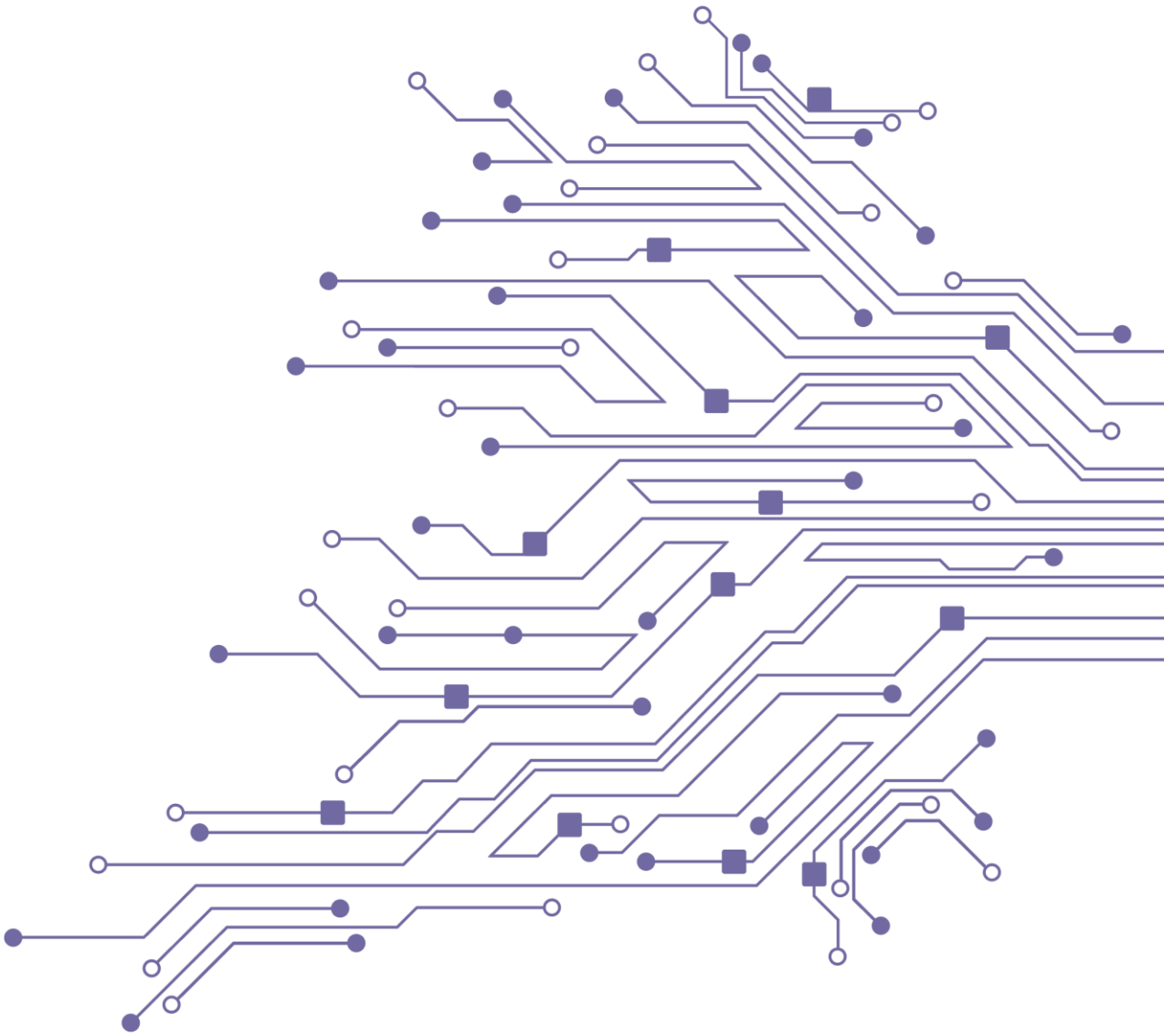
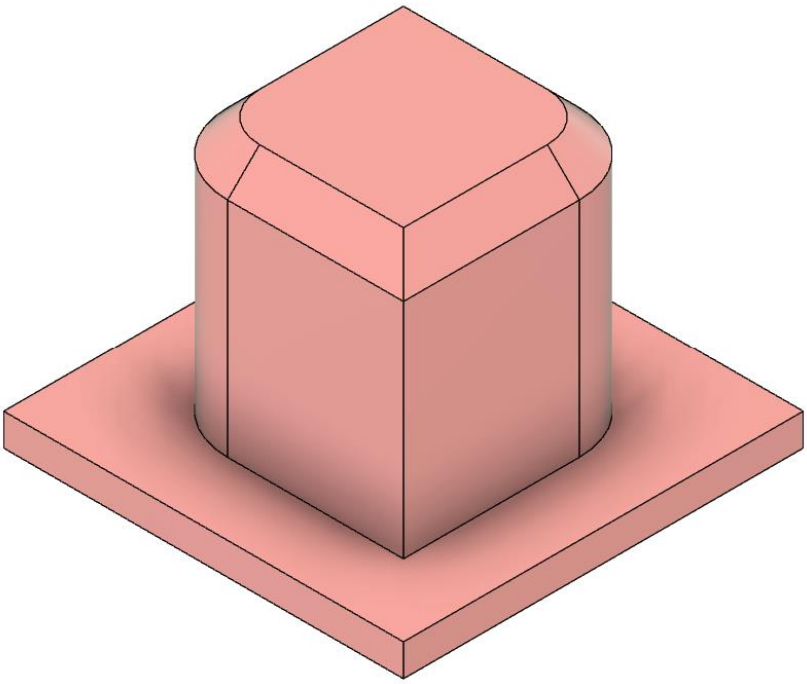
YQM.A.R.S
Mechatronics and Robotics Society

