space Background

There will be a lot of camera movement in this scene, so it would be best to use a very large sphere to encompass your scene. Your entire scene will occur inside this "universe."

Step 1: Make a Sphere:

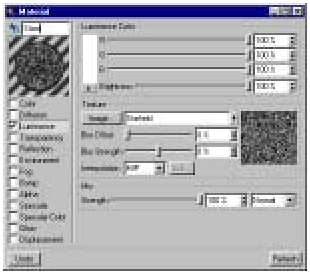
Editor: Objects=>Primitive=>Sphere
Shortcut: None

Change the name of the Sphere to Stars.

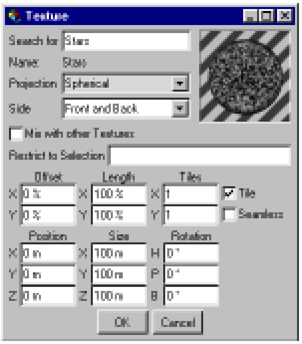
Double click on the Sphere icon in the Object Manager to change the settings. It should have a Radius of 1000000m, with 24 segments.

Step 2: Create a new material.

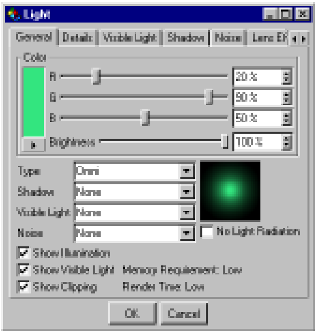
Double click on the text "New" just under the gray sphere in the Material Manager. This opens a dialog that allows you to change the name of the material. Change it to "Stars." Click OK.



Step 2. Stars Color



Step 2. Stars Projection



Step 2. Green General

Double click on the gray sphere icon in the Material Manager to open its dialog and change the settings. Turn off all channels but the Luminance channel. Use one of C4D's built-in procedural textures. Click on the triangle next to the image dialog and select the Starfield procedural. Click Refresh.

Apply this material to the Star by dragging it to the Object Manager and dropping it right on top of the Stars object.

Step 3. Make sure to save your project. Save it as SciFi Scene.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Adding Lights to the Stingray Spaceship

Before compositing the scene, you will want to add the lights to the Stingray to create the engine glows.

Step 1: Open up the Stingray project with materials already attached.

Editor: File=>Open
Shortcut: Ctrl+O (pc) / Cmd+O (mac)

Step 2: Add a light to the scene.

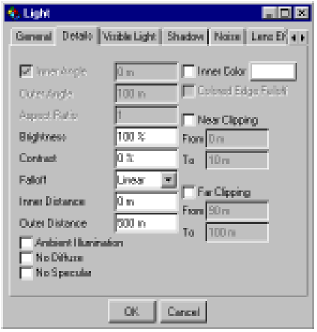
Editor: Objects=>Scene=>Light
Shortcut: None

Double click on the text "Light" in the Object Manager. This opens a dialog that allows you to change the name of the material. Change it to "Green." Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

The default Omni light will work fine for this light.

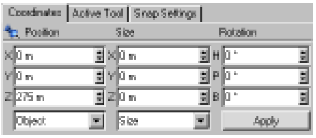
Use the color settings R=20%, G=90%, B=50%, Br=100%. This will give you a light green.



Step 2. Green Details

Go to the Details tab and set the Falloff to Linear. This gives the light a uniform dropoff. Click OK.

Make sure the object tool is selected and move the light to the middle engine hole in the back of the ship. The position shown is X=0m, Y=0m, Z=275m.

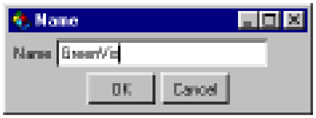


Step 2. Green Coordinates

Step 3: Copy the Green light

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.



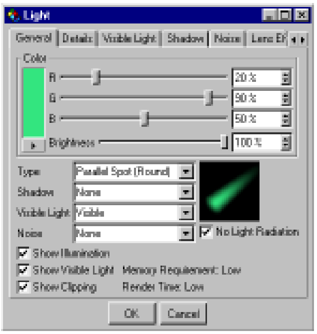
Step 3. Rename Green.1

Double click on the text "Green.1" in the Object Manager. This opens a dialog that allows you to change the name of the material. Change it to "GreenVis." Click OK.

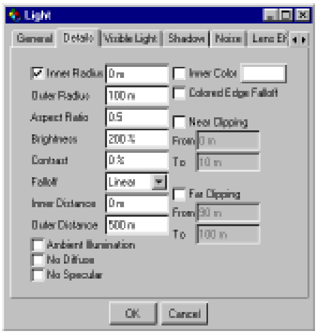
Double click on the light icon in the Object Manager to open its dialog and change the settings.

In the General window, change this light to a Parallel Spot Round and change the Visible Light from None to Visible. Activate No Light Radiation by clicking on the checkbox. This way the light will cast no illumination.

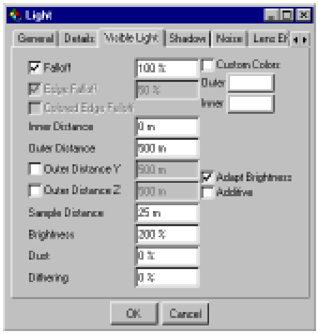
Go to the Details page and change the aspect Ratio to 0.5. This makes the light oval; the height will be half the width.



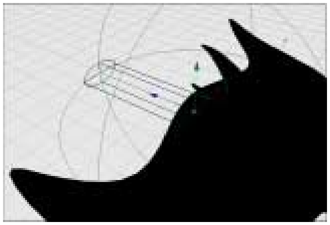
Step 2. GreenVis General

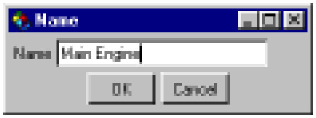


Step 2. GreenVis Detail

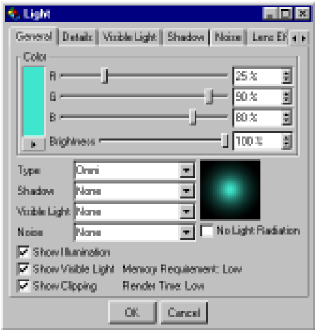


Step 2. GreenVis Visible


Step 3. Green Lights



Step 3. Rename Object Group



Step 4. Blue Light - General

Step 4. Blue Light - Details

Go the Visible Light settings. Change the Outer Distance to 500m and set the Brightness to 200%. Click OK.

Group the two green lights.

Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the green lights and let go. You will have a Null Object group.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Main Engine."

Step 4: Add another light to the scene.

Editor: Objects=>Scene=>Light
Shortcut: None

Double click on the text "Light" in the Object Manager. This opens a dialog that allows you to change the name of the material. Change it to "Blue." Click OK.

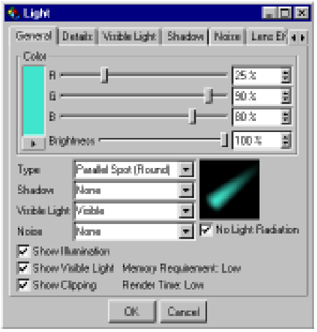
Double click on the light icon in the Object Manager to open its dialog and change the settings.

The default Omni light will work fine for this light.

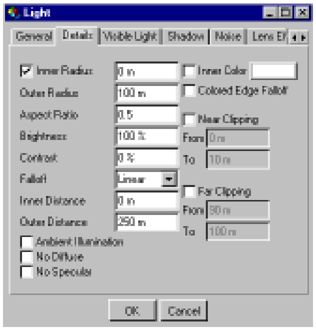
Use the color settings R=25%, G=90%, B=80%, Br=100%.

Go to the Details tab and set the Falloff to Linear and set the Outer Distance to 250m. Click OK.

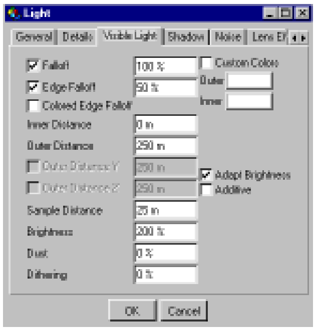
Move the light to the right engine hole in the back of the ship. The position shown is X=-130m, Y=-15m, Z=260m.



Step 5. BlueVis - General



Step 5. BlueVis - Details



Step 5. BlueVis - Visible

Step 5: Copy the Blue light.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Double click on the text "Blue.1" in the Object Manager. This opens a dialog that allows you to change the name of the material. Change it to "BlueVis." Click OK.

Double click on the light icon in the Object Manager to open its dialog and change the settings.

In the General window, change this light to a Parallel Spot Round and change the Visible Light from None to Visible. Activate No Light Radiation by clicking on the checkbox. This way the light will cast no illumination.

Go to the Details page and change the aspect Ratio to 0.5. Again this will make the light oval in shape.

Go the Visible Light settings. Change the Outer Distance to 250m and set the Brightness to 200%. Click OK.

Group the two blue lights.

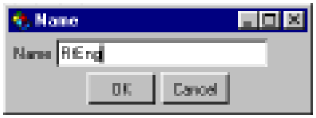
Object Manager: Objects=>Group Objects
Shortcut: G

When the crosshairs appear click and drag a marquis (rectangle) around the blue lights and let go. You will have a Null Object group.

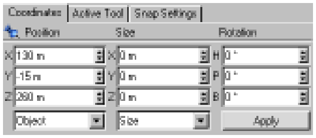
Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "LftEng."

Step 6: Copy the LftEng light group.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)



Step 6. Rename LftEng



Step 6. LftEng Group

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

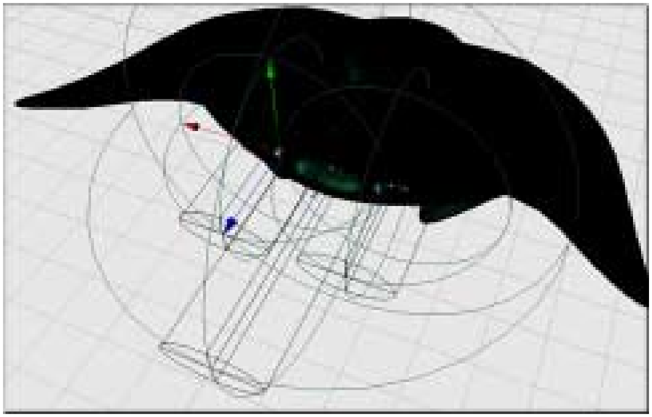
Double click on the text “LftEng” in the Object Manager. This opens a dialog that allows you to change the name of the material. Change it to “RtEng.” Click OK.

Move this light group to the right engine hole in the back of the ship. The position shown is X=130m, Y=-15m, Z=260m.

Step 7: Make sure to drag and drop each of the light groups into the Stingray model in order to keep all aspects together for the animation process. The Singray Cage must remain the first object under the Hyper NURBS or it won‘t be evaluated.

Step 8: Save your Stingray project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)



Animation

Contents:

- Visual Composition
- Camera Angles
- Framing Your Shots
- Putting Objects into Motion
- Animation Tracks
- Sequences
- Keyframes
- Traditional Animation Techniques
- The Speed of Motion
- Animating Cameras

Visual Composition

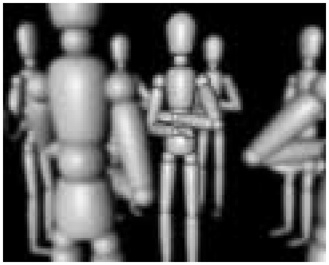
Now it's time to bring all the elements of your scene together to create a visually compelling image or animation. In all of the disciplines we have covered up to this point (project planning, modeling, texturing and lighting) we have emphasized the importance of conveying a message with your image or animation; understanding what you want the audience to get out of your art. More than anything else, how you compose those elements and the way you choose to present them to your audience defines and communicates your message.

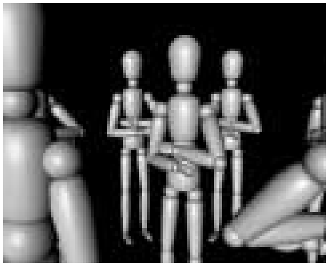
How and where do you place objects in relation to each other, and at what angle will you have the audience view the scene? This is a skill that is almost impossible to explain. There are no right or wrong ways of composing a scene. The moment someone makes a rule, there is an artist who creates a beautiful piece of art that outright breaks the rules. Some say to avoid symmetry, but there are many artists who have created masterpieces by using symmetry. Every scene is different and every artist may approach it differently. Each vision can be correct.

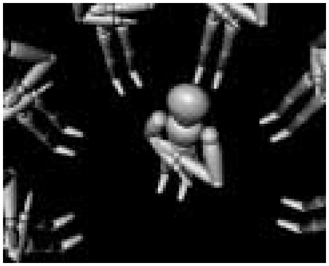
The idea behind visual composition is to inspire an emotional reaction. The best way to do that is to tell a story by directing the audience' eye to what is important, lead the viewer's eye to the subject of the scene or the action so that they do not miss anything. You want to emphasize the most important action occurring at that moment. In addition, it's best to have only one subject to focus on at a time or you will lose your audience.

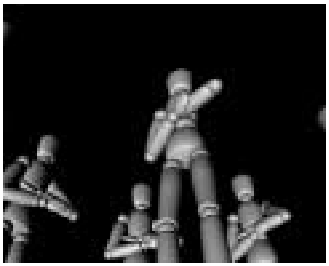
One trick is to contrast the main object in some way so it stands out from the rest of the scene. For instance, you would not want to animate a blue object moving across a blue background … the object and its action would get lost. If you had a character bend down to tie his shoes, it would be better to view this action from the side so the audience can see exactly what he is doing. Another way to create contrast is motion. The viewer's eye will naturally be drawn to motion in an otherwise still scene. In a scene with everything moving, the audience will naturally be drawn to the still object.

You can also use lighting to draw the viewers' attention to where you want them to look; just as in a stage production when a spotlight is used to add attention to the main character or action in


Normal Angle


Normal Angle


Bird Angle


Worm Angle

the scene. While the set is well lit, emphasis can be placed on one actor or an area of the stage with subtle or even dramatic lighting changes.

You can also use depth of field as a way of making your main subject stand out. In a 3D-software package, everything inside a camera's lens is in focus at all times, no matter what type of lens you use. This is contrary to real cameras where only part of the scene can be in focus at one time. This is where depth of field comes in. Using the depth of field setting, your CINEMA 4D cameras can emulate real lenses. This way you can have the foreground in focus, while the background is out of focus, and vice versa.

Camera Angles

The camera angle determines your audience' point of view evoking an emotional response. The most commonly used angle is horizontally level, from an eye-level point of view as if someone is standing where the camera is, watching the scene. Rendering from a higher or lower point of view can be used to convey feeling or meaning. For instance, when looking up at a tall building, placing the camera close to the base of the building and pointing straight up will make the building look tall and ominous. Aiming a camera down at your scene from a sharp angle will make the objects in the scene appear small and insignificant. It's best to keep your camera level to the horizon, unless you are trying to arouse fear or confusion (e.g. horror, surrealism, etc.).

One of the biggest problems in 3D animation is that it is too easy to move and place the virtual camera anywhere in the scene. This sometimes leads to erratic movement or too much movement, and inappropriate or disorienting camera angles.

Like everything else in 3D, it is best to study the world around you. Take a look at movies on video to see at what angle the camera views the scene. Filming from the eye level of a standing person may actually appear too high, waist level too low. Play with the placement of the camera in your own scenes to achieve the "feel" you want.

Framing Your Shots

Before you begin animating, it's important to plan your shots. For the best results, you have to think like a cinematographer (or at least pick up a book on cinematography - there are many listed on our web site). The most important aspect to remember is balance. Frame your scene and objects in an obvious way; one that is pleasing to the eye and reasserts the style you have chosen to convey.

How far away from the scene you place the camera and what type of lens (Focal Length) you use will define what you can see. The shorter the Focal Length, the wider your Field of View (FOV). If you define your camera as a 35mm lens, the FOV is 63 degrees (this would be considered wide-angle). A 36-mm lens is 53 degrees (This is the default for CINEMA's camera. Normal for traditional film work is a 50mm lens with a FOV of 46 degrees. For distant shots, you would use a 135-mm lens that has a FOV of 18 degrees (also called telephoto). A wide-angle lens exaggerates depth in your scene. The telephoto lens minimizes changes in depth.

Here are the most basic shots used:

Distant Long Shot: Also called an Establishing Shot. Objects are small but recognizable in frame. Larger objects, like buildings or large interiors, appear in full view or the majority of it shows. This type of shot establishes the physical location of a scene.

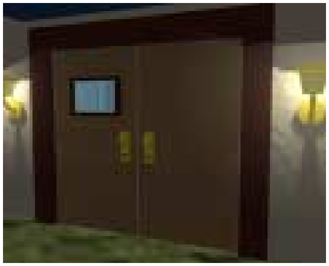
Long Shot: Determines the physical relationship of objects or characters to each other and the close surroundings. You can see all or the majority of subjects in the scene (e.g. a small group in conversation or a large section of a room).

Medium Shot: This is the most commonly used shot. Good examples are a single person from waist up or two in close conversation.

Distant Long Shot

Long Shot

Medium Shot



Close-Up

Extreme Close-Up

Close-up: Several objects on a table, the interior of a car, or the full facial expression of one person. A character shot should include the head and neck of character. There should be one clear central focus (e.g. a facial expression or a single object on a table).

Extreme Close-up: The screen is full with all or part of a face or one object; fear in the eyes of a character or the written words on a letter.

Here are some common film making techniques:

Continuity: An editing and film making style defined by revealing events as they happen. This is the most common style of film making.

180 Degree: Organizing and maintaining camera angles from one side of the scene. A good example is when you watch a football game. The game is always presented to the audience from one side of the field. Switching sides can confuse viewers.

Montage: A quick sequence of related shots cut together. Many times used to show the passage of time.

Mise-en-Scene: A scene filmed and presented without change later in editing. Several movies have used this technique. A well known Janet Jackson music video was done this way using one long shot.

Spatial Connection: Making sure you lead your audience from action to action using realistic spatial relationships. Example: First Shot, a character walks up to a door. Second Shot, his hand close up on the door turning the handle. Third Shot, him walking in the door and tossing mail onto table. Fourth Shot, mail landing on the table close up. The audience knows it's the same door and stack of mail because of the relationship you've established.

Time/Emotional Connection: Maintaining a temporal and emotional connection between shots. Example: First Shot, a hand raising a gun. Second Shot, close-up of a person's eyes widening in fear. The first shot defines the second. The audience knows to what the eyes are reacting. You could also reverse the sequence for a different perception: you see the fear but don't know the source, then you see the gun!

Putting Objects into Motion

Everything in CINEMA 4D can be animated; models, lights, cameras, procedural modifiers, etc. Creating the illusion of movement is done just like every other medium; a series of two-dimensional images is created, flashed before the audience' eyes at a certain rate simulating smooth motion. To create motion in CINEMA 4D, you have to create animation tracks. On these tracks you create keyframes; the key moments of change in an object.

Animation Tracks

The type of animation track you use defines how the object changes over time. There are many kinds of animation tracks in CINEMA 4D.

- Position Track: For animating an object from point A to point B.
- Rotation Track: For rotating an object about its own axes.
- Scale Track: For animating the size of an object.
- Motion Track: For mixing the motion of Position, Rotation and Scaling tracks.
- Align to Path: For banking objects along the animation path.
- Align to Spline: Uses the specified spline as a motion path.
- Inverse Kinematics: Animates the hierarchical relationship of objects.
- Target: Aligns the Z axis of your object to another object in the scene.
- Morph: Morphs the geometry of one object to another.
- PLA: To animate the points of an object.
- Pulsate: Causes an object's position, scale or rotation animation to pulsate.
- Sound: Animates the parameters of a sound file.
- Texture: For morphing from one material to the next.
- Vibrate: Creates vibration in an object.
- Visibility: Animates the visibility of an object
- Parameter: For animating the parameters of lights, deformation objects, and other parametric objects.
- Plug-ins: You can even create custom animation tracks.

Sequences

In traditional drawn animation, there are key artists and in-betweeners. The key artists draw the keyframes or key moments of the action, and the in-betweeners articulate the frames in-between. It's the same in CINEMA 4D. You create the keyframes and when your animation track has a sequence the program interpolates the action in-between.

Most programs do not utilize sequences and there are several advantages to having them in CINEMA 4D. First, a track can have more than one sequence and this gives you much more control over the animation of an object. Sequences can be looped, so that once you have created a motion that you wish to occur again and again in the scene, all you have to do is loop that sequence. In addition, you can have tracks without sequences for when you wish to have no interpolation between keyframes (e.g. a light turning off and on).

Keyframes

To create animation for an object, you will create keyframes. Each keyframe defines a pivotal state of an object at a given moment in time. If you were animating an object moving from point A to point B, there would be two keyframes in your sequence; one at the beginning of the movement and another at the end. If you were animating a ball bouncing, there would be a keyframe at each point where the ball hits the ground. These are the key moments of its movement.

Traditional Animation Techniques

There are many tricks you can use to bring life into the movement of your objects. Again, there are many books on the subject out there and we list many of them on our web site. Here are a few of the basics of classic 2D animation. These are well known techniques that have been used by generations of animators to add personality to moving objects.

Squash and Stretch: When a ball bounces, it squashes as it hits the ground and stretches upwardly towards the sky as it rebounds. The exaggeration of this movement is known as Squash and Stretch. The trick is to keep the volume the same no matter the state — normal, squashed or stretched. The more dramatic the deformation of the ball, the faster it seems to be traveling. Because inanimate objects are generally rigid, using this technique brings them to life.

Timing and Motion: In every movement there is anticipation, action and reaction. The speed by which these movements occur conveys a story. If the process happens slowly, it looks labored and heavy. If it happens quickly, it appears out of control and wild. The bigger and heavier an object, the longer it takes for an action to happen. This technique also defines the relationship between objects. If a character winds up and hits a punching bag and it moves an inch, it has the appearance of being very solid and heavy compared to the character's strength. If, on the other hand, the character punches the bag and it flies off its chain out of the scene, it appears to be light … or the character strong.

Anticipation: This can be as simple as pulling an arm back before punching, or as complex as stretching and deep breathing before lifting heavy weights. The real purpose of anticipation is to get the audience' attention — so they are looking where the action is going to happen. If your goal is rapid action, well-done anticipation prepares your viewer for the action. The way in which you employ this technique tells a story. A track runner slowly flexes his leg muscles before bursting from the starting blocks. This emphasizes the speed of his action. By contrast, a rapid preparation followed by slow action makes the task look labored. For instance, an old man in a chair quickly positions his arms in preparation and pushes himself to a standing position very, very slowly.

Recoil and Follow-through: Recoil and follow-through are two types of reaction to an action. When a cartoon character runs into a wall, he bounces off and vibrates in reaction to the collision. This is recoil. When a baseball player throws a ball, he releases the ball long before the movement of his arm stops. That's follow-through. Heavy objects are slow and deliberate to finish movement. Light objects end movement quickly and sharply.

Overlapping Action: Overlapping is when a second action begins before the first has completely finished. Dead time between actions is not always necessary. Imagine a character winding up, pitching the baseball and reacting to the batter hitting the ball. This can be done two ways: 1. The ball rockets back at him before he has fully completed his pitch sending him spinning in the air, or 2. He fully completes his pitch, waits in anticipation, then gets knocked off his feet. Both are effective, but offer a different story.

Ease-In and Ease-Out: By default, animation in 3D occurs evenly from one keyframe to the next. That means an object moving from point A to point B will move the same speed in the beginning, middle and end of its motion. This, of course, is contrary to the real-world where objects start out slowly and pick up speed (ease-in), reach optimum speed, then slow down to a stop (ease-out). Each of these will be different depending on the object and type of motion. In CINEMA 4D you can use the Time Control to modify how changes occur between keyframes.

The Speed of Motion

How quickly should something move in your scene? How many frames should it take to complete that motion? The answer is, "what looks correct." Many times, the actual speed at which something moves from point A to point B may not "look right" to the audience. Filmmakers often slightly modify reality to change the perception of speed. Of course, it's best to base your motion on actual movement — then tweak it.

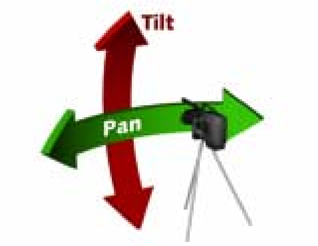
Hare are some examples of motion at different speeds and the number of frames it takes.

	Distance per sec.	**Number of Frames to Travel 10 meters @30 fps**
Bouncing Ball	.5 meters	600
Walking	1 meters	300
Running	3 meters	100
Car	30 meters	10

Animating Cameras

You can place any number of cameras anywhere in your 3D environment. Just like traditional film cameras, they can be moved, angled, have different lenses, and more. Unlike traditional filmmaking, you do not have to worry about the physical limitations of real cameras. Cameras are virtual objects, and so can make almost any move, be positioned anywhere in your scene, angled at any direction and are not seen by other cameras when rendering.

However, this additional freedom can cause problems. When creating motion for your camera, be careful not to "lose" your audience or cause disorientation with rapid erratic movement or strange angles. It is best to stay with the tried and true traditional methods of physical cameras.



Pan and Tilt

Pan and Tilt

To Pan a camera, means to rotate the camera around an object or scene (horizontal). To Tilt a cameras means to rotate the camera around an object or scene (vertical). This is just like turning your head from side to side (Pan), or up and down (Tilt). Panning is used to follow moving objects or characters. It can be used to view a scene that does not fit into a single frame, like a landscape.

To Orbit or Tilt a camera in CINEMA 4D, select the Rotation tool and the Object tool, and make sure the camera is selected in the Object Manager. The camera will orbit, as if you were holding a camera in your hands. To Orbit or Tilt exclusively, lock the axis you do not wish to rotate.

Track

Track

Tracking a camera is moving it parallel to the scene, either left and right, or up and down, while maintaining a parallel view to the scene. It is camera movement that is perpendicular to the camera lens. In traditional filmmaking, this is the same as moving a camera on a straight track and/or mounting it to a vehicle.

To Track a camera in CINEMA 4D, select the Position tool and the Camera Tool, and lock all axis but the one you want to track the camera. The camera will track along just that axis.

Dolly

Dolly

To "Dolly a camera" means to move the camera towards or away from the scene while maintaining focus. Generally this move is used on the Z axis, but can happen on any axis. A good example would be walking down a corridor or path.

To Dolly a camera in CINEMA 4D, select the Position tool and the Camera Tool, and make sure you have selected a target for the camera to maintain its focus on. Move the camera forward and back as you wish. You could also Right Click (PC) or Command-Click (Mac) on the Move View Widget or while pressing the 1 key.

Animating the 3D Logo Project

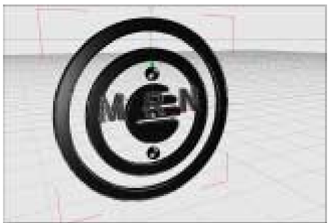
Motion is the most difficult part of the 3D animation process. This scene includes basic position and rotation animation. It also covers velocity control for the ease-in and ease-out of motion. And of course, what introductory 3D animation would be complete without an explosion.

Animating Your Scene

Before you get started, it's always good to briefly go over the storyline and map out how you will animate the objects:

- Establish Story: An object with rotating rings and elements in the empty expanse of outer space.
- Introduce Conflict: The camera with dramatic affect slowly drifts closer to the object. It is now recognized as a logo.
- Develop Conflict: As the camera moves closer, the movement of the rings slows and the object turns towards the audience, revealing the client's logo.
- Climax: The rings slow to a stop. The rings begin to glow. The glow builds until the rings explode.
- Resolution: The explosion sets the logo and elements spinning. The fragments of the rings appear to reform below the logo as text revealing the name of the company.
- Moral/Message: The company represented is modern, ahead of its time, and promises explosive performance.

All of the object animation takes place in one location as the camera moves closer. The easiest way to approach this is to animate the objects first. Once that has been completed, you can animate the camera move.

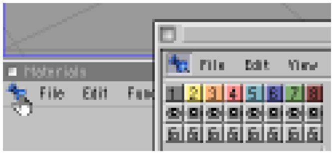


Ready to animate!

Preparation

Step 1. Hide Text and Sky Objects

Step 1: If they are not already, please make sure to hide the Text and Sky background in the editor window. This will make it a lot easier to work on the scene. You can hide these objects by clicking the top gray dot to the right of the icon in the Object Manager until it turns red. This hides the object in the Editor window. The bottom gray button hides the object from the camera when rendering.

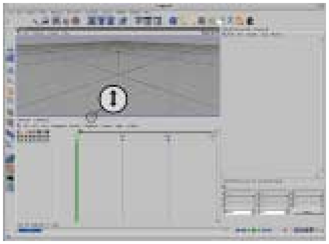


Step 2. Docking Time Line

Step 2: Open the Time Line window and dock it with the Material Manager.

Editor: Window=>Timeline
Shortcut: Shift+F3

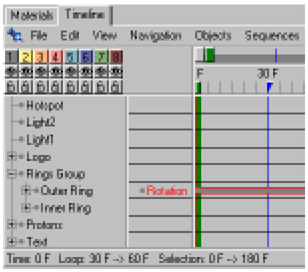
To dock it with the Material Manager, click on the thumbtack icon at the top left of the window and drag it to the thumbtack at the top of the Material Manager. When you see the little hand, let go and the Time Line will be indexed with the Material Manager.


Step 2. Adjusting Time Line

Adjust the Time Line window so that it takes some of the Editor window space as shown. You will need more room when working in the Time Line.

Rotating the Rings

It's best to start with the simplest parts of the animation first, so begin with the Rings.

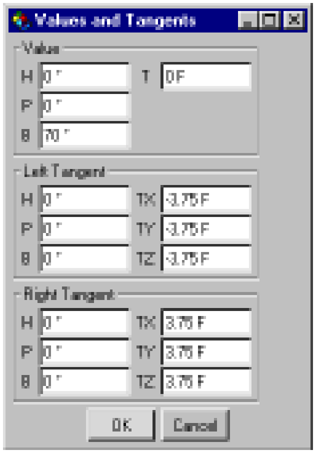


Step 1. Rotation Track

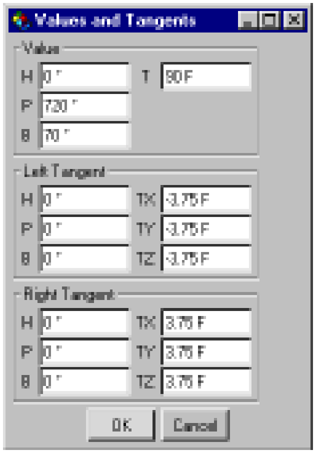
Step 1: With the Outer Ring selected create a Rotation track.

Timeline: File=>New Track=>Geometry=>Rotation
Shortcut: None

A track name and sequence will appear to the right of the Outer Ring in the Time Line.



Step 2: Outer Ring Rotation Frame 0



Step 3. Outer Ring Rotation Frame 90

Alternatively, you can create keyframes by moving the Time Slider, manipulating objects in the Editor window, and clicking on the red Record button at the bottom-right of the interface. You can also enable Automatic Keyframing, so that when you move the Power Slider to a new time and change the state of an object the program will automatically record keyframes.

Step 2: Define the rotation of the Outer Ring for the entire scene. It will rotate two full revolutions around the P axis. With the Rotation track selected, create the first keyframe for the Outer Ring rotation.

Timeline: File=>New Key
Shortcut: None

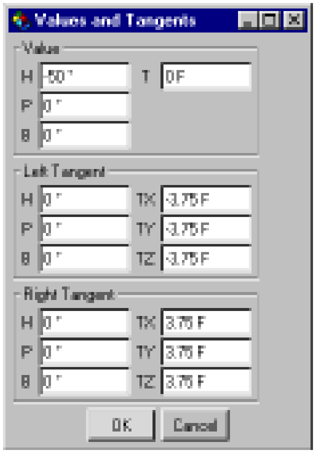
Control Click on the Sequence at Frame 0. The keyframe dialog will open. To give the rotation a slight vertical angle, set the B rotation to 70 degrees. Click OK. This creates the initial state of the Outer Ring.

Step 3: With the Rotation track selected, create the last keyframe for the Outer Ring rotation.

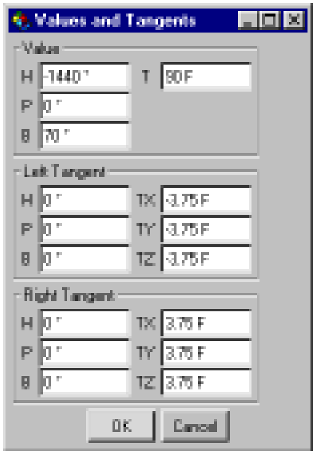
Timeline: File=>New Key
Shortcut: None

Control Click on the Sequence at Frame 90. The keyframe dialog will open. To retain that slight vertical angle, set the B rotation to 70 degrees. Then, to create two full rotations enter 720 degrees in the P rotation field. Click OK. This creates the last rotational position of the Outer Ring.

To see the results of your animation, you can click play at the bottom-right of the interface or scroll through the animation by dragging the scrub bar at the top of the Time Line. Or you can scrub with the Time Slider.



Step 4. Inner Ring Rotation Frame 0



Step 4. Inner Ring Rotation Frame 90

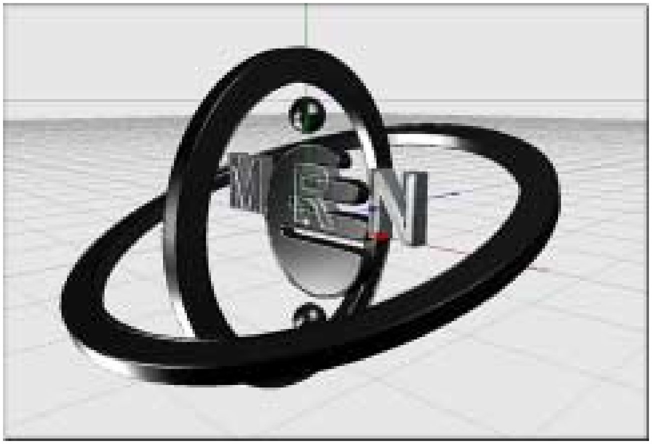
Step 4: Now create the rotation of the Inner Ring for the entire scene. This ring will rotate mainly along its H axis four revolutions, with a slight change axis of rotation over time. A shortcut to adding rotation to the Inner Ring is to copy the Rotation track of the Outer Ring.

While holding the Control key, click and drag the Outer Ring's Rotation track to the Inner Ring. Make sure to drag the track label (marked "Rotation"), not the gray sequence bar. When you see the little plus sign, let go. Voila! You have copied the track over.

Next, change the keyframe settings. Double click on the first keyframe and change the settings to H=-50, P=0, B=0. Click OK.

Double click on the last keyframe and change the settings to H=-1440, P=0, B=70. Click OK.

This makes the Inner Ring rotate in the opposite direction to the Outer Ring. You can also see the it is slightly angled, although again contrary to the Outer Ring.



Step 5: In the outline of the scene above, the rotation of the rings are described as "slowing down" as the camera gets closer. For this you will need to use Time Curves to affect how the rings rotate from zero to their ultimate rotational value. Time Curves effect the entire sequence.

With the Rotation track of the Outer Ring selected in the Time Line, open the Time Curves Window.

Timeline: Window=>Time Curves
Shortcut: Shift+T

A new window with a grid will open within the Time Line. The Time Curves window is where you can control how the state of an object changes during a sequence.

Every sequence can have a curve. So if you have multiple sequences, each can have its own Time Curve. Each curve affects the animation sequence in its own way.

The Red line "P" affects the Position or actual state of the keyframe.

The Green line "V" affects the velocity or how fast the transition happens.

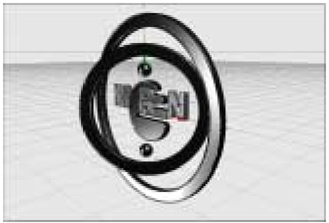
The Blue line "A" affects the acceleration of how the transition happens.

Since you want to gradually slow the rotation of the rings, you will be affecting the Velocity of the rotation. The Time Curve defaults to Path Mode, so you need to change to Velocity Mode.

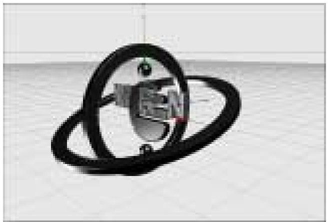
Timeline: Curves=>Time Curves=>Velocity Mode
Shortcut: None

Zoom out a bit on the Time Curve window by clicking and dragging on the grid size control icon. Dragging down zooms out, dragging up zooms in. The icon next to it scrolls the window up and down.

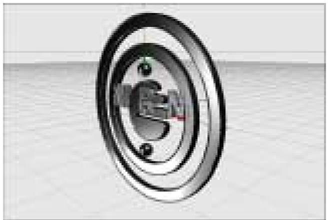
To create a simple curve, hold the Control key then click and drag along the line to create control points with handles. You only need to create three control points to create the curve as shown. Notice the curve shows 150% velocity from frame 0- 30, with a gradual reduction in the velocity of the rotation until it reaches its final position.



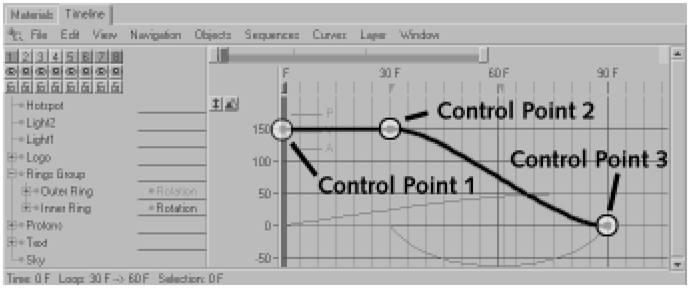
Step 5. Outer Ring - Frame 30



Step 5. Outer Ring - Frame 60

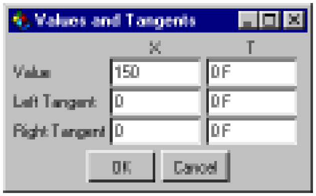


Step 5. Outer Ring - Frame 90

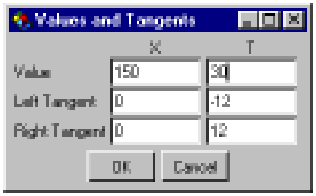


If you double click on the control points, you can see their exact settings. The settings shown are:

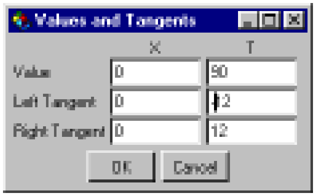
Control Point 1:



Control Point 2:



Control Point 3:



If you find that the Outer Ring does not seem to be reaching its final position, use the Fit Path function in the Time Curve window. This will guarantee the sequence reaches its final setting.

