

TUTORIAL 2

Surface Slicing

Learning Objectives

After completing this tutorial, you will be able to:

- Use the new 3D Modeling tools in AutoCAD 2007 for surface slicing.

Required Competencies

Before starting this tutorial, you should have been able to:

- Use AutoCAD at an intermediate to advanced level
- Manipulate the UCS
- Create Planar Surfaces
- Revolve Surfaces
- Rotate Surfaces
- Loft Surfaces.

The new 3D modeling tools in AutoCAD 2007 allow you to model complex freeform shapes that previously were not possible to model in AutoCAD. This tutorial assumes that the user is completely familiar with creating precise 2D sketches of arcs, lines, polylines, and splines in any location as well as the 3D tools from previous releases.



Putty Knife

1. Open the file named Tutorial 2 Putty Knife.

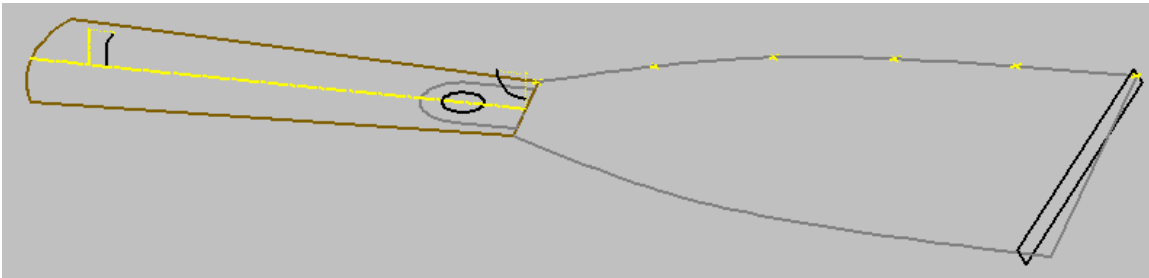


Figure 1

2. Turn off all layers except the Handle Base Sketch and the Handle Solid layers. Make the Handle Solid layer the active layer.

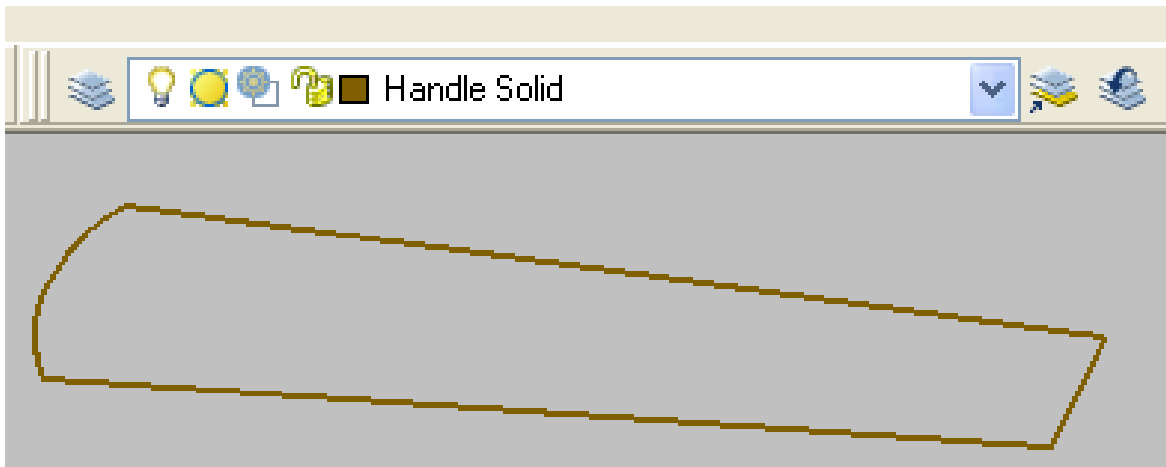


Figure 2

3. Set the “delobj” variable to 0 so that the sketches will not be consumed. That way if you make a mistake you can go back to the original geometry. (*Tip: There are new options for the delobj variable – be sure to check them out.*) Extrude the profile a distance of .75”. (*Alternatively you could have used the new Presspull tool to “pull” the solid. An advantage to the Presspull tool is that the profile does not need to be a closed polyline, only a closed boundary.*) Turn off the Handle Base Sketch layer.