CAD Workshop

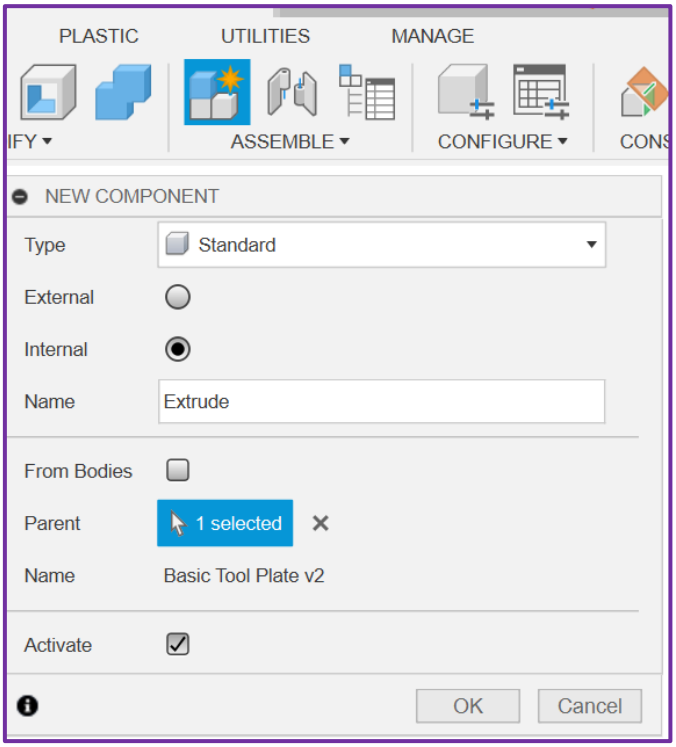
Semester 2, 2024



Part 1: Extrude



Step 1.1 Make a New Component



Step 1.2 Create the Base Plate

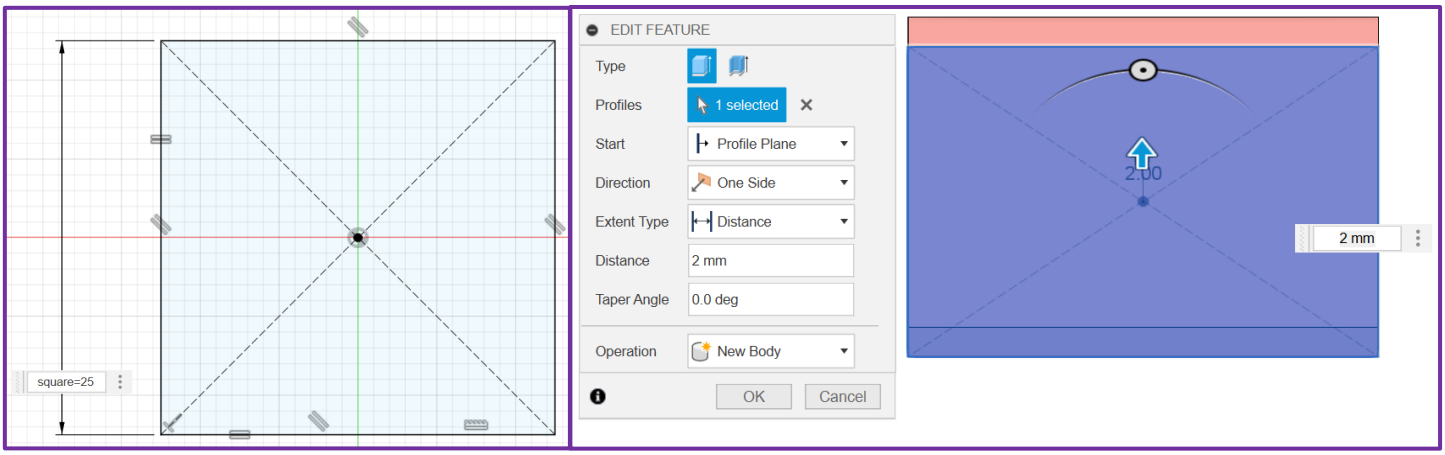
1.2.1 Create a sketch on the XY plane

1.2.2 Place a centre point rectangle, centred at the origin

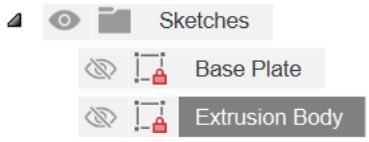
1.2.3 Use the equal constraint on two adjoining sides

1.2.4 Dimension one side to square=25

1.2.5 Extrude to 2 mm



Note: Don't forget to name your sketches!!

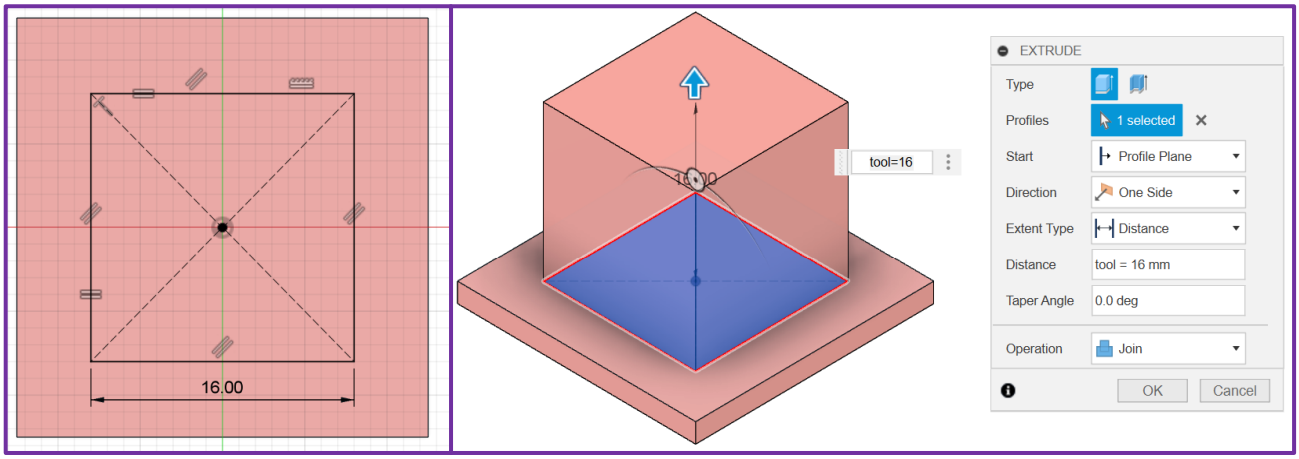


Step 1.3 Extrusion Body

1.3.1 Create a sketch on the top face of the base plate

1.3.2 Centre Point Rectangle at Origin → Equal Constraint → Dimension one side to 16 mm

1.3.3 Extrude and set the dimension to tool=16



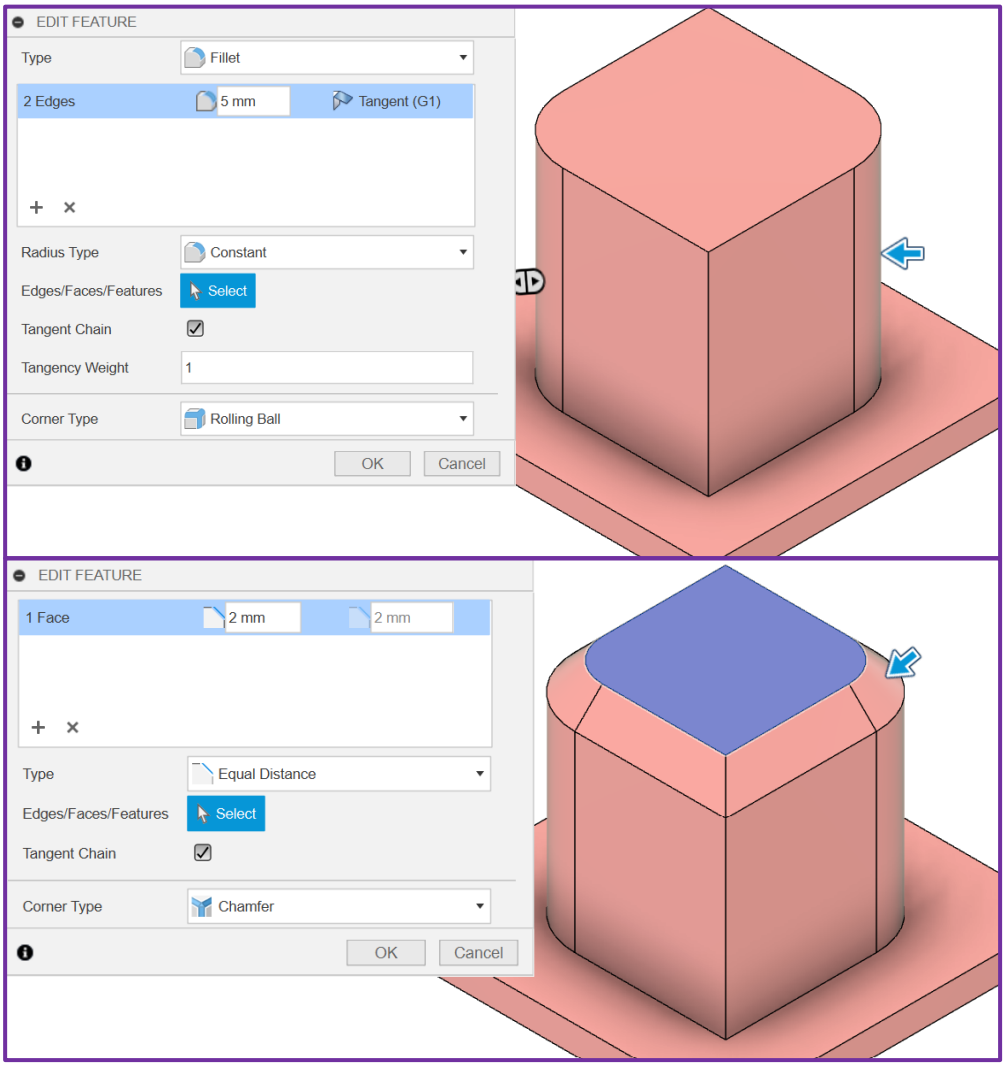
Step 1.4 Fillet and Chamfer

1.4.1 Select the fillet tool from the modify tab

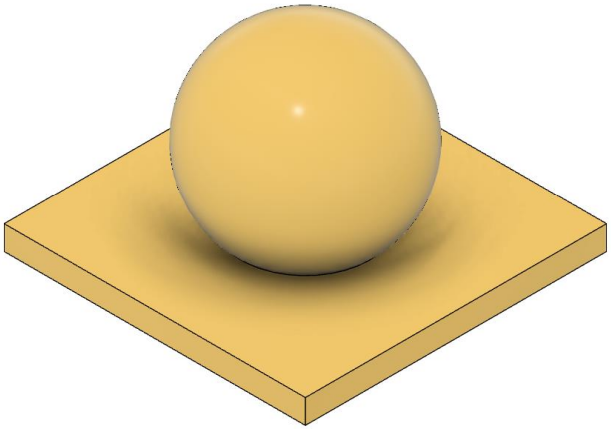
1.4.2 Select 2 opposite edges of the extruded body and set the fillet radius to 5 mm

