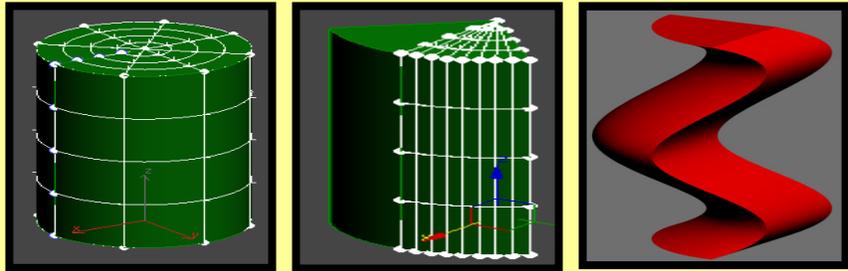


Power Cylinder Tool

In this tutorial, you will learn how to create a Power Cylinder and be shown how to:

- **Edit Control Points and Handles.**
- **Edit Spline Cage Settings.**
 - Smooth Bezier Curves, C1 Bezier Curves, Z-Axis Symmetry.
 - Rotational Symmetry, Edge Rounding, Slice From, Slice To.



Tool Used In This Tutorial

This tutorial will be accomplished with the following tool:



Power Cylinder tool (**Pwr_Cylinder**).

Creating Power Cylinder

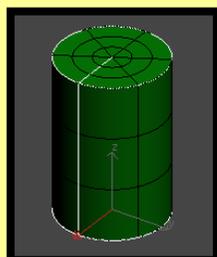
In this section we will discuss:

- A) Smooth Bezier Curves for the Power Cylinder
- B) C1 Bezier Curves for the Power Cylinder

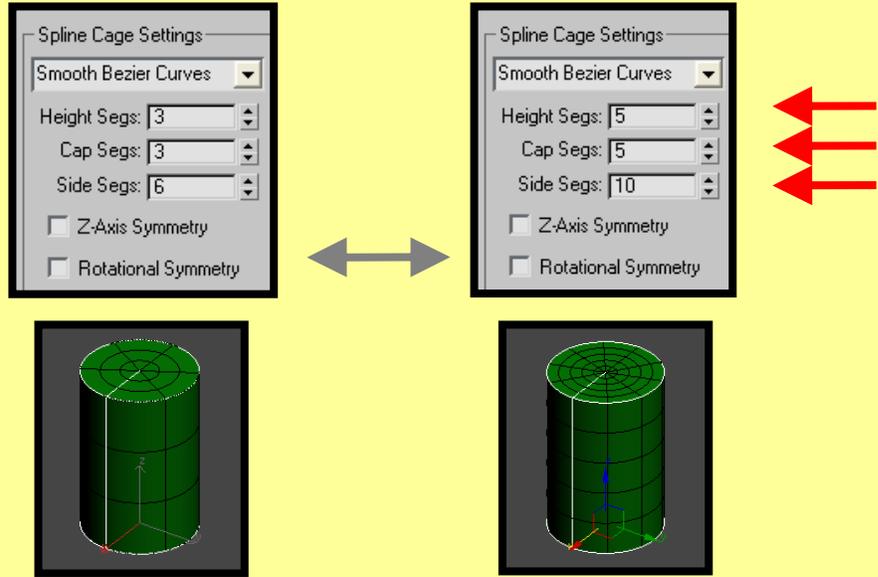
Procedure – Power Cylinder Tool

The Power Cylinder tool provides a convenient way to create a spline cage that consists of 3 to 5 Rail Sweep surfaces. The initial shape is either a complete cylinder or a cylinder with a slice. The shape of the cylinder can be modified by editing the points and curves of the associated spline cage sketch or by using the Sub-Object Point or Sub-Object Curve editing on the Power Cylinder object itself.

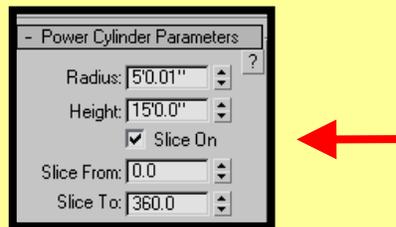
- 1) Start off by accessing the Power Cylinder tool .
- 2) In the user view port use the click/drag/click method and create a Power Cylinder shape.



