

3D Operations

Unless otherwise specified, these operations work only on 2D contours, or on properly selected "ribs".

To select a "rib" on a 3D shape, select the shape with vertices visible; hold the Command key (cursor changes to solid-white with tilde (~)); then click on the "rib".

Most often, 2D contours are created for use in 3D operations; for the best results, draw 2D contours in the Front View window. Contours to be used for Path Extrude should be drawn in the Top View window. These conventions should be followed regardless of what the final orientation of the 3D item will be; the default settings for the tools are set to handle contours drawn in the Front View window. It is a simple matter to reposition a 3D item after it has been built, however it can be quite difficult to build it in position. You may want to refer to the .pdf files in this folder which show detailed tutorials for using the Intuitive Interface for each of these tools.

Option-click on a tool button in the palette to reset it to its default settings.

Lathe [^]

The axis about which the lathe rotation occurs defaults to perpendicular to the plane of the 2D contour (must be one of the principal planes (zx, yx, yz)).

Intuitive interface: with contour drawn in Front View window, select the contour; in Front View window, drag center of cross-hairs to position center of the operation (y-value is determined by the position of the contour); in Front View window, drag endpoint of cross-hairs to determine Bank angle of the operation; in Top View window, drag endpoint of the circle to determine Degree of Arc of the operation. Double-click to perform the operation.

Tool Info palette

Center x, y, z (3 data fields)

Make an entry (Units) to precisely set the position of the center of

the lathe rotation.

° of Arc (data field)

Make an entry (degrees) to precisely set the amount of lathe

rotation about the center.

Segments (data field)

Make an entry (whole number >1) to determine how many "ribs"

will be used to construct the lathed object. (Minimum 2; start and end).

Bank (data field)

Make an entry (degrees) to precisely set the angle of the axis about

which the lathe rotation occurs (default is 0 (perpendicular to the plane of

the 2D contour)).

Lathe (button)

Click to perform the lathe operation.

Extrude [^e]

This operation can be useful for creating objects like a straight,

hexagonal pipe.

The extrusion defaults to occur perpendicular to the plane in which the

2D contour is originally drawn.

Intuitive interface: with contour drawn in Front View window, select the contour; in all View windows, drag the triangle endpoint to position center of "end" face (original contour is the "start" face); in Front View window, drag a contour-corner triangle to resize the "end" face; in Front View window, drag a contour-edge circle to rotate the "end" face. Double-click to perform the operation.

Tool Info palette

$\Delta x, \Delta y, \Delta z$ (3 data fields)

Make an entry (Units) to precisely set the center of the "end" rib; ("start" rib is the original 2D contour).

XZ/T° ($XY/F^\circ, ZY/R^\circ$) (data field)

Dynamic display depending in which View window you choose to angle the extrude. Make an entry (degrees) to make the extrusion occur other than perpendicular to the plane in which the 2D contour is originally drawn.

Δ (data field)

Make an entry (Units) to precisely set the distance between the "start" and "end" ribs.

Seg (data field)

Make an entry (whole number >0) to determine how many "ribs" will be used to construct the lathed object. (Minimum 1; start and end).

W^*, H^* (2 data fields)

Make an entry (number > 0) to precisely set the size of the "end" rib as a percentage of the "start" rib. (i.e. 0.5 = 50%; 1.5 = 150%; 1.0 = same size).

rot° (data field)

Make an entry (degrees) to rotate the "end" rib about its center.

Extrude (button)

Click to perform the operation.

Linear/Polar Duplicate

This operation applies to 2D contours or 3D volumetric shapes.

Intuitive interface (Linear Duplicate): with contour drawn in Front View window, select the item. In all View windows, drag triangle endpoint to position the final copy. Set the number of copies in the Tool Info palette. Double-click to perform the operation.

Intuitive interface (Polar Duplicate): in Tool Info palette, Polar check box “on”, z-axis of rotation radio button “on”; in Front View window, drag hollow circle control point to reposition the original item; drag the hollow triangle control point to position the center about which the copies will be distributed. Double-click to perform the operation.

Tool Info palette

Total # of copies (data field) Including Original
Make an entry (whole number > 1) to determine how many copies of the original item will be made.

Polar X, Y, Z (check box and 3 radio buttons)
Click in the box to toggle between Polar and Linear Duplicate tool.
Click on a radio button to select the axis of rotation for Polar duplicate.

Duplicate (button)
Click to perform the operation.

Loft [^o]

Use this operation to stretch a “skin” over two or more 2D contours. It can be useful for creating objects like an aerodynamic car body.

