VM 250 Computational Lab Sessions
Lab #6

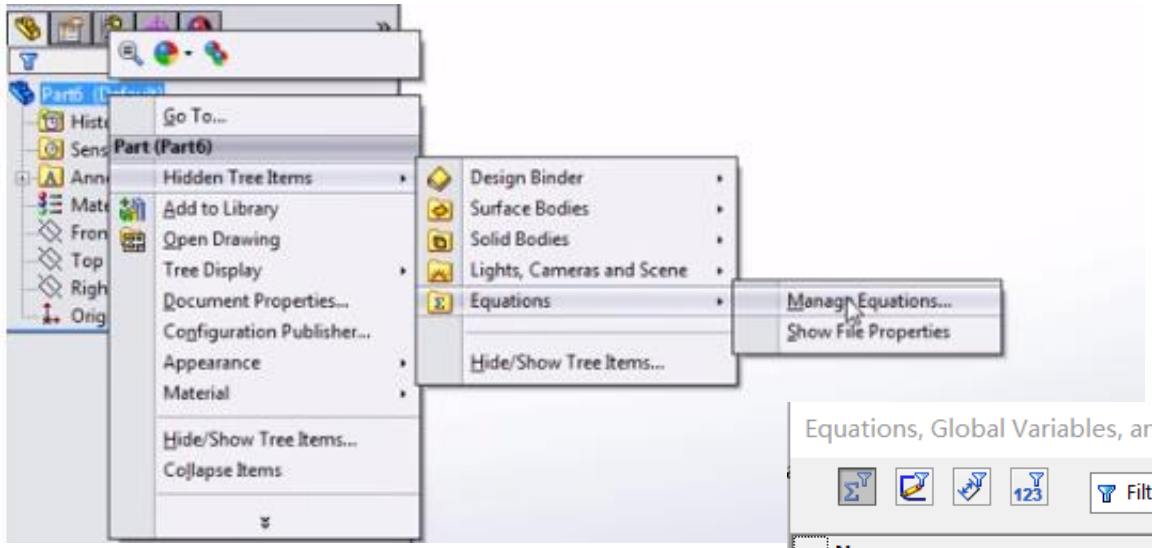
Spur and Helical Gears

Prepared by TA Group

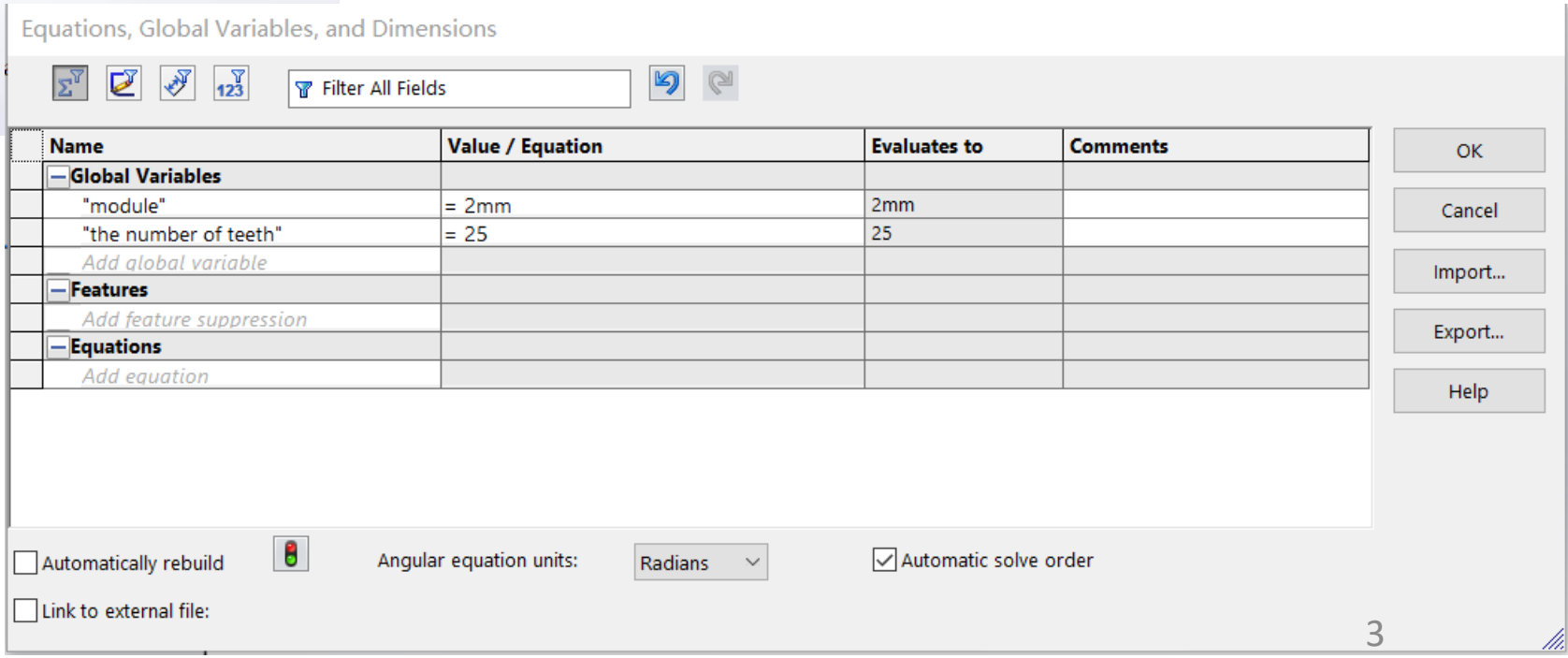
Spur gears

Preparation

- Global variables

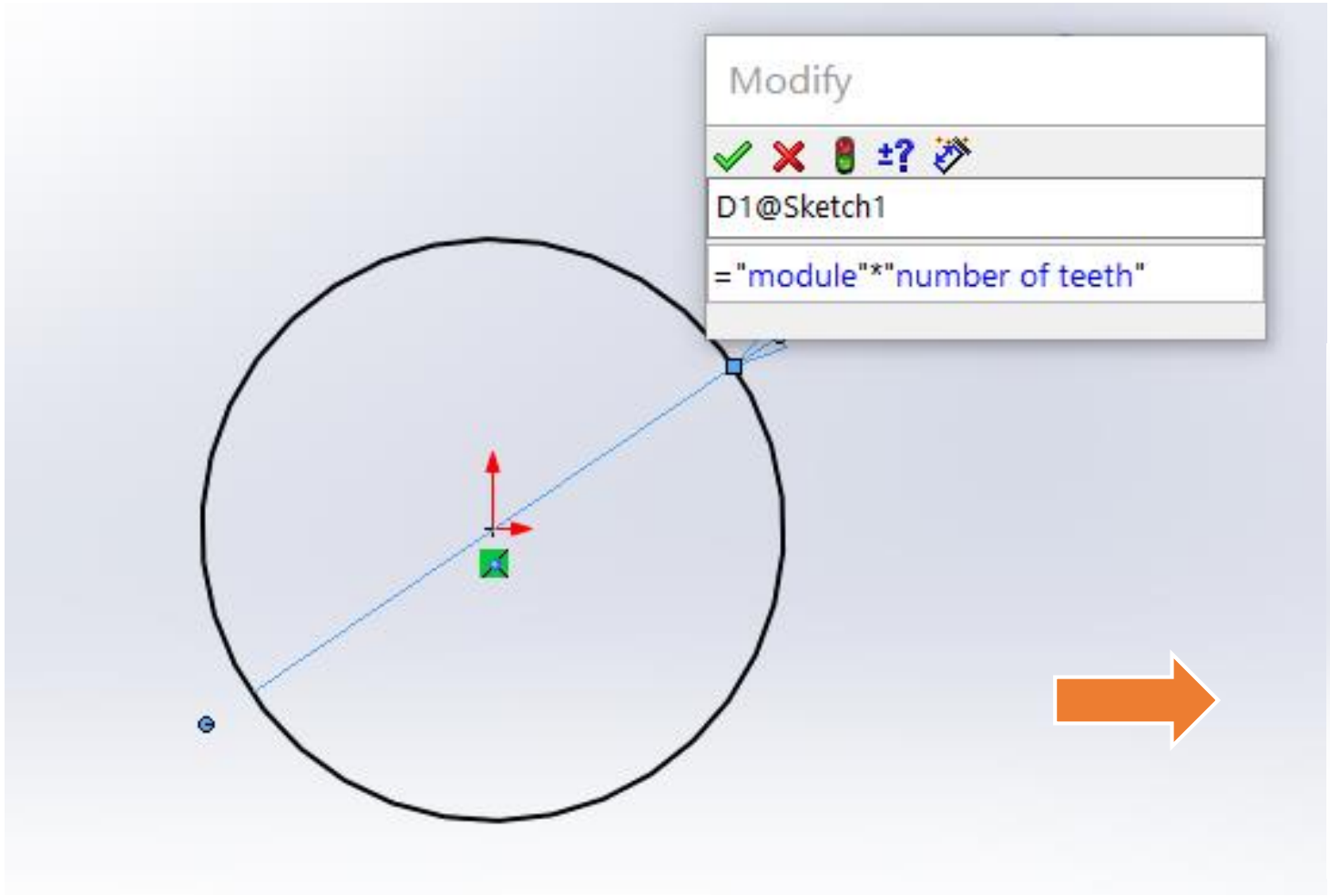


The procedures of managing global variables

