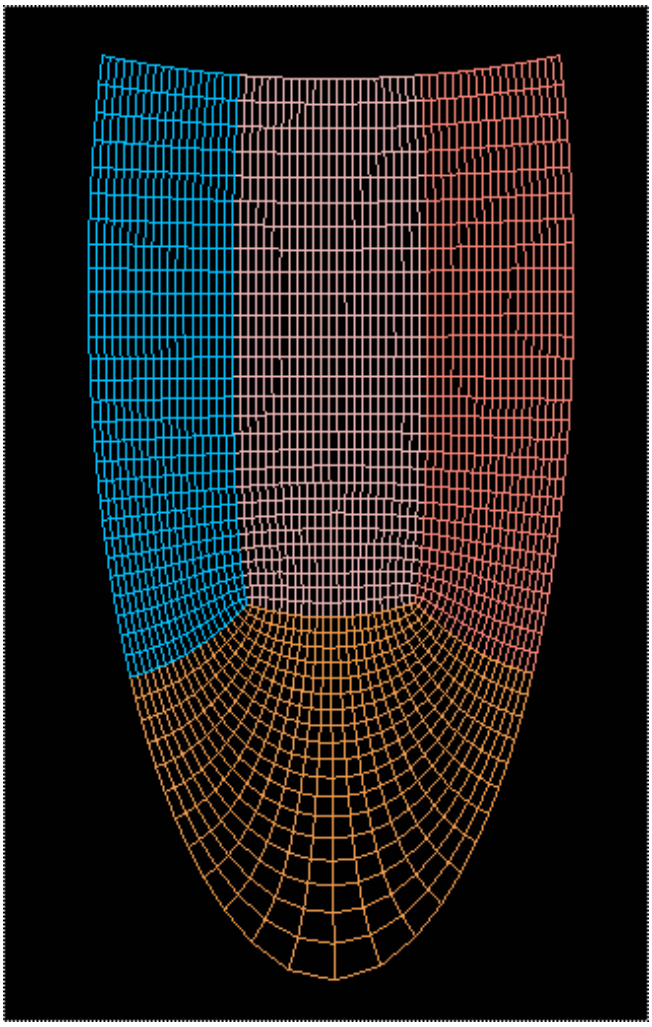
# Tutorial 3.1: Creating a Grid between two Intersecting surfaces

Creating an internal mesh on a surface intersecting another surface is important for design analysis. At times, only one part of the geometry will be analyzed while the other parts will not be meshed. In Tutorial **3.1** we will learn how to make an internal mesh on a 2D surface while the curvature of the intersecting surface will be used as a boundary. In Tutorial **3.2**, we will mesh a similar geometry in 3D and will introduce the function of the **Cut-Plane** which will be extremely useful in designing topology for complex shapes.