1.4.3 Select the chamfer tool from the modify tab

1.4.4 Select the top face of the extruded body and set the chamfer radius to 2 mm

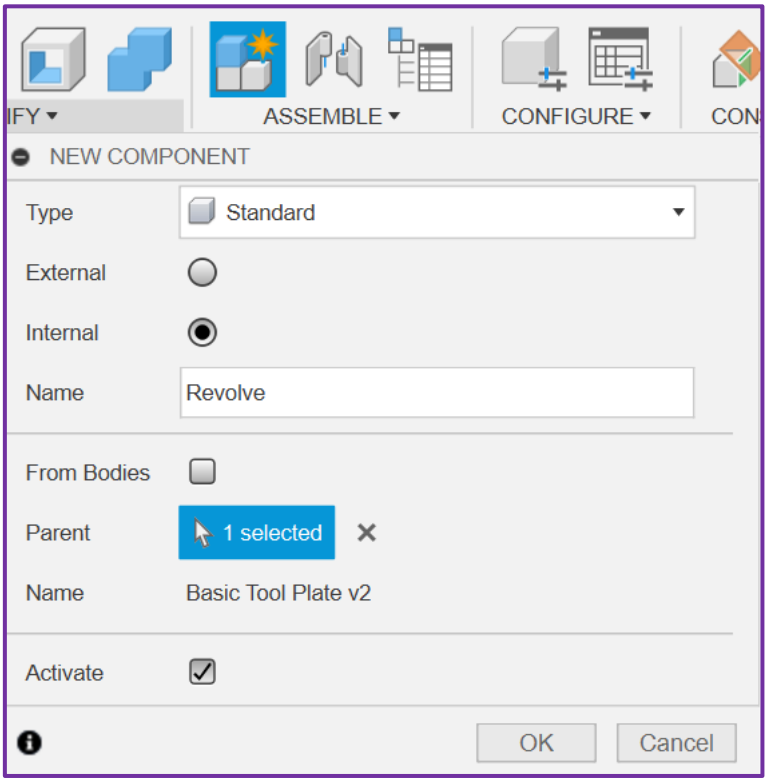


Part 2: Revolve



Step 2.1 Create a New Component

2.1.1 Make sure the parent is set to the whole file, rather than the extrude component



Step 2.2 Create the Base Plate

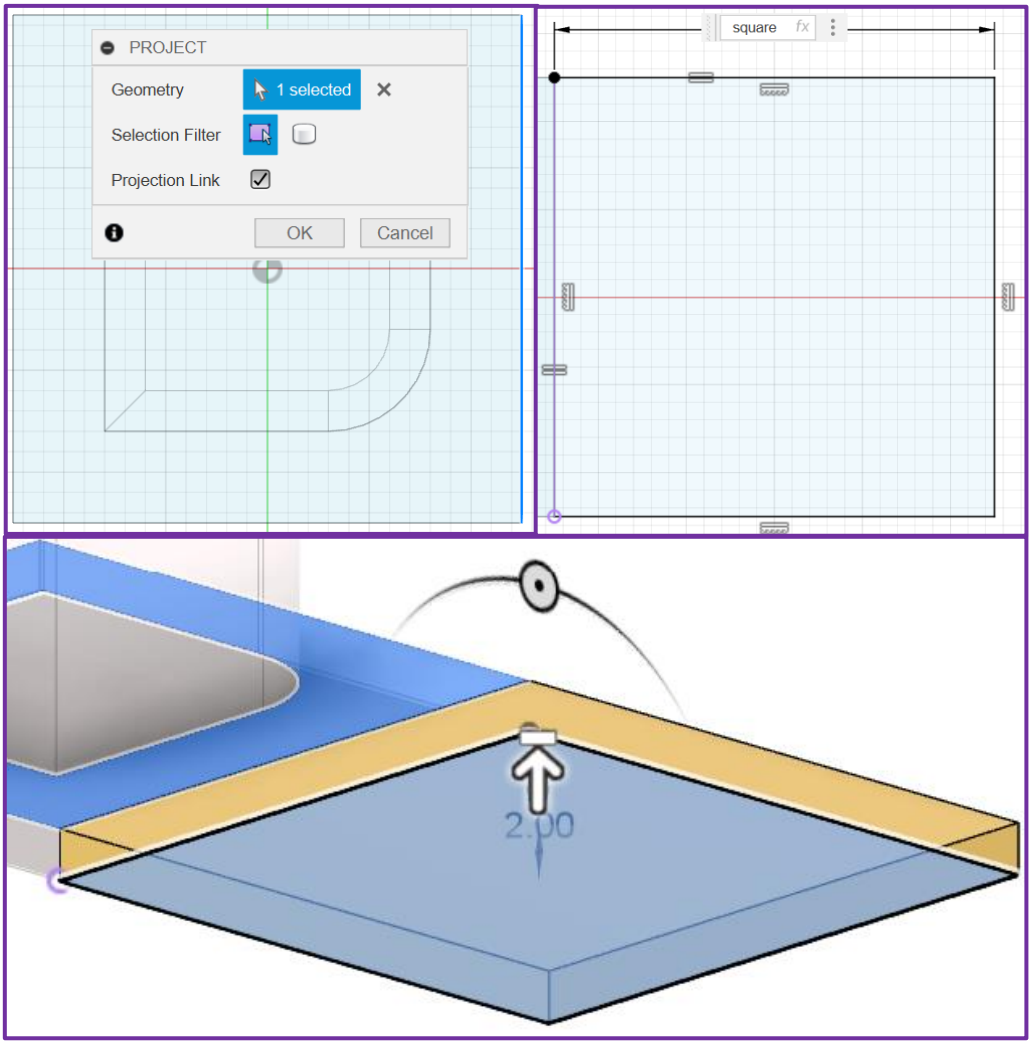
2.2.1 Create a sketch on the bottom of extrude base plate and remain in that view

2.2.2 Activate the project tool and select the right most edge of the extrude base plate

2.2.3 Use the 2-point rectangle, selecting a purple circle and random point to the right

2.2.4 Use the equal constraint on 2 adjoining sides and dimension one to be square

2.2.5 Extrude to 2 mm



Step 2.3 Create the Revolve Body Sketch

2.3.1 Create a sketch on the XZ plane (or the plane that bisects the base plate)

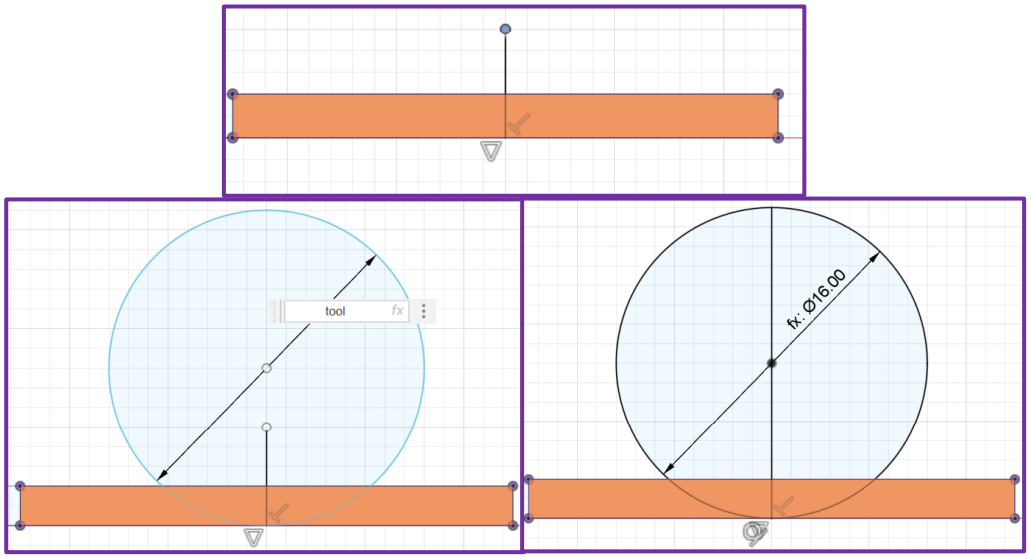
2.3.2 Project the front side of the base plate

