

# Spatula



## Introduction:

The model shown in the picture is made of three parts, - the base, the washer and the handle. The base requires the use of **Spline** and **Style Spline** command, **Slot** command and **Mirror** command. Various planes are also required.

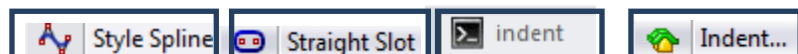
The handle makes use or the **Spline**, **Style Spline** and the **Sweep** commands.

The washer is connected to the handle using the **Indent** feature.  
<https://youtu.be/yvAImJTsmPU>

## Learning Intentions:



This lesson will focus on the improvements made to the Spline command, Slots, and how to use the search tool. The indent feature will also be used.



## Prerequisite knowledge:

To complete this model you should have a working knowledge of SolidWorks 2006/2009, with particular reference to Extrude/Boss Base, Mirror , Sweep, loft etc.

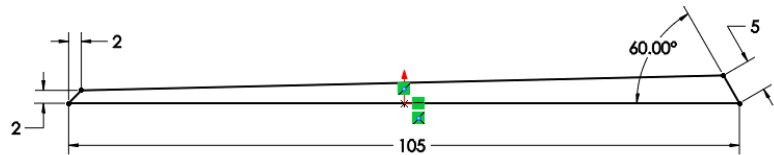
## Base

### New Part



Start by creating a **New Part** and saving this part as **Base**.

On the **Front plane** draw the Sketch to the given dimensions.



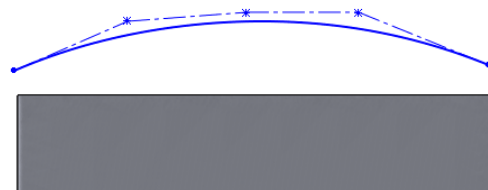
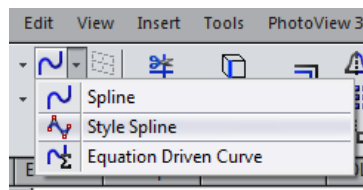
Extrude by **105mm** using midplane.



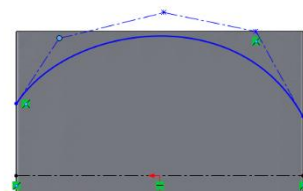
On the underside, draw the centreline shown.



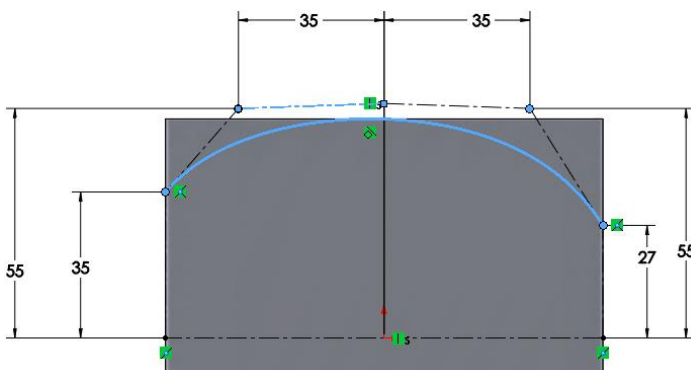
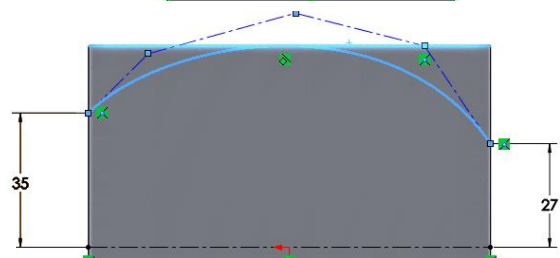
Select the **Style Spline** command and draw the curve using five nodes (see diagram).



Drag the nodes into position and add the tangent relation between the spline and the edge of the surface.

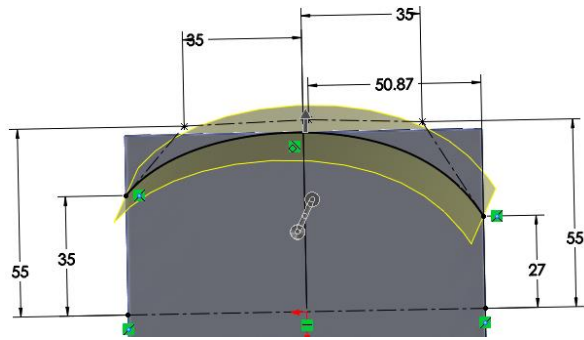


Using **Smart Dimension** add the dimensions shown.