## What You Will Create

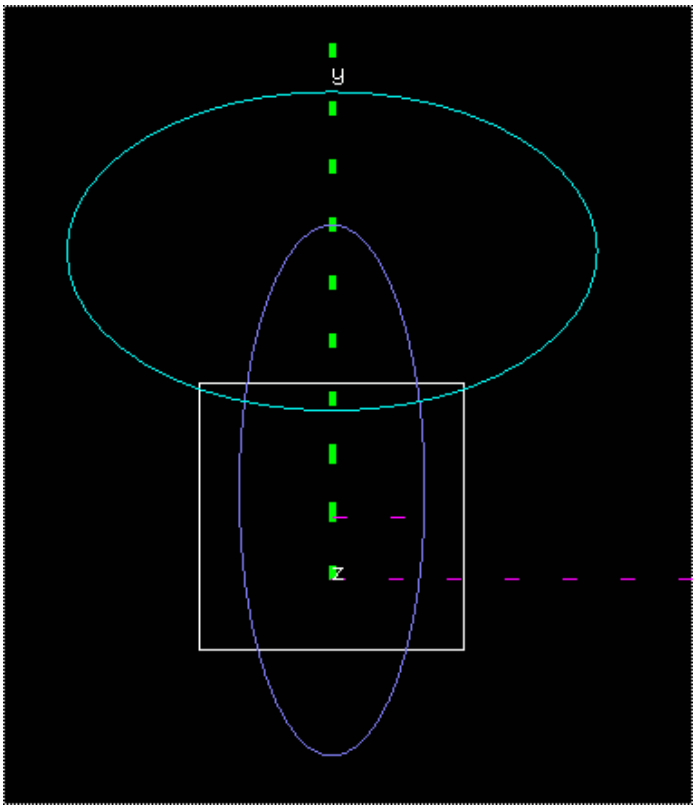


## What You Will Learn

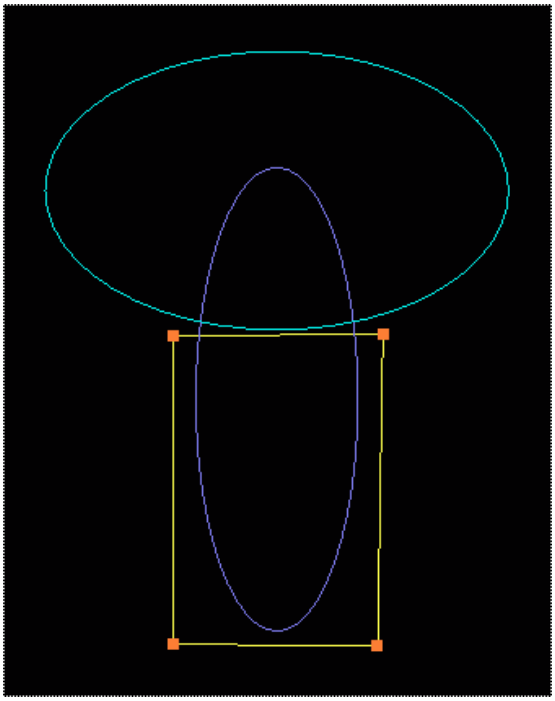
- How to remove edges on the topology to create a wrap for an intersecting surface.
- Changing the grid density interactively.
- Automatic grid reloading.
- Displaying surfaces in the Grid Viewer.

## Step 1 Making the Wrap

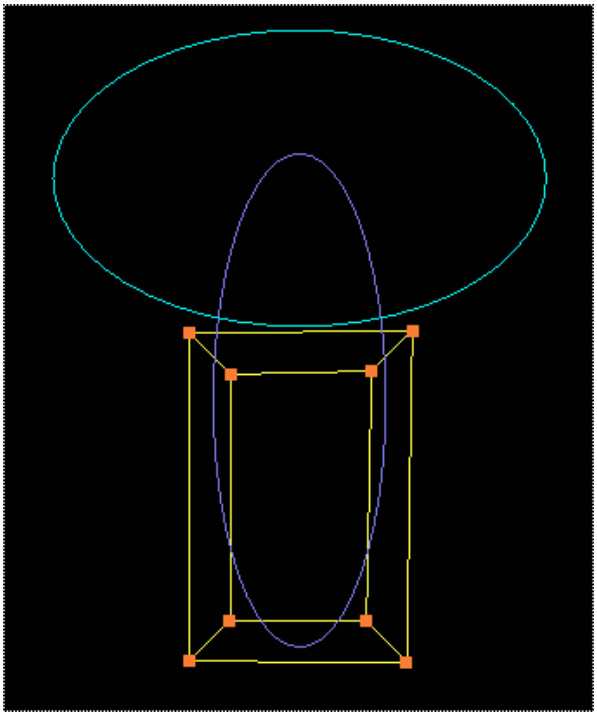
In **Tutorial 2**, double assignments were shown to be very important in creating a well-defined external mesh at the intersection of two surfaces. The same principle will be applied in **Tutorial 3**. Load the file into the **az manager** of **GridPro** and read the **TIL** file named **Tutorial_3.1** or double click directly on the file with the left mouse button. The geometry should appear on the 2D workplane as in the picture below.