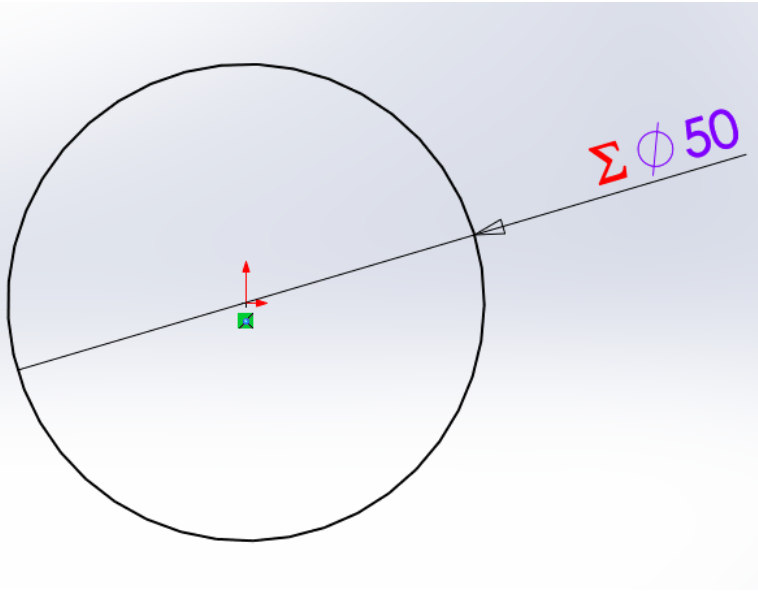


Sketch a circle

- Enter a pitch diameter by formulated Global variables



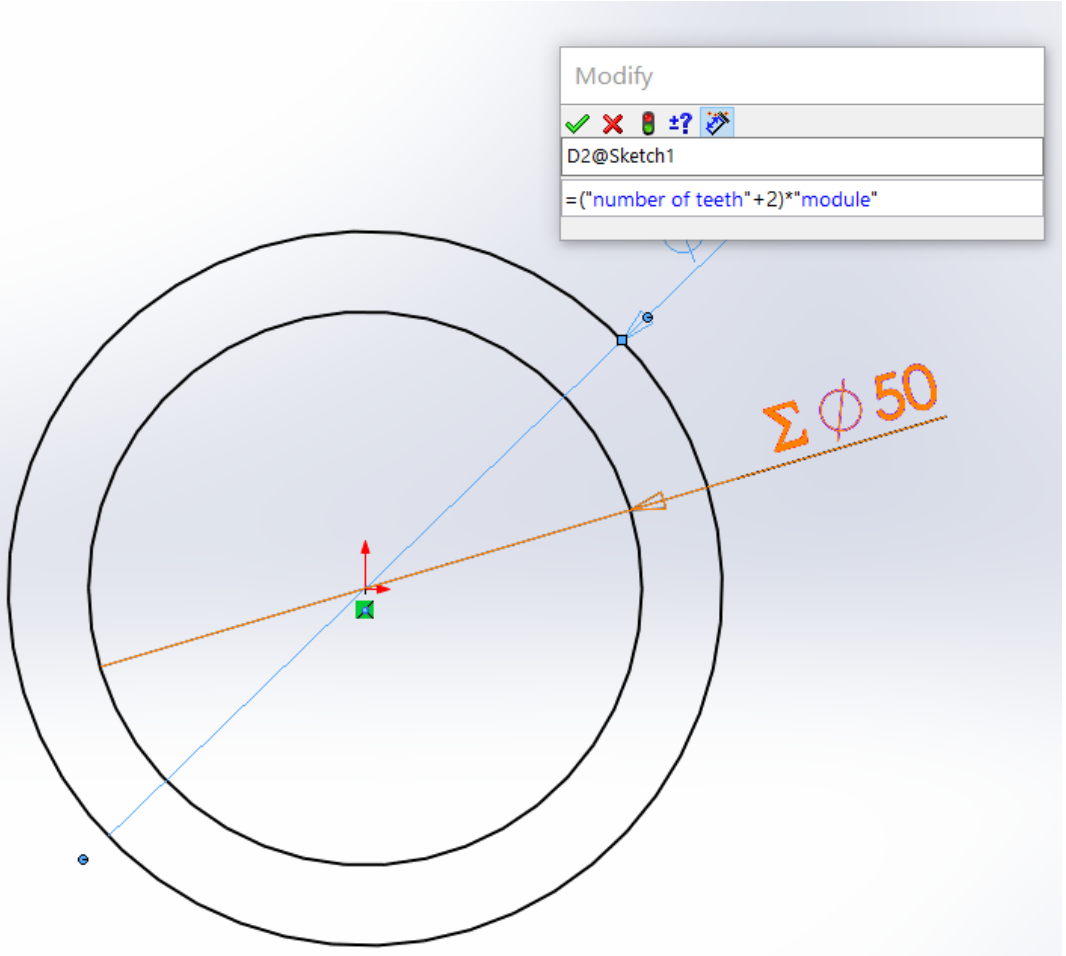
Enter this equation on the smart dimension for this circle



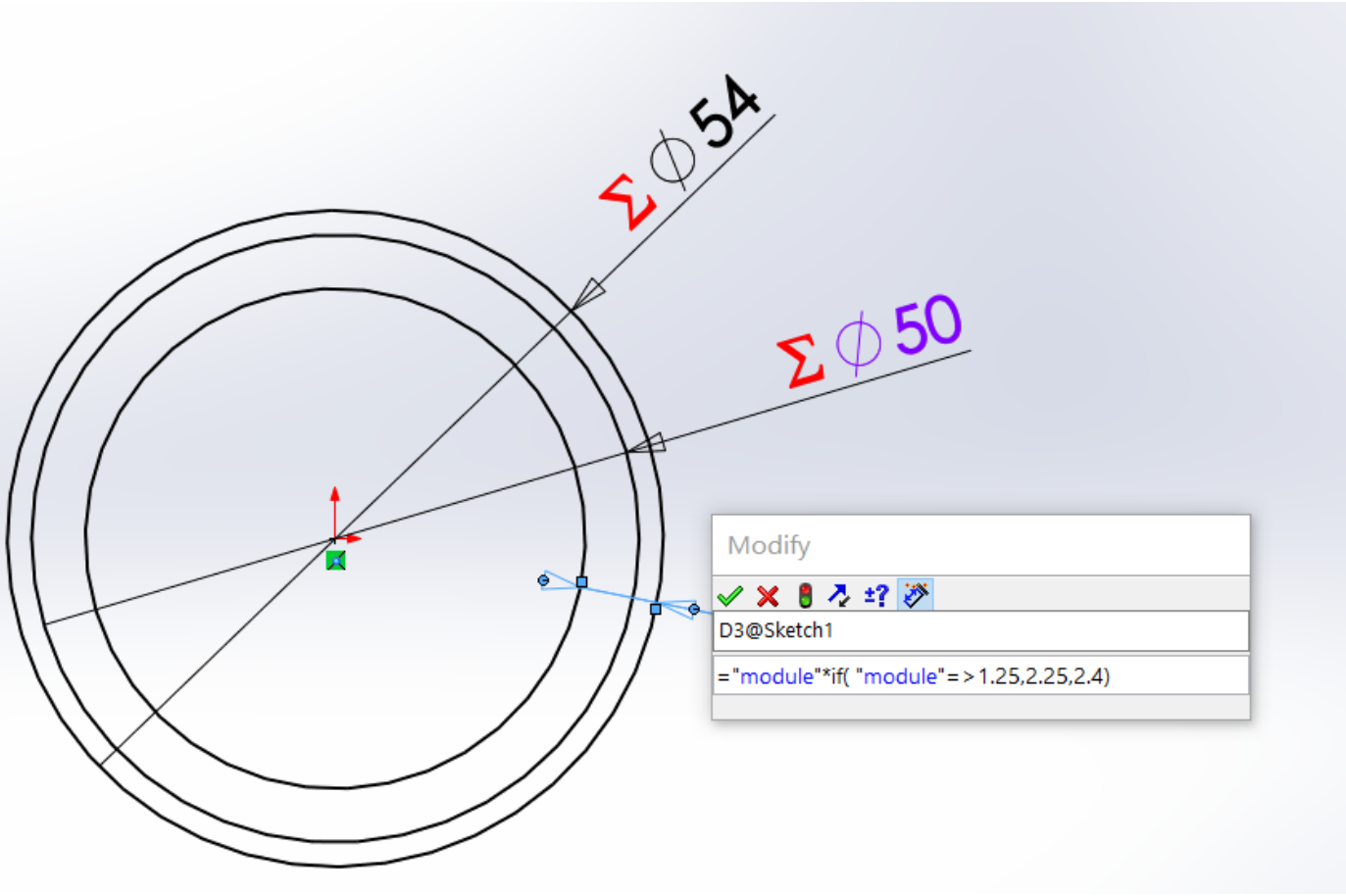
It turns….