Timeline: Curves=>Time Curves=>Fit Path End to 100%
Shortcut: None

Now if you test the motion you will see the rotation of the Outer Ring slow as it reaches it final position.

Step 6: Use the same Time Curve settings for the Inner Ring rotation. Copying this is actually quite easy. First, go back to Sequence Mode on the Time Line.

Timeline: Window=>Sequences
Shortcut: Shift+Q

Select the Rotation track for the Inner Ring and use the Get Time Curve function to copy the settings from the Outer to the Inner Ring Rotation.

Timeline: Sequences=>Get Time Curve from
Shortcut: None

Step 6. Get Time Curve from . . .

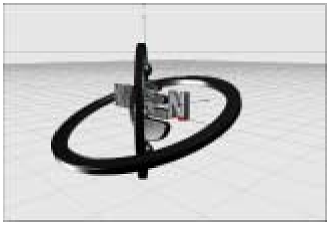
When the question mark appears, click on the sequence on the Outer Ring Rotation track and the settings will be copied over.

You can also save Time Curves for use with other objects. While you are working in Time Curve Mode, use the Save Curve function.

Timeline: Curves=>Time Curves=>Save Time Curve As
Shortcut: None

This allows you to save the curve for later use on another Sequence. Give the curve a name. When saved, the file name will be given an extension ".fcv" to identify it as a Time Curve.

To add a saved curve to another Sequence, use the Load Time Curve function.


Step 6. Ring Rotation - Frame 60

Timeline: Curves=>Time Curves=>Load Time Curve
Shortcut: None

Choose the curve from where you saved it and it will be applied to the Sequence you are working on.

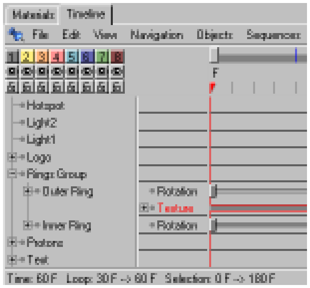
That completes the Rings rotation portion of the animation.

Making the Rings Glow

In the climax of the storyline above, the rings begin to glow before they explode. For that you will need to create texture animation.

Step 1: With the Outer Ring selected create a Texture track.

Timeline: File=>New Track=>Special Effects=>Texture Shortcut: None



Step 1. Texture Track

A track name and sequence will appear to the right of the Outer Ring in the Time Line.

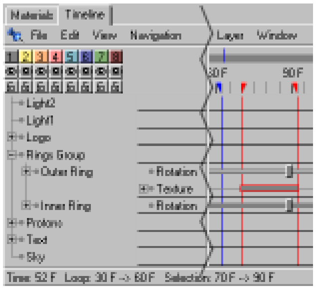
Step 2: Since the glow only becomes apparent at the end of the animation, shorten the Sequence so it only influences the texture near the end of the animation.

Double click on the Sequence of the Texture track. In the dialog, change the sequence to start at Frame 70 and end at Frame 90. Click OK.

Step 2. Sequence

Now you will see a sequence (the gray line) only from Frame 70-90. This alleviates the problem of having to create a keyframe at Frame 0 with the same settings as Frame 70.

When there is no sequence, there is no interpolation. When there is a sequence, there is gradual change from keyframe to keyframe. Without a sequence, changes do not occur until the next keyframe is reached. For instance, if you wanted a light to flash on and off, you would delete the sequence and create keyframes where the light is off and on. If you wanted a light to slowly illuminate, as in the glow above, you would use a sequence.

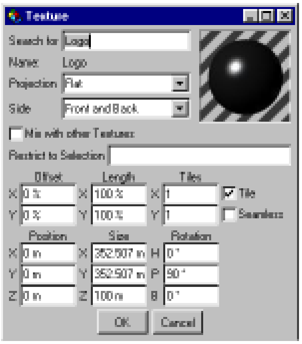


Step 2. Sequence

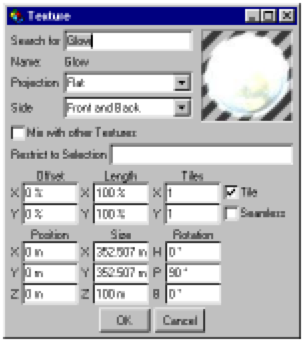
Another good situation to shorten a sequence to only where the change occurs is when you are using Time Curves.

Step 3: Define the first and last keyframes of the sequence.

Timeline: File=>New Key Shortcut: None



Step 3. Texture Key - Frame 70



Step 3. Texture Key - Frame 90

Control Click on the Texture track Sequence at Frame 70. The keyframe dialog will open. In the dialog, the Logo texture should already be indicated as the texture applied at this point in time. If not, type "Logo" into the "Search for" field. Click OK.

Control Click on the Texture track Sequence at Frame 90. The keyframe dialog will open. In the "Search for" field, type in "Glow." This will make the Glow the material applied at this point in time. Click OK.

If you move the Time Slider to Frame 70 and do a quick Render Preview, you will see the Outer Ring texture is still the same as the others. Move the Time Slider to Frame 90 and do another render preview and you will see the new glow material on the Outer Ring.

You can also see in the Object Manager, the material that is applied to the object with change as the Time Slider is moved forward. Whichever material has the most influence at that time will appear to the right of the object.

Step 4: Repeat the same process for the Inner Ring.

Once you have created a Texture track for one object you can always copy it to another. However, since you are using projection settings that include "Fit to Object" you do not want to use that here. You want to preserve how the material is applied. If you copy, it will retain the settings for projection on the first object. This setting will not apply to the new object.

That completes the Texture portion of the animation.

Making the Rings Explode

After the rings glow, they explode setting the Logo spinning.

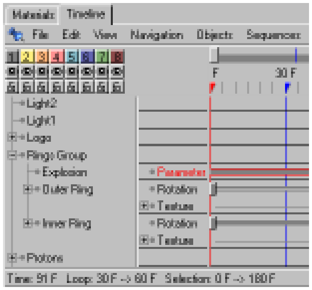
Step 1: Since you will be exploding both rings equally, you need only create one explosion track for the Rings Group. Create an Explosion Deformer.

Step 1. Explosion Object

Editor: Objects=>Deformation=>Explosion
Shortcut: None

Place it inside the Ring Group object. This will make the explosion affect only these objects

Step 2: With the Explosion object selected in the Time Line, create a Parameter track.



Step 2. Parameter Track

Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the Explosion in the Time Line.

Step 3: Since the Explosion happens after the rings begin to glow, adjust the Sequence so it only influences the rings when you want it to.

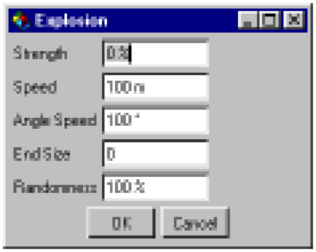
Step 3. Sequence

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at Frame 90 and end at Frame 120. Click OK.

Now you will see a sequence (the gray line) only from Frame 90-120.

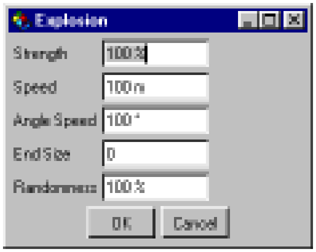
Step 4: Define the first and last keyframes of the sequence.

Timeline: File=>New Key
Shortcut: None



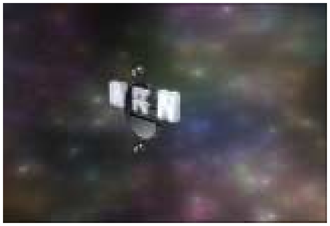
Step 4. Explosion - Frame 90

Control Click on the Parameter track Sequence at Frame 90. The Explosion settings dialog will open. In the dialog, you can leave the settings at default. Note the first field where the Explosion has 0% strength. Click OK.

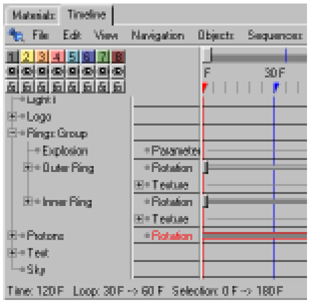


Step 4. Explosion - Frame 120

Step 4. Explosion - Frame 90



Step 4. Explosion - Frame 120



Step 1. Protons Rotation Track

Control Click on the Parameter track Sequence at Frame 120. The Explosion settings dialog will open. In the dialog, change the strength settings to 100%. Click OK.

If you move the Time Slider to Frame 90 and do a quick Render Preview, you will see the rings are still the same. Move the Time Slider to Frame 100 and do another render preview and you will see the rings begin to break apart. By frame 120, all parts of the rings have disintegrated.

Step 4. Explosion - Frame 100

Animating the Protons

The Protons will rotate around the logo like the Rings. When the Rings explode, they will be blasted off screen for a moment only to return beneath the Logo with the Text.

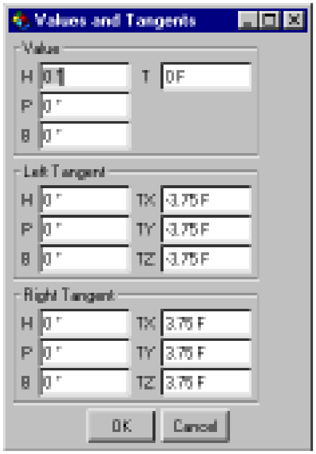
The Protons will rotate vertically with a slight offset, four revolutions before the explosion.

Step 1: With the Protons selected create a Rotation track.

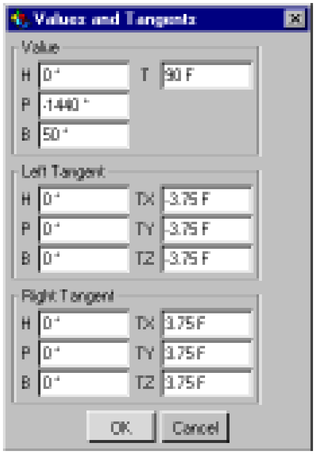
Timeline: File=>New Track=>Geometry=>Rotation
Shortcut: None

A track name and sequence will appear to the right of the Protons in the Time Line.

Step 1. Rotation Sequence



Step 2. Rotation Frame 0



Step 2. Rotation Frame 90

Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at Frame 0 and end at Frame 90. Click OK.

Step 2: Define the rotation of the Protons for the first part of the scene. It will rotate four full revolutions around the P axis with a slight offset. With the Rotation track selected, create the first keyframe for the Protons rotation.

Timeline: File=>New Key
Shortcut: None

Control Click on the Protons' Rotation Sequence at Frame 0. The keyframe dialog will open. Make sure all the settings for rotation are at 0. Click OK. This creates the initial state of the Protons.

Control Click on the Sequence at Frame 90. The keyframe dialog will open. To create a slight vertical angle, set the B rotation to 50 degrees. Then, to create four full rotations enter -1440 degrees in the P rotation field. Click OK.

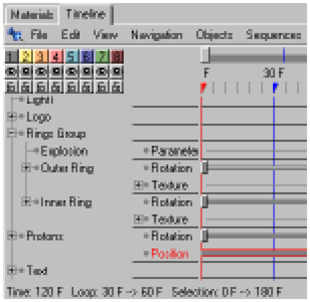
Step 3: For continuity, you're going to want the Protons to slow their rotation at the same rate as the Rings. Use the Get Time Curve From function to copy the curve from one of the Rings. With the Rotation sequence for the Proton selected copy the Time Curve.

Timeline: Sequences=>Get Time Curve from
Shortcut: None

When the question mark appears, click on the rotation sequence for one of the Ring's Rotation tracks and the settings will be copied over.

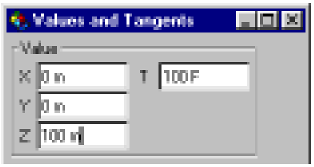
That takes care of rotation before the explosion.

Step 4: When the explosion happens, you are going to want the Protons to fly off for a moment before returning to their position with the Text. So, you will have to create a Position track. With the Protons selected in the Time Line create a Position track.

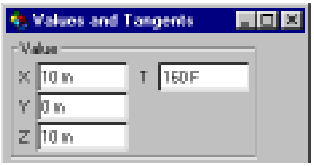


Step 4. Protons Position Track

Step 4. Position Sequence



Step 5. Position Key Frame 100



Step 5. Position Key Frame 160

Timeline: File=>New Track=>Geometry=>Position
Shortcut: None

A track name and sequence will appear to the right of the Protons in the Time Line.

Double click on the Sequence of the Position track. In the dialog, change the sequence to start at Frame 90 and end at Frame 160. Click OK.

Step 5: Define the Position of the Protons for the scene. With the Position track selected, create the first keyframe for the Protons.

Timeline: File=>New Key
Shortcut: None

Control Click on the Sequence at Frame 90. The keyframe dialog will open. Make sure all the position settings are at the 0 default. Click OK. This creates the initial state of the Proton from the beginning of the scene until Frame 90.

To make the Protons fly off at the point of explosion, Control Click on the Sequence at Frame 100 (or one tenth of a second after the rings begin to explode). The keyframe dialog will open. Change the Z position to 100. Click OK. This moves the Protons to a position outside the explosion.

To make the Protons return to a final position with the Text object, Control Click on the Sequence at Frame 160. The keyframe dialog will open. Change the Position settings to X=10, Y=0, Z=10. Click OK. This moves the Protons roughly where the Text will be revealed.

Step 6: You'll notice that the Protons do not seem to be rotated properly. So you will have create another Rotation sequence to get them to their final position. With the Rotation track selected in the Time Line, add a second sequence to the track.

Timeline: File=>New Sequence
Shortcut: None

Step 6. Rotation Sequence

A Sequence dialog will open. Change the sequence to start at Frame 91 and end at Frame 160. Click OK.

Now your Rotation track has two Sequences, one from Frame 0-90 (which has a Time Curve influencing it) and one from Frame 91-160 (without Time Curve influence).

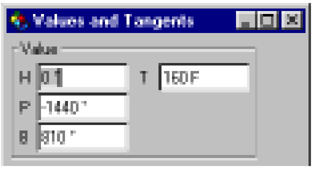
Step 7: Complete the Rotation of the Protons for the scene. With the Rotation track selected, create a keyframe for the Protons.

Timeline: File=>New Key
Shortcut: None

Step 7. Rotation Frame 91

Control Click on the Sequence at Frame 91. The keyframe dialog will open. To make a smooth transition between the previous sequence and this one, you'll set the values to be the same as those in frame 90. Those values are: H=0, P=-1440, B=50.

Control Click on the Sequence at Frame 160 to define the final rotation of the protons. The keyframe dialog will open. The P value should remain -1440 degrees. Change the B value to 810 degrees. Click OK.



Step 7. Rotation Frame 160

Step 8: However, the position of the Protons also depends on the Sphere object itself. The distance between the Protons is defined by the position of the Sphere. So you will need to create a Position track for the Sphere. With the Sphere selected in the Time Line create a Position track.

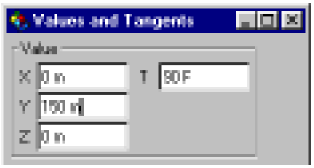
Timeline: File=>New Track=>Geometry=>Position
Shortcut: None

Step 8. Sphere Position Sequence

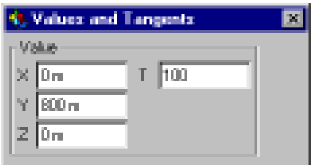
A track name and sequence will appear to the right of the Sphere in the Time Line.

Double click on the Sequence of the Sphere's Position track. In the dialog, change the sequence to start at Frame 90 and end at Frame 160. Click OK.

Step 9: Define the Position of the Sphere for Frame 90. With the second Position sequence (the Sphere Position track) selected, create a keyframe for the Sphere.



Step 9. Sphere Position Frame 90



Step 9. Sphere Position Frame 100

Step 9. Sphere Position Frame 160

Step 10. Sphere Parameter Track Frame 90

Step 10. Sphere Parameter Track Frame 160

Timeline: File=>New Key
Shortcut: None

Control Click on the Sequence at Frame 90. The keyframe dialog will open. The Position should be the same as you set it in the beginning — X=0, Y=150, Z=0.

Control Click on the Sequence at Frame 100. The keyframe dialog will open. The Position should be X=0, Y=800, Z=0.

To define the final position in between the Text objects, Control Click on the Sequence at Frame 160. The keyframe dialog will open. Change the Position settings to X=0, Y=60, Z=0. Click OK. This rotates the Protons into position roughly where the Text will be revealed.

Step 10: Finally, the Protons will be much too large to fit between the Text objects in their final position, so you will need to scale them down at the end of the animation. With the Sphere selected in the Time Line, create a Parameter track.

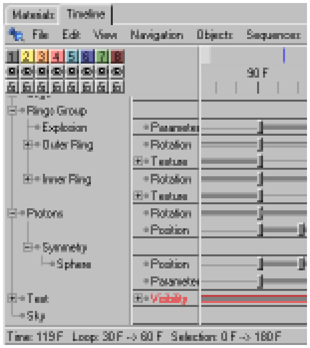
Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the Sphere in the Time Line.

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at Frame 90 and end at Frame 160. Click OK.

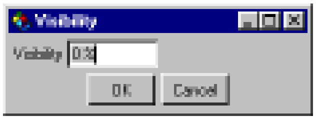
Control Click on the Sequence at Frame 90. The Parameter dialog will open. It should show the settings of the Sphere when it was created — Radius 25m. Click OK.

Control Click on the Sequence at Frame 160. Change the Radius to 10m. This scales the Protons in size.

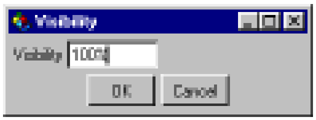


Step 1. Text Visibility Track

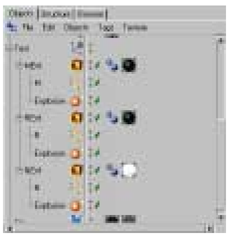
Step 1. Text Visibility Sequence



Step 1. Visiblity Frame 100



Step 1. Visibility Frame 110



Step 2. Explosion Objects

Making the Text Appear

After the explosion, the storyline has the Text assemble itself below the Logo.

Don't forget to unhide the Text objects if you hid them before while working.

Step 1: Since the letters will assemble from pieces you won't want the pieces to be visible until they begin to reassemble. So you will need to create a Visibility track for the entire Text group.

With the Text group selected in the Time Line, create a Visibility track.

Timeline: File=>New Track=>Special Effects=>Visibility
Shortcut: None

A track name and sequence will appear to the right of the Text group in the Time Line.

Double click on the Sequence of the Position track. In the dialog, change the sequence to start at Frame 100 and end at Frame 110. Click OK.

Control Click on the Sequence at Frame 100. The Visibility dialog will open. Leave it at the default 0% Visibility.

Control Click on the Sequence at Frame 110. The Visibility dialog will open. Change it to 100% Visibility.

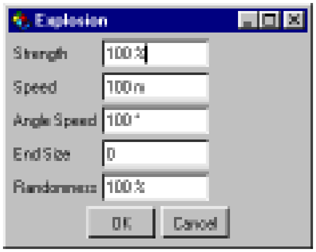
This will make the Text object invisible until it begins to reveal on Frame 100, becoming fully visible by Frame 110.

Step 2: Use an Explosion Deformation to animate the Text objects reassembling themselves. Create an Explosion Deformer for each letter in the Text Group.

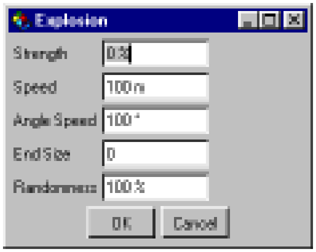
Editor: Objects=>Deformation=>Explosion
Shortcut: None

Place each inside the letter objects — "MExt," "RExt" and "NExt."

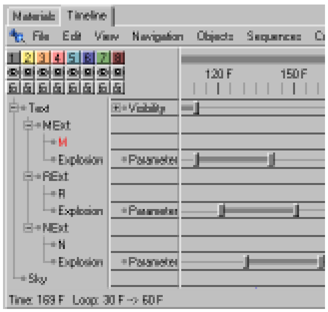
Step 3. Parameter Sequence



Step 4. Explosion Frame 110



Step 4. Explosion Frame 140



Step 6. Explosion Tracks

Make sure the Explosion object is in position after the spline that defines the Extrude NURBS as shown.

Step 3: Go back to the Time Line. With the "MExt" Explosion object selected in the Time Line, create a Parameter track.

Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the Explosion in the Time Line.

Double click on the Sequence of the MExt's Parameter track. In the dialog, change the sequence to start at Frame 110 and end at Frame 140. Click OK. This will make it assemble over 30 frames.

Step 4: The Explosion needs to be animated in reverse after the Rings explode. Define the first and last keyframes of the sequence.

Timeline: File=>New Key
Shortcut: None

Control Click on the Parameter track Sequence at Frame 110. The Explosion settings dialog will open. In the dialog, change the strength settings to 100%. Click OK.

Control Click on the Parameter track Sequence at Frame 140. The Explosion settings dialog will open. In the dialog, change the strength settings to 0%. Click OK.

Step 5: Now, duplicate the Parameter track to the "RExt" and "NExt" Explosion objects.

While holding the Control key, click and drag the MExt's Parameter track to the Explosions of the other two letters' Explosion Deformations. Make sure to drag the track, not the sequence. When you see the little plus sign, let go.

Step 6: You are going to want the letters to assemble one at a time in order. All you have to do is drag the Sequence for each explosion.

Drag the “RExt” Explosion Sequence to Frame 120-150. Drag the “NExt” Explosion Sequence to Frame 130-160.

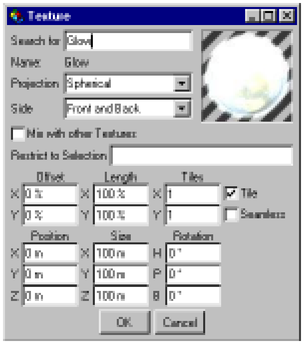
Now the Explosions are offset by 10 frames each.

Step 8. Texture Sequence

Step 7: Now animate the texture of the letters to go from a glowing material to the same material as the Logo. Basically you are going to reverse the process that you did for the Rings. With the “MExt” object selected create a Texture track.

> Timeline: File=>New Track=>Special Effects=>Texture
> Shortcut: None

A track name and sequence will appear to the right of the “MExt” in the Time Line.



Step 9. Texture Frame 125

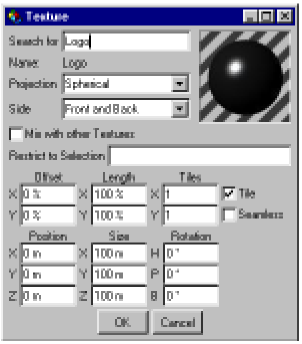
Step 8: You are going to want it to glow from the point it becomes visible until it finishes assembling.

Double click on the Sequence of the Texture track. In the dialog, change the sequence to start at Frame 125 and end at Frame 140. Click OK.

Step 9: Define the first and last keyframes of the sequence.

> Timeline: File=>New Key
> Shortcut: None

Control Click on the Texture track Sequence at Frame 125. The keyframe dialog will open. In the dialog, the Glow texture should already be indicated as the texture applied at this point in time. If not, type “Glow” into the “Search for” field. Click OK.



Step 9. Texture Frame 140

Control Click on the Texture track Sequence at Frame 140. The keyframe dialog will open. In the “Search for” field, type in “Logo.” This will make the Logo the material applied at this point in time. Click OK.

Step 10: Now duplicate the Texture track to the “RExt” and “NExt” objects.

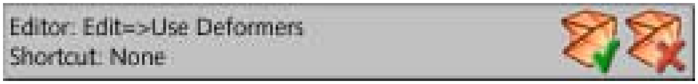
While holding the Control key, click and drag the Parameter track to the other two letters. When you see the little plus sign, let go.

Step 11: You are going to want to offset Texture animation of the letters as well. All you have to do is drag the Sequence for each Texture track.

Drag the “RExt” Explosion Sequence to Frame 135-150. Drag the “NExt” Explosion Sequence to Frame 145-160.

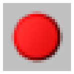
Now the Texture tracks are offset by 10 frames each.

Step 12. Deactivate the Explosions so you can position the logo and lighting effects based on the unexploded objects. Because the explosion is the only deformer you‘re using in this scene, you can deactivate all deformers.

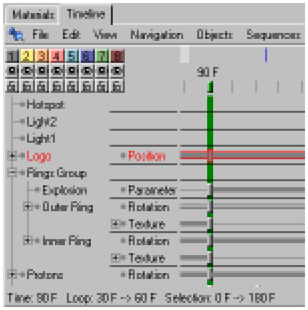


You can also deactivate an individual deformer object by clicking the green checkmark next to the object‘s visibility dots.

Step 1. Position Track Only



Step 1. Record Button



Step 1. Logo Position Track

Step 1. Logo Position Sequence

Moving the Logo into Position

So far you haven’t had to animate the Logo at all. However, you may have noticed that it is in the same location as the Text. You‘re going to want the Logo to react to the Explosion and move up into Position.

Step 1: For the Logo, you will create keyframes with the Record button. Since you will only be recording the Position of the Logo, turn off the Scale, Rotation and Parameter recording buttons. At the lower right of the interface, just click on each to turn them off as shown.

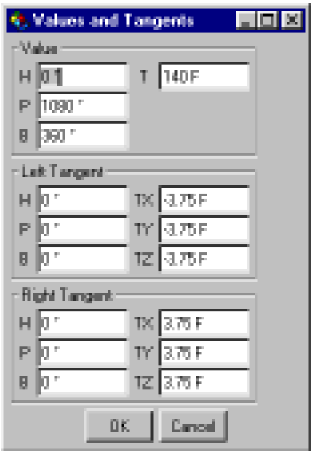
Make sure the Logo is selected in the Time Line and the Time Slider is at Frame 90. Then click the Record button at the lower right of the interface.

You will see a Position track and a keyframe at 90 has been created.

First shorten the Sequence by double clicking on it. In the dialog, change the Sequence to start at Frame 90 and end at Frame 135. Click OK.

Step 2. Logo Position

Step 3. Rotation Sequence



Step 4. Rotation Frame 140

Step 2: Move the Time Slider to Frame 135. Drag the Logo up into position above Text (approximately Y=250). Select the move tool.

Editor: Tools=>Move
Shortcut: E

To constrain the move on the Y axis, click the X and Z buttons to lock these axes or click and drag the green Y transformation handle.

Make sure the Logo is still selected in the Time Line and click the Record button again.

A new keyframe will appear at Frame 135, recording the Logo's current position.

Frame 135 is chosen because that the first letter assembles itself completely at Frame 140. It would be best to have the Logo in position before hand.

Step 3: Now for a little reaction to the explosion. With the Logo selected create a Rotation track.

Timeline: File=>New Track=>Geometry=>Rotation
Shortcut: None

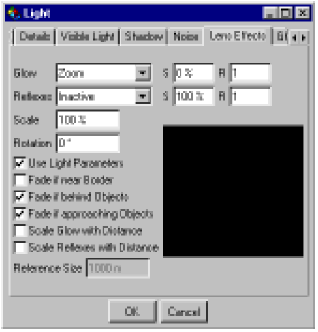
Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at Frame 90 and end at Frame 140. Click OK.

Step 4: Define the rotation of the Logo for the first part of the scene. You will want to look as if it has spun from the force of the explosion. With the Rotation track selected, create the first keyframe for the Logo rotation.

Timeline: File=>New Key
Shortcut: None

Control Click on the Sequence at Frame 90. The keyframe dialog will open. Make sure all the settings for rotation are at 0. Click OK. This creates the initial state of the Logo.

Control Click on the Sequence at Frame 140. The keyframe dialog will open. The settings here are H=0, P=1080, B=360 — three full revolutions on the P axis and a single rotation on the B axis. Click OK.



Step 1. Lens Effect Dialog

Step 5: Having the Rotation start out fast and slow towards the end would give it a nice feel. So, copy the Time Curve settings you created for the Rings rotation. Select the Rotation track for the Logo and use the Get Time Curve function to copy the settings from one of the Rings Rotation tracks.

Timeline: Sequences=>Get Time Curve from
Shortcut: None

When the question mark appears, click on the sequence of one of the Ring's Rotation tracks and the settings will be copied over.

Adding a Light Effect to the Appearing Text

A nice added touch would be to use an animated lens effect to enhance the assembling Text.

Step 1: Create a new light for the effect.

Editor: Objects=>Scene=>Light
Shortcut: None

A new light will appear in the Object Manager.

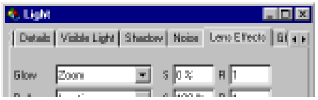
Double click on the text "Light" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "LensEffect1." Click OK.

Double-click on the Light icon in the Object Manager to open its dialog. Check the box No Light Radiation.

Step 2. Parameter Sequence

In the Lens Effects section, set the Glow to "Zoom" and the Saturation to S=0%.

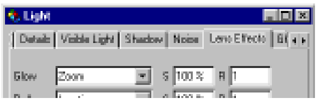
Make sure to click "Fade if Approaching Objects." This will cause the intensity of the lens effect to decrease when the light is near other objects. Click OK.



Step 2. Parameter Frame 125

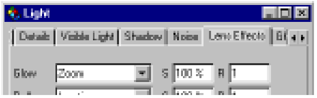
Step 2: Now to animate its Parameters. First create a Parameter track for the LensEffect1 light.

Timeline: File=>New Track=>Parameter
Shortcut: None

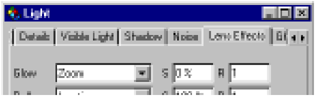


Step 2. Parameter Frame 135

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at Frame 125 and end at Frame 180. Click OK. This will enable you to animate the light effect across the letters as they assemble.

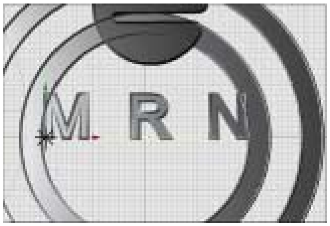


Step 2. Parameter Frame 160



Step 2. Parameter Frame 180


Step 3. Position Track Only



Step 3. Frame 135

Step 3. Position Sequence

Control Click on the Parameter track Sequence at Frame 125. The light dialog will open. In the dialog, under Lens Effects, the glow should still be Zoom at S=0%. If not, set it as such. Click OK.

Control Click on the Parameter track Sequence at Frame 135. The light dialog will open. In the dialog, under Lens Effects, change the glow setting to Zoom at S=100%. Click OK. This will make the light glow just as the first letter is assembling.

Control Click on the Parameter track Sequence at Frame 160. The light dialog will open. In the dialog, under Lens Effects, the glow should still be Zoom at S=100%. Click OK. This will retain light glow at 100% just as the last letter finishes assembling.

Control Click on the Parameter track Sequence at Frame 180. The light dialog will open. In the dialog, under Lens Effects, change the glow setting to Zoom at S=0%. Click OK. This will slowly turn off the glow after the last letter has assembled.

Step 3: Now create the position animation so the light moves across the Text as it assembles. Since you will only be recording the Position of the Lens Effect, make sure the Scale, Rotation and Parameter recording buttons are still off from before. If not, at the lower right of the interface, just click on each to turn them off as shown.

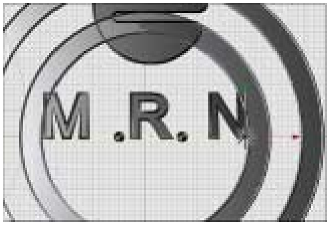
Change to XY or Front View to make sure you are setting the light in the right position.

View: View=>View 4
Shortcut: F4

Make sure the LensEffect1 is selected in the Time Line and the Time Slider is at Frame 135. Move the LensEffect1 light to the very left of the "M" (approximately -150 on Position X. Then click the Record button at the lower right of the interface.

You will see a Position track and a keyframe at 135 has been created.

First shorten the Sequence by double clicking on it. In the dialog, change the Sequence to start at Frame 135 and end at Frame 160. Click OK.



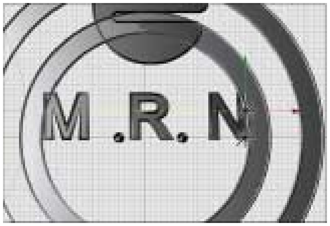
Step 4. Frame 160

Step 4: Move the Time Slider to Frame 160. Drag the light across into position just on the outside edge of the "N" (approximately X=155). Make sure the LensEffect1 is still selected in the Time Line and click the Record button again.

A new keyframe will appear at Frame 160, recording the light's current position.

Step 5: This effect will look best with another lens effect on top. So, duplicate LensEffect1. With the LensEffect1 object selected in the Object Manager.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)



Step 6. Frame 160

Or you can hold the Control key while moving the object in the Object Manager. When you see the little + sign, let go and a copy of the object will appear in the Object Manager.

Double click on the text "LensEffect1.1" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "LensEffect2."

Step 6: Next, change the keyframe settings so this light moves across the top of the Text. Double click on the first keyframe and change Y position to 50. Click OK.

Double click on the last keyframe and change the change Y position to 50. Click OK.

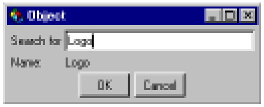
Add and Animate the Camera

Now you'll animate the camera to fly around the logo.

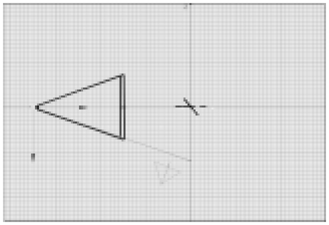
Step 1: Create a Camera.

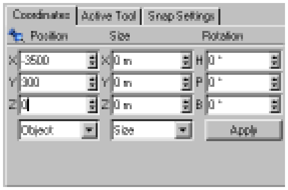
Editor: Objects=>Scene=>Camera
Shortcut: None

A Camera object will appear in the Object Manager.

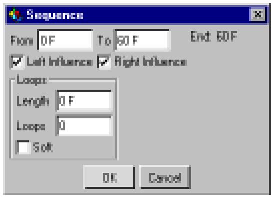


Step 2. Target Logo

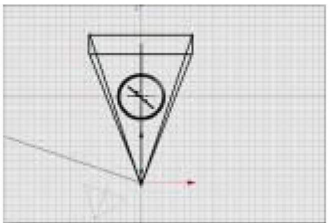

Step 3. Camera Position Frame 0



Step 3. Camera Position



Step 3. Sequence


Step 4. Frame 60

Step 2: Since the Logo is the focal point of the scene, it will be easiest to maintain the Camera's focus on the Logo with a Target Expression. With the Camera selected in the Object Manager, create a Target Expression.

Object Manager: File=>New Expression=>Target Expression
Shortcut: None

When the dialog opens type "Logo" into the field and click OK. This will ensure no matter where the camera moves it is always pointing at the Logo.

Step 3: As stated in the outline at the beginning, the Camera (or audience) sees the logo at a distance at first. As the Camera pulls in closer, it comes around the front of the logo to reveal it just before it explodes. So you will animate its position.

First, change to XZ or Top View so you can animate the Camera moving from one side of the Logo to the front.

View: View=>View 2
Shortcut: F2

Make sure the Camera is selected in the Time Line and the Time Slider is at Frame 0. Move the Camera to the left of the Logo in the scene. The settings used here are X=-3500, Y=300, Z=0. Then click the Record button at the lower right of the interface.

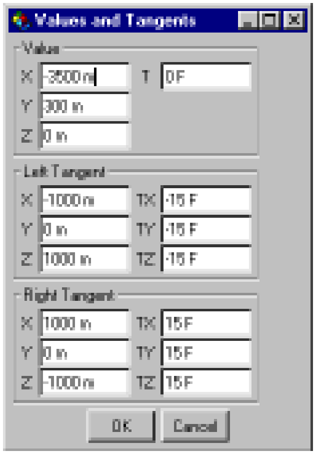
You will see a Position track and a keyframe at 0 has been created.

Shorten the sequence to end at frame 60.

Step 4: Just before the Rings explode, you will want the camera looking at the Logo straight on. Move the Time Slider to Frame 60 (thirty frames or one second before the Rings explode). Then move the Camera to a position in front of and framing the Rings. The position used here is X=0, Y=300, Z=-1200.

To make sure the Camera is positioned where you want it, you can link your active view to the Camera's view. With the Camera selected in the Object Manager, go to View: Cameras=>Link to Active Object. Once you're satisfied with the position, choose Cameras=>Editor Camera.

Step 5: If you're not already in Top View return to it now. Make sure your Camera is selected in the Object Manager, and you'll see a yellow line representing the position track of the Camera.

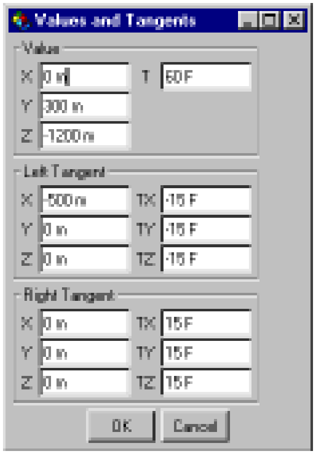


Step 5. Frame 0 Tangents

If you look at the Camera's animation path, you can see it is a completely straight line from its first position to the position in front of the Logo. The movement would look much better if the Camera curved around to the front of the Logo.

To add a bit of an arc to the motion, you will need to add tangents to the first and second keyframes of the motion.

