Modeling Organic Shapes: A Milk Pitcher Tutorial

Using Cobalt™, Xenon™, Argon™

3DPITCH0807

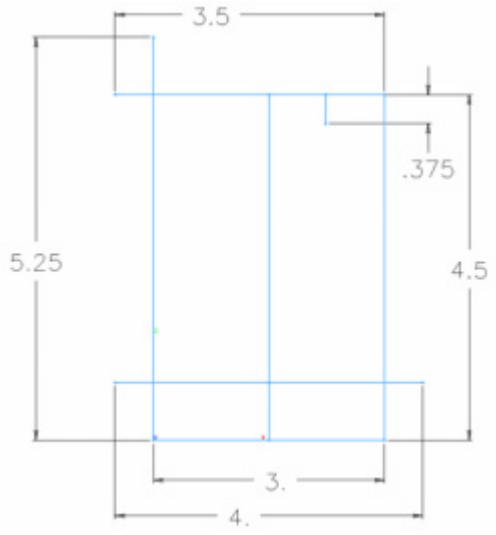
Modeling Organic Shapes: A Milk Pitcher

Intermediate Skill Level

This tutorial demonstrates how to define an organic shape with wire frame geometry, create a single, smooth surface around that wireframe, and then show how to make that surface into a solid with added details.

This is an in-depth tutorial that shows how to create complex spline shapes in 3D space and how to use guide lines for precise construction and reference purposes. This technique greatly simplifies the task of creating complex, organic shapes.

To use this technique it is important to see the shape from the front, side and top views. The photos above show the shape from these views.



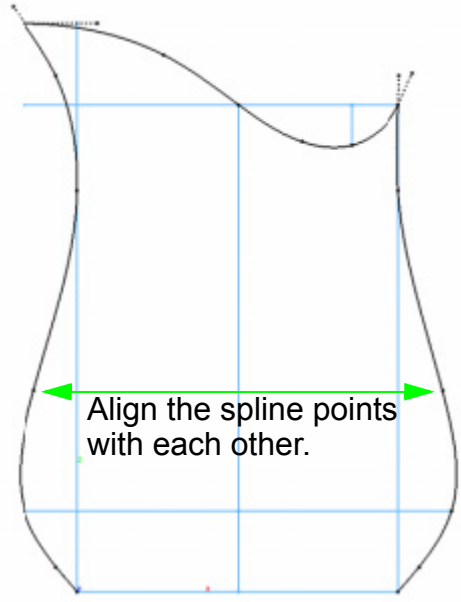
1. Start with a Front view that defines most of the shape of the object such as this side view. Measure known primary points and draw a sketch that defines overall size. Use the **Connected Lines** tool, **Single Line** tool and **Midpoint Line** tool to draw the sketch on the right. Use Status Line entries to input the values for the lines length.

2. Next, draw splines that begin to define the overall outline shape of the pitcher by connecting the endpoints and other convenient reference points from the layout sketch. It requires three splines. Press ESC key to end the spline.

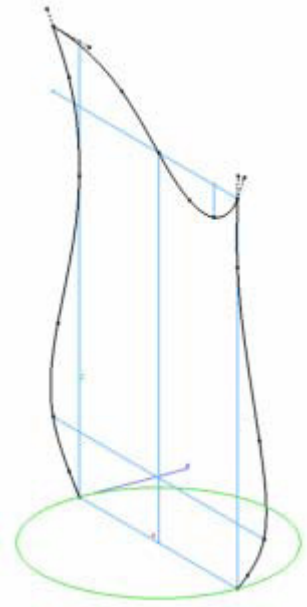
   When drawing splines, it is best to keep them as simple as possible, with as few points as possible. It is always possible to add more points later if more control in a certain area is necessary.

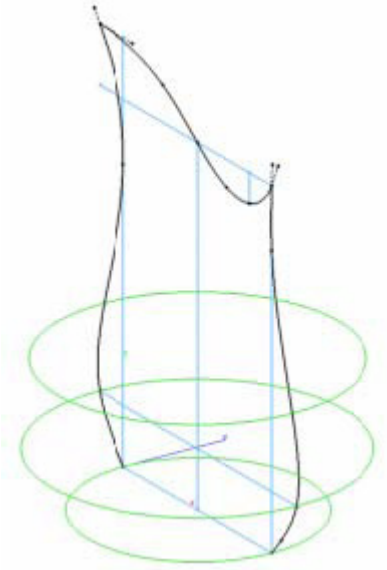
3. To edit a spline choose ***Edit>Show Points***, or hit CTRL-D (Windows) or Command-D (Mac).

   Keep the left spline and the right spline as symmetrical as possible with each other. Use the Drafting Assistant to line up the spline points.



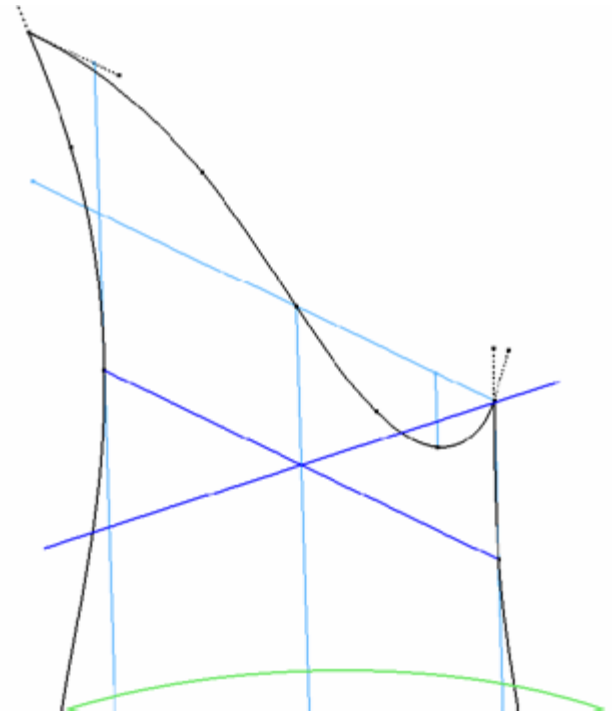
4. Now, switch to a Trimetric view and start defining the pitcher in 3D. Use the **Opposite-point Circle** tool and draw a few circles between the points on the splines. This is why lining up the spline points with each other was so important.





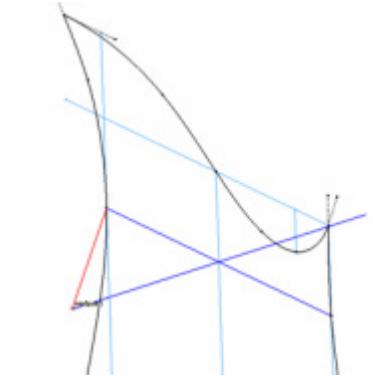
At the neck area of the pitcher, the shape begins to deform and is no longer circular. Draw a spline here to shape it as necessary.

5. Start by drawing two lines, equal length. One between the spline points, and the other at 90 degrees to the first, positioned at its midpoint. Build a second one with the **Midpoint** tool and *align y*.