2.3.3 Place a vertical line upwards from the midpoint of the base plate

2.3.4 Use a 2-point circle from the bottom of the line and dimension it as tool

2.3.5 Use the tangent constraint between the bottom of the circle and the bottom of the base plate

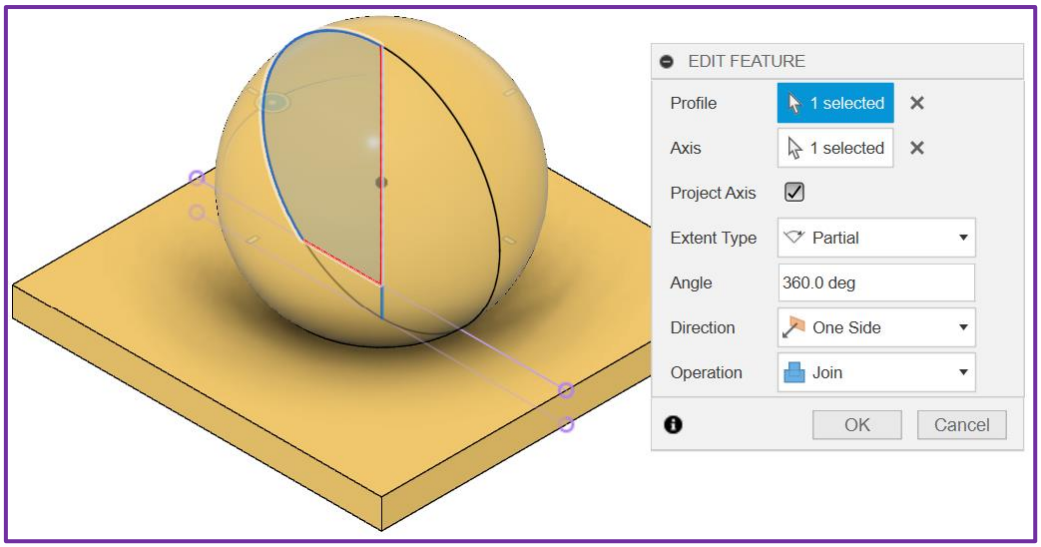
2.3.6 Use the coincident constraint between the top of the circle and the top of the line



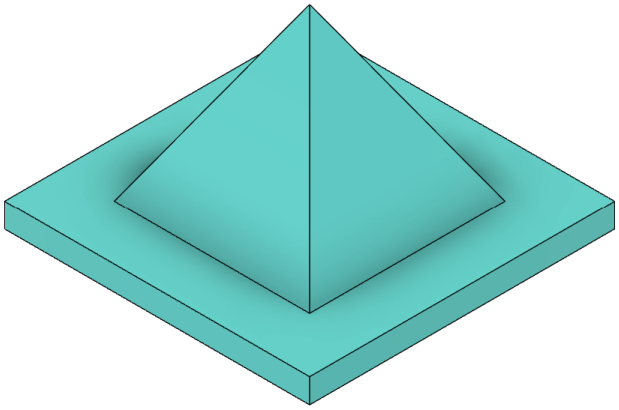
Step 2.4 Revolve

2.4.1 Activate the revolve tool from the create tab

2.4.2 Set the profile to be one half of the circle we created and the axes as the vertical line

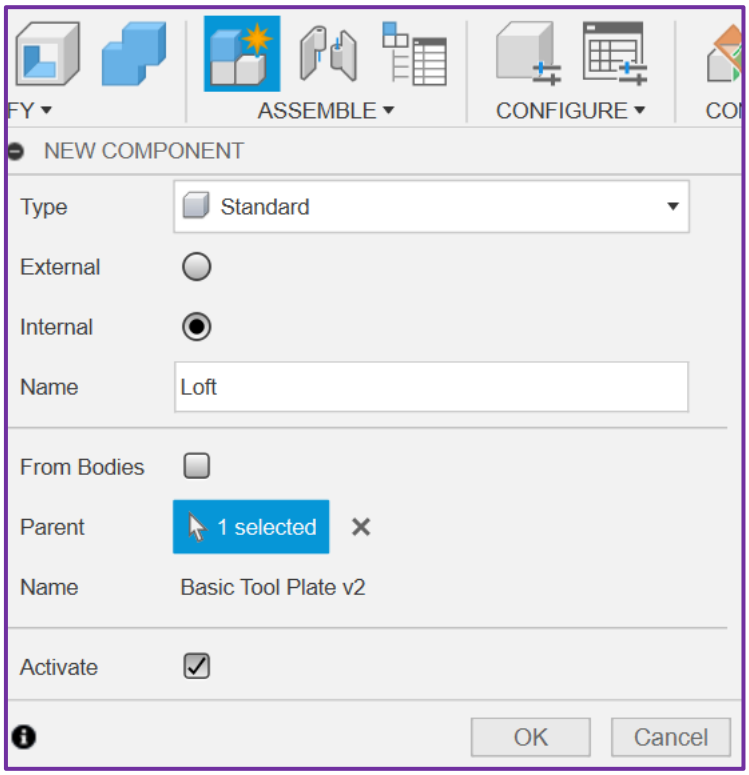


Part 3: Loft



Step 3.1 Create a new component

3.1.1 Make sure the parent is set to the whole file, rather than the extrude/revolve component



Step 3.2 Create the Base Plate

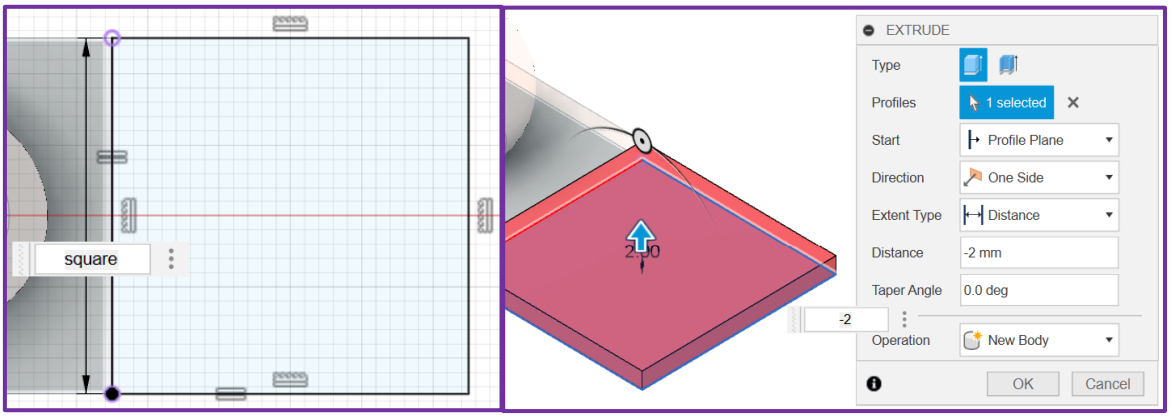
2.2.1 Create a sketch on the bottom of revolve base plate and remain in that view

