

Extrusion

Extrusion is one of the most basic operations in 3-D modeling but, also one of the most useful. This tutorial is a step-by-step tour to help you quickly familiarize yourself with the Extrude, Path Extrude, and Bevel Extrude tools, and access each of their special features. For more detailed reference information regarding these tools, consult the Tool Palette chapter. ModelPro 3.0 also incorporates an on-line Help feature located under the Apple Menu.

Part I - Creating a Simple Extruded Object

Extrusion is the process where a 2-D contour is given depth, literally making a 3-D shape. More complex forms of extrusion involve rotation and offset to create organic shapes. In this example, you will create a box out of a rectangle

Getting Started

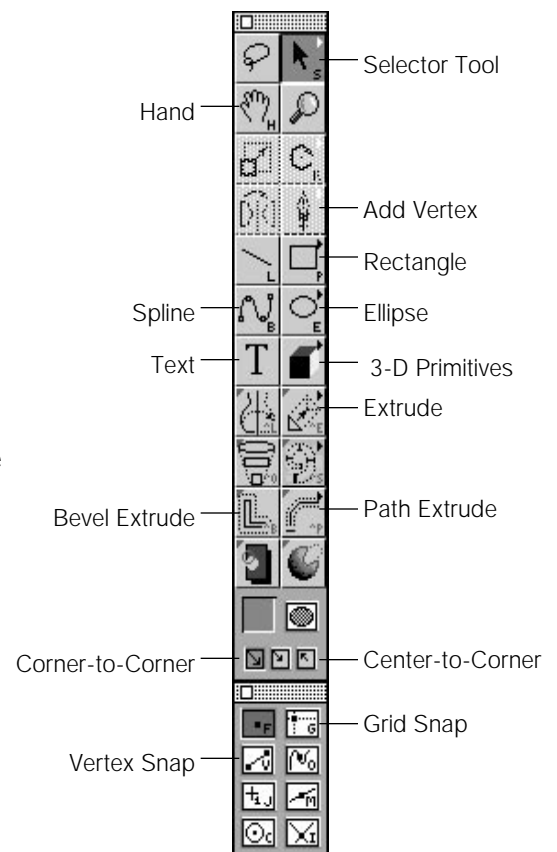
Launch ModelPro by double-clicking on its icon. Observe that ModelPro automatically opens a New blank file upon launch. Your double-width Tool palette is on the left; your Snap Palette is directly below the Tool palette; your Groups palette is on the right over the 3-D preview window titled Angled; counter-clockwise from top-left are your Top View, Front View and Right View drawing windows; at the top of the screen is the Tool Info Palette, and at the bottom of the screen is the Status Line palette.

In this part of the tutorial, you will use the Rectangle and Extrude tools. These tools and the tools you will be using in other parts of this tutorial are shown in the accompanying diagram of the Tool palette. Take a minute to review their names and locations.

Preparing the Drawing Environment

Under the Edit menu choose Preferences to display the General dialog. The box next to 3-D Operations Create Folders should be checked. If not, click in the box and click in the OK box. If checked, just click in the OK box. This cause any object created by a 3-D operation like Extrude to be place in a folder.

Note: Most of the 2-D tools can be selected by typing the letter that is in the lower-right hand corner of the icon. The 3-D operations can be selected by holding the Shift key down and typing the similarly designated letter.



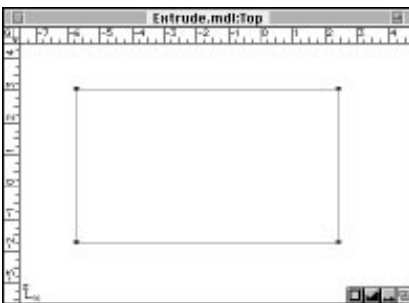


General Preferences dialog



Color Preferences dialog

Note: Preferences gives access to dialog boxes for entering numeric information and choosing options to fine-tune the ModelPro interface. The Preferences dialog boxes are: General, Screen, Drawing, Grid, and Colors. Drag the slider at the left down to expose the Colors Preferences dialog.