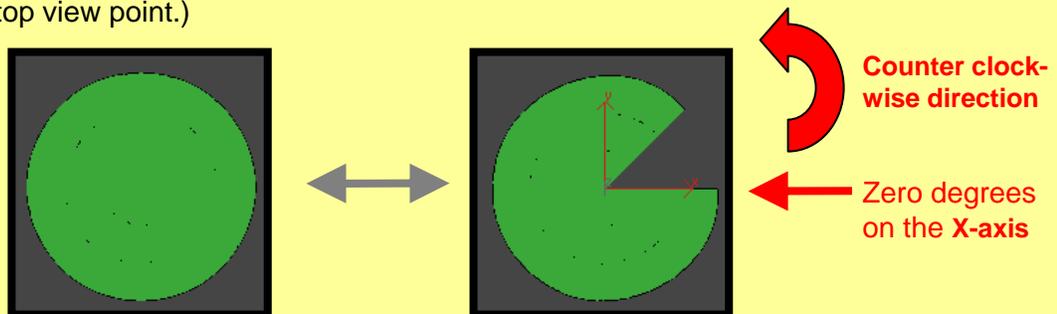
3) While the shape is still selected, go into the modify mode. Under the Power Cylinder Parameters roll out, you can change the Height, Cap, and Side segments of your shape by adjusting the spinners. Change the Height and Cap segments to 5 and the Side segments to 10 for this example. By increasing the number of segments in your shape will allow for more detail.

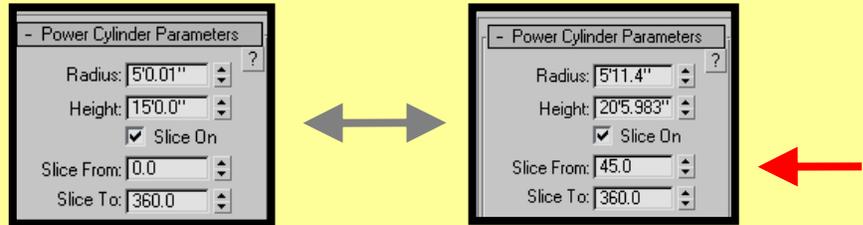


4) Change the Height, Cap, and Side segments of your shape back to the original settings of 3, 3, and 6 respectively. Check the "Slice On" option under the Power Cylinder Parameters roll out. When enabled, this option will create a Slicing of the cylinder and the creation of corresponding start and end face rail sweeps.

