Lesson: Explore Surface Creation

In this lesson, you'll modify solid geometry using direct modeling and surface tools.

Learning Objectives

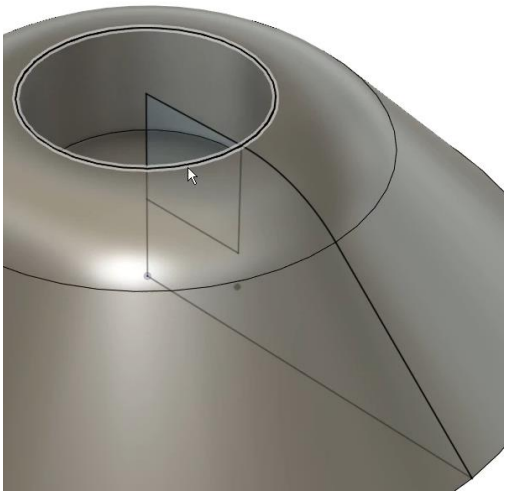
- Use direct modeling tools to remove geometry.
- Create a revolved surface.
- Use Patch.

The completed exercise

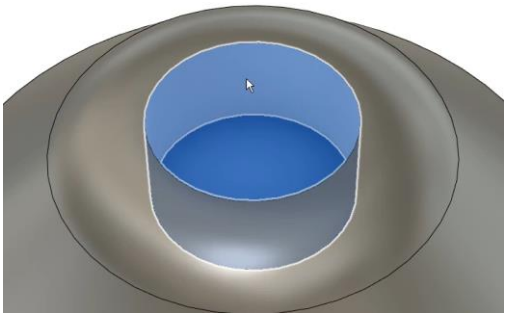
1. Upload and open the supplied *Basic Surface Creation.f3d* file.

2. In the Browser, expand the Bodies folder and Sketches folder. Notice that Sketch1 used a Revolve feature to create Body1.

3. Turn on the visibility for Sketch1 by clicking the eyeball icon next to it in the Browser. The additional geometry inside the sketch could be used to patch the design. Alternately, direct modeling tools and surface tools can be used to patch the geometry.

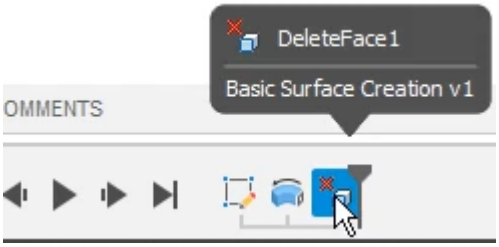


4. Select the two faces inside the part's bore, then click Modify> Delete.

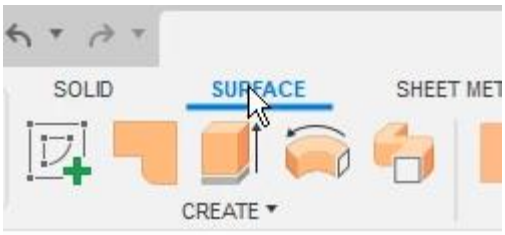


5. The faces are removed and Fusion 360 patches the geometry. In this instance, the curve's tangency is carried inwards as Fusion 360 patches the removed faces. This was not the intended result.

6. Delete the DeleteFace1 feature by selecting it in the timeline and pressing the Delete key.



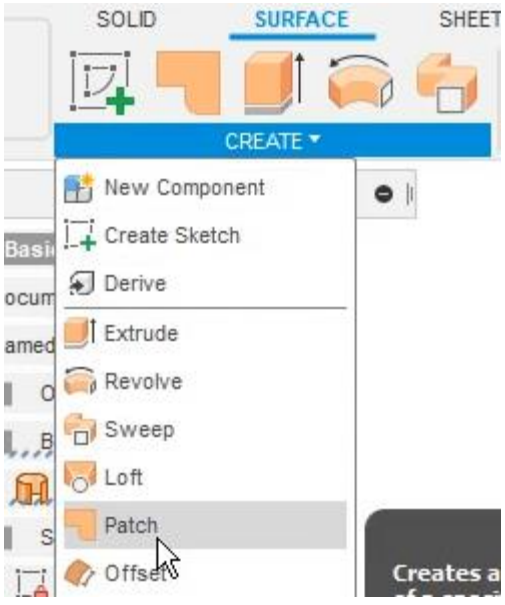
7. Navigate to the Toolbar's Surface tab.