Top view with rectangle

In order to leave a clear view of the Angled Window, compress the Groups Palette by clicking in the Zoom box located at the upper-right corner of the Palette. This will leave the Palette visible (compressed) on screen, and readily available again by clicking in the Zoom box.

Draw a Rectangle

Click on the Rectangle Tool icon in the tool palette. To draw the rectangle, click in the top, left of the Top View and drag down and to the right. Release the mouse.

ModelPro automatically names and adds all elements drawn or created to the Groups palette. While you may never have to use the Groups palette, it comes in handy for efficiently handling large, complex objects.

Extrude the Rectangle

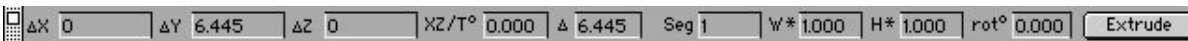
Select the Extrude tool from the tool pallet. (If your 2-D contour(s) is not still selected re-select it now using the Selector tool).

Notice that an Extrude Tool Info palette is displayed above the windows and control points appear in all the windows. These will be explained later. For now, click on the Extrude Button in the Extrude Tool Info palette or double click within any drawing window.

Click on the Smooth-shaded Display button in the 3-D Window to preview your object. You have just created a simple extrude object using ModelPro's Default Extrusion Settings.

Look at the Groups palette. You will notice a closed folder titled Extrude 1. Click on the folder arrow at the immediate left of the folder. This causes it to open and display one object titled Extrude Mesh 1.

The Drawing Options portion of the Tool palette lets you select the drag options for 2-D contours. The default option is drawing corner-to-corner.

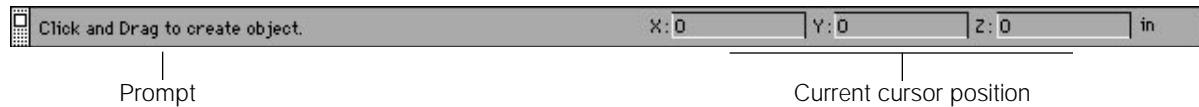


ExtrudeTool Info palette

Extrude Tutorial

Creating a Simple Extruded Object

ModelPro provides you with prompts to let you know what step is expected next. These prompts appear in the Status Line palette located at the bottom of the screen.



Extruding Other Shapes

Try extruding other contours created with any of the other 2-D drawing tools. Try extruding a contour(s) in the Top and Right View windows.

To reverse a step, choose Undo under the Edit Menu.

To change the size of an object, select the Selector Tool and hold down the option key and click on the object or just click on the name of the object in the Groups palette. Four dots representing a bounding box will appear. Click, hold, and drag on any dot to re-size the object.

To edit a shape, select the Selector Tool or hold down the Command key and click on the object, click, hold, and drag any of the points that are highlighted to change the shape.

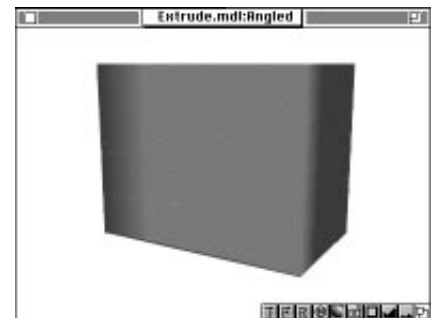
To edit a shape that is in a closed folder, either open the folder or use the Direct Selector Tool which is on the Selector Tool pop-up.

To move an object, select the Selector Tool, hold down the Option key and click, hold, and drag to the desired position.

The Angled View can be used to select points that are hidden in the Front, Top, or Right views.

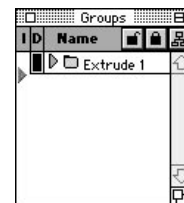
Refer to Chapter Four for a definition of the standard keyboard modifiers.

Save often when working on a project, and make backup copies using the Save and Save As commands from the File Menu.

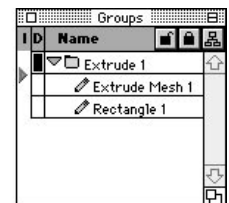


Shaded cube

Note: To return to the spline display, click on the Spline Display button in the 3-D Window.



Closed folders



Open folders

Note: The newly created object, Extrude Mesh 1, was placed in a folder because the 3-D operations Create Folders option was checked in the General Preferences dialog.