When selecting that keyframe in the Editor Window, you will see a purple tangent handle. If you have no tangents, double click on the first keyframe of the Camera's Position track. In the dialog, change the Left Tangent X to -200, and the Right Tangent X to 200. Click OK. Now you'll be able to manipulate the tangent handles.As you move the handle, you will see the motion path of the camera change. Create a nice arc as shown, by manipulating both the first and second keyframe tangents.



Step 5. Frame 60 Tangents

The final tangent settings used to create the curve shown are:

First Keyframe

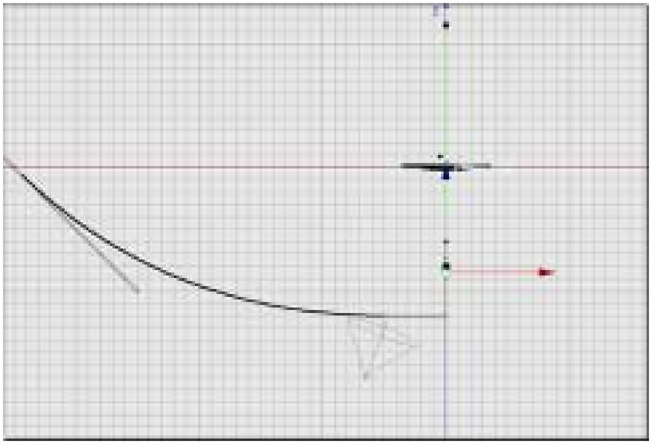
Left Tangent: X=-1000, Y=0, Z=1000

Right Tangent: X=1000, Y=0, Z=-1000

Second Keyframe

Left Tangent: X=-500, Y=0, Z=0

Right Tangent: X=0, Y=0, Z=0



Final Notes

At this point, you are done and the scene is ready to render. There are many things you could do to enhance this scene — more intricate models, better textures, animating the lights for more interesting illumination and effects, and more. Stir up your own creative juices and have some fun with the scene.

Animating the Indoor Scene

Character animation is without a doubt the hardest thing to do in 3D. You can't just move an object, you have to bring it to life. In this tutorial, you will learn how to animate an object utilizing deformations. This is a good introduction to character animation (and the easiest way to bring inanimate objects to life). Again, the motion described is a good start. Feel free to give your remote control its own personality.

Animating your Indoor Scene

Before you get started, it's always good to briefly go over the storyline and map out how you will animate the objects:

- Establish Story: A quiet, empty living room at night. The television has been left on. The moonlight comes in through the window.
- Introduce Conflict: The camera moves in closer to the coffee table focusing on the television Remote. The Remote comes to life.
- Develop Conflict: The Remote looks around to see if anyone is watching. Realizing it's alone, it stands up and moves over to the couch to watch television.
- Climax: The Remote hears someone coming from another room and frantically scrambles to get back on the table.
- Resolution: Leaping from the couch to the table, the Remote stiffens just as it lands back in place.
- Moral/Message: The secret life of inanimate objects.

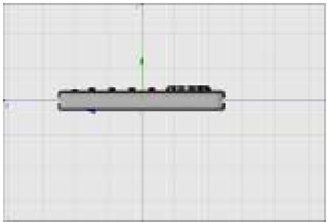
Preparation

The best way to approach this project is to animate the Remote first. This will be the most complex part of the process. Once that arduous task has been completed, you can animate the lights changing and the camera move.

Creating any kind of character animation, even an inanimate object, requires a great deal of preparation — first storyboards, rough motion tests, creating the motion, then tweaking it for timing, etc.

Fortunately (or unfortunately for that matter), we have done all this advance work for you. So the size and settings for deformations, timing of actions, etc. have been achieved after a lot of trial and error. The motion used in this tutorial is by no means the best or only solution. It is a starting point, and a way to expose you to animation tools and features.

Step 1: Open the Remote project. You will use three Null Objects to animate the Remote. The first is the Remote group all the parts were grouped under during the modeling stage. Rename this to "Middle Pivot." You will use this to spin the Remote around its middle.



Step 1. Middle Pivot Axis

Step 2: Select the object axis tool and move Middle Pivot's axis to the bottom middle of the remote as shown.

Editor: Tools=>Object Axis
Shortcut: None

You can do this by hand, or enter X=0, Y=-30, Z=0 in the Coordinates manager

Step 2: Create a new Null Object.

Editor: Objects=>Null Object
Shortcut: None

Place this Null object at the end, flush with the bottom of the Remote as shown. This is so you have a pivot point at the base of the Remote.

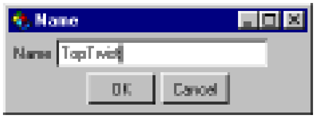
Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "RemoteBase."

Drag the Middle Pivot group into the RemoteBase null object.

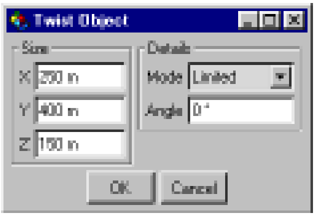
Step 3: Create another Null Object.

Double click on the text "Null Object" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "Remote."

Drag the RemoteBase group into the Remote object.



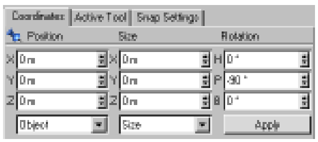
Step 1. Rename Twist



Step 1. Twist Parameters

Step 1. Twist Deformer

Step 2. Twist Deformer



Step 2. Twist Rotation

Setting up the Deformations

To animate the Remote you will need four deformation objects. There will be a twist for the upper body, a bend for the upper body, a twist for the lower body and a bulge that will animate through the body.

Step 1: Add a Twist Deformation.

Editor: Objects=>Deformation=>Twist
Shortcut: None

Double click on the text "Twist" in the Object Manager to open a dialog that allows you to change the name of the object. Change it to "TopTwist."

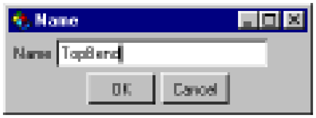
Double click on the Twist icon in the Object Manager to change the settings. Its parameters should be X=250m, Y=400m, Z=150m, Mode=Limited Angle=0. Limited mode means that this deformation will act along its X and Z axis for any geometry, even if it falls outside the blue bounding box, but will only affect along the Y within the bounding box. This is the rest state of the deformation. No deformation will occur at these settings. Click OK.

Step 2: Make sure the object tool is selected and rotate the deformation -90 on the Pitch. Position the TopTwist such that the bottom of the deformation is about at the middle of the Remote. This will align the deformation so that its Y axis runs along the length of the Remote. It will also put the base of the deformation in the middle of the Remote. The base does not twist, but remains stationary. You want this because the deformation twists objects around the Y-axis of the deformation. This will allow you to twist the upper body of the Remote, creating the effect the Remote is turning its shoulders.

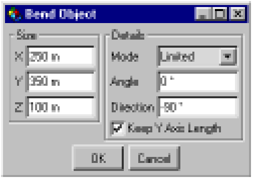
Drag and drop the TopTwist object in the Object Manager into the RemoteBase group.

Step 3: Add a Bend Deformation.

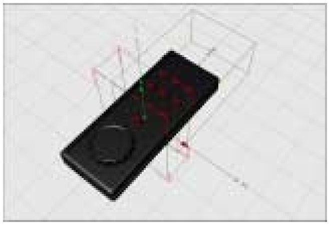
Editor: Objects=>Deformation=>Bend
Shortcut: None

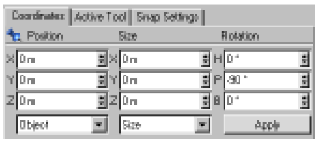


Step 3. Rename Bend



Step 3. Bend Parameters


Step 3. Bend Deformation



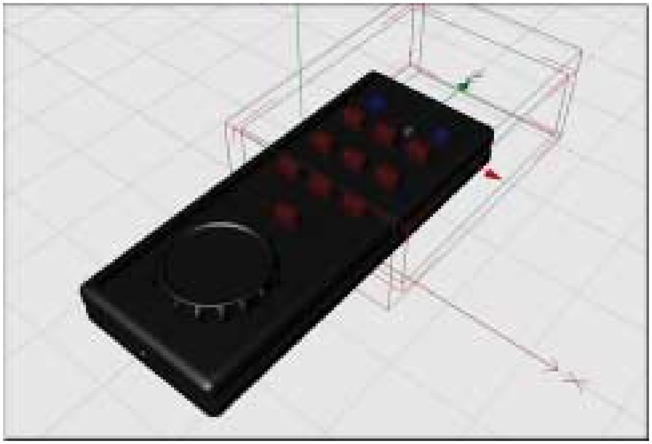
Step 4. Bend Coordinates

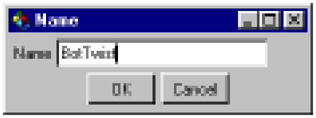
Double click on the text "Bend" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "TopBend."

Double click on the Bend icon in the Object Manager to change the settings. Its parameters will be X=250, Y=350, Z=100, Mode=Limited, Angle=0, Direction=-90. Limited mode means that this deformation will act along its X and Z axis for any geometry, even if it falls outside the blue bounding box, but will only affect along the Y within the bounding box. Make sure Keep Y Axis Length is on. This prevents the remote from stretching as it bends. The direction determines which way a bend will occur. You normally need the Remote to bend forward and -90 gives you a forward bend. You can test this by setting the Angle parameter to 90 and the Remote will bend forward. Be sure to return the Angle to 0 before continuing on.

Step 4: Rotate this deformation -90 on the P axis. Move it so that the bottom of it is at the middle of the Remote just like the twist deformation before it. Like the twist deformation, the bend deformation occurs along the Y-axis of the deformation. This will be the rest position for the Remote.

Drag and drop the Bend object in the Object Manager into the RemoteBase group.



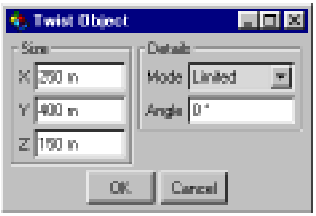


Step 5. Rename Twist

Step 5: Add another Twist Deformation.

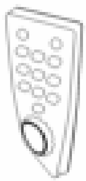
Editor: Objects=>Deformation=>Twist
Shortcut: None

Double click on the text "Twist" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "BotTwist."



Step 5. Twist Parameters

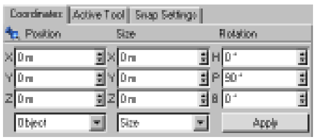
Double click on the Twist icon in the Object Manager to change the settings. Its parameters should be X=250, Y=400, Z=150, Mode=Limited Angle=0. This is the rest state of the deformation. No deformation will occur at these settings.



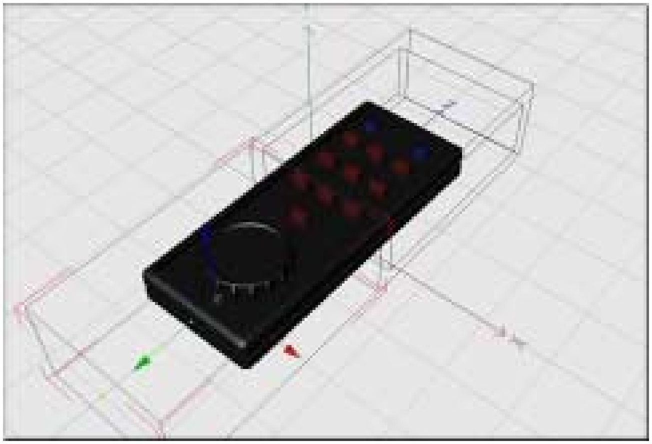
Step 6: Rotate this deformation 90 degrees on the P axis. Place this deformation such that the bottom of the deformation is about at the middle of the Remote. This will place its base in the middle of the Remote and its Y-axis running down towards the "feet" of your Remote. This will allow you to twist the lower body of the Remote, creating the effect that the Remote is walking.

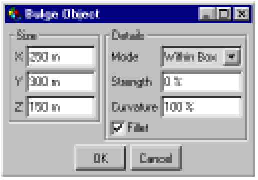

Step 5. BotTwist

Drag and drop the BotTwist object in the Object Manager into the RemoteBase group.

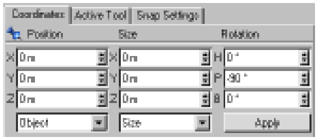


Step 6. Twist Coordinates





Step 7. Bulge Parameters



Step 7. Bulge Position

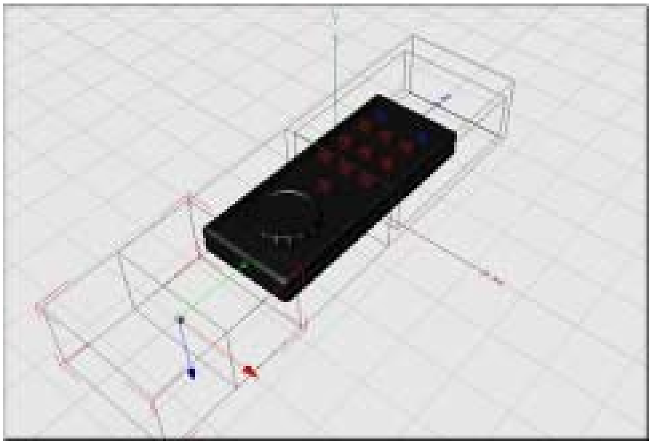
Step 7. Object Manager with Deformers Applied

Step 7: Add a Bulge Deformation.

Editor: Objects=>Deformation=>Bulge
Shortcut: None

Double click on the Bulge icon in the Object Manager to change the settings. Its parameters should be X=250, Y=300, Z=150, Mode=Within Box, Strength=0%, Curvature=100%, Fillet=On. Setting the Mode to Within Box will ensure that you only have a bulge where the deformation is, which is exactly what is needed for this scene. You will need to rotate the bulge -90 degrees on the P axis so that the effect of the deformation will run along the length of the Remote.

Next move the Bulge just below the Remote and out of the range of influence.



Drag and drop the Bulge object in the Object Manager into the RemoteBase group.

Step 8: Now that all the deformations are in place, make sure to save the Remote scene again.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Creating a Proxy Scene

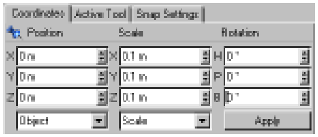
While creating the animation for the Remote, you need only include in the scene the objects that interact with the Remote. Dividing the scene this way will allow you to work more quickly.


Step 2. Proxy

Step 1: Open the Room scene that you finished in the lighting chapter. Save a copy of this scene and name it Room_anim.c4d. Delete everything from the scene except the couch and the coffee table.

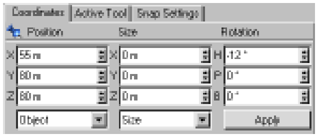
Step 2: Merge the Remote scene into the Room_anim.c4d scene.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)



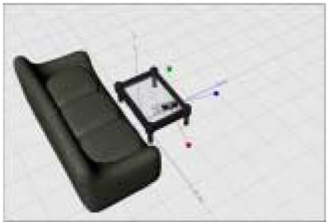
Step 3. Remote Scale

Step 3: Once the Remote is added, you will need to scale it down to match the scene. Scale the Remote object with the object tool so that X=.1, Y=.1 and Z=.1. You can also use the Coordinates Manager, change the size to Scale and input .1 into the X, Y and Z fields.



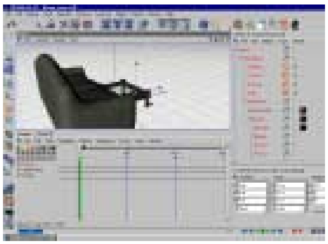
Step 4. Remote Coordinates

Step 4: Position the Remote to the back right corner of the table as you look at the table as if you're sitting on the couch. This is X=55m, Y=80m, Z=80m. Also, you will want to rotate the Remote Null so that it doesn't lie parallel to the edge of the table. A rotation of H=-12 degrees will suffice.


Step 4. Proxy

Step 5: Since you are in the default layout, you will need to add the Timeline to your scene. Open the Timeline window and dock it with the Material Manager.

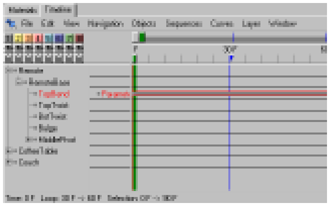
Editor: Window=>Timeline
Shortcut: Shift+F3


Step 5. Dock Timeline

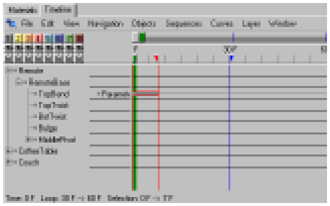
To dock it with the Material Manager, click on the thumbtack icon at the top left of the window and drag it to the thumbtack at the top of the Material Manager. When you see the little hand, let go and the Timeline will be tabbed with the Material Manager.

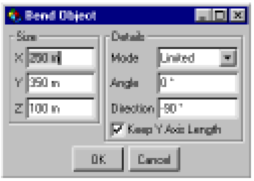
Adjust the Timeline window so that it takes some of the Editor window space as shown. You will need more room when working in the Timeline.

Now you are ready to animate the Remote.

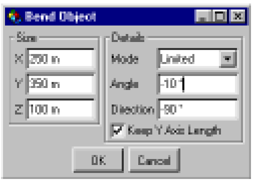

Step 1. Timeline

Step 1. Parameter Sequence


Step 1. Timeline



Step 2. Frame 0



Step 2. Frame 7

Wake Up!

Step 1: The first movement of the Remote will be to bend it back slightly before leaning up. In character animation this is known as anticipation. You will want to use this technique anytime you do a character animation. With the Bend deformation selected in the Timeline, create a Parameter track.

Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the Bend in the Timeline.

Double click on the Sequence of the Bend Parameter track. In the dialog, change the sequence to start at frame 0 and end at frame 7. Click OK.

Now you will see a sequence (the gray line) only from frame 0-7.

Step 2: Define the first and last keyframes of the sequence.

Timeline: File=>New Key
Shortcut: None

Control Click on the Parameter track Sequence at frame 0 to add a keyframe. The Bend deformation settings dialog will open. In the dialog, you can leave the settings at default. Note the Angle of the Bend is 0 degrees. Click OK.

Control Click on the Parameter track Sequence at frame 7 to add a keyframe. The Bend deformation settings dialog will open again. In the dialog, change the Angle setting to -10 degrees. Click OK.

Now the Remote is making a slight move backwards before it leans up.

Step 3: Since your Remote is laying on the table, you will need to have the Remote rotate up slightly to keep the it from passing through the glass tabletop. With the RemoteBase group selected, create a Rotation track.

Timeline: File=>New Track=>Geometry=>Rotation
Shortcut: None

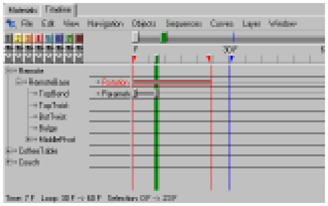
Step 3. Rotation Sequence

A track name and sequence will appear to the right of the RemoteBase in the Timeline.

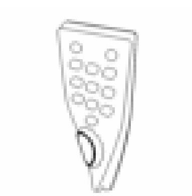
Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at frame 0 and end at frame 23. Click OK.

Step 4: Use this Rotation track to keep the Remote from rocking back through the glass top. With the Rotation track selected, create the first keyframe for the Remote rotation.

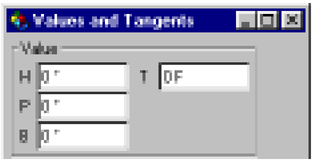
Timeline: File=>New Key
Shortcut: None


Step 3. Timeline

Control Click on the Rotation Sequence at frame 0 to add a keyframe. The keyframe dialog will open. Make sure all the settings for rotation are at 0. Click OK. This creates the initial state of the Remote.

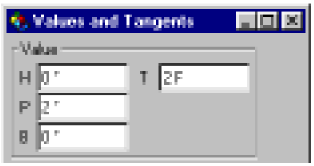


Control Click on the Sequence at frame 2 to add a keyframe. The keyframe dialog will open. Add a rotation of 2 degrees to the P axis. This lifts the Remote slightly in compensation for the bend backwards.

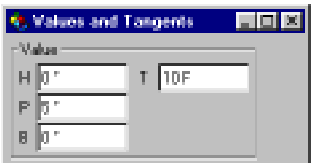


Step 4. Frame 0

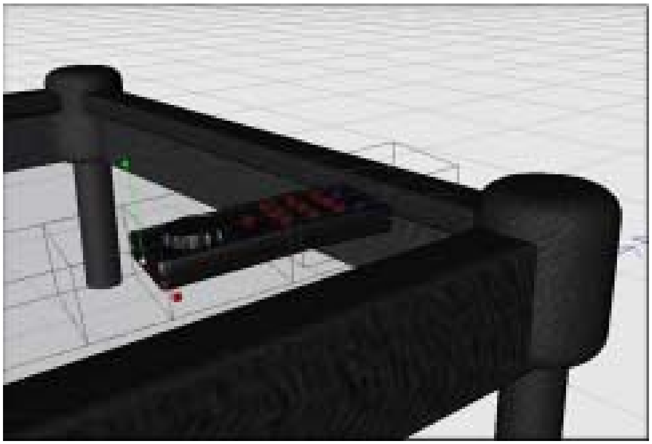
Step 5: Due to the nature of the bend, more keyframes are needed on this track. At frame 10 add a keyframe that increases the P value to 5 degrees. This will ensure that the Remote is clear of the tabletop at the end of the backward bend.



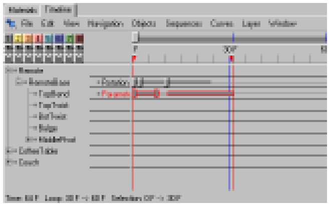
Step 4. Frame 2



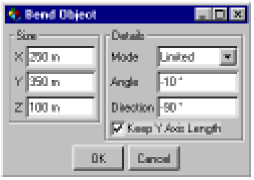
Step 5. Frame 10



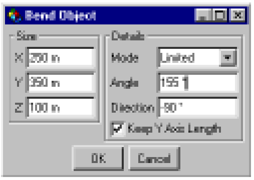
Step 6. Parameter Sequence



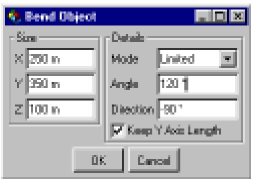
Step 6. Timeline



Step 7. Frame 11



Step 7. Frame 23



Step 7. Frame 30

Step 6: Back to the Bend deformation. Once the Remote has bent slightly backwards, it will pause for a brief moment. This is known as holding. The hold is created by the fact that the sequence ends at frame 7. Your next sequence will begin at frame 11. Since there is no sequence in between, there will be no change from frame 7 to 11 , creating a hold position for a few frames.

With the Parameter track of the Bend deformation selected in the Timeline, add a second sequence to the track.

Timeline: File=>New Sequence Shortcut: None

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 11 and end at frame 30. Click OK.

Now you will see a new sequence (the gray line) only from frame 11 to 30.

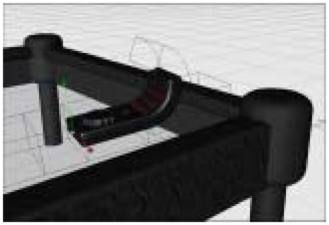
Step 8: For this sequence you will bend the Remote forward, giving the appearance it is sitting up. Add a keyframe at frame 11.

Timeline: File=>New Key Shortcut: None

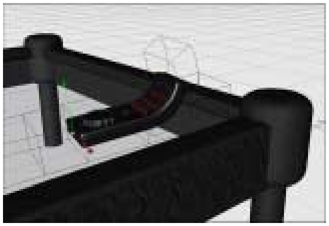
Control Click on the Bend Parameter Sequence at frame 11 to add a keyframe. The keyframe dialog will open. Be sure that the angle parameter is set to -10; the same as for frame 7. Click OK. This ensures no change during the hold stage of the movement.

Control Click on the Sequence at frame 23 to add a keyframe. The Bend deformation settings dialog will open again. In the dialog, change the Angle setting to 155 degrees. Click OK.

Set a third keyframe at frame 30 with the angle set to 120 degrees.


Step 7. Frame 23

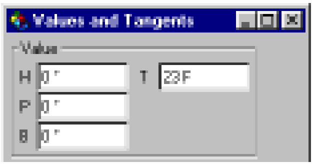
The last two keyframes create what is known as overshoot and recover. In real life it is almost impossible to stop a motion precisely where you want to, short of colliding with a large immovable object such as a wall. Overshooting causes the motion to extend past the desired end point and then come back to settle in. In Character animation it is often desirable to exaggerate this motion, along with most others, so that it is clearly visible to an observer. Often what would be considered a realistic amount of overshoot does not read properly in animation and must be exaggerated to make the motion look normal.


Step 7. Frame 30

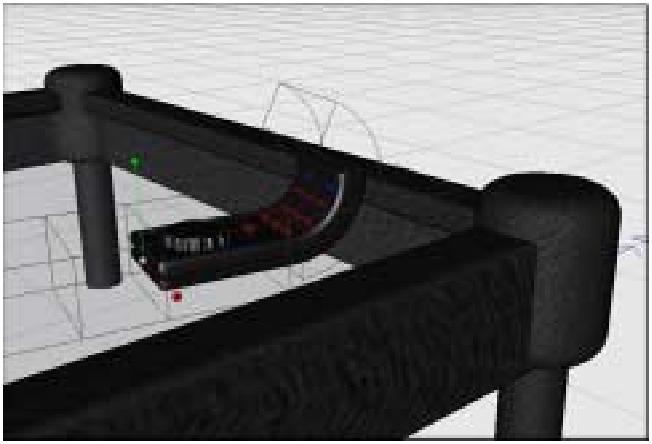
Step 8: As the Remote bends forward you need to remove the compensatory rotation from the RemoteBase. On the rotation sequence that you created, add a keyframe at frame 23.

Timeline: File=>New Key
Shortcut: None

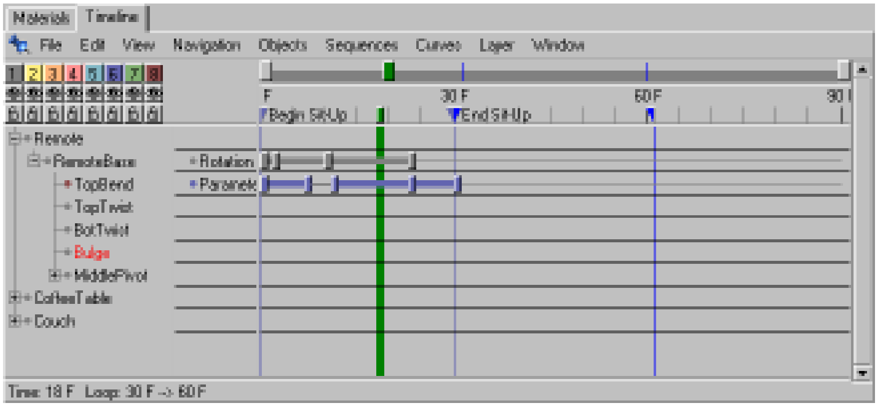
Reset the P rotation to 0 so that the base of the Remote is again lying flat on the table. The Remote should now be sitting up looking straight ahead.



Step 8. Frame 23



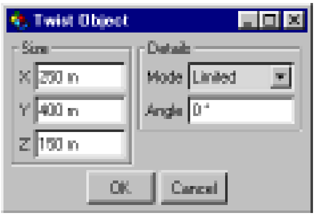
It would be a good idea to add markers to your scene as you go along to remind you what is going on. For example you could set markers at the beginning and end of this sequence saying "Begin Sit-up" and "End Sit-up". An easy way to add markers at those points is to select a keyframe at the time you want a marker and choose Markers from Selection from the Sequence menu. Double click on the marker to name it and set it on its own layer. You can set the markers to a layer if you wish, or leave them on the layer they are created on. Layers is another way to organize your tracks. You might choose to assign all Rotation tracks to Layer 1, all Position tracks to layer 2, all Parameter tracks to Layer 3 and all Scale tracks to Layer 4. This way you can tell at a glance what type of track you are working on. Another possibility is to assign each object to its own layer. That way you can identify the tracks belonging to the TopTwist by color quite easily.



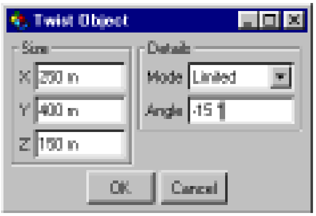
Don't forget to periodically save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Step 1. Sequence

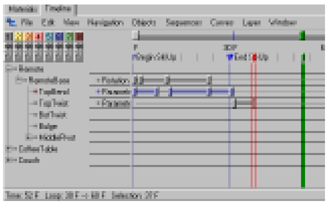


Step 2. Frame 31

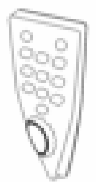


Step 2. Frame 37

Step 2. Checking for Onlookers



Step 2. Timeline



Checking for Onlookers

Now the Remote is going to look around, to see if anyone is watching. To accomplish the look, you will use the TopTwist deformation.

Step 1: With the TopTwist deformation selected in the Timeline, create a Parameter track.

Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the TopTwist in the Timeline.

Double click on the Sequence of the TopTwist Parameter track. In the dialog, change the sequence to start at frame 31 and end at frame 37. Click OK.

Now you will see a sequence (the gray line) from frame 31-37.

Step 2: Define the first and last keyframes of the sequence.

Timeline: File=>New Key
Shortcut: None

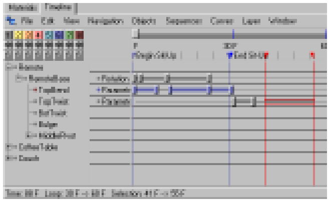
Control Click on the Parameter track Sequence at frame 31 to add a keyframe. The TopTwist deformation settings dialog will open. In the dialog, you can leave the settings at default. Note the Angle is 0 degrees. Click OK.

Control Click on the Parameter track Sequence at frame 37 to add a keyframe. The TopTwist deformation settings dialog will open again. In the dialog, change the Angle setting to -15 degrees. Click OK.

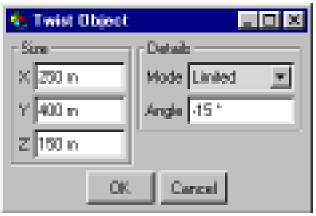
This creates an anticipatory move to the right before the Remote looks left.

If your twist doesn't look quite right, make sure the twists are above the bend in the object manager hierarchy. This way you're twisting the bend rather than bending the twist.

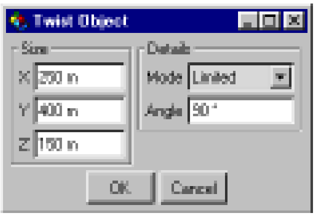
Step 3. TopTwist Sequence



Step 3. TopTwist Sequence



Step 4. Frame 41



Step 4. Frame 51

Step 5. Frame 55

Step 3: Now to make the Remote look left. With the Parameter track of the TopTwist deformation selected in the Timeline, add a second sequence to the track.

Timeline: File=>New Sequence
Shortcut: None

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 41 and end at frame 55. Click OK.

Now you will see a new sequence (the gray line) only from frame 41 to 55. Again, the gap between sequences will create a hold for a brief moment.

Step 4: For this sequence you will turn the Remote to the left with a slight position overshoot. Add a keyframe at frame 41.

Timeline: File=>New Key
Shortcut: None

Control Click on the TopTwist Parameter Sequence at frame 41 to add a keyframe. The keyframe dialog will open. Be sure that the angle parameter is set to -15 degrees; the same as the last frame in the sequence before. Click OK. This ensures no change during the hold stage of the movement.

Control Click on the Sequence at frame 51 to add a keyframe. The TopTwist deformation settings dialog will open again. In the dialog, change the Angle setting to 90 degrees. Click OK.

Set a third keyframe at frame 55 with the angle set to 75 degrees. This is a good position so it looks like the Remote is looking past the end of the couch.

Step 5: The Remote will look to the left for a third of a second, then it will look to the right. With the Parameter track of the TopTwist deformation selected in the Timeline, add a third sequence to the track.

Timeline: File=>New Sequence
Shortcut: None

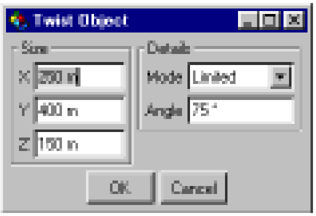
Step 5. Sequence

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 65 (10 frames from the end of the last sequence) and ending at frame 87. Click OK.

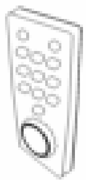
Now you will see a new sequence (the gray line) only from frame 65-87. Again, the gap between sequences will create the brief pause.

Step 6: For this sequence you will turn the Remote to the left with a slight position overshoot. Add a keyframe at frame 65.

Timeline: File=>New Key
Shortcut: None

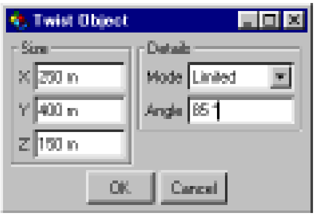


Step 6. Frame 65



Control Click on the TopTwist Parameter Sequence at frame 65 to add a keyframe. The keyframe dialog will open. Be sure that the angle parameter is set to 75 degrees; the same as the last frame in the sequence before. Click OK. This ensures no change during the hold stage of the movement.

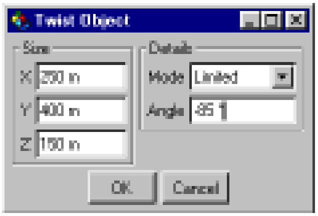
Control Click on the Sequence at frame 72 to add a keyframe. The TopTwist deformation settings dialog will open again. In the dialog, change the Angle setting to 85 degrees. Again, this creates an anticipatory move to the left before the Remote looks to the right. Click OK.



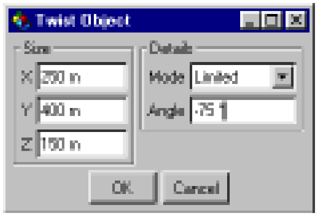
Step 6. Frame 72

Set a third keyframe at frame 82 with the angle set to -85 degrees. This overshoots your final position, which you will set with a keyframe at frame 87.

Set a third keyframe at frame 87 with the angle set to -75 degrees. This is the final “look right” position.



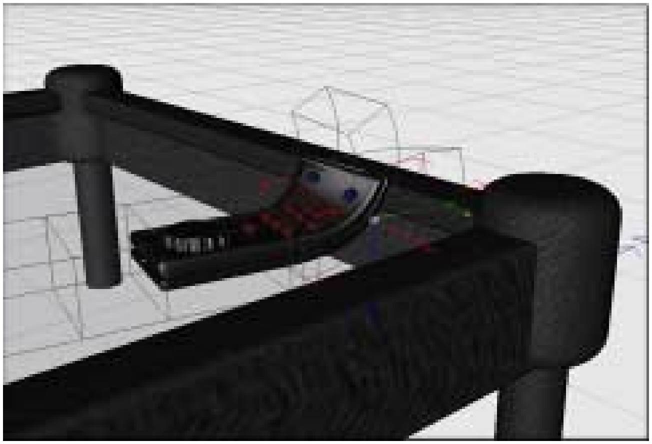
Step 6. Frame 82



Step 6. Frame 87

Step 6. Frame 72

Step 6. Frame 82



Step 6. Frame 87

Step 7: The last part of the looking motion is bringing the Remote back to a forward facing position. Begin by adding another sequence to the parameter track of the TopTwist deformation from 98 to 116.

Timeline: File=>New Sequence
Shortcut: None

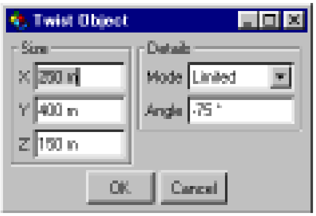
Step 7. Parameter Sequence

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 98 and end at frame 116. Click OK.

Now you will see a new sequence (the gray line) only from frame 98-116. Again, the gap between sequences will create the brief pause.

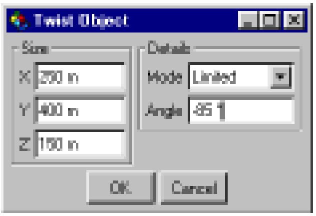
Step 8: Add a keyframe at frame 98.

Timeline: File=>New Key
Shortcut: None



Step 8. Frame 98

Control Click on the TopTwist Parameter Sequence at frame 98 to add a keyframe. The keyframe dialog will open. Be sure that the angle parameter is set to -75 degrees; the same as the last frame in the sequence before. Click OK. This ensures no change during the hold stage of the movement.



Step 8. Frame 102

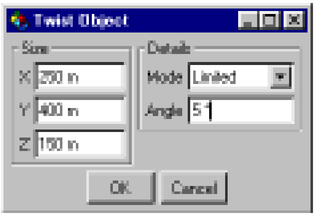
Control Click on the Sequence at frame 102. The TopTwist deformation settings dialog will open again. In the dialog, change the Angle setting to -85 degrees. Again, this creates an anticipatory move to the left before the Remote turns back towards the front. Click OK.

Set a third keyframe at frame 112 with the angle set to 5 degrees. This overshoots your final position, which you will set with a keyframe at frame 116.

Set a fourth keyframe at frame 116 with the angle set to 0 degrees. The Remote is now facing straight forward again.

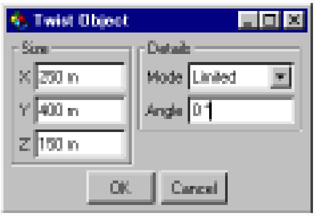
Make sure to save your project as you are working. It is also recommended to save several copies (e.g. rev2, rev3, etc.). It is a good idea to create backups at different stages of development. You can also have the program generate backup copies for you. Go to the General Settings dialog.

Editor: Edit=>General Settings
Shortcut: Ctrl+E



Step 8. Frame 112

In the first dialog window activate Generate Backup Copies by clicking on the checkbox.