6. Now, with the **Through-point B-spline**  tool, start at the front of the pitcher and connect each endpoint of the lines.

1



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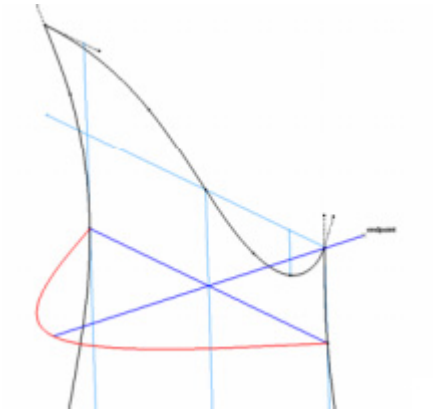

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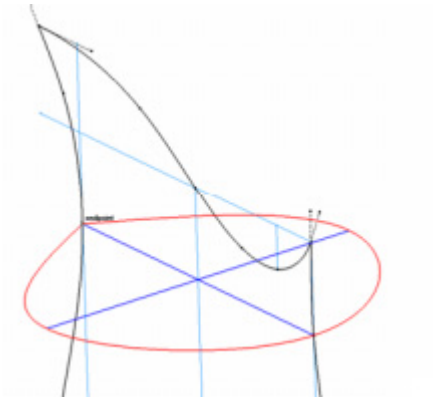
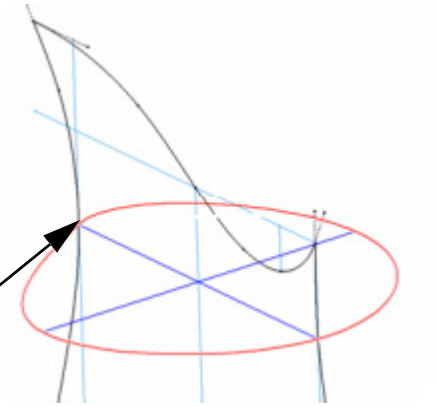


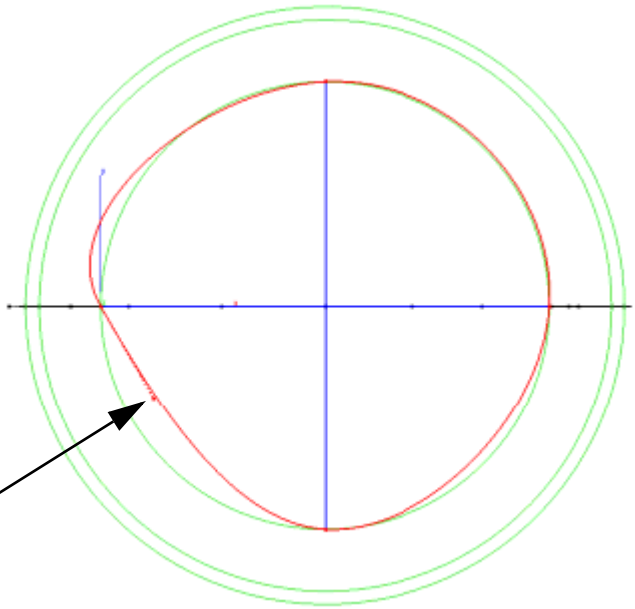
4



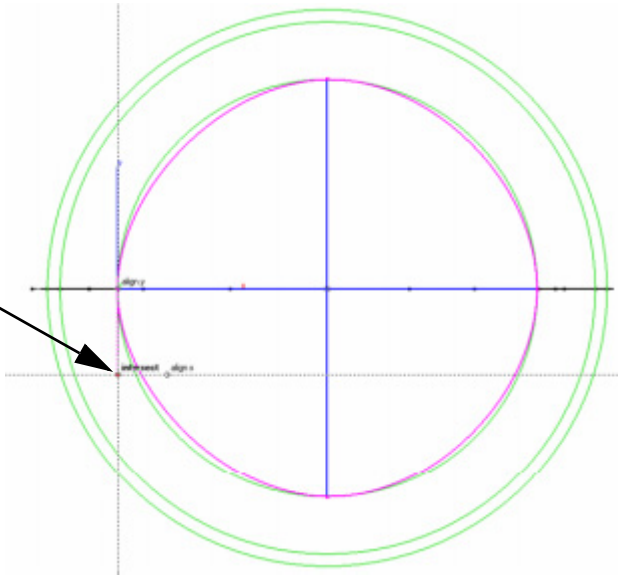
7. Double-click on the last point to create a single, closed loop spline.

Looking from the Top view it is obvious that the spline shape needs adjusting.

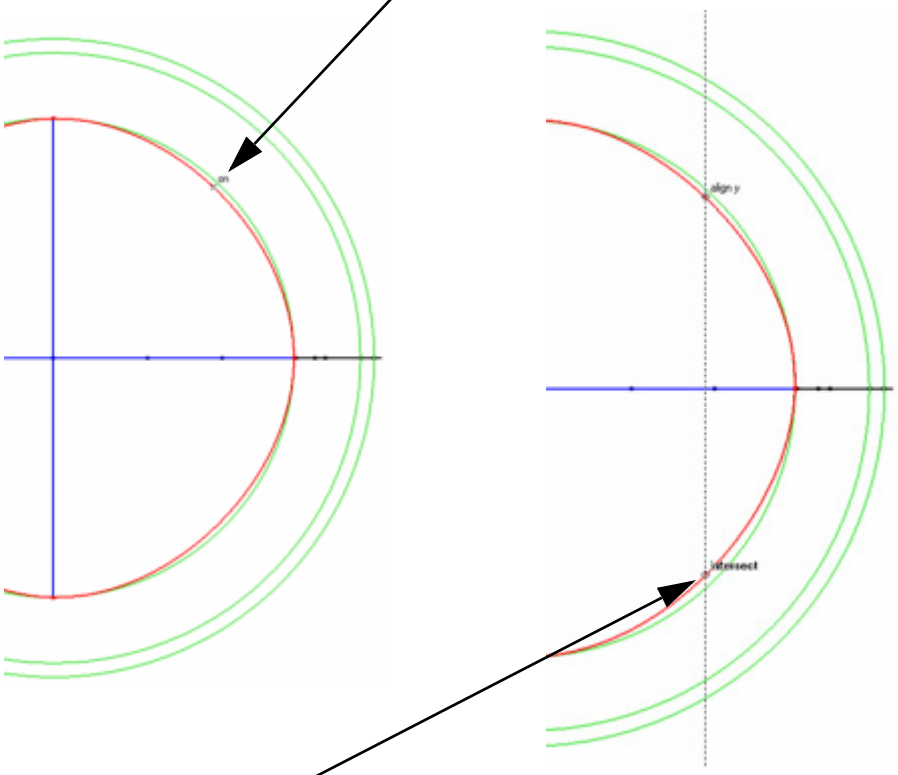
8. Show the control points for the spline: ***Edit>Show Points***, or press CTRL-D (Windows) or Command-D (Mac), so we can edit it.



