16

Animating Techniques

Animation Techniques

Ray Dream Studio has a number of features for developing animations. Most of them can be used in more than one way. This chapter covers some techniques that will save you time and trouble and help you develop more interesting, natural and dynamic animations.

In this chapter you'll learn about animating object shapes using the modelers. You'll learn about animating with Deformers, how to get smooth motion paths, and use cloaking to hide and show an object at different points. You'll also learn about the many uses of rotoscoping and how to animate in shaders.

Animating Object Shape

You can change the shape of an object over time. This is as easy as jumping into the object and changing its shape to create a key event. Ray Dream Studio creates the transitions necessary to "tween" the original into the modified shape.

The type of object determines which modeler you'll use when you jump in and, therefore, what modifications you can make. For example, with the **Free Form** modeler, you can edit the cross sections, sweep path and scaling envelope. But with the volumetric primitives, like Fire and Cloud, you'll use sliders to change the character of the object.

Animating a Deformer is another way to change an object's appearance over time. Refer to "Animating with Deformers" on page 332.

Free Form Modeler

Ray Dream Studio 5 allows you to change the shape of a free form object during animation using the **Free Form** modeler.

There are some limitations in the kinds of changes you can make in your models, but generally you can edit all existing cross sections and points on an extrusion path or scaling envelope.

You *cannot* add or delete cross sections or points, or change the basic structure of the object. For instructions on modeling with extrusion paths and cross sections, refer to "Cross Sections and the sweep path" on page 131.

To create free form models whose shapes you want to animate:

1. Create all of the control points for the extrusion path.

   You cannot add or delete points during the animation, so you must create all you'll need at the outset.

2. Create all of the cross sections, with all of the control points.

   Start with the most complex shape your object will have during the entire animation. You can pull the control points close together at first, and then pull them apart as the object changes shape.

To animate the free form shape:

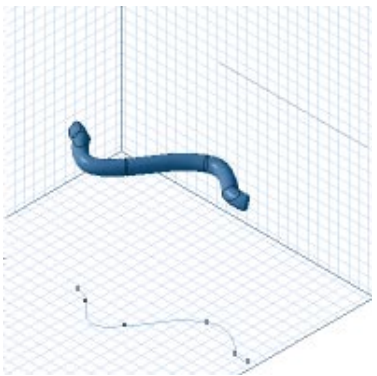
1. Set the current time bar to the point where you want the key event to occur.

2. Display the Hierarchy **Masters** tab.

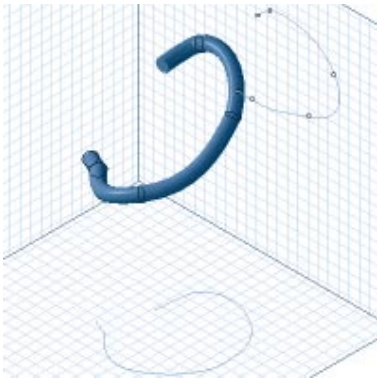
3. In the **Masters** tab, double-click the name of the object whose shape you are animating.

   You may also select it, then choose **Edit menu▸ Jump In**.

4. In the **Free Form** modeler, adjust the points and curves of any cross section, extrusion path or envelope line.



To animate a free form object's shape, first create a an object in the Free Form modeler using cross sections and a sweep path...

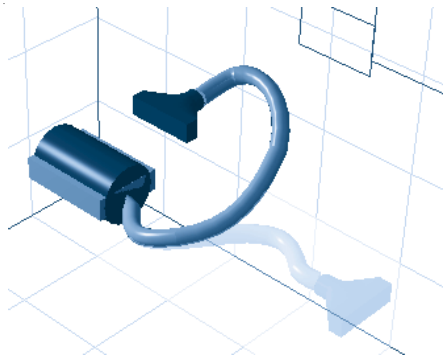


...then adjust the shapes in a different frame.