Step 8. Frame 116

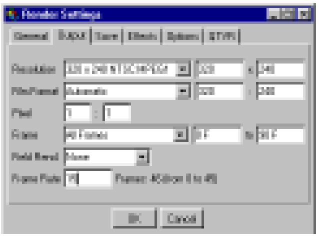

Step 8. Frame 98


Step 8. Frame 102

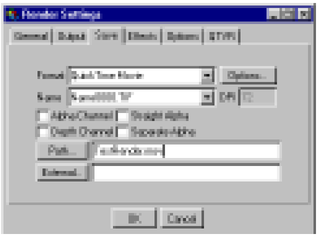

Step 8. Frame 112


Step 8. Frame 116

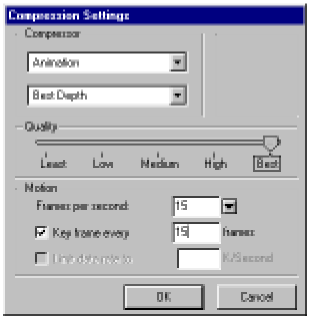
Preview Render Settings - General Tab



Preview Render Settings - Output Tab



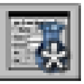
Preview Render Settings - Save Tab



Preview Render Settings - Quicktime Settings

Anytime you want to test the motion of the remote, you can render a wireframe preview. Create a new Render setting called "Preview" so that you can create preview renders easily. Choose New Render Settings from the Render Menu.

Editor: Render=>New Render Settings
Shortcut: None



Name the setting "Preview"

On the General tab set the Render Mode to As Editor. This will disable all of the other features as they are no longer applicable.

On the Output tab set the size of the final animation. Set the resolution to 320x240. This will allow you to see the render quickly. Set the Frame to All frames so that the entire animation is rendered. Set the Frame Rate to 15. This will render only every other frame and cut the rendering time in half.

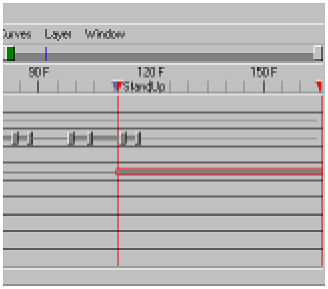
On the Save tab set the Format to QuickTime Movie. Click the Options button to pull up the QuickTime dialog. Choose Animation codec. Set the Quality to Best, as this will render fastest. Set the frame rate to 15 and set a keyframe every 15 frames. This will make sure that a full frame is written every second and will prevent the image quality from degrading. Click the Path button to pull up a standard save dialog. Type in the name of the movie you wish to render and hit save.

Any time you want to see a preview of the motion, click the Render to Picture Viewer button.

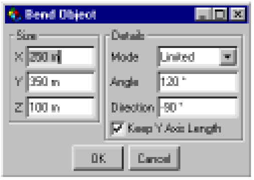
Editor: Render=>Render To Picture Viewer
Shortcut: Shift+R

One of the advantages of CINEMA 4D is that you can continue working while you are rendering. You can occasionally check to see if the render is finished. This is a great way to do motion tests, so you can tweak the motion.

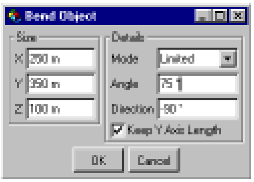
Step 1. Parameter Sequence



Step 1. Sequence



Step 2. Frame 111



Step 2. Frame 121

Stand Up and Be Recognized

Now you need to get the Remote control onto its "feet." This will be done with rotation tracks and a parameter track on the Bend deformation. You will also make use of the Middle Pivot created earlier.

Step 1: With the Parameter track of the Bend deformation selected in the Timeline, add a third sequence to the track.

Timeline: File=>New Sequence
Shortcut: None

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 111 and end at frame 164. Click OK.

Now you will see a new sequence (the gray line) only from frame 111 to 164.

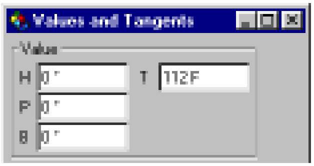
Step 2: The Remote will bend backwards slightly in anticipation of standing up. Add a keyframe at frame 111.

Timeline: File=>New Key
Shortcut: None

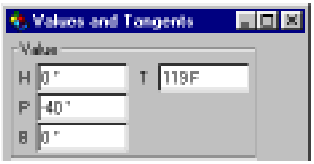
Control Click on the Bend Parameter Sequence at frame 111 to add a keyframe. The keyframe dialog will open. Be sure that the angle parameter is set to 120 degrees; the same as for the last frame of the sequence before it. Click OK. This ensures no change between this and the last sequence.

Control Click on the Sequence at frame 121 to add a keyframe. The Bend deformation settings dialog will open again. In the dialog, change the Angle setting to 75 degrees. Click OK. This will cause the Remote to bend backwards. You'll notice that there is no anticipatory keyframe. This is because of overlap. The twisting motion of the Remote turning to face front again leads smoothly into the leaning back motion. This creates a sense of flow from one action to the next, giving the Remote a fluid feeling.

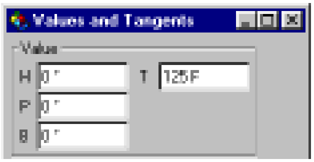
Step 3. Rotation Sequence



Step 4.Frame 112



Step 4. Frame 119



Step 4. Frame 125

Step 3: Now add a rotation track to the Middle Pivot object. You need this to create the effect of the Remote really leaning backwards to propel itself forward onto its feet. With the Middle Pivot group selected, create a Rotation track.

> Timeline: File=>New Track=>Geometry=>Rotation
> Shortcut: None

A track name and sequence will appear to the right of the Middle Pivot in the Timeline.

Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at frame 112 and end at frame 125. Click OK.

Step 4: With the Rotation track selected, create the first keyframe for the Middle Pivot rotation.

> Timeline: File=>New Key
> Shortcut: None

Control Click on the Rotation Sequence at frame 112 to add a keyframe. The keyframe dialog will open. Make sure all the settings for rotation are at 0 degrees. Click OK. This imitates the initial state of the Remote from the beginning of the scene until now.

Control Click on the Sequence at frame 119 to add a keyframe. The rotation keyframe dialog will open. Add a rotation value of P=-40. Click OK. This is the leaned back position of the Remote. The “feet” of the Remote are now lifted into the air.

Create a last keyframe for this sequence at frame 125. Here, the Middle Pivot should be returned to an angle of P=0 degrees for the final keyframe.

Step 4. Frame 112

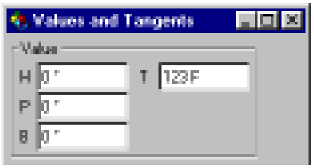
Step 4. Frame 119

Step 4. Frame 125

Step 5. Rotation Sequence

Step 5: As the feet return to the ground, you need to start the Remote tipping forward onto its feet. With the Rotation track of the RemoteBase selected in the Timeline, create another sequence from frame 123 to 133.

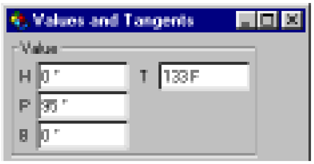
Timeline: File=>New Sequence
Shortcut: None



Step 5. Frame 123

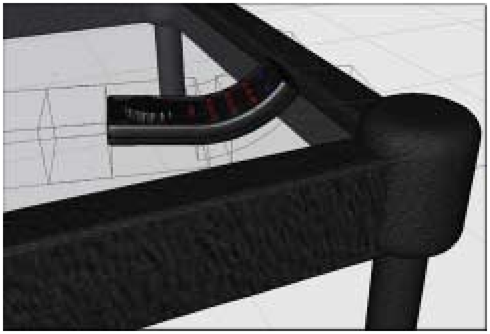
Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at frame 123 and end at frame 133. Click OK.

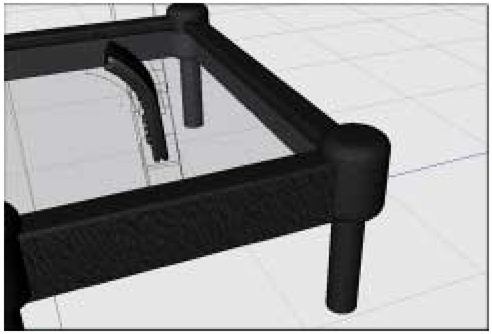
Control Click on the Rotation Sequence at frame 123 to add a keyframe. The keyframe dialog will open. Make sure all the settings for rotation are the same as the end of the last sequence. They should be H=0, P=0, B=0. Click OK.

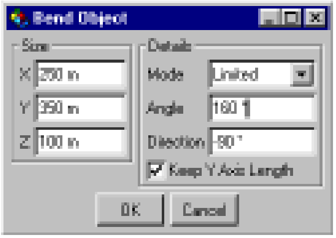


Step 5. Frame 133

Control Click on the Sequence at frame 133 to add a keyframe. The rotation keyframe dialog will open. Add a rotation value of P=95. Click OK. This will overshoot your final standing rotation of 90. Notice that the Remote does not immediately recover. This is to sell the idea that the Remote put a lot of power into the movement to stand up.

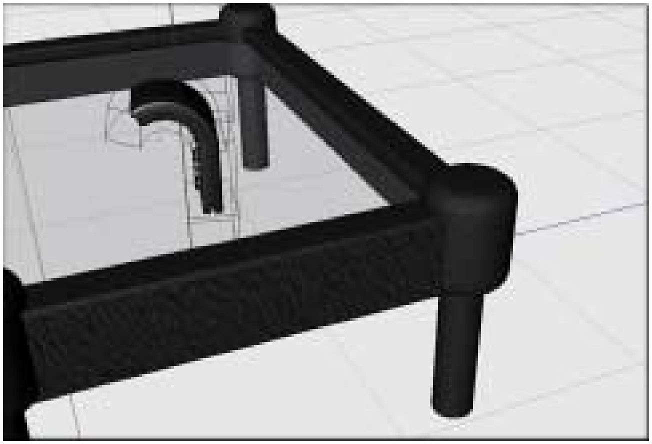

Step 5. Frame 120


Step 5. Frame 125



Step 6. Frame 131

Step 6: Return to the parameter track on the Bend object. Add a keyframe at frame 131 with an angle value of 160 degrees. This causes the Remote to bend over double as it lifts itself onto its feet. This is a very exaggerated position, but is an additional aid to selling the power of the standing up motion.

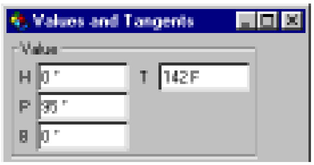


Step 7. Rotation Sequence

Step 7: Now settle the Remote into its upright position. Create a new sequence for the rotation track of the RemoteBase object.

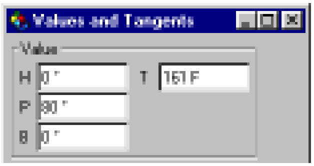
Timeline: File=>New Sequence
Shortcut: None

Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at frame 142 and end at frame 171. Click OK.

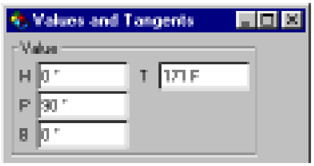


Step 7. Frame 142

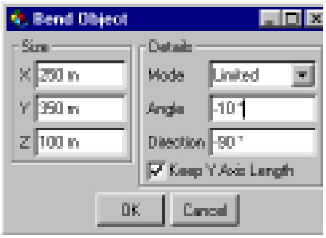
Control Click on the Rotation Sequence at frame 142 to add a keyframe. The keyframe dialog will open. Make sure all the settings for rotation are the same as the end of the last sequence. They should be H=0, P=95, B=0. Click OK.



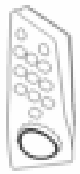
Step 7. Frame 161



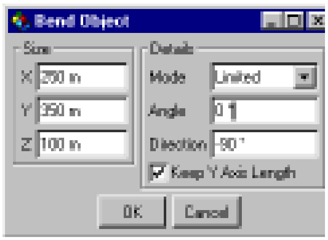
Step 7. Frame 171



Step 8. Frame 147




Step 8. Frame 147



Step 8. Frame 164

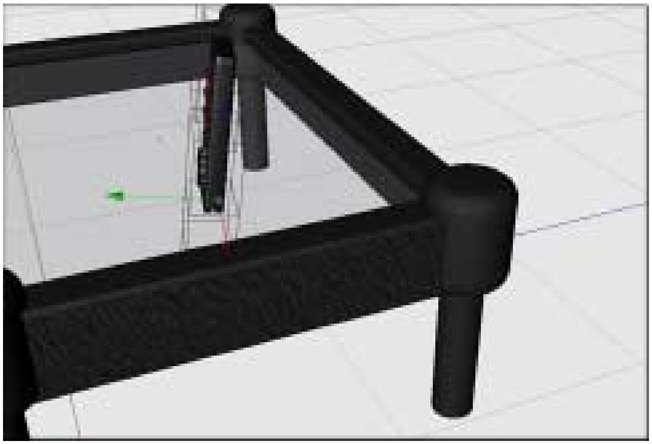
Control Click on the Sequence at frame 161 to add a keyframe. The rotation keyframe dialog will open. Add a rotation value of P=80. Click OK. This causes the Remote to rock backwards, in essence overshooting the final position a second time, a clear indicator that the Remote is almost more powerful than it can control.

The final keyframe on this sequence will be at frame 171 and has a value of P=90, the Remote is now standing upright.

Step 8: Now that the Remote is standing upright, you need to straighten the body out again. On the Bend object parameter track, add a new keyframe at frame 147. Change the Angle to -10 degrees.

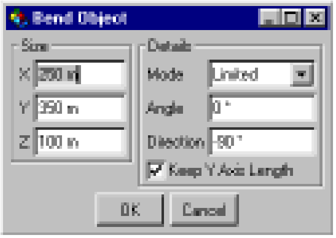
Just as the rotation overshoots the final resting position as the Remote comes back up, so does the bend. Control Click on the Bend Parameter Sequence at frame 164. The keyframe dialog will open. Set the angle parameter to 0 degrees. Click OK. The Remote should now be standing up straight.

As mentioned before, it is a good idea to save your files sequentially, so that you can go back and start over from the last major step you finished. This is just in case you decide you don't like something you've done. Now would be a good time to save out another version of your project.

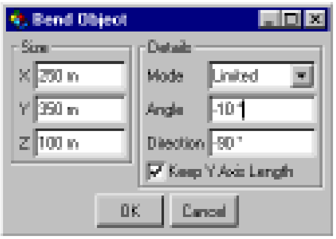

Step 8. Frame 164

Take a Walk on the Wild Side

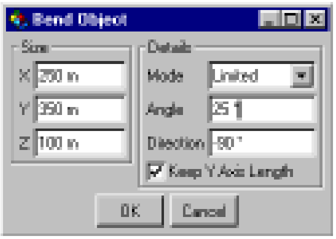
Step 1. Parameter Sequence



Step 2. Frame 184



Step 2. Frame 193



Step 2. Frame 216

Time to walk the Remote over to the edge of the table.

Step 1: Create a new sequence on the Bend object's parameter track from frame 184 to frame 216.

Timeline: File=>New Sequence
Shortcut: None

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 184 and end at frame 216. Click OK.

Step 2: Here you will bend the Remote slightly forward. Add a keyframe at frame 184.

Timeline: File=>New Key
Shortcut: None

Control Click on the Bend Parameter Sequence at frame 184 to add a keyframe. The keyframe dialog will open. Be sure that the angle parameter is set to 0 degrees; the same as the last frame in the sequence before. Click OK. The Remote is at rest.

Control Click on the Sequence at frame 193 to add a keyframe. The Bend deformation settings dialog will open again. In the dialog, change the Angle setting to -10 degrees. Click OK. This is the Remote leaning back a little in preparation for the forward movement.

Set a third keyframe at frame 216 with the angle set to 25 degrees. This brings the Remote leaning forward into its motion and gives a look of direction and purpose to the walk.

Step 3: The Remote will now be moving forward, so you will need to add a Position track. With the RemoteBase group selected in the Timeline, create a Position track.

Timeline: File=>New Track=>Geometry=>Position
Shortcut: None

Another track name and sequence will appear to the right of the RemoteBase in the Timeline.

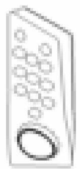
Step 3. Position Sequence

Double click on the Sequence of the Position track. In the dialog, change the sequence to start at frame 208 and end at frame 275. Click OK. This moves the Remote to the edge of the tabletop in just over 2 seconds.

Step 4: With the Position track selected, create the first keyframe for the RemoteBase.

Timeline: File=>New Key Shortcut: None

Step 4. Frame 208

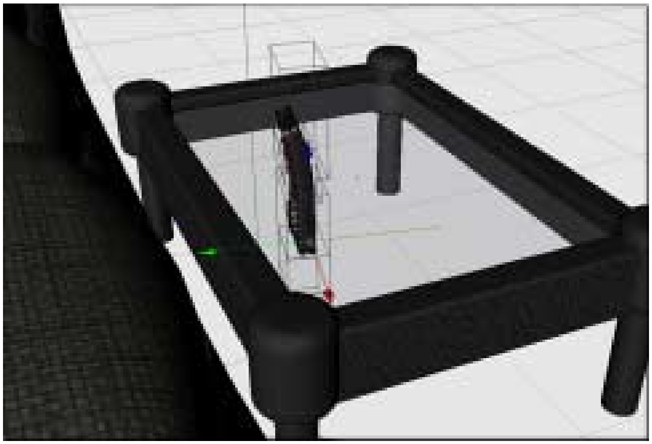


Control Click on the Sequence at frame 208 to add a keyframe. The keyframe dialog will open. Make sure the position settings are X=0m, Y=0m, Z=-240m. This is where the Remote is from the very beginning of the scene. The tangent values should all be 0F as you want a linear motion from point to point. Click OK.

The second keyframe brings the Remote to the edge of the table. Control Click on the Sequence at frame 275. The keyframe dialog will open. Change the position settings to X=0m, Y=0m, Z=-740m. Click OK.

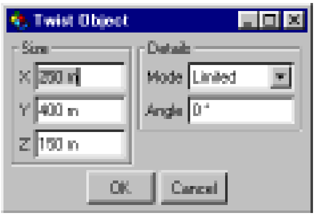
Step 4. Frame 275

The Remote should now be at the edge of the table.

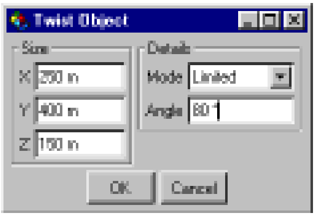

Step 4. Frame 275


Step 4. Frame 208

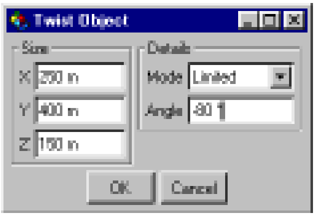
Step 5. Parameter Sequence



Step 5. Frame 208



Step 5. Frame 220



Step 5. Frame 242

Step 5: If you play back this part of the animation, you'll notice that the Remote glides across the tabletop. You are going to want the Remote to look like it is walking. For that you will use the BotTwist deformation.

With the BotTwist object selected in the Timeline create a Parameter track.

Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the BotTwist in the Timeline.

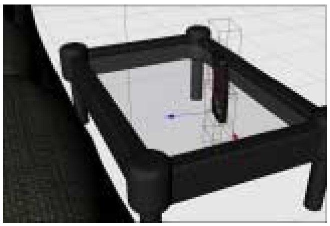
This track will run the same length as the position track. Double click on the Sequence of the BotTwist Parameter track. In the dialog, change the sequence to start at frame 208 and end at frame 275. Click OK.

Control Click on the Sequence at frame 208 to add a keyframe. The keyframe dialog will open. Make sure the Angle is at 0 degrees. This is the state of that deformation from the very beginning of the scene. Click OK.

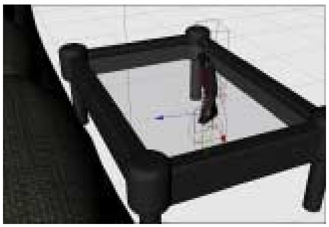
Control Click on the Sequence at frame 220 to add a keyframe. The keyframe dialog will open. Change the Angle to 80 degrees. Click OK. This brings the Remote's left "foot" forward.

Control Click on the Sequence at frame 242 to add a keyframe. The keyframe dialog will open. Change the Angle to -80 degrees. Click OK. This reverses the position so the right "foot" is forward.

Control Click on the Sequence at frame 264 to add a keyframe. The keyframe dialog will open. Change the Angle to 80 degrees. Click OK. Again this twists the left "foot" forward.

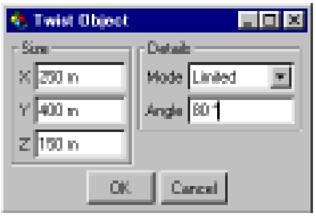


Step 5. Frame 208

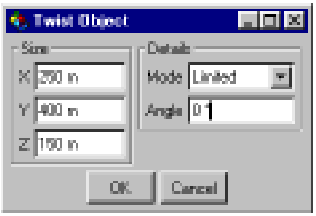


Step 5. Frame 220

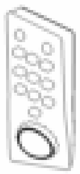
Step 5. Frame 242



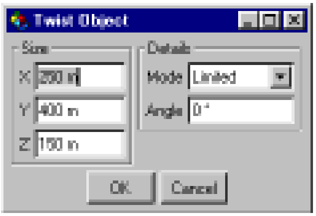
Step 5. Frame 264



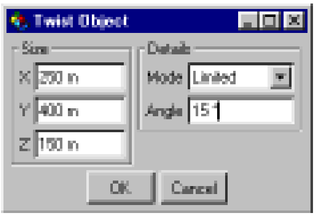
Step 5. Frame 275



Step 6. Parameter Sequence



Step 6. Frame 212



Step 6. Frame 225

Control Click on the Sequence at frame 275 to add a keyframe. Finally bring the feet back to rest under the Remote with an angle value of 0 degrees. As you can see, each step is approximately 1 second long.

This sequence took a tremendous amount of tweaking. The lower body had to twist at a rate equal to the distance the Remote was traveling. Making it look like the Remote is walking and not floating is very difficult.


Step 5. Frame 264


Step 5. Frame 275

Step 6: To make the Remote more believable, you need to add the shoulder movement into the walk. Shoulders move in opposition to the feet of a person. You'll want to do the same with the Remote. Create another sequence for the TopTwist object's parameter track.

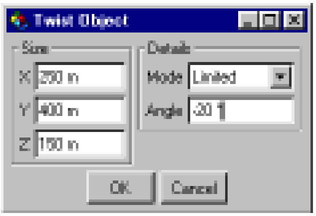
Timeline: File=>New Sequence
Shortcut: None

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 212 and end at frame 275. Click OK.

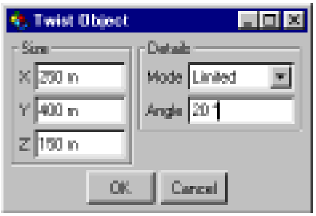
This will delay the shoulders slightly behind the feet, motivating the shoulder movement by the foot movement.

Control Click on the Sequence at frame 212 to add a keyframe. The keyframe dialog will open. Make sure the Angle is at 0 degrees. This is the state of that deformation from the last sequence. Click OK. This way, the "shoulders" are straight ahead.

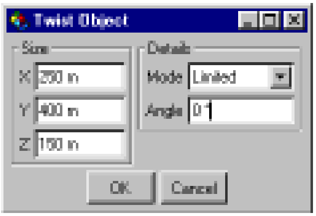
Control Click on the Sequence at frame 225 to add a keyframe. The keyframe dialog will open. Change the Angle to 15 degrees. Click OK. This brings the Remote's right "shoulder" forward.



Step 6. Frame 242



Step 6. Frame 264



Step 6. Frame 275

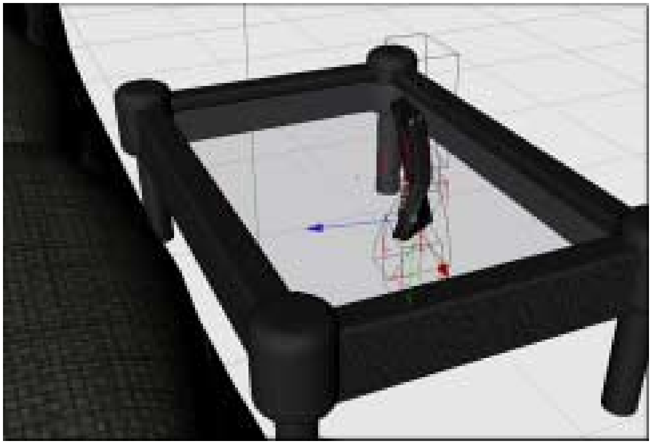
Step 6. Frame 212

Control Click on the Sequence at frame 242 to add a keyframe. The keyframe dialog will open. Change the Angle to -20 degrees. Click OK. This reverses the position so the left "shoulder" is forward.

Control Click on the Sequence at frame 264 to add a keyframe. The keyframe dialog will open. Change the Angle to 20 degrees. Click OK. Again this twists the right "shoulder" forward.

Control Click on the Sequence at frame 275 to add a keyframe. Change the Angle to 0 degrees bringing the shoulders in line with the rest of the body.

The angle values are both positive for the TopTwist and the BotTwist concurrently. This is because the deformations are rotated in opposite directions.



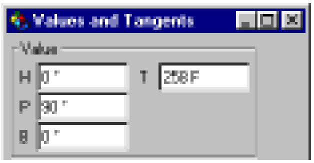
Step 6. Frame 225

Step 6. Frame 242

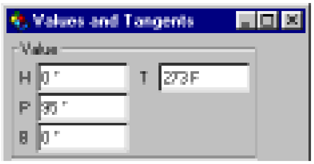
Step 6. Frame 264

Step 6. Frame 275

Step 7. Rotation Sequence



Step 7. Frame 258



Step 7. Frame 273

Step 7. Frame 284

Step 7: Finally, as the Remote comes to a halt at the end of the walk, you want it to rock forward slightly and then settle in. This can be done using the bend track, the rotation track, or both. For this tutorial you will just use the rotation track, but feel free to add the bend track in as well. Create a new sequence on the RemoteBase object's rotation track.

Timeline: File=>New Sequence
Shortcut: None

Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at frame 258 and end at frame 284. Click OK.

Control Click on the Sequence at frame 258 to add a keyframe. The keyframe dialog will open. Keep the P rotation at 90 degrees. Click OK. This maintains the position from sequence to sequence.

Control Click on the Sequence at frame 273 to add a keyframe. To make the Remote rock forward slightly, enter 95 degrees in the P rotation of the dialog. Click OK.

Control Click on the Sequence at frame 284 to add a keyframe. Enter 90 degrees in the P rotation to settle the Remote back into the upright position.

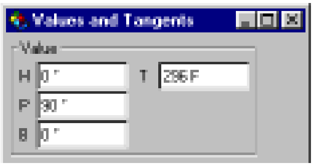
Now would be a good time to save out another version of your project.


Step 6. Frame 258

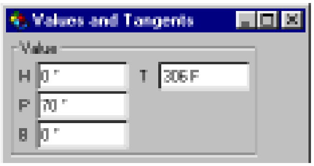

Step 6. Frame 273


Step 6. Frame 284

Step 1. Rotation Sequence



Step 1. Frame 296



Step 1. Frame 306

Step 1. Frame 319

Jump Around, Jump Around

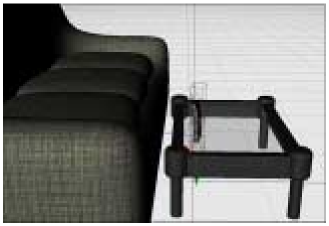
Now you need to create a jumping sequence, bringing the Remote from the tabletop onto the couch. This motion will be built with techniques similar to the standing motion. You'll create sequences as you need them and jump from track to track building up the entire motion.

Step 1: Create a new sequence for the RemoteBase object's rotation track from frame 296 to 383. This is the longest sequence of the entire jump and spans almost the entire three-second movement.

Control Click on the Sequence at frame 296 to add a keyframe. Enter 90 degrees in the P rotation of the dialog. Click OK. Again, this creates a parallel keyframe to the last keyframe on the previous sequence.

Create the next keyframe at frame 306 and lean the Remote backward at an angle of 70 degrees on the P. This, so the Remote prepares to leap forward.

Add the next keyframe at frame 319. By this time the Remote will be leaning forward deep into its leap. Make the angle of 125 degrees on the P axis.


Step 1. Frame 296


Step 1. Frame 306


Step 1. Timeline


Step 1. Frame 319

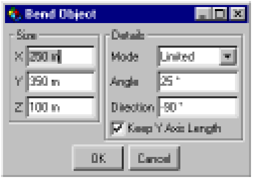
Step 2: Next you will add a sequence on the Bend object's parameter track to help accentuate the Remote's jump. With the Bend object selected in the Timeline, create a new sequence. Make it from frame 296 to 319.

Add the keyframe at frame 296 with a value of 25 degrees for the angle. This maintains the Remote's leaning forward position that it achieved at the end of the walk.

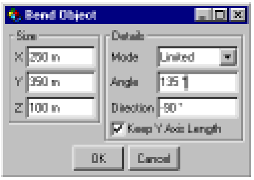
Create another keyframe at frame 313. Change the Angle to 135 degrees to bend the Remote forward. This bend precedes its leap into the air giving the impression the Remote is launching itself.

Finally, the Remote returns to an unbent position at frame 319. Create a keyframe at frame 319 and change the Angle to 0 degrees. This will correspond with the Remote being fully extended in flight between table and couch.

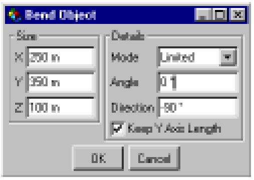
Step 2. Parameter Sequence



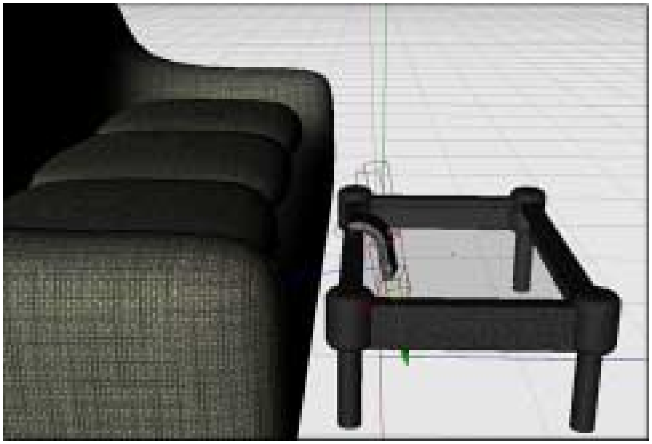
Step 2. Frame 296



Step 2. Frame 313



Step 2. Frame 319



Step 2. Frame 313

Step 2. Frame 296

Step 2. Frame 319

Step 3. Position Sequence

Step 3. Frame 314

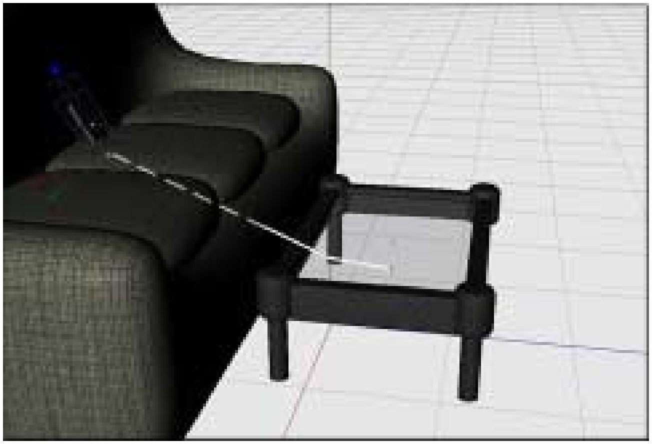
Step 3. Frame 314

Step 3: Now that you've got the basics of the leap put together, it is time to create the flight path. Create a new sequence for the Position track of the RemoteBase object. With the Position track selected in the Timeline, create a new sequence from frame 314 to 354.

As you are used to by now, create the first keyframe at frame 314. Its values should be X=0m, Y=0m, Z=-740m matching the ending position of the Remote's walk forward.

Create a second keyframe at time 354 with the values X=0m, Y=600m, Z=-2720m. This moves the Remote onto the couch.

Your Y setting will vary based on how thick you modeled your couch cushions.

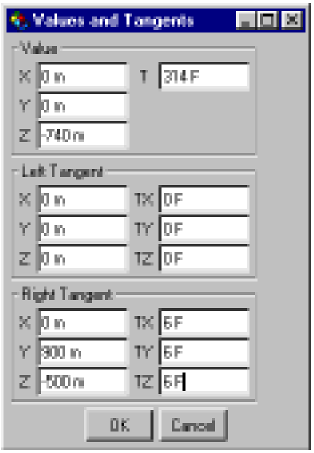


Step 3. Frame 354

Step 4: However, the path by which the Remote gets to the couch is a bit straight. You will need to adjust the tangents of the animation to curve the path of the RemoteBase. Switch to the Animation Tool.

Editor: Tools=>Animation
Shortcut: None

Select the RemoteBase object in order to see its animation path — the yellow line showing its position path. Using the Animation tool, double click on the yellow dot representing the first keyframe

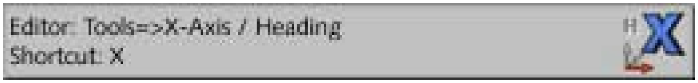


Step 4. Frame 314 Tangents

of this sequence of the Position path. The keyframe dialog will open. You can also double click on the keyframe in the timeline to open the dialog.

Conversely, you can hold the Shift key while you click and drag on a keyframe in the editor window to create tangents for a path. Creating tangents in this manner creates equal tangents for both sides. However, for this animation, you only want a tangent on one side of each keyframe, it would be best to create tangents in the dialog.

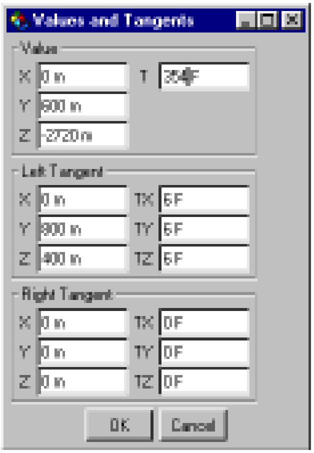
If you decide to do it by hand, lock the x-axis so that the tangents can not be moved in the X direction.



If you edit the tangent settings in the dialog (recommended), you just input the numbers.

Double click on the Keyframe at frame 314 on the Position track. Set all the Left Tangent values to 0. The Right Tangent should have 6F for TX, TY, and TZ with X=0m, Y=900m and Z=-500m for the Right Tangent position. Click OK. This gives you roughly a 60 degree angle.


Step 4. Frame 314 Tangent



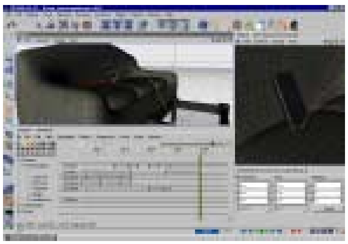
Step 4. Frame 354 Tangents

Double click on the Keyframe at frame 354 on the Position track. Set all the Right Tangent values to 0. The Left Tangent should have 6F for TX, TY, and TZ with X=0m, Y=800m and Z=400m for the Left Tangent position. Click OK. This gives you roughly a 45 degree angle.

Notice how the position path now arcs from the table to the couch.

At this point, you are probably going to need a second Editor view closer to the Remote so you can work on the finer points of the animation. Create a new View window.

Editor: Window=>New View Panel
Shortcut: None


Step 4. Docked View Panel

Dock it with the Object Manager, click on the thumbtack icon at the top left of the window and drag it to the thumbtack at the top of the Object Manager. When you see the little hand, let go and the New View Window will be indexed with the Object Manager, Structure Window and Browser. You can now adjust this view with the quick buttons on the top right to move in for a close up view of the Remote. You'll note it moves independent of the other window, giving you a second reference.

Step 5: For an added touch, you will use the Bulge deformation to increase the look of determination and power in the take off. Add a parameter track to the Bulge object.

Create a sequence on this track from frame 296 to 317.

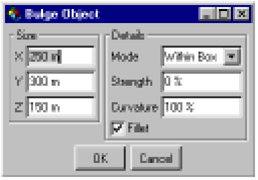
Create the first keyframe at frame 296. Set the Strength to 0%. This will preserve the rested state of the deformation.

Add a second keyframe at frame 304. Increase the strength to 40% causing the base of the Remote to bulge out.

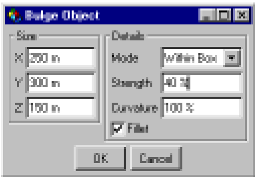
Add another keyframe at time 311 with the strength set to 50%. The bulge will continue to grow stronger.

Finally at frame 317 set another keyframe with the strength at 20%.

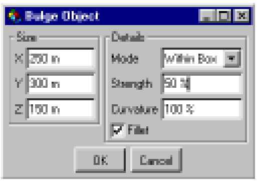
Step 5. Parameter Sequence



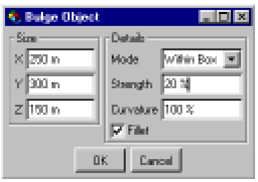
Step 5. Frame 296



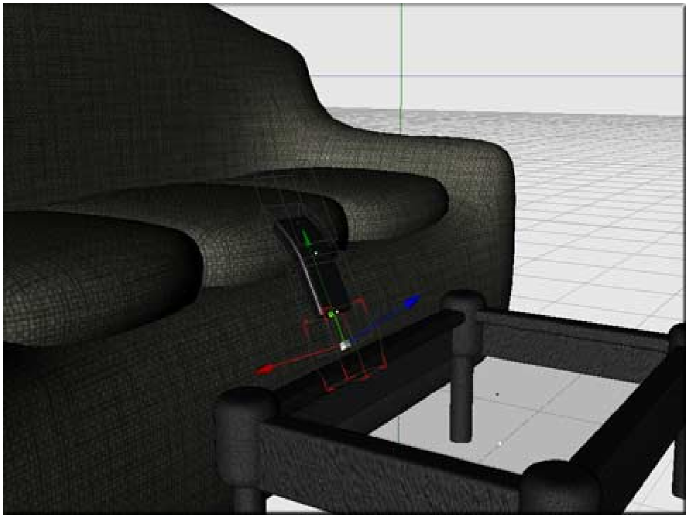
Step 5. Frame 304



Step 5. Frame 311



Step 5. Frame 317



Step 5. Frame 317

Step 6: You'll notice, that although the deformation is bulging, it is not affecting the Remote. To achieve the feeling that Remote is exploding into the air, you'll animate the deformation moving from the base of the Remote through the top of it.

