

Radiation Between Surfaces - Geometry

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Problem Specification

1. Pre-Analysis & Start-Up

2. Geometry

3. Mesh

4. Physics Setup

5. Numerical Solution

6. Numerical Results

7. Verification & Validation

Exercises

Comments

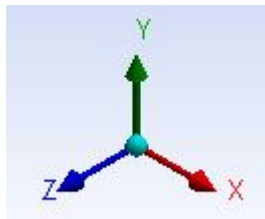
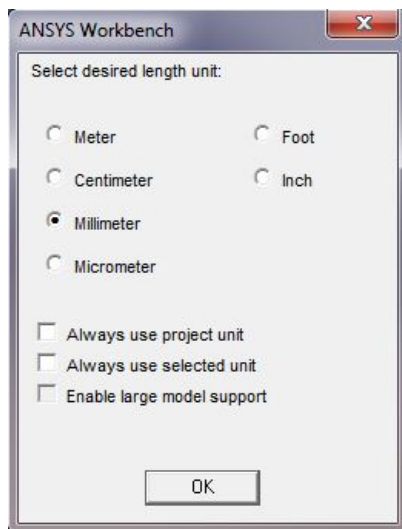
Create the shell

Sketch the shell

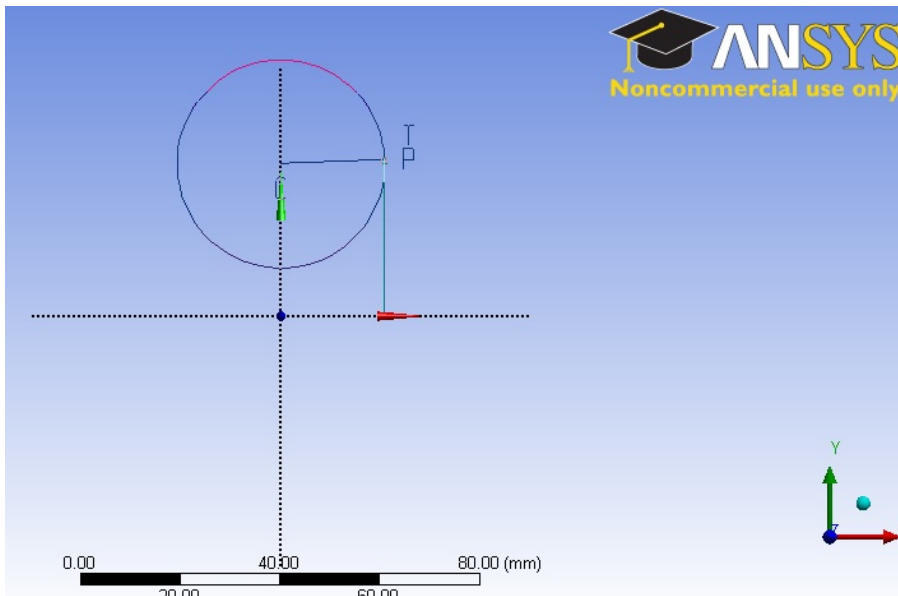


For users of ANSYS 15.0, please check [this link](#) for procedures for turning on the Auto Constraint feature before creating sketches in DesignModeler.

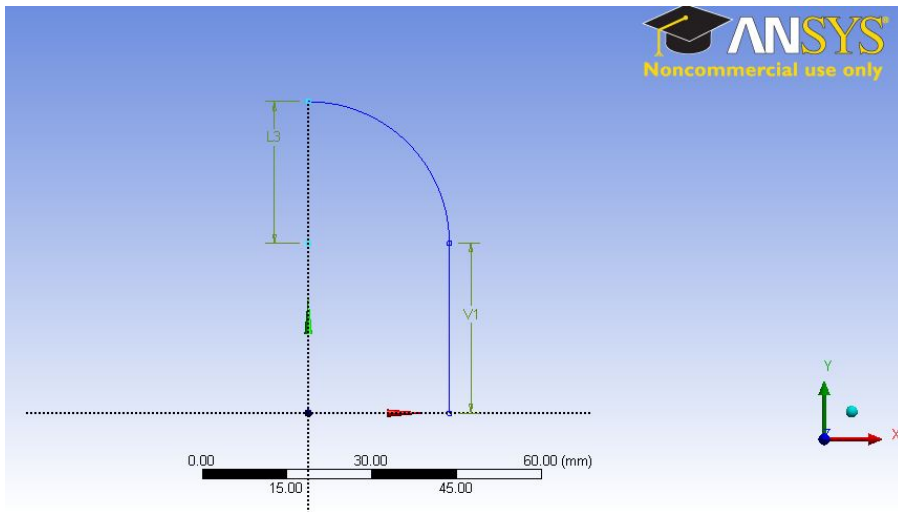
In **Project Schematic**, double click on **Geometry** to open the Design Modeler. When prompted, select **Millimeter** as the unit.