Sketch circles

- Draw a addendum circle of a gear

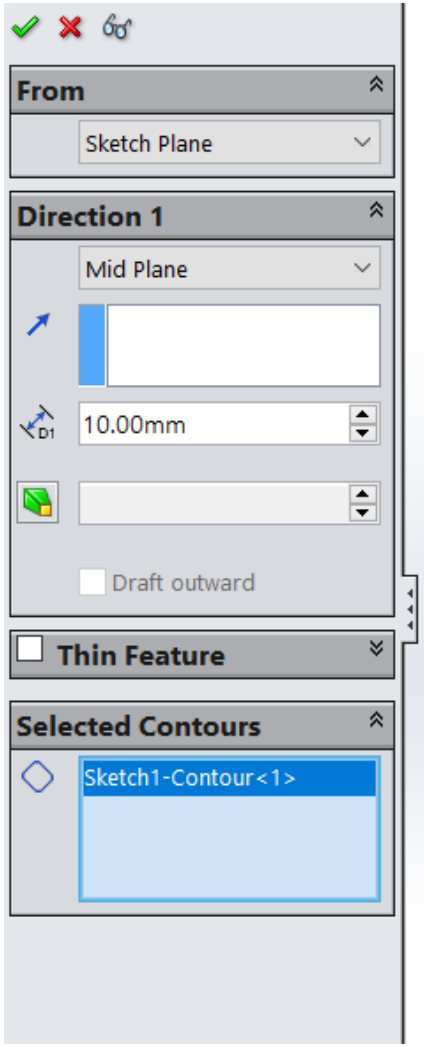


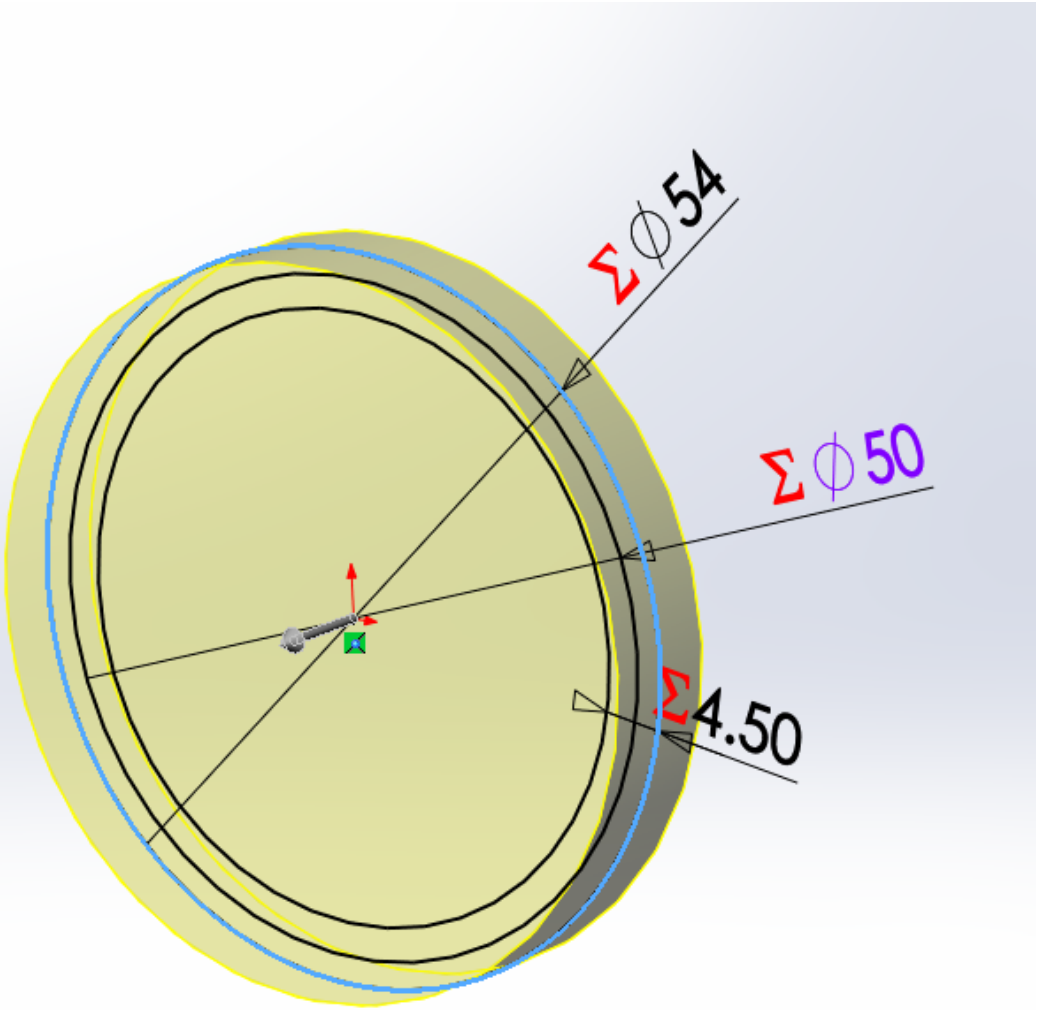
- Capture the route diameter



Sketch circles

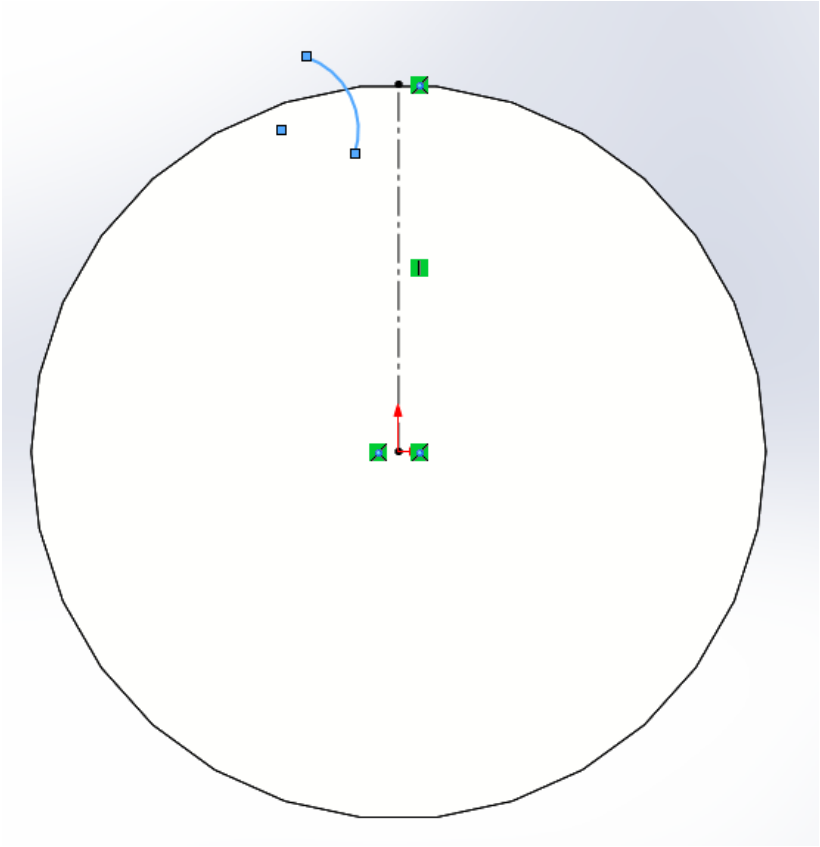
- Extrude the outside diameter with a midplane extrusion option

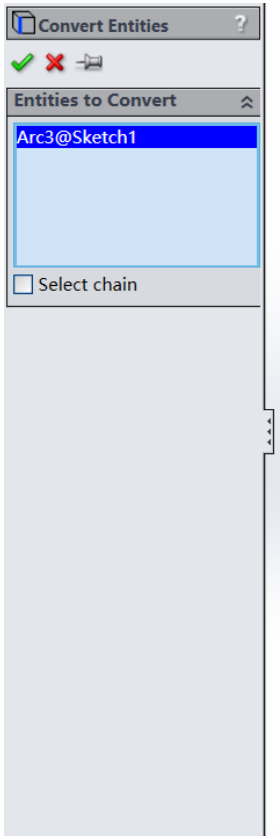


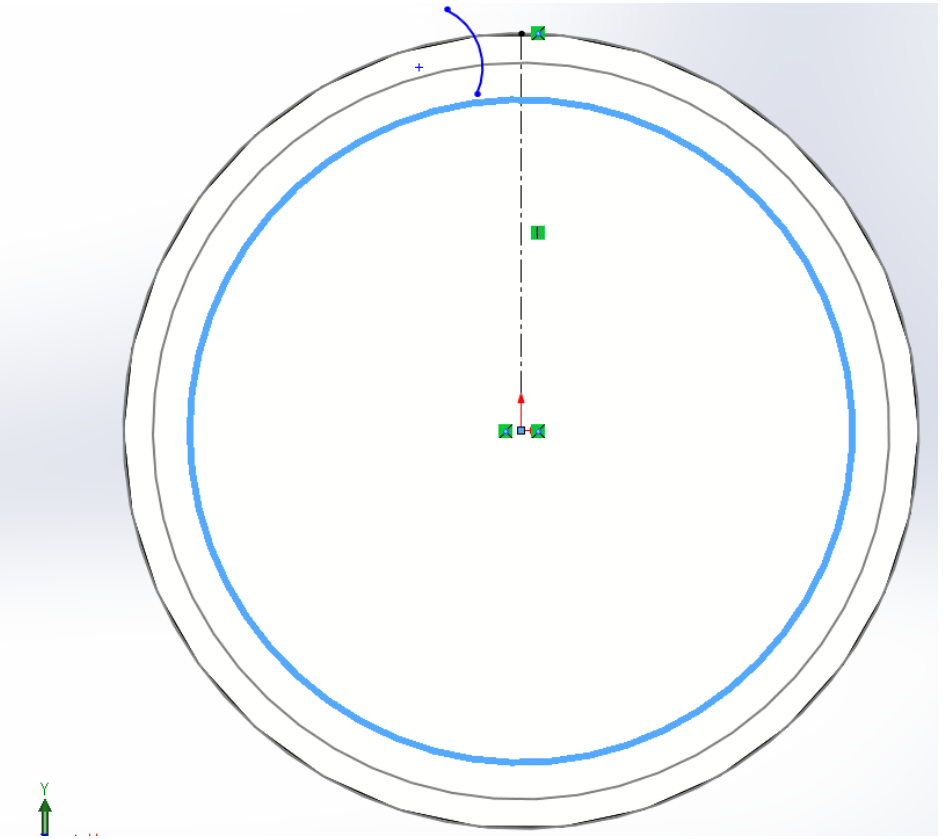


Draw gear teeth

- Convert entities





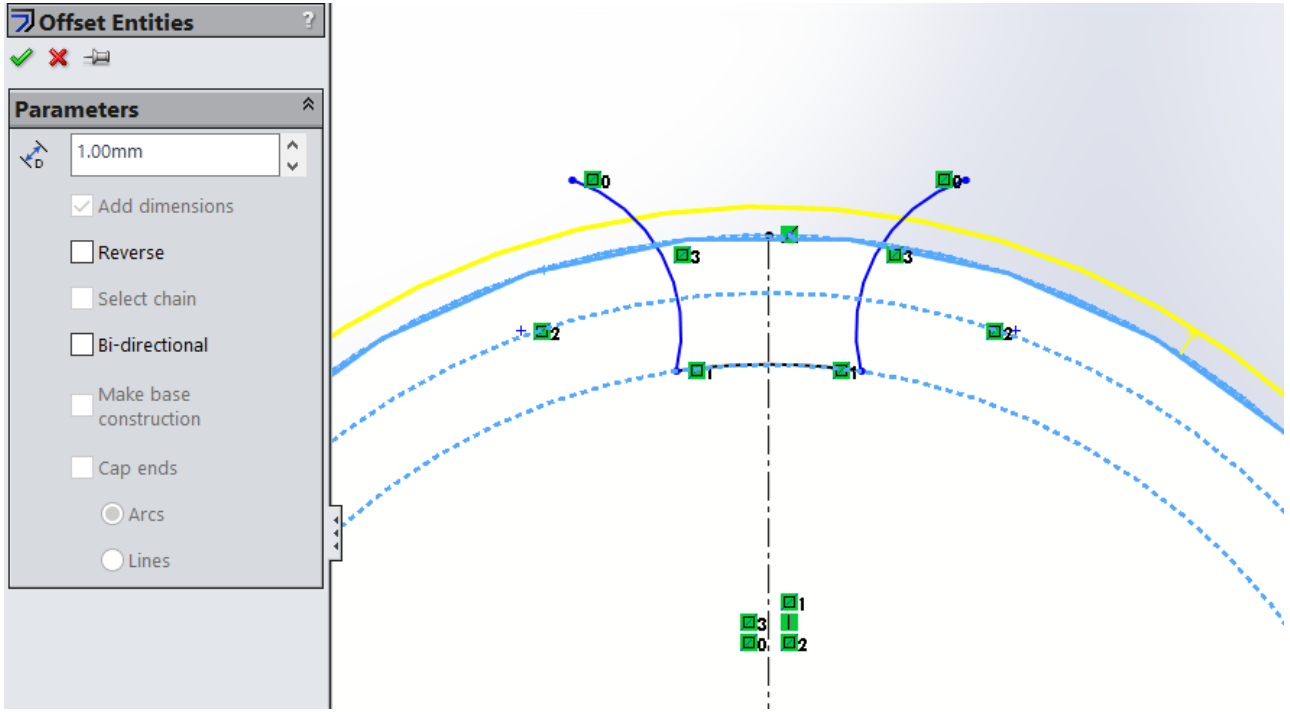


1. Sketch a center line on the front plane and create a 3-points arc with random dimension

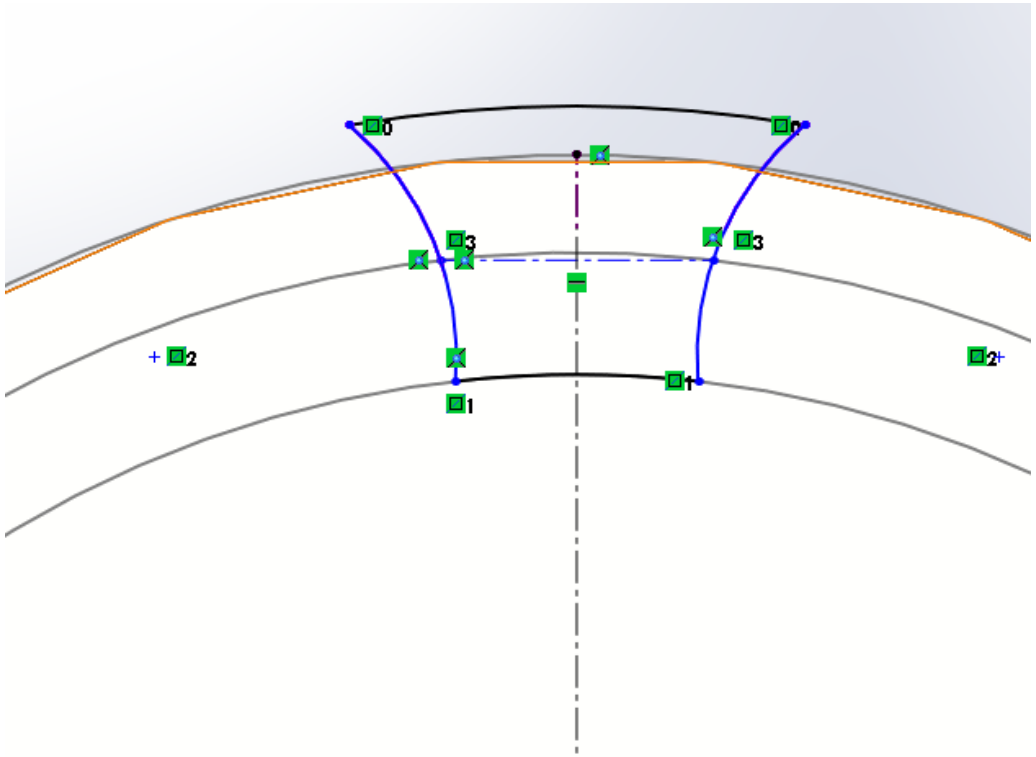
2. Show the previous sketch and convert the inner circle into the entity for convenience of sketching.
3. Mirror the 3-point based arc by using mirror entities.