2.2.2 Activate the project tool and select the right most edge of the revolve base plate

2.2.3 Use the 2-point rectangle, selecting a purple circle and random point to the right

2.2.4 Use the equal constraint on 2 adjoining sides and dimension one to be square

2.2.5 Extrude to 2 mm

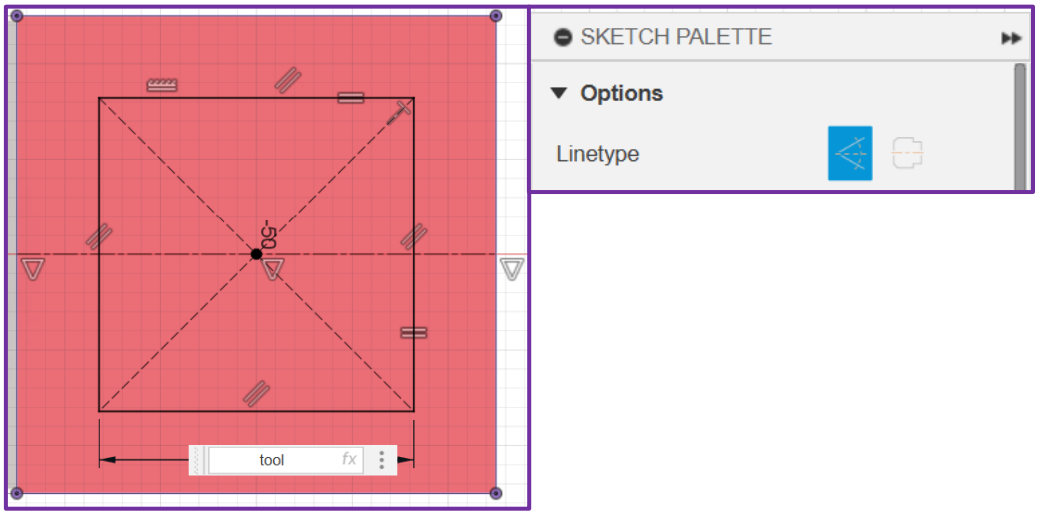


Step 3.3 Loft Body Sketch

3.3.1 Create a sketch on the top of the base plate

3.3.2 Place a horizontal construction line through the middle of the base plate

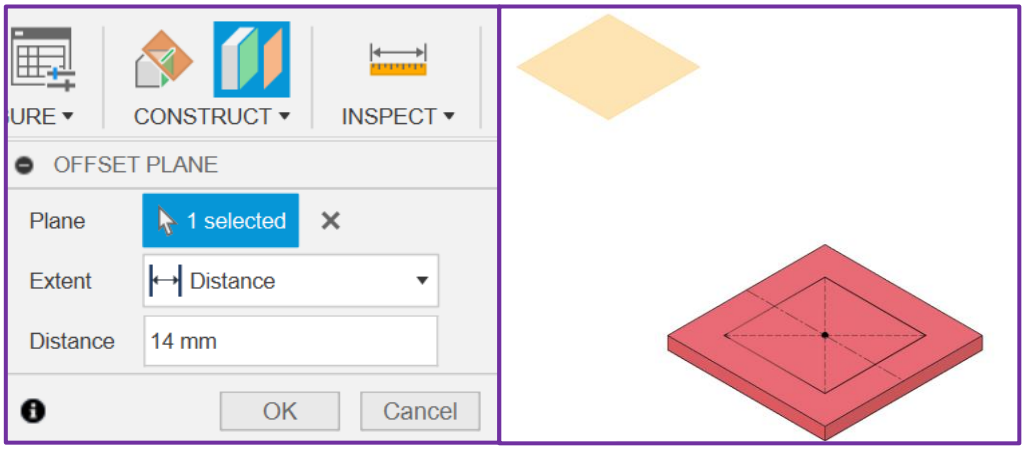
3.3.3 Place a centre point square at the midpoint of the base plate, dimensioned as tool



Step 3.4 Offset Plane

3.4.1 Select the offset plane tool from the construction tab

3.4.2 Set the plane to the XY plane and the distance to 14 mm



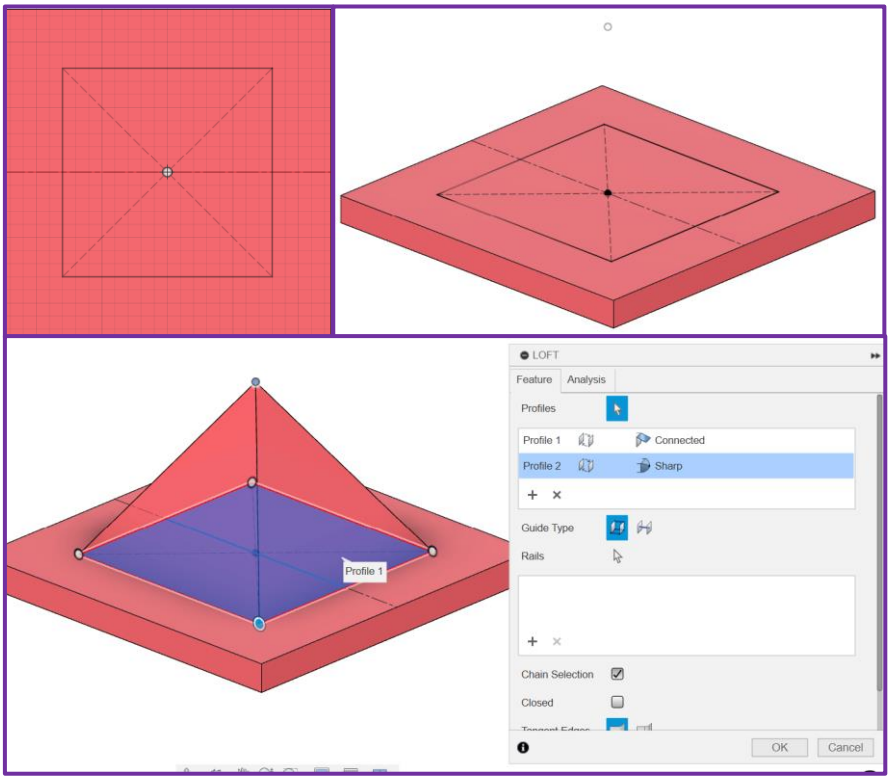
Step 3.5 Point Sketch and Loft Tool

3.5.1 Create a sketch on the new plane we created

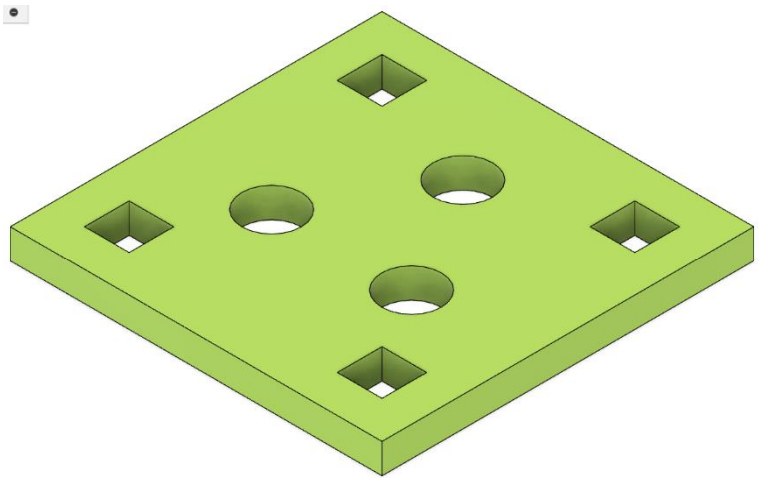
3.5.2 Place a point in the centre of the loft body sketch and finish the sketch

3.5.3 Activate the loft tool from the create tab

3.5.4 Select both halves of the square, followed by the point (Note: Loft connects in the order you select in, make sure you select the whole square before you select the point)



Part 4: Patterns



Step 4.1 Create a new component and the base plate

4.1.1 Create a new component and make sure the parent is set to the whole file, rather than the extrude/revolve/loft component