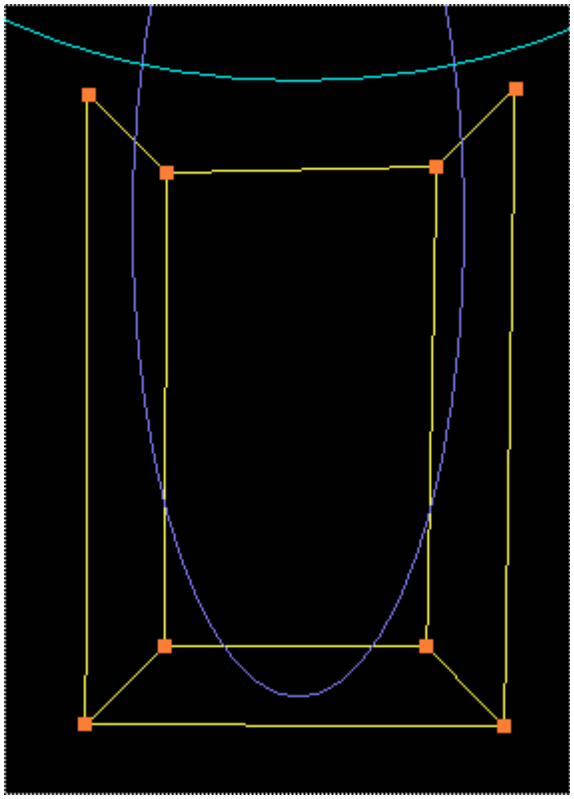
Turn off the **Axis** and **Cut-Plane** to reduce screen clutter. The objective is to mesh the stem of a 2D mushroom while using the head as an intersecting curve bounding the grid. Create simple rectangular topology around the stem.



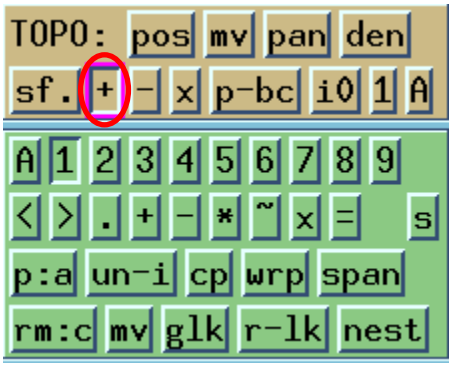
Add the topology to **Group 1** and wrap it 25% smaller as in the picture below.



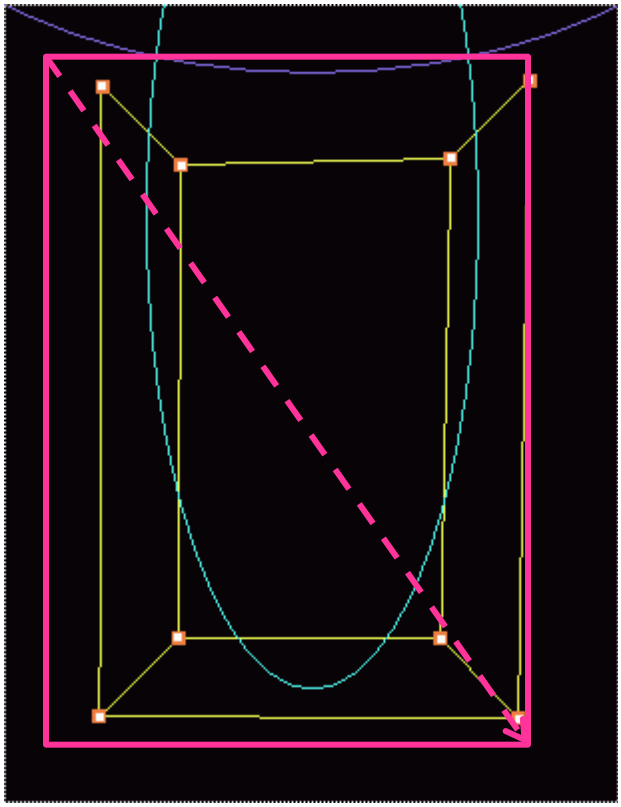
Only the stem will be meshed so remove the edge at the top of the topology.