Draw gear teeth

- Add a centerline



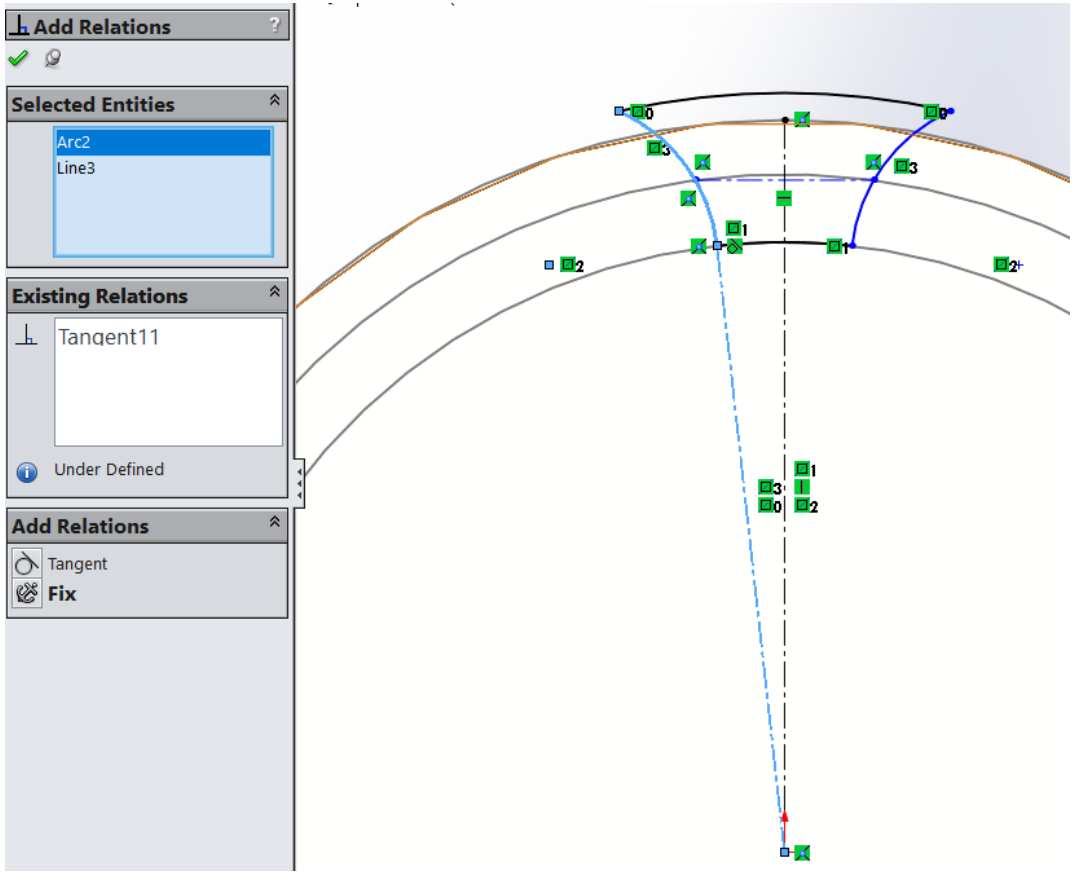
4. A offset circle (1mm) that intersects one point of 3-points arc.



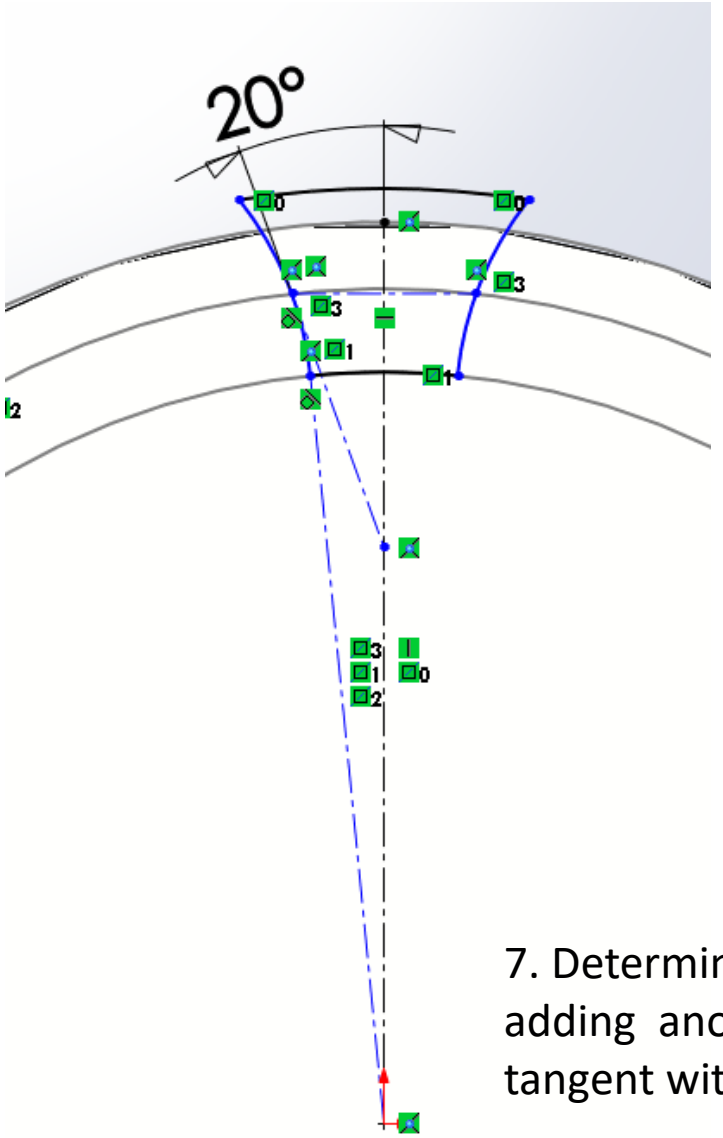
5. Draw a center line intersecting the middle point of the arcs after making the sketch visible.

Draw gear teeth

- Add another center line.



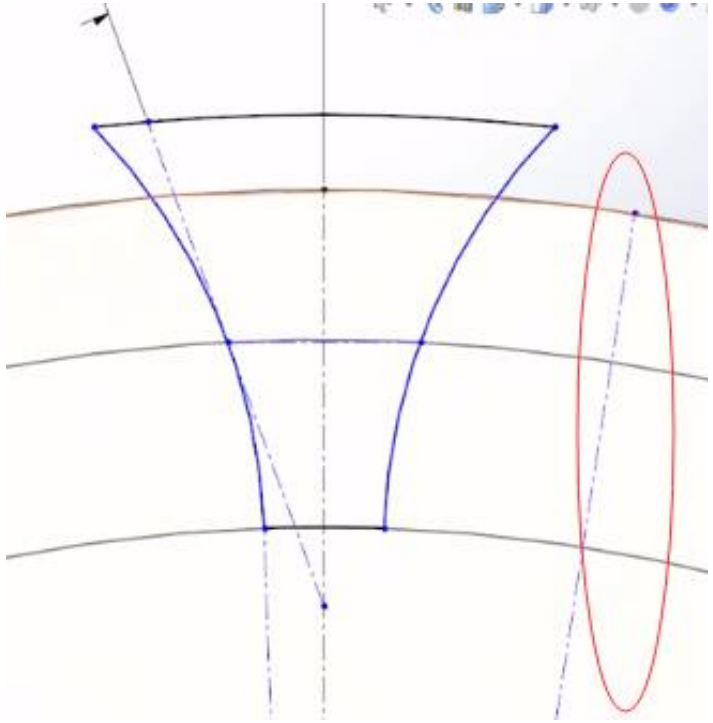
6. Using a center line from the origin and make it tangent with the arc before determining pressure angles.



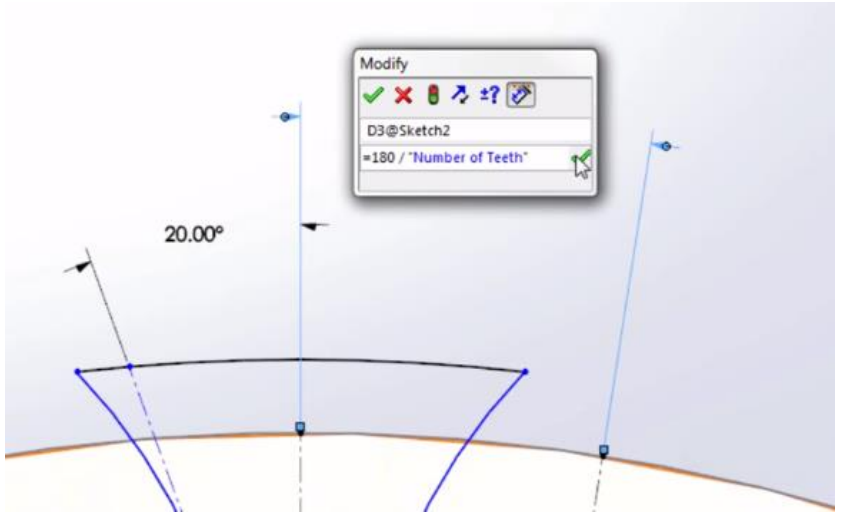
7. Determining pressure angles by adding another center line which is tangent with the arc.

Draw gear teeth

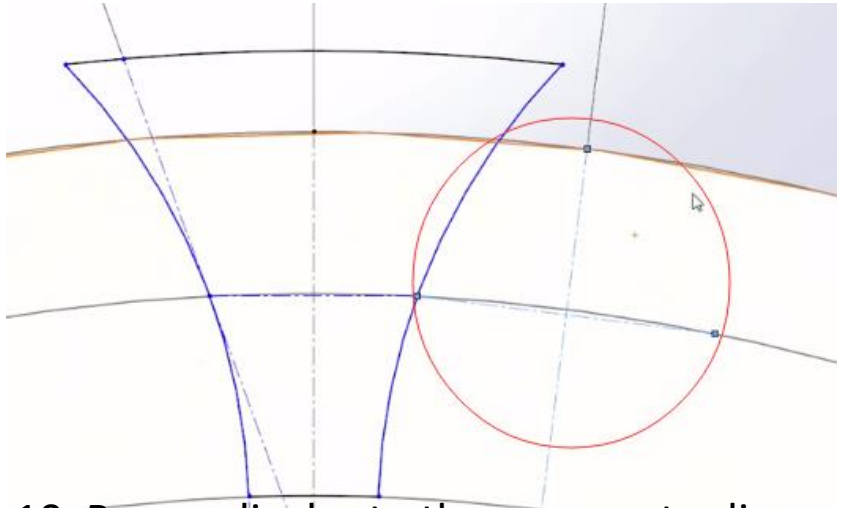
- Incorporate the previous sketch with the number of teeth.



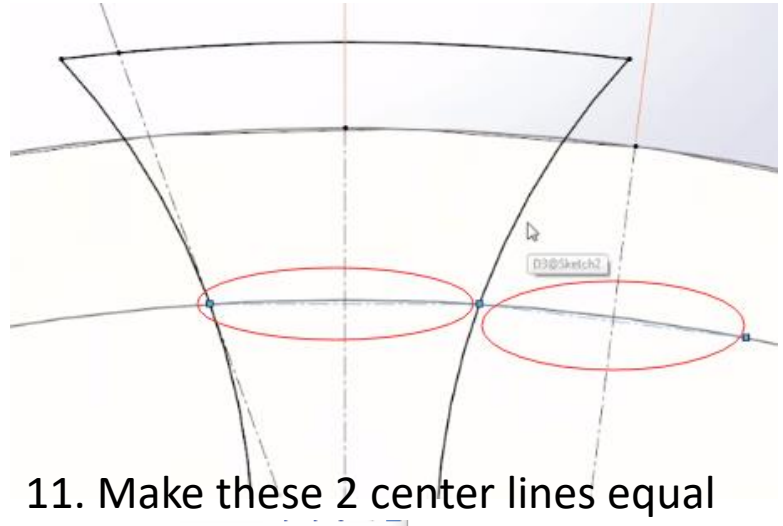
8.Draw another center line.