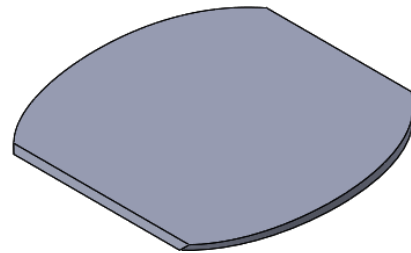


Fully define the sketch. **Extrude Cut**, then **Through All**.

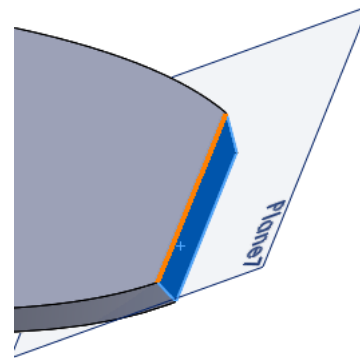
**Mirror** the extrude cut about the **Front plane**.



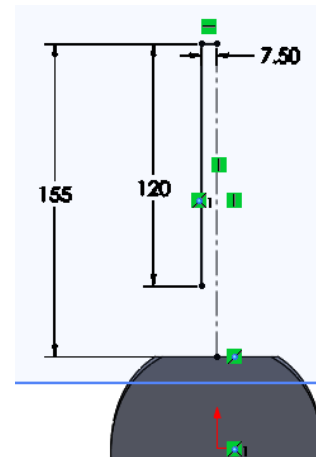
The result should look as follows in isometric view.




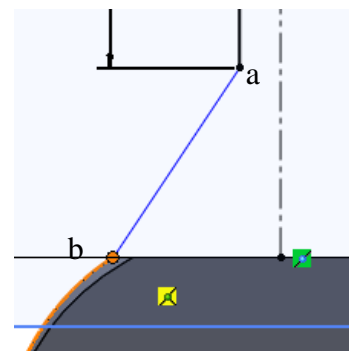
To draw the stem a plane is needed perpendicular to the sloping face at the back, and touching the edge which is highlighted.



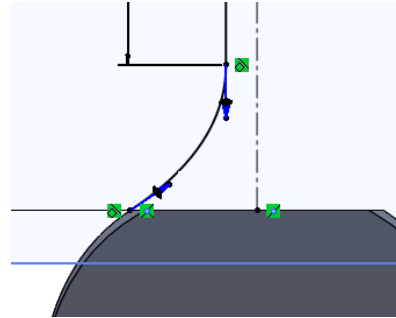
Draw a centreline. Then draw the horizontal and vertical lines to the dimensions shown.



Using  **Spline** command draw a line from a. to b.



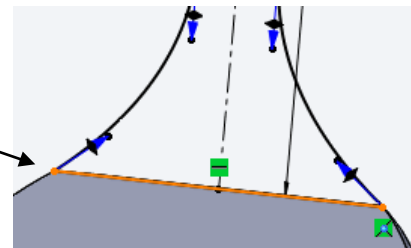
Add **Tangent relations** between the line and spline, and between spline and the curve of the base.



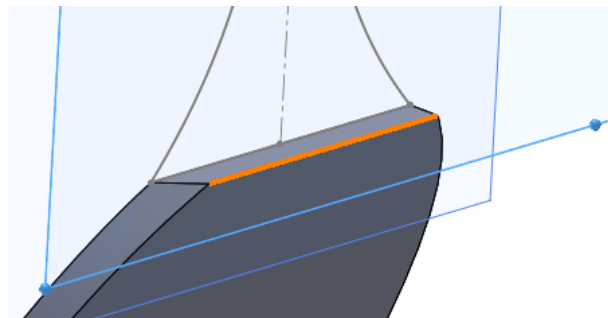
Mirror about the centreline.

Select line highlighted.

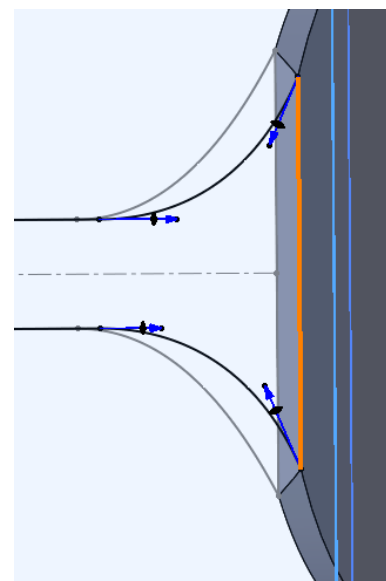
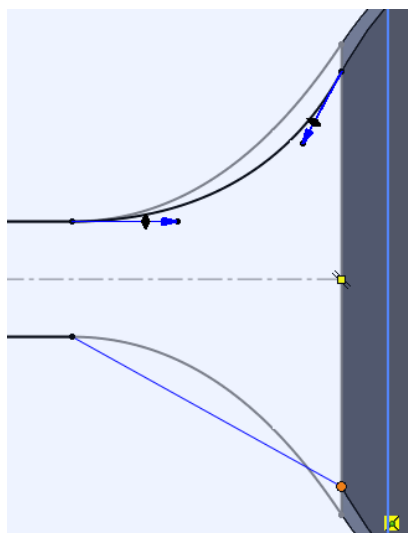
Use **Convert Entities** to close the sketch as shown.