Tip: After completing a 3-D operation like an Extrude, you may decide that you want to change the shape and extrude again. ModelPro provides you with the ability to change your design with some basic edit capabilities. You can use the multiple level Undo capability to reverse your operations, the scaling capability to re-size the object, and vertex editing to change the shape of the object.

Part II - Creating Extruded Objects Using Custom Tool Settings

In the previous example you created an extrude object using ModelPro's default extrusion values. These settings provide a general starting point for extrusion operations, and can be used to quickly generate 3-D objects. For more specific tasks, however, ModelPro allows you to set custom values for the Extrusion Tool's parameters. These custom values can be set using either ModelPro's Interactive Controls or specific Numeric Input.

Getting Started

In this example, you will use the Rounded Rectangle and the Extrude tools with its custom tool settings to twist and re-shape the extruded rectangle. If you are not in ModelPro, launch ModelPro by double-clicking on its icon. Create a new document by selecting New under the File menu.

Preparing the Drawing Environment

In this part of the tutorial, we want direct access to all objects and do not want them place automatically in a folder after a 3-D operation. Select the Edit menu and choose Preferences to display the General dialog. The box next to 3-D Operations Create Folders should be un-checked. If it's checked, click in the box and click in the OK box. If it's un-checked, click in the OK box.

In the Top Window you are going to create a rounded square drawn out from the center. First, select the center to-corner option in the Drawing Options portion of the Tool palette. Click and hold on the Rectangle Tool icon in the Tool palette. Drag over to the Rounded Rectangle Tool, the Second one in the pop-up, and release. To draw the square, while holding the Shift key down, click in the center of the Top View and drag away from the center. Release the mouse when the rounded square nearly fills the window.

Using Extrusion Control Handles

Select the Extrusion Tool from the Tool Pallet. Notice the preview copy displayed in the Angled Window and the Extrude Tool's intuitive control handles shown in the Top/Front/Right View windows only.

To ensure that everything will be visible in all of the View windows, hold the Command key and click in the Fit to Window box in any View window (left-most button at the bottom of Top/Front/Right View windows).

Setting the Depth and Direction of Extrusion

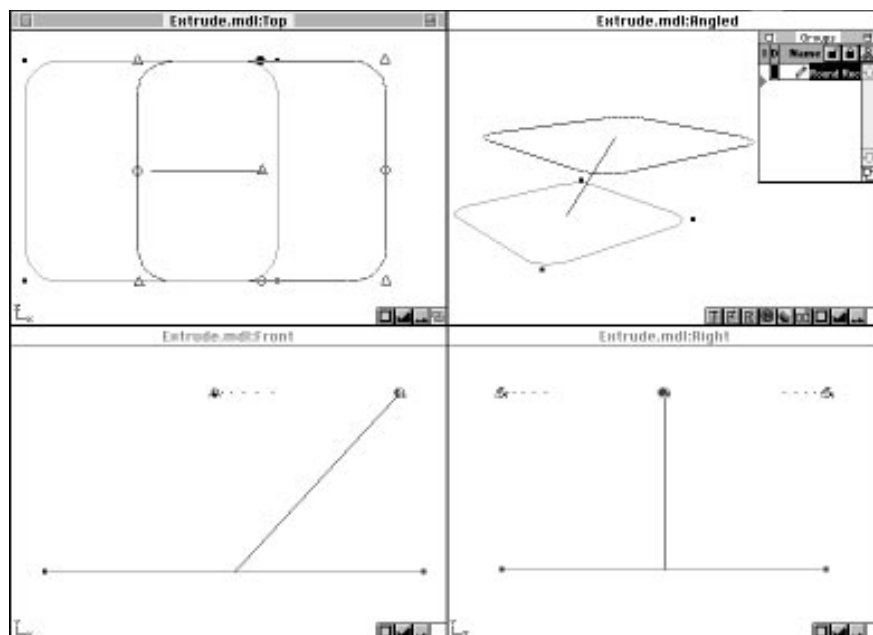
In the Front View click-drag on the triangular control handle centered with the preview copy of your contour. This control handle sets the depth and direction of an extrusion. The line extending between the contours serves as a visual guide in establishing the settings for these parameters. Move the control handle up and to the right.