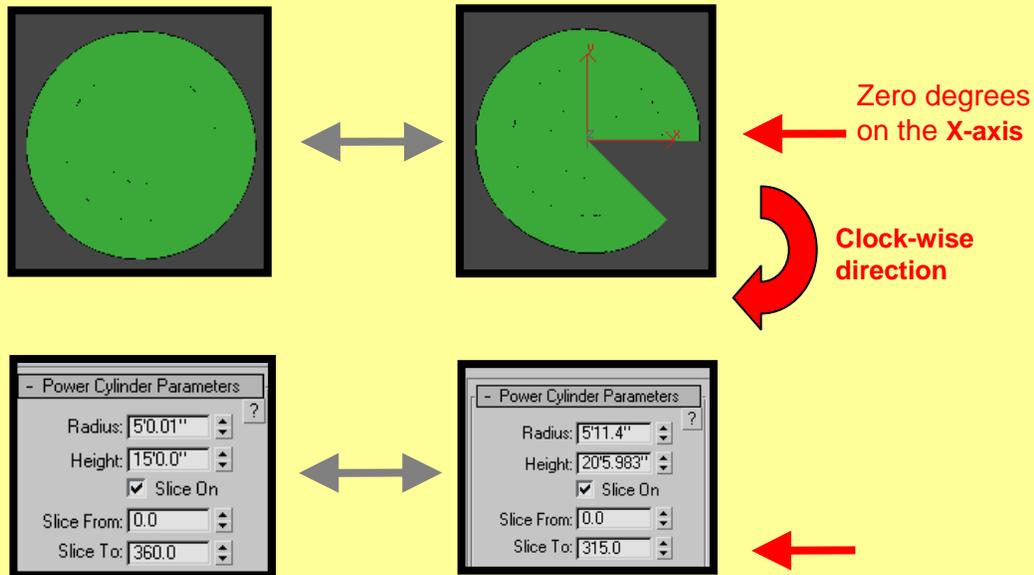


5) Now adjust the "Slice From" spinner to 45. As you adjust the spinner, an angle opening occurs starting from zero degrees on the X-axis. This sliced space will open in a counter clock-wise direction. (Observing from the top view point.)





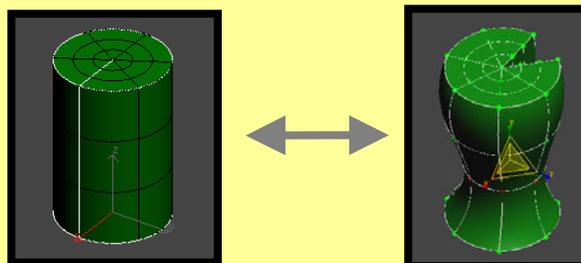
5) By adjusting the “Slice To” spinner from 360 to 315, an angle opening occurs starting from zero degrees on the X-axis. Though, just the opposite of the “Slice From” spinner, the “Slice To” spinner will open in the Clock-wise direction.



A) Smooth Bezier Curves for the Power Cylinder

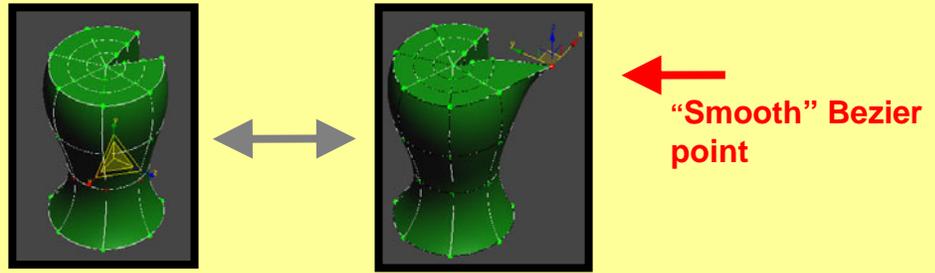
1) Change the Spline Cage Type to “Smooth Bezier Curves”, if not already done. Select the “Sub Object Points” option of your “Pwr_Cylinder” sub-object. Highlight the third row of points on your object. Scale the selected points inward to deflate the cylinder along these edges.

- The “Sub Object Curve” sub-object allows you to grab a complete Edge on your object. You can also use the “Ctrl” key to select multiple Sub Object Points and Edges.

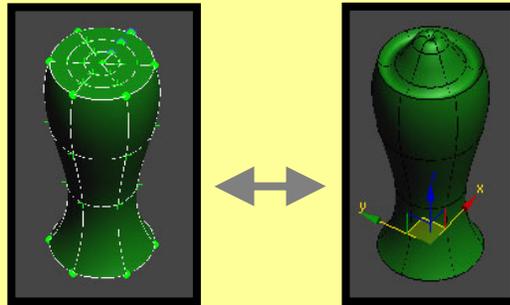


- When working in the “Smooth Bezier Curves” mode, the Smooth Bezier Curves will consist of “Smooth” Bezier points. Go to the Sub Object Point mode and select the top right corner and pull outward. By dragging the Smooth Bezier points, you can alter your object in a variety of ways.

