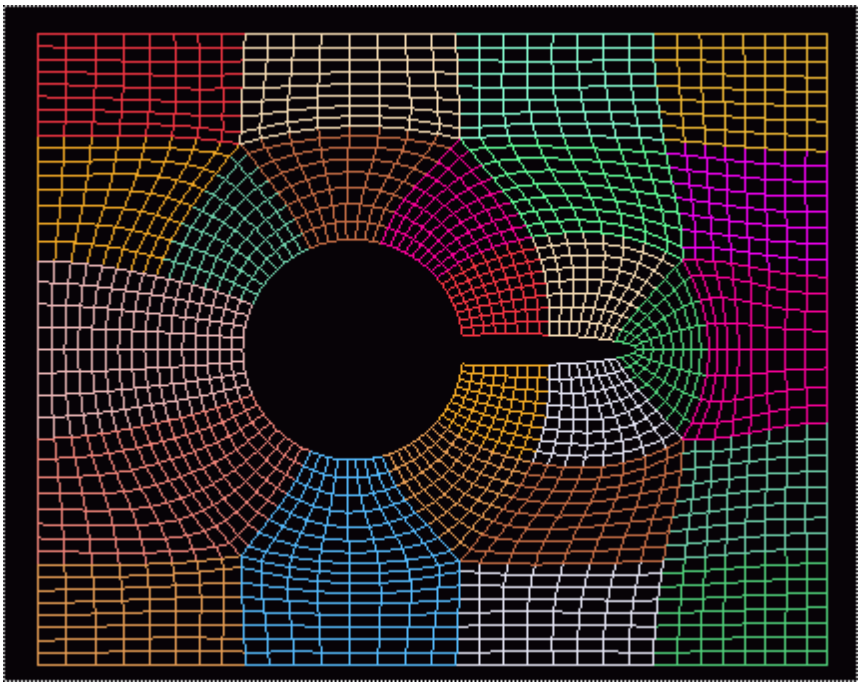
Tutorial 2.1: Idealized Wing Body

Many cases will arise when you must mesh intersecting surfaces. The advantage of using **GridPro** is that the code is not restricted to meshing only one solid volume. If two solid models or surfaces intersect the user can choose to mesh one, the other or both. The point of intersection will remain clearly defined. In Tutorial_**2.1** of this tutorial we will mesh two intersecting surfaces in 2D, and in Tutorial_**2.2** we will apply the same principles to mesh a 3D model of a simple airplane fuselage and wing.