Click on the **XY Plane** and the **z axis** to begin sketching. Use the **Line** sketching tool to create a vertical line starting from the **x axis**. Hover the cursor around the axis until you see a symbol **C** to begin your sketch. The symbol C means the line is coincident with the x axis. Next, use the **Arc by Center** to create the dome of the shell. Hover the cursor near the **y axis** until you see the symbol C. Single click on the y axis and click again on the tip of the line you have just created. You should see a symbol **P** when you click on the vertex, which means coincident. Finally, click on the **y axis** again to finish the arc.

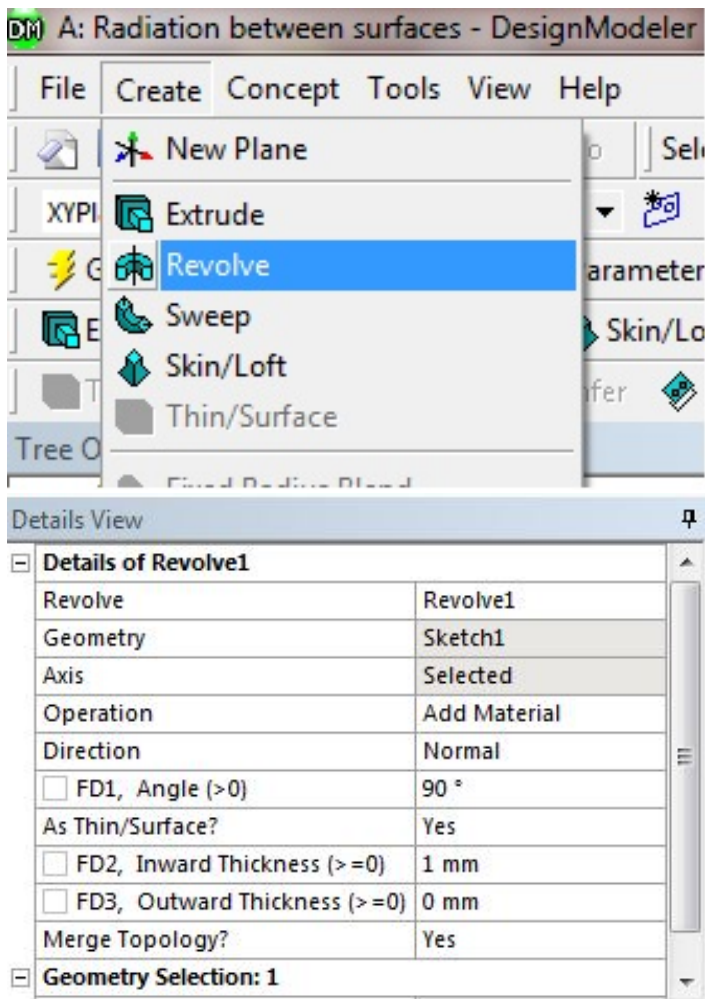


Use the **General** dimension tool to create dimensions for the line and the radius of the arc. The length of the line is **30 mm** and the radius of the arc is **25 mm**. Your sketch should look like this:

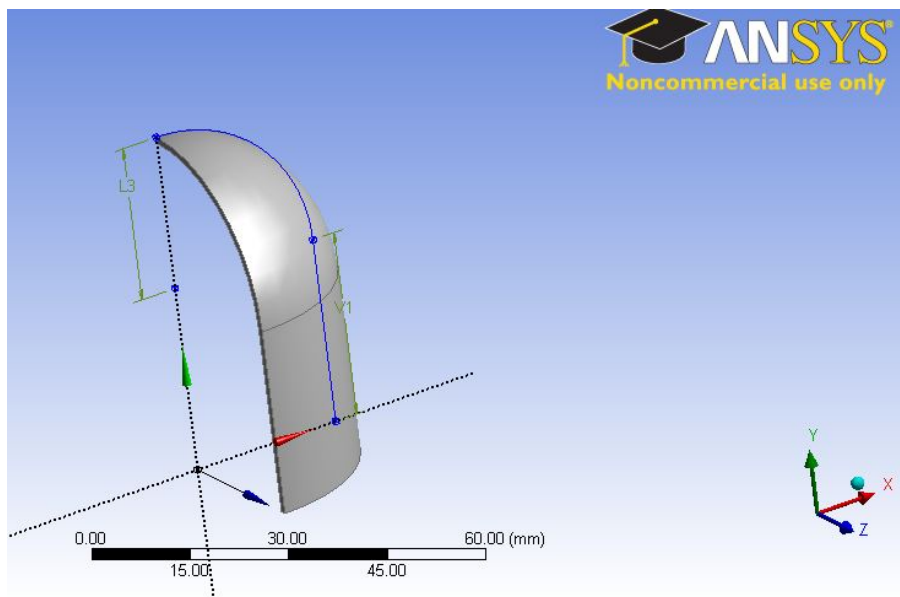


Model the shell

Click on **Create** from the top menu bar and select **Revolve**. The Revolve tool should automatically select your shell sketch for its geometry. If not, highlight the cell next to geometry and select **Sketch1** under the **XYPlane** tree. Select the **Y axis** for **Axis**. This will allow the sketch to revolve around the y axis to create a shell. Change the **Angle** from **360** to **90** degrees. Highlight **As Thin/Surface?** and change the option from **No** to **yes**. Keep the **Inward Thickness** to **1 mm**. Click on **Generate**.



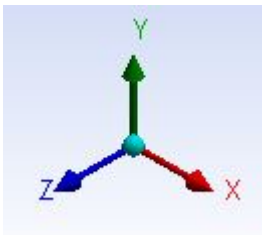
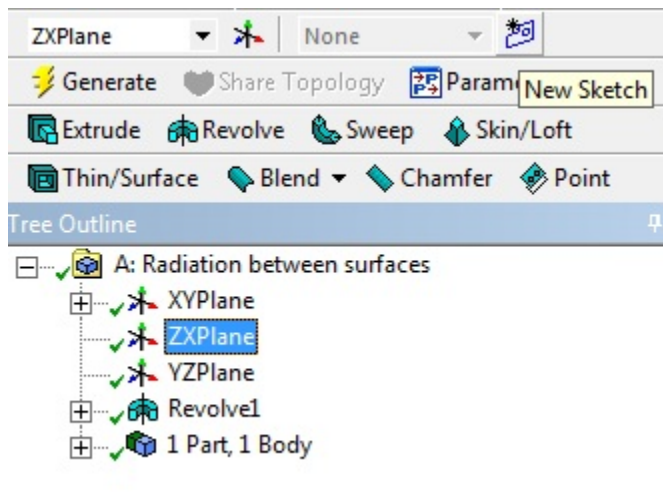
The 1/8 shell model



Create the Specimen

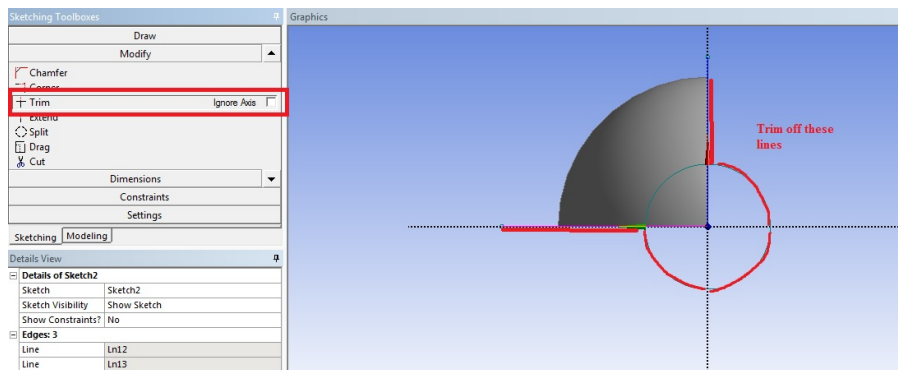
Sketch the specimen

We will create the specimen from the ZX plane. Highlight **ZXPlane** in the Tree Outline and click on **New Sketch** :