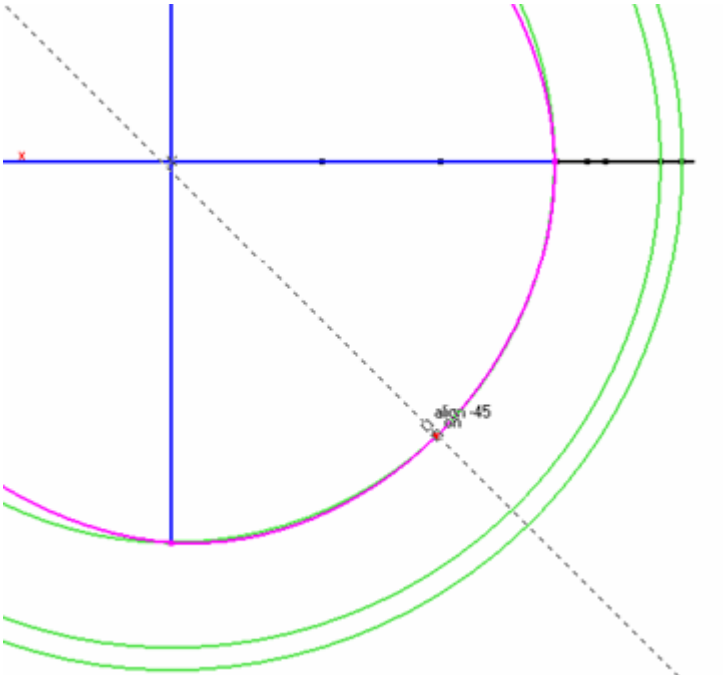
9. Grab the control arm point as shown here and make the spline shape more symmetrical by dragging it until it aligns on the Y Axis with the endpoint.



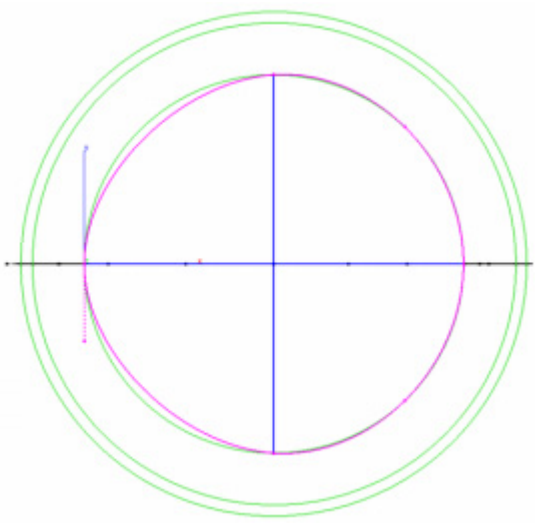
10. Now use the **Add Control Point**  tool to add a control point to the back potion of the spline.

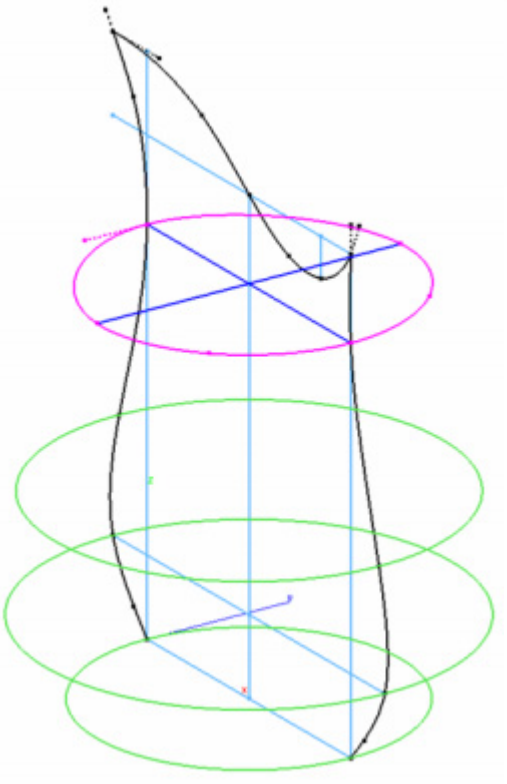


11. Add another point here and align with the previous point so that they are symmetric.
12. Move these new points until they meet up to the circle below. This will make the back of the spline more rounded.



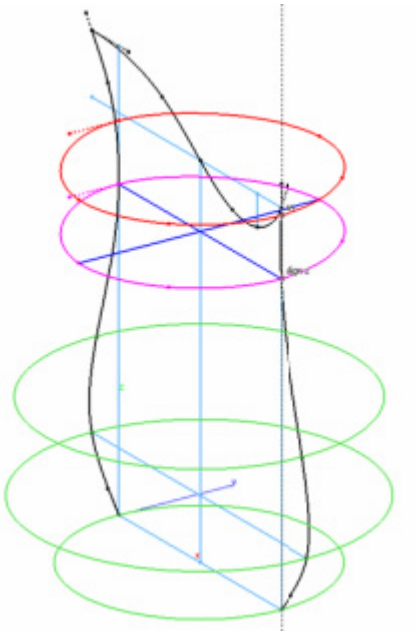
This spline looks much better now.



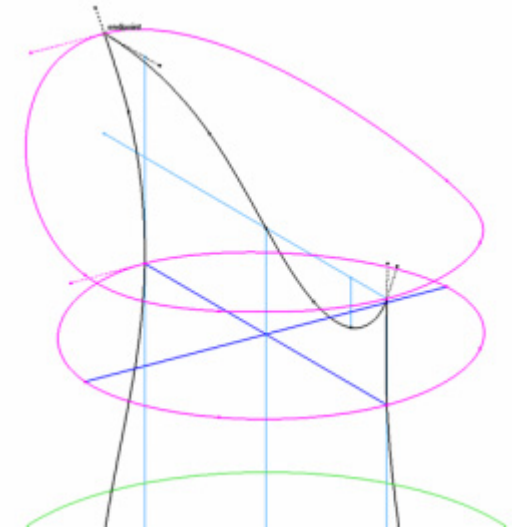


Form the complicated top most spline and learn how to develop a wavy, 3D spline of this type.

13. First copy the spline just made in the previous step and use it as the starting point for the top spline shape. Hold CTRL and drag the spline up (along Z) and snap to the top end point as shown.