Create another plane parallel to plane 1 and touching bottom edge.



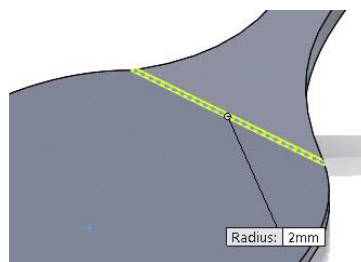
Draw a similar shape on this plane. Use **Convert Entities** for the straight lines. Use the **Spline** command to draw a similar curve, but touching the base edge instead. Close the sketch as above.



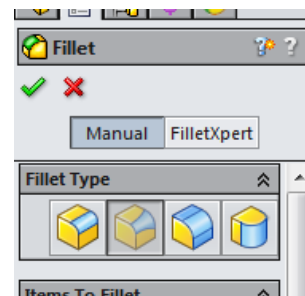
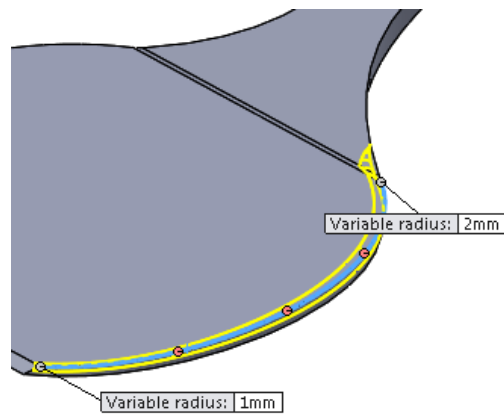
Select  **Boundary Boss/base** and select the two sketches to complete the stem.



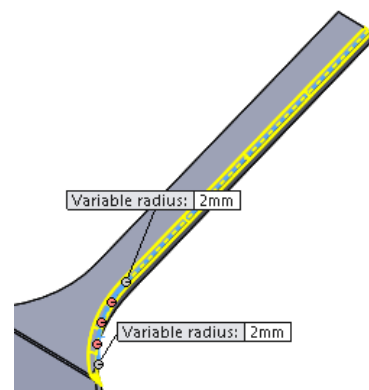
Add a **2mm** fillet as shown.



Use **Variable Fillet** command to apply fillets as shown.



Complete the exercise by applying **2mm** fillets to the stem.

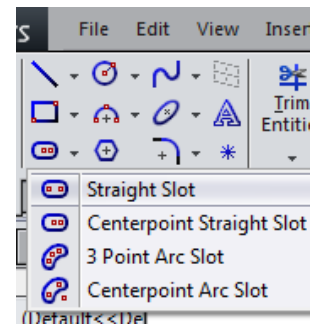


## ▲ Slots

The slot command saves a lot of time, as alternatively circles, lines and trim commands would need to be used to create the same shape.

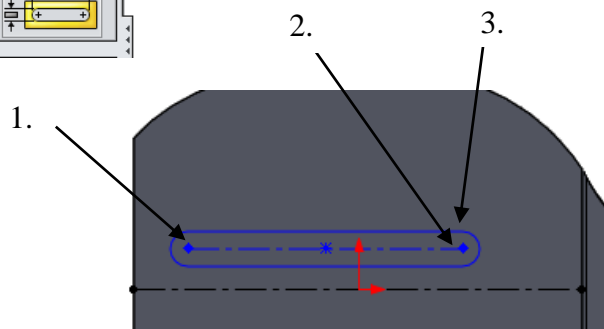
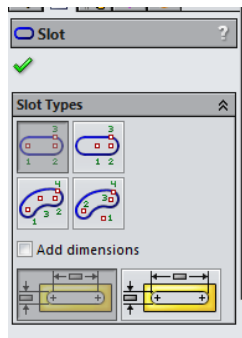
As can be seen in the diagram, various shapes of slots can be drawn.

Slots have also been included in the mate commands, enabling easy mating between slots.

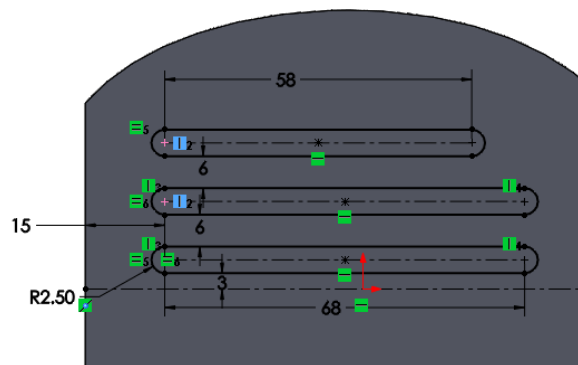


On the underside of the base draw a centreline.

