

09/22

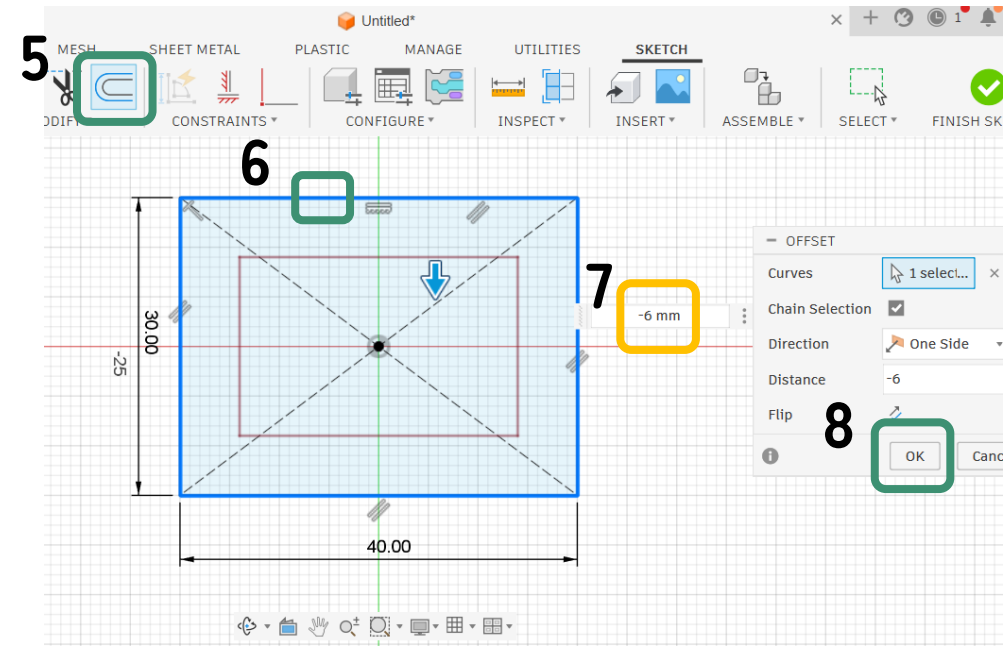
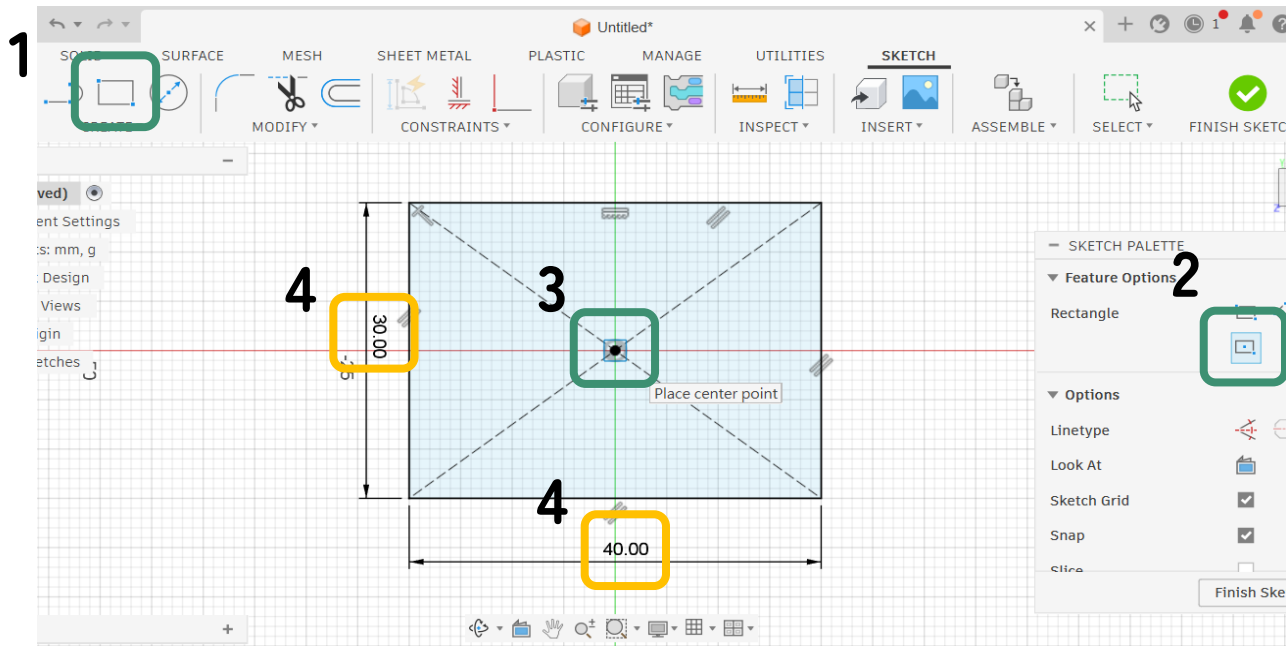
Drawing a fidget toy step by step

TA: Che-Wei Hsu

Feel free to raise your hand if you have any question



Step 1: Drawing the frame of the fidget toy



Outer dimensions: 30mm by 40mm

Offset distance: 6mm (add a negative sign if the direction is wrong)

