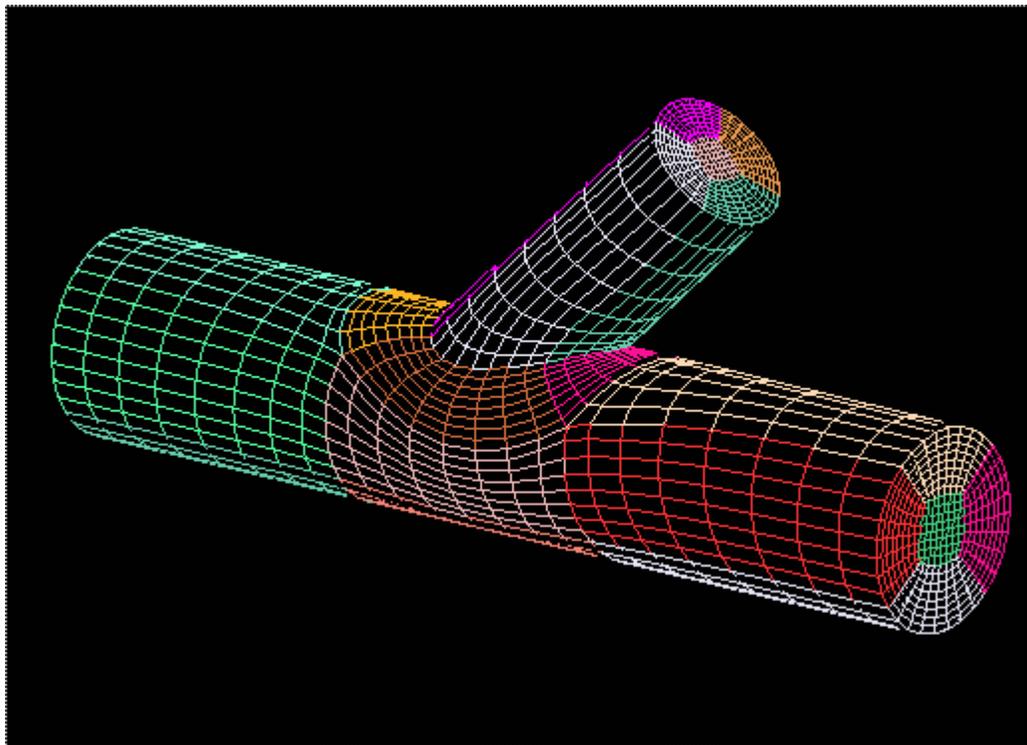


Tutorial 5: T-Joint

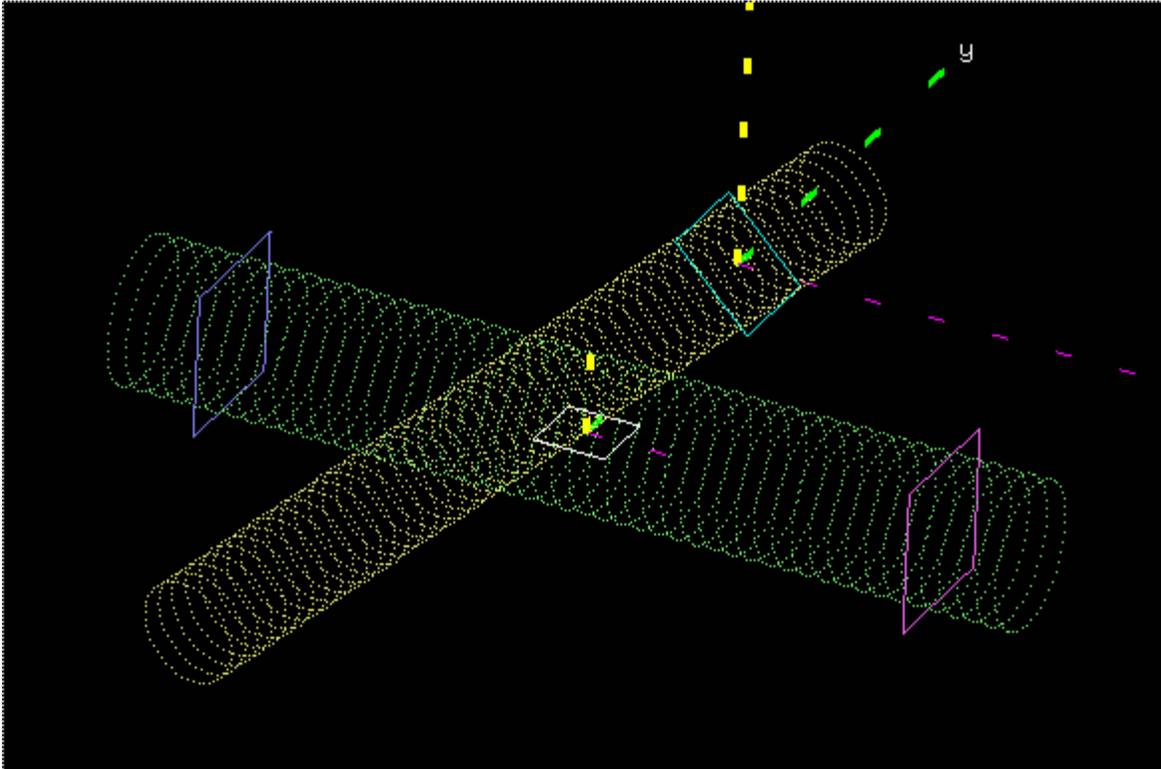
In this tutorial we will apply the lessons learned in **Tutorial 4** to grid a T-Joint. T-Joints have many applications including medical, heating and ventilation, and the aerospace and automobile industries. We will focus on how to make a grid on the intersection of the two tubes.