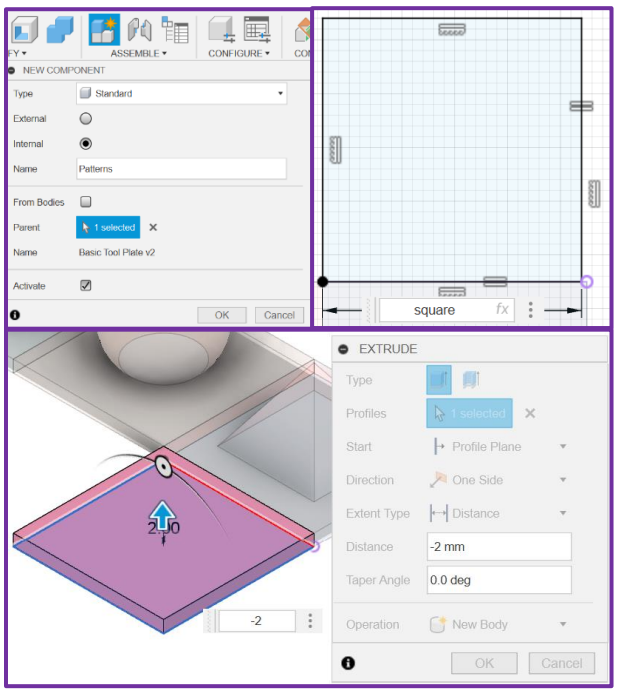
4.1.2 Create a sketch on the bottom of loft base plate and remain in that view

4.1.3 Activate the project tool and select the topmost edge of the loft base plate

4.1.4 Use the 2-point rectangle, selecting a purple circle and random point upwards

4.1.5 Use the equal constraint on 2 adjoining sides and dimension one to be square

4.1.6 Extrude to 2 mm



Step 4.2 Squares

4.2.1 Create a sketch on the top of the base plate

4.2.2 Create a 3x3 centre point square in the top left corner

4.2.3 Dimension the centre point 4 mm away from the top of the base and 4 mm from the left edge of the base

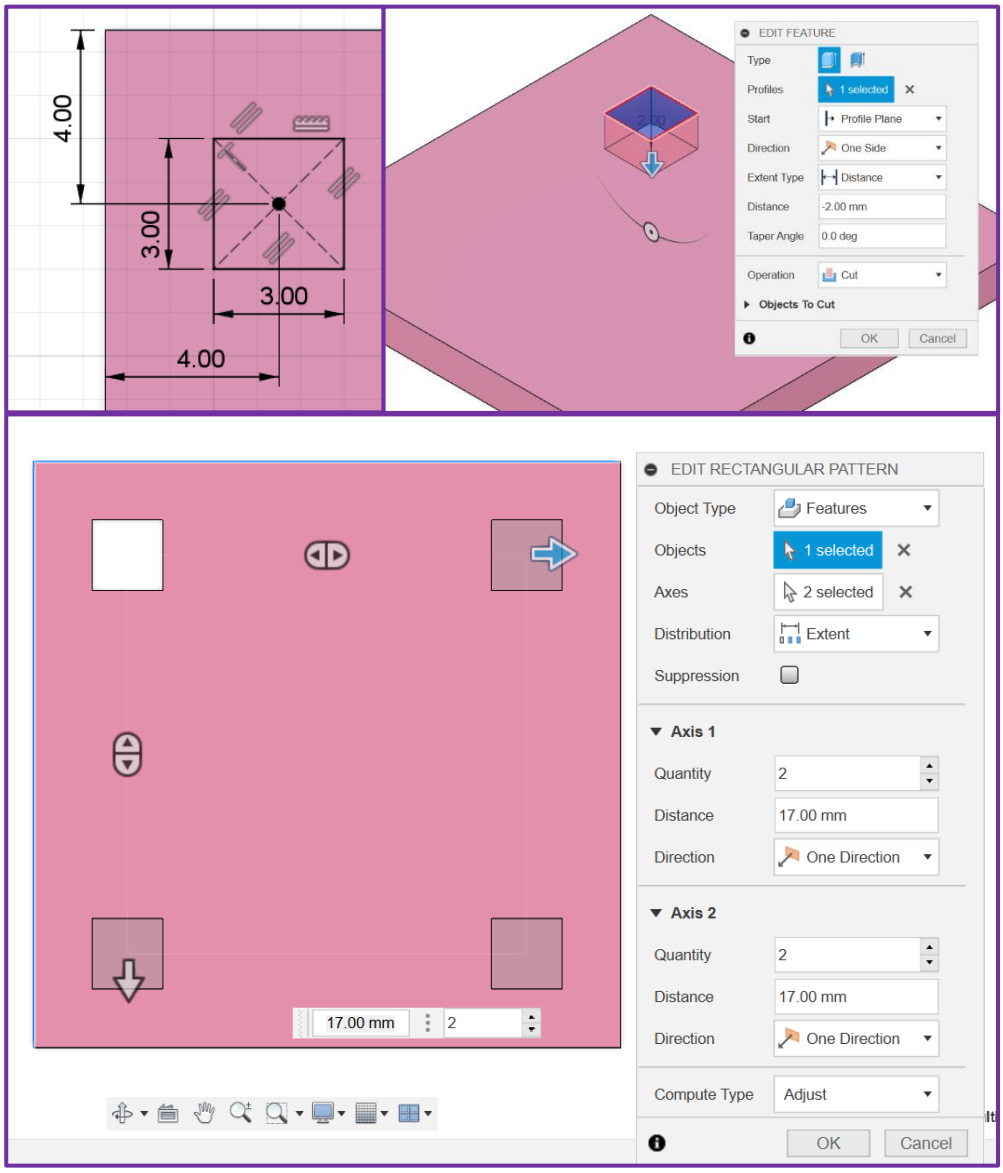
4.2.4 Extrude it 2 mm downwards

4.2.5 Select the rectangular pattern from the create tab

4.2.6 Change the object type from bodies to features

4.2.7 Select the hole as the object and two adjoining edges as the axes

4.2.8 For both axes, set the quantity to 2 and the distance to 17 mm



Step 4.3 Circle Sketch and Extrusion

4.3.1 Create a sketch on the top of the base plate

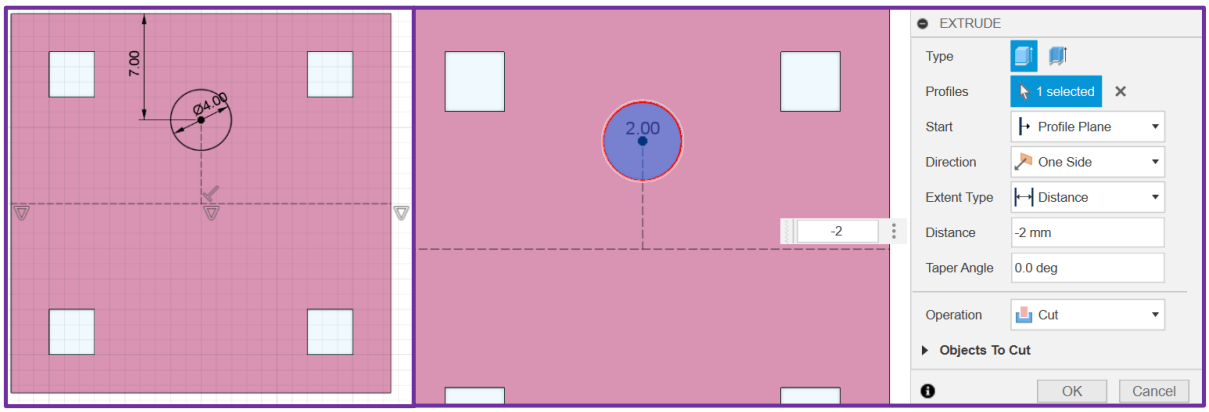
4.3.2 Place a horizontal midpoint construction line on the base plate