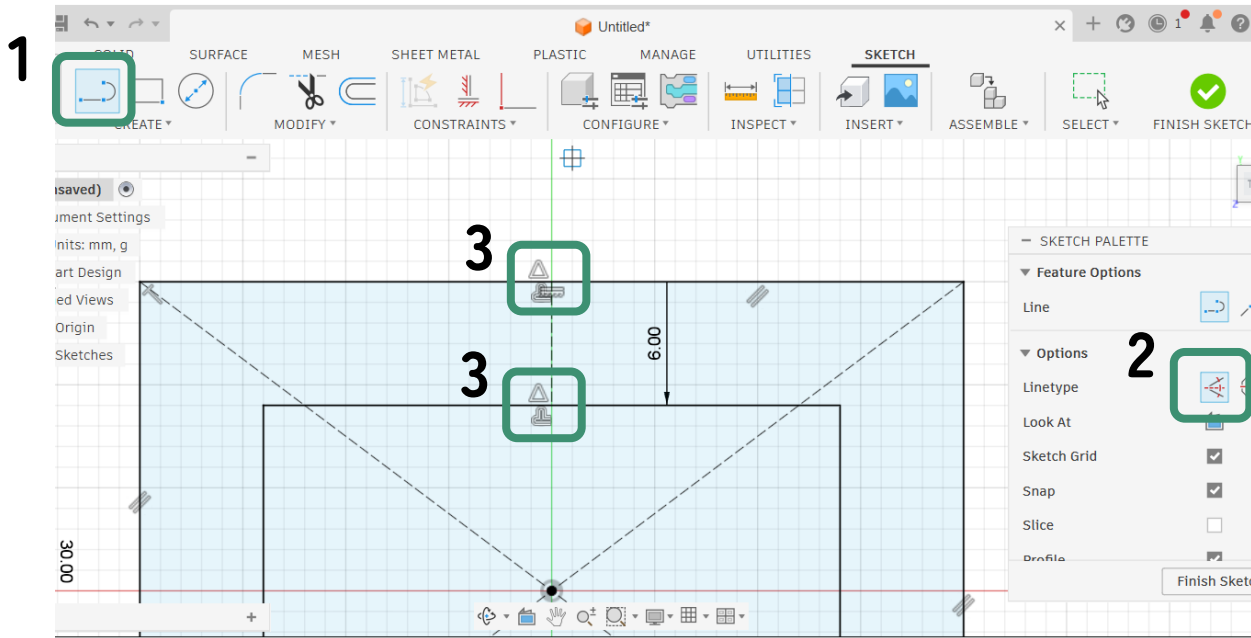


Click Here



Insert Here

Step 2: Sketching the details



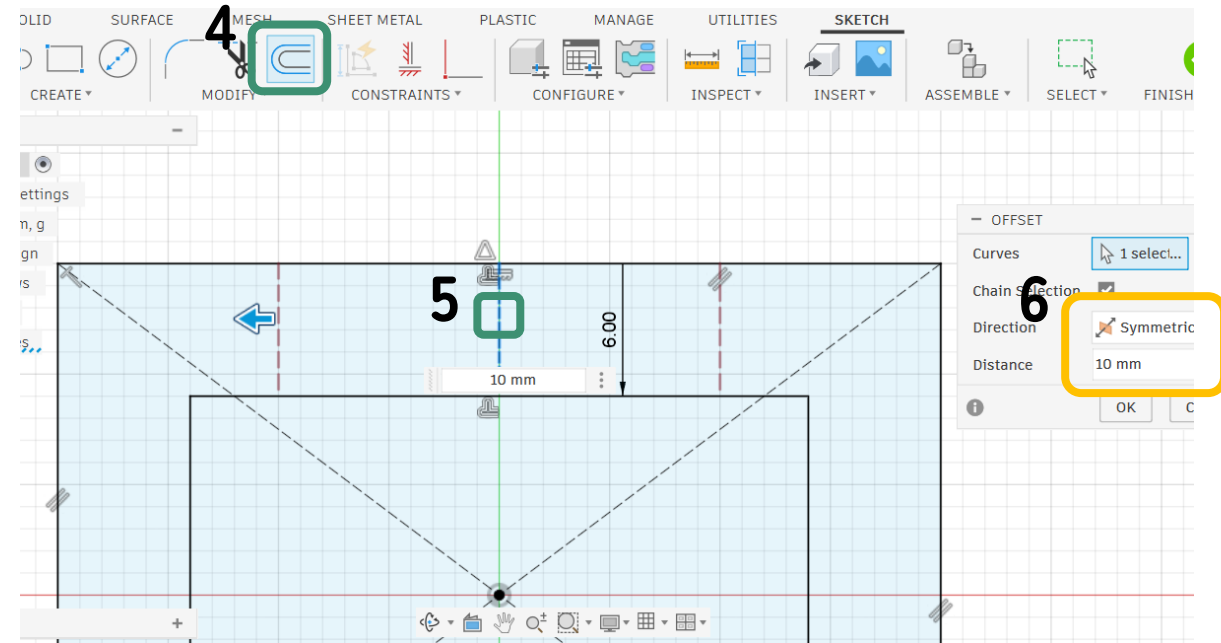
Make sure using dash line (construction line)