Select **Straight Slots**.  
Click position for 1, 2, and 3.

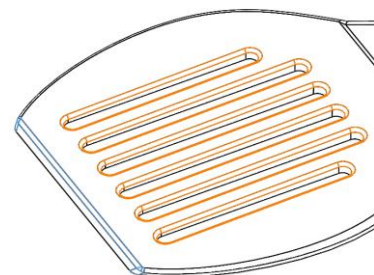
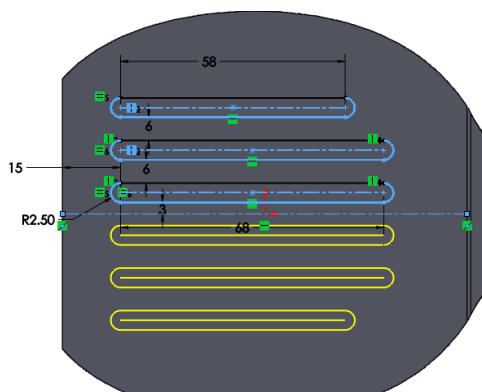


Add **Equal relations** for the radii and vertical relations for the centre point 1 of the three slots. Then add the following measurements and **mirror** about the centreline.



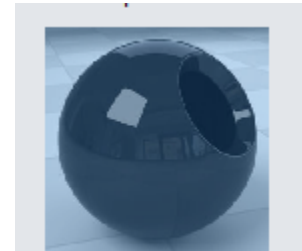
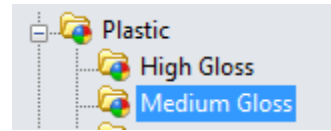
Select **Extrude Cut, Through All**.

Add a few more **2mm** fillets as shown.



## Appearance

Add an **Appearance** as shown

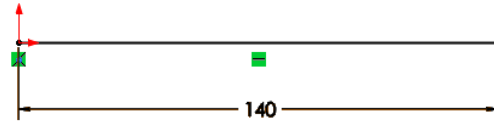


black medium gloss plastic

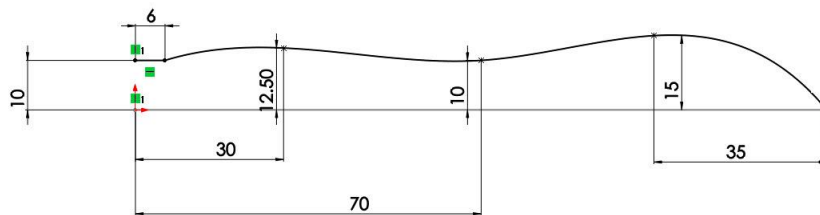
## Handle

Three sketches are drawn to create the shape.

**Sketch 1** - A line is drawn on the **Front Plane**.



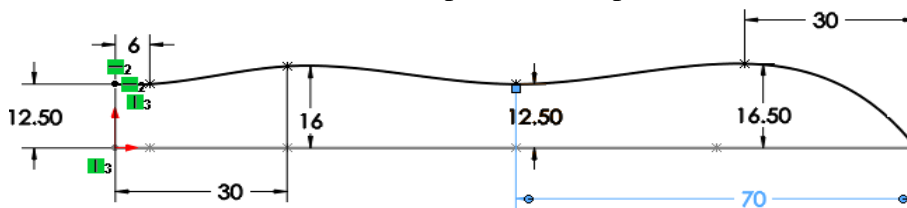
**Sketch 2** - On the **Front Plane** using **Line** and **Spline** command, draw to the dimensions shown. A line **6mm** in length is drawn first.



**Sketch 3** - On the **top plane** draw a **Spline** with 5 points.

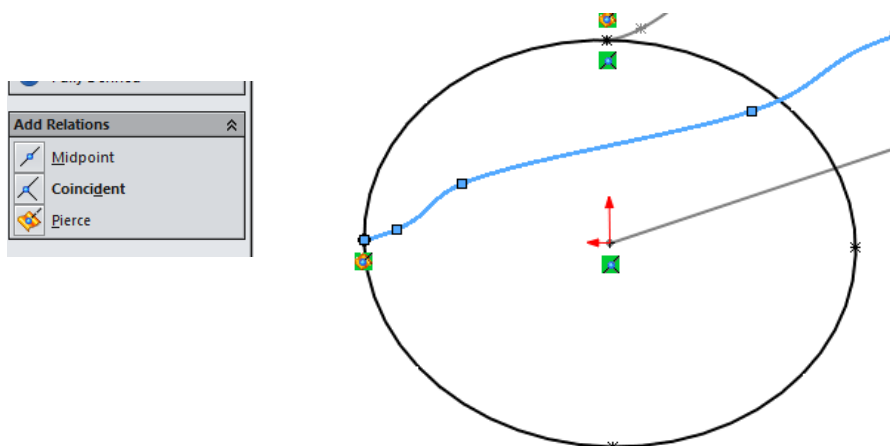
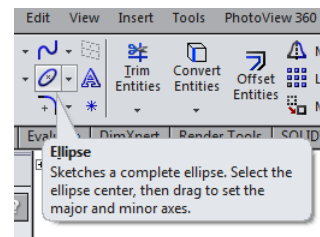
As above, a line **6mm** in length is drawn first with a **Vertical relation** between first point and Origin.