**What
You
Will
Create**



Step 1 Creating the Internal Surface

Open the **Tutorial_5.fra** file and rotate the geometry to an isometric view.



The tubes should have coordinates and magnitude of:

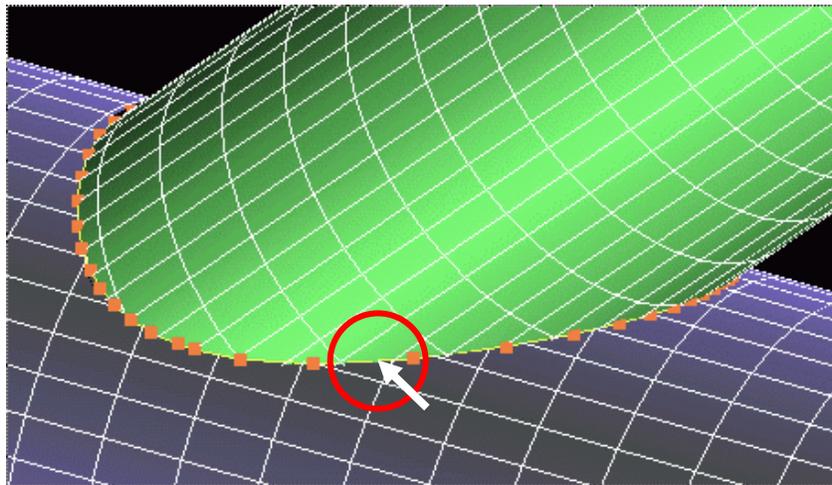
Tube at 45 degree Angle

center :	<input type="text" value="-2 0 0"/>
semi-u :	<input type="text" value="1 0 -1 1.4"/>
semi-v :	<input type="text" value="0 1 0 1.5"/>
semi-w :	<input type="text" value="1 0 1 1e+015"/>
power :	<input type="text" value="2"/>
scale :	<input type="text" value="25"/>

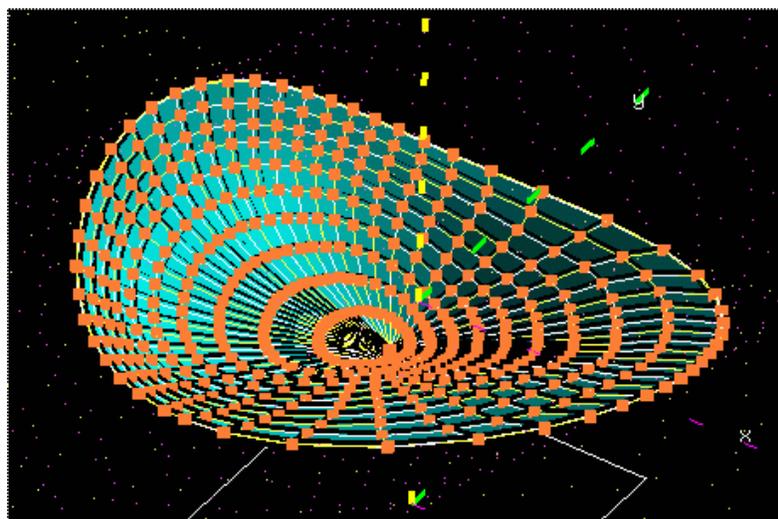
Straight Tube

center :	<input type="text" value="0 0 0"/>
semi-u :	<input type="text" value="0 1 0 2"/>
semi-v :	<input type="text" value="0 0 1 2"/>
semi-w :	<input type="text" value="1 0 0 1e+015"/>
power :	<input type="text" value="2"/>
scale :	<input type="text" value="25"/>

The planes surrounding the tubes should have these coordinates: center of 4,0,6 and normal/magnitude of -1, 0, -1, 1.5; center of -10, 0,0 and normal magnitude of 1,0,0,2; center of 10,0,0 and normal/magnitude of -1,0,0,2. If you want to verify these settings go to the **surf** sub-menu at the top and **reload current**. **Zoom-in** on the intersection, **shade with HLR** and go to the **TOPO** sub-command menu and left click on **i0** the button. Click on a point close to the intersection of the two surfaces as we did in **Tutorial_4.2**.



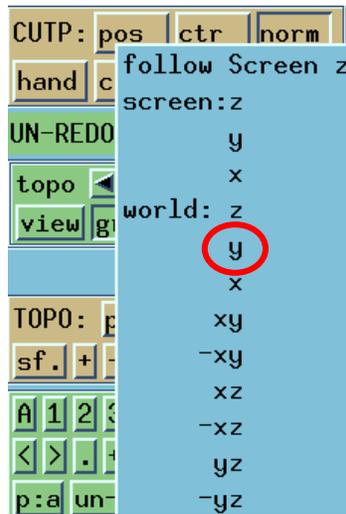
Go back to the **TOPO** sub-command menu and click on the **1** and choose **--** from the sub-menu. Group the topology and save it as a surface by going to the **topo** sub-menu and choosing **save grp as surf**. Import it as a **2-sided surface with auto matching** and display it as we did in **Tutorial_4.2**.