Click Here



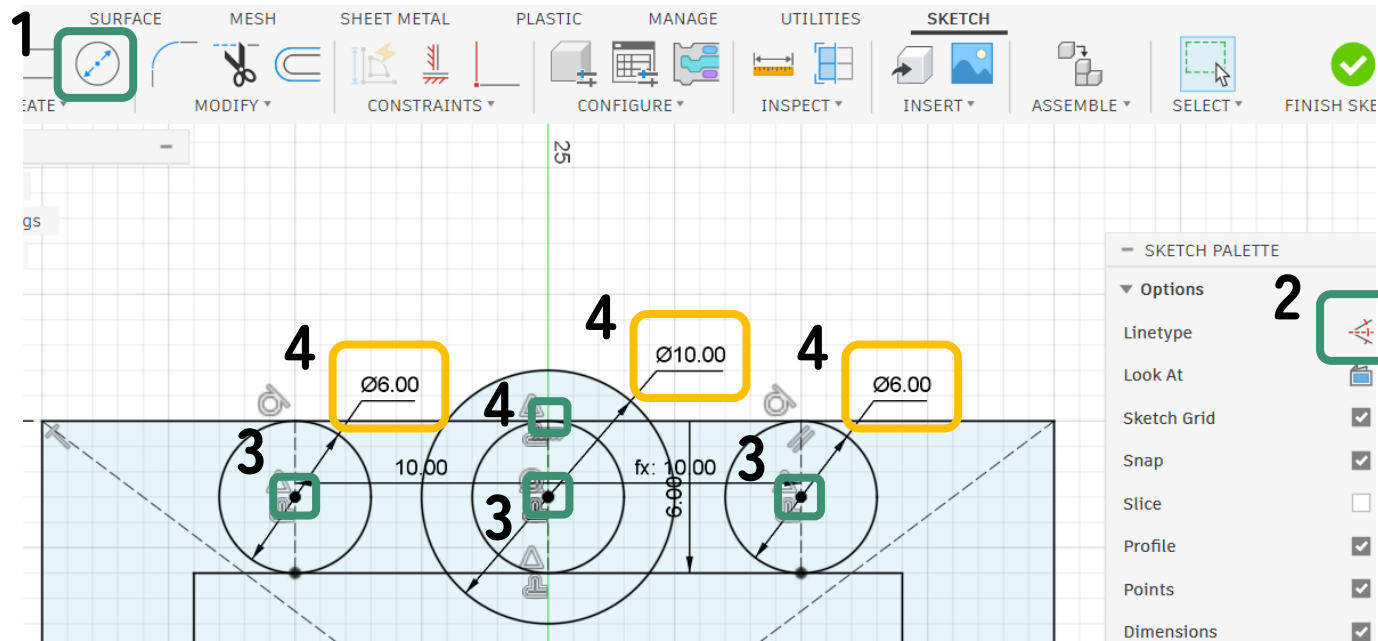
Insert Here



Select **Symmetric** in stead of One side

Construction line allows us to confirm dimensions without sabotaging the sketch

Step 2: Sketching the details



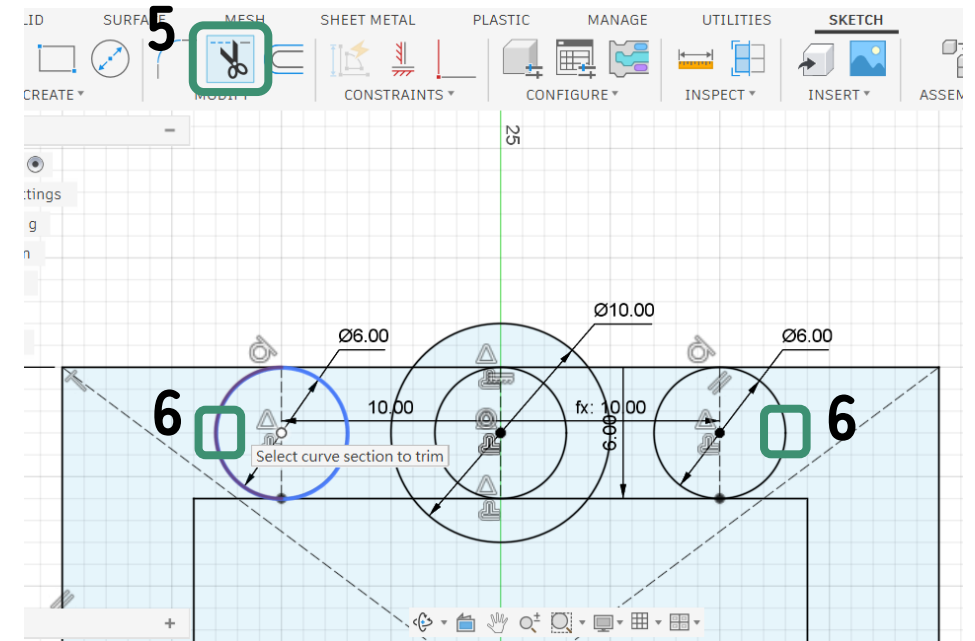
Make sure changing back to physical line (2's icon untoggled)



Click Here

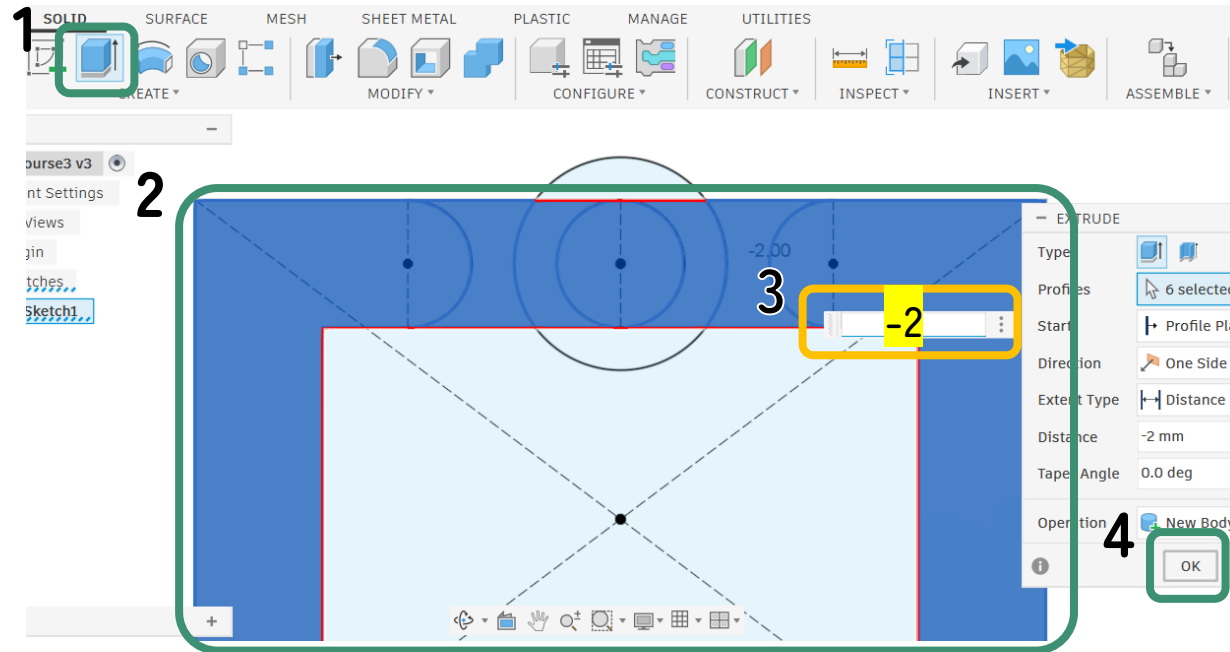


Insert Here



Trim only the two half circles

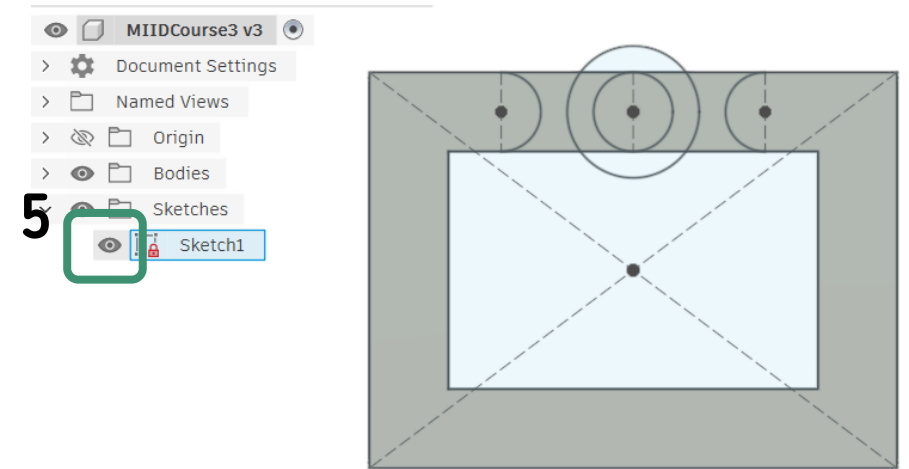
Step 3: Extrusion



Select all the parts from the outside frame

 Click Here

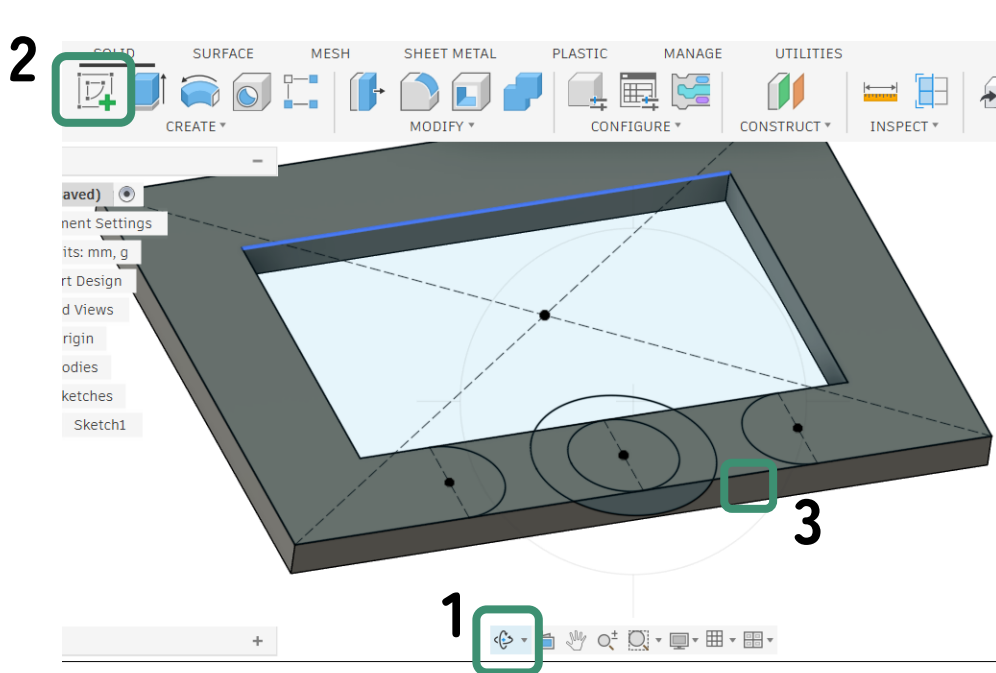
 Insert Here



Toggle the **Show/Hide** on the Sketch1 ON
(You should see as this)