Setting the Scale of the End of the Extrusion

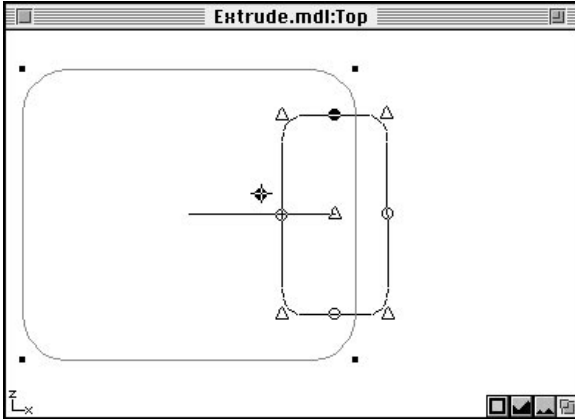
In the Top View window click and drag one of the four triangles located at the corners of the preview copy of your contour. These handles control the relative scale of the preview copy of your contour. By clicking on and dragging any of these triangles you can modify the scale of the preview copy in one or both dimensions. This feature allows you to create objects that widen or narrow as they extrude into 3-D space such a funnel or a megaphone. Notice the preview copy is re-drawn as you move the control handles. Drag the lower right control handle inward to reduce the size of the preview copy.

Note: The Shift key constrains objects like ellipses, rectangles, and other polygons to circles, squares and regular shapes.

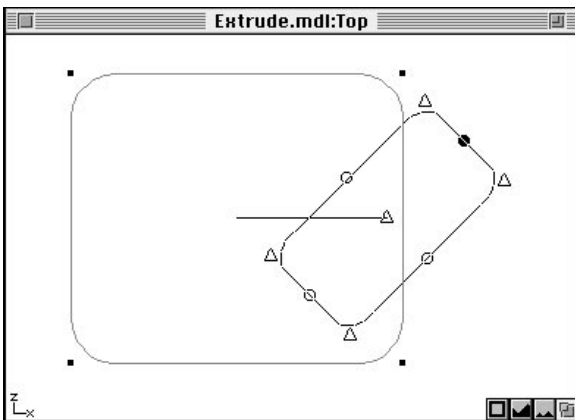
Note: Clicking in a Fit to Window box re-sizes the objects to fit in that window. Holding the Command key while clicking in any Fit to Window box re-sizes the objects in all windows.



Extrusion Control Handles



Contour control handles



Rotated contour

Setting the Rotation of the End of the Extrusion

While still in the Top View drag one of the four circles (one on each edge of the preview copy). Drag in any direction to rotate the preview copy. As you rotate the preview copy notice the Rotation Value changing in the Tool Info palette. This number represents the numeric value for the Extrusion parameters you are modifying intuitively.

Notice that the rotation is about the center triangle.

Double click in the “rot” box in the Tool Info palette at the top of the screen. From the keyboard enter the value “45”. Notice that the screen updates to reflect the new value you have entered. In this manner ModelPro allows for precise input of a numeric value for each of the Extrude Tool’s parameters. You can use any combination of numeric and interactive input to establish the parameters for the Extrude Tool. All of the Extrude Tool’s parameters can be established using either method, with the exception of the Segment parameter. The Segment parameter must be input numerically.

Extrude the Rounded Square

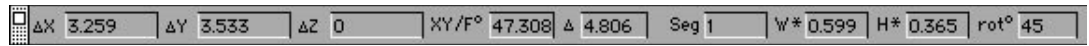
Click on the Extrude button or double click in any window to create the extruded object based on the parameters you have just established. You will notice that the object is twisted and tapered.

Go to the File Menu and select Save AS. At the prompt for a name, type Extruded Base.mdl. You can now quit or continue on to the next part.

ModelPro will remember the most recent values for a tool’s parameters. This feature is useful for creating a series of objects based on different contours with the same parameter values applied.

To reset a tool’s parameters, hold the Option key while selecting the tool icon from the Tool palette. The ability to override a tool’s currently set parameters is useful when undoing a 3-D operation. It allows you to set new parameters for the operation.