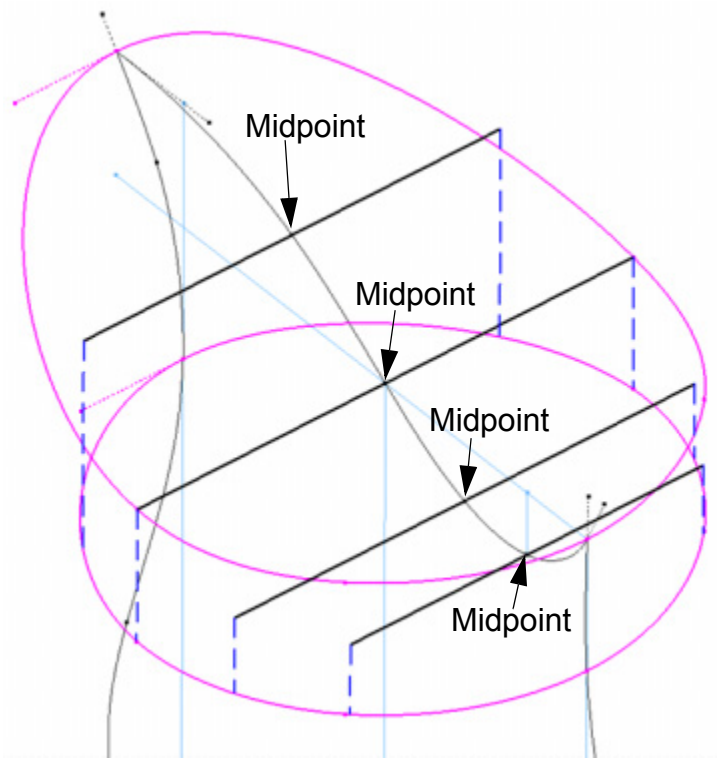


14. Now select the point at the front of the spline and drag it up to the endpoint at the tip of the spout. This begins to shape the spline in 3D.

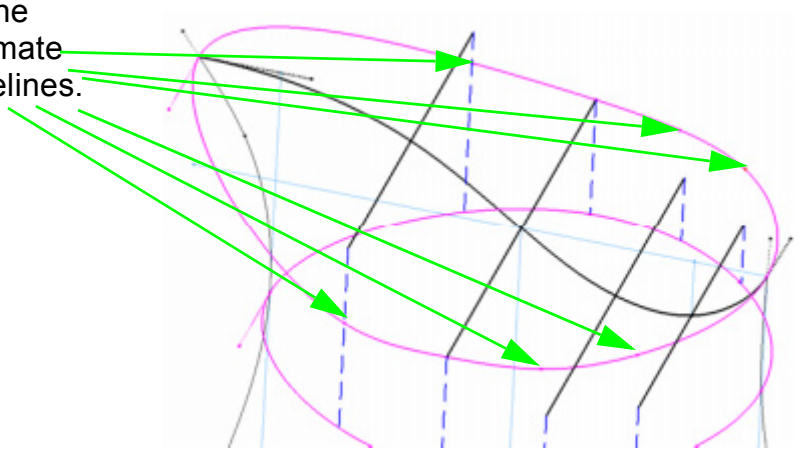


To define the spline as precisely as possible, draw guidelines that can be used to snap to and reference with the Drafting Assistant.

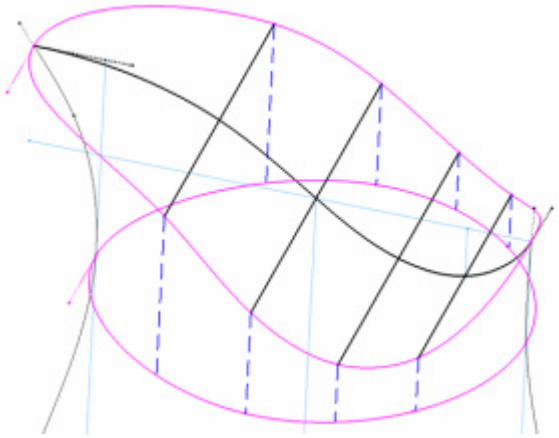
15. Use the **Midpoint Line**  tool to draw guidelines.



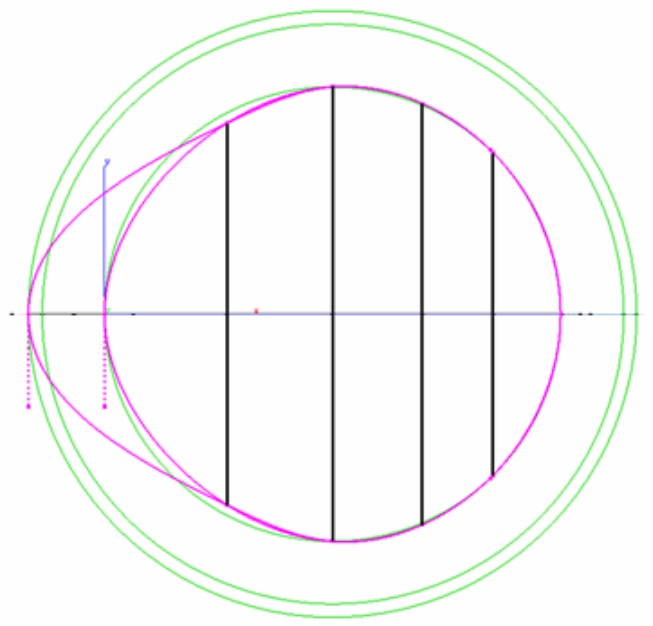
16. Add points  to the spline at the approximate locations of the guidelines.



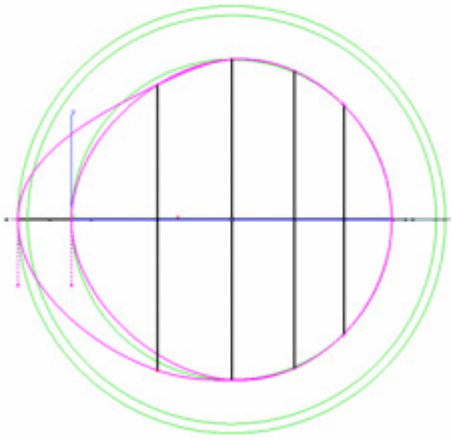
17. Now move each of those new points to the endpoints of the guidelines. The 3D spline should now be almost complete.



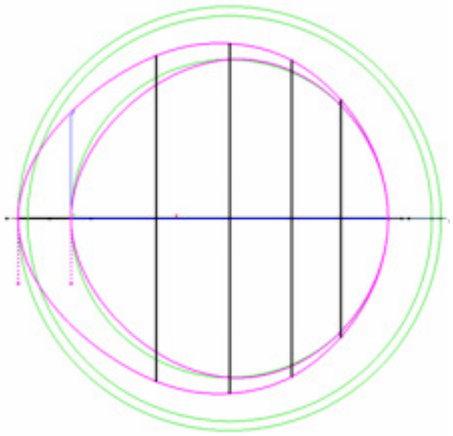
A quick look from the top reveals that the shape is not quite right yet and needs some final adjusting.