Extrusion extrudes the solid in vertical direction

Step 4: Creating a new sketch in different dimension



Rotate the viewing angle to show this side



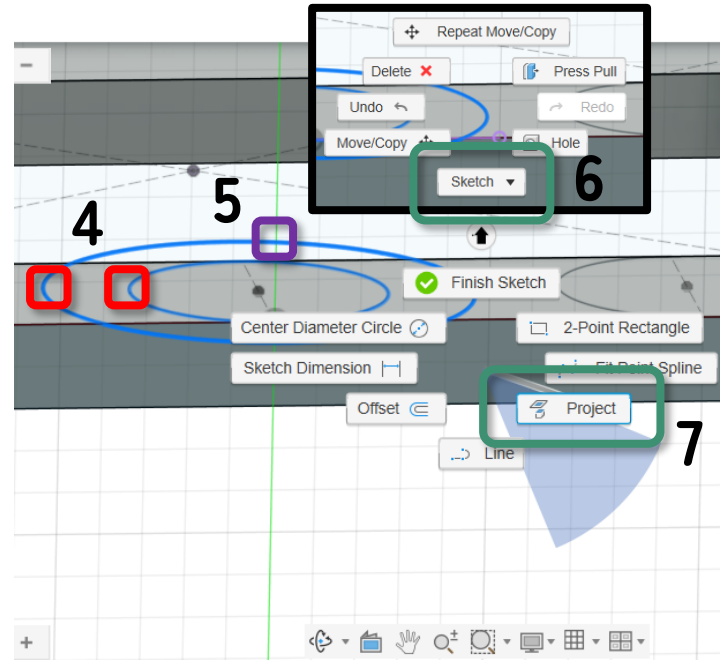
Click Here



Ctrl+Click Here (For multiple selection)



Right Click Here

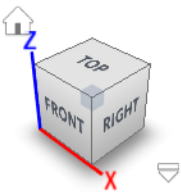
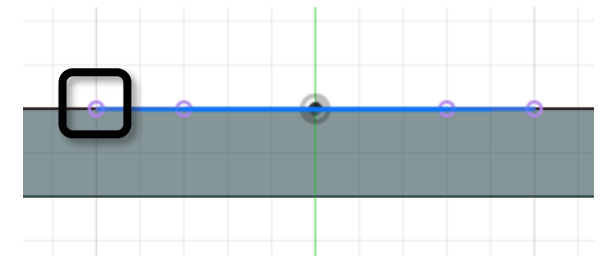


Rotate the viewing angle again to show the sketch

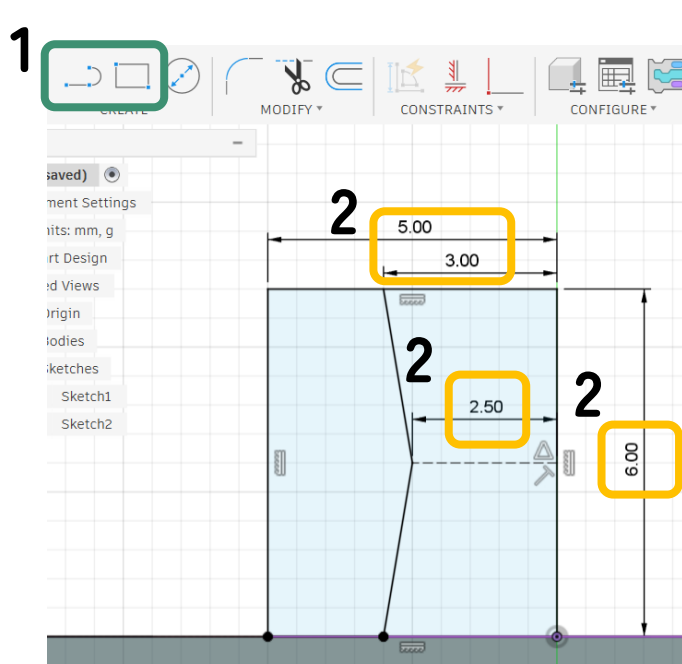
When activating **Rotate**, click and drag to rotate the view to the specific angle you want (Or click on the cube)

Project is a very useful function, as it allows you to create references for drawing connected components