Extrude Tutorial Using Custom Tool Settings



ModelPro allows you to extrude multiple contours simultaneously. To select multiple contours Shift-select the desired contours to be extruded.

Contours can be selected before or after activating the Extrude Tool.

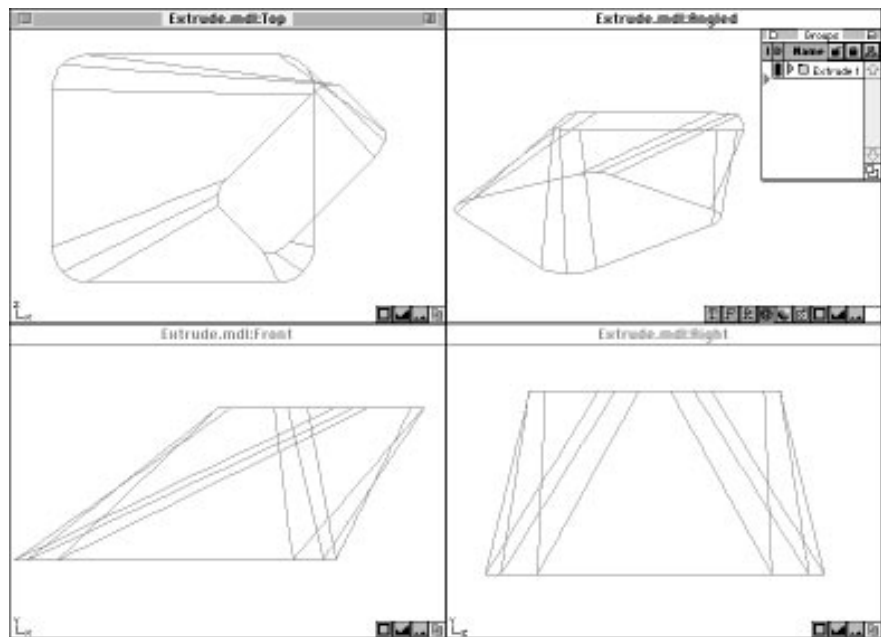
Additional contours can be added to an active selection by Shift-selecting.

To deactivate the Extrude Tool without performing an extrusion, click on the Selector Tool icon.

Select Re-display under the Windows menu whenever you want to see the result of an operation. To save time waiting for screen refresh, some actions and operations do not automatically re-display.

Extrusion Tool Info palette

Note: The segment parameter defines the number of segments the extruded part contains. The default is one segment.



Final Extrude

Part III - Using “ribs” to Extend an Extruded Object

The results of 3-D operations on 2-D contours, like Extrude, create a series of connected splines that form a 3-D object. One or more of these splines can be selected as “ribs” by ModelPro and used for performing additional 3-D operations.

Extruding a Rib

ModelPro allows you to select one or more splines generated in a 3-D operation as a “rib”. These ribs can be used as 3-D contours for other 3-D operations. In this example, you will select the end of the extruded rounded rectangle created in Part II as the rib and use it to perform another extrusion.

If you are not in ModelPro, launch ModelPro by double-clicking on its icon. Go to the File Menu and Open Extruded Base.mdl

Preparing the Drawing Environment

To continue the extrusion process using the previously created 3-D object, we will need to re-adjust the scale of the windows. In the Front View, move the cursor to the Zoom out icon, click, and hold until the object has shrunk slightly in size. Use the Hand Tool to move the object down near the bottom of the window.

Select the Rib and Extrude

In this part we will use the rounded rectangle lying at the end of the previous extrude, the “rib”, as the contour to be extruded. Selecting a “rib” is a two step process. First, use the the Selector Tool to select the extruded object and show its vertices. If the four bounding box control points appear instead of the vertices, it means you have selected the object instead of the vertices. This occurs when the object to be selected is inside a closed folder. You need to open the folder and select again or use the Direct Selector Tool. It is located on the pop-up next to the Selector Tool.

Second, while holding down the Control key, click, hold, and drag a small rectangle around the top part of the extruded object in the Front View as shown. This selects the top rounded rectangle as the “rib” to be used in the next step of the extrusion.