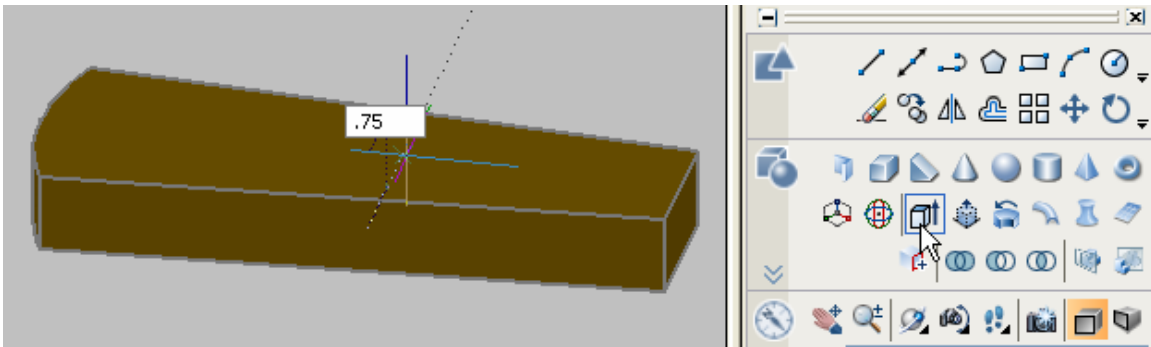


Figure 3

4. Add a .5 radius fillet to the 5 edges highlighted in Figure 4a.

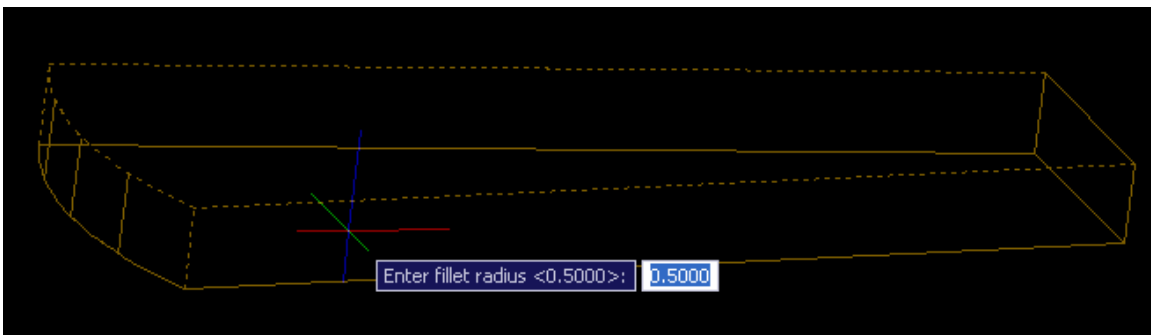


Figure 4a

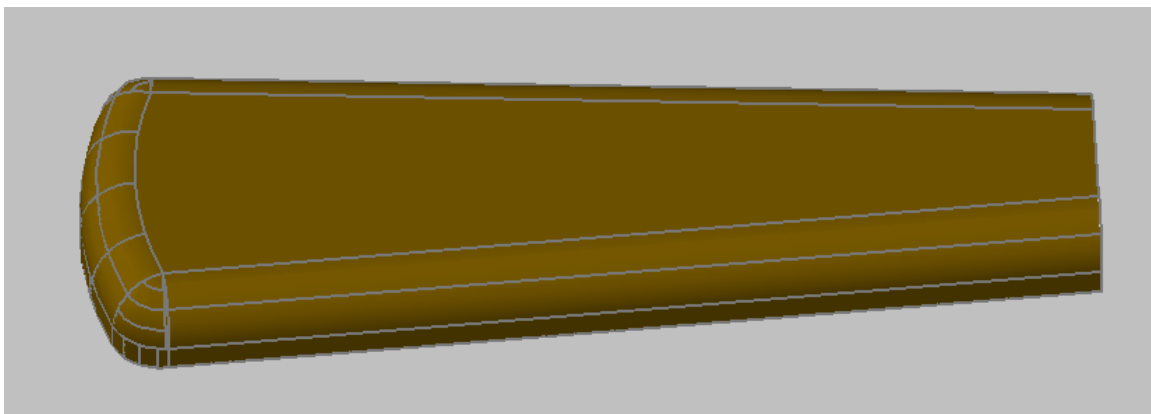


Figure 4b

5. In the Visual Styles control panel of the Dashboard select Realistic as the shade style. As you are working you may want to change to x-ray mode from time-to-time (shown here circled in red).

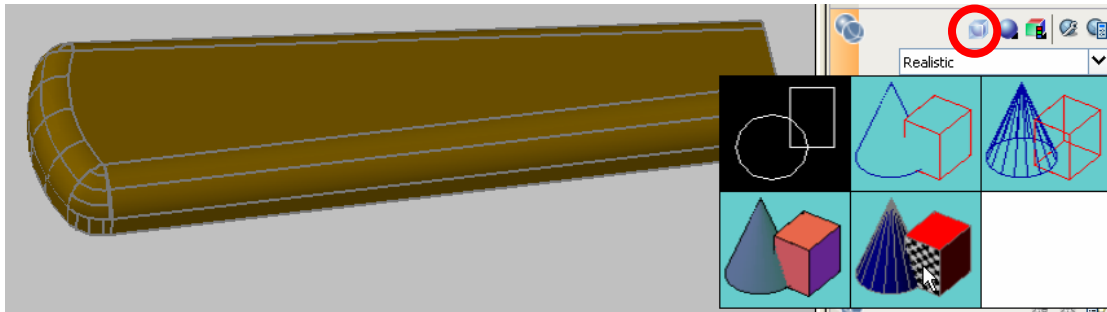


Figure 5

6. Make the Handle Hanger Hole Sketch layer and the Construction layer visible. Revolve the open cyan profile around the centerline. Because the profile is open the result will be a surface.

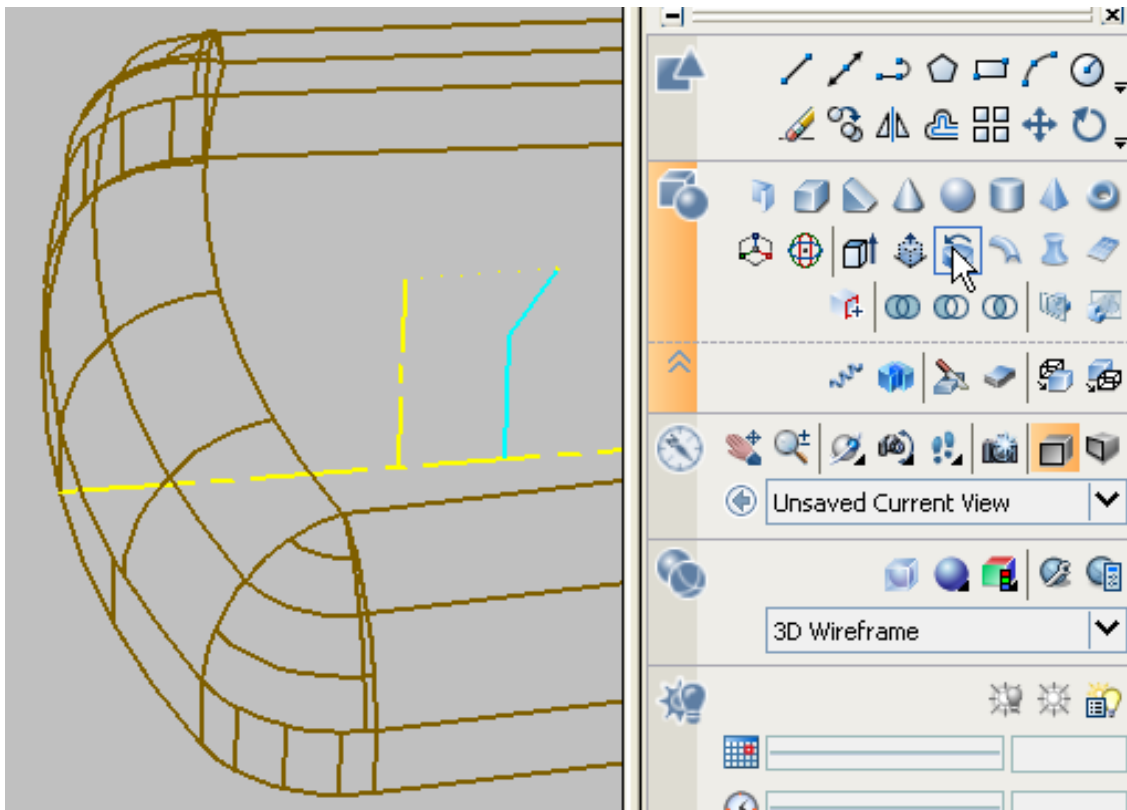


Figure 6

7. Move the cursor arrow to the area of the Make 3D control panel in the Dashboard as shown in Figure 7. A down pointing chevron will appear to expand the control panel revealing more tools. Click on the chevron.