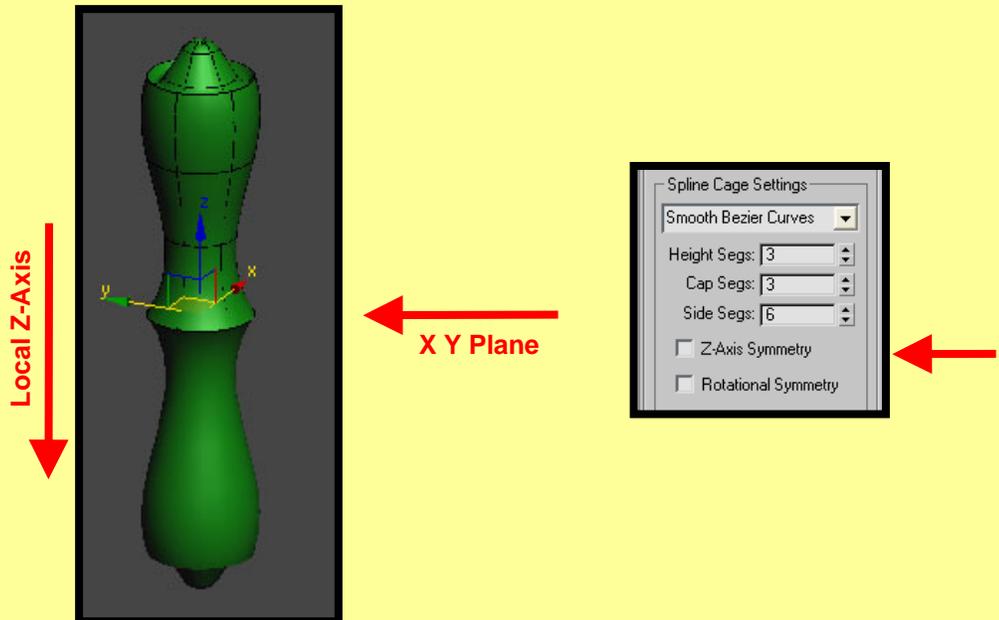
A) Smooth Bezier Curves for the Power Cylinder



2) Create another Cylinder. Select the third row of Sub Object Points and Scale inward. Now select from the top (cap) of the object the center most points and drag upwards.

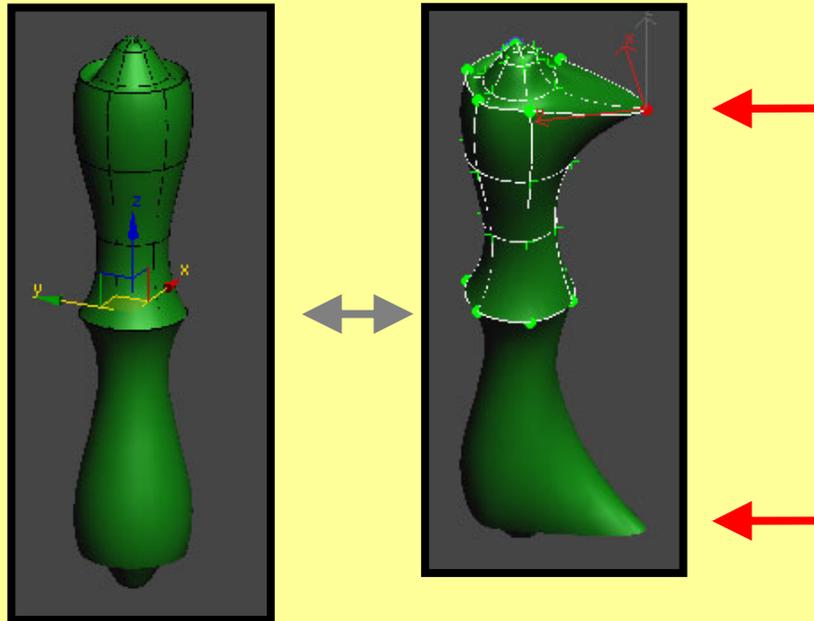


4) While your shape is still selected, Click the "Z-Axis Symmetry" option. This option specifies that a symmetry will be applied at the local Z-Axis about the X Y plane.



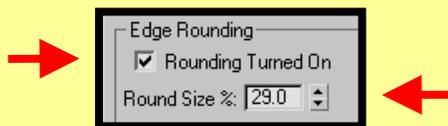
A) Smooth Bezier Curves for the Power Cylinder

5) Select a “Sub Object point” on the original shape and drag along the local Y-axis“. Any changes you make to the original shape’s sub-d will be reflected on the mirrored shape.