What You Will Create

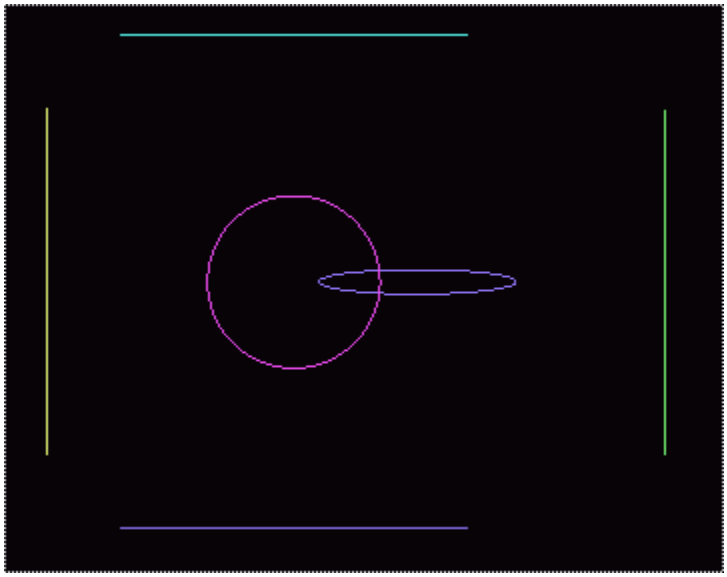


What You Will Learn

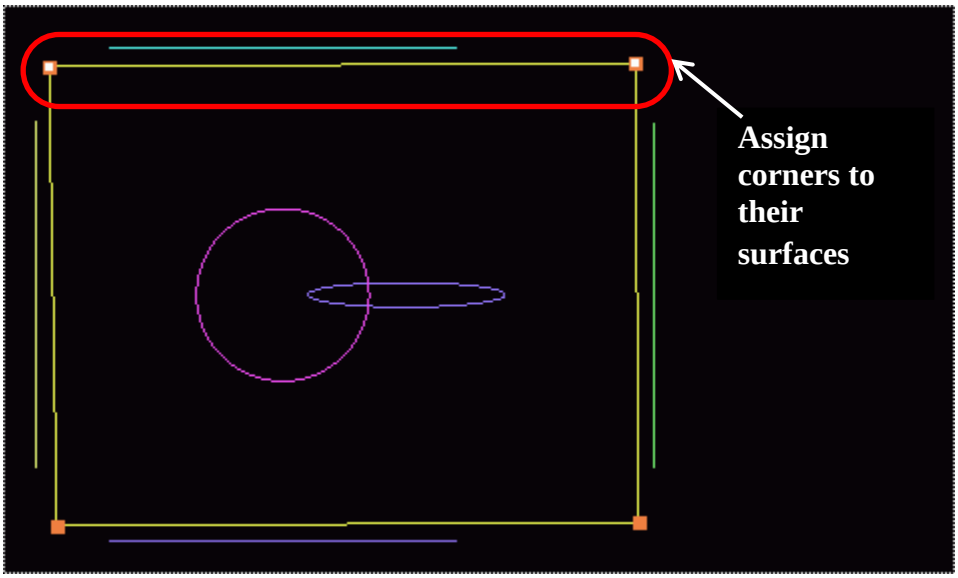
- How to design topology for intersecting surfaces
- The importance of making a well-defined mesh at the surface intersection using double topology assignments
- About the un-zoom command

Step 1 Create the Topology

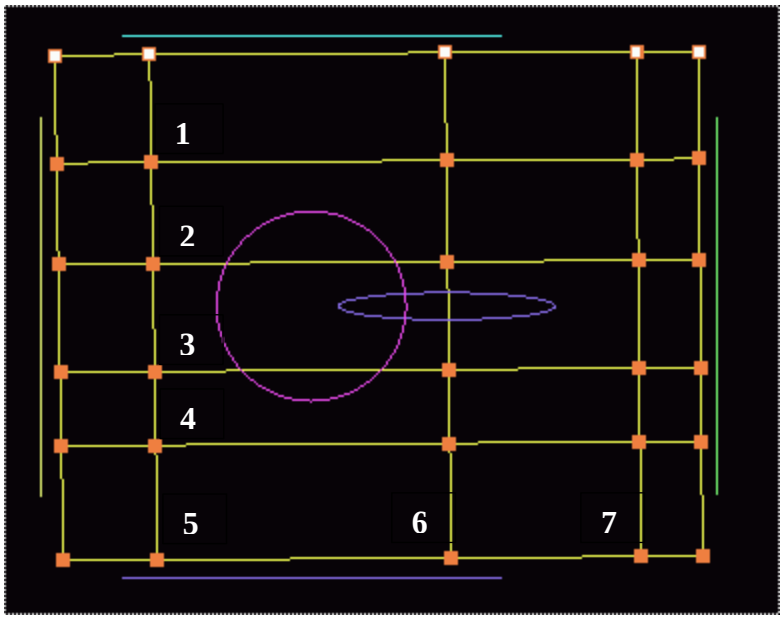
Let’s look at the geometry and think for a moment about how to make the topology.