Select the contours, using the Shift key, in the order/direction in which you want the “skin” to stretch.

No intuitive interface. With contour drawn in Front View window, select the contour. Shows preview of “surface transition” between successive contours. Use the Tool Info palette to fine-tune surface transitions. Click Done button in Tool Info palette to perform the operation.

Tool Info palette

Last / Next (2 buttons)
Click to preview “surface transition” between “next” or “previous” contours.

Shift Left / Shift Right (2 buttons)
Click to “move” the connections between vertices around the contours.

Reverse (button)
Click to “move” the connections between vertices across the contours.

Evenly (button)
Click to “ask” ModelPro to make the best connections between contours.

Circular (check box)
Click to toggle “on/off”; stretches “skin” between last and first contours.

Smooth (check box)
Click to toggle “on/off”; stretches smooth-curved “skin” across contours.

Sweep [^s]

Use this tool to create objects like a spring, or a snail shell.

Intuitive interface: with contour drawn in Front View window, and ΔY “on” in Tool Info palette; in Front View window, drag center triangle endpoint to position “start-center” of the operation; in Front View window, drag midpoint triangle to position “end-center” of the operation; in Top View window, drag triangle endpoint to position the “end” face; in Front View window, drag a contour-corner triangle to resize the “end” face; in Front View window, drag an contour-edge circle to rotate the “end” face. Double-click to perform the operation.

Tool Info palette

By Seg (check box)

Click to toggle “on/off”; makes the data field displays in the palette reflect the values per segment, rather than for the “end-contour” of operation.

If you make a data entry, toggle “off” then “on” to see conversion.

ΔX , ΔY , ΔZ (3 radio buttons and data fields)

Click a radio button to select an axis of rotation for the operation.

Make an entry (Units) to precisely set how far along that axis the operation will set the “end” of the sweep.

Seg (data field)

Make an entry (whole number > 0) to determine the number of “ribs” used to make the final shape.

W^* , H^* (data fields)

Make an entry (number > 0) to precisely size the “end” contour as a percentage of the original contour.

(i.e. 0.5 = 50%; 1.5 = 150%; 1.0 = same size).

rot[°] (data field)

Make an entry (degrees) to precisely rotate the “end” contour about its center.

Sweep[°] (data field)

Make an entry (degrees) to precisely determine how many times the original contour will sweep around the axis of rotation.

Sweep (button)

Click to perform the operation.

Radial Duplicate

Intuitive interface: with contour drawn in Front View window, and z-axis “on” in Tool Info palette; controls same as Sweep; no option to resize or rotate “end” face. Set the number of copies in the Tool Info palette. Double-click to perform the operation.

Tool Info palette

Total (data field)

Make an entry (whole number >1) to determine how many copies to

make including the original item.

Axis X, Y, Z (radio buttons)

Click a radio button to select an axis of rotation for the operation.

Bevel Extrude [^b]

No intuitive interface. with contour drawn in Front View window, select the contour. Shows preview of “surface transition” between “start” face and “end” face. Use the Tool Info palette to fine-tune surface transition. Click Bevel button in Tool Info palette to perform the operation.

Tool Info palette

Edit (button) **Style** (pull-down menu)

Click to access Modify Bevel Contour editing window.

The current selection in the Style menu will display.

Click-hold to expose the menu, then drag to the desired option; release the mouse to select the option.

Modify Bevel Contour (window)

Drag solid square points to edit the bevel contour.

Depth is displayed at far-left edge (Units).

The pre-set “height” of the bevel is displayed at the top edge.

3 displays at the right edge show absolute value distance between points; and absolute value of angle between base of the bevel and line defined by two points.

Drag solid square points to edit the bevel contour.

User Defined

Hold Option key and select a bevel contour you have previously drawn in ModelPro.

Auto (check box)

Click to toggle “on/off”; applies only when extruding a contour with a “hole” in it (i.e. the letter form “R”); causes the inner contour to bevel opposite to the outer contour.

Out / In (2 radio buttons)

Click on a button to make the bevel surface extend Out from the edge of the contour, or In from the edge of the contour.

Depth (data field)

Make an entry (Units) to precisely set the distance from the “start” face to the “end-face”.

slider scale

Drag the triangle-pointer along the scale to intuitively position the outer-most edge of the bevel surface.

Bevel (button)

Click to perform the operation.