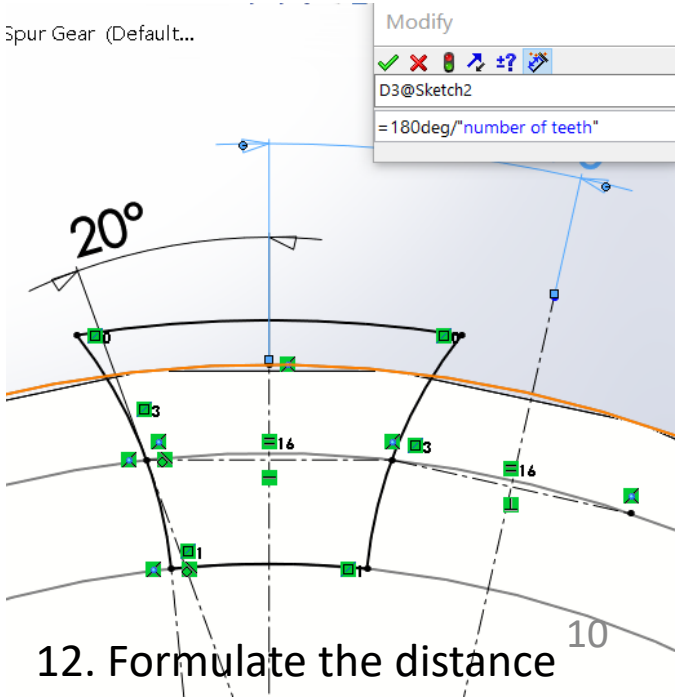
9. Dimension the distance with the center line



10. Perpendicular to the new center line from adjacent teeth with previous one.



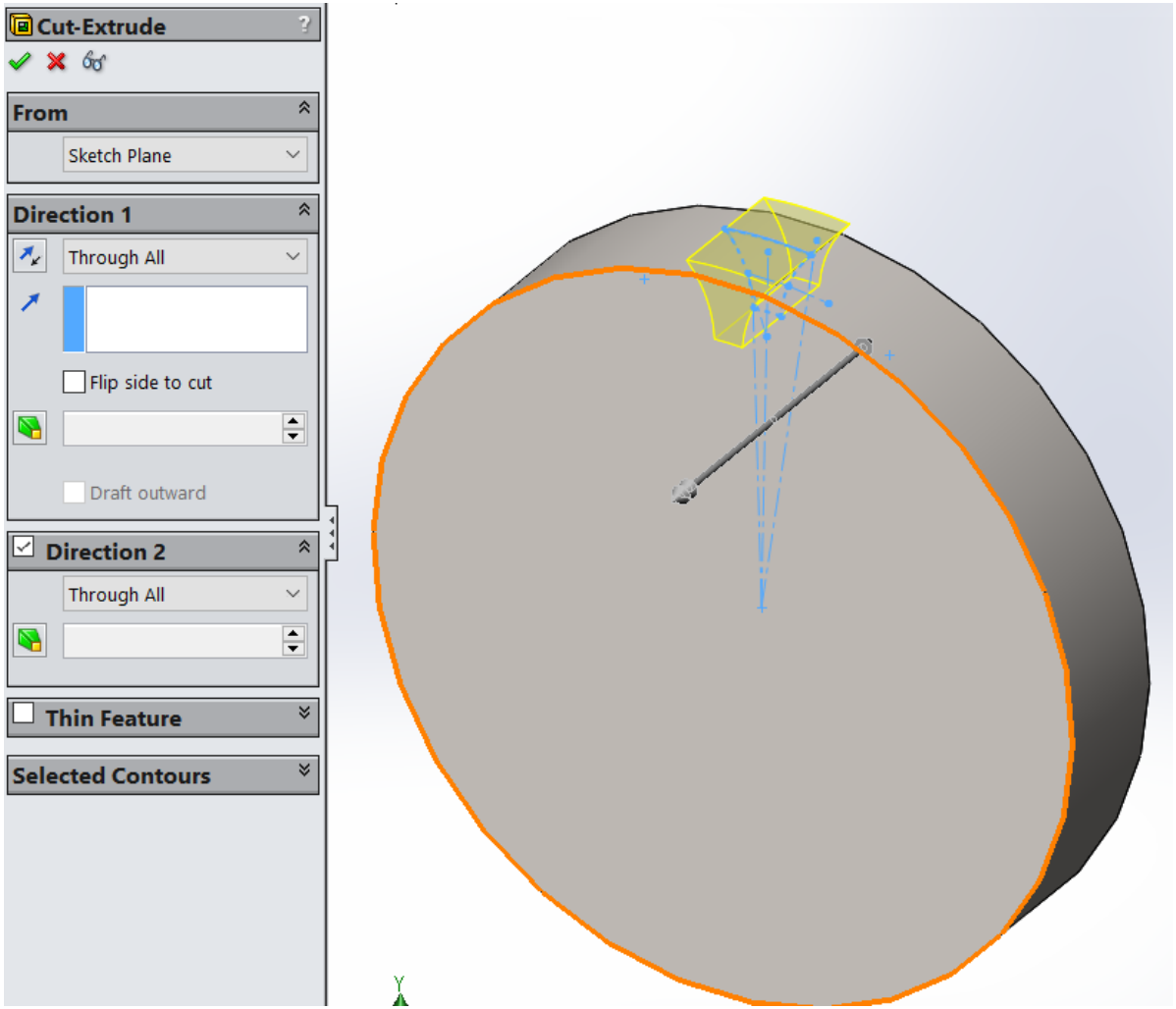
11. Make these 2 center lines equal



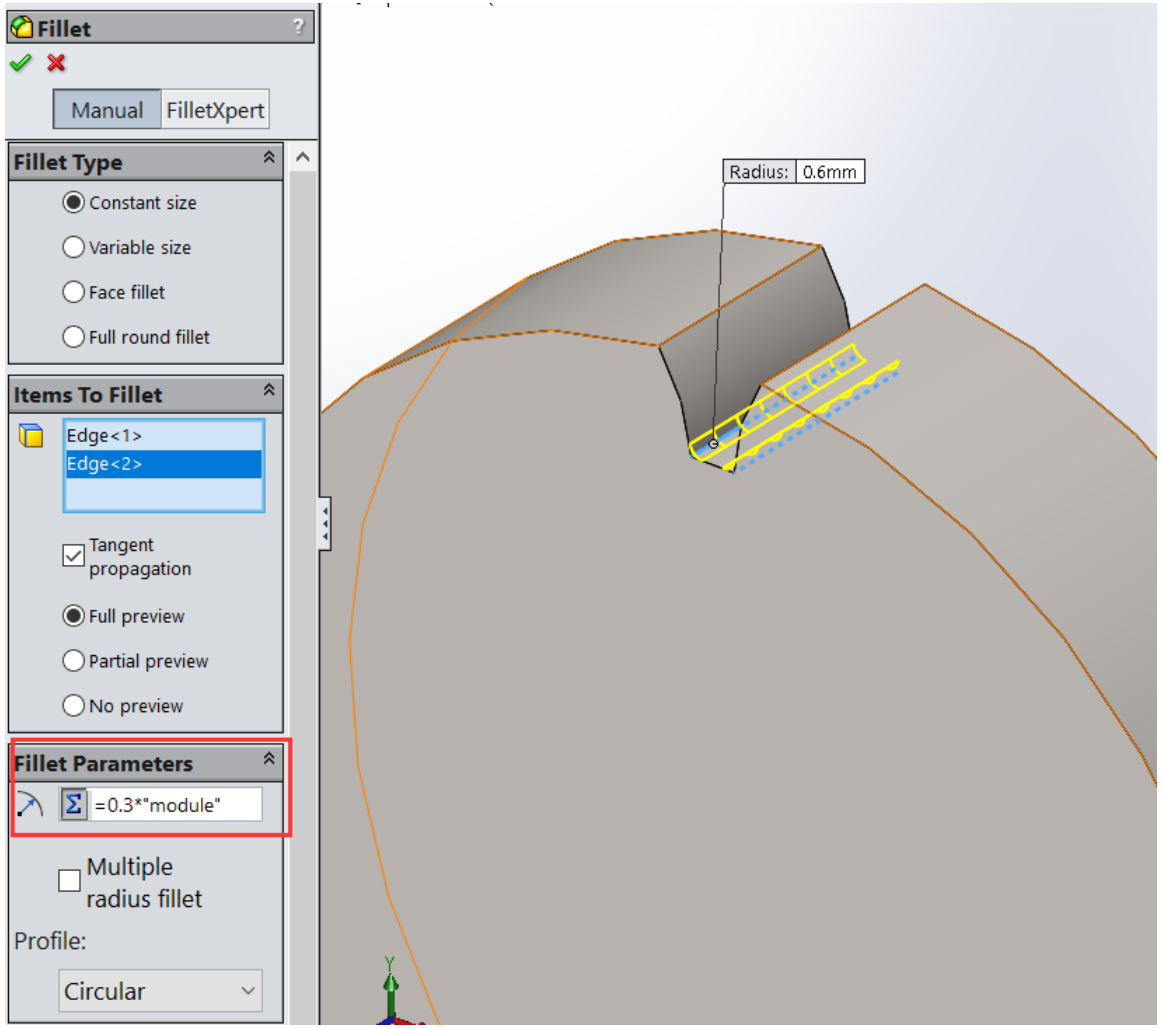
12. Formulate the distance

Cut the shape of teeth

- Create an extruded cutting feature of a single tooth.