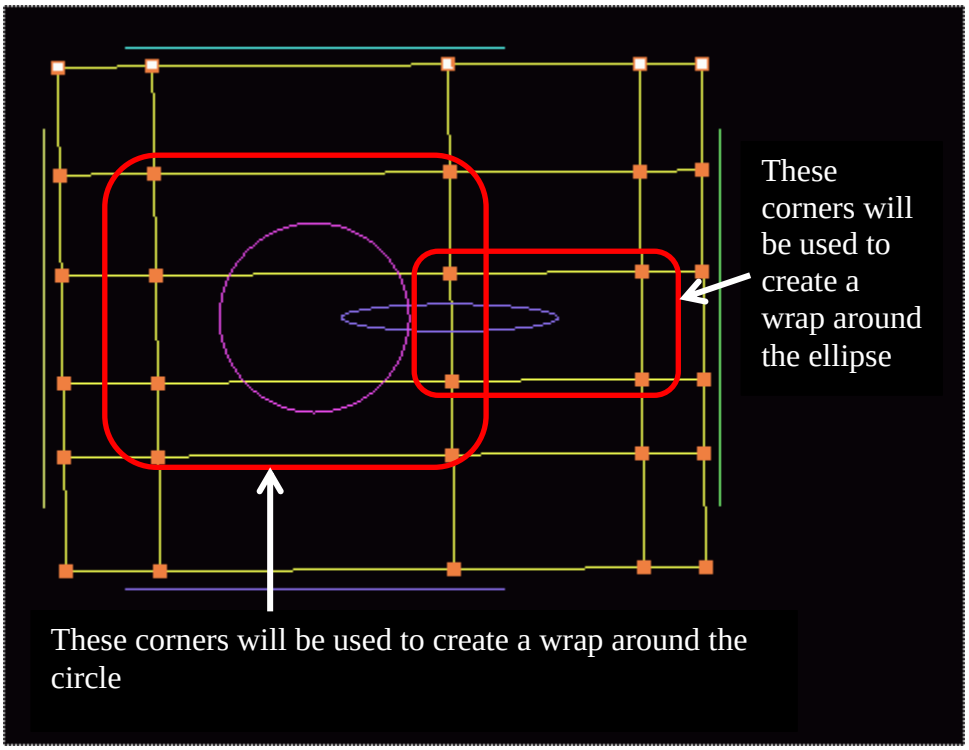
Since both surfaces need to be meshed, the topology should be designed such that the wrap can be easily assigned to each surface with enough room so that the corners remain on the outside of both surfaces. Place four topology corners at the corners of the walls surrounding the geometry. Let’s take advantage of surface assignment inheritance by assigning the corners to the walls so that when we insert the inner topology using **Topology Sheets** the outside corners will be automatically assigned.



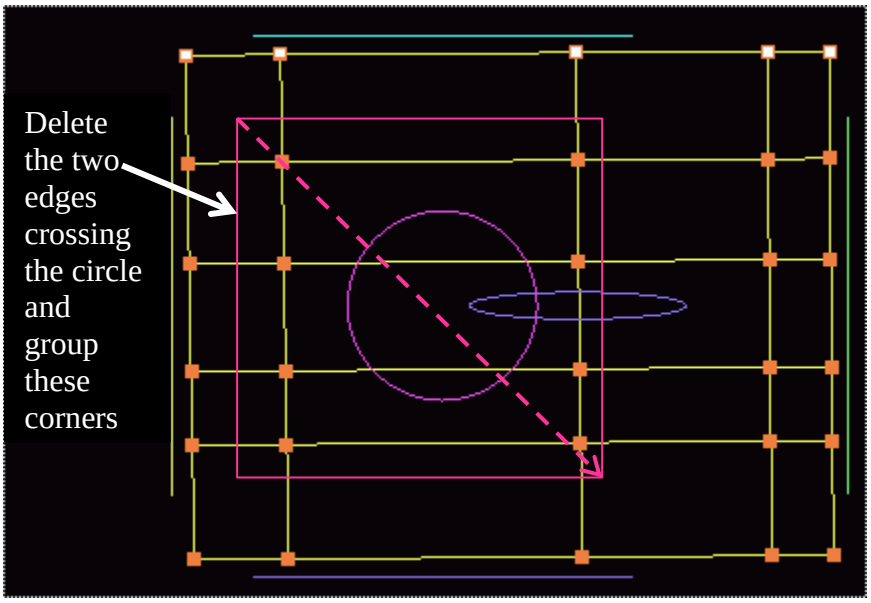
Now begin inserting the **Topology Sheets** to surround the circle and the ellipse



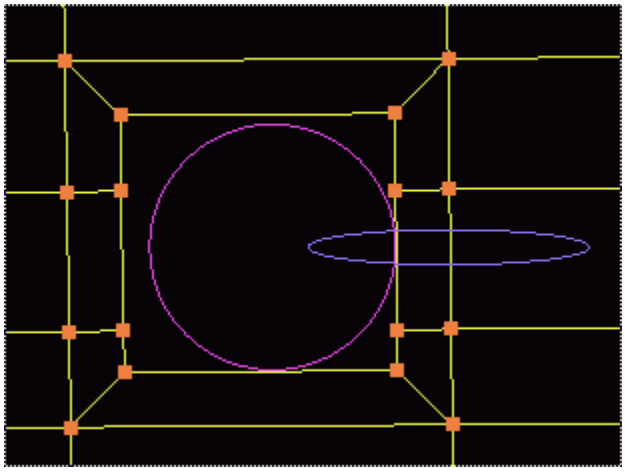
Let's take a look at the topology in the picture below and review the reasons why we placed the edges in the chosen location.