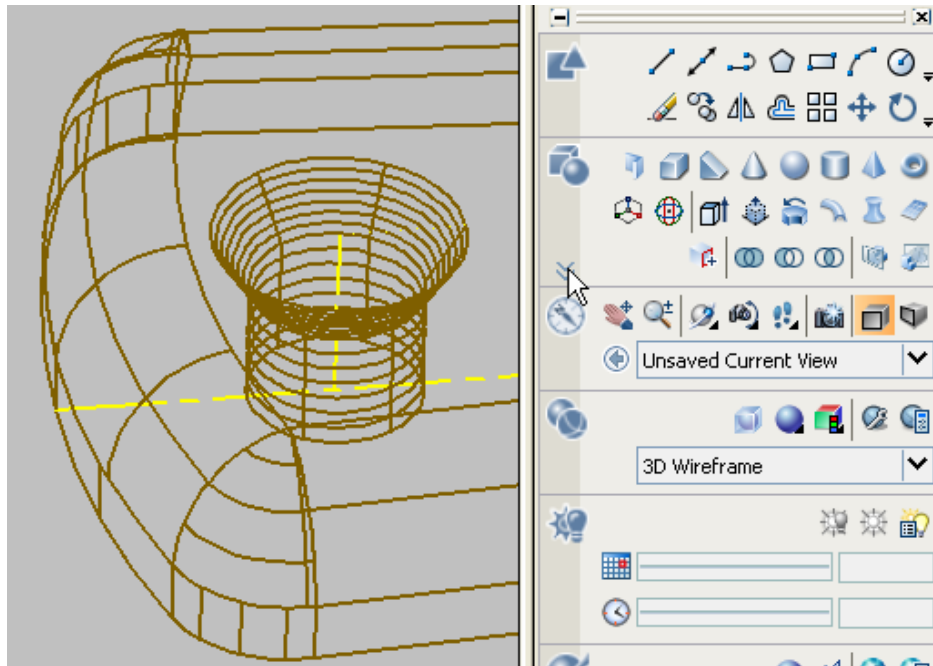


Figure 7

8. Click on the Slice tool.

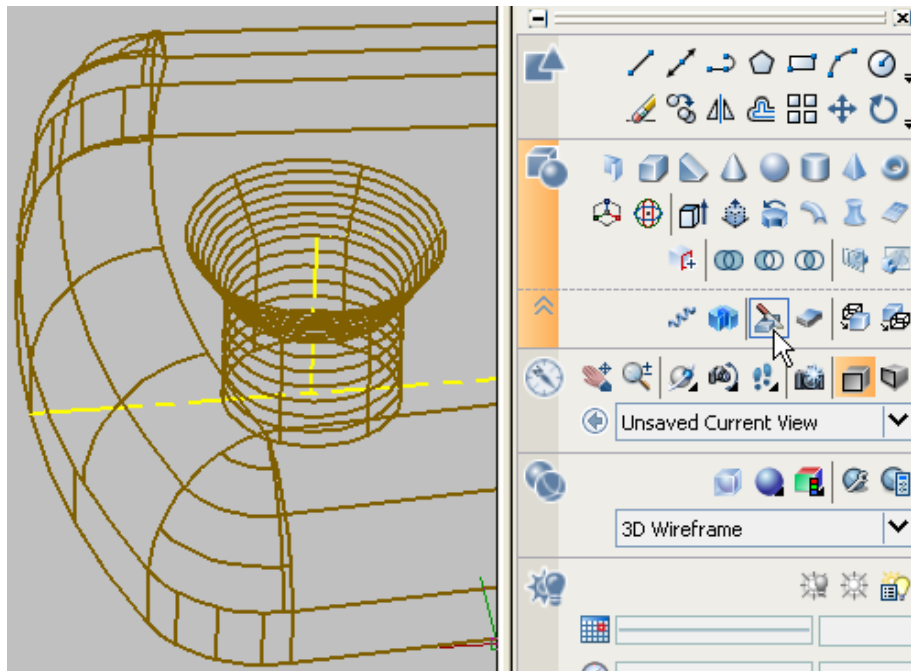


Figure 8

9. Select the Solid and then press Enter.

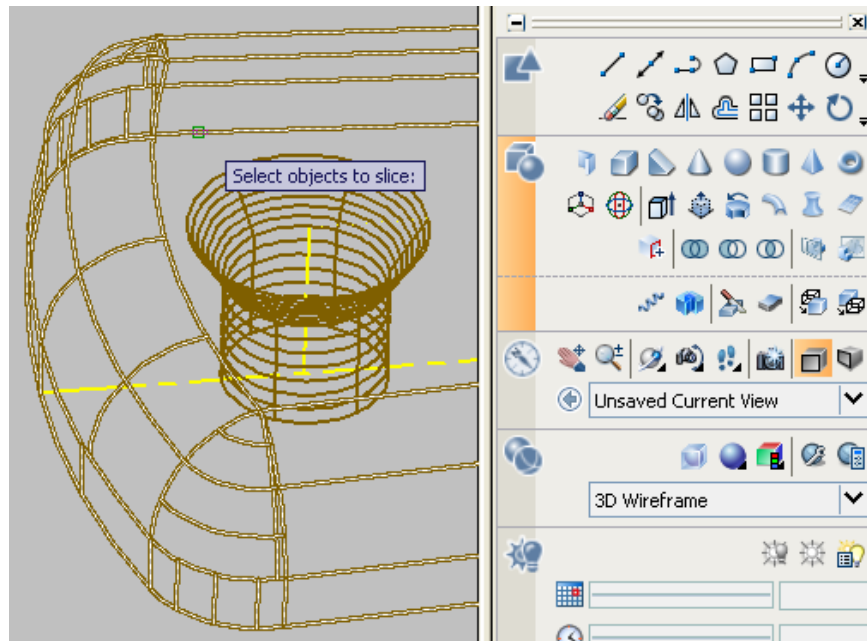


Figure 9

10. Right Mouse Button (in the future I will refer to RMB) and select Surface from the list. Then pick the revolved surface.

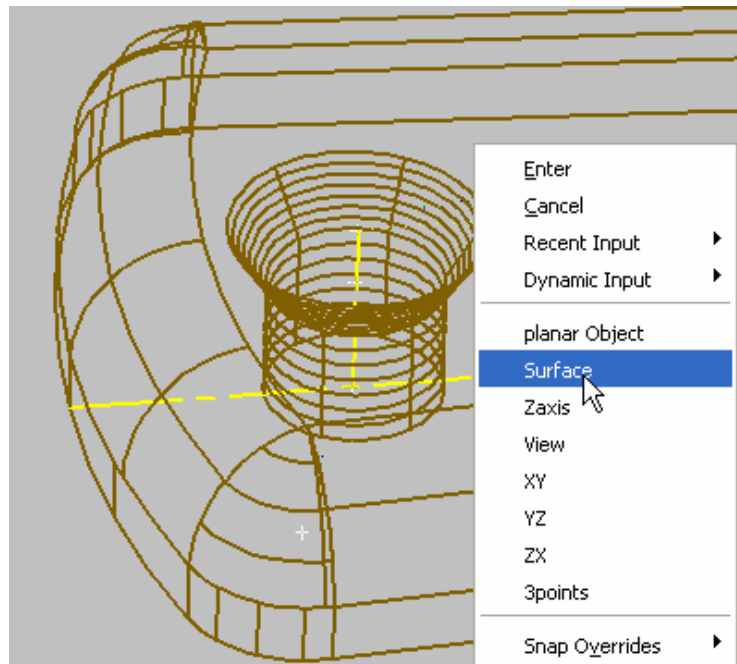


Figure 10

11. Then following the prompts, select the part of the solid you wish to keep. Move the revolved surface to the Hide Surfaces layer. If you shade the part you will see a hole in the handle.