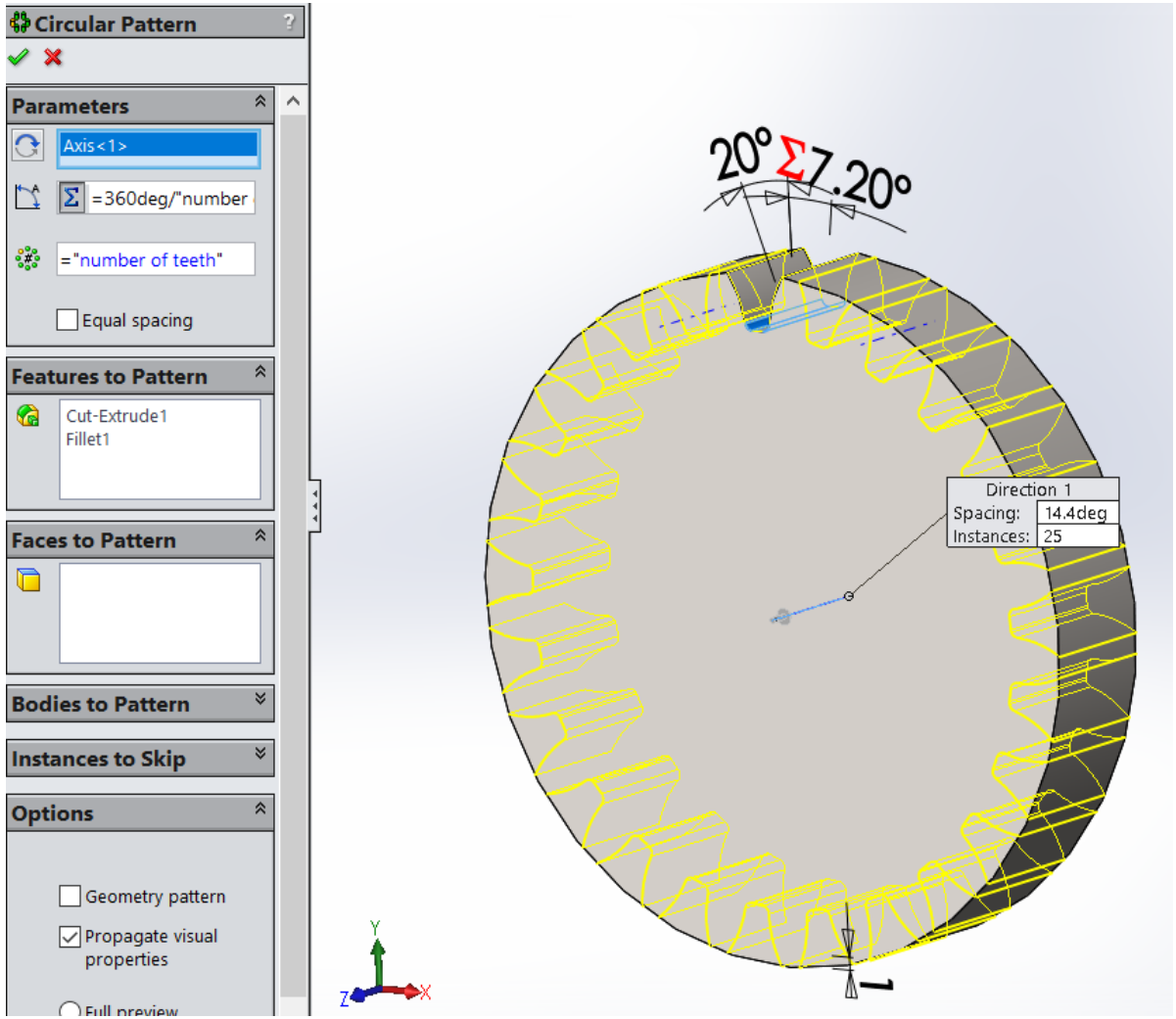
Cut through

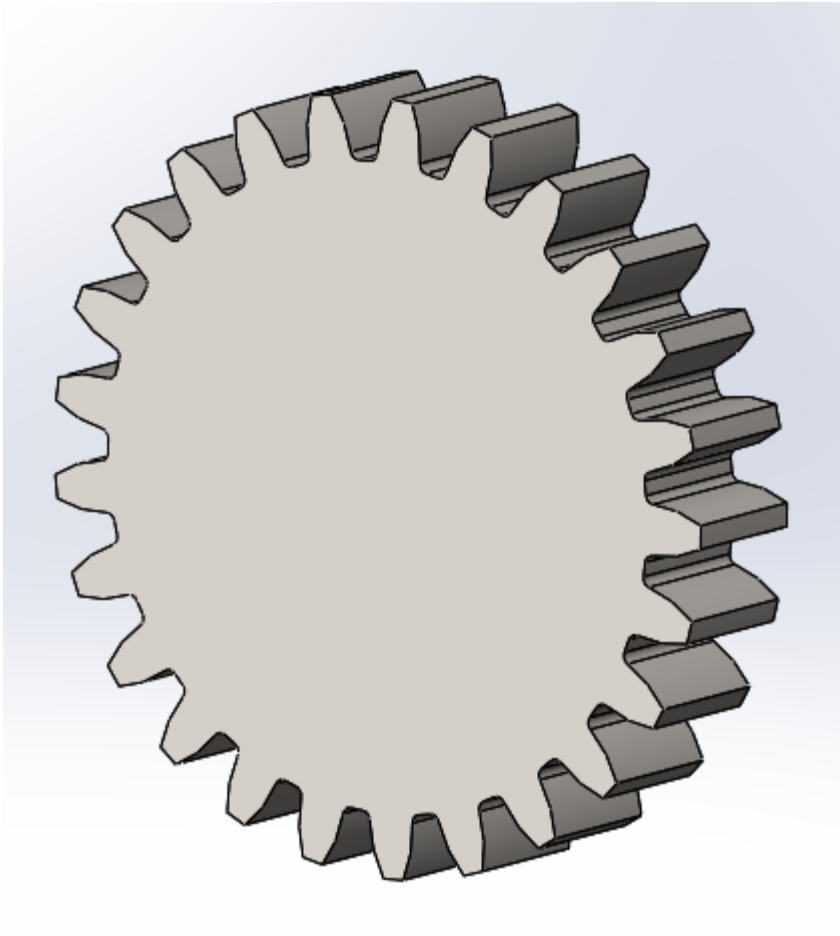


Create a filet with formulated parameters.

Cut the shape of teeth

- Circumferential patterning of the teeth feature with respect to a temporary axis.





Helical gears

Preparation

- Delete the circular patterns, extrusion cut and fillet feature and some equations.

Equations, Global Variables, and Dimensions

Filter All Fields

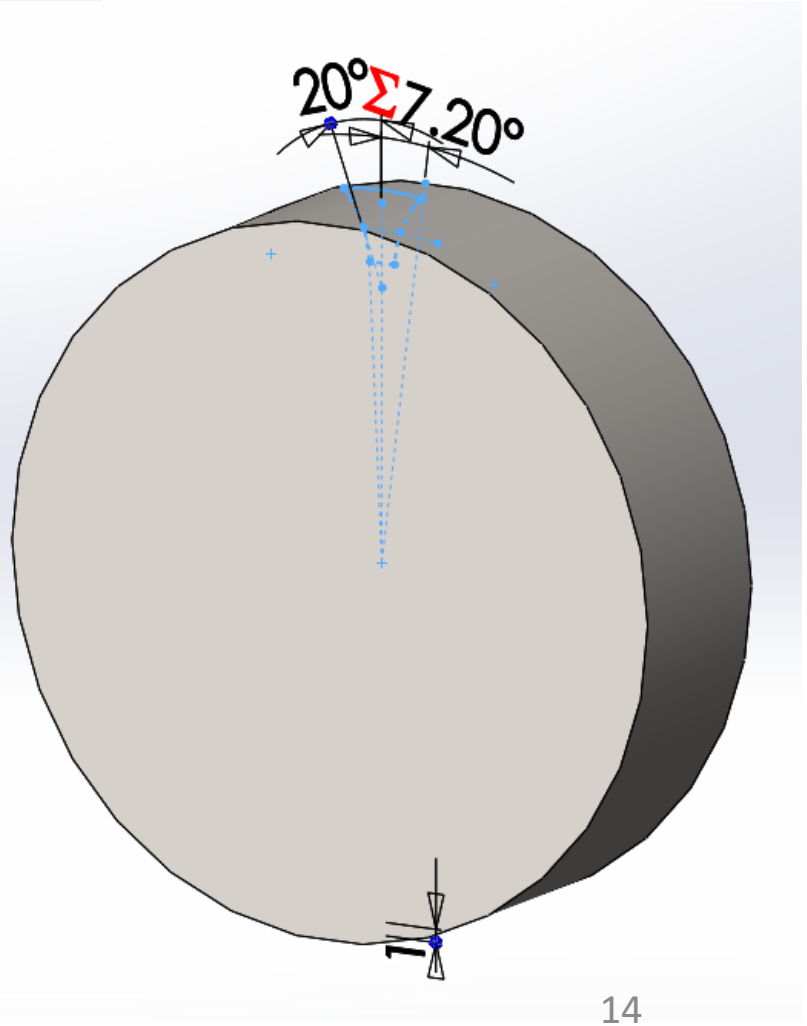
Name	Value / Equation	Evaluates to	Comments
Global Variables			
"module"	= 1.5mm	1.5mm	
"number of teeth"	= 30	30	
"width"	= 30mm	30mm	
Add global variable			
Features			
Add feature suppression			
Equations			
"D1@Sketch1"	= "module" * "number of teeth"	45mm	
"D2@Sketch1"	= ("number of teeth" + 2) * "module"	48mm	
"D3@Sketch1"	= "module" * if ("module" = > 1.25 , 2.25 , 2.4)	3.38mm	
"D3@Sketch2"	= 180deg / "number of teeth"	6deg	
"D1@Fillet1"	= 0.3 * "module"		
"D2@CirPattern2"	= 360deg / "number of teeth"		
"D1@CirPattern2"	= "number of teeth"		
"D1@Boss-Extrude1"	= "width" / 2	15mm	
Add equation			

Automatically rebuild

Angular equation units: Radians

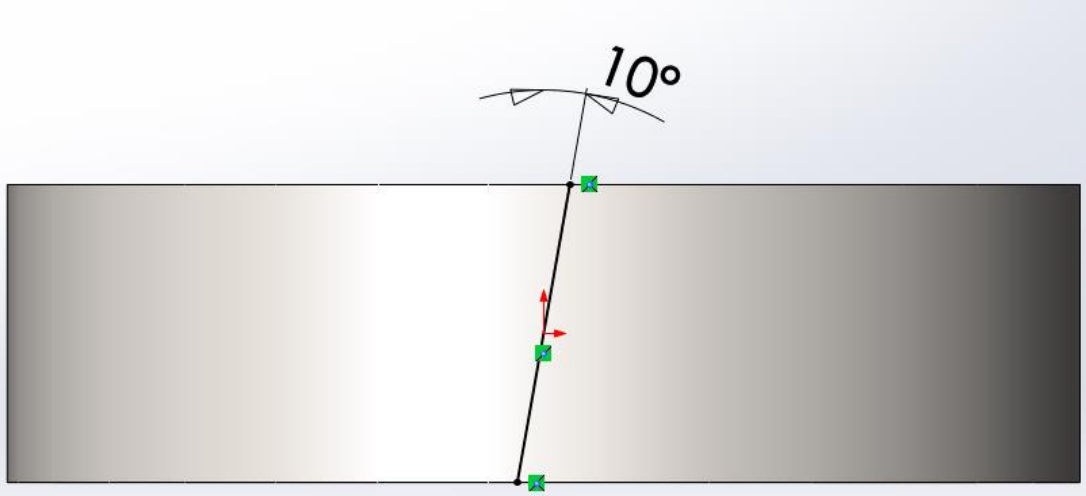
Automatic solve order

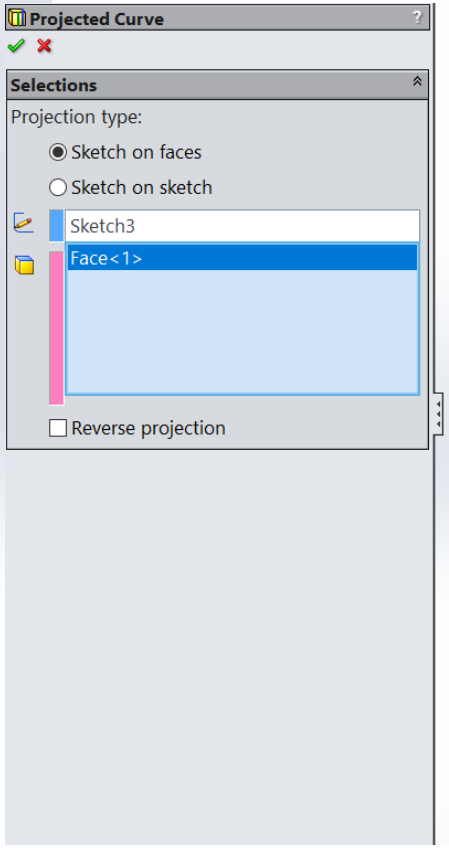
Link to external file:

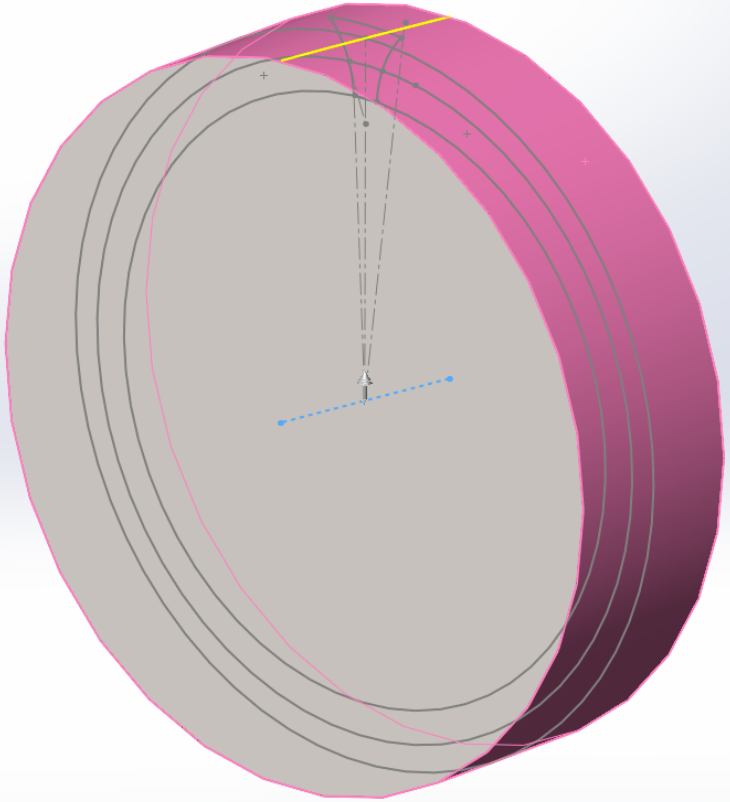


Guideline for extrusion cut

- Sketch the line denoting the helix angle on the top plane and project it on a cylindrical face.



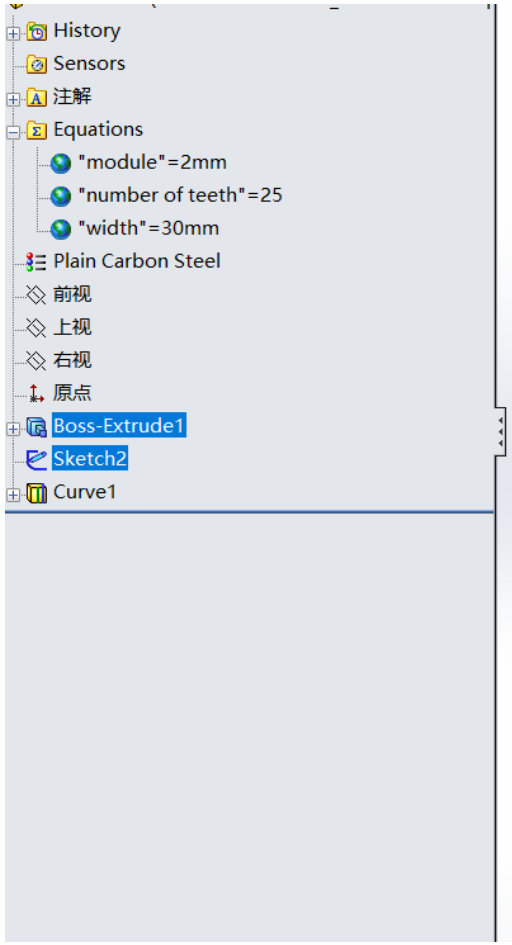


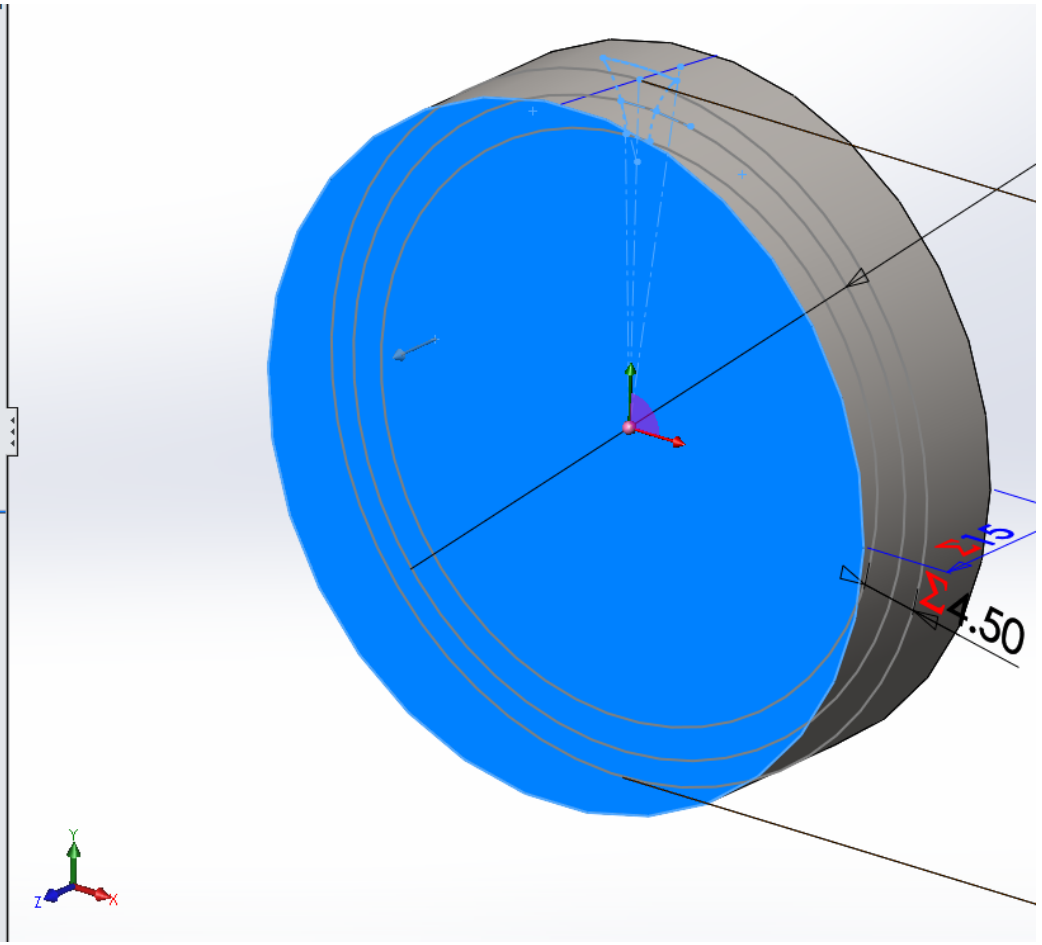


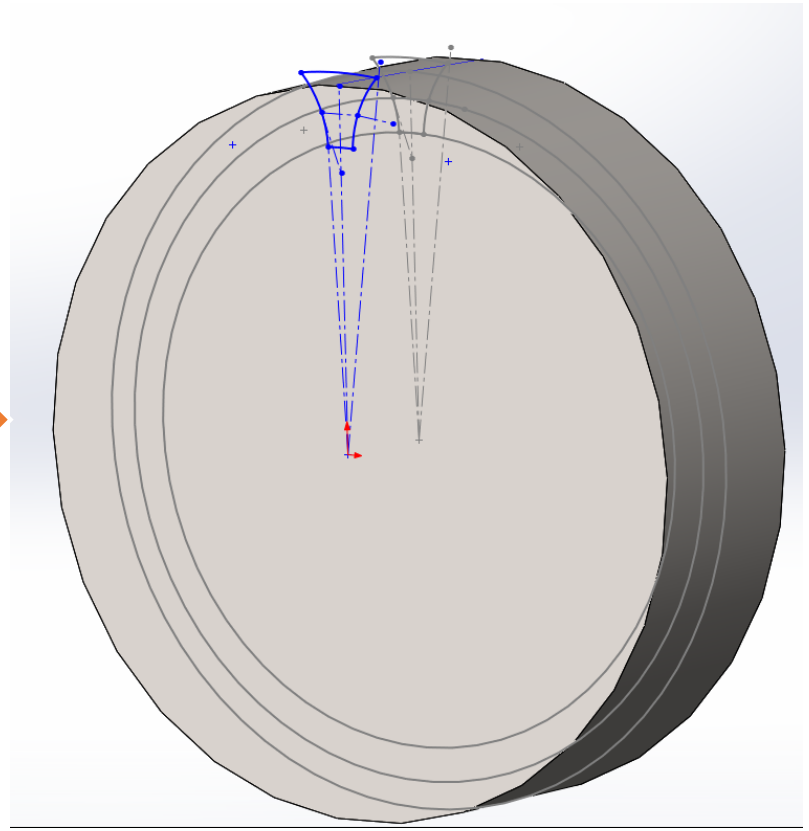
1. Add a midpoint relationship between the origin and the line.
2. Set the angle for the line and the right plane.
3. Use a projected curve feature.