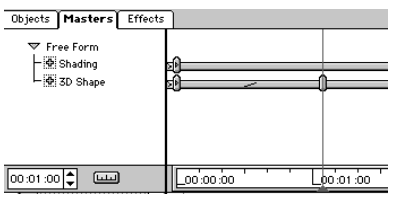
You may not add or delete points or add a cross section shape.

5. When you are finished changing the object shape, click **Done**. You may also choose **Edit menu▸ Jump Out**.

   Ray Dream Studio adds a key event marker to the free form object's time track in the **Masters** tab of the hierarchy.



When you run the animation, Ray Dream Studio fills in the action between the two shapes to show the change of shape or movement.



A new key frame appears on the Master time track to indicate the change of shape.

You can now change the tweener between the two event marker s and set the transition method

Mesh Form Modeler

In Ray Dream Studio 5 you can change the shape of a mesh form object during animation using the **Mesh Form** modeler.

When you're using the **Mesh Form** modeler to animate, you're only animating movement and position. You cannot preform any operations on an object that will add, or remove vertices. Since commands like **Loft**, **Extrude** and **Sweep** all add vertices, you cannot use any of them during an animation.

For instructions on modeling with vertices and polymeshes, refer to "Creating Polymesh Objects" on page 151.

To create mesh form models whose shapes you want to animate:

1. Create all of the vertices for the object.

   You cannot add or delete vertices during the animation, so you must create all you'll need at the outset.

2. Shape the object into the desired form using any of the modelers features.

   Since you can adjust the position of vertices during the animation, the object you create at the onset doesn't have to be the final form. You can move vertices to deform the object over time.

To animate the mesh form shape:

1. Set the current time bar to the point where you want the key event to occur.
2. Click the **Masters** tab in the **Time Line** window.
3. In the **Masters** tab, double-click the name of the object whose shape you're animating.

   You can also select it, then choose **Edit menu▸ Jump In**.
4. In the **Mesh Form** modeler, adjust the position of the object's vertices.

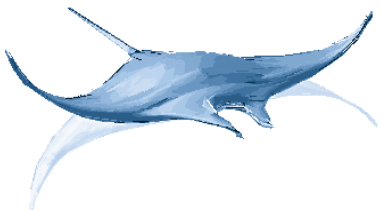
To begin an animation, first create a an object in the Mesh Form modeler using vertices...

...then adjust the position on the vertices in a different frame.

You may not add or delete vertices.

5. When you're finished changing the object shape, click **Done**. You can also choose **Edit menu▸ Jump Out**.

   Ray Dream Studio adds a key event marker to the mesh form object's time track in the **Masters** tab of the **Time Line** window.



When you run the animation, Ray Dream Studio adds key frames to simulate movement.

You can now change the tweener between the two event markers and set the transition method.

Particle and Volumetric Primitives

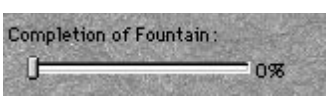
Fountain is a particle-based primitive. The volumetric primitives include Fire, Clouds, and Fog. Each of these primitives has its own modeling dialog, but the technique for animating them is the same.

Note: Animations of Fountain or the volumetric primitives won't be visible when previewing. You'll need to do a test render to see the results.

To animate the volumetric primitive shape:

1. Create the volumetric primitive and adjust its attributes at the start of the animation.

   The **Completion of _____** slider sets the current moment of the animation. In most cases, the slider should be at zero at the start of the animation.



The completion fountain sets the current movement of the primitive.

Note: Fog rises, Fire burns and the Fountain spews. The Cloud, however, is static. Therefore, the Cloud modeling dialog does not have a **Completion** slider.

For descriptions of the attributes for each environmental primitive, refer to "Creating Environmental Primitives" on page 99.

2. When you're finished setting the attributes, click **Done** to close the volume modeler.

3. Set the current time bar to the point where you want the key event to occur.

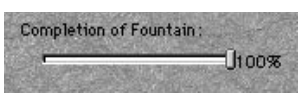
4. Display the hierarchy **Masters** tab.

5. In the **Masters** tab, double-click the name of the object.

   You may also select it, then choose **Edit menu▸ Jump In**.