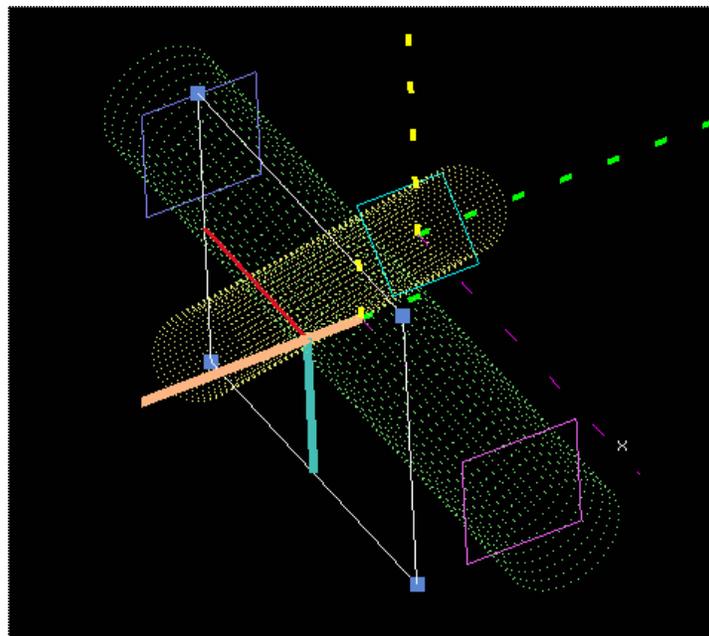
Remove the topology and redisplayed the geometry as points.

Step 2 Creating the Topology

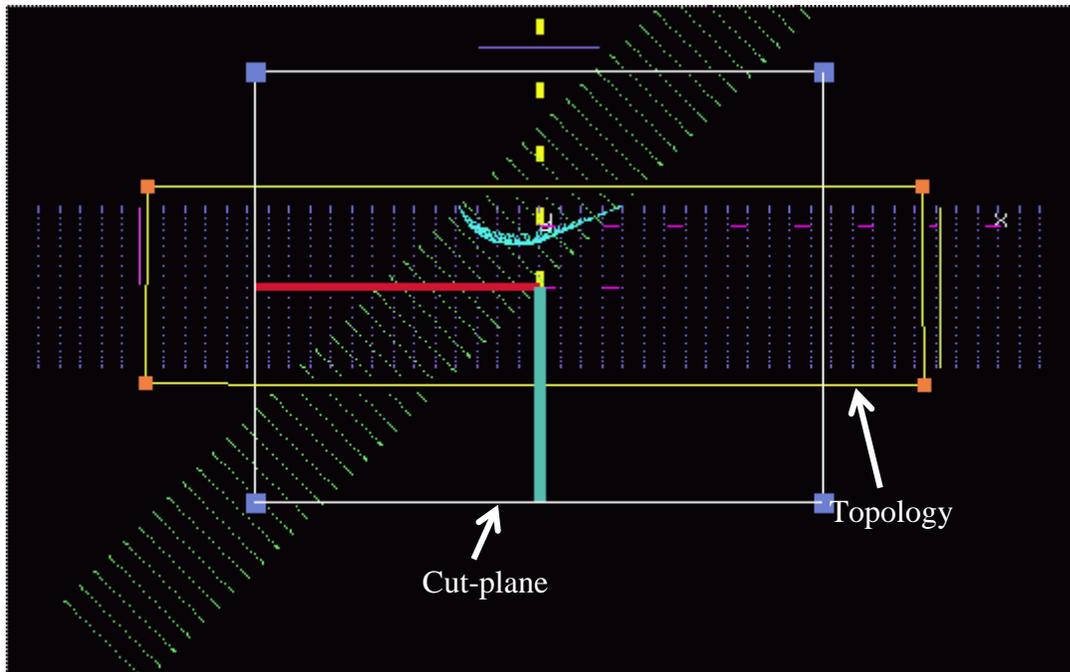
Now that the internal surface is created, let's start making the topology. Position the **Cut-Plane** perpendicular to the **global (world) y-axis** by clicking on  in the **CUT-P** sub-command panel and selecting **world:y**.



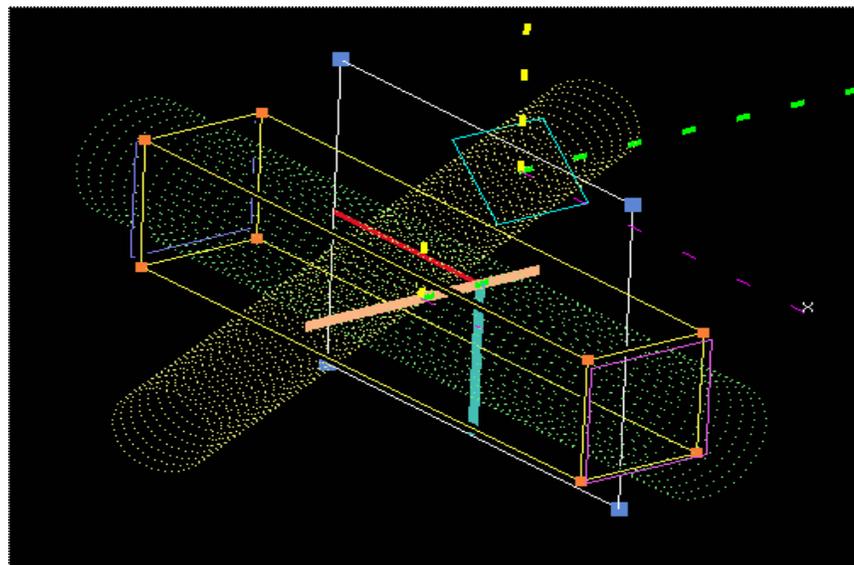
Drag the plane along the **Cut-Plane z-axis** (colored in light brown) toward the front of the geometry as in the picture below.