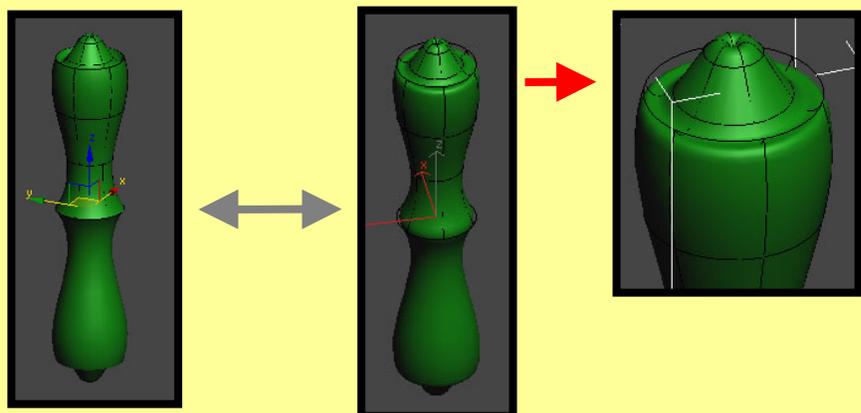


6) Examining the Edge Rounding options. Edge Rounding is useful for smoothing between all edges of your Power Cylinder. If symmetry is turned on, it will also blend the connection between the symmetric objects.

Go back to the original “peg roller” looking object. While your shape is still selected, turn on the “Rounding Turned On” option and adjust the “Round Size %” spinner.

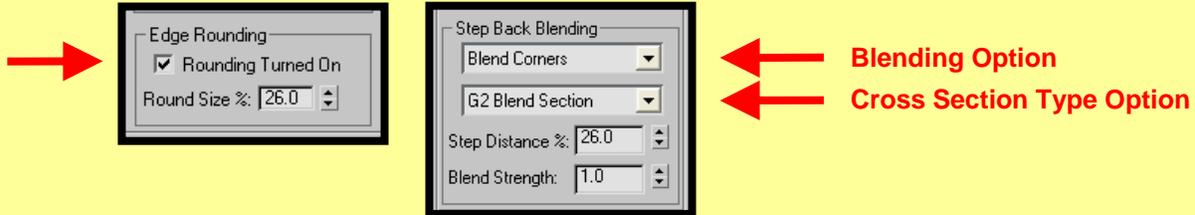


By Adjusting the “Round Size %” spinner, the higher the value the smoother the blends between the two mirrored objects surfaces and the edges of the resultant shape.