Add a **Pierce relation** between the last point of the spline and the line.



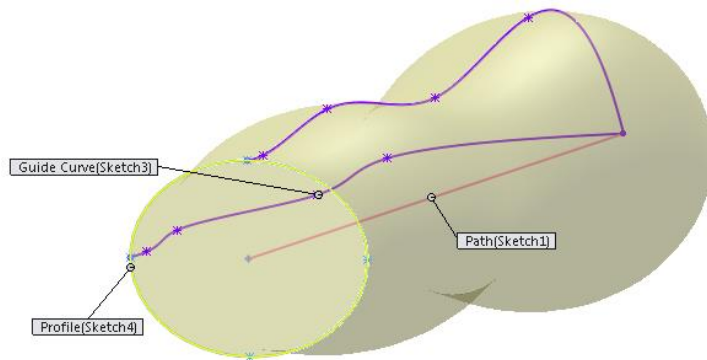
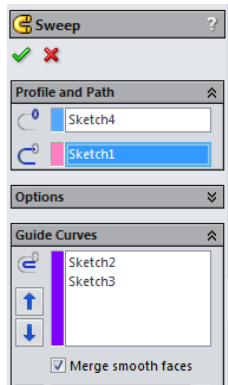
**Sketch 4** - On the right plane, draw an **Ellipse** and add **Pierce Relations** between the top of minor axis and sketch 2.

Add a **Pierce Relation** between the end of the major axis and sketch 3.

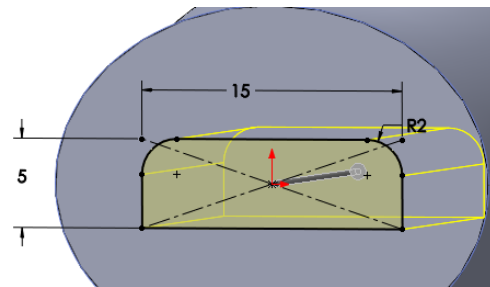
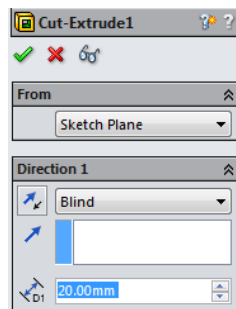




Select **Sweep** command to form the shape.



On the front face, draw the **Rectangle**, and **Extrude Cut** by **20mm**. This will be the recess for the stem.



**Adding decoration on the face of the handle.**

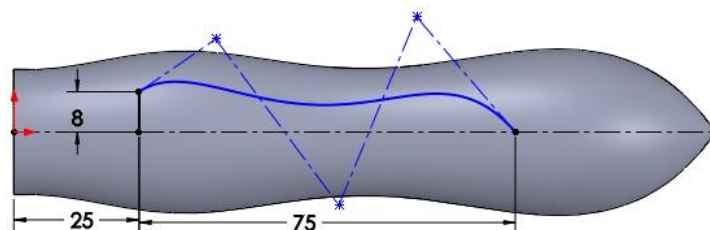
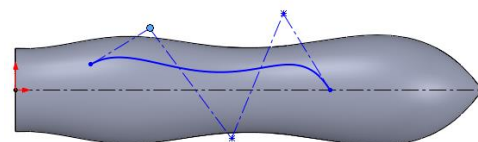
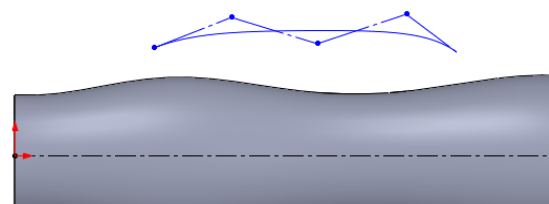