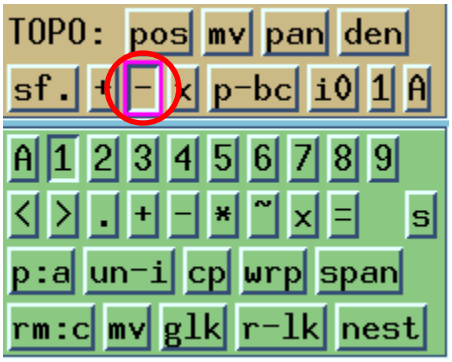
Since we want to create the area mesh within the stem, the outer topology will be assigned to the surface. The wrap will be unassigned to allow it to freely converge to equilibrium inside of the area. Make sure the **stem** is turned on as the **Current Surface** and is highlighted in light blue. Go to the **TOPO** sub-command panel and click on the  button in the surface selection panel.



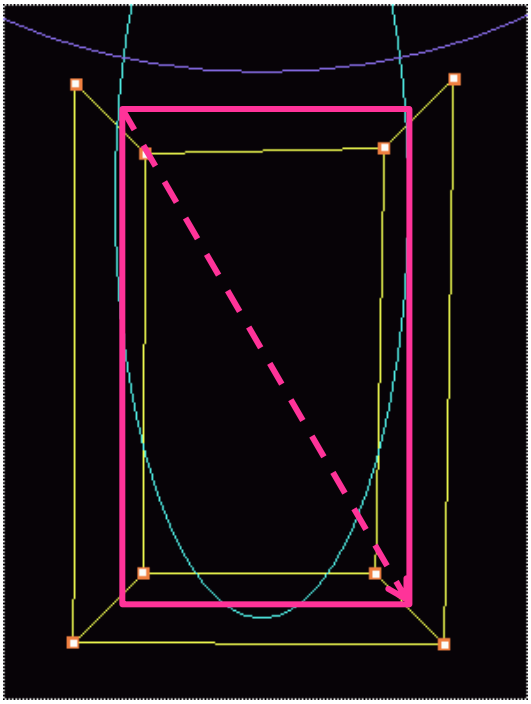
Hold down the right mouse button and drag a purple box around all of the topology.



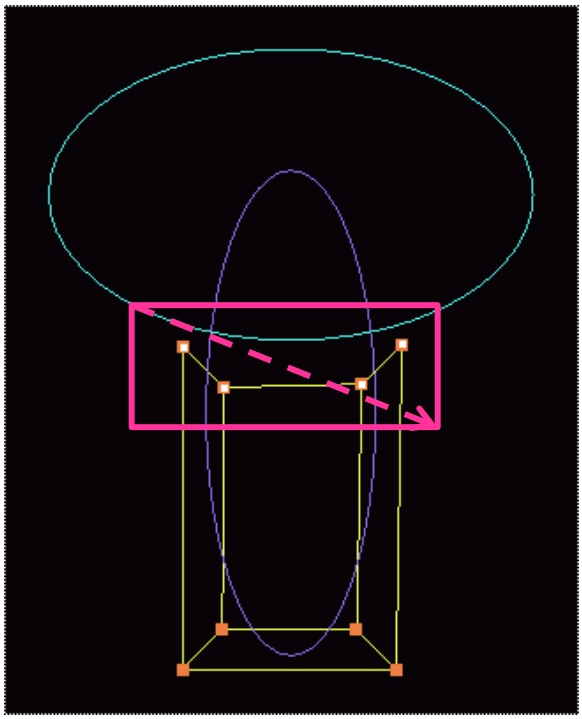
Since the inner corners of the wrap will not be assigned to the surface, delete them from the current surface by clicking on  in the **TOPO** sub-command panel,