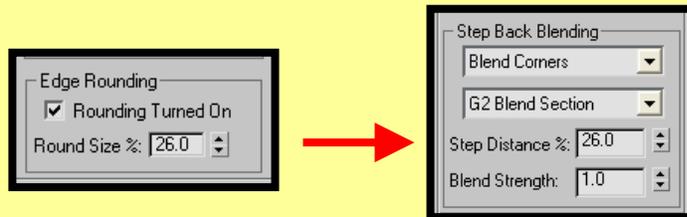


A) Smooth Bezier Curves for the Power Cylinder

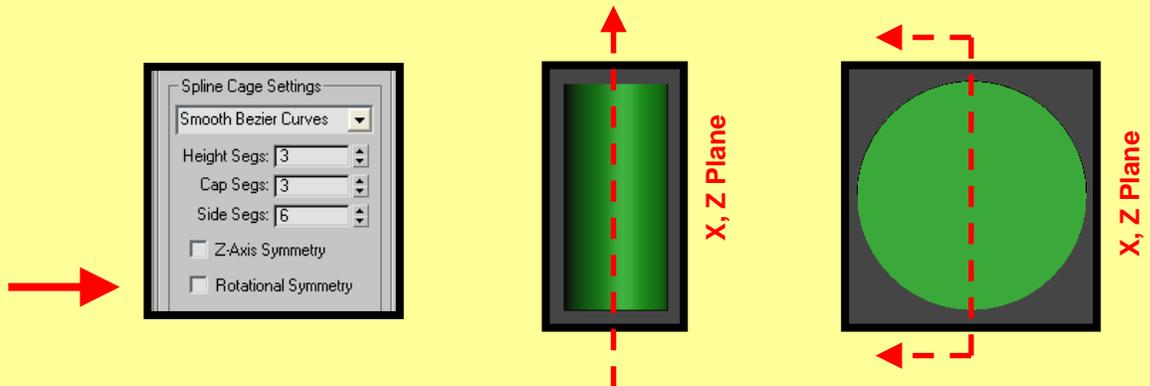
When the "Rounding Turned On" option is selected, this is a short cut for turning on the "Step Back Blending" options in the "Power Surface Parameters" panel. When the "Rounding Turned On" option is selected, this option sets the Blending option to "Blend Corners" and the Cross Section Type option to "G2 Blend Section" in the Step Back Blending dialog.



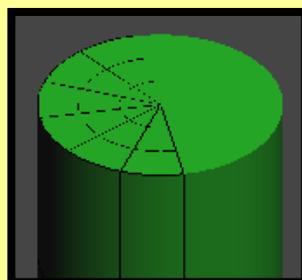
As you adjust the "Round Size %" spinner, the "Step Distance %" spinner within the Step Back Blending dialog adjust simultaneously.



7) Let us discuss **Rotational Symmetry**. This option specifies a symmetry is to be applied about the plane defined on the cylinder axis using the X, Z plane. Create a cylinder object and turn on Rotational Symmetry.

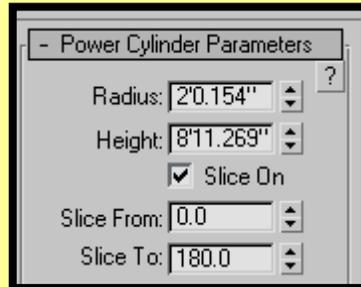


As illustrated above, the Cylinder is divided in half along the X, Z plane which is a 180 degree half cylinder object ($360/2 = 180$). The other half cylinder is the mirrored object of the first. You can tell this by observing that half the cylinder has the "Power Sketch" lines and the other half does not.



A) Smooth Bezier Curves for the Power Cylinder

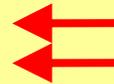
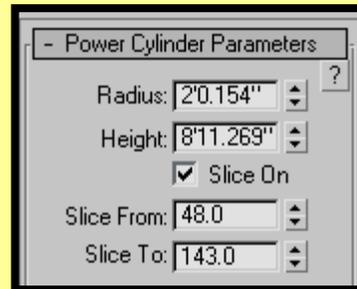
Also, notice that the “Slice On” option was automatically selected when the “Rotational Symmetry” option was turned on. In addition, the “Slice To” option was set to 180.



← “Slice On” selected

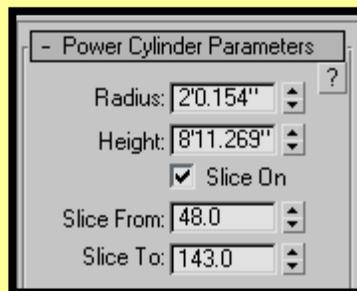
← “Slice To” set to 180

Now you can adjust the “Slice On” and “Slice From” spinners for some interesting effects.



7) While the shape is still selected, you have the option to adjust the Radius settings under the Power Cylinder Parameters roll out of your shape.

Radius: Radius of the cylinder.



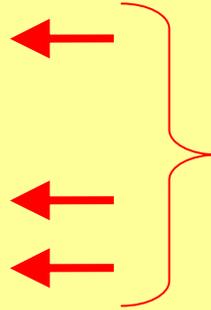
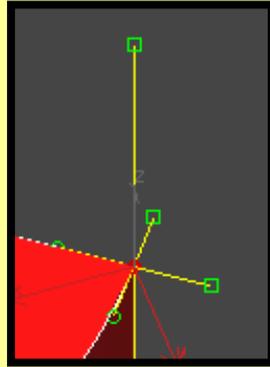
Note: the modification of the Length, Width and Height will reset the spline cage to the shape of the box and loose any edits done on the spline cage. Once you have modified the spline cage, you can change the number of segments without resetting the box shape because the new spline cage is generated using the existing surfaces

B) C1 Bezier Curves for the Power Cylinder

The “C1 Bezier Curves” spline cage type works very similar to the “Smooth Bezier Curves” spline cage type except for the operation of the Bezier curves.