You should see the purple dots



Step 5: Draw the cross-section of the axis



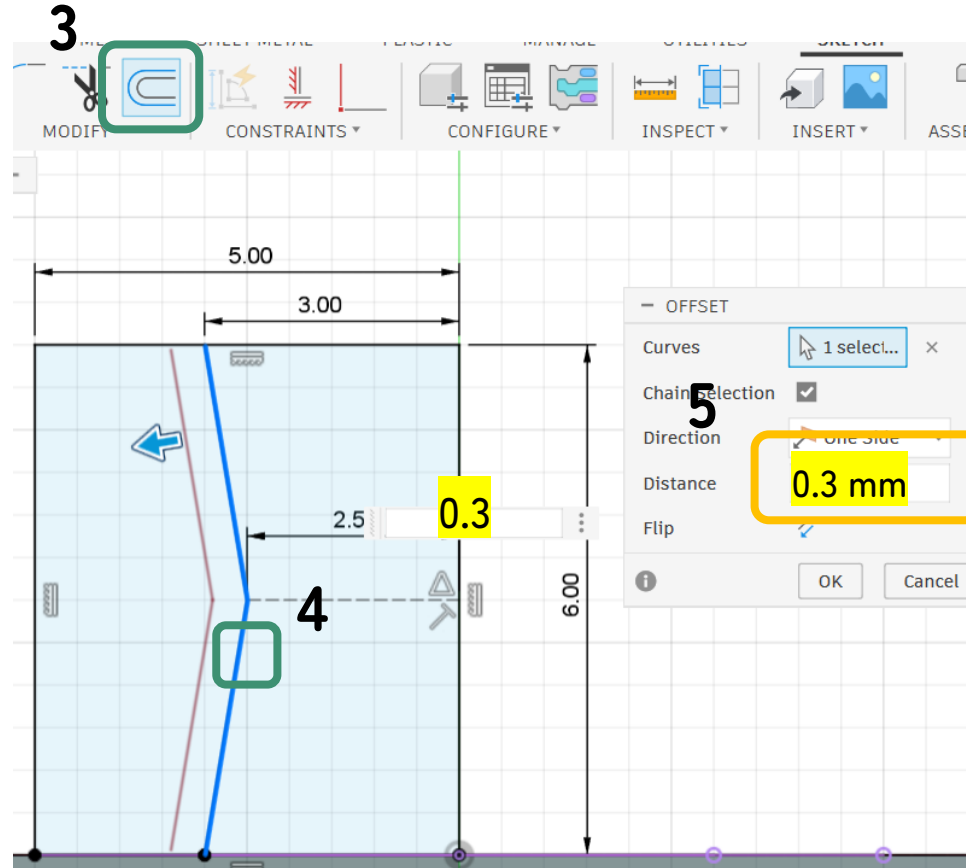
Draw the rectangle first



Click Here



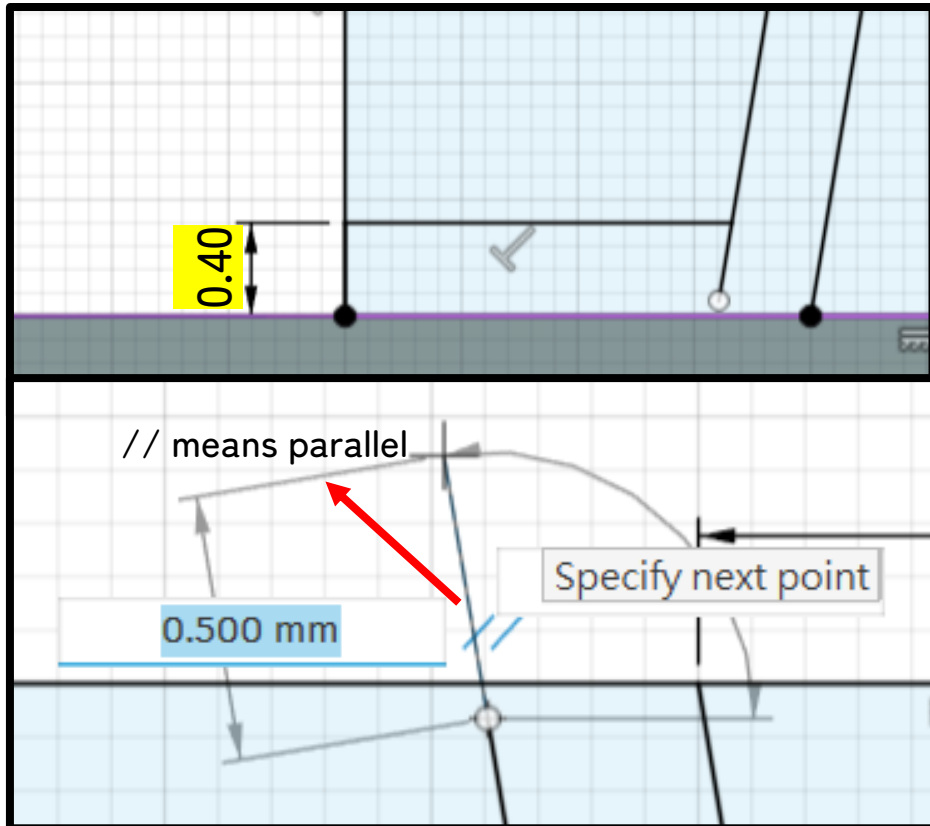
Insert Here



The spacing of 0.3 mm is tested by the tolerance test

Step 5: Draw the cross-section of the axis

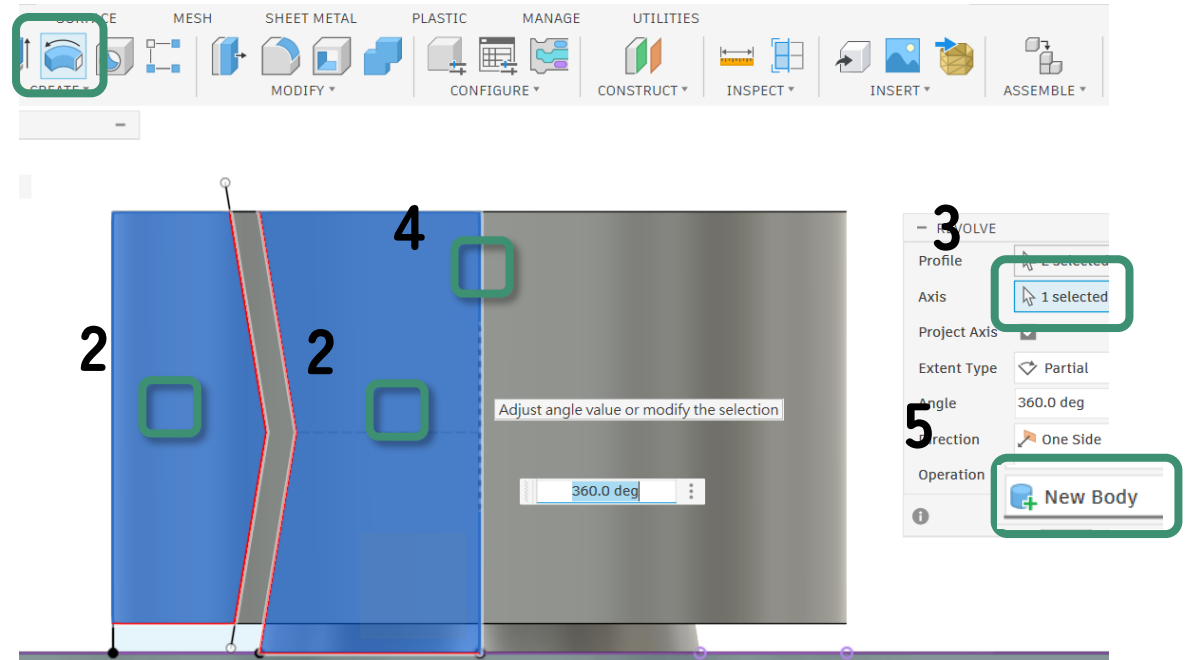
1



Add these lines to close the region



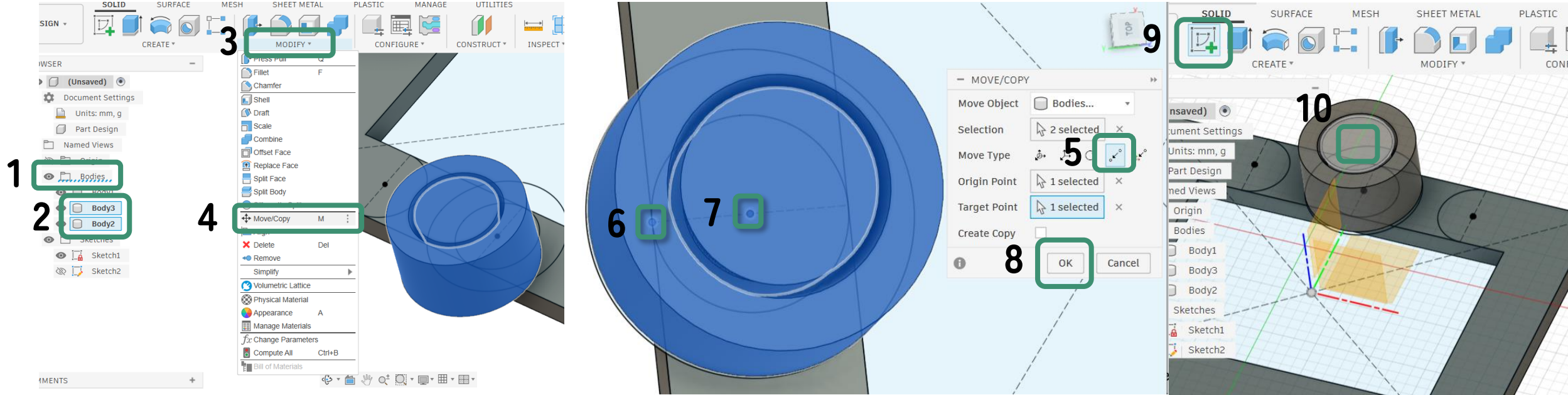
Click Here



Use Revolve to create a solid from the cross-section