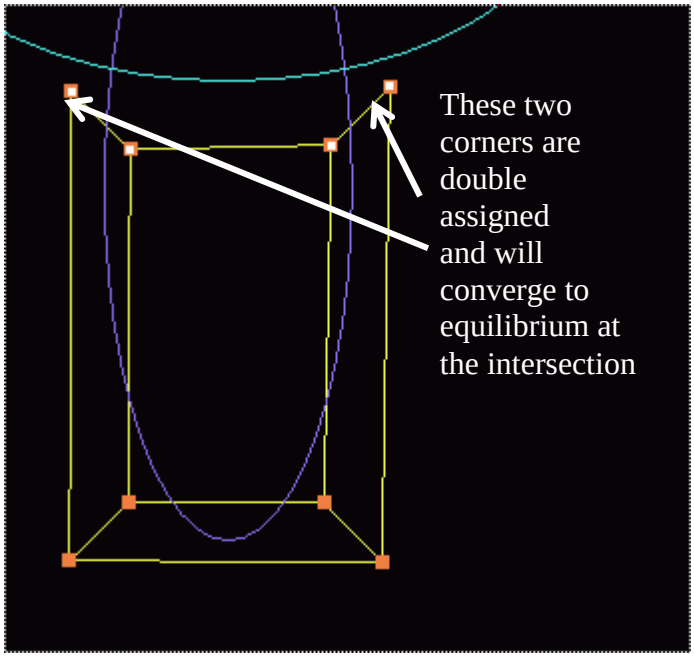

and dragging a purple box around the corners.



The white flags on the wrap will turn off. The upper part of the mesh should be bound to the curved intersecting surface. To ensure that the boundary of the mesh remains smooth and well defined, assign the topology at the top to the intersecting surface. Again make sure that it is the current surface and is highlighted in light blue.

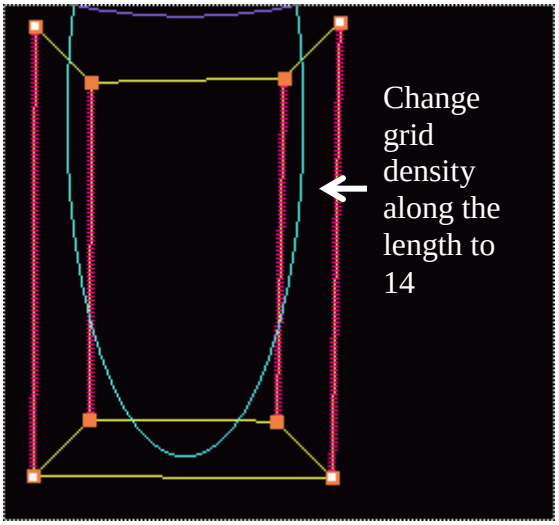


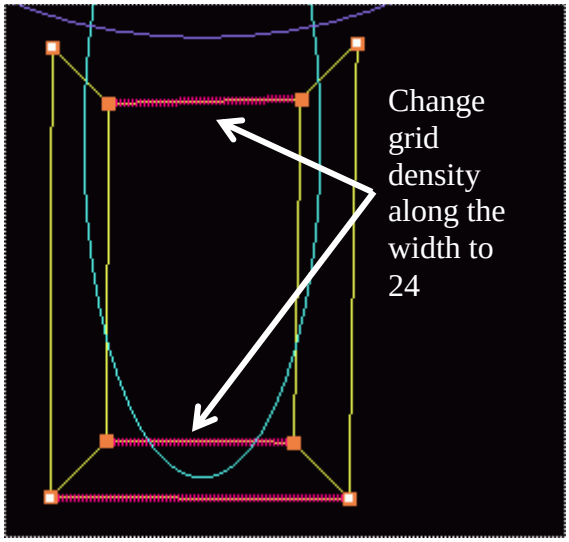
The upper most left and right corners of the topology are double assigned and will come to equilibrium at the intersection.