Derive sketch for preparing lofted cut

- Derive the sketch



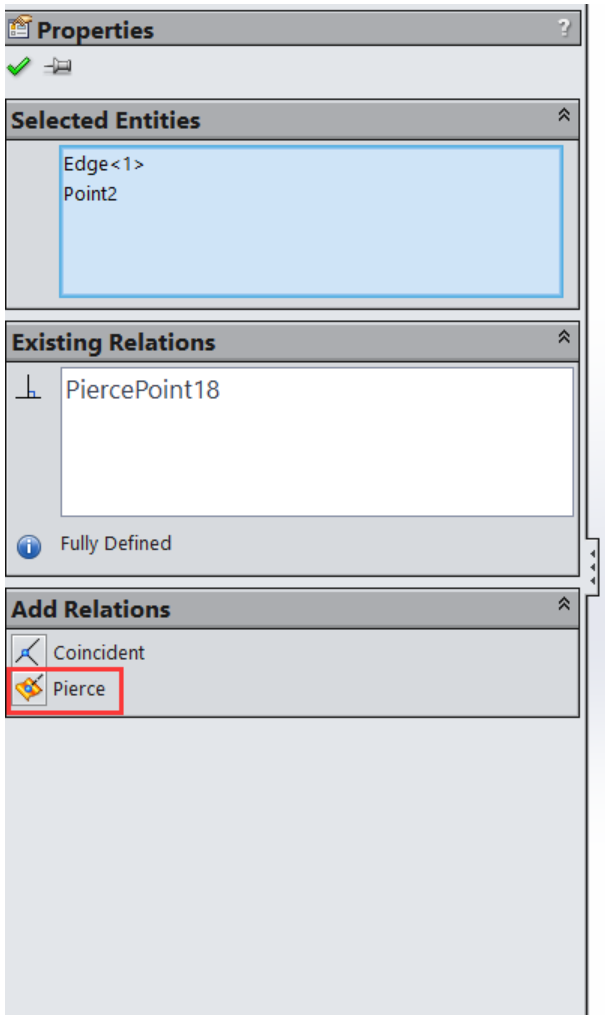


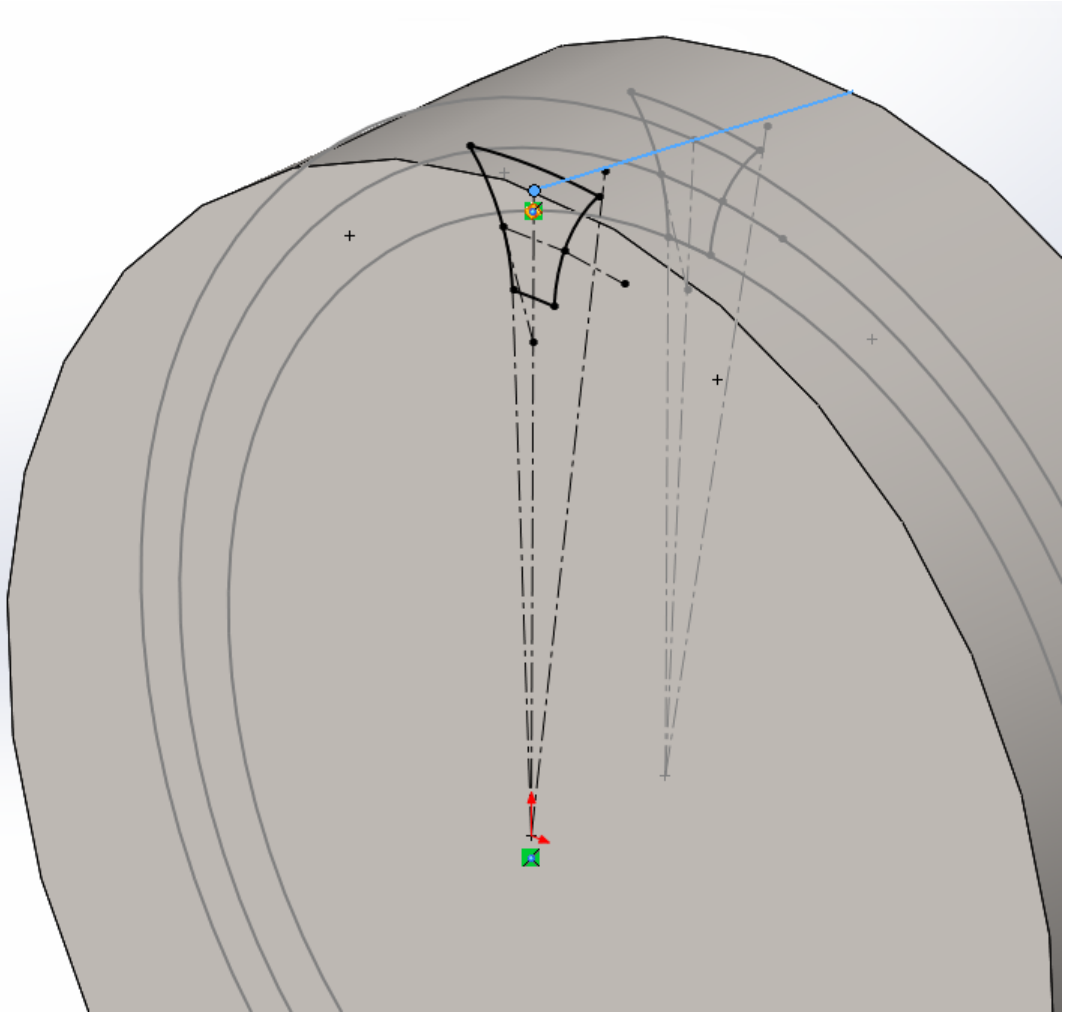


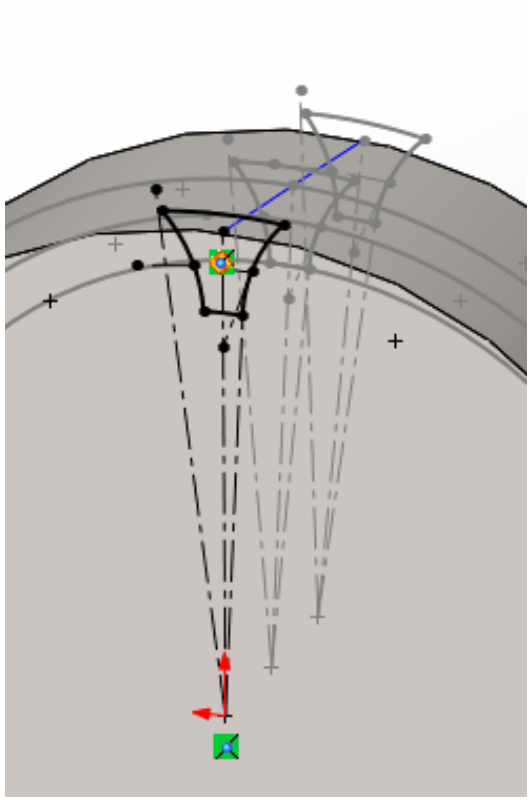
1. Select the blue face and sketch2.
2. Find derive sketch with the insert option.

Add relationship to the derived sketch

- Fix the sketch by adding a coincide relationship and a pierce relationship.

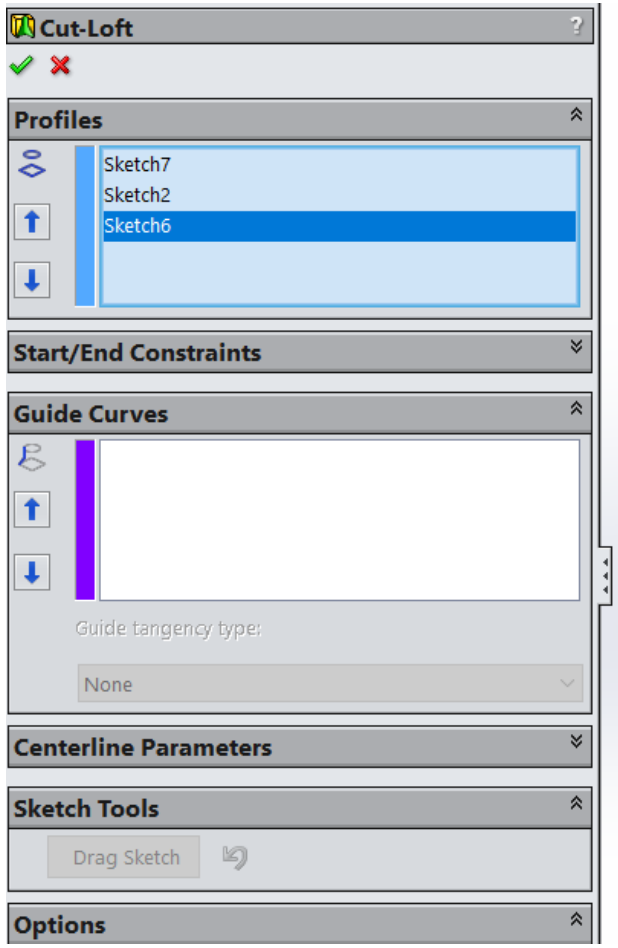


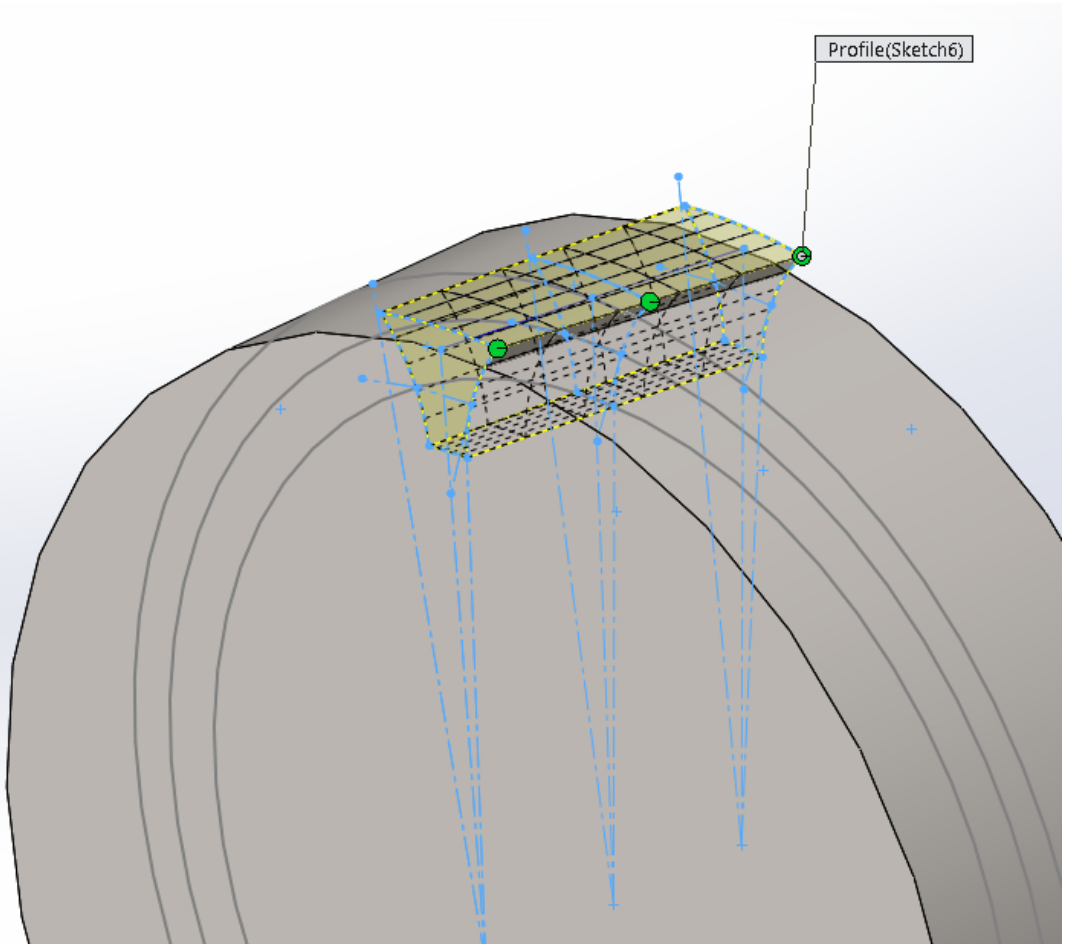


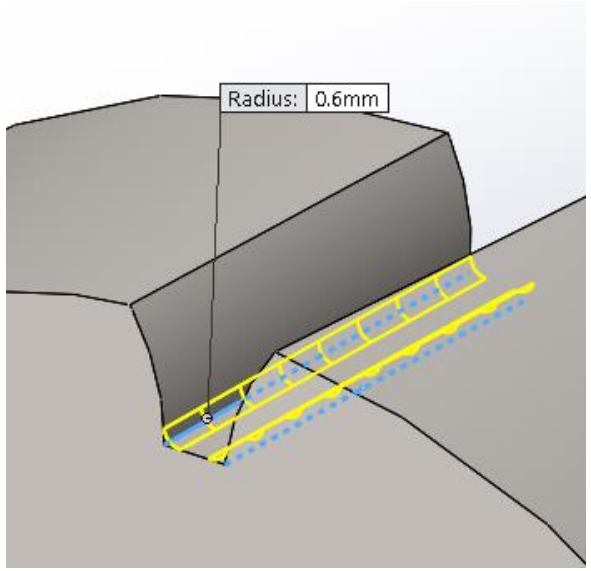


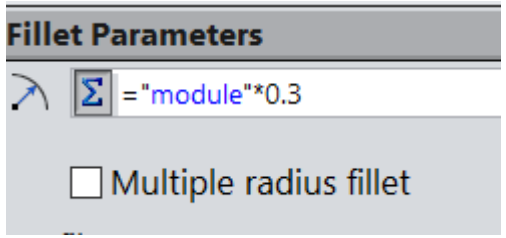
Add lofted cut and fillet features

- Lofted Cut and add fillets.









Ultimate Helical Gear

- On the circular pattern, change the helical direction by setting global variable.