6. In the **Attribute** dialog, adjust the **Completion of _____** slider to the percentage that describes how much of the object's animation should be accomplished at this point.

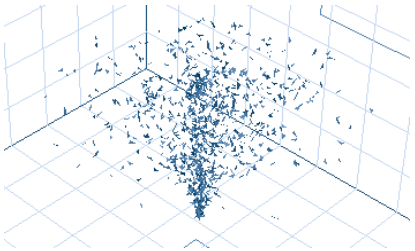
   Assuming that this is the end of the animation, set it to 100%.



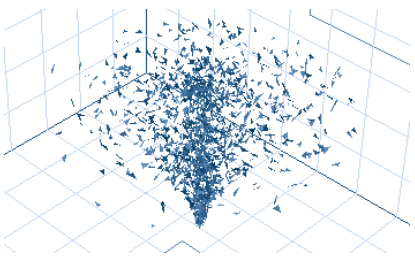
The completion fountain sets the current movement of the primitive.

7. You can adjust other attributes to change the characteristics of the object.

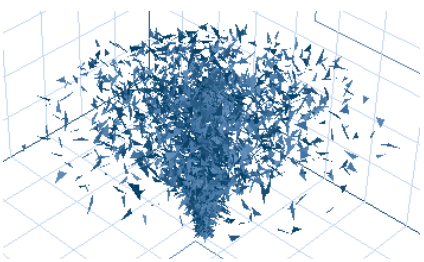
   For example, you might want the Fire to change the quantity of flames or its upward speed.



Fountain primitive with completion at 0%.



Fountain primitive with completion as 50%.



Fountain primitive with completion as 100%.

8. When you are finished changing the object shape, click **Done**. You may also choose **Edit menu▸ Jump Out**.

   Ray Dream Studio adds a key event marker to the free form object's time track in the **Masters** tab of the hierarchy.

You can now change the tweener between this event marker and the previous one to set the transition method. For example, to get flickering flames, you can use the Oscillate tweener.

Animating with Deformers

Deformers allow you to dynamically alter the shape of an object. Deformers like Stretch, Bend and Twist, Explode, Dissolve and Shatter produce interesting animated effects that cannot be achieved by other means.

Deformers are especially useful in animation because they can be used to animate the shape of entire groups, which cannot be edited directly in a modeler.

A group animated with Bend and Twist deformer.

Only one deformer can be applied to a single object or group. Since the deformer you apply becomes part of the object's property hierarchy (which remains fixed throughout the animation), it cannot be replaced with another deformer during the animation. These limitations prevent you from applying two or more Deformer (either simultaneously or sequentially) to the same object during an animation.

You can overcome this limitation by nesting objects hierarchically within groups and applying a deformer to each group as well as to the object itself. This allows you to apply multiple Deformer to the same object—either simultaneously or successively.

Bend and Twist, and Stretch Deformers applied to a text object.

To animate with a Deformer:

1. Apply the Deformer to the object. For instructions on applying a Deformer, refer to "Applying Deformers" on page 172.
2. Set the **Deformer** options you want in frame 1.

   For complete descriptions of the Deformers and their options, refer to Chapter 9, "Deformers.".

   Deformers that apply a dynamic effect, like **Explode** or **Dissolve**, have a **Completion** slider which sets the current moment of the animation. In most cases, the slider should be at zero at the start of the animation.
3. Set the current time bar to the point where you want the deformation to peak or finish.
4. Use the options in the **Properties palette: Deformer tab** to change the state of deformation at that point.
5. If the Deformer has a **Completion** slider, set it to the percentage that describes how much of the deformation should be accomplished at this point.

Note: Remember to apply your changes.

You can now change the tweener between this event marker and the previous one to set the transition method.

Animating Motion

Translate versus Rotate

Complex motion is generally animated by moving (translating) an object to various positions along the desired motion path and creating key events at each position.

The Bézier tweener can then be applied to smooth the motion. When animating along simple, curved paths, however, it is often easier to offset an object's ***hot point*** and animate its motion using rotation rather than translation.