Note: Note to access the Direct Selector Tool, type D or click and hold on the Selector Tool to get the pop-up and drag over to the end of the pop-up.

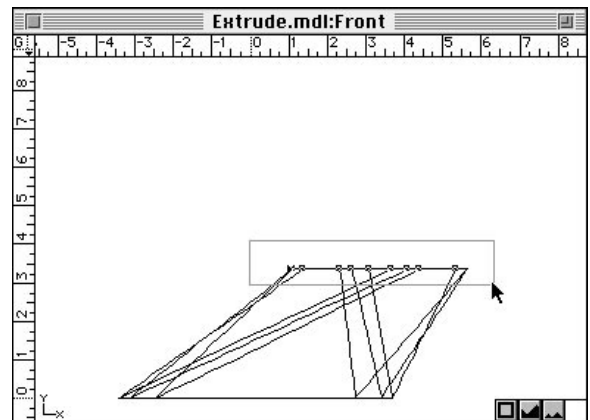
Extrude Tutorial Extruding a "Rib"

If you are continuing directly from Part II, hold the Option key down to reset the Extrude parameters and select the Extrude Tool from the Tool pallet. Otherwise, just select the Extrude Tool from the Tool pallet.

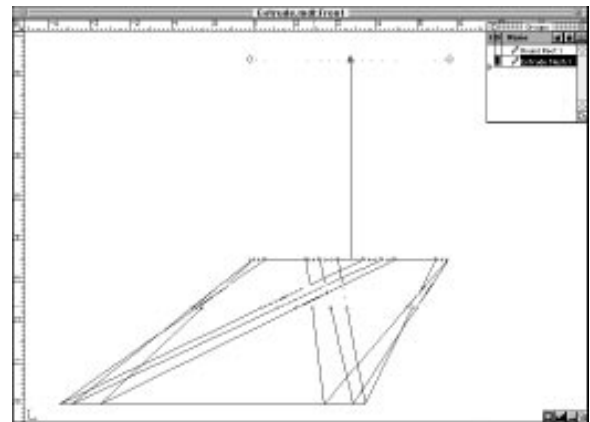
This is a good time to re-size the object in all views. Hold the Command key down and click in any window's Fit to Window icon.

Click on the Extrude button on the Extrude Tool Info palette, or double-click, to complete the extrusion.

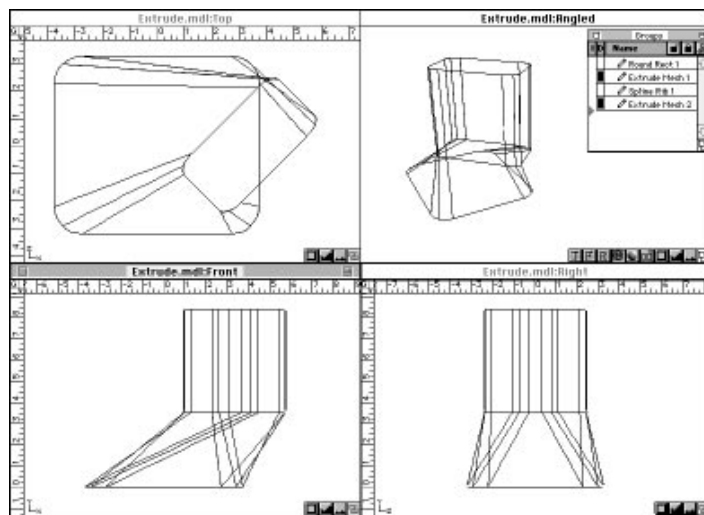
Go to the File Menu and select Save As. At the prompt for a name, type Extended Base.mdl. You can now quit or continue on to the next part..



Select the rib



Extrude preview



After Extruding the Rib

Note: Rib selection is a very powerful feature of ModelPro. It enables you to create some very exotic and complex shapes. Any spline segment or groups of spline segments can be selected for 3-D operations. By holding down the Control key, the Selector Tool becomes a "rib" Selector which can select any generated 3-D spline for use in further 3-D operations. For proper use, the vertices must be showing so they can be selected.



Notes