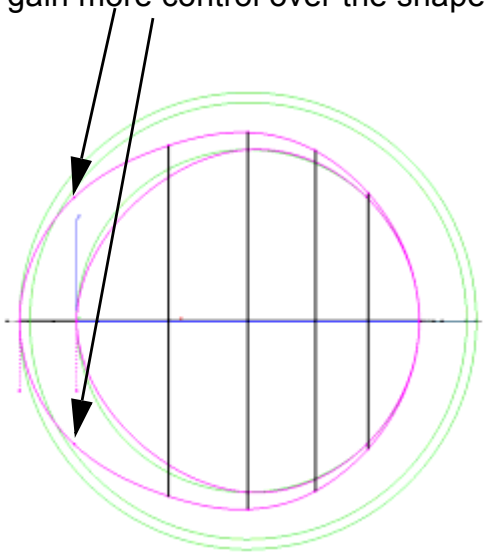
18. Begin adjusting the points to make them match the photo more precisely. Avoid moving them in the Z-Axis direction.



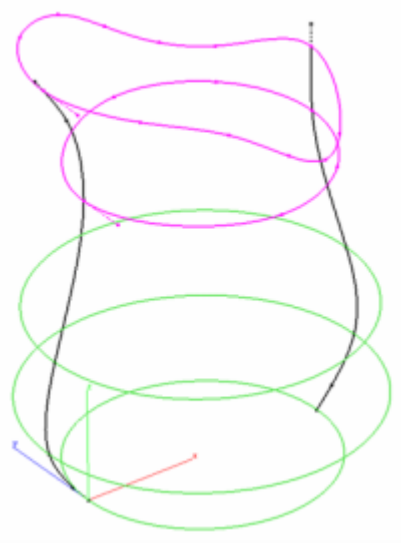
** Use the **Move**  tool to type in a precise distance when moving the points. This way it is possible to move the left and right points equal and precise distances.*



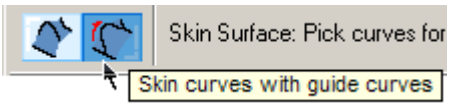
19. Insert two more points at the front of the spout to gain more control over the shape.



Now that the shape has been defined, let's try surfacing it.



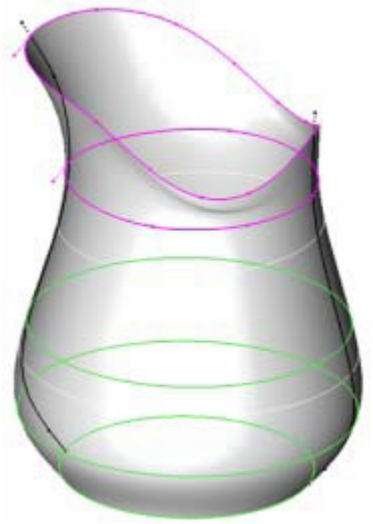
20. Select the **Skin Surface** tool and then select the second option in the

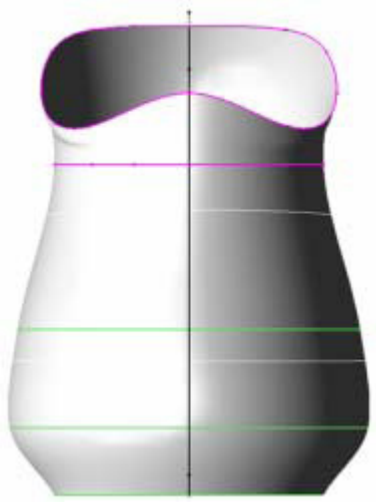


Message Line that uses guide curves.

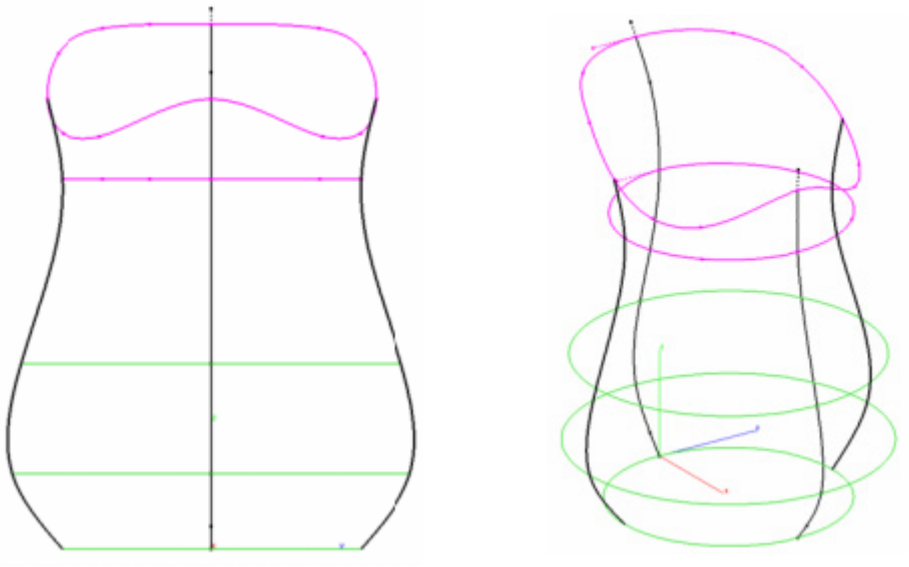
21. Hold the SHIFT key and select the green circles and magenta splines for the "profile" curves and then release the SHIFT key. Now hold SHIFT again and select the two black splines as the "guide."

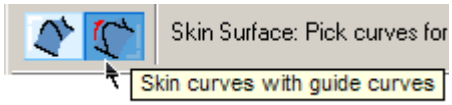
The resulting surface looks pretty good, but upon closer inspection we can see some things that aren't quite right yet.