4.3.3 Place a second construction line vertically from the midpoint of the midpoint construction line

4.3.4 Place a 4 mm centre point circle from the top of the vertical construction line

4.3.5 Dimension the centre of this circle to be 7 mm from the top of the base plate

4.3.6 Extrude this 2 mm downwards



Step 4.4 Circular Pattern

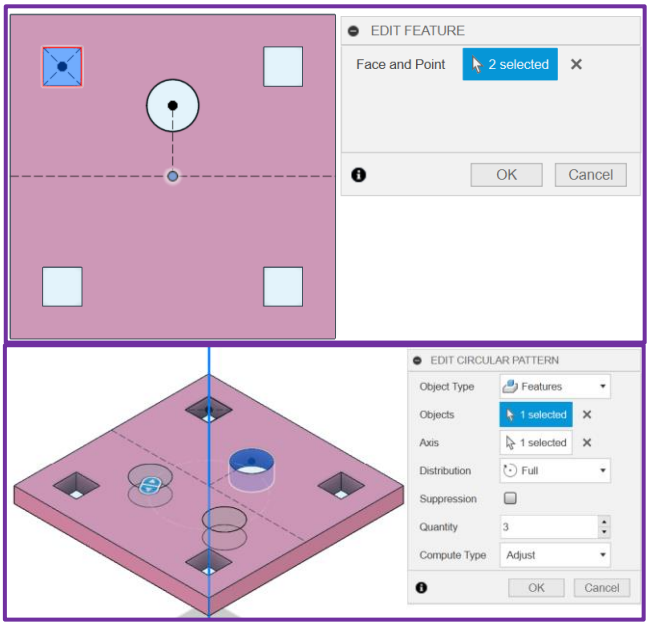
4.4.1 Ensure both your square and circle sketch are visible

4.4.2 Select the Axis Perpendicular to Face at Point from the Construct tab

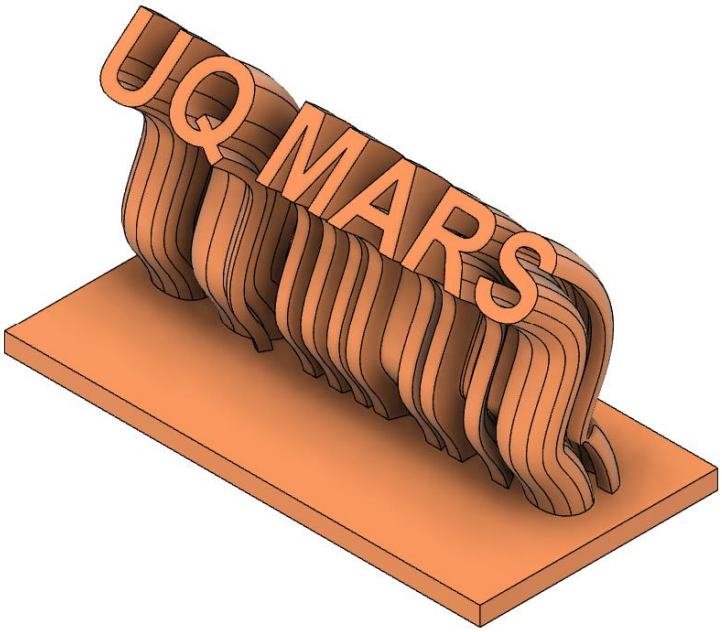
4.4.3 Select the face of the original square, as well as the intersection point between the horizontal and vertical construction lines and click ok

4.4.4 Activate the circular pattern tool ensure it is set to features

4.4.5 Choose the circle hole as the object and the construction axis that we created as the axis



Part 5: Sweep



Step 5.1 Create a new component and the base plate

4.1.1 Create a new component and make sure the parent is set to the whole file, rather than the extrude/revolve/loft/patterns component

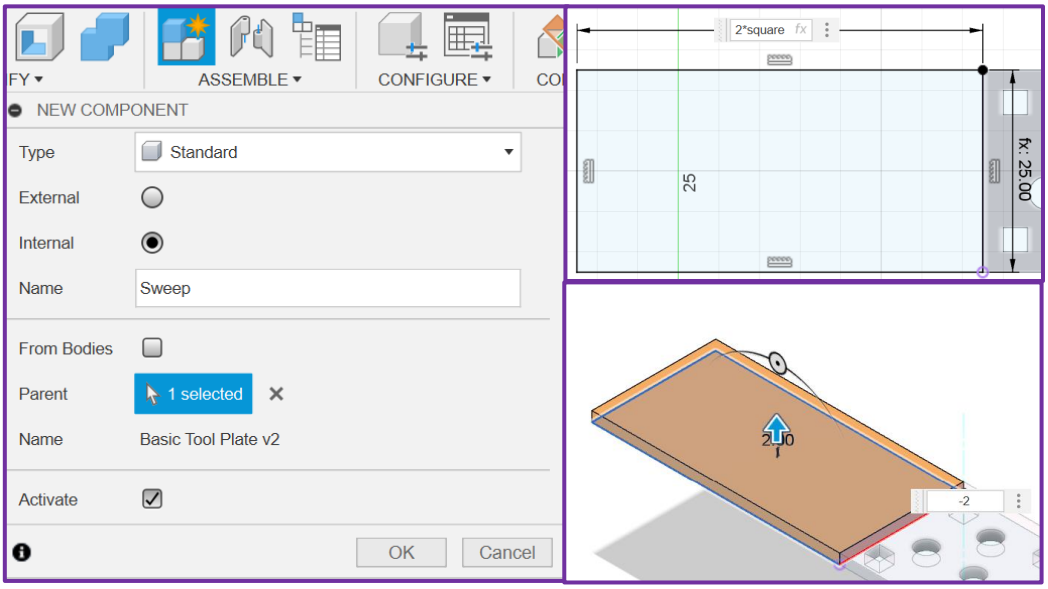
4.1.2 Create a sketch on the bottom of patterns base plate and remain in that view

4.1.3 Activate the project tool and select the left edge of the patterns base plate

4.1.4 Use the 2-point rectangle, selecting a purple circle and random point to the left

4.1.5 Dimension the vertical sides to square and the horizontal sides to 2*square

4.1.6 Extrude to 2 mm

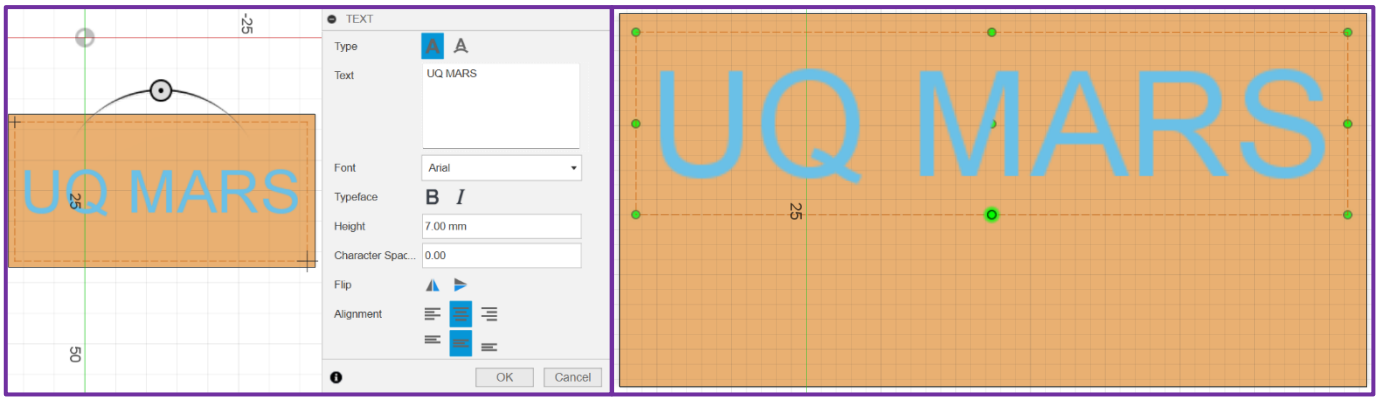


Step 5.2 Text

5.2.1 Create a sketch on the top of the base plate

5.2.2 Activate the text tool from the create tab

5.2.3 Draw the text box to fit within the base plate, type your desired text, align it both centre and middle, adjust the height and select ok (Note: We recommend something short for this particular activity, such as your initials or “UQ MARS”)