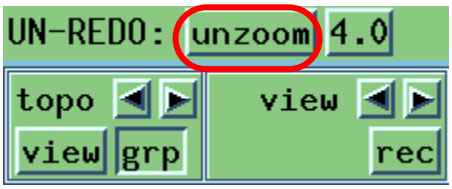
As can be seen from the above picture, two corners will be shared when the wrap is created. These corners will come to equilibrium at the intersection of the two surfaces. Before we make the wrap, the two edges crossing the circle need to be deleted and a group made of the remaining corners. Delete these edges by holding down the R key on the keyboard, placing the cursor over the edge and clicking the left mouse button.



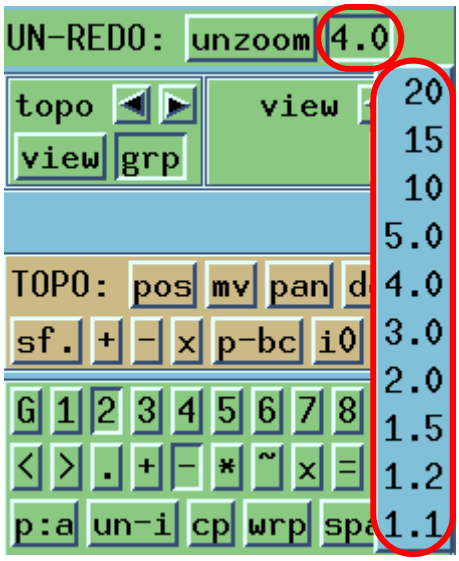
Now wrap the group 25% smaller. If the wrap seems too close to the circle, undo using the **TOPO Scroll Bar** in the **UN-REDO** subcommand panel. Zoom-in on the wrap by right clicking and dragging a white box around the topology close to the circle.



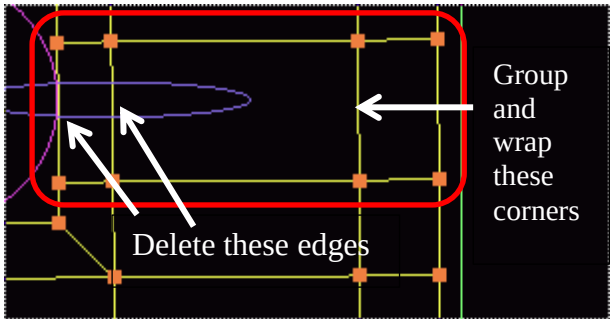
If you zoom-in too close you can un-zoom by going to the **UNREDO** sub-command panel and clicking on the unzoom button.



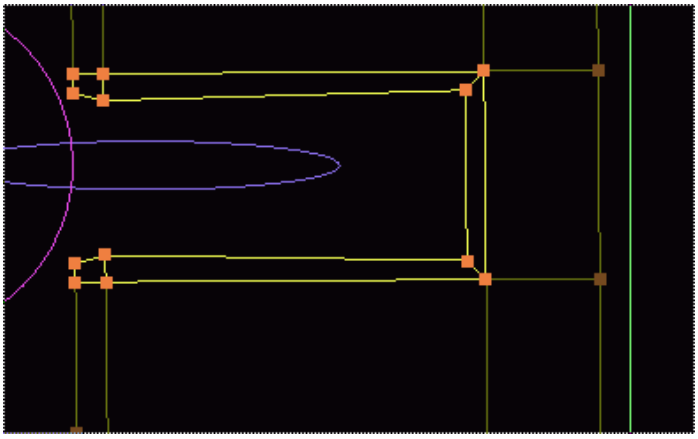
To the right of the un-zoom button is the scale, set the scale to a desired value as in the picture below.



Two unneeded edges appear on the ellipse close to the intersection of the two surfaces, delete these edges and group the corners surrounding the ellipse as shown in the picture below.