With the Bulge deformation selected in the Timeline, create a Position track.

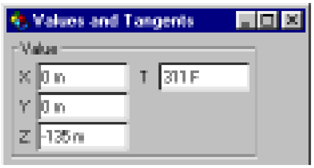
Step 6. Position Sequence

Add a sequence from frame 311 to 319. Double click on the Sequence of the Position track. In the dialog, change the sequence to start at frame 311 and end at frame 319. Click OK.

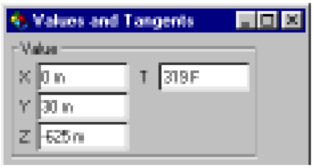
Create the first keyframe frame 311. Its position should be consistent with where it has been from the beginning of the scene, X=0, Y=0 and Z=-135.

Add a second keyframe at frame 319 and change the values to X=0, Y=30, Z=625.

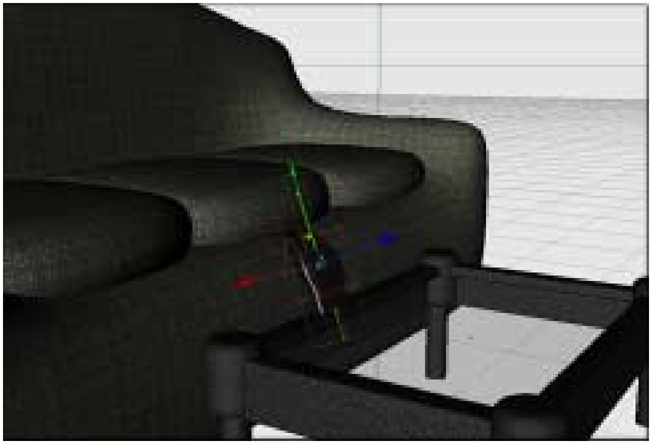
The Bulge object now travels through the Remote object adding that burst of energy as it jumps.



Step 6. Frame 311



Step 6. Frame 319

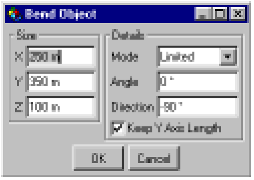

Step 6. Frame 315

Step 7: Now that you've finished the take off, you'll want to improve the middle portion of the flight. Notice how as the Remote reaches the highest point of its jump, it is still angled forward. At this point the base should rotate a bit under it so it will land on its feet.

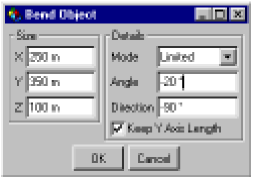
Step 7. Frame 330

Return to the rotation track on the Remote object and add a new keyframe at frame 330. Change the P rotation to 115 degrees. This will bring the Remote closer to being upright.

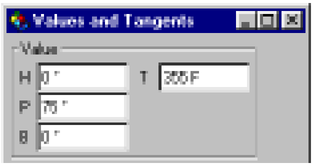
Step 8. Parameter Sequence



Step 8. Frame 325



Step 8. Frame 336



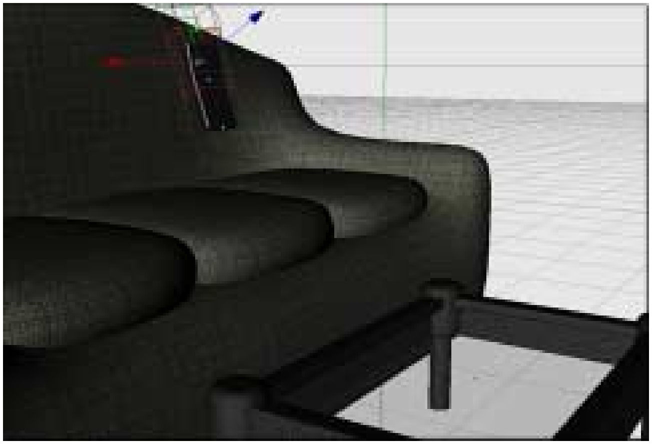
Step 9 . Frame 355


Step 9. Frame 355

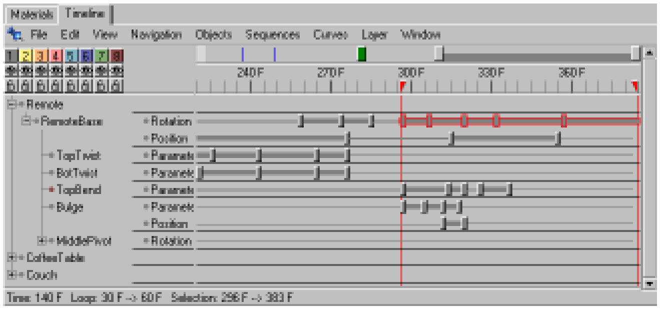
Step 8: Now add a new sequence to the Bend object's Parameter track. Make it last from frame 325 to 336.

Again the first keyframe at 325 should mimic the last keyframe of the previous sequence for consistency; an angle value of 0 degrees.

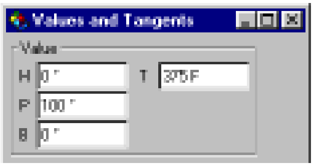
Create a new keyframe at frame 336. Add an Angle of -20 degrees. This will cause the Remote to lean back a little.


Step 8. Frame 336

Step 9: Finally you'll need to improve the landing of the Remote to give it a more dynamic look. Start by adding a new keyframe to the Rotation track of the Remote Base object at frame 355. Change the P rotation to 75 degrees. This will cause the Remote to land leaning back feet first.



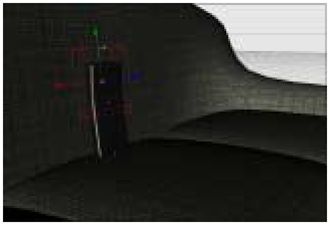
Step 9. Timeline

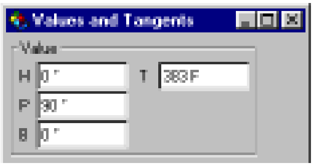


Step 10. Frame 375

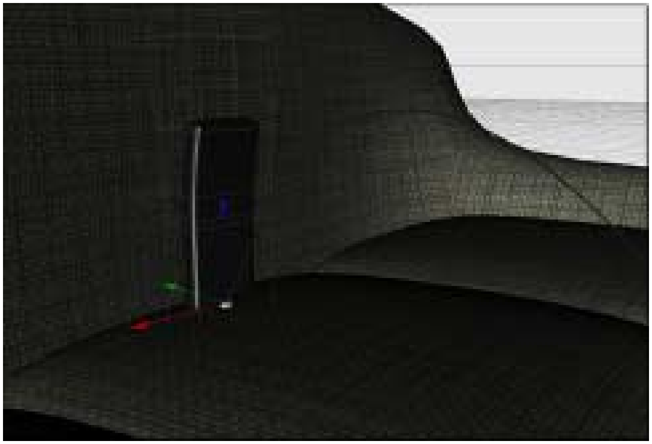
Step 10: Finally make the Remote to straighten itself back into an upright position. Add another keyframe to the Rotation track at frame 375. Change the P rotation to 100 degrees. This will cause the Remote to fall forward with the momentum of the leap.

Then bring the Remote back to the full upright position with a final keyframe on frame 383 with a P angle of 90 degrees.


Step 10. Frame 375



Step 10. Frame 383


Step 10. Frame 383

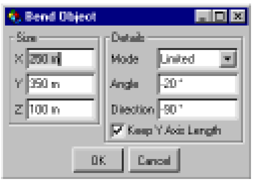
Step 11. Parameter Sequence

Step 11: To accentuate the look of the momentum carrying the Remote forward upon landing, create a bend forward just after landing. Add a new sequence to the Bend object's Parameter track. Make the new sequence from frame 355 to frame 386.

Add a keyframe at time 355 with an angle value of -20 degrees. Again, matching the last frame from the previous sequence. So the Remote is still leaning slightly backwards.

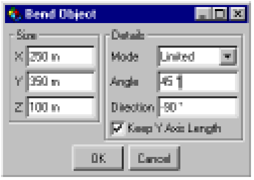
Add another keyframe at frame 368 with the angle value set to 45 degrees. This adds a bit of recoil to the Remote's jump action.

At frame 386 add your last keyframe with the angle value of 0 degrees.

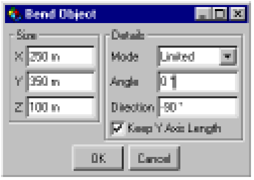


Step 11. Frame 355

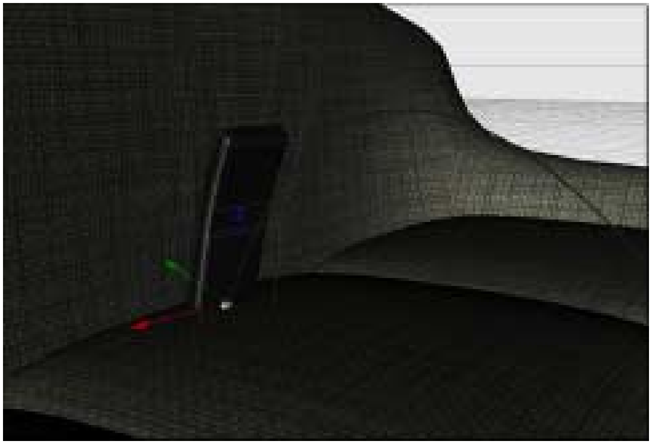
This would be a good time to save another copy of your scene and/or do a test render of the animation to check your results so far.



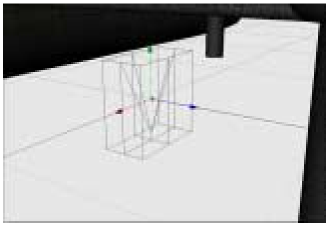
Step 11. Frame 368

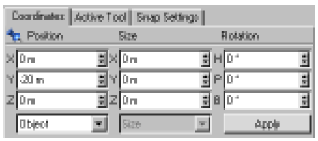


Step 11. Fream 386


Step 11. Frame 368

Step 12. FFD Parameters


Step 12. 1stLanding FFD



Step 12. FFD Coordinates

Step 12: If you look carefully at the Remote, you'll notice that the base is now buried in the couch cushion. To fix this you'll use a Free Form Deformation region to sink the cushion underneath the Remote control.

Add an FFD object to the scene.

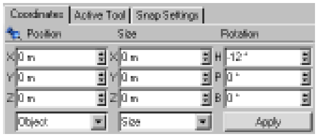
Editor: Objects=>Deformation=>FFD
Shortcut: None

Double click on the text "FFD" in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to "1stLanding."

Open the parameters of the FFD and set the Grid Points to X=3, Y=2, Z=3 and the Grid Size X=50m, Y=50m, Z=25m. This makes the FFD approximately the same size as the base of the Remote.

Change into Point mode. Select the middle point of the top of the FFD. Turn off the X and Z axis so that you can only move in the Y direction. Drag the middle point downwards. The setting shown is X=0m, Y=-20m, Z=0m.

Step 13. Transfer



Step 13. Rotation

Step 13. Object Manager

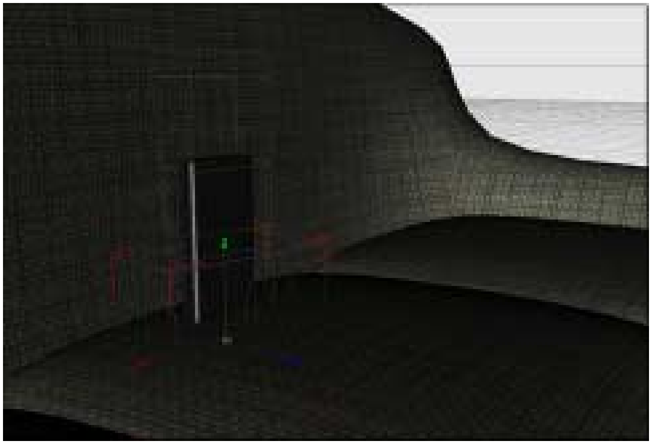
Step 13: Position the 1stLanding deformation where the Remote is currently positioned with the Transfer tool. Make sure the Time Slider is set to frame 383. The Remote should be in its landing position on the couch. Select the 1stLanding deformation object in the Object Manager and select the Transfer tool.

In the dialog, make sure only Position is selected and type RemoteBase into the Search for dialog. This will duplicate the RemoteBase positional coordinates to the 1stLanding.

Make sure the object tool is selected and rotate the FFD to -12 degrees on the H axis. This is the same direction the Remote is angled. This way the depression in the cushion will be inline with the direction the Remote is facing.

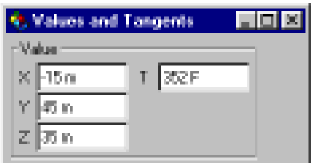
Drag and drop the 1stLanding deformation into the middle cushion.

In order to deform this cushion properly, you may need to subdivide the plane. To do this, choose the polygon tool. With the live selection tool, select the top polygon. From the Structure menu, choose Subdivide. Enter a value of about 2 and make sure the Hyper Subdivide option is checked. This subdivides the plane without changing the shape.

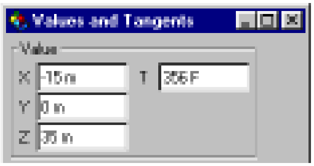


Step 13. FFD

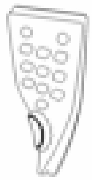
Step 14. Position Sequence



Step 14. Frame 352



Step 14. Frame 356



Step 1. Parameter Sequence

Step 14: Now add a Position track to the 1stLanding object. Make the sequence of that track from frame 352 to frame 356. This corresponds to the time just before the Remote lands until just after it lands.

Set a keyframe on the sequence at frame 352. The values should be X=-15m, Y=45m, Z=35m. This leaves the cushion in tact for the moment.

Set your second keyframe with the values X=-15m, Y=0m, Z=35m at frame 356. Now as the Remote lands the couch cushion will collapse downwards under its weight. This is the last piece to making this first jump look really nice.

As the Remote lands there would be a springy rebound on the foam cushions. This action is not detailed here. This is something you can play with on your own.

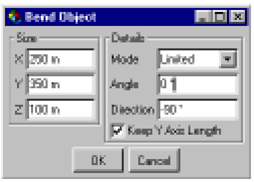
Hop To It

Now you'll make the Remote take a little hop across the cushion. This is essentially the same process as the larger jump from table to couch.

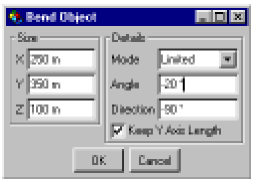
Step 1: Add a new sequence to the Parameter track of the Bend object from frame 391 to frame 397.

At frame 391 add a keyframe with the angle parameter set to 0 degrees.

Then at frame 397 set another keyframe with the angle parameter at -20 degrees. This will lean the Remote back, as if getting ready to hop.



Step 1. Frame 391



Step 1. Frame 397


Step 1. Frame 397

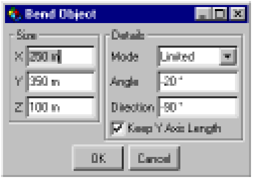
Step 2: Create another sequence on the Bend object's parameter track from frame 402 to 448.

At frame 402 add a keyframe with an angle value of -20. This holds the Remotes slightly bent back position, matching the end of the previous sequence.

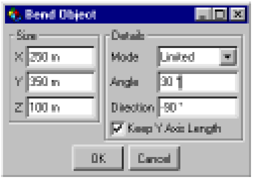
Now at frame 412 add a keyframe with the angle value of 30 degrees as the Remote leans into its hop.

As the Remote leaps into the air again, you want it to straighten a bit, so add a keyframe at frame 427 with an angle value of 20 degrees.

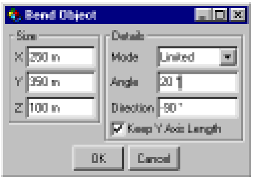
Step 2. Parameter Sequence



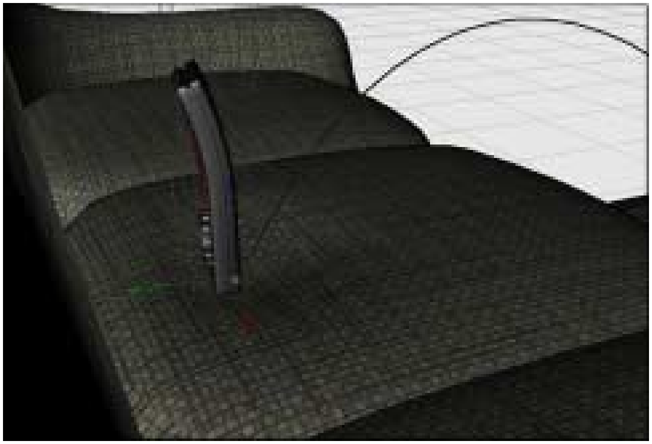
Step 2. Frame 402



Step 2. Frame 412



Step 2. Frame 427

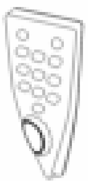

Step 2. Frame 412

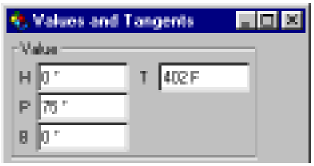

Step 1. Frame 402


Step 1. Frame 427

Step 3. Rotation Sequence

Step 3. Frame 394





Step 3. Frame 402

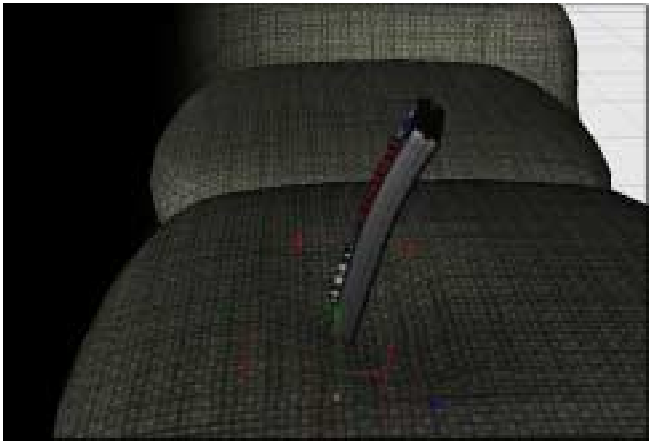
Step 4. Position Sequence

Step 4. Frame 409

Step 3: Now you need to add more to the take off of the Remote for its second hop. Create a new sequence on the RemoteBase's Rotation track from frame 394 to 440.

Set the first keyframe on this sequence at time 394 and with a P rotation of 90 degrees.

The second keyframe will add a leaning back anticipation before the leap. Put it at frame 402 with a P rotation of 75 degrees.



Step 3. Frame 402

Step 4: The next step is to animate the Remote moving from the first landing spot to the second landing spot. Add a new sequence to the RemoteBase object's Position track. It should run from frame 409 to 430.

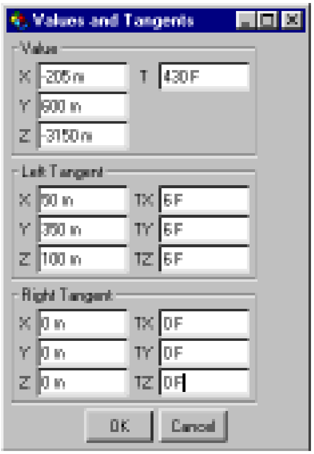
The jump will only last about two-thirds of a second. Set the first keyframe at the beginning of the sequence with the values X=0m, Y=600m and Z=-2720m.

The second keyframe should be placed at the end of the sequence on frame 430. The values for this keyframe should be X=-205m, Y=600m and Z=-3150m.

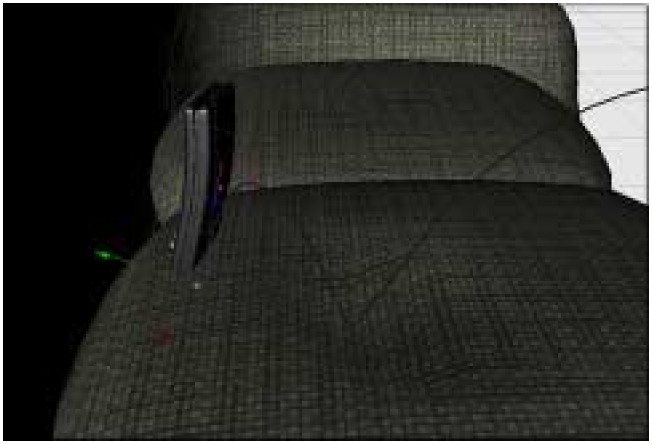
You'll want to adjust the tangents as you did previously to create a nice arc along the path the Remote will take. In this case you'll have to adjust the tangents in all three axis at once as the Remote moves along all three axis as it travels. You could set the tangents

Step 4. Frame 409

numerically or set them numerically as a starting point and adjust them visually from there. A good starting point is to set the first keyframe's right tangent to X=50m, Y=350m, Z=-100m and TX=6F, TY=6F, TZ=6F. Set the second keyframe's left tangent to X=50m, Y=350m, Z=100m and TX=6F, TY=6F, TZ=6F.

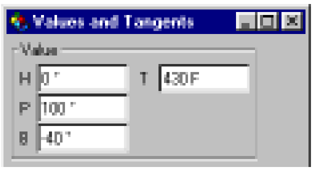


Step 4. Frame 430

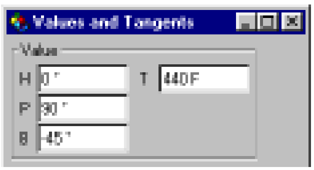

Step 4. Frame 430

Step 5: As the Remote flies through the air, you want it to turn a little in the direction it is jumping. On the Rotation track for the RemoteBase, create a keyframe at frame 430 with a P rotation of 100 degrees and a B rotation of -40. The P rotation will land the Remote leaning slightly forward and the B rotation begins to turn the Remote in the direction of the jump.

Add your last keyframe for this sequence at frame 440 with the P rotation at 90 and the B at -45 degrees.



Step 5. Frame 430



Step 5. Frame 440


Step 5. Frame 430


Step 5. Frame 440

Step 6. Position Sequence

Step 6: Since the Remote is no longer going to be depressing the cushion, you need to animate the 1stLanding deformation object lifting off the couch and returning the cushion to its original shape.

Create a new sequence on the Position Track of the 1stLanding object from frame 405 to frame 420.

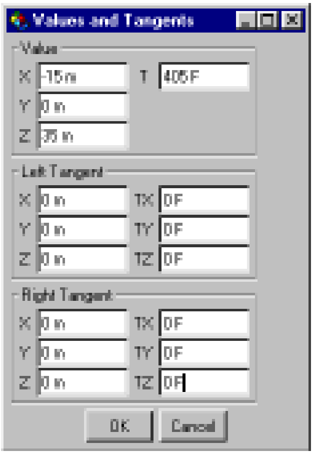
The first frame should be at time 405 and should have the parameters X=-15m, Y=0m and Z=35m. The tangents settings should all be 0.

The second keyframe should be at time 420 with the values X=-15, Y=45 and Z=35. Again, the tangent values should all be 0.

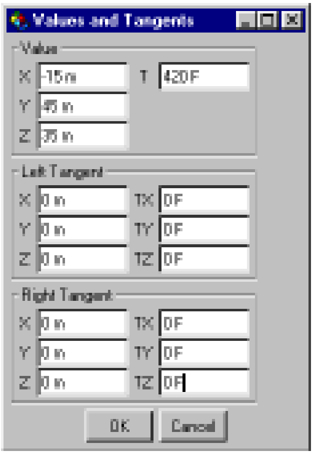
Step 7: You'll want to add some more detail to the jump using the Bend object's parameter track. Add a keyframe to the sequence at 433 with a value of 35 degrees in the angle field. This will cause the Remote to bend forward slightly as it lands.

Add another key at frame 442 with a value of -20 degrees. This will bend the Remote backwards as it overcompensates standing up.

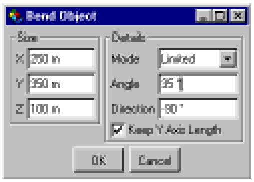
Finally at frame 448 bring the Remote back to an upright position with a keyframe with an angle value of 0 degrees.



Step 6. Frame 405

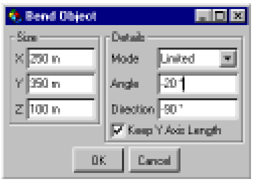


Step 6. Frame 420

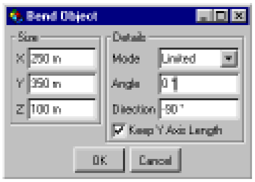


Step 7. Frame 433

Step 7. Frame 433



Step 7. Frame 442



Step 7. Frame 448

Step 8. Transfer

Step 8. Object Manager

Step 8: Again if you look carefully at the Remote, you'll notice that it is now buried in the couch cushion. To fix this you'll use another FFD region to push down the cushions around the Remote control.

Duplicate the 1stLanding object by copying it and pasting in the object manager. Make sure this new object is a child of the middle cushion. Rename this copy to 2ndLanding and delete the sequences from its position track.

With 2ndLanding selected in the Object Manager, choose Transfer from the functions menu. Type RemoteBase into the name field and hit enter.

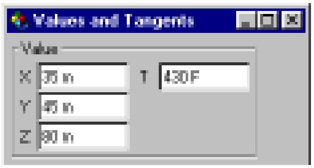
Step 9: Add a sequence on the position track from frame 430 to frame 434. This corresponds to the time just before to after the Remote lands.

Set a keyframe on the sequence at time 430. The values should be X=35m, Y=45m, Z=80m.

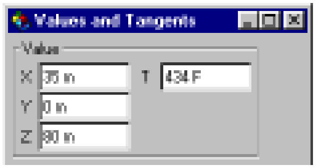
Set your second keyframe with the values X=35m, Y=0m, Z=80m at time 434. Now as the Remote lands on the couch cushion again, the cushion will indent under the Remote's weight.

This would be a good time to save another copy of your scene and/or do a test render of the animation to check your results so far.

Step 9. Position Sequence



Step 9. Frame 430



Step 9. Frame 434

Twist and Shout

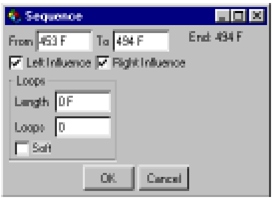
Now the Remote is facing basically towards the back of the couch. You need to turn it around so that it is facing the television. Rather than just having the Remote do a simple turn, you will make it leap into the air and spin itself around.

Step 1: In order to turn itself around, the Remote will use its upper body to generate torque. To create this effect you will return to the TopTwist object.

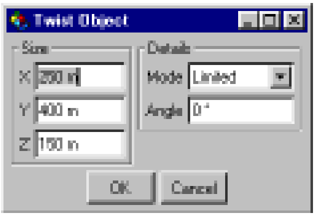
Create a new sequence on the TopTwist object's parameter track from frame 453 to frame 494.

Add a keyframe at time 453 with the angle value at 0 degrees.

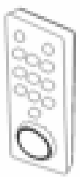
The second keyframe should be at frame 461 with an angle of 60 degrees. This is the "wind up" as the Remote twists itself to the right, opposite the direction it wishes to spin.

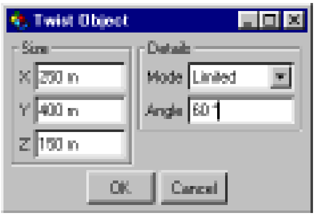


Step 1. Parameter Sequence



Step 1. Frame 453





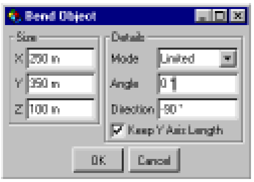
Step 1. Frame 461


Step 1. Frame 461

Step 2. Parameter Sequence

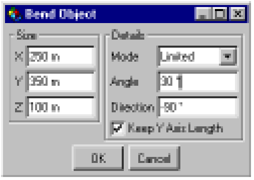
Step 2: As the Remote winds itself up, it also needs to gather itself to jump into the air. Create a new sequence on the Bend object's Parameter track from frame 454 to 508.

The first keyframe is an angle of 0 degrees at frame 454.

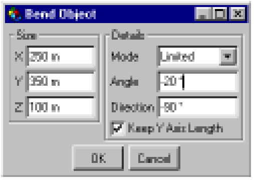


Step 2. Frame 454

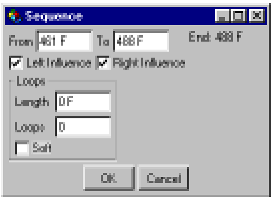
The second keyframe at time 463 has the angle parameter at 30 degrees, bending the Remote downwards.



Step 2. Frame 463

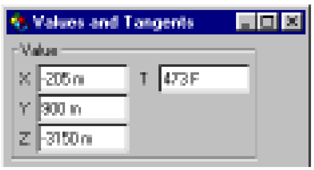


Step 2. Frame 477



Step 3. Position Sequence

Step 3. Frame 461 / Frame 488



Step 3. Frame 473

The third keyframe at frame 477 has an angle of -20 degrees as the Remote's leap upwards also propels it backwards slightly.

Step 3: Now you need to make the Remote fly up into the air and return to the couch cushion again. Create a new sequence on the RemoteBase object's Position track from frame 461 to frame 488. This little leap and spin will last about two-thirds of a second.

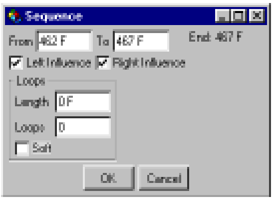
The first keyframe is at frame 461 and has the values of X=-205m, Y=600m and Z=-3150m. All of the tangent values are 0F.

The second keyframe defines the top of the leap at frame 473 with the parameters X=-205m, Y=900m and Z=-3150m.

The third keyframe is a duplicate of the first one and placed at frame 488.

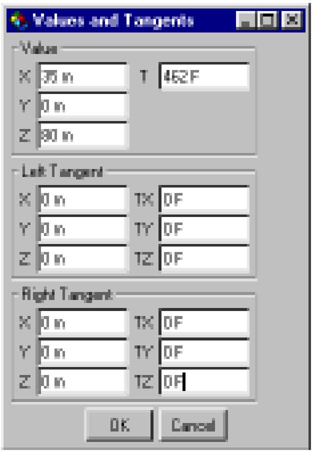

Step 3. Frame 473

Step 4: Now the Remote is no longer going to be on the cushion. You will need to animate the 2ndLanding object lifting off the couch and returning the cushion to its original shape. Create a new sequence on the Position Track of the 2ndLanding object from frame 462 to frame 467.

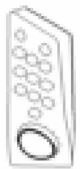


Step 4. Position Sequence

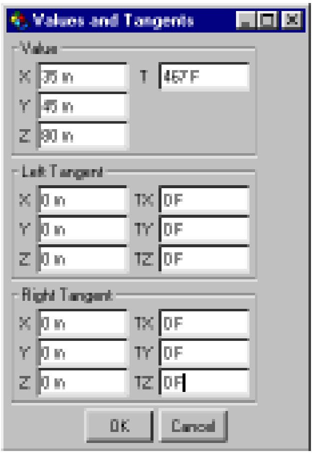
The first frame should be at time 462 and should have the parameters X=35m, Y=0m and Z=80m. The tangent values should all be at 0F.



Step 4. Frame 462



The second keyframe should be at time 467 with the values X=35m, Y=45m and Z=80m. Again, the tangent values should all be 0F.

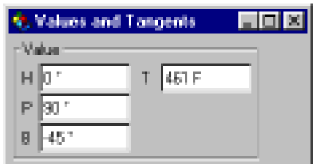


Step 4. Frame 467

Step 5: Add a new sequence to the Rotation track of the RemoteBase object from frame 461 to 484. You will use this to spin the Remote around in the air.

Create a keyframe at time 461 on this sequence with the values H=0, P=90 and B=-45.

The second keyframe will go at the end of the sequence on frame 484. Its parameters will be H=0, P=90 and B=-180.

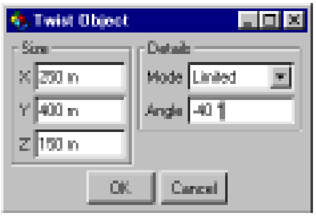


Step 5. Frame 461

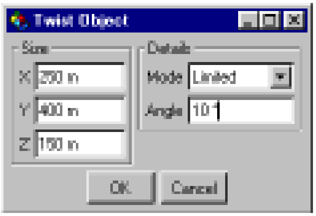
Step 5. Frame 484


Step 5. Frame 461

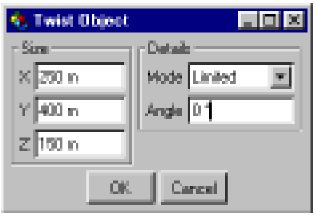

Step 5. Frame 484



Step 6. Frame 480



Step 6. Frame 489



Step 6. Frame 494

Step 5. Frame 473

Step 6: Return to the sequence in the Parameter track of the TopTwist object. Add a keyframe at frame 480 with the angle value set to -40 degrees. The Remote will untwist itself and as it does so throw itself around.

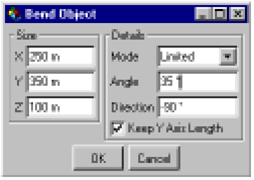
The next keyframe on this sequence will be at frame 489 and have an angle of 10 degrees. The Remote will be returning to its straight forward position, but will overshoot the final resting point.

The last keyframe at frame 494 returns the Remote to rest with an angle value of 0 degrees.

Step 6. Frame 480

Step 6. Frame 489

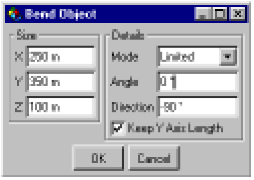
Step 6. Frame 494



Step 7. Frame 490

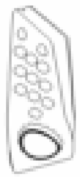
Step 7: As the Remote lands, the momentum will bend it forward again. Create a new keyframe at frame 490 with an angle value of 35 degrees on the Bend Parameter track.

Add another keyframe at time 496 and set the angle to 0 degrees. This will cause the Remote to lean back to an upright position. This is actually an overshoot position because you want the Remote leaning slightly forward to give it a more purposeful look.



Step 7. Frame 496

The final keyframe should be placed at frame 508 and have a value of 25 degrees, leaning the Remote's "head" just a little forward.



Step 7. Frame 508

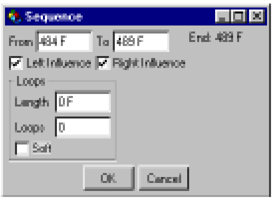

Step 7. Frame 490


Step 7. Frame 508

Step 8: Now as the Remote lands on the couch cushion again, the cushion will collapse downwards under its weight. This will add the same effect as the previous jumps. Add a sequence on the Position track of the 2ndLanding object from frame 484 to frame 489. This corresponds to the time just before the Remote lands until just after it lands.

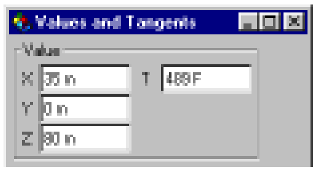
Set a keyframe on the sequence at time 484. The values should be X=35m, Y=45m, Z=80m.

Set your second keyframe with the values X=35m, Y=0m, Z=80m at time 489.

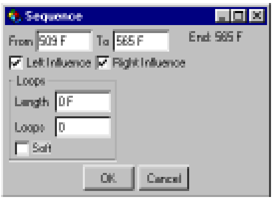


Step 8. Position Sequence

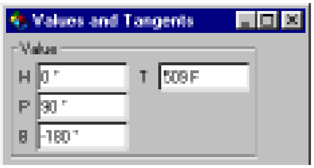
Step 8. Frame 484



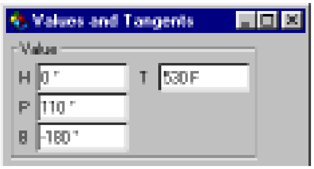
Step 8. Frame 489



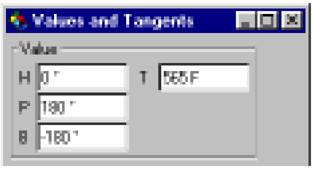
Step 1. Rotation Sequence



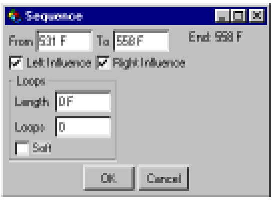
Step 1. Frame 509



Step 1. Frame 530



Step 1. Frame 530



Step 2. Parameter Sequence

Kickin' Back

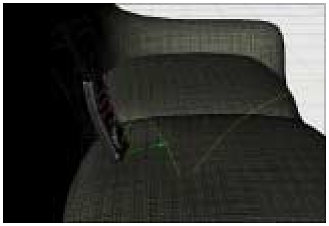
Now you want the Remote to lean back against the back of the couch before sliding down into a relaxed position.

Step 1: Start by creating the rotation of the Remote as it leans back. Create a new sequence from frame 509 to frame 565 on the Rotation track of the RemoteBase object.

Add a keyframe at time 509 with a rotation value of P=90 and B=-180 for consistency.

At frame 530 the Remote will be leaning back so that it is resting on the couch. Set a keyframe with the rotation values P=110 and B=-180.

Finally the Remote will settle into the couch completely horizontally. Add a keyframe at frame 565 with the values P=180 and B=-180.



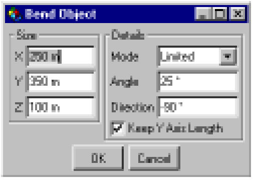
Step 1. Frame 530

Step 1. Frame 565

Step 2: You'll notice that now the Remote is buried in the couch. To correct this, create a new sequence on the Bend object's Parameter track from frame 531 to frame 558.

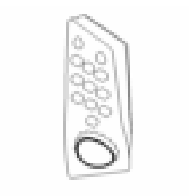
The first keyframe on this sequence will be at frame 531 with an angle value of 25 degrees.