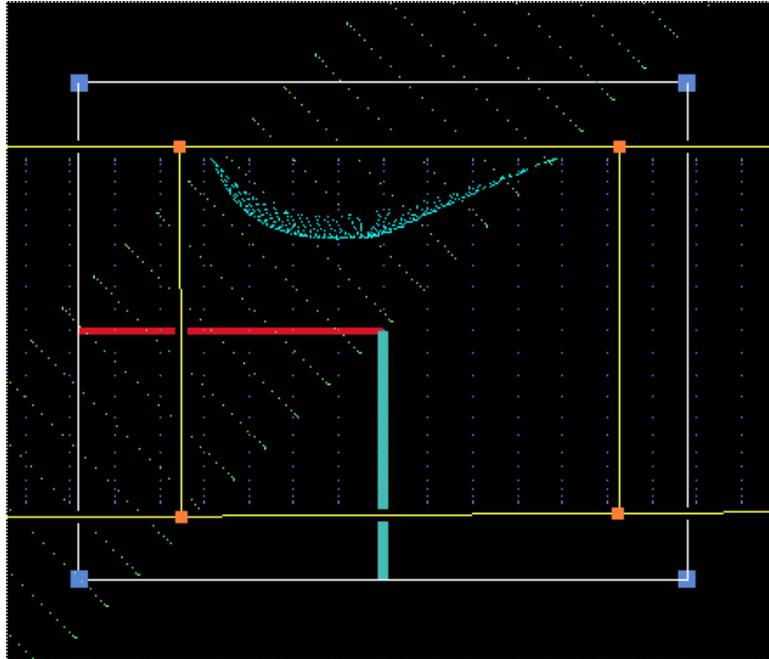
Now snap the grid along the **global XZ plane** and begin making the topology around the straight tube.



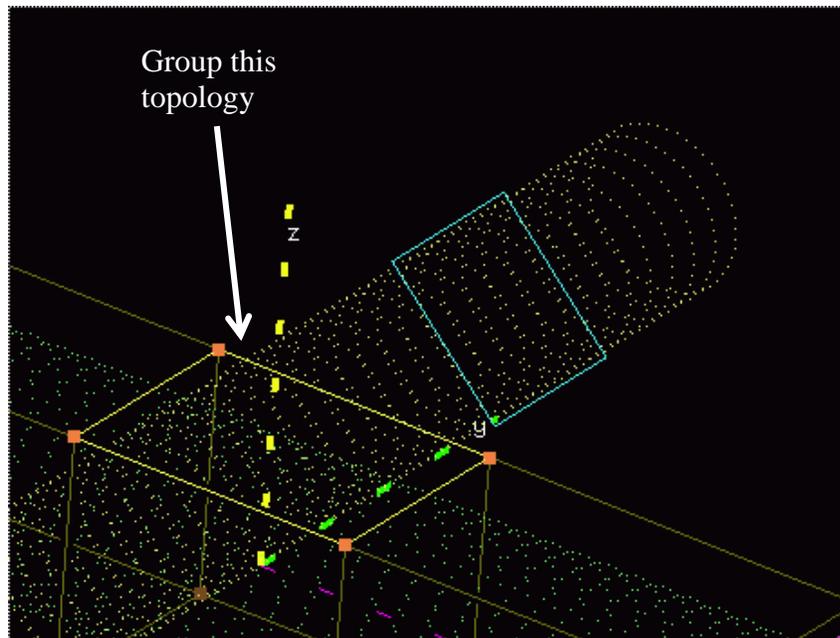
Move the **Cut-Plane** to the opposite side, add the topology to a group and copy using drop back edges as in the picture below. **Note:** If the copy creates distorted topology go to the **CUT-P** sub-command panel to fix the **Cut-Plane** to the center of the grouped topology, and drag again.



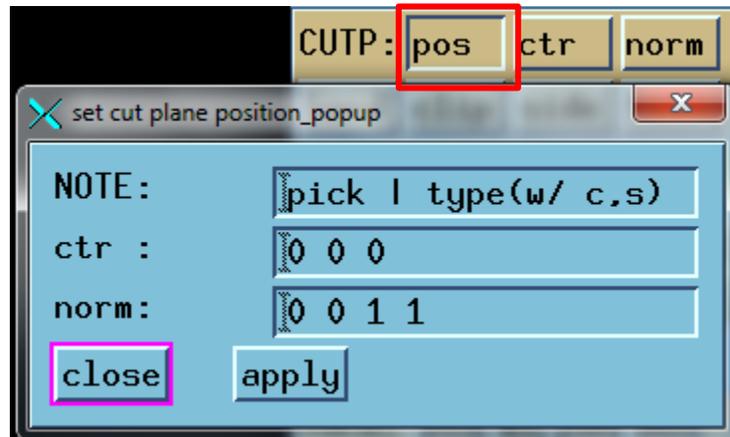
Snap the grid back to the **XZ plane** and insert the inner topology around the tube that is at a 45 degree angle.