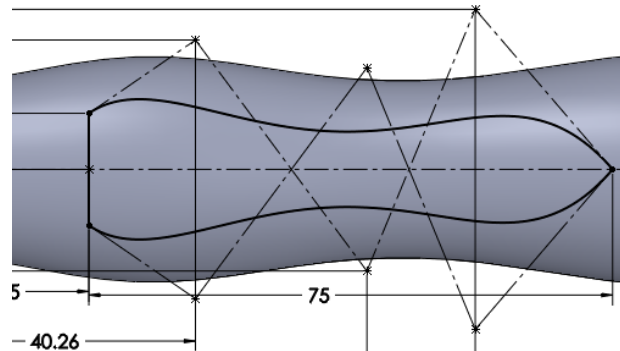
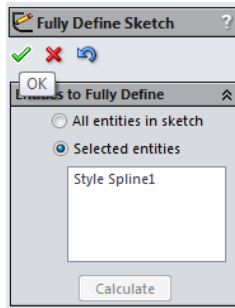
On the Top Plane, use **Style Spline** to draw the shape shown.

Drag the points into position and adjust the curve.

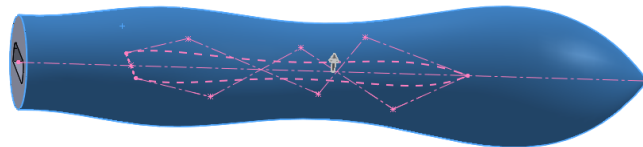
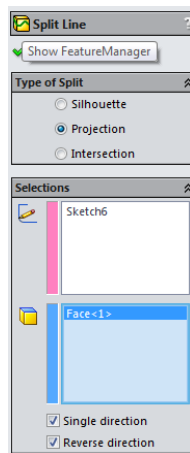
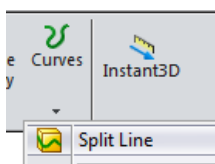
Add a few dimensions.

**Mirror** the sketch about the centreline and **Fully Define** the sketch.





Select **Split Line**, and make sure single direction is selected.

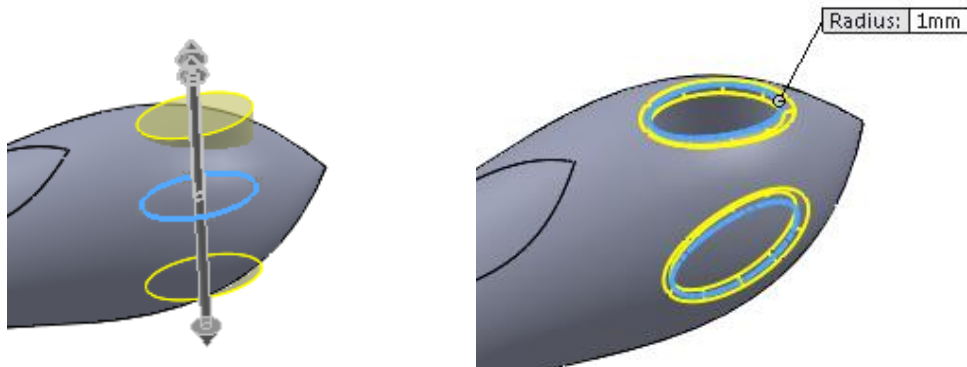
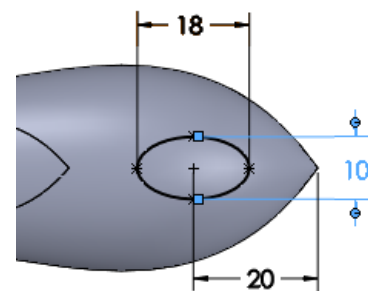


### The Hole at the Back

On the **Top Plane**, draw the **Ellipse** shown.

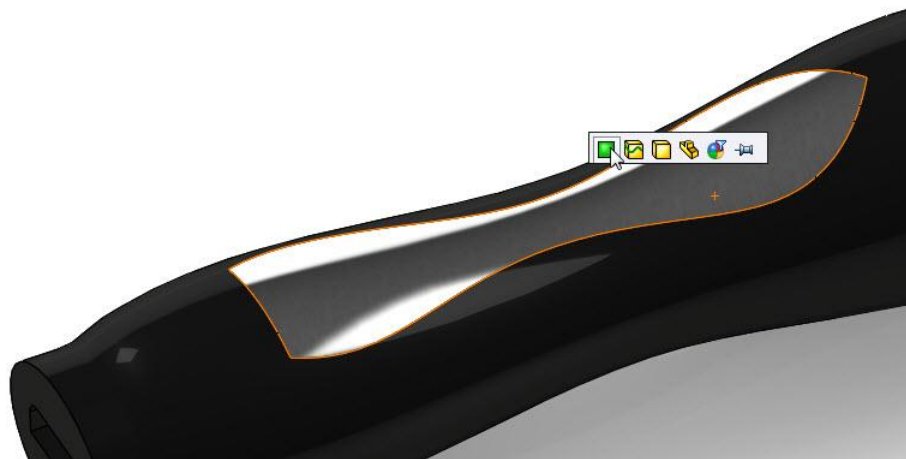
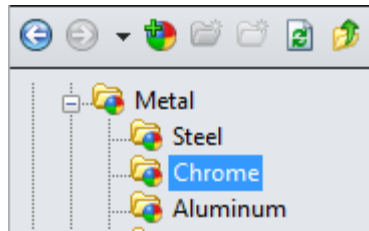
**Add relations** to make the major axis **collinear** with the end point.