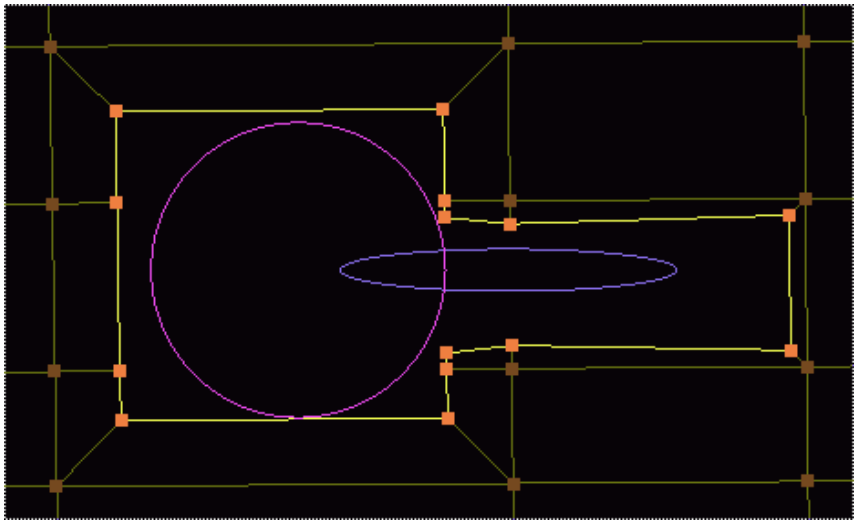
The wrap around the ellipse should look like the topology in the picture below,



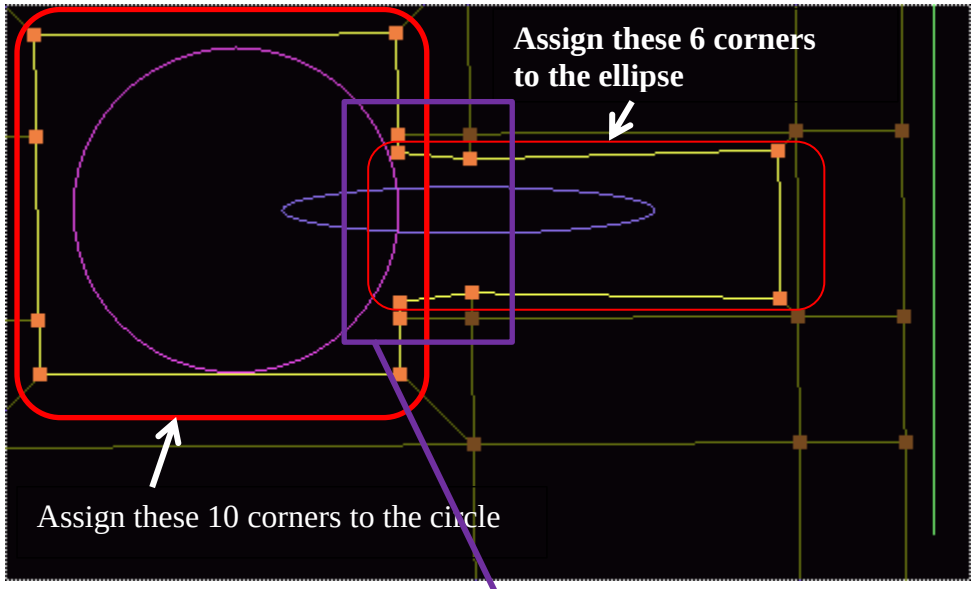
Now that the wrap is created, only the surface assignments remain.

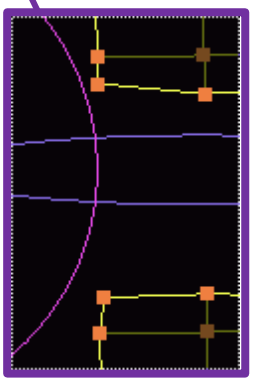
Step 2 Surface Assignments

Now that our wrap is complete, let's take a look at what we have.



Two basic wraps exist, one for the circle and the other for the ellipse. Our objective is to mesh both objects while maintaining a well-defined grid at the intersection. We will achieve our goals by a double surface assignment for the two corners at the wrap intersection as shown in the picture below,