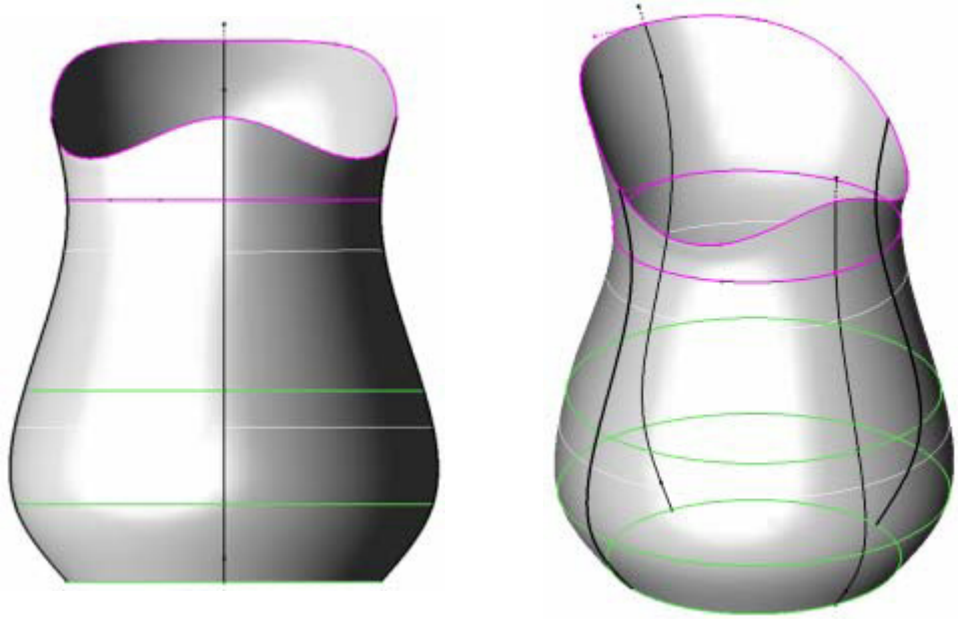


22. Delete the surface and then draw two additional splines to better define the sides of the pitcher.

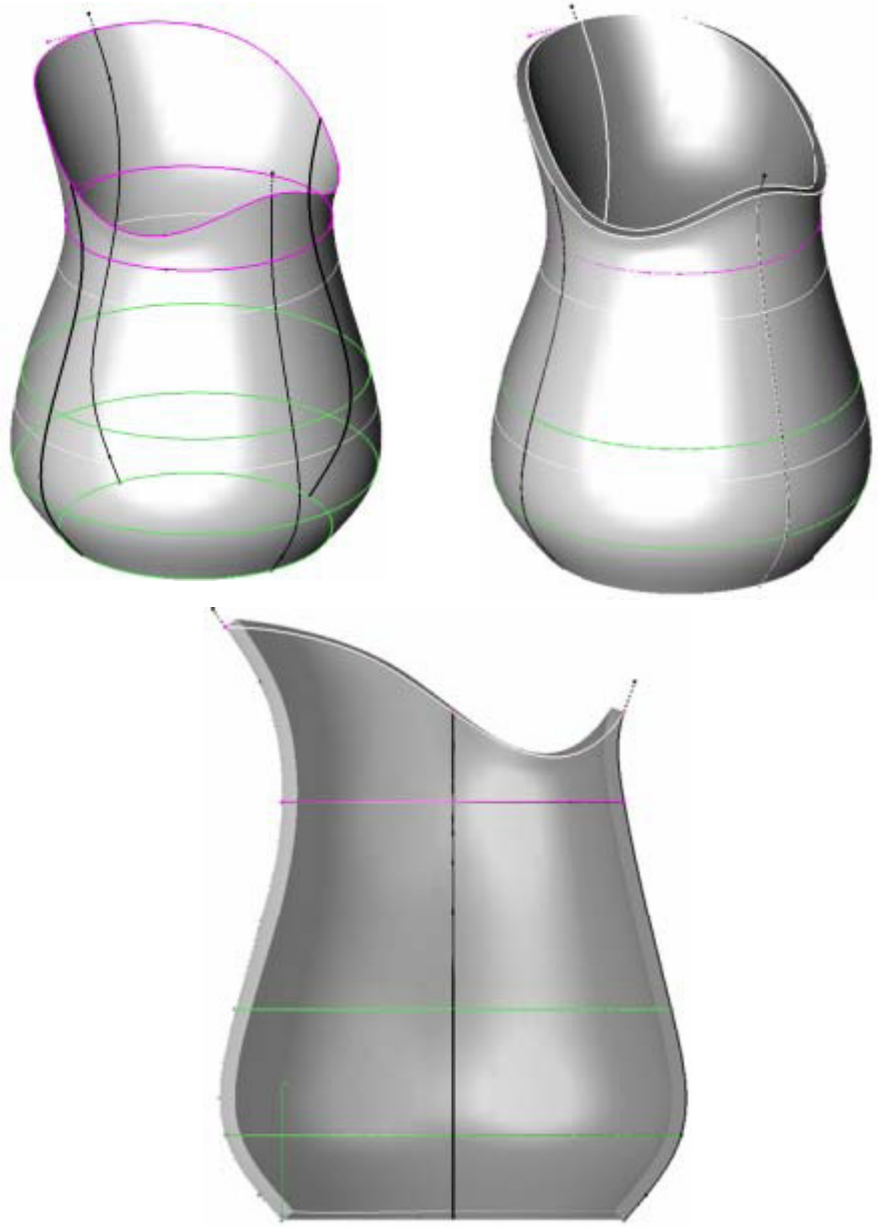


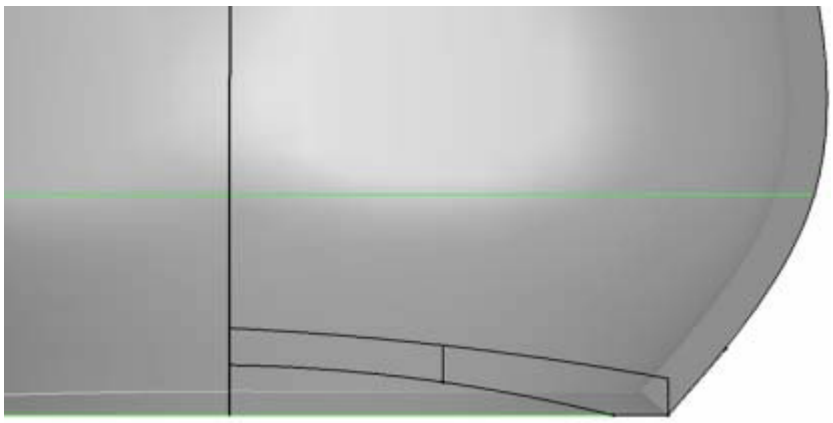
23. Use the **Skin Surface**  with Guide Curves 

again but this time select all four black guide splines. The result below now looks much better!



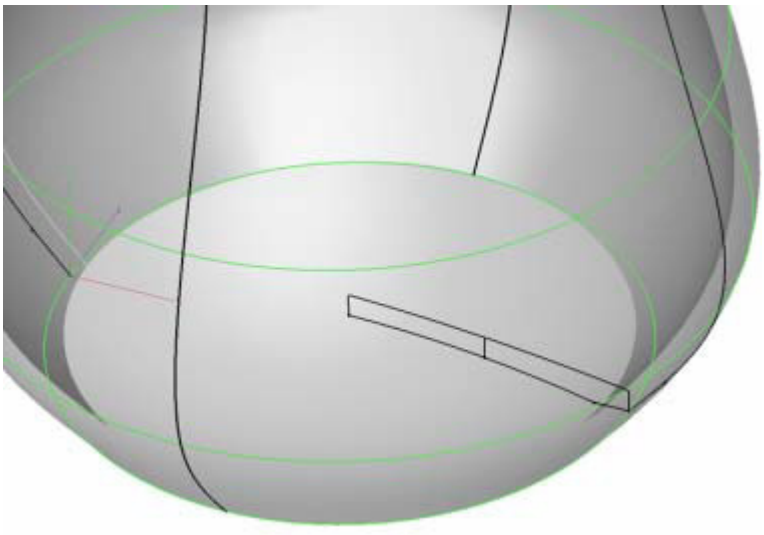
24. Use the **Thicken Solid**  tool and click on the surface to thicken it into a solid. Make the thickness .125.