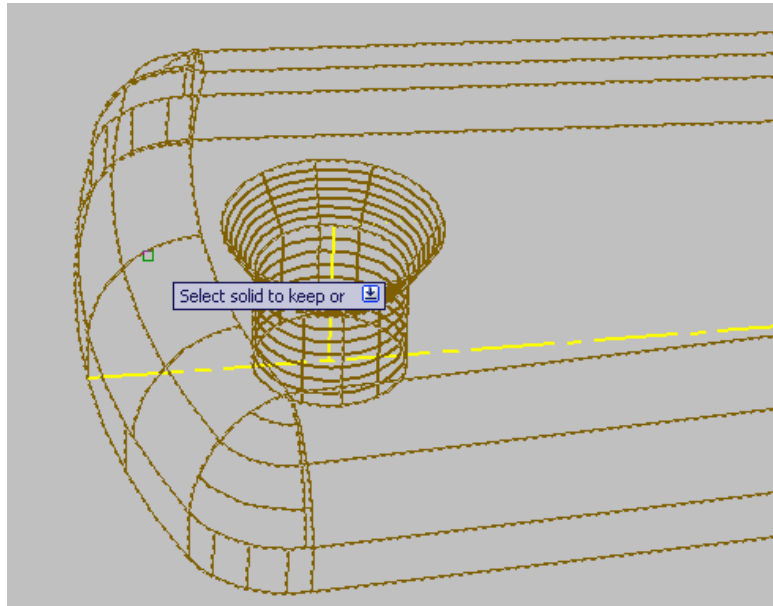


Figure 11

12. Make the Rivet Hole Sketch layer visible and extrude the circle. You don't have to enter a height distance, simply stretch the preview beyond the handle solid and press Enter. Subtract the extruded cylinder from the handle.

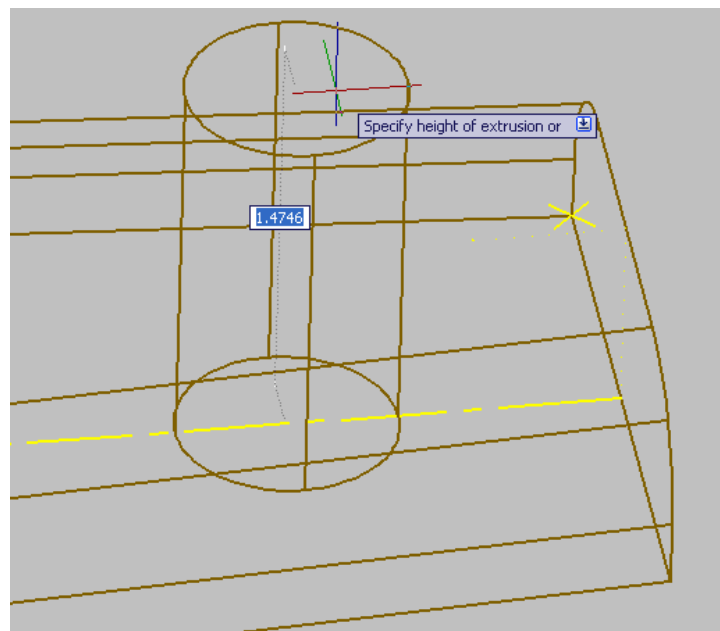


Figure 12

13. Make the Handle Relief Sketch layer visible.

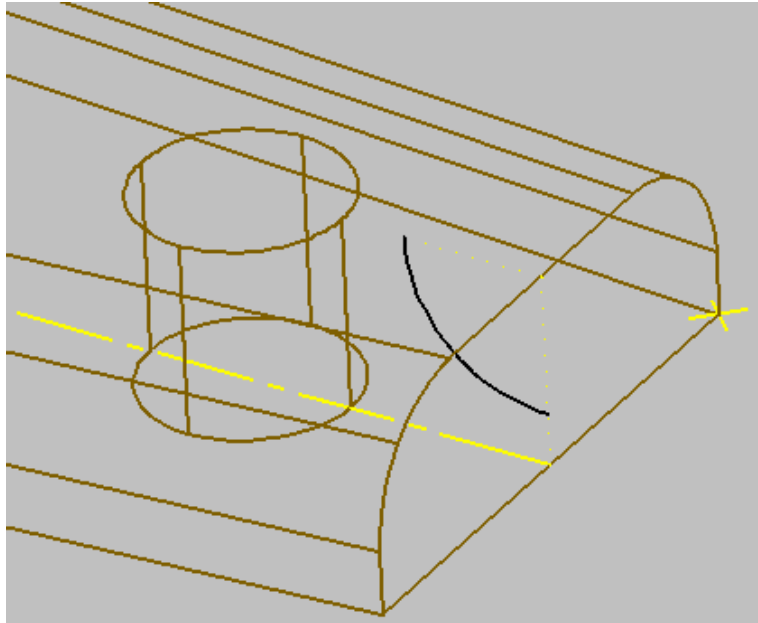


Figure 13

14. Extrude the arc as a surface stretching any distance beyond the far side of the solid at least the width of the solid. Notice that the dynamic UCS changed on its own.