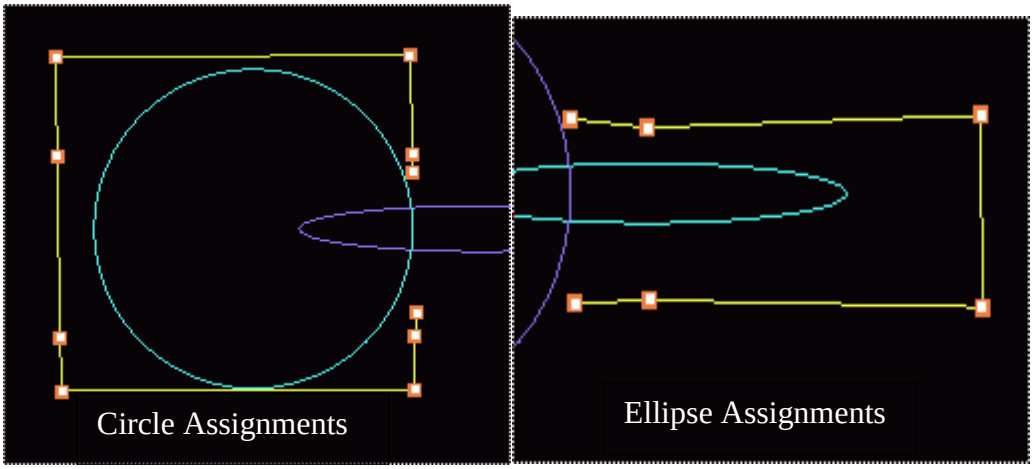


These two corners are double assigned

Double Assignments

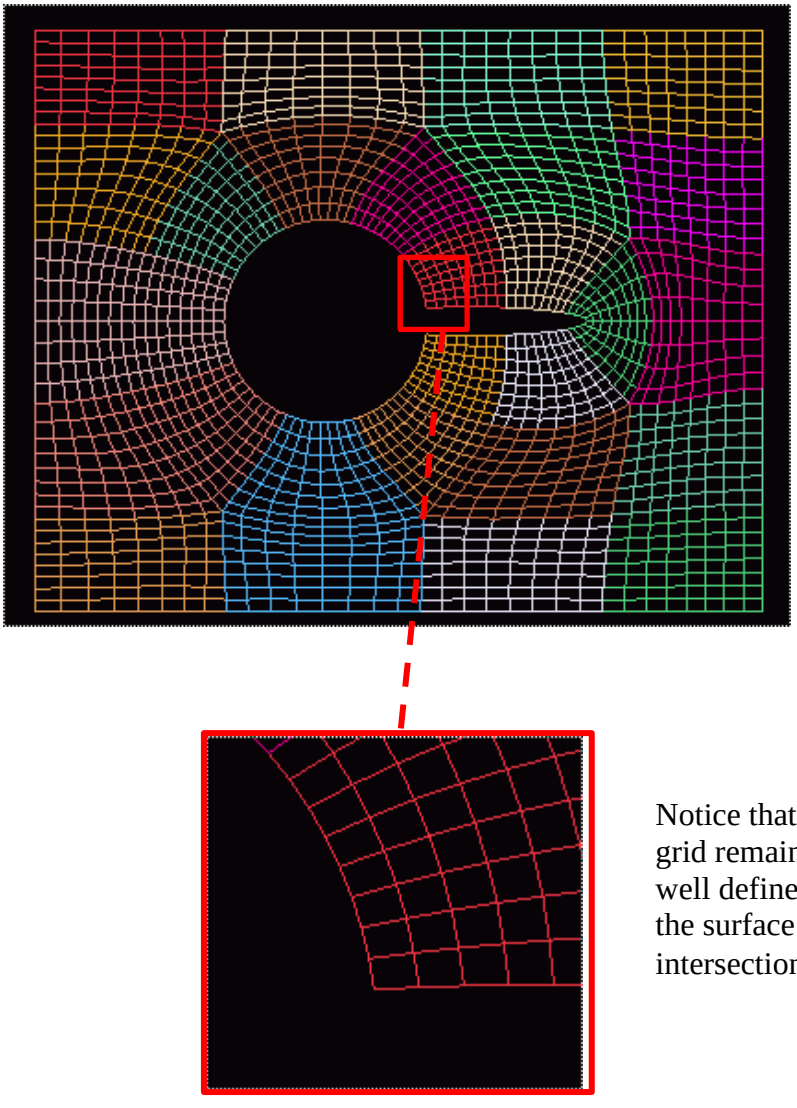
Anytime you need a sharp definition in your volume mesh at surface intersections, you must double assign topology corners.

Now let's take a look at our assignments by clicking on  in the **TOPO** sub-command panel and scrolling through the current surfaces in the **CURRENT** sub-command panel. The assigned surfaces on the circle and ellipse should look like the pictures below.



Step 3 Create the Grid

Now that we have assigned all surfaces, start the gridding process, load and view the results. The grid should look like the picture below



Notice that the grid remains well defined at the surface intersection