**Extrude** in both directions, and add **1mm** fillets.



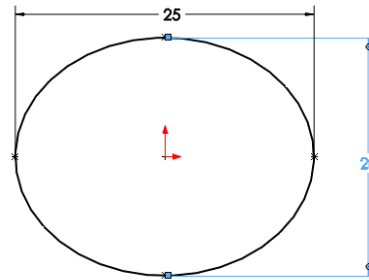
## Appearance:

Apply a **Brushed Chrome** appearance to the face.

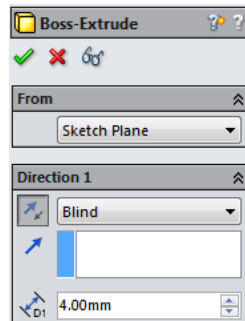


## Part 3 Washer

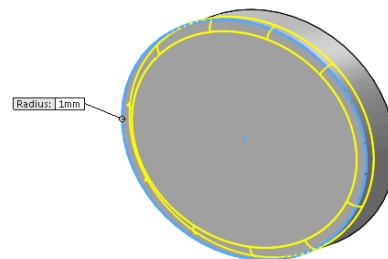
On **Front Plane**, draw an **Ellipse** to given dimensions.



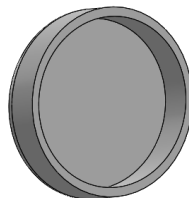
**Extrude** by **4mm**.



Add a **1mm Fillet** to front edge.

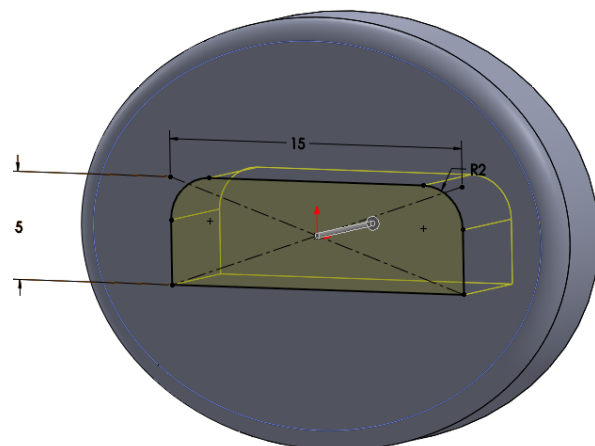


**Shell** out the back using a thickness of **1mm**.



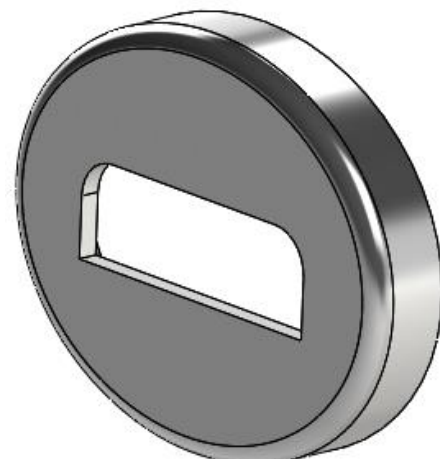
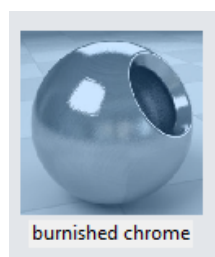
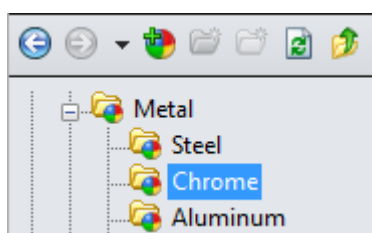
On front face, select **Centre Rectangle** and draw to the dimensions shown. Using **Fillet** command, add a **2mm** fillet to the top corners of the rectangle.

Select **Extrude Cut** and through all.




### Appearance:

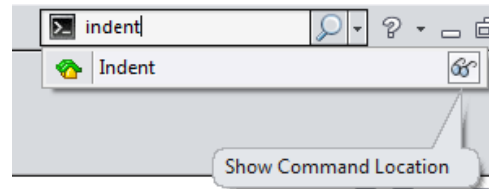
Apply a **Brushed Chrome** appearance to the washer.