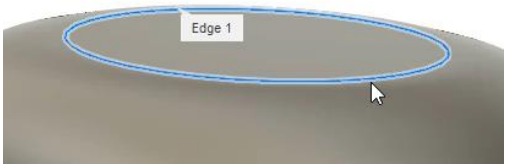
8. Select the same two faces you selected in Step 4, then click Modify> Delete. The selected faces are removed, and a surface patch fills the resulting hole.

9. Notice in the Browser's Bodies folder that the icon indicates that the solid body has been converted to a surface body. The opening needs to be patched.

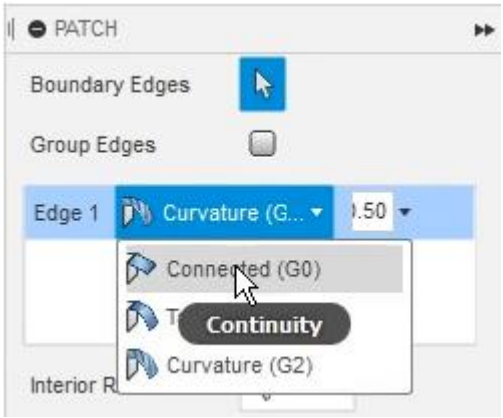
10. Click Create> Patch.



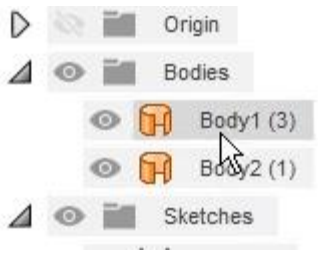
11. Select the edge shown in the image on the right as the dialog's Boundary Edges selection.



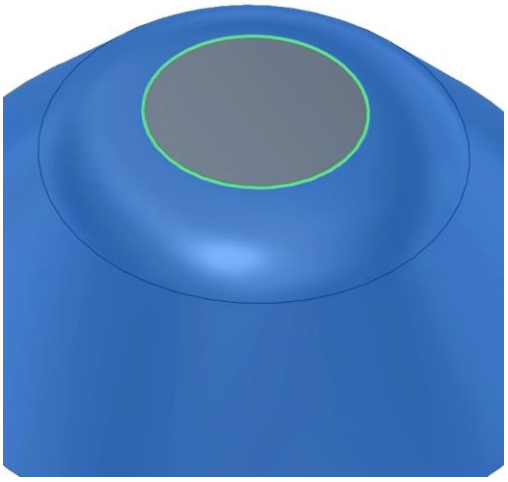
12. The patch's curvature can be adjusted using the menu in the dialog. In this instance, choose the Connected (G0) option, then click OK.



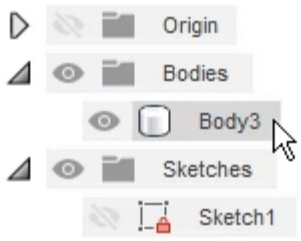
13. The patch surface is added to the Bodies folder. The body is now made up of two separate surface bodies that need to be stitched together to create a solid body.



14. Click Modify> Stitch, then select the two surface bodies as the dialog's Stitch Surfaces selections. Click OK in the dialog.



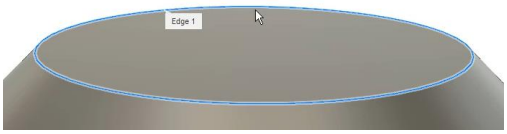
15. The two surface bodies are stitched together and the geometry is now a solid body.



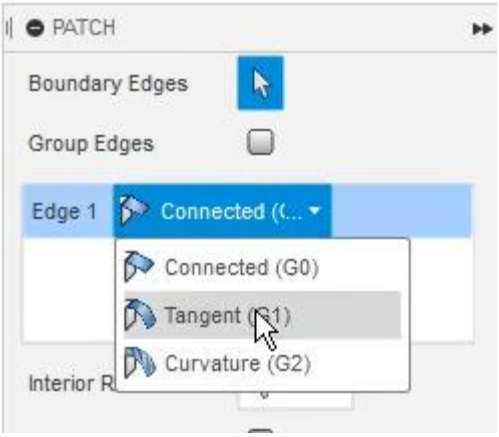
16. Hold down Ctrl and select the two faces shown in the image on the right. Click Modify> Delete.

17. The selected faces are deleted and the remaining faces are converted to surfaces.

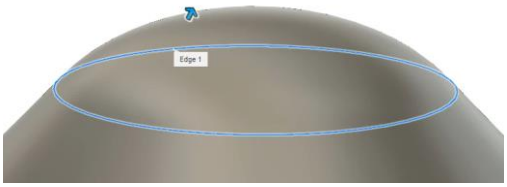
18. Click Create> Patch and select the open edge. A flat patch is created to close the opening.