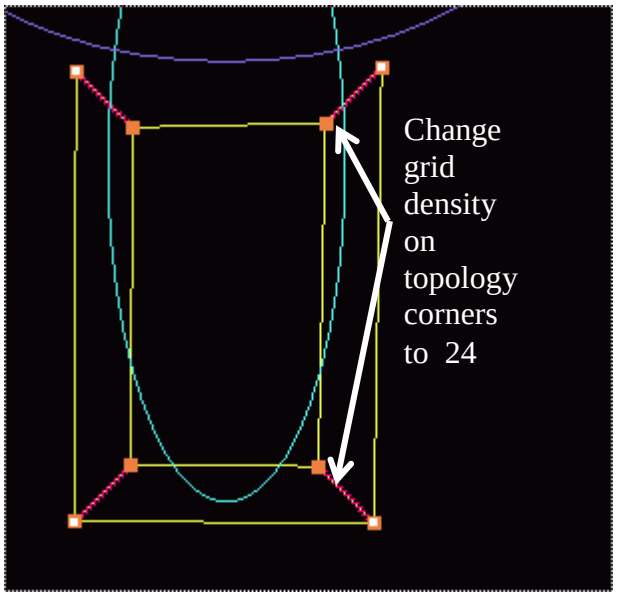



## Step 2 Grid Density

Change the grid density along the topology from the default value of 8 to the values shown below.



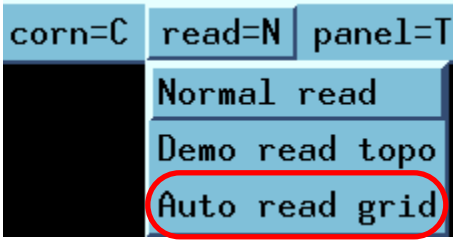



## Step 3 Introduction to Automatic Grid Loading

**GridPro** allows the user to automatically load the grid and change its density while it is converging to equilibrium. This interactive tool is useful in inspecting the grid quality and making necessary changes quickly. Start the grid generation and go to the **Grid Viewer** and **load new** by clicking on the **blk.tmp** file. Go to the 

sub-menu at the top and choose **Auto read grid**.




Every time **GridPro** dumps the grid data to the **blk.tmp** file, the program automatically loads it into the grid viewer. The process is like a movie, sequencing from frame to frame, as the grid converges to equilibrium. If you want to go back to reading normally, click on **Normal Read** in the **read** sub-menu. To see the grid in relation to its surfaces, go to the **SHOW** sub-command panel and click on as 