The spacing of 0.4mm is because our FDM is printing with 0.2mm layer height, leaving two stack of spaces

Step 6: Move the part and create a new sketch

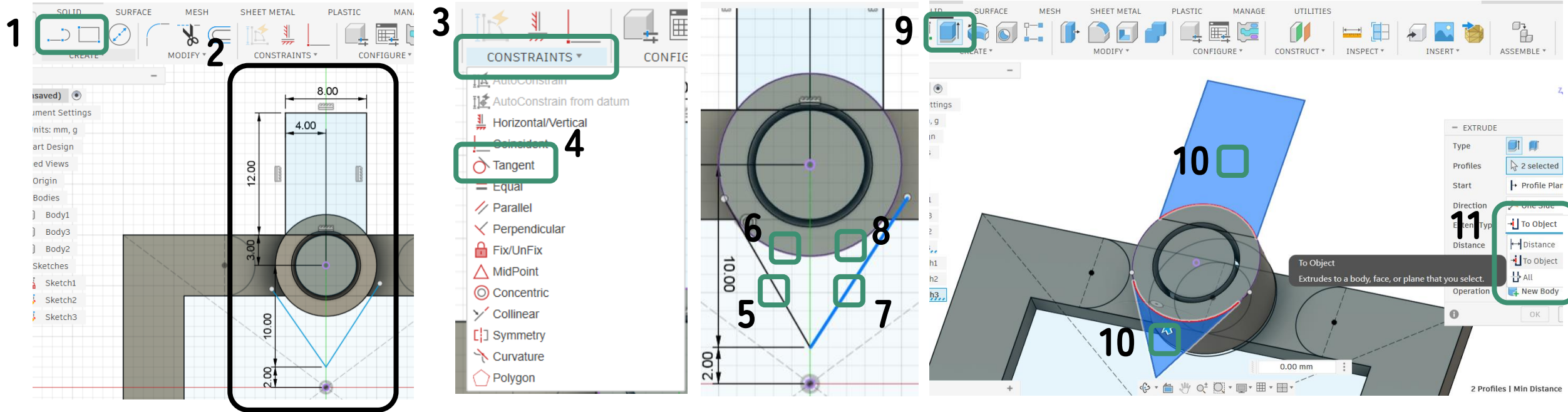


Since we draw the cross-section on the edge, we need to move the whole body back



Click Here

Step 7: Let's draw the switch!

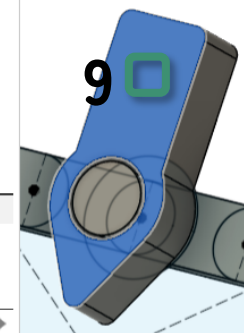
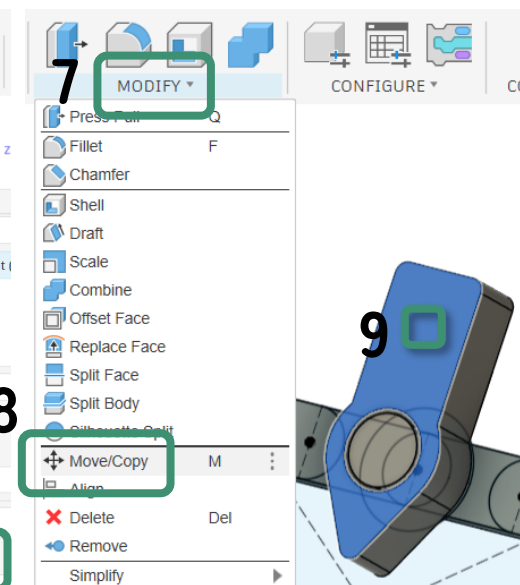
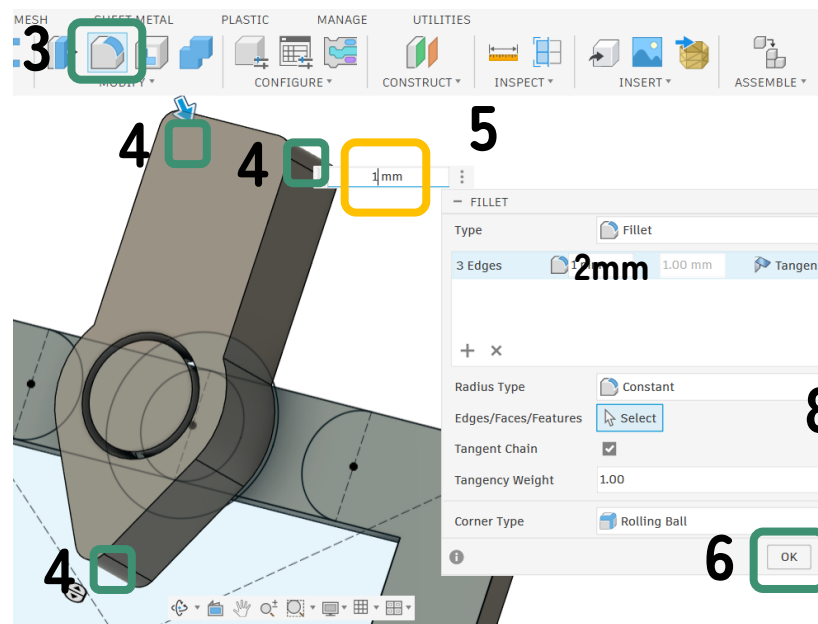
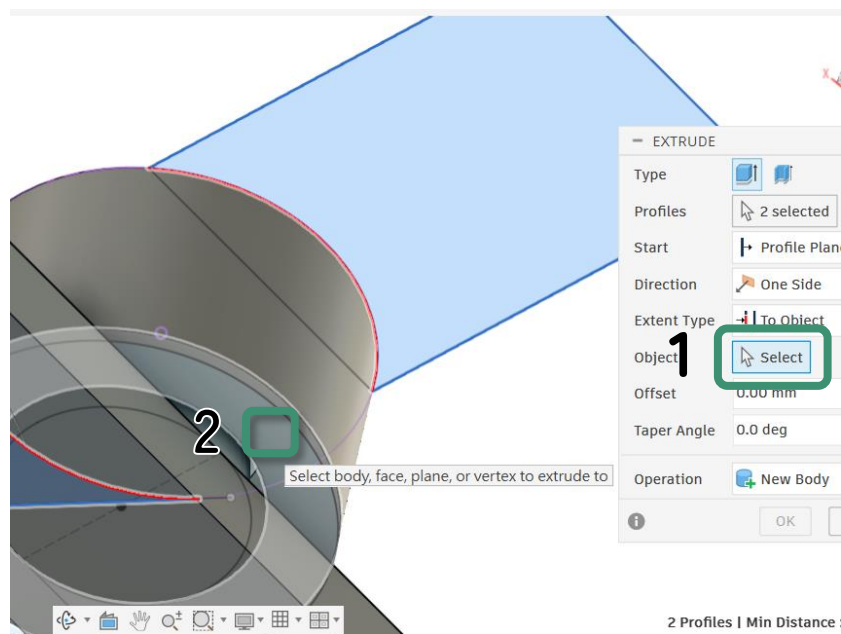