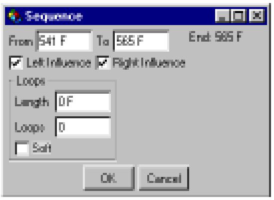
The second keyframe will be at frame 558 and have an angle value of 120 degrees. The Remote will now be sitting down and facing the television.



Step 2. Frame 531

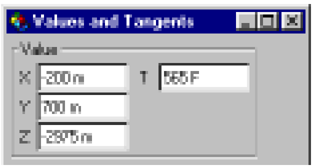
Step 2. Frame 558





Step 3. Position Sequence

Step 3. Frame 541



Step 3. Frame 565

Step 2. Frame 558

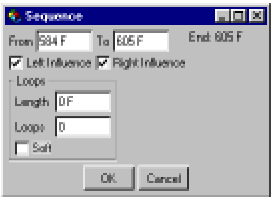
Step 3: However, you'll notice that the Remote is still somewhat buried in the couch. You can fix this by sliding the base of the Remote forward as it rotates down. Create a new sequence on the Position track of the RemoteBase object from frame 541 to 565.

Add your first keyframe at time 541 with values of X=-205, Y=600and Z=-3150. Zero out all of the tangent values so that this will be a nice linear movement.

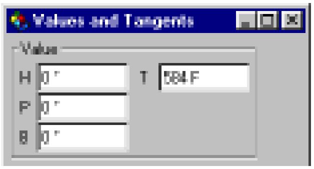
Add a second keyframe at frame 565 with the values X=-200, Y=700 and Z=-2975. Again make sure that you set all the tangent values to 0F.

This is another area that requires a lot of tweaking. If you made your couch with more padding than here, the Remote will sink into the couch geometry sooner. If you made it thinner, the Remote may float above the couch. Tweak your numbers as needed.

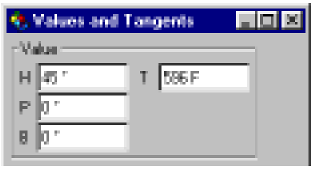
Step 3. Frame 565



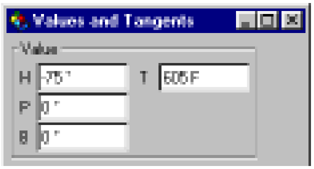
Step 1. Rotation Sequence



Step 1. Frame 584



Step 1. Frame 596



Step 1. Frame 605

Changing Channels

Now that the Remote is sitting down and comfortable, you want it to remain there for a few seconds. This provides a break in the animation so that it is not constantly in motion. However, a completely static pause is very boring to the viewer. You'll want to create what is known as a "moving hold." This adds some motion to a character that is standing still. For example, a character might shift its weight back and forth, tap its foot, etc. The moving hold you'll create for the Remote is to rotate its jog wheel.

Step 1: Add a Rotation track to the Jog object and change the sequence from frame 584 to 605.

Add a keyframe at frame 584 with all axes set to 0 degrees.

At frame 596 set a keyframe so that the H axis is at 45 degrees.

At frame 605 add a third keyframe with the H axis at -75 degrees.

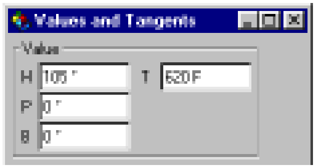
Step 2: Add another sequence to the Rotation track from frames 609 to 620.

The first keyframe at 609 is a copy of the last keyframe of the previous track; the H axis set to -75 degrees.

At frame 620 set another keyframe with the H axis at 105 degrees.

Step 2. Rotation Sequence

Step 2. Frame 609



Step 2. Frame 620

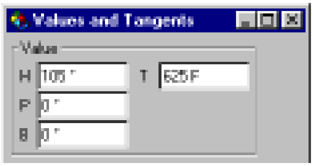
Step 3: Add a third sequence to the Rotation track of the Jog object from frames 625 to 643.

Create a keyframe at time 625 with the H axis at 105 degrees.

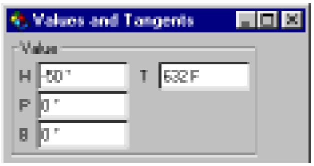
Create a second keyframe on this sequence at frame 632 with the H axis set to -50 degrees.

Add your last keyframe on the end of the sequence at frame 643 with an H axis rotation of 0 degrees.

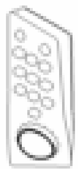
This all gives the impression of idle, sub-conscious movement.

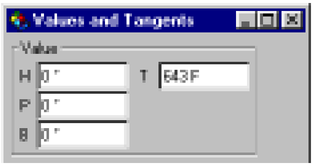


Step 3. Frame 625



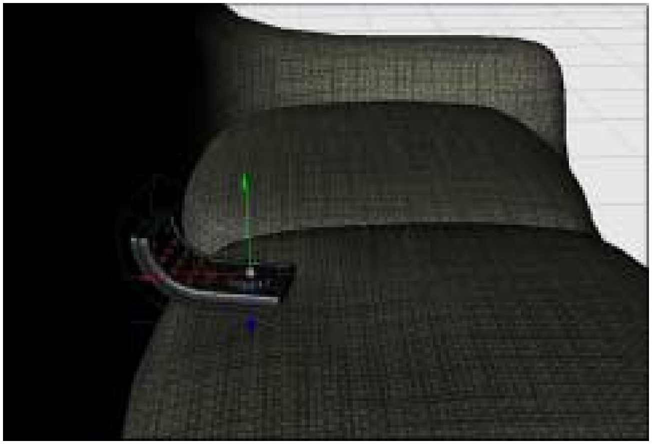
Step 3. Frame 632





Step 3. Frame 643

Step 3. Parameter Sequence

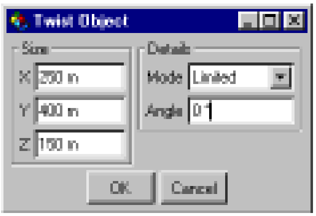

Step 3. Frame 625

Getting Caught

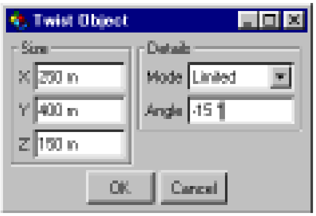
Every story needs some conflict. Although this is an exercise, you can add a little for this story. As the Remote is sitting on the couch it hears someone coming down the hall. To show that the Remote hears something coming, it needs to look towards the direction of the sound.

Step 1: Add a new sequence to the TopTwist object's Parameter track. This sequence should go from frame 640 to 669. Notice that this sequence overlaps with the Jog Wheel's animation.

Add a keyframe at time 640 with the Angle parameter set to 0 degrees.



Step 1. Frame 640



Step 1. Frame 650

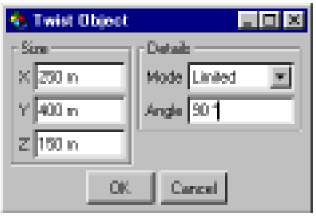
Set a new keyframe at time 650 with the angle parameter set to -15 degrees, this is the anticipation of the turn towards the left and the source of the sound.

At frame 663 set a keyframe with the angle parameter at 90 degrees, the overshoot position.

At frame 669 the angle parameter is 80 degrees as the Remote settles into position looking left.

Step 1. Frame 640

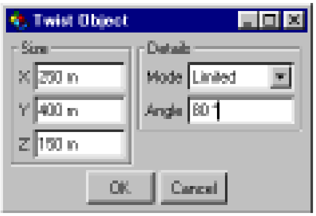
Step 1. Frame 650



Step 1. Frame 663

Step 1. Frame 663

Step 1. Frame 669

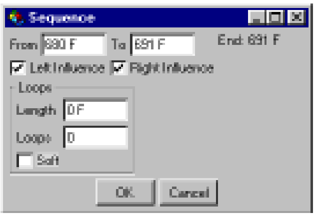


Step 1. Frame 669

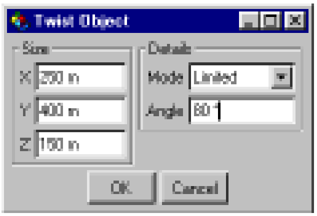
Step 2: Add a second sequence from frame 680 to frame 691.

Add a new keyframe at time 680 with the angle parameter at 80 degrees.

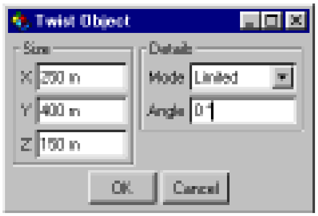
Add the last keyframe at frame 691 with an Angle parameter value of 0 degrees.



Step 2. Parameter Sequence



Step 2. Frame 680



Step 2. Frame 691

One Small leap for Remote, One Giant Leap for Remotekind

Now you have to retreat the Remote to its original position. The Remote's leap to back to the table starts by getting it back onto its feet. The Remote will bend forward to gain momentum to lift itself up.

Step 1: Add a new sequence to the Bend object's Parameter track from frame 682 to frame to 766.

Add a keyframe at time 682 with an angle of 0 degrees.

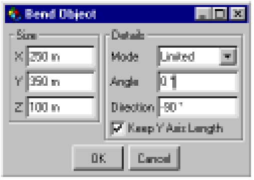
At frame 689 add a keyframe with an angle of 105 degrees.

At frame 697 the Bend angle should be keyframed at 190 degrees.

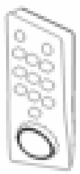
At frame 719 add a keyframe with an angle of 220 degrees.

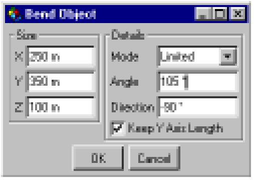
At frame 731 set a keyframe with an angle value of -20 degrees.

Step 1. Parameter Sequence



Step 1. Frame 682





Step 1. Frame 689

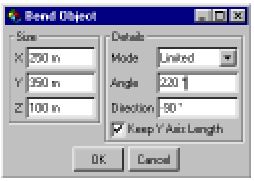
Step 1. Frame 697


Step 1. Frame 689

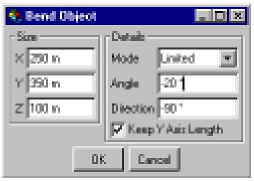

Step 1. Frame 697


Step 1. Frame 719

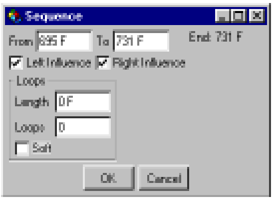

Step 1. Frame 731



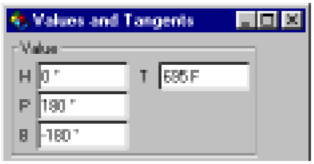
Step 1. Frame 719



Step 1. Frame 731



Step 2. Rotation Sequence



Step 2. Frame 695

Step 2. Frame 723

Step 2. Frame 731

Step 3. Frame 745

Step 2: Concurrently, add a new sequence to the Rotation track of the RemoteBase object from frame 695 to 731.

At frame 695 add a keyframe to the sequence with the P axis set to 180 degrees and the B axis set to -180 duplicating the previous sequence end.

Add a keyframe at time 723 with the P axis now set to 100 degrees and the B axis still at -180.

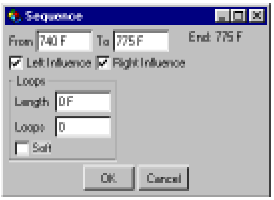
At frame 731 add a keyframe with the P axis at 90 degrees and the B axis at -180 degrees. The Remote should be standing up.

Step 2. Frame 723

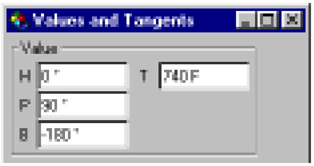
Step 3: Now you want the Remote to leap into the air. As the Remote flies through the air it will straighten out and turn lifeless. Return to the Bend object's parameter track and add a keyframe at time 745 with an angle value of 60 degrees. The Remote will be throwing itself into the leap.

Add your last keyframe to this track at time 766 with the angle set to 0 degrees.

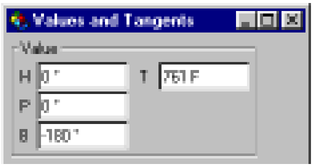
Step 3. Frame 766



Step 4. Rotation Parameters



Step 4. Frame 740



Step 4. Frame 761

Step 4. Frame 775

Step 5. Position Sequence

Step 4: Add a new sequence to the RemoteBase's Rotation track from frame 740 to 775.

Add a keyframe at time 740 with the P axis set to 90 degrees and the B axis set to -180 degrees.

Add a second keyframe at time 761 so that the P axis is 0 degrees and the B axis remains -180 degrees. This will get the Remote laying down flat.

But the buttons are facing down instead of up, so you need one more keyframe. Add the last keyframe at the end of the track at time 775. The values of this keyframe should be 0 on all axes.


Step 4. Frame 761 - Remote inside cushion

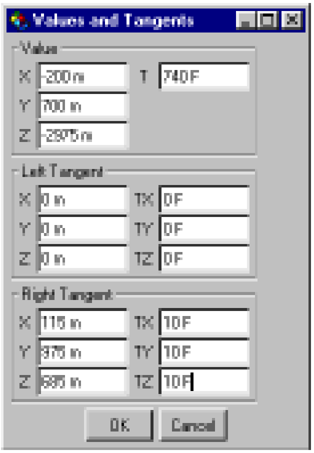

Step 4. Frame 775

Step 5: Now to add the leap. Add a new sequence from frame 740 to 816 on the RemoteBase object's Position track. This will be used to move the Remote to the table and then into a slide across the table.

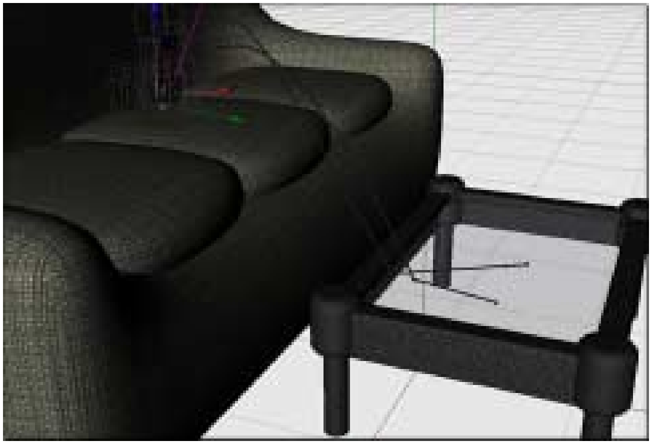
The first keyframe is at time 740 and has the values X=-200m, Y=700m and Z=-2975m. The Left tangent is all zeroes and the right tangent has values X=115m, Y=975m and Z=685 and TX,TY, TZ set to 10F.

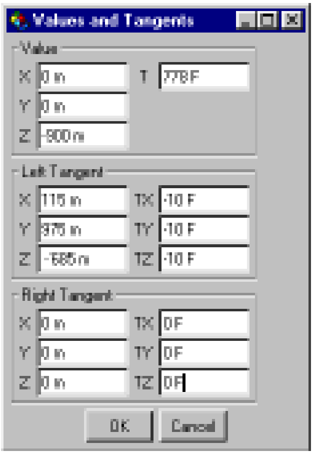
Add a second keyframe halfway along the sequence at time 778. Set its parameters to X=0m, Y=0m and Z=-900m. The Left Tangent should have the values X=115m, Y=975m, Z=-685m and TX,TY,TZ should all equal -10F. The Right Tangent should be all zeroes.

Add the last keyframe at frame 816. It should have all zeroes in the tangents and the values X=-580m, Y=0m and Z=-300m.

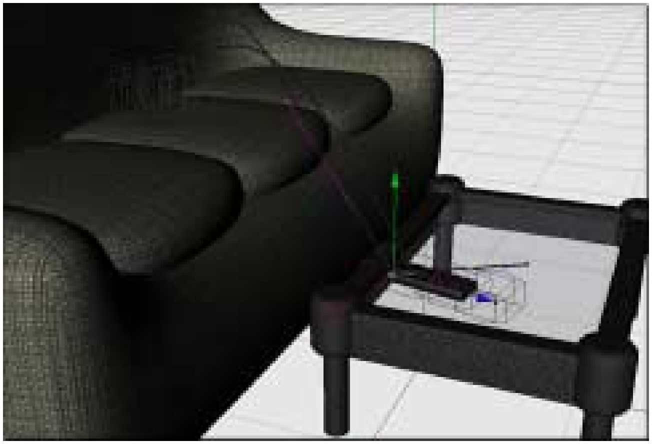


Step 5. Frame 740


Step 5. Frame 740



Step 5. Frame 778


Step 5. Frame 778

Step 5. Frame 816


Step 5. Frame 816

Step 6: Don't forget to remove the depression in the couch cushion as the Remote leaves the couch. Add a sequence on the 2ndLanding object's Position track from frame 745 to 749.

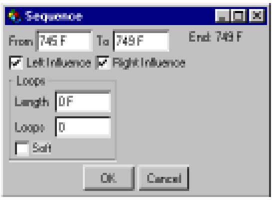
The first keyframe should be X=35m, Y=0m and Z=80m.

Add the last keyframe at time 749 with values X=35, Y=45 and Z=80m. All the tangent values in both keyframes should be 0F.

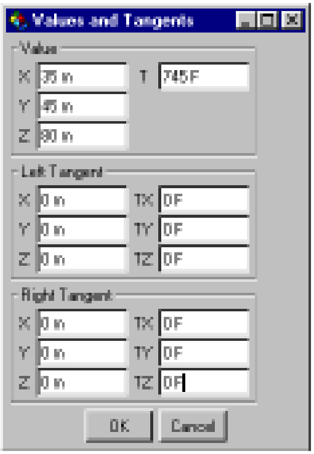
Step 7: When the Remote lands on the table, it will spin around a bit as it slides across. Add a sequence to the Rotation track of the Middle Pivot object. The sequence should run from frame 782 to 827.

Add a keyframe at time 782 with all values at 0 degrees.

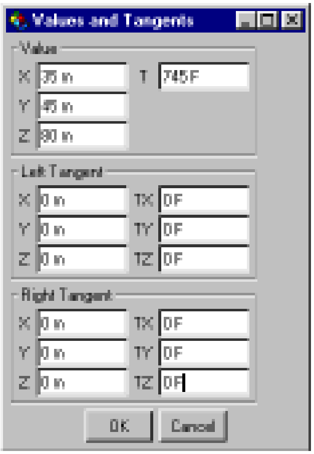
Add the second keyframe at time 827 to make the Remote turn three quarters of a turn. This corresponds to a value of -270 degrees on the H axis of the keyframe.



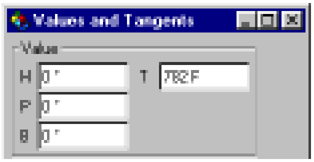
Step 6. Position Sequence



Step 6. Frame 745

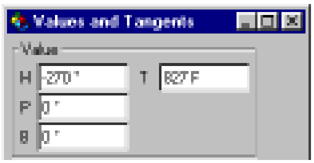


Step 6. Frame 749

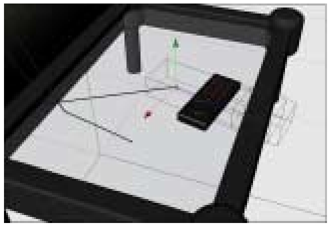


Step 7. Frame 782

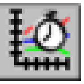

Step 7. Frame 782



Step 7. Frame 827


Step 7. Frame 827

Step 8: Now you'll want to use Time Control so the Remote gradually spins to a stop. Make sure the last sequence on the MiddlePivot Rotation track is selected. Then switch to the Time Control window.

Timeline: Window=>Time Curves
Shortcut: Shift+T 

A new window with a grid will open within the Timeline as shown on the next page. The Time Curves window is where you can control how the state of an object changes during a sequence.

Every sequence can have a curve. So if you have multiple sequences, each can have its own Time Curve. Each curve affects the animation sequence in its own way.

- The Red line "P" affects the Position or actual state of the keyframe.
- The Green line "V" affects the velocity or how fast the transition happens.
- The Blue line "A" affects the acceleration of how the transition happens.

Since you want to gradually slow the rotation of the Remote, you will be affecting the Velocity of the rotation. The Time Curve defaults to Path Mode, so you need to change to Velocity Mode.

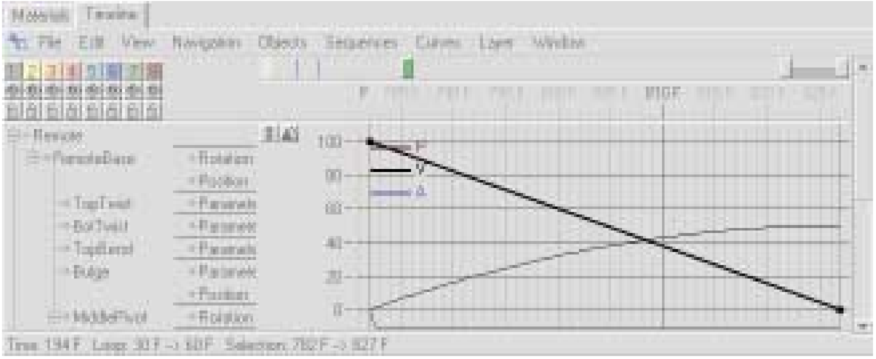
Add a Ramp Down curve to the Rotation sequence in Velocity mode.

Timeline: Curves=>Time Curves=>Ramp Down
Shortcut: None

This means the velocity or speed of the rotation will start out fast and gradually decrease.

Then choose Fit Path End to 100%.

Timeline: Curves=>Time Curves=>Fit Path End to 100%
Shortcut: None

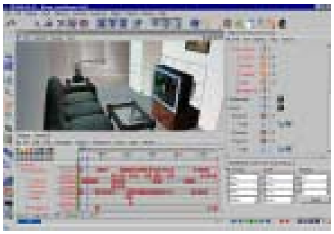


Step 8. Time Curves

This guarantees the sequence will complete its full motion.

Make sure to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)


Merged Scene

Merge with Caution

Now it's time to bring it all together.

Go back to your completed Room scene. Delete the Couch and Coffee Table.

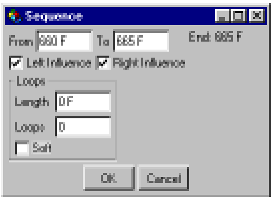
Editor: File=>Open
Shortcut: Ctrl+O (pc) / Cmd+O (mac)

And, Merge your Remote animation scene into it.

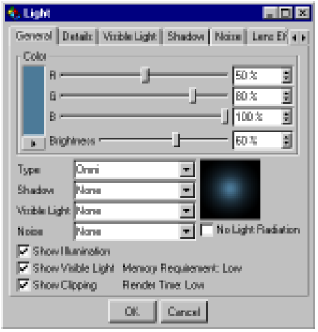
Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

Make sure to save this new combined project.

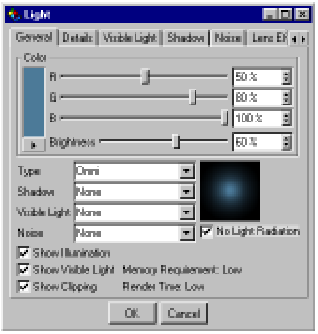
Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)



Step 1. Parameter Sequence



Step 1. Frame 660



Step 1. Frame 665

Animating the Lights

In the story you've created for the remote, there is conflict between the remote and the inhabitant of the house. As the remote watches television, it hears someone coming. It tries to make it back to the coffee table before the lights turn on and it is caught moving about.

There are four lights that need to be animated to simulate someone turning on the lamp in the room. Then, there is an additional texture that must be changed to simulate the difference between light coming in from the window and light filling the room.

Animating the Moonlight

First animate the change in the moonlight coming through the window.

Step 1: Create a parameter track for the light named "MoonL". With MoonL selected in the Timeline, create a Parameter track.

Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of MoonL in the Timeline.

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 660 and end at frame 665. Click OK.

Add a keyframe at frame 660 to this track. Click OK. This light is already on and you want it to stay on.

Add a second keyframe at frame 665. Turn on "No Light Radiation" for this keyframe and click OK. Now the light from the moon will disappear right on frame 665. You are using the "No Light Illumination" checkbox because it creates an abrupt change from on to off in the light. This is the easiest way to animate this type of light change.

Animating the Lamp Lights

Step 1: Create a parameter track for the light named “LampS”. With LampS selected in the Timeline, create a Parameter track.

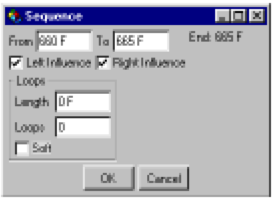
Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the LampS in the Timeline.

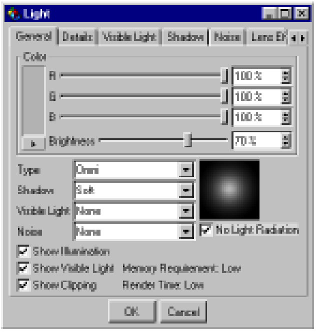
Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 660 and end at frame 665. Click OK.

Add a keyframe at frame 660 to this track. Click OK. This light is already off and you want it to stay off.

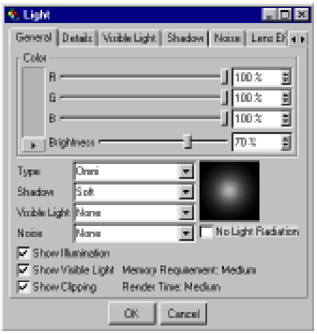
Add a second keyframe at frame 665. Turn off “No Light Radiation” for this keyframe and click OK. Now the light from the Lamp that casts a shadow will turn on at frame 665.



Step 1. Parameter Sequence



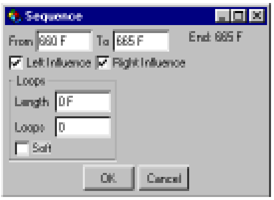
Step 1. Frame 660



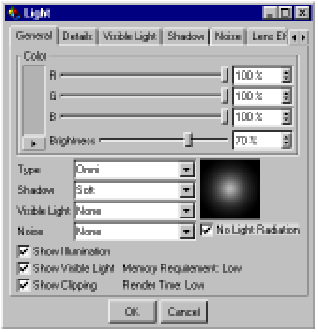
Step 1. Frame 665

Step 2. Frame 660

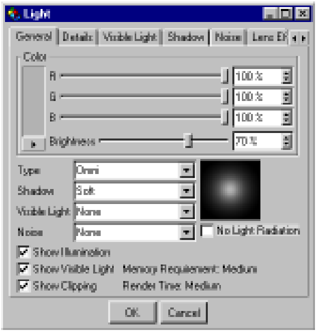
Step 2. Frame 665



Step 2. Parameter Sequence



Step 2. Frame 660



Step 2. Frame 665

Step 2: Create a parameter track for the light named " LampL". With LampL selected in the Timeline, create a Parameter track.

Timeline: File=>New Track=>Parameter Shortcut: None

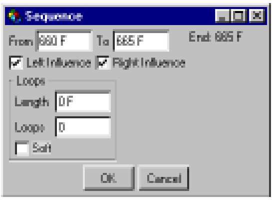
A track name and sequence will appear to the right of the LampL in the Timeline.

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 660 and end at frame 665. Click OK.

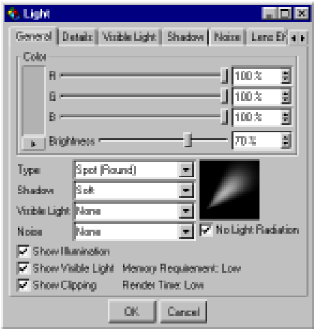
Add a keyframe at frame 660 to this track. Click OK. This light is already off and you want it to stay off.

Add a second keyframe at frame 665. Turn off "No Light Radiation" for this keyframe and click OK. Now the light from the Lamp that doesn't cast a shadow will turn on at frame 665.

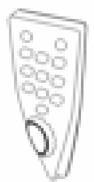
Step 2. Frame 660

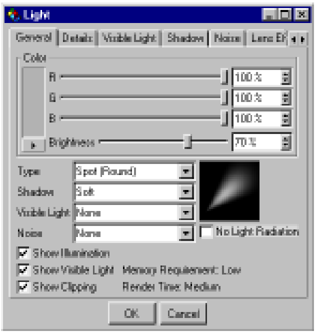


Step 3. Parameter Sequence



Step 3. Frame 660





Step 3. Frame 665

Step 3: Create a parameter track for the light named " LampF". With LampF selected in the Timeline, create a Parameter track.

Timeline: File=>New Track=>Parameter
Shortcut: None

A track name and sequence will appear to the right of the LampF in the Timeline.

Double click on the Sequence of the Parameter track. In the dialog, change the sequence to start at frame 660 and end at frame 665. Click OK.

Add a keyframe at frame 660 to this track. Click OK. This light is already off and you want it to stay off.

Add a second keyframe at frame 665. Turn off "No Light Radiation" for this keyframe and click OK. Now the light from the extra lamp light that punches up the illumination on the lamp will turn on at frame 665.

Animating the Window Texture

Finally you will create a texture track for the Environment object so that as the lights turn on, the window changes.

Step 1: Create a texture track for the object named "Environment". With Environment selected in the Timeline, create a Texture track.

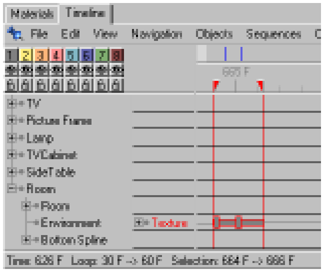
Timeline: File=>New Track=>Special Effects=>Texture
Shortcut: None

A track name and sequence will appear to the right of the Environment in the Timeline.

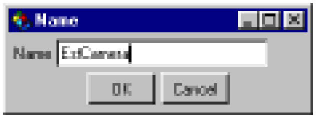
Double click on the Sequence of the Texture track. In the dialog, change the sequence to start at frame 664 and end at frame 666. Click OK.

The first keyframe goes at frame 664. Click OK to accept the current texture, LtSky.1, applied to the Environment.

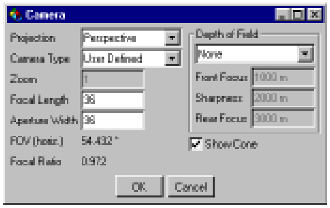
Step 1. Sequence



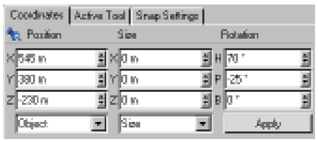
Step 1. Timeline



Step 1. Rename Camera



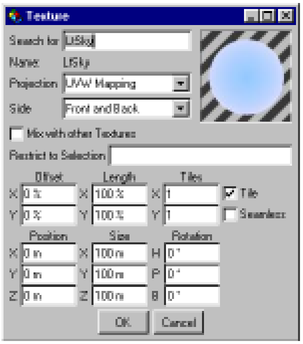
Step 1. EstCamera Parameters



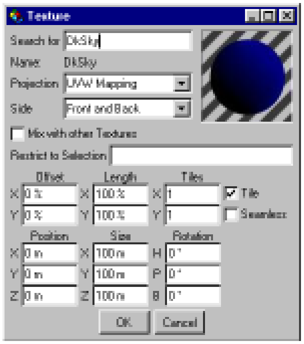
Step 1. EstCamera Coordinates

At frame 665 add a second keyframe. Change the name of the Texture to DkSky.1 and click OK to apply the Darkened window texture.

The reason the keyframes are one frame after the other is you don't want any interpolation between night and day. The lights switch on abruptly and the window must change just as quickly. The extra frame at 666 is simply there to make the sequence easier to relocate without accidentally grabbing a key.



Step 1. Frame 664



Step 1. Frame 666

Animating Multiple Cameras

Bet you were wondering just how you were going to render this; from what angle, etc. For this scene you are going to need more than one camera. One will be a stationary camera for establishing shots. The other will be a rotating camera for following the action from a close vantage point.

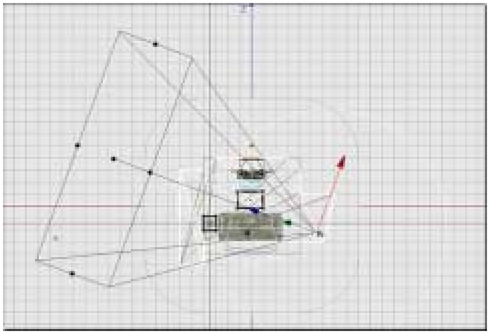
Animating the Establishing Camera

Step 1: Add a new Camera to the scene.

Editor: Objects=>Scene=>Camera
Shortcut: None

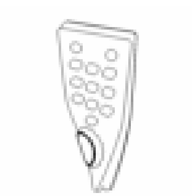
Name this Camera, "EstCamera."

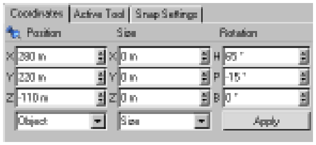
In the camera settings dialog, make sure its focal length is set to 36. Place this camera at X=545m, Y=380m and Z=-230m. Rotate the camera so that H=70, P=-25 and B=0.



Step 1. EstCamera Position (Top View)

Step 1. EstCamera Linked View





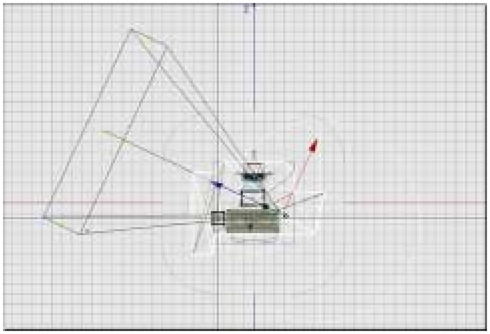
Step 2. CU Camera Coordinates

Step 2: Duplicate the EstCamera and rename it to CUCamera.

Place this camera at X=280m, Y=220m and Z=-110m. Rotate the camera so that H=65, P=-15 and B=0.

Since this will be the camera that will rotate, switch to it in the Editor view

View: Cameras=>Scene Cameras=>CUCamera
Shortcut: None



Step 2. CUCamera Position (Top View)

Step 2. CUCamera Linked View

Step 3: Create a Rotation Track for the CUCamera.

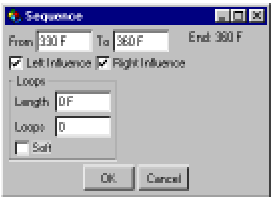
Timeline: File=>New Track=>Geometry=>Rotation Shortcut: None

Make the sequence from frame 330 to frame 360. This will cover the time where the remote leaps from the couch to the table.

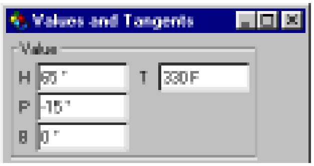
Add a keyframe at frame 330 and click OK to accept the current values.

Add a second keyframe at time 360 and make H=110, P=-5 and B=0. Be sure to zero out all of the tangent values.

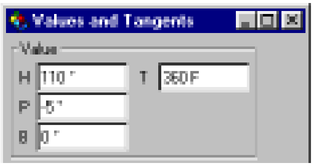
Finally, add a Ridge Time Curve to the sequence in Velocity mode to create a more natural camera movement.



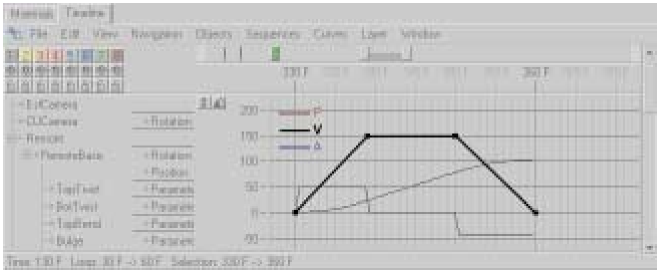
Step 3. Rotation Sequence



Step 3. Frame 330



Step 3. Frame 360



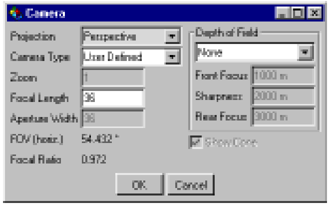
Step 3. Time Curve

Step 4: After the camera rotates to follow the remote, it is too far away to see the action in detail. To solve this, you will animate the camera zooming in. Add a Parameter track to the CUCamera.

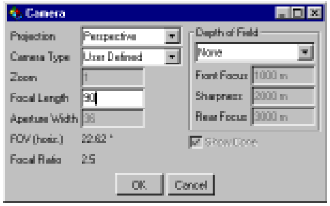
Timeline: File=>New Track=>Parameter Shortcut: None

Step 4. Parameter Sequence

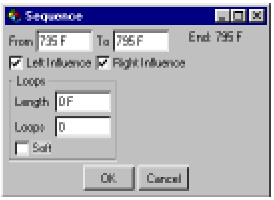
Change the sequence to run from frame 390 to frame 510.



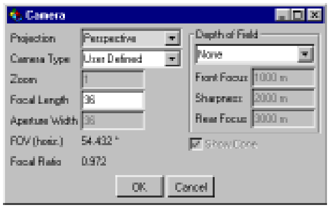
Step 4. Frame 390



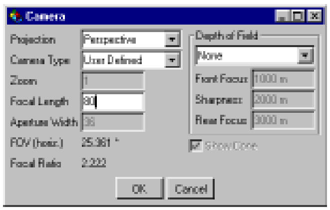
Step 4. Frame 510



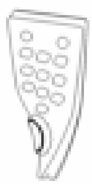
Step 5. Parameter Sequence



Step 5. Frame 735



Step 5. Frame 795



Add a keyframe at frame 390 and accept the current values.

At frame 510 add a second keyframe with the Focal Length parameter set to 90 m. This will create a slow zoom in to see the remote more clearly.

Step 4. Frame 510

Step 5: With the camera this close, when the remote leaps back from the couch to the table, you will miss the action if you leave the CUCamera at these settings. But rather than zoom out quickly and reposition, later you'll switch back to the EstCamera. The camera switch will be done with a Stage Object.