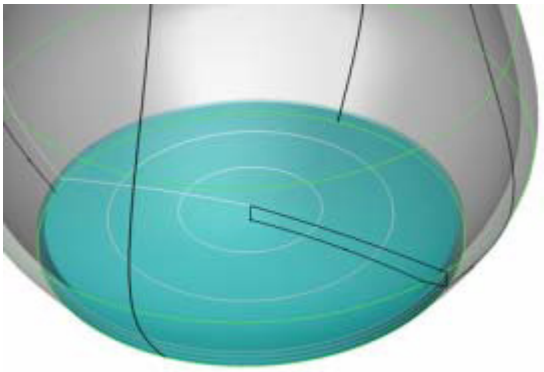
Now let's add the bottom.

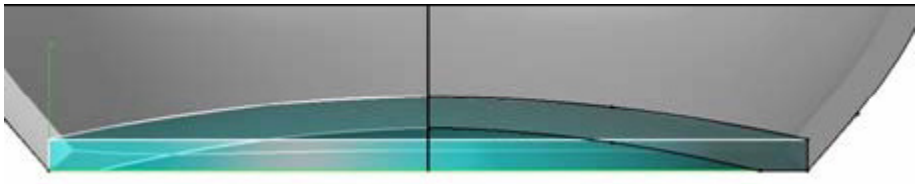
25. Draw a shape as shown above from the side view.



This will be the shape to revolve to form the bottom.

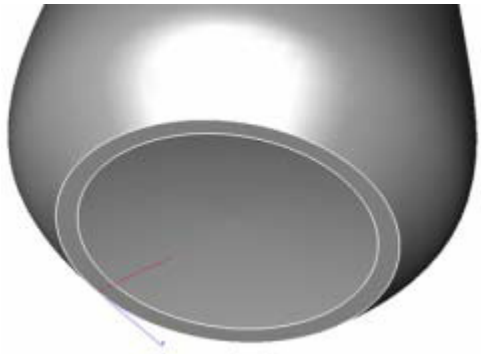
26. Select the **Lathed Solid** tool and then select the profile. Select the inside vertical line as the axis of rotation.





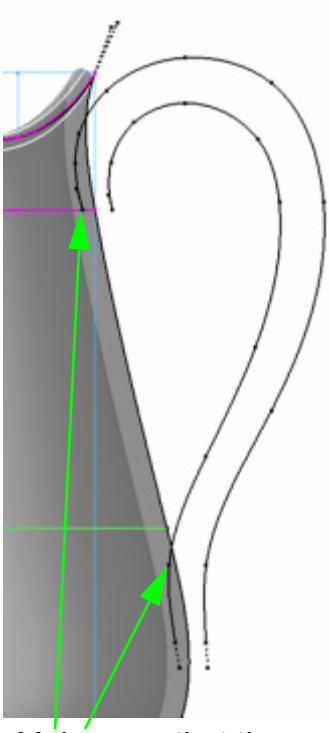
27. Now use the **Boolean Surface** tool with the **Add** option in the Message Line

to add the revolved bottom to the pitcher.

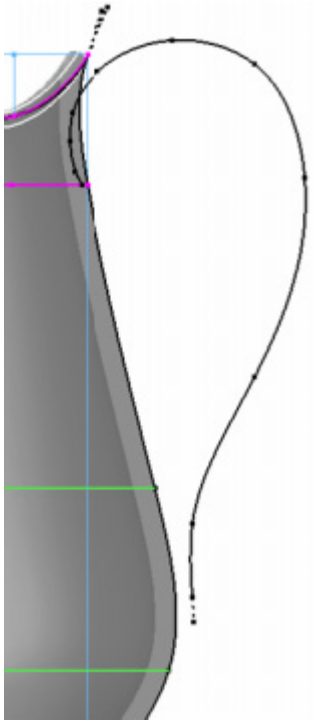


28. Add some blends around the edges and this will complete the base pitcher shape.

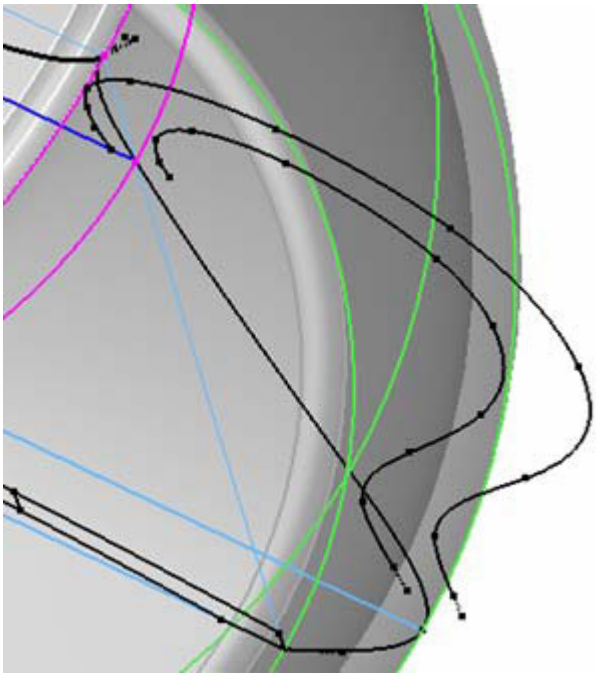
Create the handle next.



Make sure that the ends of the splines partially pass inside the thickness of the pitcher.

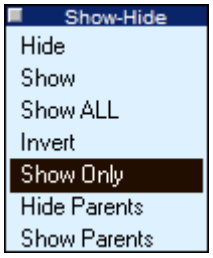


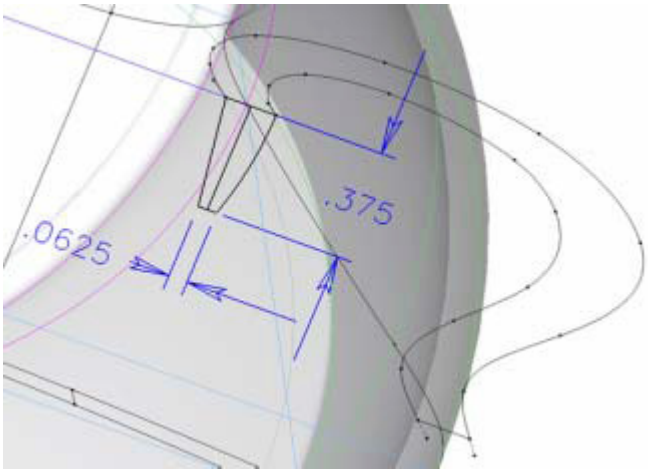
29. Use the **Through-point B-spline**  tool and draw the inside and outside curves that define the handle shape.