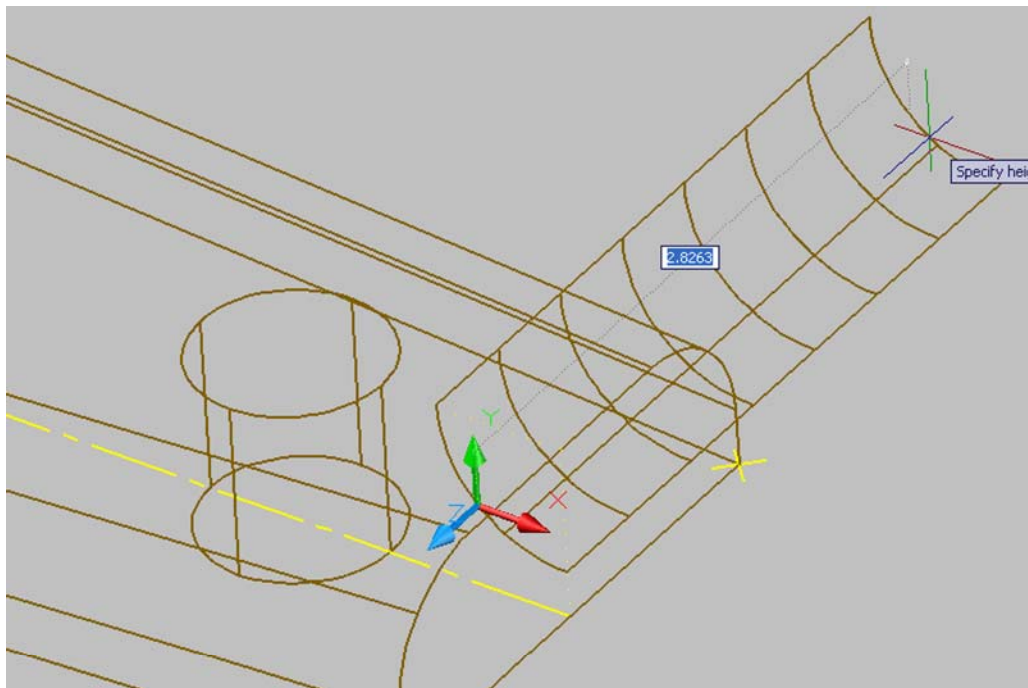


Figure 14

15. Highlight a grip and move the surface down along the y-axis beyond the bottom edge of the solid as shown.

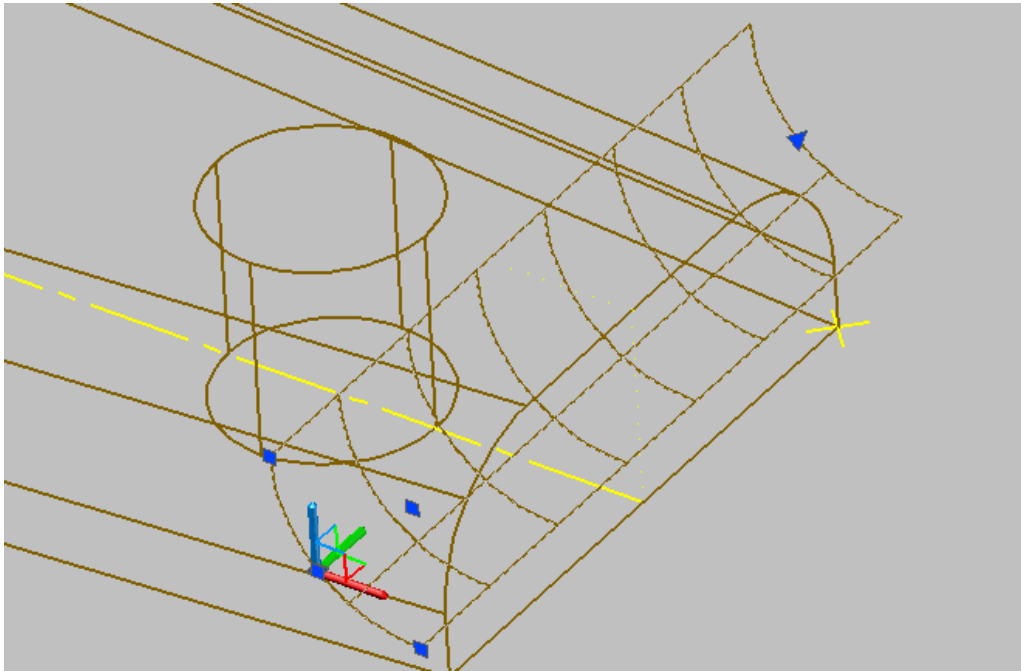


Figure 15

16. If the surface doesn't go completely through the solid, select the arrow shaped grip and stretch the surface out along the temporary UCS z-axis (-z) as shown in Figure 16. The goal is to have the surface completely slice through the solid at both ends.

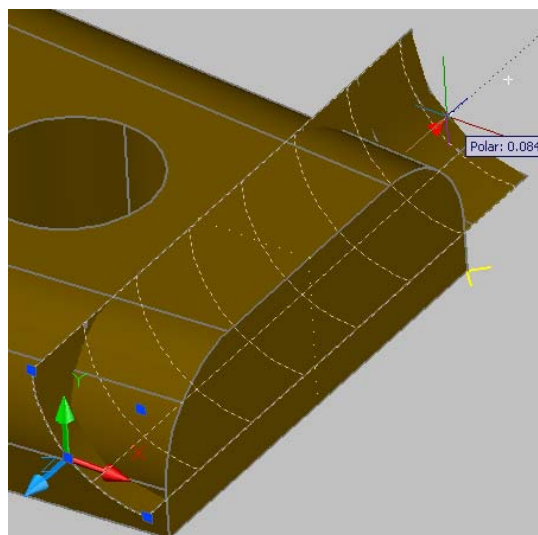


Figure 16

17. Slice the solid with the surface and then hide the surface and any visible sketch layers.

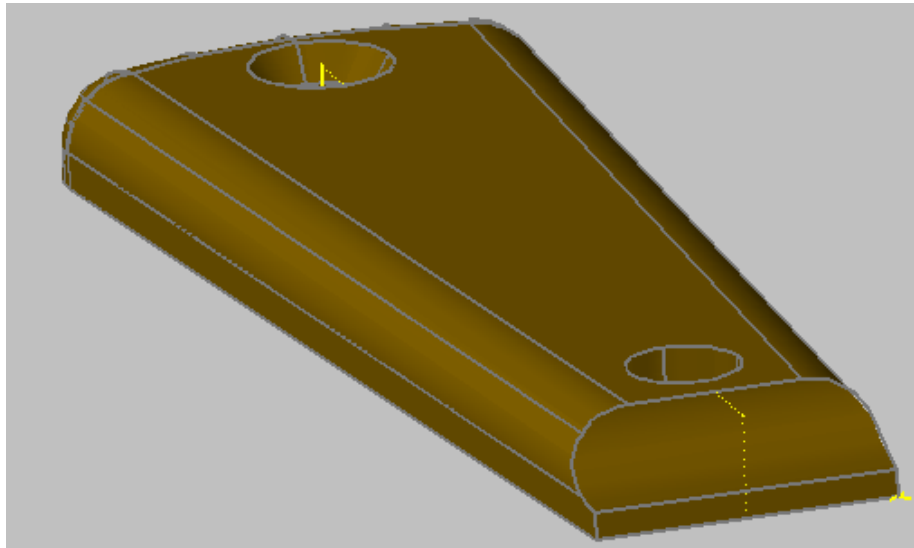


Figure 17

18. Make the Blade Sketch layer visible and Extrude the loop shown a distance of $1/32$ into the handle. Subtract the resulting solid from the handle. Mirror the handle to the opposite side and then turn off the visibility of the Handle Solid layer.