Before doing that, as the scene finishes, you want to come a little closer to the action with the EstCamera, so you'll add another zoom in effect to this camera as well. Add a Parameter track to the EstCamera.

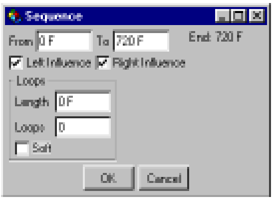
Timeline: File=>New Track=>Parameter
Shortcut: None

Make the sequence from frame 735 to frame 795.

Add a keyframe at frame 735 and click OK to accept the current values.

At frame 795 add a second keyframe with the Focal Length parameter set to 80m.

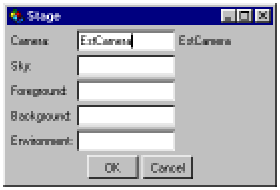
Step 5. Frame 795



Step 6. Parameter Sequence

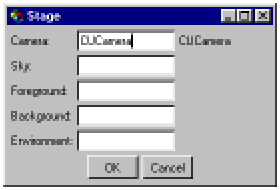
Step 6: Now all that is left to do is animate the switching of the cameras. You could do this in a video editing application, but CINEMA 4D provides a way to do this during the render. Add a Stage Object to your scene.

Editor: Objects=>Scene=>Stage
Shortcut: None



Step 6. Frame 0

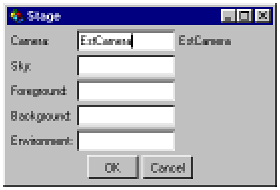
Add a Parameter Track to the Stage object with a sequence from frame 0 to frame 720.



Step 6. Frame 60

At frame 0 add a keyframe. In the edit field where it says Camera, Type in “EstCamera” leave the other fields blank.

At frame 60 add a keyframe and type “CUCamera” in the edit field. This will cause the camera to switch to the CUCamera at frame 60.



Step 6. Frame 720

Finally at Frame 720, add a third keyframe and switch back to the EstCamera.

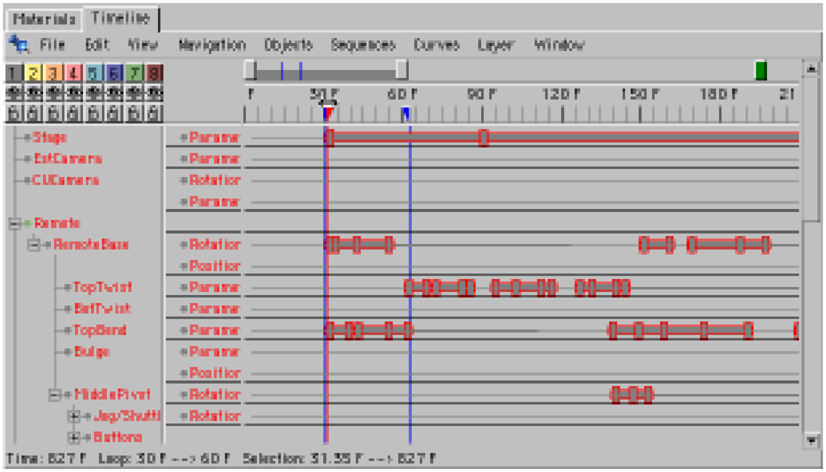
Step 7: Do a preview render of the animation in Editor mode. You may feel the camera motion starts to soon (as we did after finishing this scene). The establishing shot is not long enough and the viewer doesn't have enough time to figure out what is going on before the remote leaps into action.

To fix that, go to the Timeline and select all of the sequences and keys.

Timeline: Edit=>Select All
Shortcut: Ctrl+A (pc) / Cmd+A (mac)

Grab the leftmost red triangle and drag it 30 frames to the right.

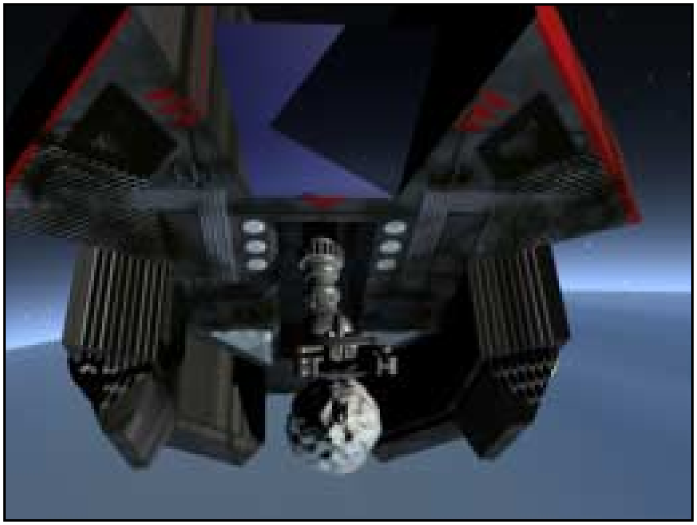
This provides one full second of stillness before the remote goes into motion. It won't change any of the other timing.



Step 7. Timeline

Animating the SciFi Scene

Although it may not seem extremely complex, animating an object like the Robotic Arm can become a daunting task. There's a lot more you could do with this scene. The Stingray Ship could have attacked the cargo ship or a squadron of Stingray ships. We know you SciFi fans will find some way to get an explosion into this scene.



Animating your Scene

In this scene you will animate the two ships that you have built. The shot opens with the camera over a planet covered by slowly moving gas clouds and looking towards the sun. The Stingray will fly past the camera and as it moves by, the camera will turn to follow the ship. As the camera pans to the left the second ship will come into view and the focus will shift to it. The camera will settle in as the cargo bay door opens and the claw extends outward. The claw will move towards the asteroid that is spinning at the bottom of the shot. You can add more to this scene if you wish, but that is the basic shot.

First open in the SciFi scene you created during the lighting tutorial.

Step 1: Open the SciFi Scene

Adding a Camera to the Scene

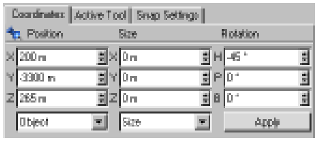
In this project, the main space elements are all set up. You'll need to place the camera into the scene and frame your shot.

Step 2. Camera Settings

Step 2: Add a camera to the scene.

Editor: Objects=>Scene=>Camera
Shortcut: None

Double-click the camera icon next to the text Camera in the object manager to change its settings. Set the focal length and aperature width to 50 and click OK.



Step 3. Camera Coordinates

Step 3: Place the camera in a position with the planet at the bottom of the scene and the sun in the upper right corner of the shot. The position used here is X=200m, Y=-3300m and Z=265m. Set its H axis to -45 degrees. This is a nice establishing shot for a sci-fi scene.

To look through your camera, so you can see what it sees, use the Virtual Camera function.

View Menu: Cameras=>Link Active Object
Keyboard Shortcut: None

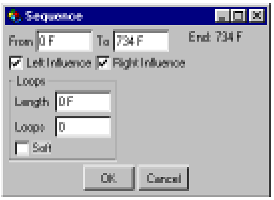
The Link Active Object to perspective view can be used with any object, not just cameras. This comes in handy when making sure lights are pointing at a particular object or location. When using objects, the view will be from the Z axis point of view.

Creating Movement on the Planet

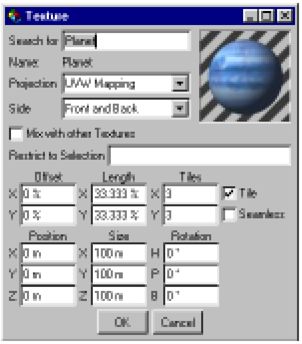
You want the planet's surface to be moving a little bit. This keeps the planet from looking stagnant. However, its important to be sure that the planet doesn't look like it is too active.

Step 1: Create a texture track for the planet.

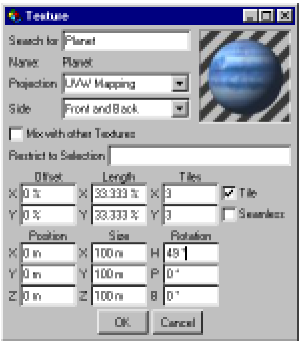
Timeline: File=>New Track=>Special Effects=>Texture
Shortcut: None



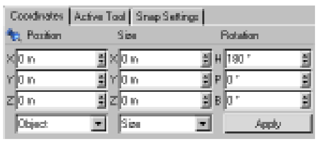
Step 1. Texture Sequence



Step 1. Frame 0



Step 1. Frame 734



Step 2. Stingray Coordinates

A track name and sequence will appear to the right of the Planet in the Timeline.

Double click on the Sequence of the Texture track. In the dialog, change the sequence to start at frame 0 and end at frame 734. Click OK.

Now you will see a sequence (the gray line) only from frame 0-734. This is exactly 24.5 seconds.

Control click to add a keyframe at time 0. Click OK to accept the defaults.

Control click to add a keyframe at time 734. The texture placement dialog will open again. Change the H Rotation to 49 degrees. This is the same as a rotation of 2 degrees per second, which gives a nice slow moving effect.

Animating the Stingray

To animate the Stingray, you will draw a spline and use it as your animation path.

Step 1: Merge the Stingray scene into the current scene.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

Make sure to save this new combined project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Step 2: The first thing to do is be sure that the Z-axis of the ship is pointing out the front of the ship. Make sure the Stingray is active in the Object Manager and select the axis tool.

Editor: Tools=>Object Axis
Shortcut: None

Select the Stingray object and type 180 degrees in the H-axis in the Coordinates Manager. This will turn the axis around so that the Z axis points out of the front of the ship. This is important

Point	X	Y	Z
0	3850	0	240
1	-11690	0	23625

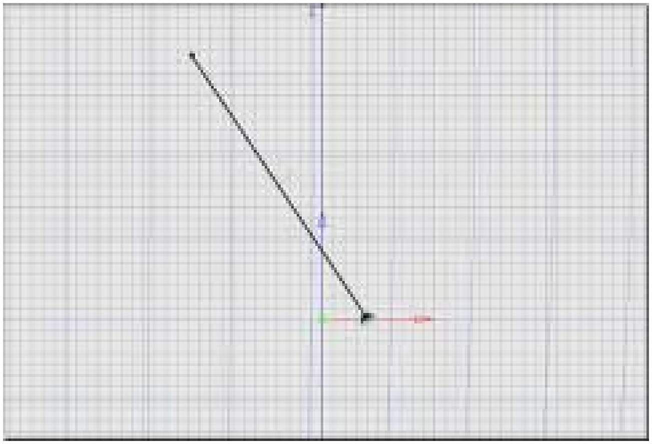
Step 3. Spline Point 1

because the ship will be animated using the tangential option in the spline track. Otherwise, the ship will travel backwards along the spline.

Step 3: Now to create the animation path. Create a new bezier spline.

Editor: Objects=>Create Spline=>Bezier
Shortcut: None

CINEMA 4D will automatically switch you to the Points tool. While holding the Control key, click to add points to create the Spline as shown.



Top View of spline

The ship will fly along a straight path. Add your first point for the spline at X=3850m, Y=0m and Z=240m. Add the second point at X=-11690m, Y=0m and Z=23625m. Make sure none of the points have tangents. You can set these values more accurately by opening the Structure Manager after creating both points.

Editor: Window=>Structure Manager
Shortcut: Shift+F5

The Structure Manager is basically a spreadsheet that can display the numeric values associated with points, polygons, UVW, and vertex mapping.

You should see the two points you‘ve created, marked 0 and 1. Modify the values by double-clicking in the field, typing a new value, and hitting Enter.

Double click on the text “Spline” in the Object Manager. This opens a dialog that allows you to change the name of the object. Change it to “Stingray Spline.”

Step 4. Spline Coordinates

Step 4: Switch to the Object Tool and the Move transition tool, and move the entire spline object to Y=-3320m.

This is the path the Stingray to follow.

Step 5: In the Timeline create an Align to Spline Track for the Stingray object. With the Stingray object selected in the Timeline, create an Align to Spline Track.

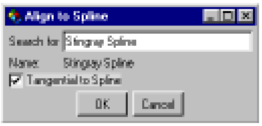
Timeline: File=>New Track=>Geometry=>Align to Spline Keyboard Shortcut: None

Step 5. Align to Spline Sequence

A track name and sequence will appear to the right of the Stingray in the Timeline.

Double click on the Sequence of the Align to Spline track. In the dialog, change the sequence to start at frame 0 and end at frame 750. Click OK.

Control click to add a keyframe at time 0. In this keyframe enter the spline you’ve just created, Stingray Spline. Don’t forget to click the checkbox for Tangential to Spline.

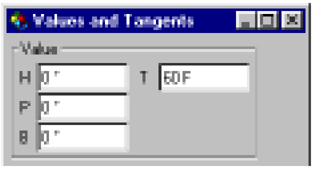


Step 5. Frame 0

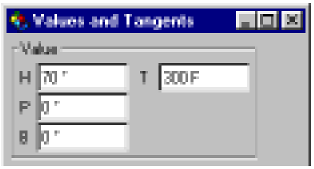
When using a spline track, the object will follow the spline while maintaining its rotational orientation. When selecting the tangential option, the object will always point its Z axis down the direction of the spline.

The Stingray will now follow the spline you have designated.

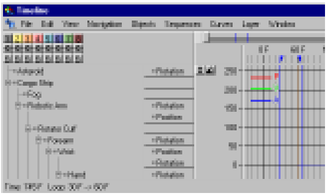
Step 1. Rotation Sequence



Step 1. Frame 60



Step 1. Frame 300


Step 2. Blank Timecurves Window

Animating the Camera

Now you'll animate the camera to track the motion of the ship. Add a rotation track to the camera object.

Step 1: With the Camera selected in the Timeline, create a Rotation track.

Timeline: File=>New Track=>Geometry=>Rotation
Shortcut: None

A track name and sequence will appear to the right of the Camera in the Timeline.

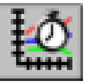
Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at frame 60 and end at frame 300. Click OK.

At frame 60 add a keyframe using the current rotation of the camera. Set all the tangent values to 0. Click OK.

Add a keyframe at frame 300 with the H axis now at 70 degrees.

Step 2: You'll want to add a time curve to the sequence so that the camera eases in and out of its motion. Select the Rotation track sequence and go to the Time Curves.

Timeline: Window=>Time Curves
Shortcut: Shift+T



A new window with a grid will open within the Timeline as shown. The Time Curves window is where you can control how the state of an object changes during a sequence.

Since you want to gradually ease-in and -out the rotation of the Camera, you will be affecting the Velocity of the rotation. The Time Curve defaults to Path Mode, so you need to change to Velocity Mode.

Timeline: Curves=>Time Curves=>Velocity Mode
Shortcut: None

Add a Ridge curve to the Rotation sequence in Velocity mode.

Timeline: Curves=>Time Curves=>Ridge
Keyboard Shortcut: None

This means the velocity or speed of the rotation will start out slow, reach its peak velocity in the middle and gradually decrease.

Then choose Fit Path End to 100%.

Timeline: Curves=>Time Curves=>Fit Path End to 100%
Shortcut: None

This guarantees the sequence will complete its full motion.

Step 3: Check the camera motion by playing back the scene or test rendering. You'll notice that the ship enters the frame after the camera is moving. Since the idea is that the camera moves to track the ship, this won't work. However, the speed of the ship is not really the problem, what is the problem is the time it enters.

So what you need to do is get the ship there a little sooner, without changing the speed and you don't want to add time to the camera's hold at the beginning. The trick is to make use of "negative time."

Negative time allows you to get the action moving for the scene before the scene itself starts.

Click and drag the sequence for the Stingray's spline track and move it so that it starts at frame -58 to 692. This gets the ship moving a little bit sooner and into the frame just in time for the camera to start tracking it.

Now the ship should enter the frame and the camera should follow after it as it flies off into space. The camera will keep moving past the first ship and it will move out of frame.

The first half of the animation is done. Now on to the robotic claw.

Don't forget to periodically save your project and make backups.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Adding the Cargo Ship and Robotic Arm

The second ship will not be moving through space. It will be hovering over the planet. However, you will animate the complex claw you built earlier.

First you will need to bring the Robotic Arm and Cargo Ship together in one project.

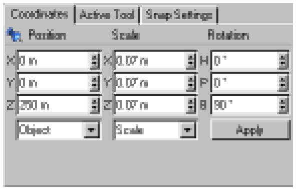
Step 3. Robotic Arm Scale

Step 1: Open the Cargo Ship scene.

Editor: File=>Open
Shortcut: Ctrl+O (pc) / Cmd+O (mac)

Step 2: Merge the Robotic Arm into the Cargo Ship scene.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)



Step 4. Robotic Arm Coordinates

Step 3: It's pretty obvious you will need to resize the arm so it fits into the cargo ship. With the Robotic arm selected in the Object Manager, scale it down to approximately 7% of its size.

You can use the Coordinates Manager. Change the Size to Scale settings and input .07 into the X, Y and Z Scale dialogs. Click Apply.

Step 5. Object Manager

Step 4: Move the Robotic Arm into position in the Cargo Ship. The position shown is X=0, Y=0m, Z=250m with a 90 degree rotation on the B axis.

Step 5: Drag and drop the Robotic Arm into the Cargo Ship group.

The hierarchy should look like the example image.

Step 6: Make sure to save your changes.

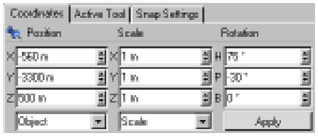
Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Animating the Robotic Arm

The next section will be animating the cargo door opening and the Robotic Arm coming out of the ship to grab an asteroid.

Step 1: Go back to the SciFi scene and merge the Cargo Ship scene.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)



Step 1. Cargo Ship Coordinates

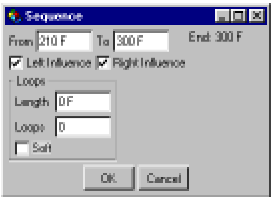
Start by placing the cargo ship in the camera view. The claw comes out of the bottom of the ship, so you'll want to be able to see that clearly.

Place the Cargo Ship at X=-560m, Y=-3300m and Z=500m.

You'll also want to be looking almost straight down the length of the ship, so change its H axis to 75 degrees.

Rotate it so that the front of the ship is tilted slightly upwards. The angle shown is a P axis value of -30 degrees.

The Cargo Ship is now in place for the animation of the claw.



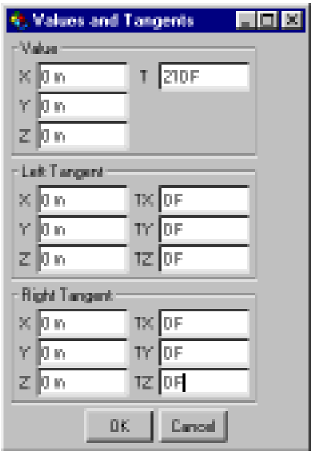
Step 2. Position Sequence

Step 2: Before you can animate the claw, you have to animate the Bay Door. Create a position track for the Door object.

Timeline: File=>New Track=>Geometry=>Position
Shortcut: None

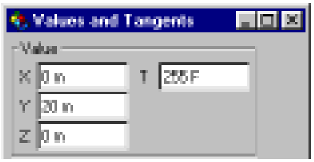
A track name and sequence will appear to the right of the Door in the Timeline.

Double click on the Sequence of the Position track. In the dialog, change the sequence to start at frame 210 and end at frame 300. Click OK. This will cause the door to finish opening just as the camera settles onto the Cargo Ship.



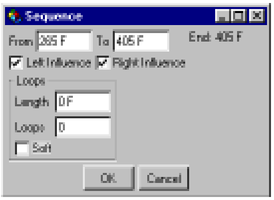
Step 2. Frame 210

Create your first keyframe at frame 210 with the default values of X=0m, Y=0m and Z=0m. Be sure to zero out the tangent values if there are any. Click OK.



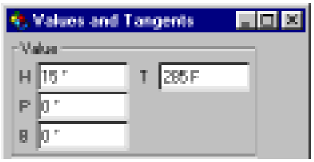
Step 2. Frame 255

Step 2. Frame 300

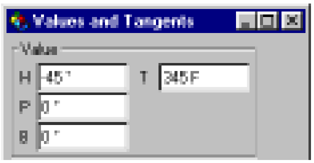


Step 3. Rotation Sequence

Step 3. Frame 265



Step 3. Frame 285



Step 3. Frame 345

Create a second keyframe at time 255 with the values X=0m, Y=20m and Z=0m and set all tangents to 0 as well. This will raise the Bay Door into the ship.

Add a third keyframe to the sequence at time 300. The values in this keyframe should be X=100m, Y=20m and Z=0m. This slides the door off to the side and reveals the claw.

Step 3: The tricky part of the animation is getting the claw to come out of the Cargo Ship without passing through any part of the ship's body.

Before you start animating the Robotic Arm, you will want to hide some of the objects in your scene. Hide the Planet, Space Background, Sun and Cargo Ship. Make sure to make the Robotic Arm visible by clicking the top gray dot until it is green. This enables you to still see the Robotic arm even though its parent, the Cargo Ship, is hidden.

Create a rotation track for the Forearm object.

Timeline: File=>New Track=>Geometry=>Rotation Shortcut: None

A track name and sequence will appear to the right of the Forearm in the Timeline.

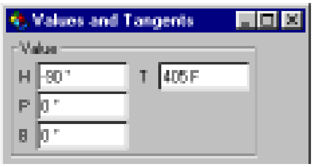
Double click on the Sequence of the Rotation track. In the dialog, change the sequence to start at frame 265 and end at frame 405. Click OK. This will overlap the action of the door opening, avoiding any dead time in the scene.

Create a keyframe at frame 265 with the values H=0, P=0 and B=0.

Add a second keyframe at frame 285 with the values H=15, P=0 and B=0.

Add a third keyframe at frame 345 with the values H=-45, P=0 and B=0 degrees.

Add a fourth keyframe at frame 405 with the values H=-90, P=0 and B=0.



Step 3. Frame 405

For smooth motion be sure that all the tangent values for all keyframes are zero.

Step 4: Since no object starts and stops going the exact same speed, you will want to add Velocity curve to the sequence. Select the Rotation track sequence in the Timeline and go to the Time Curves.

Timeline: Window=>Time Curves
Shortcut: Shift+T

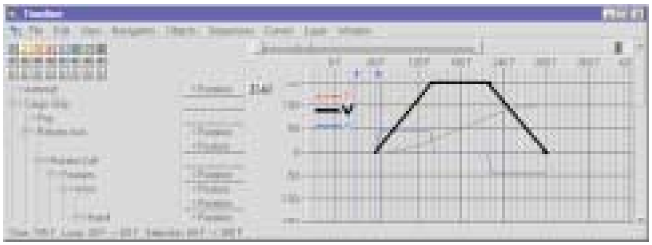
A new window with a grid will open within the Timeline. The Time Curves window is where you can control how the state of an object changes during a sequence.

Since you want to gradually ease-in and -out the rotation of the Arm, you will be affecting the Velocity of the rotation. The Time Curve defaults to Path Mode, so you need to change to Velocity Mode.

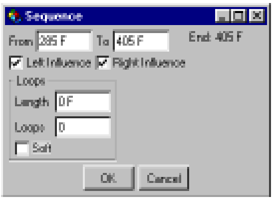
Timeline: Curves=>Time Curves=>Velocity Mode
Shortcut: None

Add a Ridge curve to the Rotation sequence in Velocity mode.

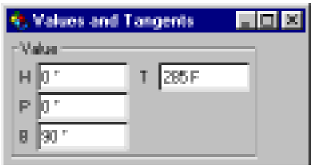
Timeline: Curves=>Time Curves=>Ridge
Keyboard Shortcut: None


Ridge Time Curve

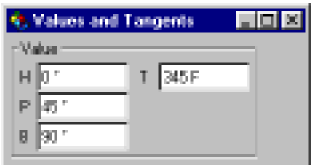
This means the velocity or speed of the rotation will start out slow, reach its peak velocity in the middle and gradually decrease.



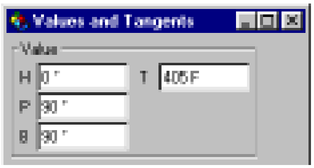
Step 5. Rotation Sequence



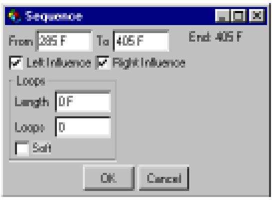
Step 5. Frame 285



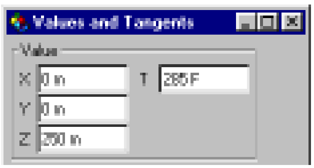
Step 5. Frame 345



Step 5. Frame 405



Step 7. Position Sequence



Step 7. Frame 285

Then choose Fit Path End to 100%.

Timeline: Curves=>Time Curves=>Fit Path End to 100%
Shortcut: None

This guarantees the sequence will complete its full motion.

Step 5: Next, go back to Sequence Mode on the Time Line.

Timeline: Window=>Sequences
Shortcut: Shift+Q

Add a rotation track to Robotic Arm and give it a sequence from 285 to 405.

Place a keyframe at frame 285 with a value of H=0, P=0 and B=90.

Add your second keyframe at frame 345 with a value of H=0, P=45 and B=90.

A third keyframe should be added at frame 405 with the values H=0, P=90 and B=90.

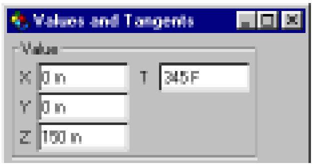
For smooth motion be sure that all the tangent values for all keyframes are zero.

Step 6: Use the same Time Curve settings from the Forearm rotation. Copying this is actually quite easy.

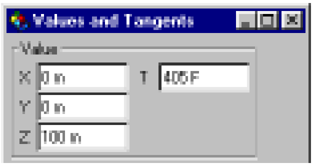
Select the Rotation track for the Robotic Arm and use the Get Time Curve function to copy the settings from the Forearm to the Robotic Arm Rotation.

Timeline: Sequences=>Get Time Curve from
Shortcut: None

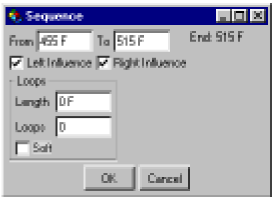
When the question mark appears, click on the sequence on the Forearm Rotation track and the settings will be copied over.



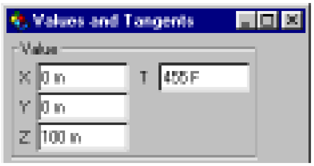
Step 7. Frame 345



Step 7. Frame 405



Step 8. Position Sequence



Step 8. Frame 455

Step 8. Frame 515

Step 7: Now you'll need the entire arm to move forward slowly as it unfolds itself, ensuring that it slips through the opening. Create a position track on the Robotic Arm object.

Timeline: File=>New Track=>Geometry=>Position Shortcut: None

Make the sequence run from frame 285 to frame 405.

Set the first keyframe at frame 285 with the values X=0, Y=0 and Z=250.

Add a second keyframe at frame 345 with the values X=0, Y=0 and Z=150.

The last keyframe is at frame 405 and has the values X=0, Y=0 and Z=100.

For smooth motion be sure that all the tangent values for all keyframes are zero.

Use the Get Time Curve function to copy the Time Curve settings from the Forearm or Robotic Arm Rotation track to the Robotic Arm Position track.

At this point the Robotic Arm should come out of the ship quite easily.

Step 8: Now that the Arm is out of the ship, you will move it towards where the asteroid will be located. The first step in bringing the claw forward is to move the Arm forward.

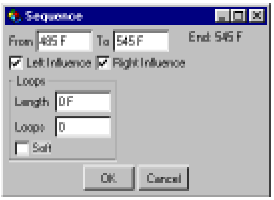
Create a new sequence by choosing File=>New Sequence on the position track of the Robotic Arm from 455 to 515.

Add a keyframe at frame 455 it should have the values X=0, Y=0 and Z=100.

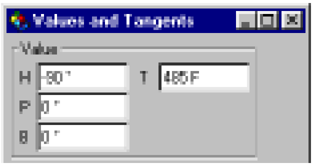
Add a second keyframe at frame 515 with the values X=0, Y=0 and Z=-100.

Again, be sure that all the tangent values for all keyframes are zero.

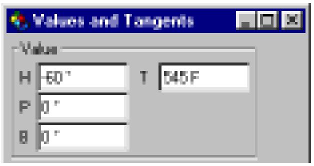
Use the Get Time Curve function to copy the Time Curve settings from any of the Rotation tracks to the new position track sequence.



Step 9. Position Sequence



Step 9. Frame 485



Step 9. Frame 545

Step 9: As the Arm moves forward the angle of the Forearm needs to change a bit so it is coming down towards the Asteroid and the camera.

Add a new sequence to the Forearm's Rotation track from frame 485 to 545.

The first keyframe should be placed at frame 485 with the values H=-90, P=0 and B=0.

At frame 545 add another keyframe with the values H=-60, P=0 and B=0.

Again, be sure that all the tangent values are zero and copy over the ridged velocity curve from any of the other sequences.

Step 10: The claw is now pointed at the camera, but it still isn't close enough. To bring the claw closer to the camera and asteroid, animate it pistoning out of its sheath.

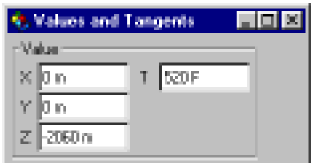
Add a Position track to the Wrist object with a sequence from frame 520 to 580.

Add a keyframe at frame 520 with the values X=0, Y=0 and Z=-2060.

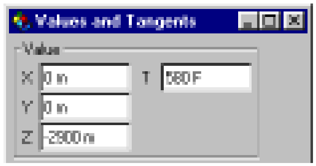
At frame 580 add another keyframe with the values X=0, Y=0 and Z=-2900.

Again, be sure that all the tangent values are zero and copy the ridge velocity curve from one of the other sequences.

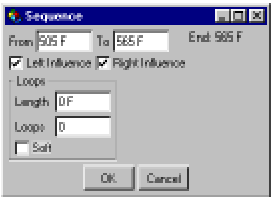
Step 10. Position Sequence



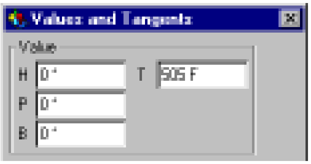
Step 10. Frame 520



Step 10. Frame 580

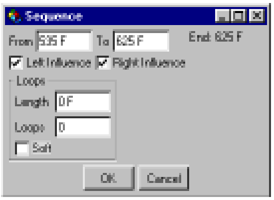


Step 10. Rotation Sequence

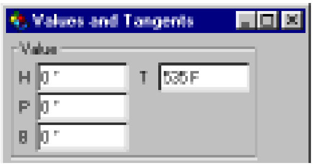


Step 11. Frame 505

Step 11. Frame 565



Step 12. Rotation Sequence



Step 12. Frame 535

Step 11: There, the claw is now moving towards the camera and you can see it very clearly. However, you'll note that the claw is still pretty lifeless. What it needs is some secondary motion, such as the claw opening and closing or the wrist turning, or both.

Add a Rotation Track with a sequence from frame 505 to 565 to the Wrist Object.

Add a keyframe at frame 505 with the values H=0, P=0 and B=0.

Add a second keyframe to the sequence at frame 565 with the values H=0, P=0 and B=270.

Again, be sure that all the tangent values are zero and copy the ridge velocity curve to the sequence.

This turns the claw around a bit.

Step 12: Since this is a fully articulated Arm, you might as well show all parts of it working. Add a Rotation Track to the Hand with a sequence from frame 535 to frame 625.

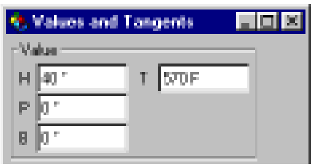
Add a keyframe at time 535 with the values H=0, P=0 and B=0.

Add a second keyframe at time 570 with the values H=40, P=0 and B=0.

Add a third keyframe at time 600 with the values H=-15, P=0 and B=0.

Set the last keyframe at time 625 with the values H=0, P=0 and B=0.

Again, be sure that all the tangent values are zero and copy the ridge velocity curve to the sequence.



Step 12. Frame 507

Step 12. Frame 600

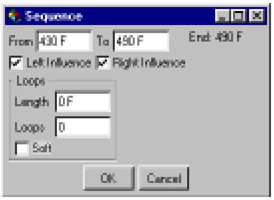
Step 9. Frame 545

Step 13: Now add some motion to the fingers themselves, in an effort to capture the Asteroid. With the Metacarpals selected in the Timeline, create a rotation track with a sequence from frame 430 to 490.

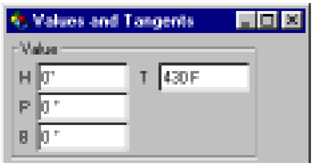
Add a keyframe at time 430 with H=0, P=0 and B=0.

Add a second keyframe at time 490 with the values H=20, P=0 and B=0.

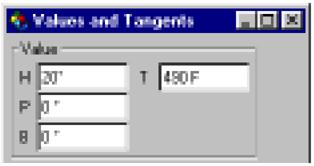
Again, be sure that all the tangent values are zero and copy the ridge velocity curve to the sequence.



Step 13. Rotation Sequence



Step 13. Frame 430



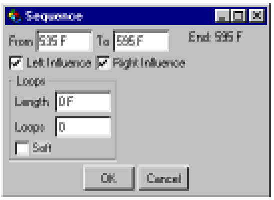
Step 13. Frame 490

Step 14: Copy that sequence by holding the control key, clicking on the sequence and dragging it forward. Add the new sequence to this track from frame 535 to 595.

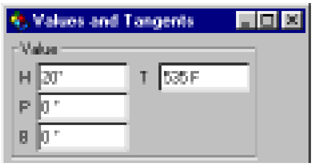
Change the first keyframe at frame 535 to the values H=20, P=0 and B=0.

Change the second keyframe at the end of the sequence on frame 595 to H=0, P=0 and B=0.

No need to make sure the tangent values are zero or copy the ridge velocity curve. It was already applied.



Step 14. Rotation Sequence



Step 14. Frame 535

Step 14. Frame 595

Now you have a nice looking claw motion. You can always add more motion to the claw if you like, but this is a good start.

Step 15. Unhide all the objects you've hidden.

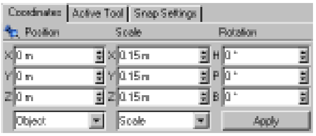
Adding the Asteroid

Add the asteroid into the scene. This asteroid will be floating in space right in front of the Cargo Ship, a potential target for the claw.

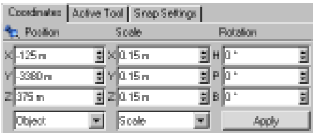
Step 1: Add the Asteroid project to the scene.

Editor: File=>Merge
Shortcut: Ctrl+Shift+O (pc) / Cmd+Shift+O (mac)

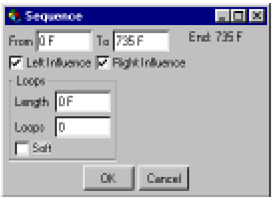
Scale the Asteroid to 15% of its current size. Use the Coordinates Manager. Change the Size to Scale settings and input .15 into the X, Y and Z Scale dialogs. Click Apply.



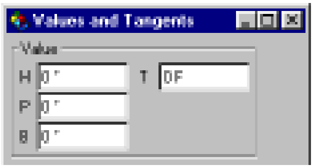
Step 1. Asteroid Scale



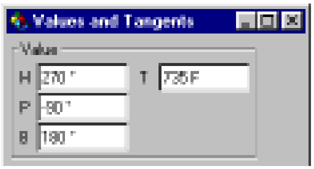
Step 1. Asteroid Coordinates



Step 2. Rotation Sequence



Step 2. Frame 0



Step 2. Frame 735

Place the Asteroid at X=-125m, Y=-3380m and Z=375m.

Step 2: You don't want the asteroid just sitting there, so add some rotation to it.

Create a Rotation track for the asteroid with a sequence from frame 0 to 735.

At time 0, set H=0, P=0 and B=0.

At time 735 add a second keyframe with H=270, P=-90 and B=180.

These settings will give you a nice slow rotation/drift. You can try different numbers to speed up or slow down the movement of the asteroid.

Step 3: Feel free to add more asteroids to the scene, slowly tumbling and drifting about. This will help add realism to the scene.

To add more asteroids, it would be best to make an Instance of the Asteroid to keep the complexity of the scene down., just be sure that none of them passes in front of or collides with one of the ships.

Step 4: Make sure to save your project.

Editor: File=>Save
Shortcut: Ctrl+S (pc) / Cmd+S (mac)

Rendering

Rendering is the process where 3D data is turned into 2D images. The computer determines what color each pixel will be using the models, materials, textures, lighting and animation that you have created. Think of it as the computer taking a picture of the scene at its current state.

Pixels

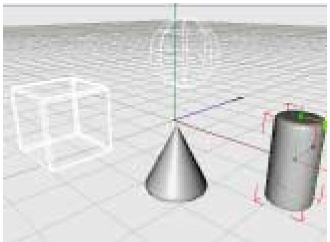
Pixels are individual dots of color that make up a 2D-bitmap image. Pixels are often square, but they don't have to be. Some video standards call for pixels to be rectangular. You can control whether your pixels are square or rectangular in CINEMA 4D.

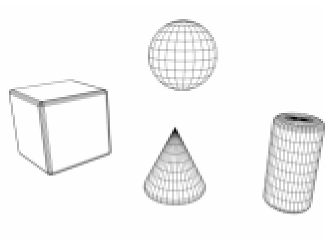
Image Size

When the program renders, it creates a 2D-image file. This file is usually a tif or similar bitmap graphics format or for video a QuickTime movie. Anything you are able to do to a bitmap graphic or a QuickTime movie can be done to a rendering.

The size of a bitmap graphic is described in terms of X pixels wide by Y pixels tall. The larger this graphic is, the longer it takes to render. All 3D software renders to 72 dpi (screen resolution), and in fact dpi is a meaningless term until the graphic is printed onto paper. DPI stands for dots per inch and describes how many pixels will be printed into one inch of a piece of paper.