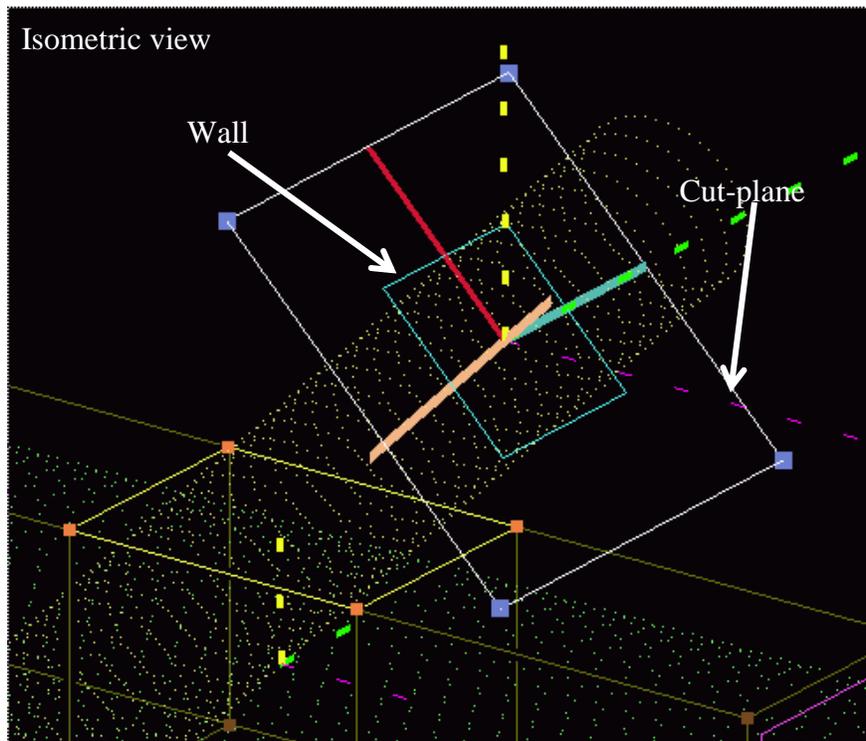
Now we need to make the 3D topology that will wrap around the 45 degree angle tube. We will accomplish this procedure by grouping the topology loop surrounding the tube and copying it to the cut plane using **Pancaking**. Position the geometry in an isometric view and group the topology loop around the tube as in the below picture.



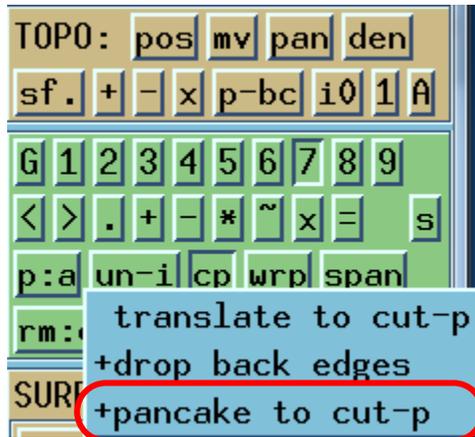
Now snap the **Cut-Plane** to the 45 degree angle wall by going to the **CUT-P** sub-command panel and clicking on the **pos** button. When the **set cut plane** pop-up menu appears place the cursor over the 45 degree angle wall, left click with the left mouse button and then click **apply** in the pop-up menu.



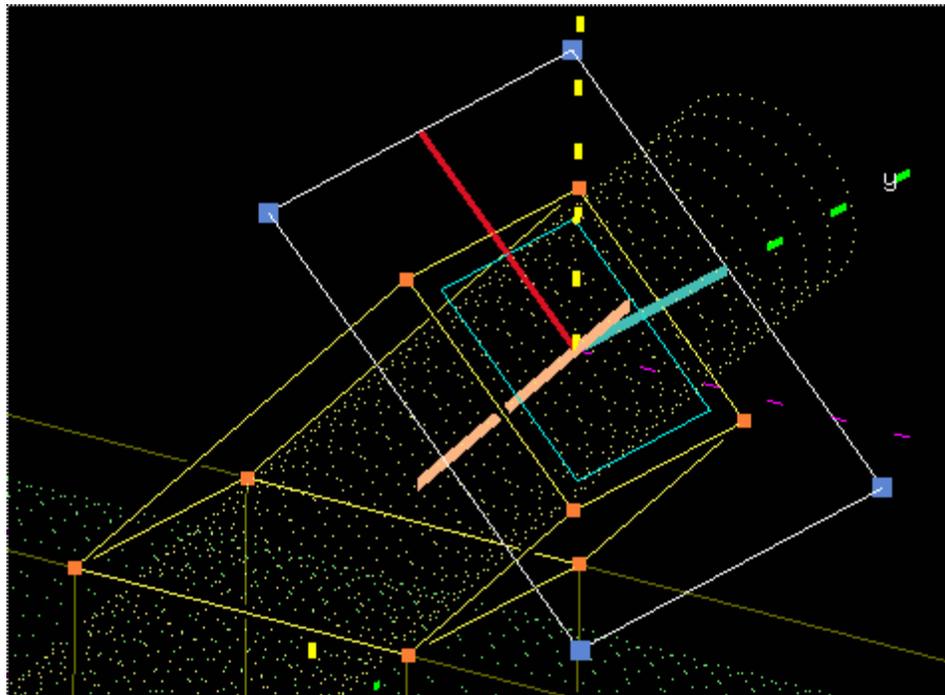
The **Cut-Plane** will be snapped normal and in the center of the wall as in the picture below.



When the plane is in position, go to the **TOPO** sub-command panel and click on **cp** and choose **pancake to cut-plane**.