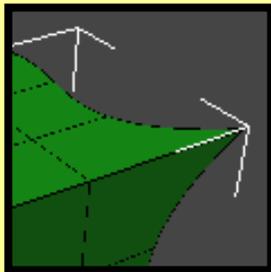
1) Let us look at the operation of the “C1 Bezier Curves” points.

When working in the “C1 Bezier Curves” mode, the C1 Bezier Curves will consist of “C1” Bezier points. The C1 Bezier point contains Three sets of Control Handles for the edges of your Cylinder and Two sets of Control Handles for the side surface, top, and bottom of your Cylinder to assist you in defining your shape.



“C1” Bezier point with three sets of control handles for the edges

Recap: For the Cylinder, the “Smooth Bezier Curves” use “Smooth” Bezier points and the “C1 Bezier Curves” use Three sets of Control Handles for the edges of your Cylinder and Two sets of Control Handles for the side surface, top, and bottom.

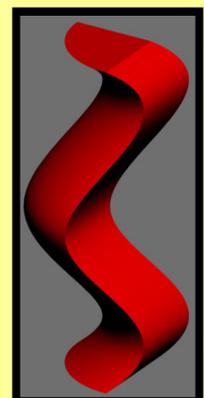
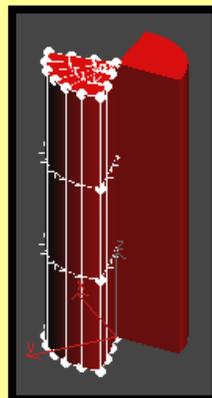
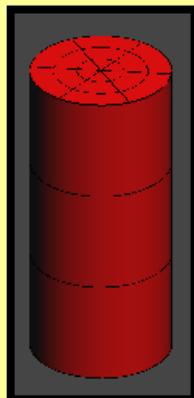


“Smooth” Bezier point



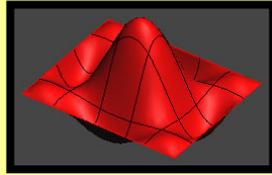
“C1” Bezier point with three sets of control handles

2) By altering the Control handles you can create interesting forms.

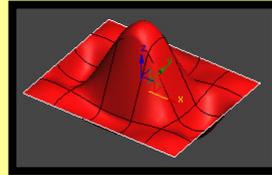


B) C1 Bezier Curves for the Power Cylinder

Also, another interesting difference between “C1 Bezier Curves” and “Smooth Bezier Curves”. The “C1 Bezier Curves” has less rippling effects on the surface of your shape because of the added vector constraints to the localized edits. Notice the difference in the wavelike motion between the “Smooth” and “C1” bezier curves.



↑
“Smooth”
Bezier point



↑
“C1”
Bezier point

Because the “C1” and “Smooth” bezier curves parameters work very similar, refer back to the “A) Smooth Bezier Curves for the Power Cylinder” section in regards to:

- “Height”, “Cap” and, “Side” Segment settings
- “Rotational Symmetry
- “Z-Axis Symmetry” option
- “Rounding Turned On” option
- “Round Size %” setting
- Cylinder “Radius”, and “Height” settings

Summary

In this tutorial, you were shown how to create Power Cylinder using:

- Smooth Bezier Curves spline cage type
- C1 Bezier curve spline cage type

You were also shown how to modify a Cylinder using:

- “Height”, “Cap” and, “Side” Segment settings
- “Rotational Symmetry
- “Z-Axis Symmetry” option
- “Rounding Turned On” option
- “Round Size %” setting
- Cylinder “Radius”, and “Height” settings



Power Cylinder tool (**Pwr_Cylinder**).