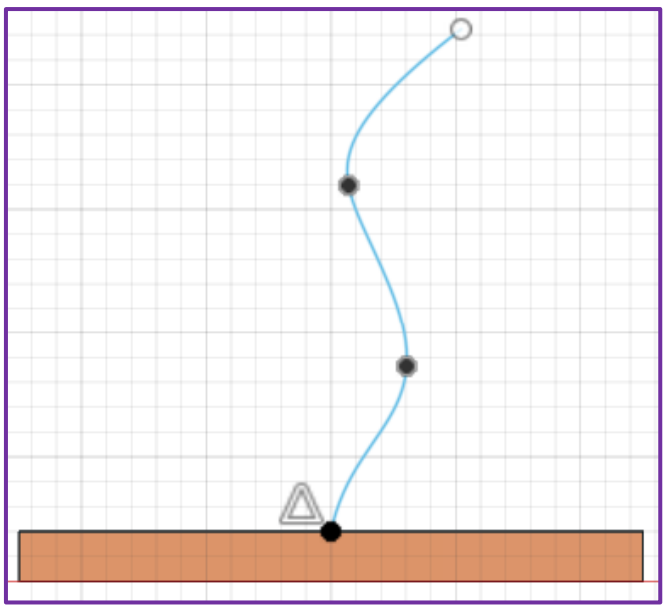
Step 5.3 Text Path

5.3.1 Start a new sketch on the left side of the base plate

5.3.2 Activate the fit point spline tool from the create tab

5.3.3 Draw some curves in a rough wave shape, starting from the midpoint of the base plate (Note: Make sure you select the green tick when you’re done, pressing escape will delete it)

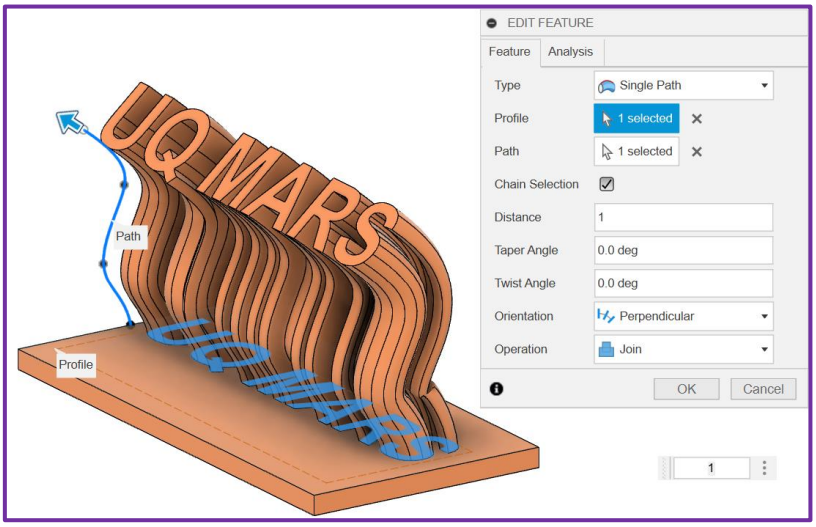
5.3.4 You can adjust the shape using the green tangent lines and the dots



Step 5.4 Sweep

5.4.1 Activate the sweep tool from the create tab

5.4.2 Select the text as the profile and the curve as the path



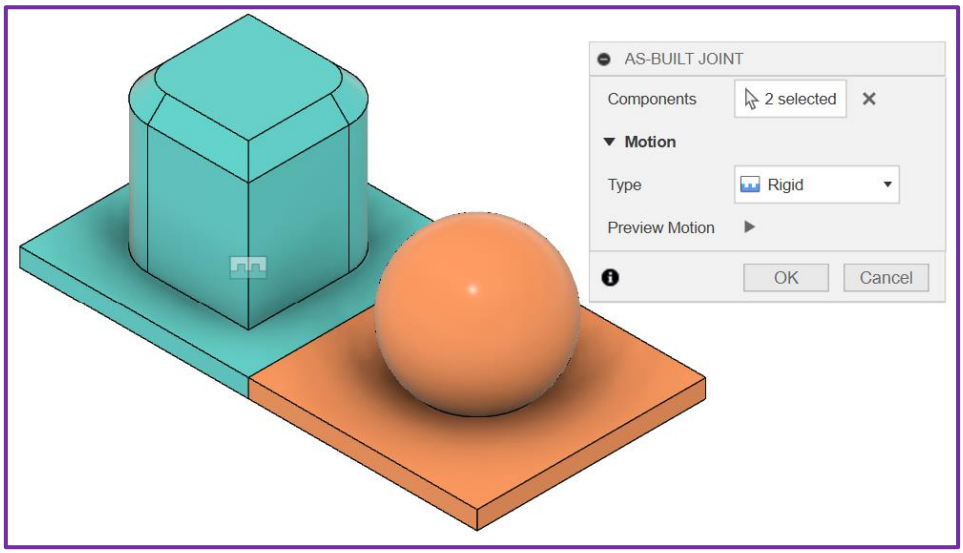
Part 6: Joining

Step 6.1 Joining

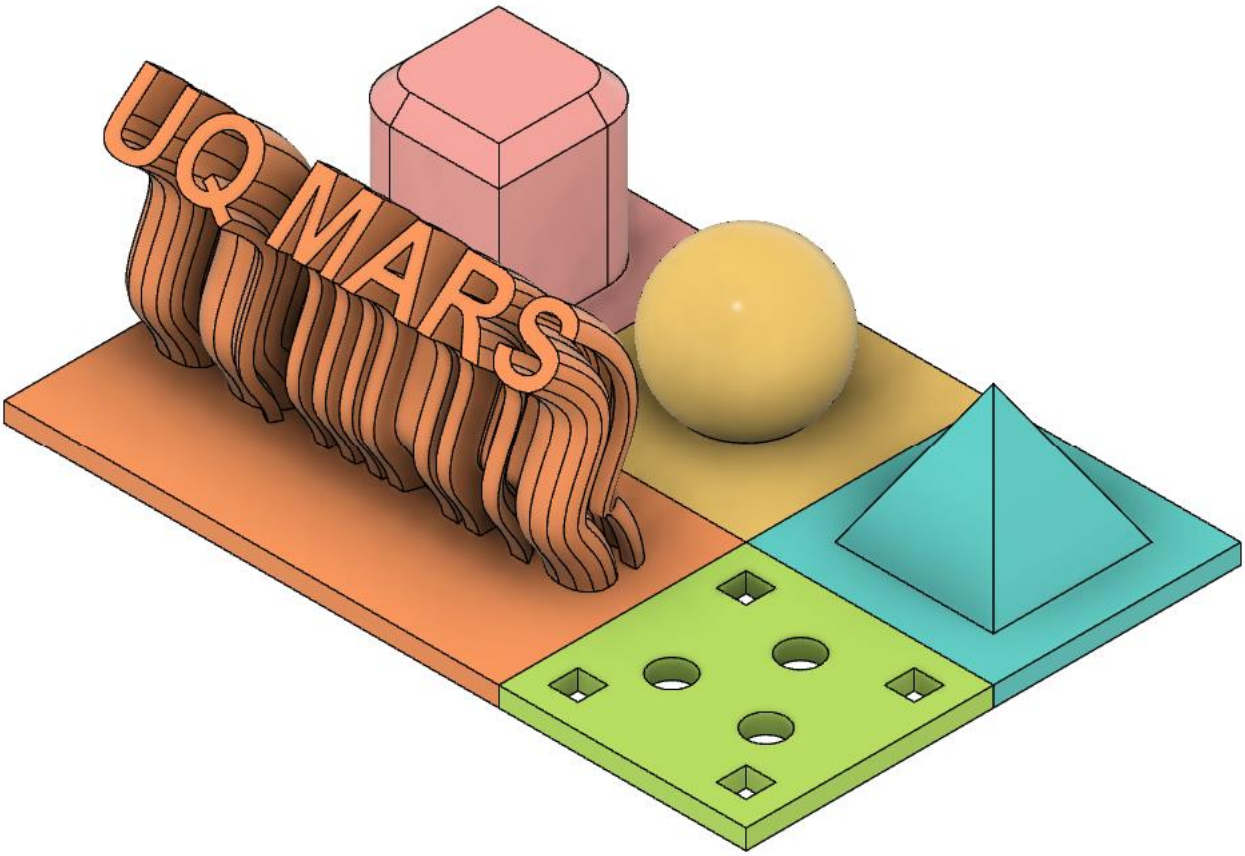
6.1.1 Select the As-Built Joint tool from the assemble tab

6.1.2 Select both the extrude and the revolve base plates and ensure it is set to rigid

6.1.3 Repeat this until all components are fixed



Completed!



Credits

- Lili-Grace Bacon
  - Follow-along Document
- Binara Wasala
  - Part design