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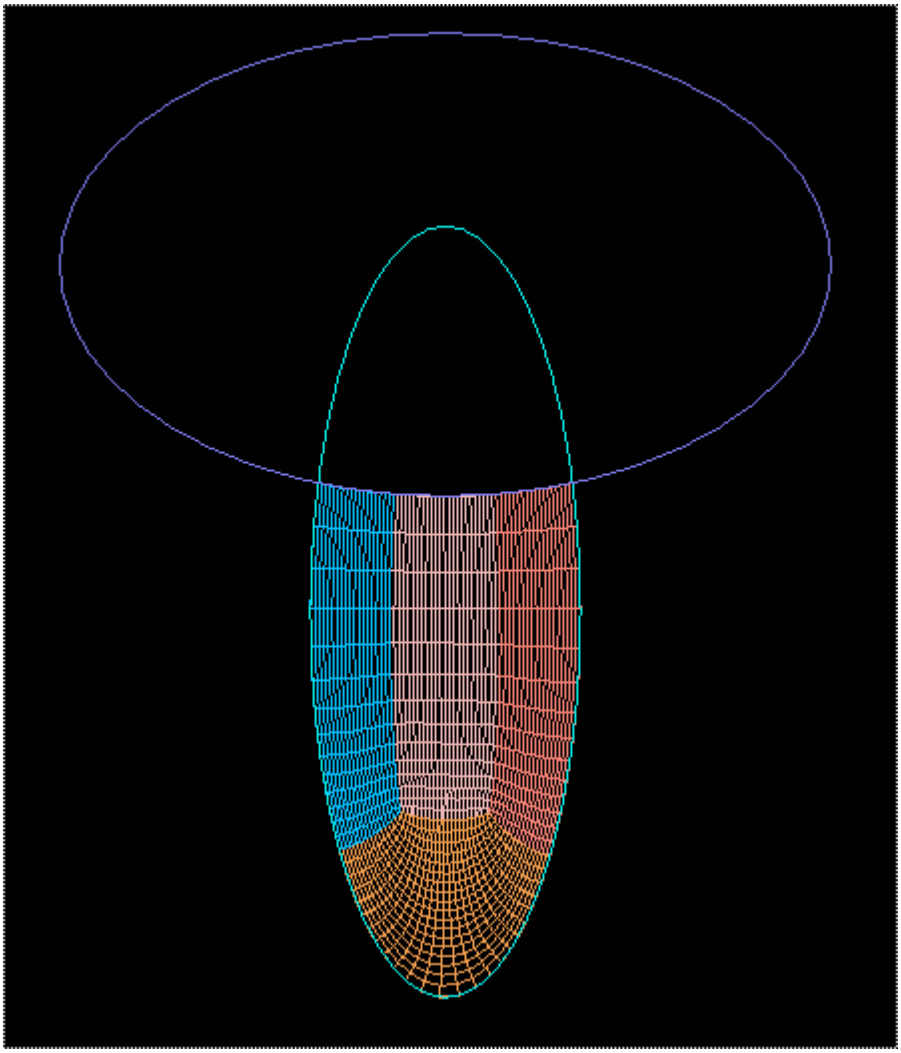
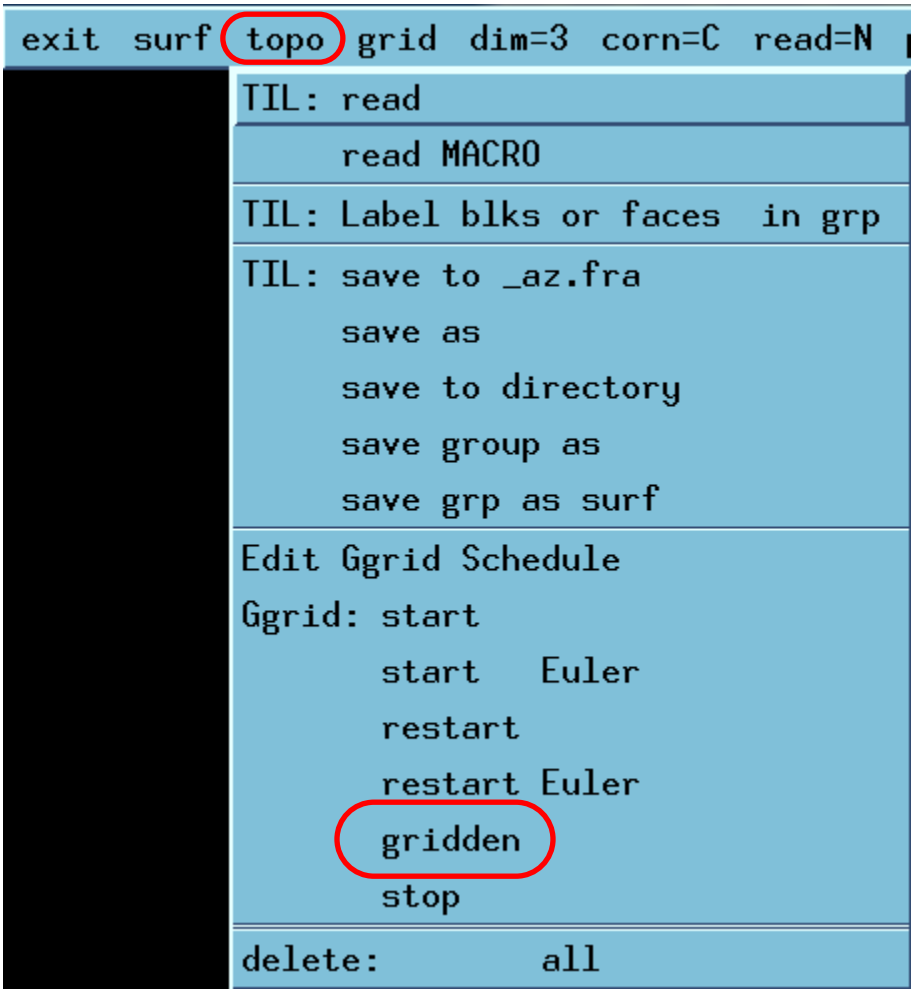


As can be seen from the above picture, the mesh along the length is course. This problem can be corrected interactively by going back to the **Topology Builder** and increasing the density along the length. Change the density to 28 and select **gridden** from the **topo** pull-down menu.




Now, go back to the **Grid Viewer** and notice the change in density as the grid is automatically reloaded.