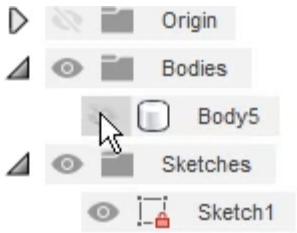
19. Choose the Tangent (G1) option from the dialog's menu and note its effects on the patch. The patch is created in a way that carries tangency with the ramped face.



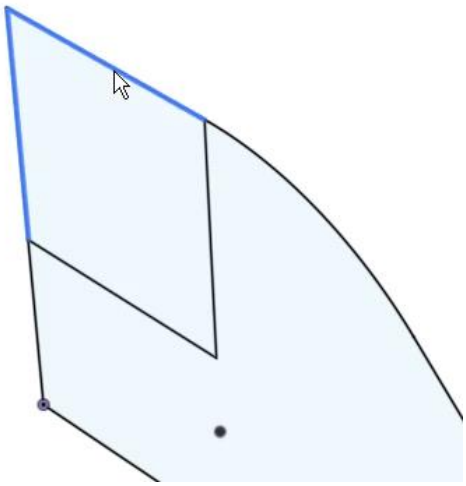
20. Next, select the Curvature (G2) option and note its effects. Click the dialog's OK to accept the changes.



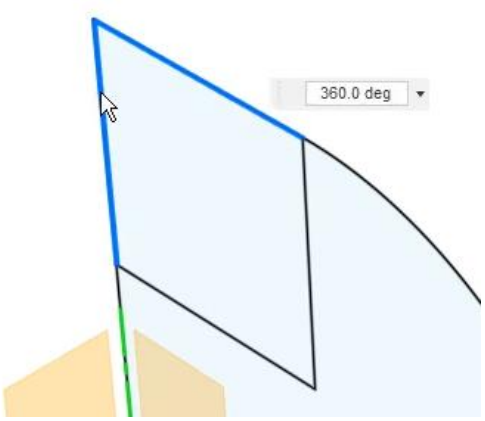
21. Combine the two surface bodies together so that they create a solid body. Click Modify> Stitch and select the two surfaces as the dialog's Stitch Surfaces selections. Turn on the visibility for Sketch1, then turn off the visibility for Body5.



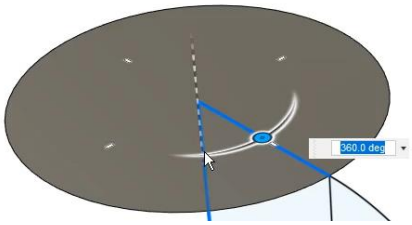
22. Making sure you are still in the Toolbar's Surface tab, click Create> Revolve. Choose the geometry shown in the image on the right as the dialog's Profile selection.



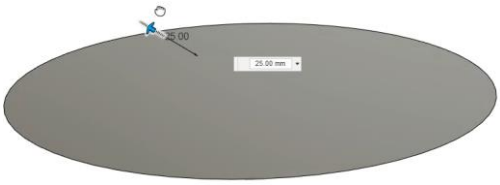
23. For the dialog's Axis selection, choose the vertical line.



24. The selected geometry is revolved into a surface body. Click OK to accept the new surface body. This surface could be used to patch the body's geometry.

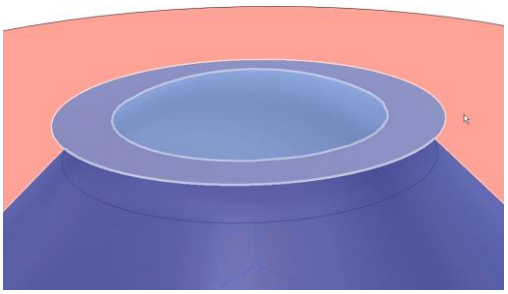


25. Click Modify> Extend, then choose the surface body's perimeter as the dialog's Edges selection. Extend the surface to 30 mm, then click OK.



26. Use the Browser to turn on the visibility for Body5 and notice that the surface extends outside the solid geometry.

27. Click Modify> Split Body. For the dialog's Body to Split, choose the solid geometry. For the dialog's Splitting Tool(s) selection, choose the surface body. Click the dialog's OK.



28. Use the Browser to turn off the visibility for the surface body and the top solid geometry. The surface geometry has been used to modify the solid geometry. The solid geometry has been modified and patched using several different tools, but many more could have been used. The correct tool to use depends on the geometry that needs to be created. Save the file and continue to the module.