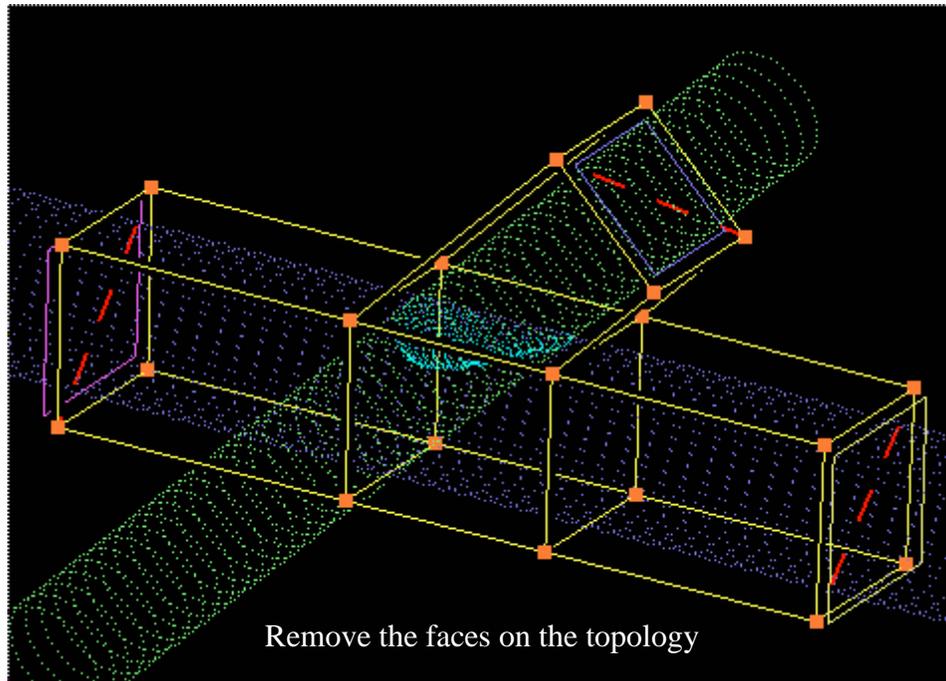


The topology will be copied to the Cut-Plane as in the picture below.

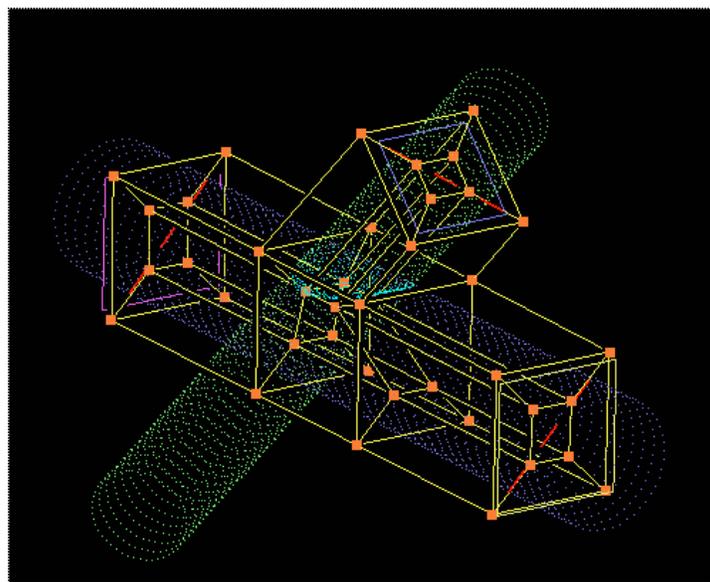


Step 3 Creating the Wrap

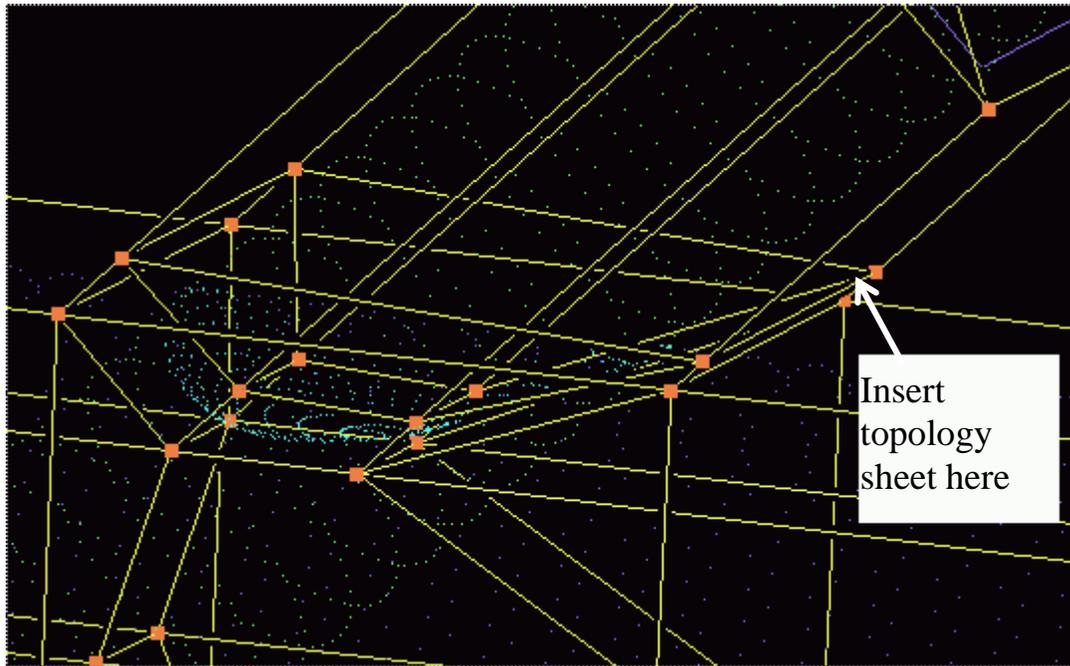
Place all of the topology into one group and turn off the **Cut-Plane** and **Axis**. Since we want to confine the mesh to the walls, remove the 3 faces on the topology parallel to the walls. We will later assign the topology to the walls so that a sharp, well defined mesh is created.