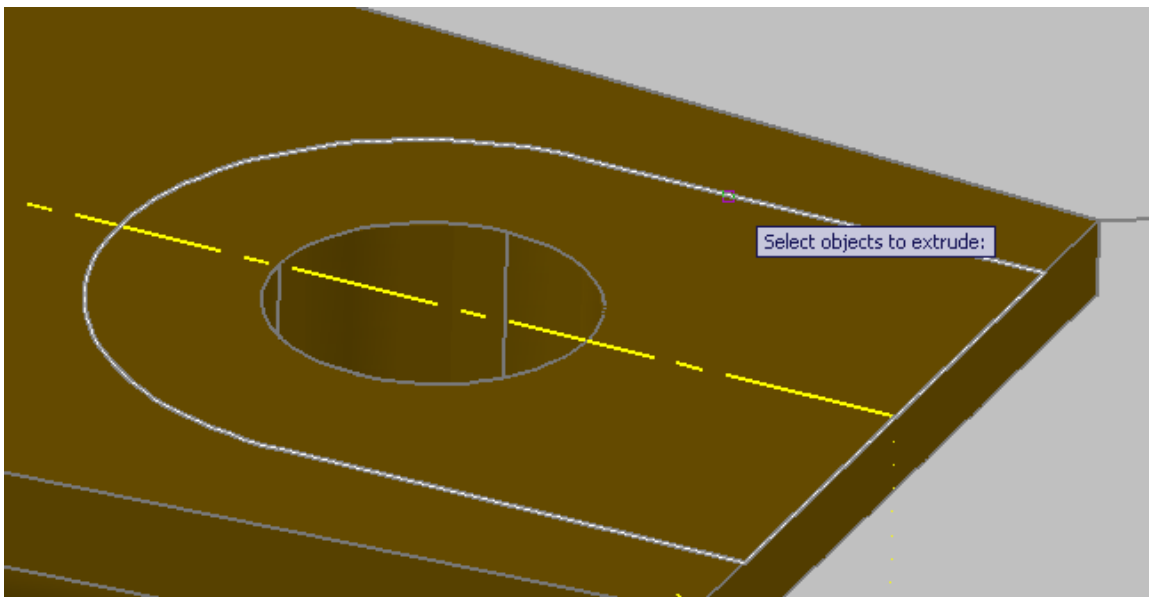


Figure 18

19. Make the Blade Solid layer the active layer.

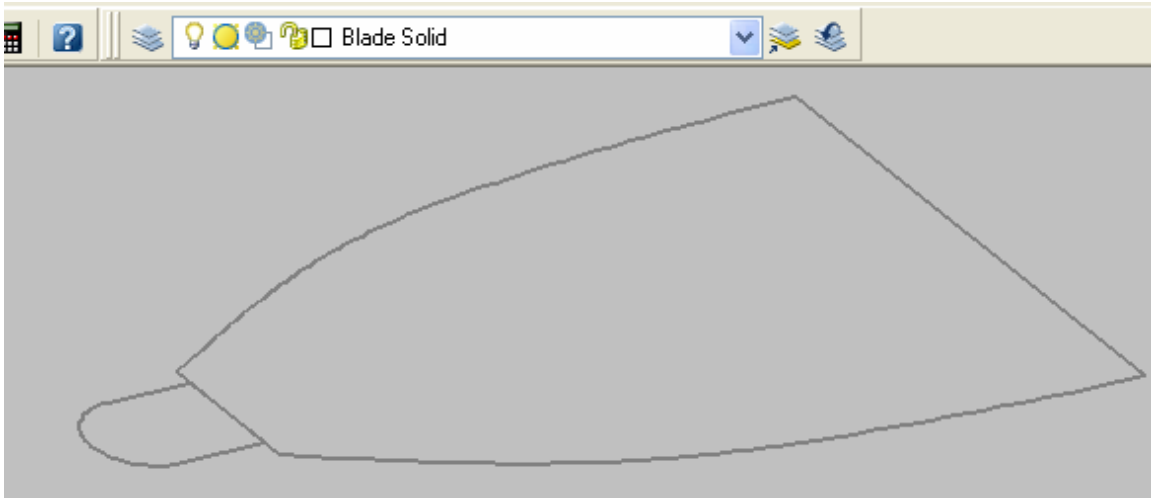


Figure 19

20. Extrude the loop again 1/32" down.

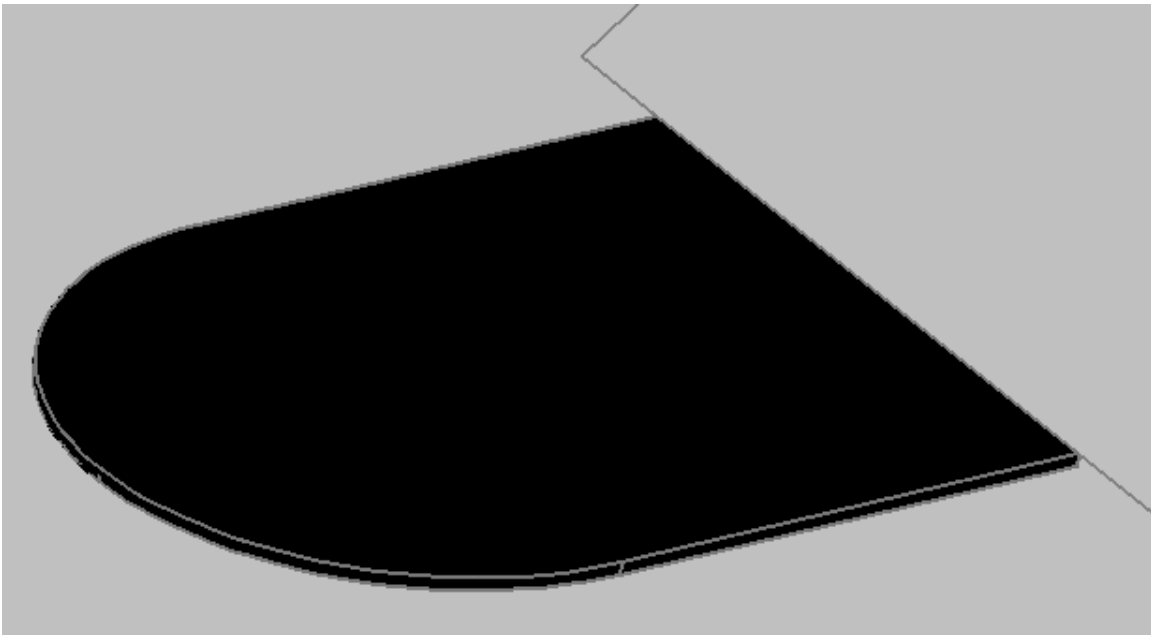


Figure 20

21. While holding the Ctrl key select the face of the solid.

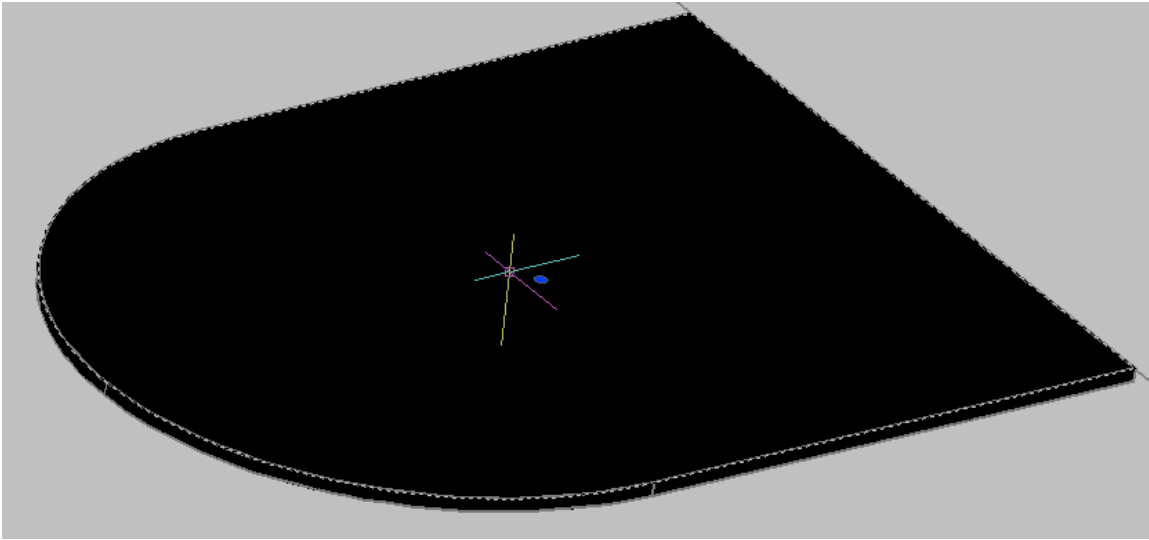


Figure 21

22. Select the grip and stretch the face a distance of $1/32$ for a total thickness of $1/16$ midplane about the sketch.

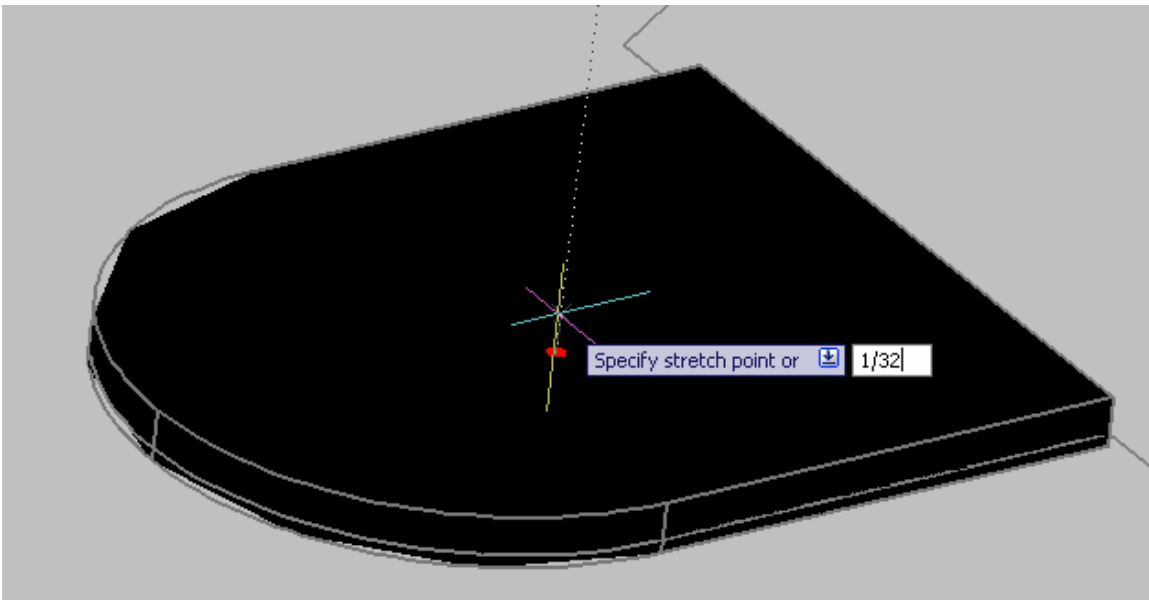


Figure 22

23. Select the Loft tool in the Dashboard and then click the two splines in the sketch. Press Enter and then RMB change the option from Cross-sections to **Guides**. Select the two lines at either end of the splines as the guides. (How would you have created a spline bounded solid in earlier releases?)