An object always rotates around its hot point. By default, an object or group's hot point is at the center of its bounding box; however, you can move the hot point anywhere, even some distance from the object.

For example, you can point a camera at an object and move the camera's hot point to the center of the object. You could then rotate the camera around its own hot point to animate a "fly-around" of the object. This approach generally requires fewer key events than creating a similar motion path in the usual way, and produces equal or better results.

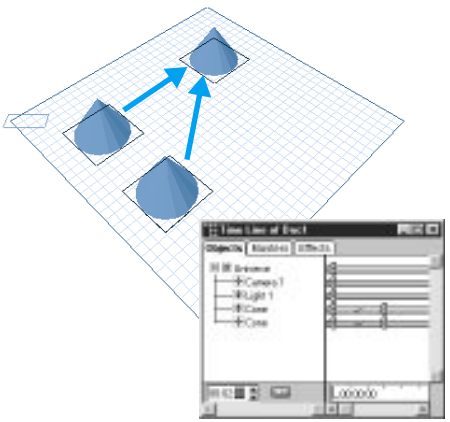
For instructions on working with hot points, refer to "The Hot Point" on page 233.

Duplicating Relative Motion with Groups

Duplicating an object or effect also duplicates its animation data (its key events and tweeners).

When key events are duplicated in this fashion, the values of the original object's properties are copied exactly to the duplicate. In the case of motion, this does not always produce the desired results.

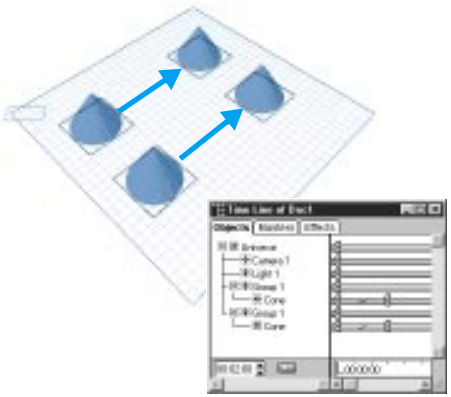
Suppose you have animated an object, and you decide you want to create a flock of identical objects, all moving in the same way. Figure 9-2 illustrates what happens when you duplicate your object and offset the duplicate from the original.



An animated object, duplicated and offset.

Since the numerical coordinates of the original object at the second key event were copied exactly to the duplicate object, the two objects end up in the same location.

This problem can be avoided by nesting the original object within a group before duplicating. When an object is animated within a group, its position is animated relative to the group, not relative to the global coordinate system. Therefore, when the group is duplicated and offset, the animated object in the duplicate group moves along its own motion path, within the group.



A group containing an animated object, duplicated and offset.

Cloaking an Object

When you want to have an object enter or exit (appear or disappear) during the course of your animation, you'll use a technique called *cloaking*.

Cloaked objects are visible and can be manipulated in the **Perspective** window; they simply are not included in the rendering of your animation.

You can take advantage of cloaking to switch one version of an object for another version of the same object. This is advantageous when the two versions have contradictory properties, which you need at different times of the animation. As long as the two objects look the same, occupy the same space, and cloak and uncloak in the same frame, the exchange from the one to the other will be seamless.

To cloak or uncloak an object at a specific point in time:

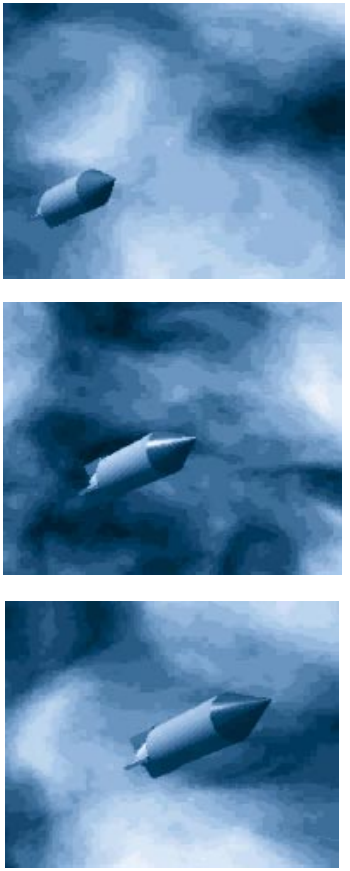
1. Select the object.
2. Display the **Properties palette: General tab**.
3. Enable or disable the **Cloak** checkbox.