Do it yourself to draw it based on the dimensions

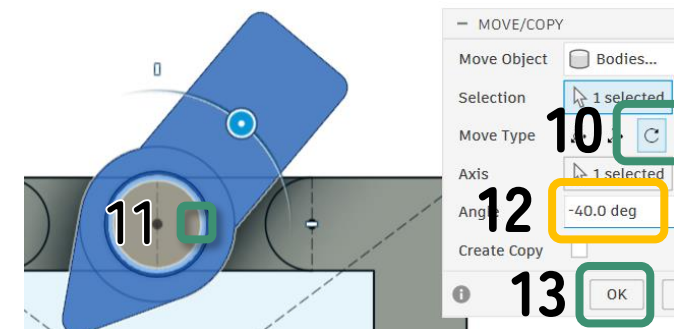


Click Here

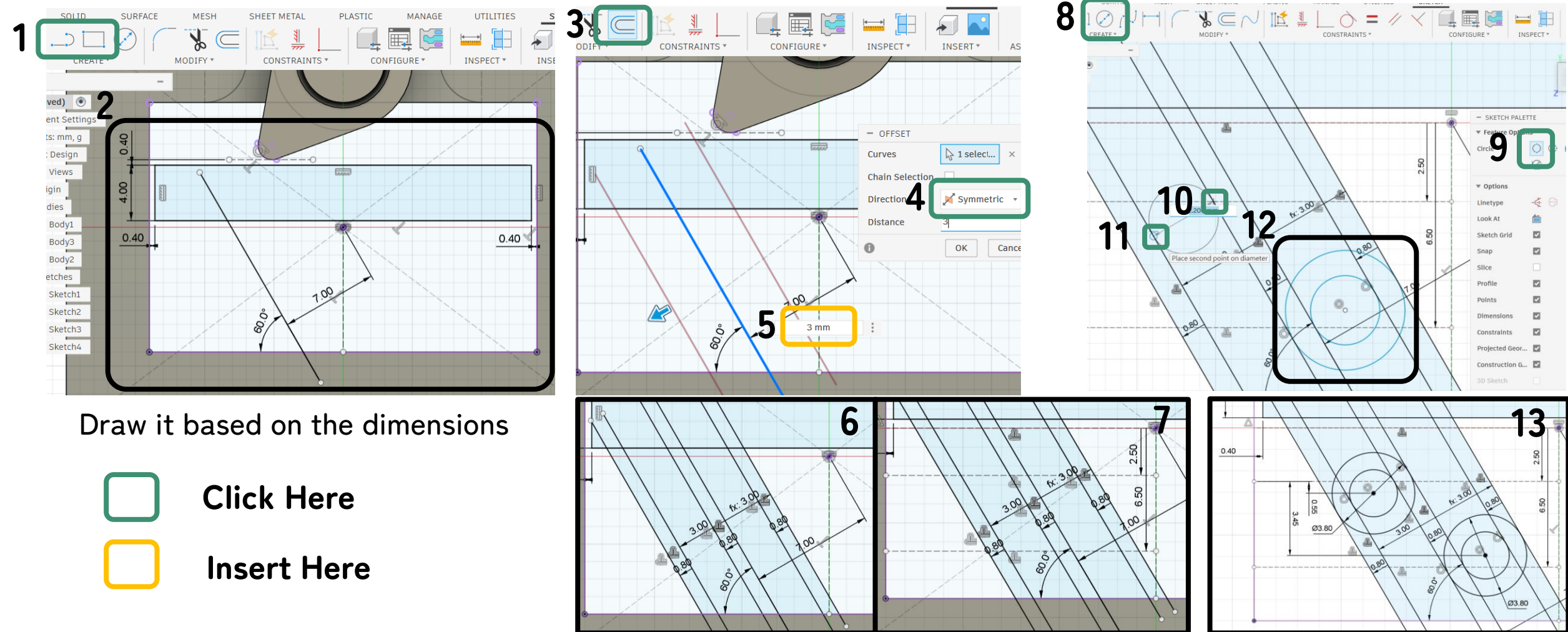
Step 7: Let's draw the switch!



-  Click Here
-  Insert Here



Step 8: Let's draw the spring!