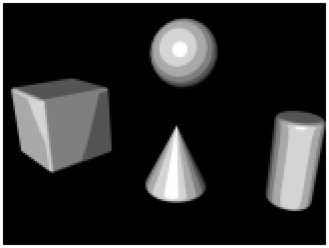
Some packages, CINEMA 4D included, will allow you to set the dpi of the image at render time. This is useful if you will be taking your 3D renderings and printing them out. If you are going to video, then dpi is irrelevant as video uses only the number of pixels.

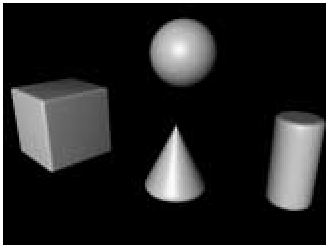

As Editor (Preview) Render

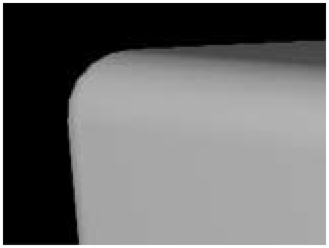

Wireframe Render

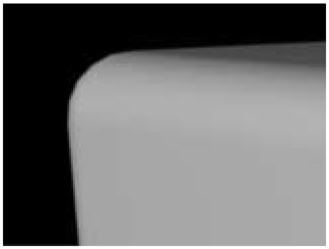
Rendering Modes

Many 3D packages offer multiple rendering modes. The common ones are usually a preview render and a final output. Some also offer wireframe and comic modes. The preview mode usually is a very basic rendering that let's you see what the motion looks like, but the image quality is poor. The benefit is that the render goes much faster so you don't have to wait as long to see an animation test.


Comic Render


Raytraced Render


Aliased Edges


Antialiased Edges

Wireframe: Allows you to see just the wireframe of an object. This is often used for special looks or effects, it isn't usually a common render style. This style is much like the look of the movie Tron where all the object edges are blue and the objects are black.

Comic Rendering: Also cartoon rendering makes 3D images look more like cartoons or comic books. The edges of objects are outlined and a flat color is applied to the object. This can be very useful for integrating 3D with traditionally created animation.

Raytracing: Raytracing is the primary way that CINEMA 4D creates 2D images from the 3D data. When raytracing, the camera sends out a ray (like a beam of light) for each pixel into the scene until it hits something, or hits nothing. The computer then defines that pixel (color, texture, lighting, etc.) and delivers the information back to the screen. So basically, CINEMA 4D scans the scene from the angle of the camera and reports back what the scene looks like.

Raytracing, by nature, allows the computer to take into account reflective and refractive surfaces. This is helpful in creating more photorealistic images. Refraction is the bending of light as it passes through transparent objects. Reflection is the bouncing of light from object to object.

Antialiasing

As noted earlier, in basic raytracing, each pixel in the final image is based on a single ray. However, when doing that, images can end up looking aliased or having jagged edges.

CINEMA 4D provides a solution for this in the form of antialiasing options. You're probably familiar with the term from 2D software, and the basic idea is the same. Instead of basing a pixels final color on a single pixel, the adjoining pixels are taken into account. The average of the pixels is used instead of just one. This is just how the human eye works.

There are several different kinds of antialiasing. Some programs only antialias the edges of objects. Anywhere the edge is, the renderer will compare its color to the color of what is behind it. If they are different the two will be blended together, if they are the same, they won't be blended. Some programs will antialias both the edges and the colors of objects. The antialiasing of colors is done the same way as the edges, if the two colors are the same, they are left alone, but if they are different then they are mixed together to make a smooth transition. Some programs antialias a pixel in all cases (as in the Always setting in CINEMA 4D) whether it needs it or not. This is a very slow method and is only necessary in specific scenarios. This is rarely needed in 3D rendering. Edge and Color is usually quite sufficient.

There is also a softness setting for antialiasing on the Options page of the Render Settings. The softness setting determines how large of a space to put those samples into. The smaller the space, the sharper the image, but the more jagged the edges may look. The larger the space, the softer the image, but the longer the rendering time.

Oversampling

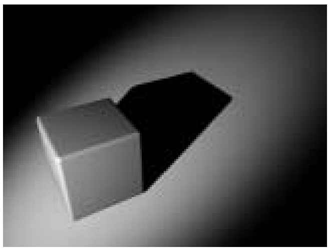
Oversampling determines how many extra pixels will be used for blending. In other words, how many extra points are checked when defining a pixel. Using 2x2 means that the four surrounding pixels will be sampled, 3x3 means the nine surrounding pixels will be sampled, and so on. The more extra points, the smoother the jagged edges, but the rendering time will increase.

Shadows

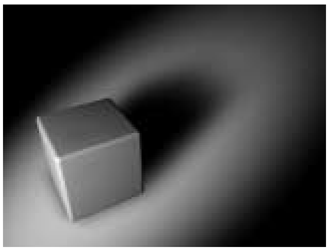
Hard Shadows: These shadows have very sharp, distinct edges. The program creates them during the rendering stage. These shadows do not change based on any map sizes, they always look the same.

Soft Shadows: These shadows have nice soft edges. This type of shadow is created using a shadow map. The program determines where the shadows will fall before the actual rendering stage occurs. The size of the shadow map will help to determine the softness of the shadows.

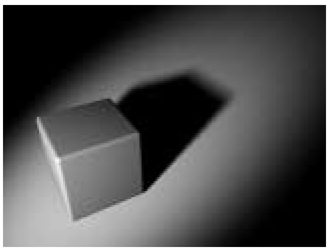
Area Shadows: Area shadows give you realistic falloff of shadows. The shadows will appear sharp near the base of an object and gradually soften the further the object casting the shadow is from the object receiving the shadow. They are very good for creating photorealistic images. However, they do slow down the rendering more than the other types of shadows.



Hard Shadows



Soft Shadows



Area Shadows

Frames, Fields and Frame Rates

Video and film are not really made up of moving images, rather they are made up of lots of still images that are shown very rapidly. Because of persistence of vision the images appear to move. Persistence of vision is where the eye still sees an image for a brief period of time even after the image is gone. The mind blends these quickly flickering images into a moving image to make what the eye sees fit with the real world.

A frame is just one still image. Many programs let you render out video as a series of separate still images rather than a single video file, some don't. CINEMA 4D allows you to do this, and it can be a good idea. The reason for rendering still images rather than video is that it can be easier to replace bits and pieces of the movie and it can be more reliable in a crash or power outage.

If your computer stops for some reason writing a single video file and the file gets damaged, the whole file is ruined and you have to start over. However if the computer is interrupted while rendering a series of still frames, the last frame may be ruined, but the rest are fine and you can start over from the last frame saving a lot of time.

Still image sequences can be edited without any fancy software. If you want to remove a piece, just delete the frames. If you want to replace one sequence with another, just put the new frames in the old frames' place.

When you render out a sequence of tif images for an animation you can very quickly use up significant amount of storage space on your hard disk. A great way to recover much of this space is to use QuickTime Pro to export your image sequence into a loss-less codec (such as Animation). Here's how it's done:

1. In QuickTime, under the file menu, choose "Open Image Sequence."
2. Make sure that you set the correct frame rate for you movie sequence.
3. Under the file menu, choose "Export."
4. Configure the export settings with the Options button. This opens the Movie Settings dialog window where you will want to check your Video settings.
5. Set the Compressor (codec) to "Animation" and "Millions of Colors" or if you have alpha channel information "Millions of Colors +."
6. Set keyframes to zero.
7. Set the Quality slider to "Best" or "100%."
8. Click "OK" and close the Video Compressor window.

9. Make sure that the Size option in the Movie Settings dialog is set to "Current Size" and that you do not have any filters enabled. If there is no sound then make sure that the Audio check box is unchecked.

10. Click "OK" to close the Movie Settings window.

11. Name your sequence and click "OK" to export your movie sequence.

Generally you will find that the resulting movie file is considerably smaller than the original image sequence. This is because the Animation codec uses an efficient, yet loss-less compression method to store the individual frames (much like LZW compression for TIF images). This means that you can save up to 75% of the original file size or better!

Fields are only used in television and video. Back when television first came out, the technology could not create full frames of video on the screen. In order to work around this, half a frame was drawn at a time. Every other line would be drawn to the screen, then in a second pass all the skipped lines would be drawn. Each of these sets of lines is known as a field.

Unfortunately terminology regarding fields is non-standard. They are sometimes referred to as even and odd, upper and lower, a and b. Because of this, there is no tried and true way to determine which field to render first, the only solution is to render it one way and test it on the final output system. If this is not correct for the type of software or equipment you are using, you have to switch to the other. It is a good idea to do a short test render to determine which way is correct before you have to do a real project under a deadline. Nothing could be more disastrous than rendering the fields incorrectly.

Frame rate is the number of images that will be flashed in a second. Film is usually 24 frames per second. That means a new image is flashed on screen every 1/24th of a second. Video in America is usually 30 frames per second (or if you want to be absolutely correct 29.97 frames per second.) This is the NTSC standard for television. In Europe, video is usually 25 frames per second for the PAL standard.

The frame rate for rendering is actually independent from the final medium to which you will be delivering the animation. Provided you have a way to convert the animation to the desired frame rate, you can render at any frame rate you want to. For example, many 3D artists will render at 24 frames per second and then go out to video at 30 frames per second. This gives the video more of a film quality motion. Saturday morning cartoons are drawn at 10-15 frames per second then put out to video at 30 frames per second.

File Formats

The file format is simply the way that the render is stored. Common file formats for rendering are tif, pict, jpeg, QuickTime and avi. Some programs will support other formats as well. Some programs only support a special type of file created by the program developers.

Each format has its own advantages and disadvantages. For example, tif format is very easy to use and is supported on many platforms. It also supports Alpha Channels, which can be very useful. On the downside, there are many flavors of tif, so it is possible to create a tif that is readable by some programs, but not all. The same thing goes for every format, they work in some cases, but not others. There is no truly universal format, though tif is very close.

Alpha Channels

Alpha Channels are gray scale images that are used to composite a render against another background. These can be useful for adding 3D elements to video for special effects or other things. Alpha Channels come in two varieties: Pre-multiplied and Straight.

Pre-multiplied Alpha Channels are standard alpha channels. They determine how opaque things are and where the edges of objects are, but they don't carry any antialiasing information in them. So if something is rendered on black and you composite it on white with a pre-multiplied alpha, you might see some dark fringes on the edges.

Straight Alpha Channels are designed with compositing in mind. The image itself isn't antialiased so its edges don't get blended into the background color of the render. Instead all the antialiasing is in the Alpha channel along with transparency. With a straight alpha you can render on black and composite on white with no oddly colored fringes.

Depth Channels

Depth channels are gray scale images that are similar to Alpha channels, however they serve a different function. Depth Channels are used to indicate the distance an object is from the camera. These are then useful in performing post process effects such as adding fog or depth of field.

Depth of Field

In a real camera system, the defects and imperfections in the actual lens cause the camera to be unable to keep every object in its field of view in focus at all times. In the real world you have to focus on one part of the field of view and let the rest blur out to some degree. In 3D, you don't have the problem of imperfections in lens systems, so images can be razor sharp throughout. This can be beneficial, but the problem is that people are so used to seeing the depth of field effect, that it is expected. To achieve this, many programs offer a post process effect to simulate this.

Motion Blur

Motion Blur is another feature of real life that is caused by the limitations of real world cameras and film. In the real world an image is recorded onto film by the opening and closing of a shutter. If an object is moving very quickly in front of the camera and the shutter speed is too slow, the object will leave a trail behind as it moves. this is known as motion blur.

3D applications do not have this limitation because the shutters are infinitely fast, nothing can move too fast for the shutter. In order to help more closely match film effects, many applications implement a motion blur effect.

One type of motion blur works only on the specified objects. It takes information from the frames before and after the current frame and blurs between the two images. This is a fairly fast process but it has limitations. Some real life effects can't be matched using this method.

The second method more closely simulates what happens in a real camera. Rather than rendering just the frame that is desired, multiple frames are rendered and blurred together. The intermediate frames are created by multiplying the frame rate by the number of frames of motion blur is desired. These extra frames are blurred together and only the resulting blurred frame is kept.

Deep Stuff

Ray Depth is used to determine the number of times a ray will bounce back and forth when calculating reflections and transparencies. The lower the number the faster a scene will render. The higher the number, the more accurate your image. For example if there were many glass objects in rows and you were trying to look through them, a low ray depth would render quickly, but many of the objects would appear black. The raytracer can only calculate the depth of transparency based on the ray depth setting.

Reflection Depth is added control over how many times the ray will bounce when calculating reflections. In an infinite mirror situation, this could be to eternity. An infinite mirror is where two mirrors face each other and reflect their reflections forever. The Reflection depth will limit the number of times this can happen and will therefore reduce rendering time. You as the artist have to decide how many times you want the ray to bounce there by giving you the type of image you want.

Shadow Depth determines how many transparent objects a ray can pass through and still cast a shadow. If this number is very low, a shadow will only be created if there aren't many transparent objects in front of each other. If there are a lot of transparent objects, no shadows will appear. Higher numbers will make the shadows appear more correct in scenes with many transparencies, at the cost of increased rendering time.

Threshold gives you the ability to adjust at what point reflection and transparency cease to be visible. The default threshold in CINEMA 4D is 15%. In real life, objects that are barely reflective or barely transparent don't appear that way to the human eye. Reflection and transparency are no longer visible at around 15% for the average person. You can use this setting to speed up rendering — the higher this number, the faster the renderer will go as it can ignore materials with numbers below the setting for reflection and transparency. You can also lower the number for extremely subtle reflections and transparency — the lower the number, the longer the rendering time.

Rendering Tags

Here's a feature you don't find in every animation package. Rendering tags allow you to modify the rendering settings for individual objects. This can be very useful for creating special effects or for compositing. The render tag in CINEMA 4D XL has five options.

Cast Shadows: The first option determines if an object will cast shadows. It can often be useful for one object to not cast shadows, for example the walls of a room.

Receive Shadows: This option let's you decide if an object will receive shadows. This allows you to have an object pass through shadows without a shadow appearing on its surface.

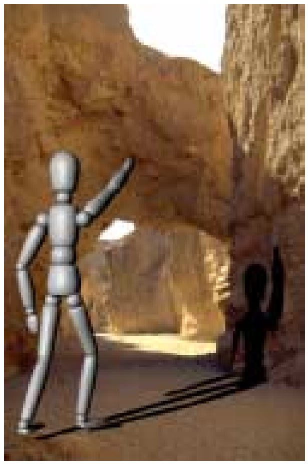
Seen by Camera: This allows you to make an object invisible to the camera. So it can still cast a shadow, appear in a reflection or through a transparency, but not be visible to a camera. This can be very useful for creating low polygon texture mapped environments to reflect in a logo but not have them appear in the final scene. Its also useful for simulating soft boxes in photography without having to be careful they don't appear in the final shot.

Seen by Rays: This gives you the ability to have an object not be seen in reflections or through transparent objects.

Composite Background: This is a very useful feature when you want to add 3D elements into images or video. It is especially valuable when you need to render only the shadows of your 3D objects to be added to images or video.

Render Tag Dialog


Without Compositing Tag


With Compositing Tag

Rendering the 3D Logo Project

Now that the animation is done, you'll want to render your movie. You'll be rendering out to Quicktime format (unless you have a video editing package, then you should render out to tif for better reliability.) You'll have an option to render a small animation or a large one. The smaller one will finish faster, play back easier and take up less disk space. The larger one will take longer to render, will be harder to play back and will use up more disk space. The small version is also suitable for putting on the web and the larger one would be used if you were putting it onto video.

Preparation

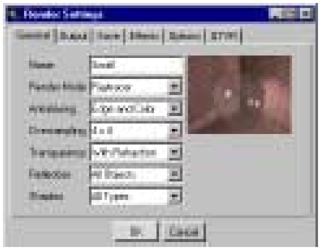
Be sure to select the camera you wish to use to render your scene. You can choose it from the View Menu: Cameras=>Scene Cameras and choose View Menu:Edit=>Use as Render View to designate this as the render camera.

Render Settings for a Small Preview

The first thing you'll want to do is name the render settings so that you can easily switch between them. Open the render settings.

Editor: Render=>Render Settings
Shortcut: Ctrl+B

Change the name to "Small" in the edit field where it says New. This will be the Small settings you will use for this project.

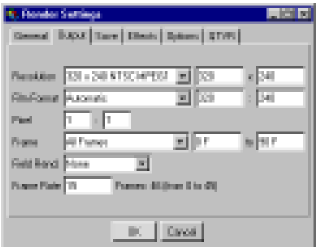


Small Render Setting - General

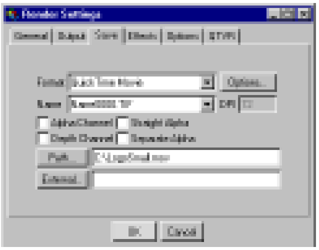
General Panel

Set the Render Mode to Raytracing. This will give a high quality final render. Set Antialiasing to Edge and Color. Set Oversampling to 4x4 to help smooth the edges nicely. This should be good enough for the small size of the render. Also, your final output will be a Sorensen compressed Quicktime which will also help smooth out the image.

You should leave all the rest of the settings on the first panel to their highest level. This is because there is no increase in rendering time unless they occur in the scene. In this case, they do not. So leave Transparency With Refraction, Reflections at All Objects and Shadows set to All Types.



Small Render Setting - Output



Small Render Setting - Save

Quicktime Movie Settings

Output Panel

This is the panel where you will set the size of the final animation. Set the resolution to 320x240. This is a common size for files that are put on the web. It's big enough to be watchable, and still download fast. Set the Film Format to Automatic. This means use the same format as the resolution. Set the Frame to All Frames so that the entire animation is rendered. Set the Frame Rate to 15. this will render only every other frame. This is a very common thing to do for web video as it cuts the file size in half.

Save Panel

Set the Format to QuickTime Movie. Click the Options button to pull up the Quicktime dialog. Choose Sorenson Video and Color. Sorenson Video is a good compression format for creating very small file sizes with fairly good quality. Set the Quality to Best, this will produce the nicest image. You can set it lower to reduce file size, but the lower you set it the more it will affect the image quality. Set the frame rate to 15 and set a keyframe every 15 frames. This will make sure that a full frame is written every second which will help keep quality high and file size small. Be sure that limit data rate is off. If it were left on the compression could get too high and cause artifacts. Click OK.

Click the Path button to pull up a standard save dialog. Type in the name of the movie you wish to render, choose where you want to save it on your computer and click Save to save these render preferences.

Click the Render to Picture Viewer button

Editor: Render=>Render To Picture Viewer
Shortcut: Shift+R

The file will begin rendering and when it is finished you can play it back using the Quicktime Movie Player.

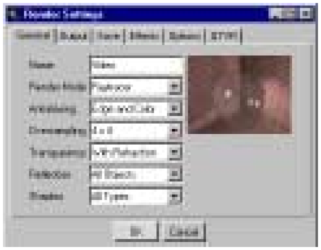
Render Settings for Video Output

The next thing you'll want to do is create a new set of Render Preferences.

Editor: Render=>New Render Settings
Shortcut: None

Change the name to "Video" in the edit field where it says New. This will be the Video settings you will use for this project.

General Panel

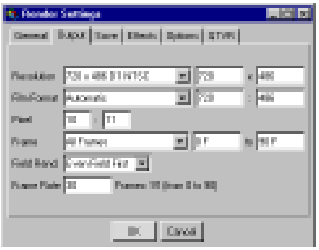


Video Render Setting - General

Set the Render Mode to Raytracing. This will give the high quality final render that you are looking for. Set Antialiasing to Edge and Color. Set oversampling to 4x4 to help smooth the edges nicely. This will make the image nice and clear for putting it out to video. In some cases you may need greater oversampling. If so, use a higher number. However, remember, the higher the oversampling the longer the rendering time.

You should leave all the rest of the settings on the first panel to their highest level. This is because there is no increase in rendering time unless they occur in the scene. In this case, they do not. So leave Transparency With Refraction, Reflections at All Objects and Shadows set to All Types.

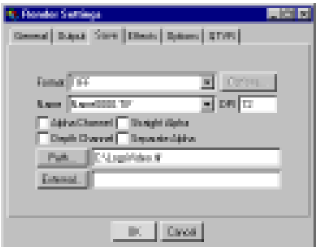
Output Panel



Video Render Setting - Output

This is the panel where you will set the size of the final animation. Set the resolution to 720x486. This is the size for files that conform to NTSC D1 standards. This is the official full screen size when working with broadcast quality video. Set the Film Format to Automatic. This means use the same format as the resolution. Set the Frame to All Frames so that the entire animation is rendered.

Set the Pixel aspect ratio to 10:11. As was mentioned in the Rendering overview chapter, pixels do not have to be square. NTSC D1 defines pixels as rectangular with the ratio of 10:11. Set the Frame Rate to 30 if you know what interlace settings you will need, or 60 if you do not. You may want to render at 60 frames per second even if you do know the correct field rendering settings and have your video output software do the interlacing itself. This often results in better image quality, especially if you will be compositing the 3D onto video.



Video Render Setting - Save

Save Panel

Set the Format to tif (If you don't have any video editing software, you probably don't need to render at this size). However, you could render to Quicktime Movie as well. If you do, Click the Options button to pull up the Quicktime dialog. Choose Animation and Best Depth. Animation is a loss-less compression format if used properly. Set the Quality to Best, this will produce the nicest image. You could set it lower to reduce file size. Set the frame rate to 30 and turn off keyframes. This ensures a full frame is written every frame, (keeping the render loss-less.)

Click the Path button to pull up a standard save dialog. Type in the name you want to give you tif images, choose where you want to save it on your computer and click Save to save these render preferences. Be sure the Name drop down is set to Name0000.tif. This will add a sequential number to the name of each frame.

It's best not to give you images a name with numbers (e.g. LogoPart1). Later when pulling into a video editing program, the number in the name can cause confusion when importing the sequence of tifs.

Click the Render to Picture Viewer button

The file will begin rendering. When it is finished, you can import the sequence of tifs or movie into QuickTime Movie Player or your video editing program to view.

Rendering the Indoor Scene

Now that the animation is done, you'll want to render the animation. You'll be rendering out to QuickTime format (unless you have a video editing package, then you should render out to tif for better reliability.) You'll have an option to render a small animation or a large one. The smaller one will be done sooner, play back easier and take up less disk space. The larger one will take longer to render, will be harder to play back and will use up more disk space, but it will let you see the results more clearly. The small version is also suitable for putting on the web and the larger one would be used if you were putting it onto video.

Preparation

The lamp creates a special problem for rendering because it is difficult to create the right shadow look using a single lampshade. In reality, light bounces all over a room. In 3D, only objects in the direct path of a light are illuminated. Raytracing isn't exactly like the real world. Light doesn't bounce around and illuminate everything.

To make the lampshade both look correct and still cast a proper shadow, you can use two lampshade objects with a render tag on each.

Step 1: Duplicate the Lampshade object.

Editor: Edit=>Copy, Edit=>Paste
Shortcut: Ctrl+C, Ctrl+V (pc) / Cmd+C, Cmd+V (mac)

Rename the Lampshade object to Visible Lampshade and the duplicate to Shadow Lampshade.

Duplicate the material for the lamp shade. Name the new material Shade.2.

Open the Shade.2 material and go to the Transparency channel. Set the color brightness slider to 80%, the mix strength slider to 20% and change the mix mode to Add. This will create a much more transparent material for the Shadow casting lampshade.

Drag this material over the texture icon of the Shadow Lampshade object in the Object Manager. Drop it on the old material to replace it.

Step 2: Add a render tag to both Lamp shades in the Object Manager.

Object Manager: File=>New Tag=>Render Tag
Shortcut: None

In the Render Tag for the Shadow Lampshade object, turn off everything but Cast Shadows. This will make this object completely invisible in the final render but it will cast a shadow into the scene.

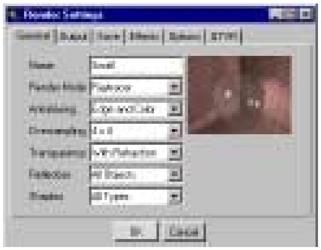
In the render tag for the Visible Lampshade object leave on the defaults on but turn off Cast Shadows. This will prevent this lampshade from casting shadows in the scene, but it will look correct.

Render Settings for a Small Preview

The first thing you'll want to do is name the render settings so that you can easily switch between them. Open the render settings.

Editor: Render=>Render Settings
Shortcut: Ctrl+B

Change the name to "Small" in the edit field where it says New. This will be the Small settings you will use for this project.

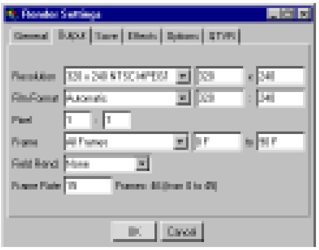


Small Render Setting - General

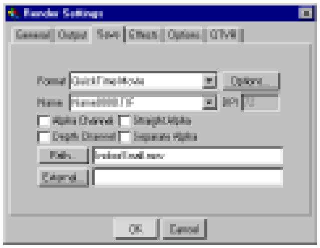
General Panel

Set the Render Mode to Raytracing. This will give a high quality final render. Set Antialiasing to Edge and Color. Set Oversampling to 4x4 to help smooth the edges nicely. This should be good enough for the small size of the render. Also, your final output will be a Sorensen compressed Quicktime which will also help smooth out the image.

You should leave all the rest of the settings on the first panel to their highest level. This is because there is no increase in rendering time unless they occur in the scene. In this case, they do not. So leave Transparency With Refraction, Reflections at All Objects and Shadows set to All Types.



Small Render Setting - Output



Small Render Setting - Save

Quicktime Movie Settings

Output Panel

This is the panel where you will set the size of the final animation. Set the resolution to 320x240. This is a common size for files that are put on the web. It's big enough to be watchable, and still download fast. Set the Film Format to Automatic. This means use the same format as the resolution. Set the Frame to All Frames so that the entire animation is rendered. Set the Frame Rate to 15. this will render only every other frame. This is a very common thing to do for web video as it cuts the file size in half.

Save Panel

Set the Format to QuickTime Movie. Click the Options button to pull up the Quicktime dialog. Choose Sorenson Video and Color. Sorenson Video is a good compression format for creating very small file sizes with fairly good quality. Set the Quality to Best, this will produce the nicest image. You can set it lower to reduce file size, but the lower you set it the more it will affect the image quality. Set the frame rate to 15 and set a keyframe every 15 frames. This will make sure that a full frame is written every second which will help keep quality high and file size small. Be sure that limit data rate is off. If it were left on the compression could get too high and cause artifacts. Click OK.

Click the Path button to pull up a standard save dialog. Type in the name of the movie you wish to render, choose where you want to save it on your computer and click Save to save these render preferences.

Click the Render to Picture Viewer button

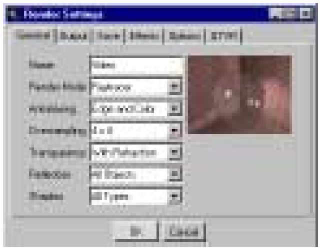
The file will begin rendering and when it is finished you can play it back using the Quicktime Movie Player.

Render Settings for Video Output

The next thing you'll want to do is create a new set of Render Preferences.

Editor: Render=>Render Settings
Shortcut: Ctrl+B

Change the name to "Video" in the edit field where it says New. This will be the Video settings you will use for this project.

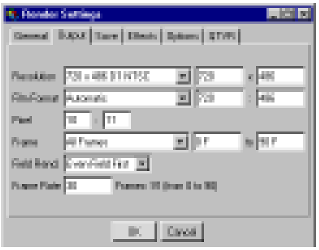


Video Render Setting - General

General Panel

Set the Render Mode to Raytracing. This will give the high quality final render that you are looking for. Set Antialiasing to Edge and Color. Set oversampling to 4x4 to help smooth the edges nicely. This will make the image nice and clear for putting it out to video. In some cases you may need greater oversampling. If so, use a higher number. However, remember, the higher the oversampling the longer the rendering time.

You should leave all the rest of the settings on the first panel to their highest level. This is because there is no increase in rendering time unless they occur in the scene. In this case, they do not. So leave Transparency With Refraction, Reflections at All Objects and Shadows set to All Types.

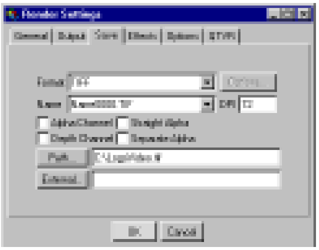


Video Render Setting - Output

Output Panel

This is the panel where you will set the size of the final animation. Set the resolution to 720x486. This is the size for files that conform to NTSC D1 standards. This is the official full screen size when working with broadcast quality video. Set the Film Format to Automatic. This means use the same format as the resolution. Set the Frame to All Frames so that the entire animation is rendered.

Set the Pixel aspect ratio to 10:11. As was mentioned in the Rendering overview chapter, pixels do not have to be square. NTSC D1 defines pixels as rectangular with the ratio of 10:11. Set the Frame Rate to 30 if you know what interlace settings you will need, or 60 if you do not. You may want to render at 60 frames per second even if you do know the correct field rendering settings and have your video output software do the interlacing itself. This often results in better image quality, especially if you will be compositing the 3D onto video.



Video Render Setting - Save

Save Panel

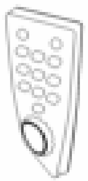
Set the Format to tif (If you don't have any video editing software, you probably don't need to render at this size). However, you could render to Quictime Movie as well. If you do, Click the Options button to pull up the Quicktime dialog. Choose Animation and Best Depth. Animation is a loss-less compression format if used properly. Set the Quality to Best, this will produce the nicest image. You could set it lower to reduce file size. Set the frame rate to 30 and turn off keyframes. This ensures a full frame is written every frame, (keeping the render loss-less.)

Click the Path button to pull up a standard save dialog. Type in the name you want to give you tif images, choose where you want to save it on your computer and click Save to save these render preferences. Be sure the Name drop down is set to Name0000.tif. This will add a sequential number to the name of each frame.

It's best not to give you images a name with numbers (e.g. IndoorPart1). Later when pulling into a video editing program, the number in the name can cause confusion when importing the sequence of tifs.

Click the Render to Picture Viewer button

The file will begin rendering. When it is finished, you can import the sequence of tifs or movie into QuickTime Movie Player or your video editing program to view.

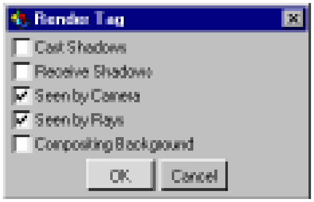


Rendering the SciFi Scene

Now that the animation is done, you'll want to render the animation. You'll be rendering out to QuickTime format (unless you have a video editing package, then you should render out to tif for better reliability.) You'll have an option to render a small animation or a large one. The smaller one will be done sooner, play back easier and take up less disk space. The larger one will take longer to render, will be harder to play back and will use up more disk space, but it will let you see the results more clearly. The small version is also suitable for putting on the web and the larger one would be used if you were putting it onto video.

Preparation

There are some objects in this scene that will require rendering tags.

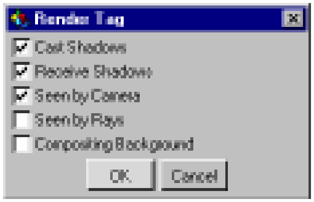


Step 1. Render Tag

Step 1: With the Planet object selected in the Object Manager, add a Rendering Tag to the Planet.

Object Manager: File=>New Tag=>Render Tag
Shortcut: None

The Rendering Tag dialog will open. Turn off casting and receiving shadows. If the planet casts any shadows or one of the ships casts shadows on it, the shadows would very likely be out of proportion. This eliminates that problem.



Step 2. Render Tag

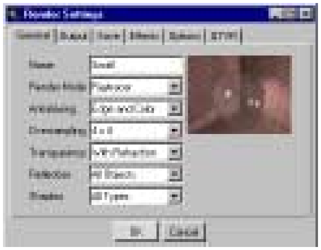
Step 2: Add a Rendering Tag to the Background Universe. Turn off Seen by Rays. This way the stars will not reflect on the space ships. Without this, the reflections on the Stingray ship will look extremely busy.

Render Settings for a Small Preview

The first thing you'll want to do is name the render settings so that you can easily switch between them. Open the render settings.

Editor: Render=>Render Settings
Shortcut: Ctrl+B

Change the name to "Small" in the edit field where it says New. This will be the Small settings you will use for this project.

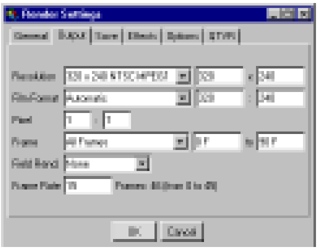


Small Render Setting - General

General Panel

Set the Render Mode to Raytracing. This will give a high quality final render. Set Antialiasing to Edge and Color. Set Oversampling to 4x4 to help smooth the edges nicely. This should be good enough for the small size of the render. Also, your final output will be a Sorensen compressed Quicktime which will also help smooth out the image.

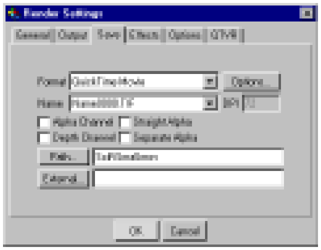
You should leave all the rest of the settings on the first panel to their highest level. This is because there is no increase in rendering time unless they occur in the scene. In this case, they do not. So leave Transparency With Refraction, Reflections at All Objects and Shadows set to All Types.



Small Render Setting - Output

Output Panel

This is the panel where you will set the size of the final animation. Set the resolution to 320x240. This is a common size for files that are put on the web. It's big enough to be watchable, and still download fast. Set the Film Format to Automatic. This means use the same format as the resolution. Set the Frame to All Frames so that the entire animation is rendered. Set the Frame Rate to 15. this will render only every other frame. This is a very common thing to do for web video as it cuts the file size in half.



Small Render Setting - Save

Save Panel

Set the Format to QuickTime Movie. Click the Options button to pull up the Quicktime dialog. Choose Sorenson Video and Color. Sorenson Video is a good compression format for creating very small file sizes with fairly good quality. Set the Quality to Best, this will produce the nicest image. You can set it lower to reduce file size, but the lower you set it the more it will affect the image quality. Set the frame rate to 15 and set a keyframe every 15 frames. This will make sure that a full frame is written every second which will help keep quality high and file size small. Be sure that limit data rate is off. If it were left on the compression could get too high and cause artifacts. Click OK.

Click the Path button to pull up a standard save dialog. Type in the name of the movie you wish to render, choose where you want to save it on your computer and click Save to save these render preferences.

Quicktime Movie Settings

Click the Render to Picture Viewer button

Editor: Render=>Render To Picture Viewer
Shortcut: Shift+R

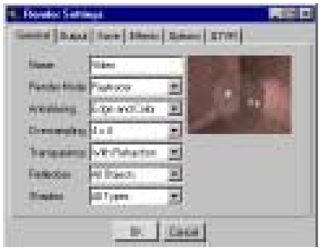
The file will begin rendering and when it is finished you can play it back using the Quicktime Movie Player.

Render Settings for Video Output

The next thing you'll want to do is create a new set of Render Preferences.

Editor: Render=>Render Settings
Shortcut: Ctrl+B

Change the name to "Video" in the edit field where it says New. This will be the Video settings you will use for this project.

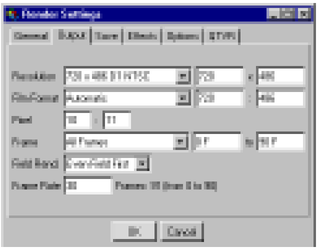


Video Render Setting - General

General Panel

Set the Render Mode to Raytracing. This will give the high quality final render that you are looking for. Set Antialiasing to Edge and Color. Set oversampling to 4x4 to help smooth the edges nicely. This will make the image nice and clear for putting it out to video. In some cases you may need greater oversampling. If so, use a higher number. However, remember, the higher the oversampling the longer the rendering time.

You should leave all the rest of the settings on the first panel to their highest level. This is because there is increase in rendering time unless they occur in the scene. In this case, they do not. So leave Transparency With Refraction, Reflections at All Objects and Shadows set to All Types.

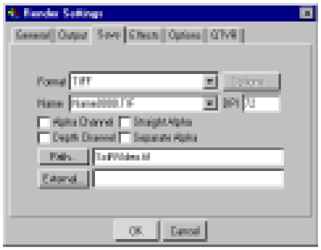


Video Render Setting - Output

Output Panel

This is the panel where you will set the size of the final animation. Set the resolution to 720x486. This is the size for files that conform to NTSC D1 standards. This is the official full screen size when working with broadcast quality video. Set the Film Format to Automatic. This means use the same format as the resolution. Set the Frame to All Frames so that the entire animation is rendered.

Set the Pixel aspect ratio to 10:11. As was mentioned in the Rendering overview chapter, pixels do not have to be square. NTSC D1 defines pixels as rectangular with the ratio of 10:11. Set the Frame Rate to 30 if you know what interlace settings you will need, or 60 if you do not. You may want to render at 60 frames per second even if you do know the correct field rendering settings and have your video output software do the interlacing itself. This often results in better image quality, especially if you will be compositing the 3D onto video.



Video Render Setting - Save

Save Panel

Set the Format to tif (If you don't have any video editing software, you probably don't need to render at this size). However, you could render to Quictime Movie as well. If you do, Click the Options button to pull up the Quicktime dialog. Choose Animation and Best Depth. Animation is a loss-less compression format if used properly. Set the Quality to Best, this will produce the nicest image. You could set it lower to reduce file size. Set the frame rate to 30 and turn off keyframes. This ensures a full frame is written every frame, (keeping the render loss-less.)

Click the Path button to pull up a standard save dialog. Type in the name you want to give you tif images, choose where you want to save it on your computer and click Save to save these render preferences. Be sure the Name drop down is set to Name0000.tif. This will add a sequential number to the name of each frame.

It's best not to give you images a name with numbers (e.g. ScFiPart1). Later when pulling into a video editing program, the number in the name can cause confusion when importing the sequence of tifs.

Click the Render to Picture Viewer button

The file will begin rendering. When it is finished, you can import the sequence of tifs or movie into QuickTime Movie Player or your video editing program to view.