Rotoscoping

Rotoscoping is a general term that describes using video selectively inside another movie. You can add live action or moving textures to your scene by rotoscoping with animations or digitized videos (movies) in your animation. Rotoscoping adds realism and visual excitement to your animations.

You can use any QuickTime (Macintosh) or Microsoft Video (AVI) file for rotoscoping. You can use movies in any of the following places:

- Texture map or paint shape on an object—including in non-color channels, like Bump.
- Background or backdrop.
- Light gel.



Using rotoscoping, you can create a scene where both the background and the objects move.

A movie is saved as a separate file. Its pathname is relative to the animation file it's used in. When you move a file with rotoscoping, be sure to maintain the relative path to the movie file.

Rotoscoping is visible on objects in Better Preview mode, but is not displayed on backgrounds, backdrops and in gels until you render the animation.

Synchronizing Movie Frames with the Animation and Looping

When you apply a movie, Ray Dream Studio creates two key events—one at the start and one at the end of the movie. You'll see the markers on the time track.

The ending event marker is placed according to the duration of the movie—not the number of frames it has. This means that the frame rate of the movie should be compatible with the rate of the animation.

It isn't necessary that the movie begin at frame 1. You can start at a later frame by synchronizing the movie to the animation.

To synchronize a movie with the animation:

1. Set the current time bar to the moment (frame) where you want to synchronize the animation.
2. Select the object or light that has the movie rotoscoped onto it. (This isn't necessary for a background or backdrop.)
3. Display the tab or window containing the rotoscope movie controls.
   - For a texture map, display the **Current Shader Editor**.
   - For a light, display the **Properties palette: Gel tab**.
   - For the background or backdrop, display the **Scene Settings window: Effects tab: Background** or Backdrop **controls**.
4. Use the preview controls to advance to the movie frame you want synchronized with the current frame of the animation.
5. Apply the change.

To loop a movie:

1. Apply the movie at the start of the animation.
2. Drag the end-of-movie key event marker out as far as you want the movie to continue.
3. Double-click the track between the two movie key event markers.
4. Choose the **Oscillate** tweener.
5. Select the **Saw/Loop Wave Shape**.
6. Set the **Up Phase** slider to 100%. This rewinds the movie instantly after each cycle.
7. Adjust the **Number of Oscillations** slider to set the number of times the movie should repeat.

   Each up slope in the graph represents one time playing the movie.
8. Close the **Transition Options** dialog.

For precise work, you'll want to calculate the correct number of oscillations based on the number of frames in the movie and the duration of the animation. You can adjust the end-of-movie marker, if necessary.

Animating Shaders

This section assumes that you have read the chapters on shading and that you have an understanding of the Current Shader Editor and its various components. For background information and step-by-step instructions on using the Current Shader Editor, refer to Chapter 10, "Shading Objects" and Chapter 11, "Creating Shaders."

Animating shaders opens a wide range of possibilities. You can animate virtually any type of change to a shader that you can imagine, from a simple color change to a shifting geometric pattern. You can even make an object appear to change from bricks to glass, or from marble to metal.

The only limitation is that you cannot replace one shader component with another during the course of an animation. You cannot, for example, replace a Wood function with a Spots function at a particular point along the time line. Thanks to the flexible, modular nature of the Shader Editor, this turns out to be only a minor limitation. "Animating Shaders with the Global Mix and Mix Components" on page 336.