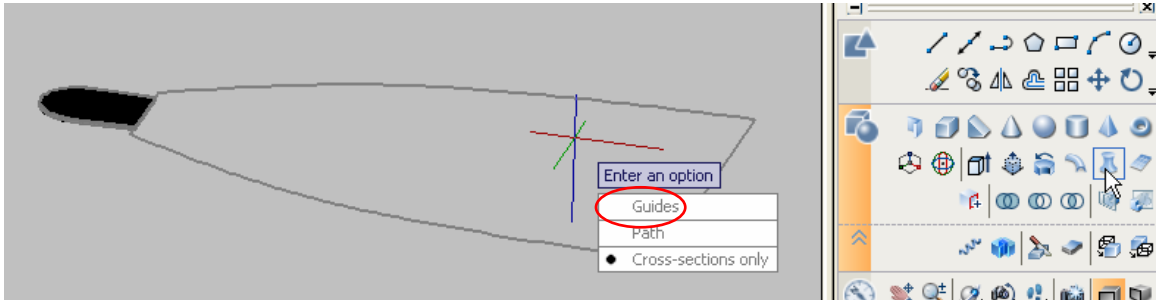


Figure 23

24. Select the Thicken surface tool in the Dashboard and then thicken the lofted surface a distance of 1/32". Move the lofted surface to the Hidden Surfaces layer keeping only the solids visible.

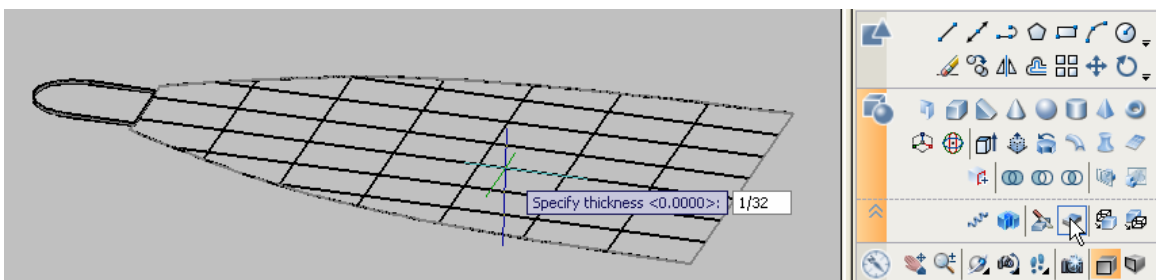


Figure 24

25. Determine which face of the blade needs to be stretched to match the thickness of the tab. Holding the Ctrl key click on the face, select the grip and stretch 1/32" as you did with the tab in Step 22. Union the two solids together. Turn the Rivet Hole layer back on and make a hole in the blade tab for a rivet to hold the assembly together.