Path Extrude [^p]

No intuitive interface. Draw/Select the contour from Front View window; Draw/Option-select the spline path from the Top View window; shows preview

rib position/orientation; one “rib” is created for each point along the path. Use the Tool Info palette to fine-tune surface transitions. Double-click to perform the operation.

Tool Info palette

“Auto” palette display mode

Position (slider scale)

Drag the triangle-pointer to intuitively position the contour to the left, to the right, or to the center of the path.

On Path / On Contour (2 radio buttons)

Click on a button to determine if the extrusion will occur from the end-point of the path, or from the face of the contour.

W*, H*

Make an entry (number > 0) to precisely size the “end” contour as a percentage of the “start” contour.

(i.e. 0.5 = 50%; 1.5 = 150%; 1.0 = same size).

Smart (check box)

Click to toggle “on/off”; this will “ask” ModelPro to try to make the surface transitions between/across ribs as smooth as possible.

Tweak It (button)

Click to make palette display in “Expert” mode.

“Expert” palette display mode

The preview of the extrusion gives you some references for determining how to manipulate the position/orientation of the ribs: a small portion of the selected/displayed rib is yellow; a red “path” extends from one side of the contour, and a white “path” extends from the opposite side.

Path Tweak (2 buttons) <number of current rib> of <total number of ribs>

Click a button select/display a rib for position editing;

-> button selects/displays the next rib;

<- button selects/displays the previous rib.

Rotate (3 buttons)

When using these buttons, picture the selected rib/contour as being drawn in a “Front View window” called “F”.

The left-most button (with a letter (T, F, R) between up- and down-pointing arrows) determines on which “view/axis” the rotation of the contour will occur; F would be the “Front” view, the axis of rotation would extend out perpendicular to the face of the contour; T would be the “Top” view, the axis would extend top to bottom through/parallel to the face of the contour; R would be the “Right side” view, the axis would extend right to left through/parallel to the face of the contour.

The button with the **up-pointing arrow** makes the rib rotate counter-clockwise about the selected “axis” of rotation.

The button with the **down-pointing arrow** makes the rib rotate clockwise

about the selected “axis” of rotation.

Flip (button)

Click to flip the selected rib front for back.

Oops (button)

Click to reset selected rib to default position/orientation.

Narrow Chk (button)

Click to “ask” ModelPro to automatically smooth corners that are too tight.

Position (button)

Click to make palette display in “Auto” mode.

Path Extr. (button)

Click to perform the operation.

Path Duplicate

No intuitive interface. Draw/Select the contour from Front View window; Draw/Option-select the spline path from the Top View window. Use the Tool Info palette to fine-tune position/orientation, and number of copies. Double-click to perform the operation.

Tool Info palette

Total (data field)

Make an entry (whole number > 1) to determine the total number of contours to “spread” along the path.

Rotate Around Axis X, Y, Z, None (four radio buttons)

Click on a button (X or Y or Z) to make the contour automatically rotate on that axis (degree of rotation depends on contour’s position along the path). Click on None button to make the contour hold its original orientation for all copies.

Duplicate (button)

Click to perform the operation.

Punch

Use 2D closed contour to punch holes in the surface of closed spline mesh: select spline mesh first, then select 2D contour. No “inner” surface is created. Results in polygonal mesh. Double-click to perform the operation.

Punch will not work if the contour to punch with is located at the same depth setting as the item to be punched.

Tool Info palette

Mesh Density (data field)

Make an entry (3 < whole number > 9) to determine the how “smooth” the resulting polygonal surface will be (3 being “coarse”; 9 being “smooth”).

A setting of 4–6 should be adequate for most applications.

Punch Out (button)

Click to perform the operation.

Boolean †

Combine 3D volumetric objects (overlapping in 3D space) to create unique 3D volumetric objects. Select 3D object to be operated on, then select the 3D object(s) to operate on the first. Use the Tool Info palette to determine operation type. Results in polygonal mesh.

Double-click to perform the operation.

When using multiple items for a Boolean operation, try to limit it to 10 or 12 items. Additionally, try to avoid doing Boolean operations on Boolean items.

Tool Info palette

Difference, Intersection, Union (three radio buttons)

Click on a button to select the desired option.

Difference “removes” the overlapping volume from the first selected object

Intersection “leaves” the overlapping volume only.

Union “welds” the volumes together.

Mesh Density (data field)

Make an entry (3 < whole number > 9) to determine the how “smooth” the resulting polygonal surface will be (3 being “coarse”; 9 being “smooth”).

A setting of 4–6 should be adequate for most applications.

Make It So (button)

Click the button to perform the operation.