Now wrap the topology 10% smaller.

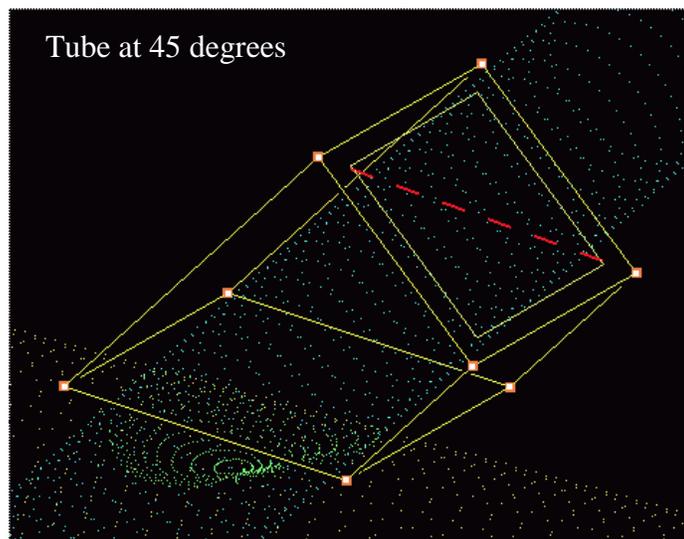


To complete the topology we need to add a sheet as a buffer to move the singularity away from the internal surface as we did in Tutorial_4.2. The placement of this sheet is very important. Make sure it is close to the intersecting surface.