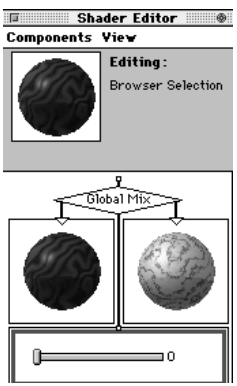
Animating simple changes to shaders is straightforward. You just use the Shader Editor to adjust the parameters of individual shader components at specific points along the time line. Examples of parameters you can adjust include:

- Colors
- Values for attributes like transparency, shininess, etc.
- Procedural function parameters, like the number of squares in a checker pattern, or the undulation of the veins in a wood pattern

Animating Shaders with the Global Mix and Mix Components

The **Global Mix** option in the **Shader Editor** allows you to animate more drastic changes to an object's shader. In the following example, a Global Mix is used to create a shader which animates gradually from wood to marble.

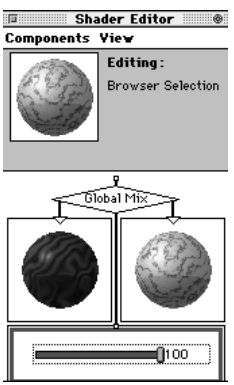
To build this animatable shader, a wood shader and a marble shader were first created separately and stored in the **Browser palette: Shaders tab**. A new shader was then created.



When the Global Mix is set to 0% the wood shader contributes 100% of the surface properties to the shader.

- The **Global Mix** option was chosen from the **Current Shader Editor: Insert menu**. A Global Mix mixes all shader channels at once, so the individual channel tabs disappear when **Global Mix** is selected.
- The original wood and marble shaders were dropped into the left and right branches of the tree, respectively.
- A Value component was placed in the lower branch, to be used as the mix function.

The value set in this Value component determines the contribution of each original shader to the mix. When the value is zero, the wood shader contributes 100%. When the value is 100, the marble shader contributes 100%. When the value is 50, the two shaders are mixed equally.



When the Global Mix is set 100% the marble shader contributes 100% of the surface properties.

Using the Global Mix you can adjust the values of two subshaders and have the texture of an object completely change over time.

To animate this shader, only the value component needs to be altered over time. To animate gradually from wood to glass, you would set the value to zero at one key event and to 100 at the next.

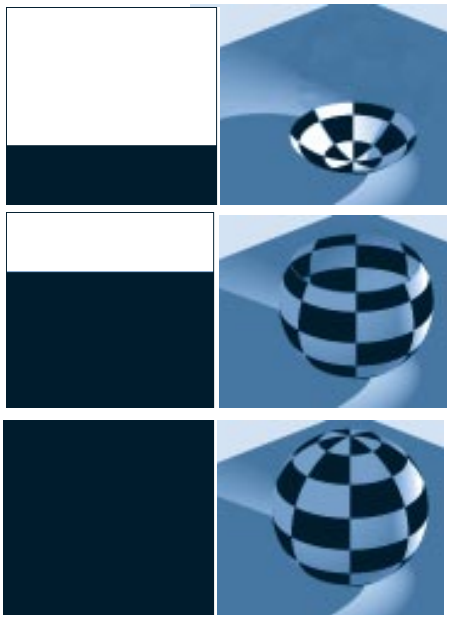
The same technique can be used to animate between different types of components within a single shader channel, except that you would use a Mix component instead of a Global Mix. This technique also allows you to animate a cross-fade between two bitmap images or movies. Just put the two bitmaps or movies in the left and right branches of the Mix.

Rotoscoping in Non-Color Shader Channels

The most common use of rotoscoping is in a shader's Color channel, where it allows a movie to be played on the surface of an object. However, rotoscoping can also be used in other shader channels to create stunning visual effects.

The example below illustrates the use of a movie in an object's Transparency channel.

The three animation frames in the right column show a sphere materializing from the floor up. This effect was achieved by playing an 8-bit grayscale movie in the sphere's Transparency channel.



An animation using rotoscoping in the Transparency channel.

The three corresponding frames from that movie are shown in the left column. The white region in each frame represents the portion of the sphere that is transparent. The black region represents the portion that is opaque.