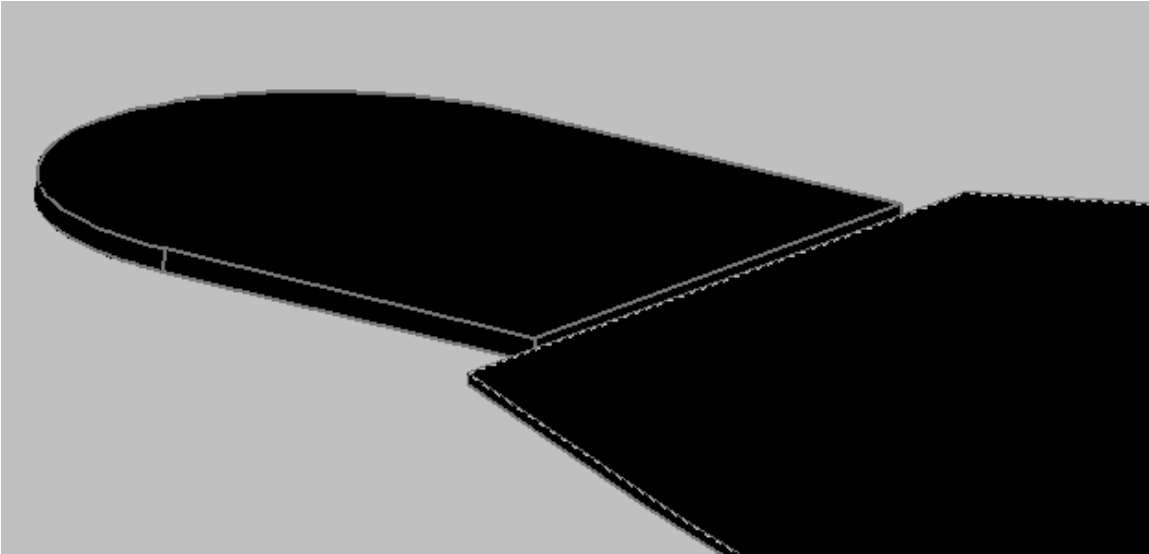


Figure 25

26. Make the Blade Compound Angle layer visible and the select the new Planar surface tool from the Dashboard. RMB select Object and then click on the rectangle.

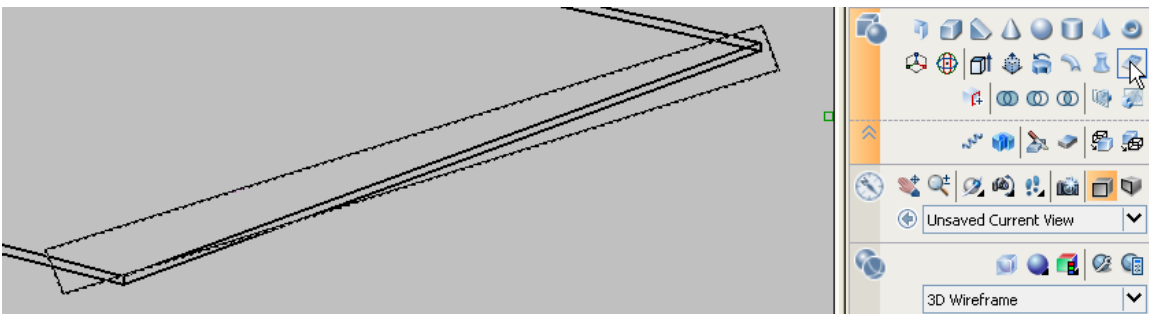


Figure 26

27. Use the resulting planar surface to slice the compound angle on the blade and then hide any visible sketches or surfaces.

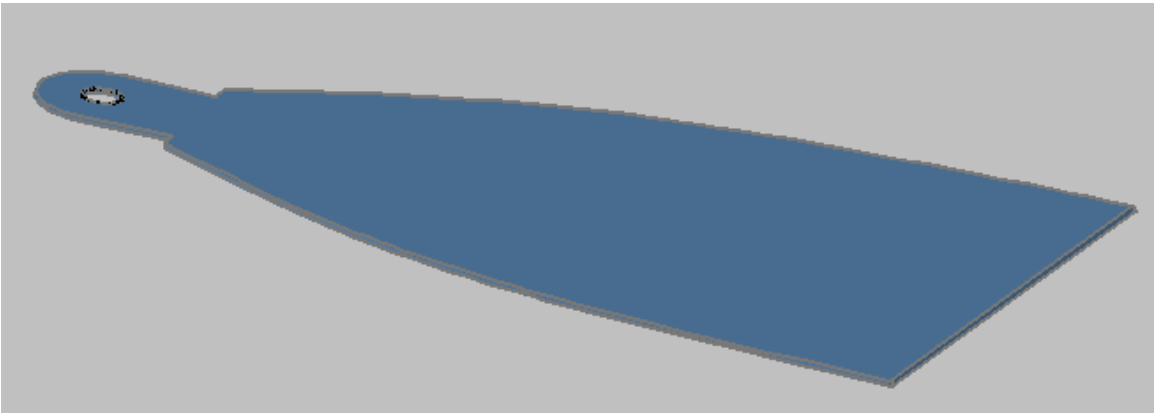


Figure 27

28. Make a Rivet for the assembly.

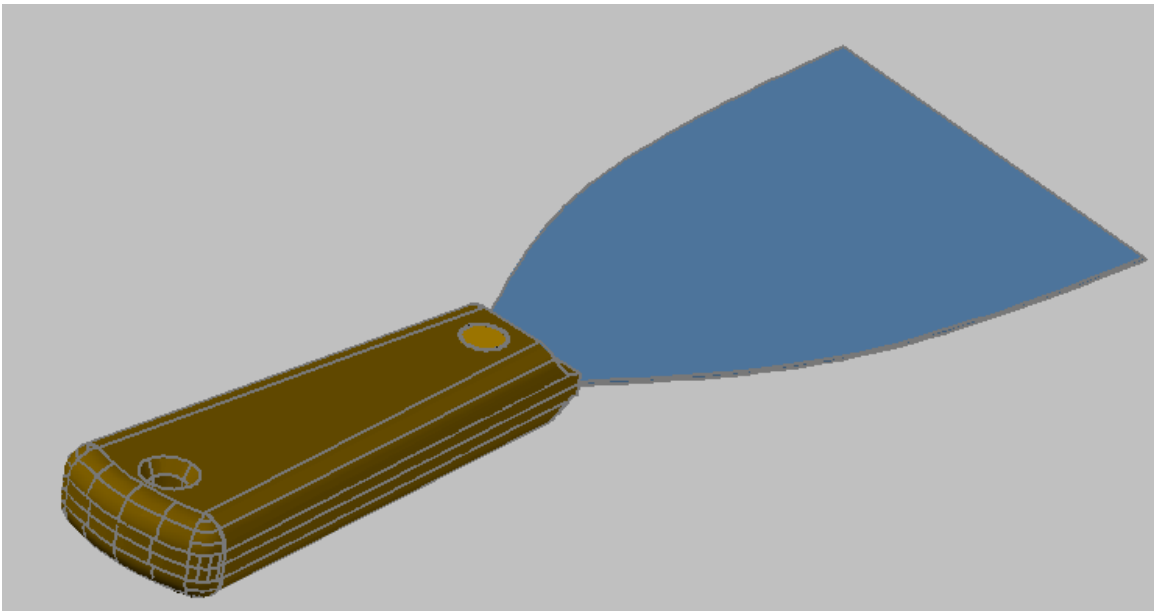


Figure 28

After doing later Tutorials come back to this one and experiment with making the same assembly using the new Presspull command.