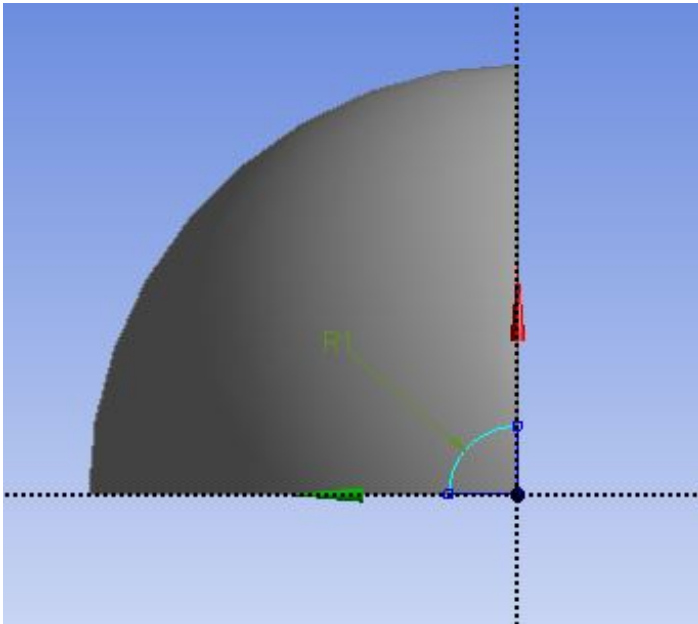


Click on the **Y axis** to view the ZX plane.

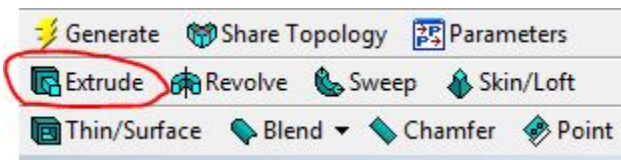
From the Sketching tab, use the **Circle** tool to draw a circle centered at the origin. Again, Make sure your cursor displays a **P** near the origin before you begin sketching. Next, use the **Line** tool to draw two lines along the **X and Z** axis. We only need to create a quarter of the full sketch to create the 1/8 model. Select the **Trim** tool and click on any sketch outside the quarter circle enclosed by the lines and the full circle. Use the **Radius** dimension tool to set the radius of the quarter circle to **4 mm**.



The size of the specimen compared to the shell:

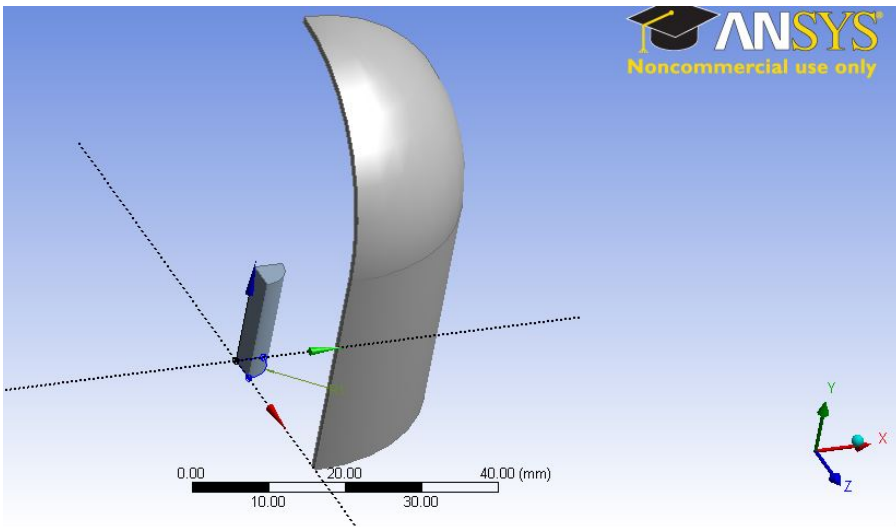


Click on the **Extrude** icon and select the quarter circle for the geometry. In the Details of Extrude1 window, set the **Depth** to **15 mm**.



Details View		⌵
[-] Details of Extrude1		
Extrude	Extrude1	
Geometry	Sketch2	
Operation	Add Material	
Direction Vector	None (Normal)	
Direction	Normal	
Extent Type	Fixed	
☐ FD1, Depth (>0)	15 mm	
As Thin/Surface?	No	
Merge Topology?	Yes	
[-] Geometry Selection: 1		
Sketch	Sketch2	

Once everything is specified as above, click **Generate**. You should see **2 Parts, 2 Bodies** in the Tree Outline. Your model should look like the following:



You may now close the Design Modeler and move on to the next step.

[Go to Step 3: Mesh](#)

[Go to all ANSYS Learning Modules](#)