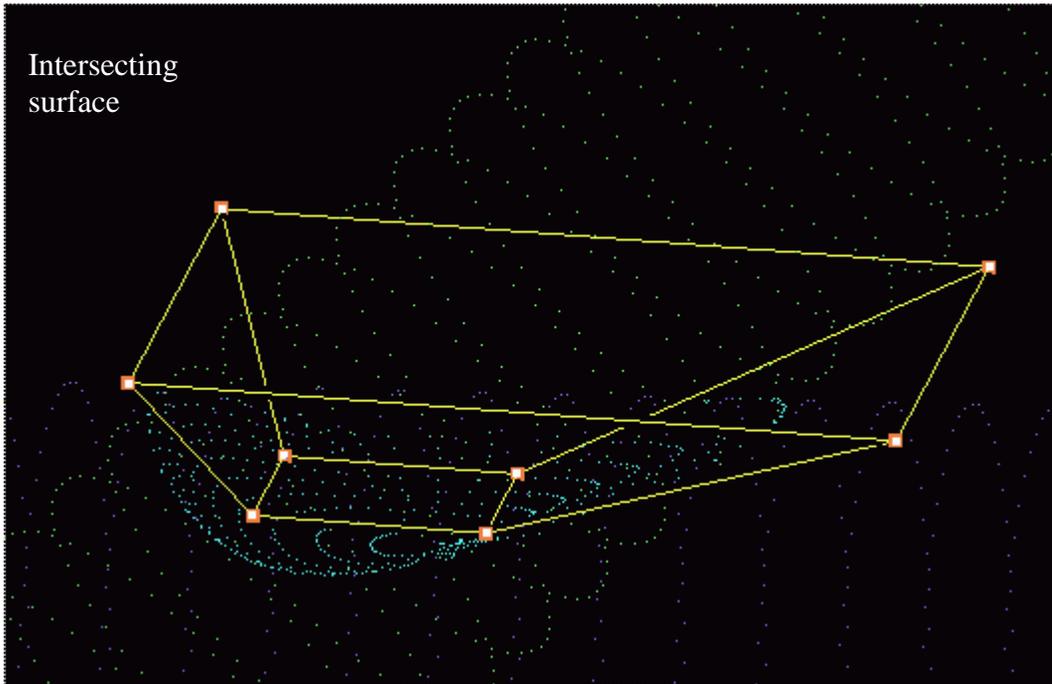


Step 4 Surface Assignments

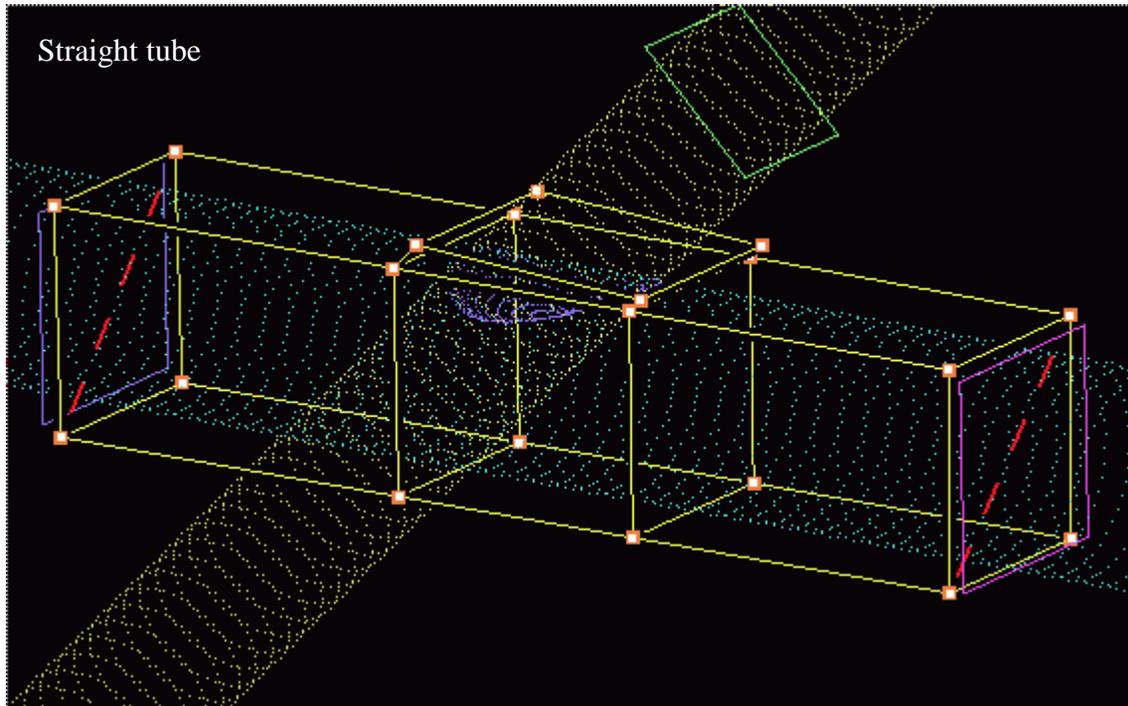
Assign the topology to the surfaces as in the pictures below.

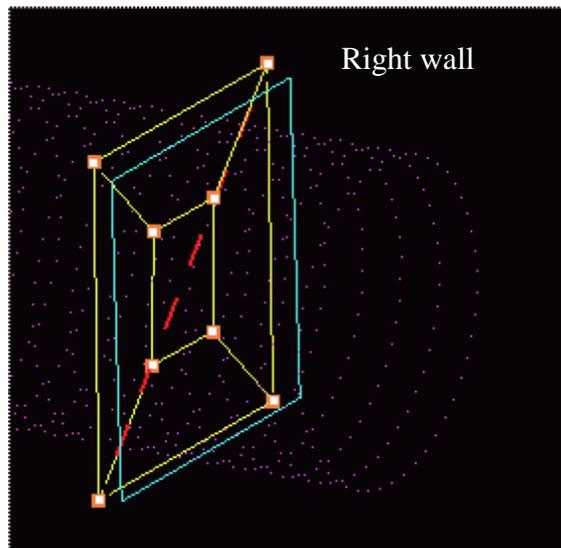
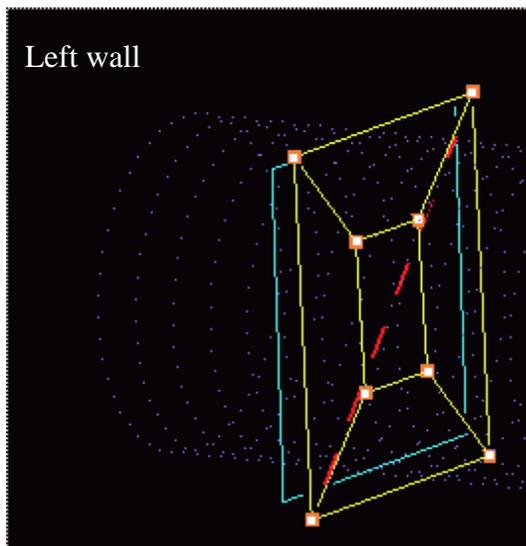
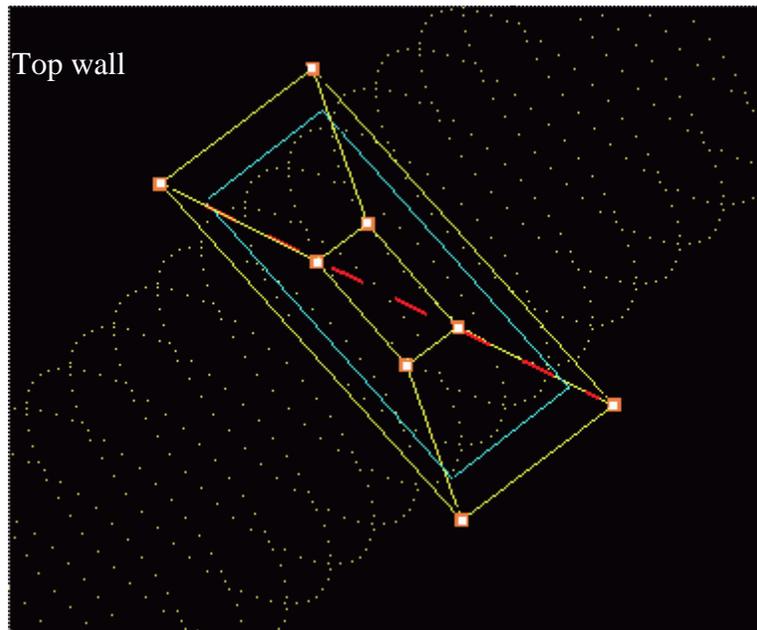


Intersecting
surface



Straight tube





Step 5 Creating the Grid

Assign a grid density of 16 along each block length of the tube. Start the gridding process and load the mesh into the grid viewer. Trim away some of the blocks so you can see inside.