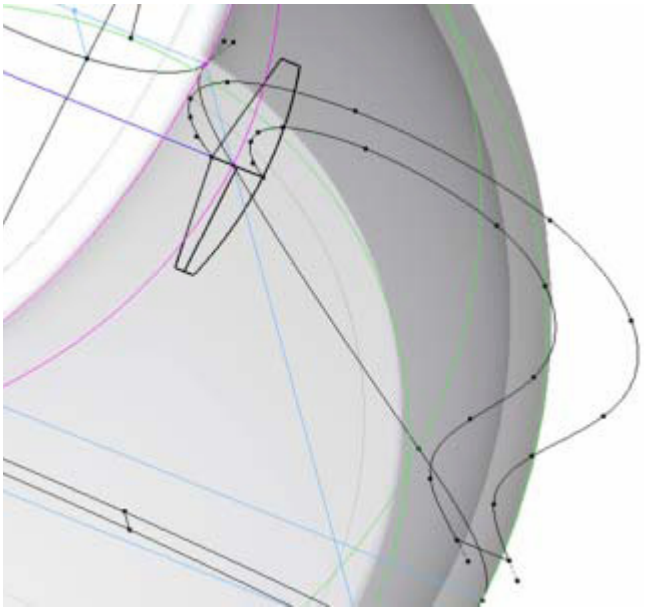
30. Now draw the cross-section. Begin with the line connecting the inside and outside curves on the top of the handle.

    For more convenience, show only the two splines that make the handle by selecting them and choosing the **Show Only** *option in the* **Show-Hide** *palette.*



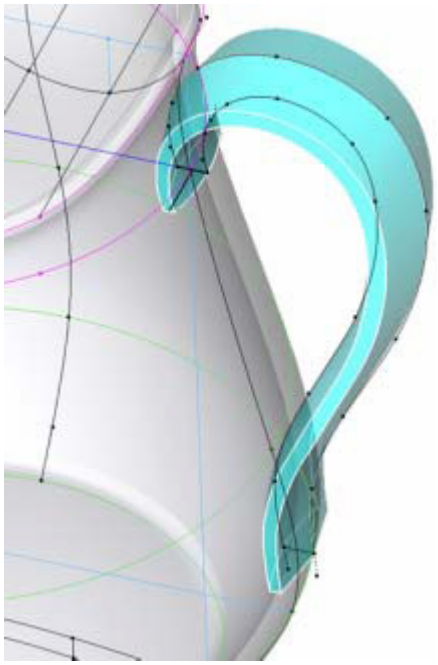


31. Draw half and then mirror  it with the **ZX Plane** option chosen in the Message Line.



32. Use the cross-section shape as the profile for

    Sweep 2 Rail Solid tool. Select the two splines for the two rail curves. Hold down the CTRL key (Windows) OPTION (Macintosh) to use the **Maintain Height** option.

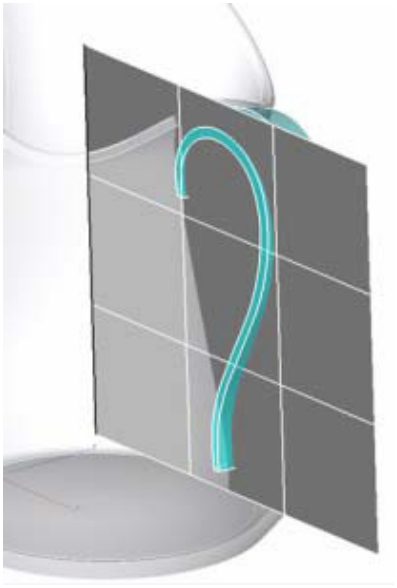


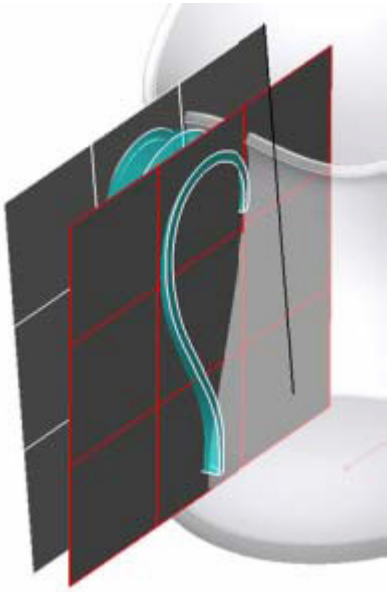
The sweep should be created. A quick comparison reveals that the handle is supposed to be angled, not straight.

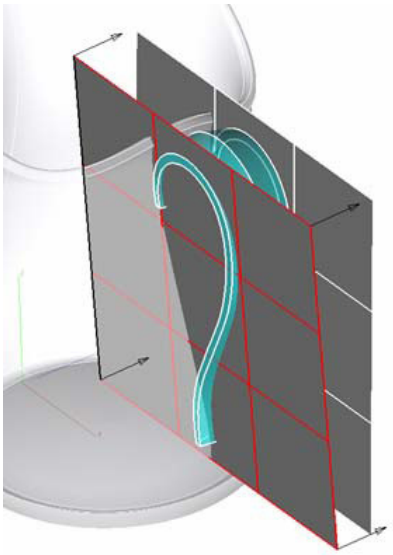
No problem, just cut the extra off.

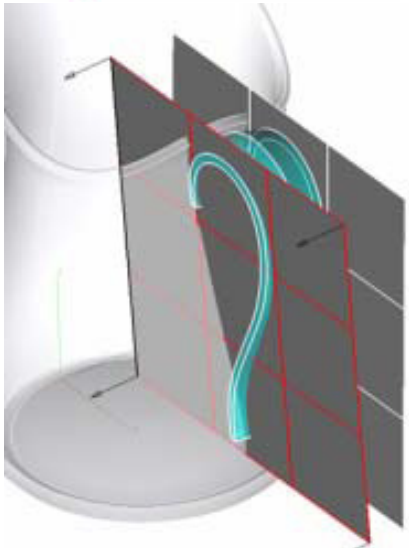
33. Draw an angled line as shown.

34. Extrude that line with the **Extrude 2Pts Surface**  tool. Then mirror  that surface with the **ZX Plane** option from the Message Line.

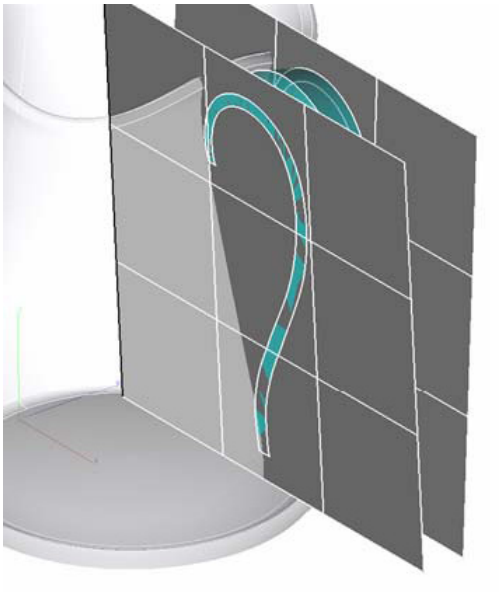








35. Use the **Trim Solid**  tool to trim the handle with the two surfaces. Follow the steps prompted by the Message Line to fulfill the operation correctly. Tap the CTRL key to toggle which side gets trimmed.



The handle now looks much more like the real pitcher.

36. Now all that is left is to add the handle to the pitcher shape with the **Union Solid** tool and then finish it with several blends .