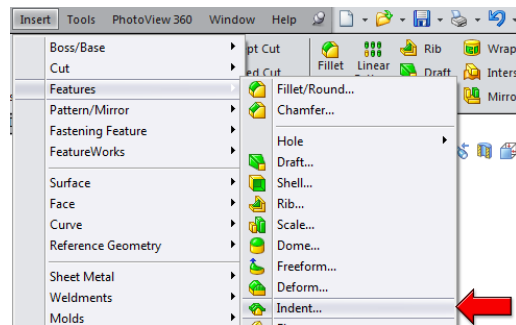
## Fixing Washer to Handle

▲ The indent feature  **Indent...** is a good one to use to make sure the washer fits snugly onto the handle.

To find the **Indent Feature**, type it into the **Search** window at the top of the screen as shown.

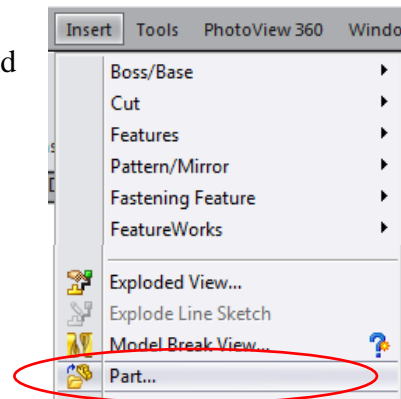


The red arrow shows its location and path.



Open the “**Handle Part**” and select **Insert**. Scroll down and select **Part**.

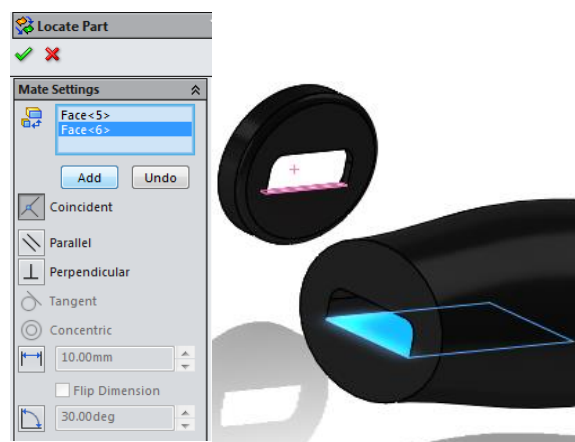
Bring in the washer.



Mates are required to position the washer correctly in position.

Select the bottom face of the hole of the handle, as shown in blue, and the bottom face of the hole in the washer, as shown in pink. Select the **Add** key to complete the mate.

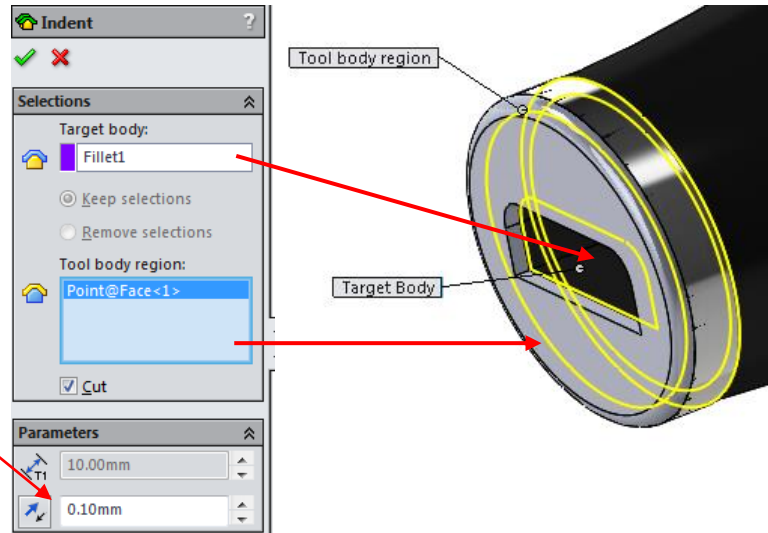
Select the front face of the handle and the back of the washer, and select **Add** to complete this mate also.



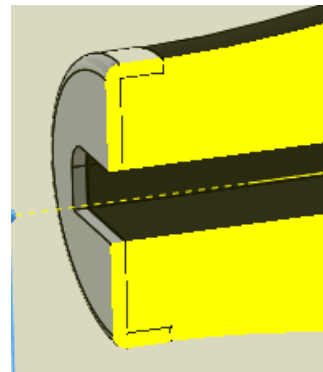
Finally select the side of the hole on the handle and the side of the hole on the washer, and **Add** mate to fix washer in position.

▲ The **Indent** feature is used to remove enough material from the Handle part in order to accommodate the washer.

Add a **0.1mm** clearance as shown.



The result can be seen in the section view shown.



**Save as Handle and Washer**

## Assembly

To assemble, bring in the **Base** first, then the **Handle and Washer**.  
Use mates to assemble.



**Save**