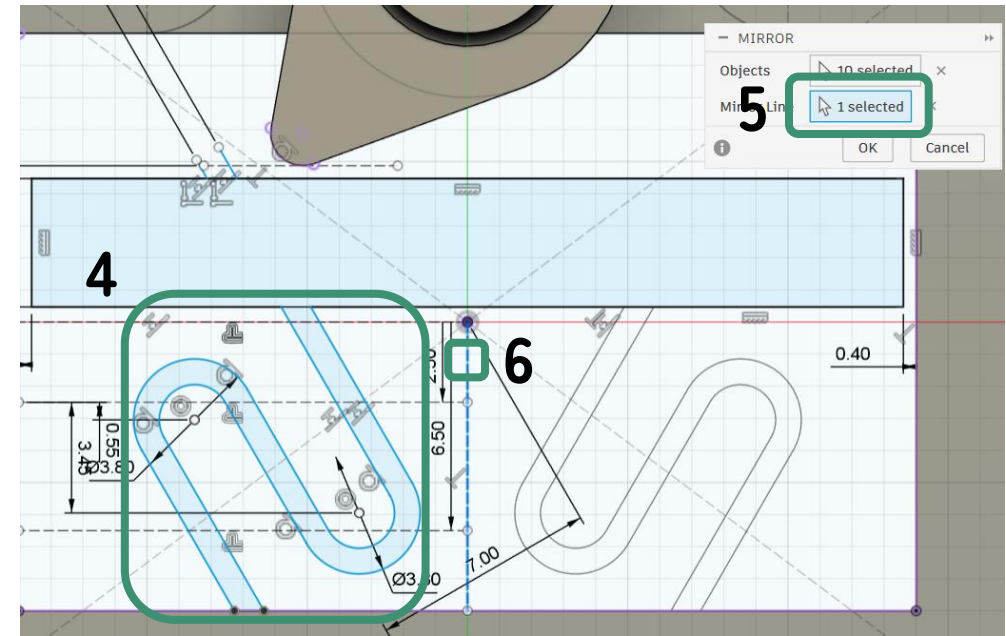
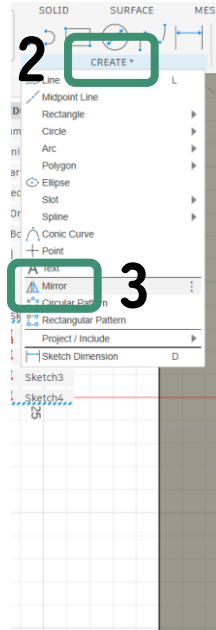
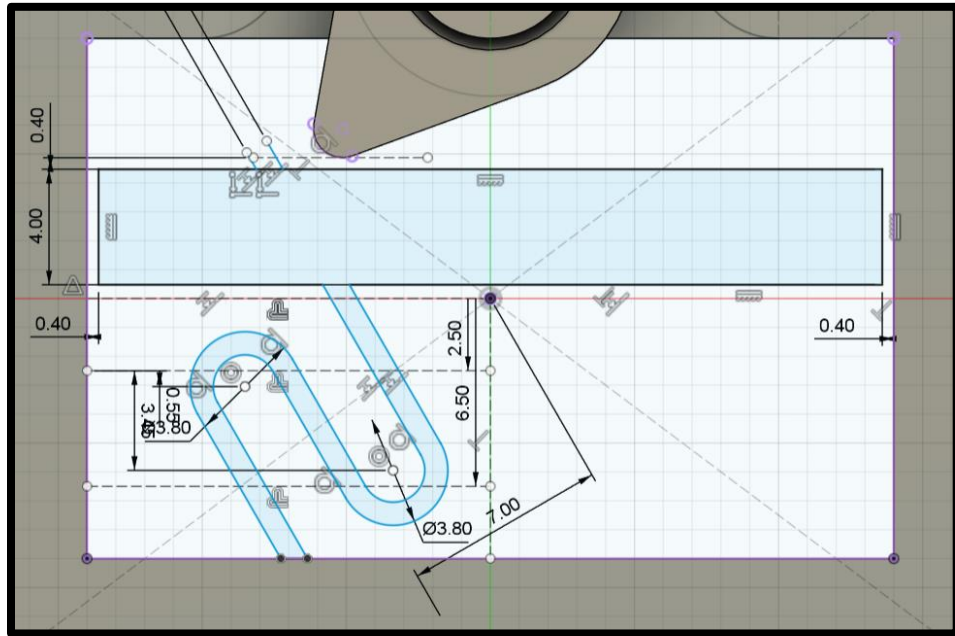


Make sure that the distance is 0.8mm

Add these construction lines

Step 8: Let's draw the spring!

1

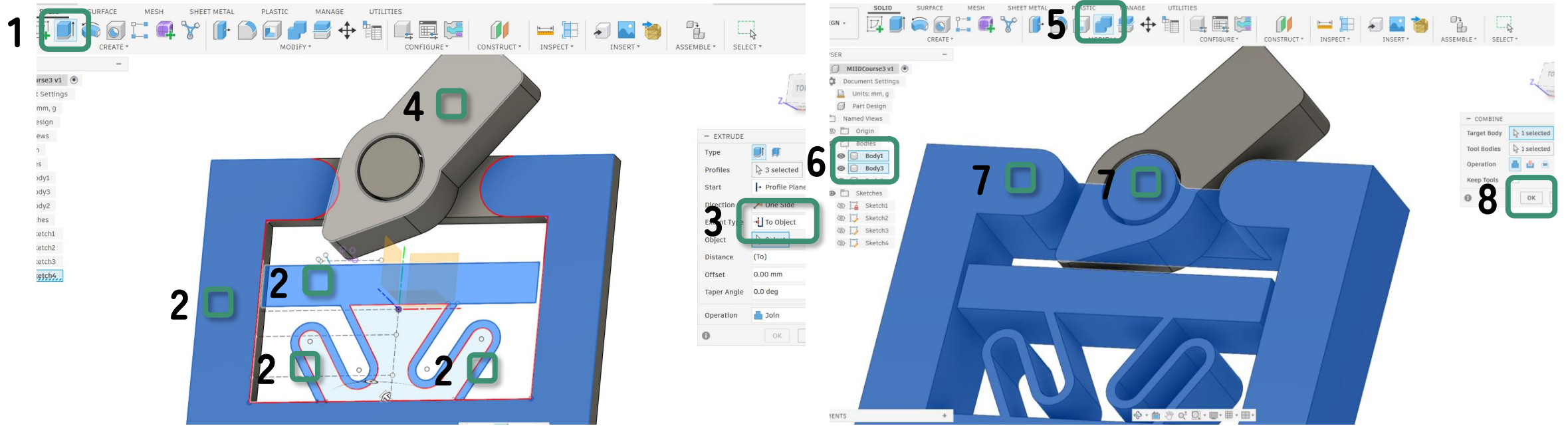


Clear the lines



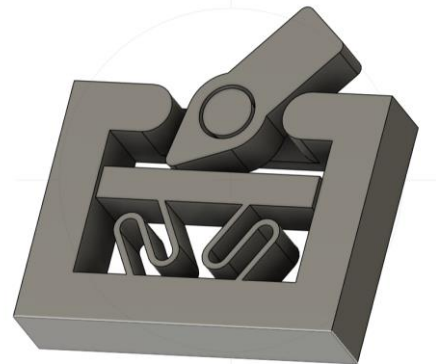
Click Here

Step 8: Let's draw the spring!

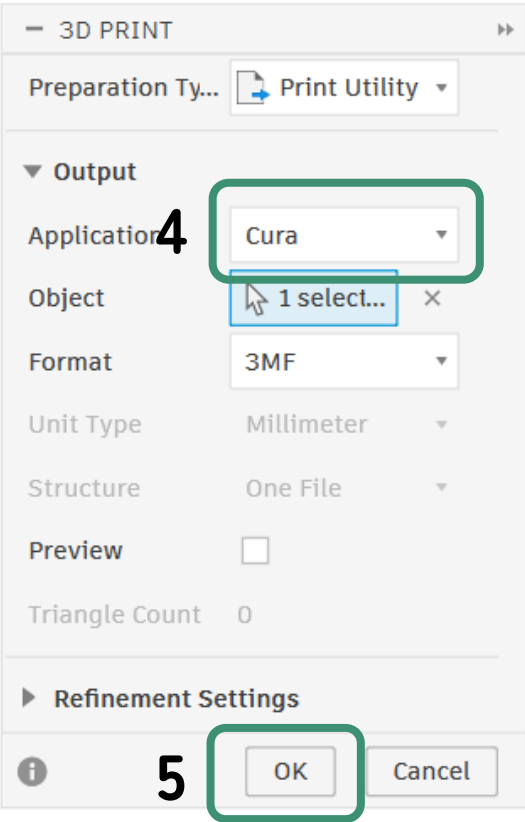
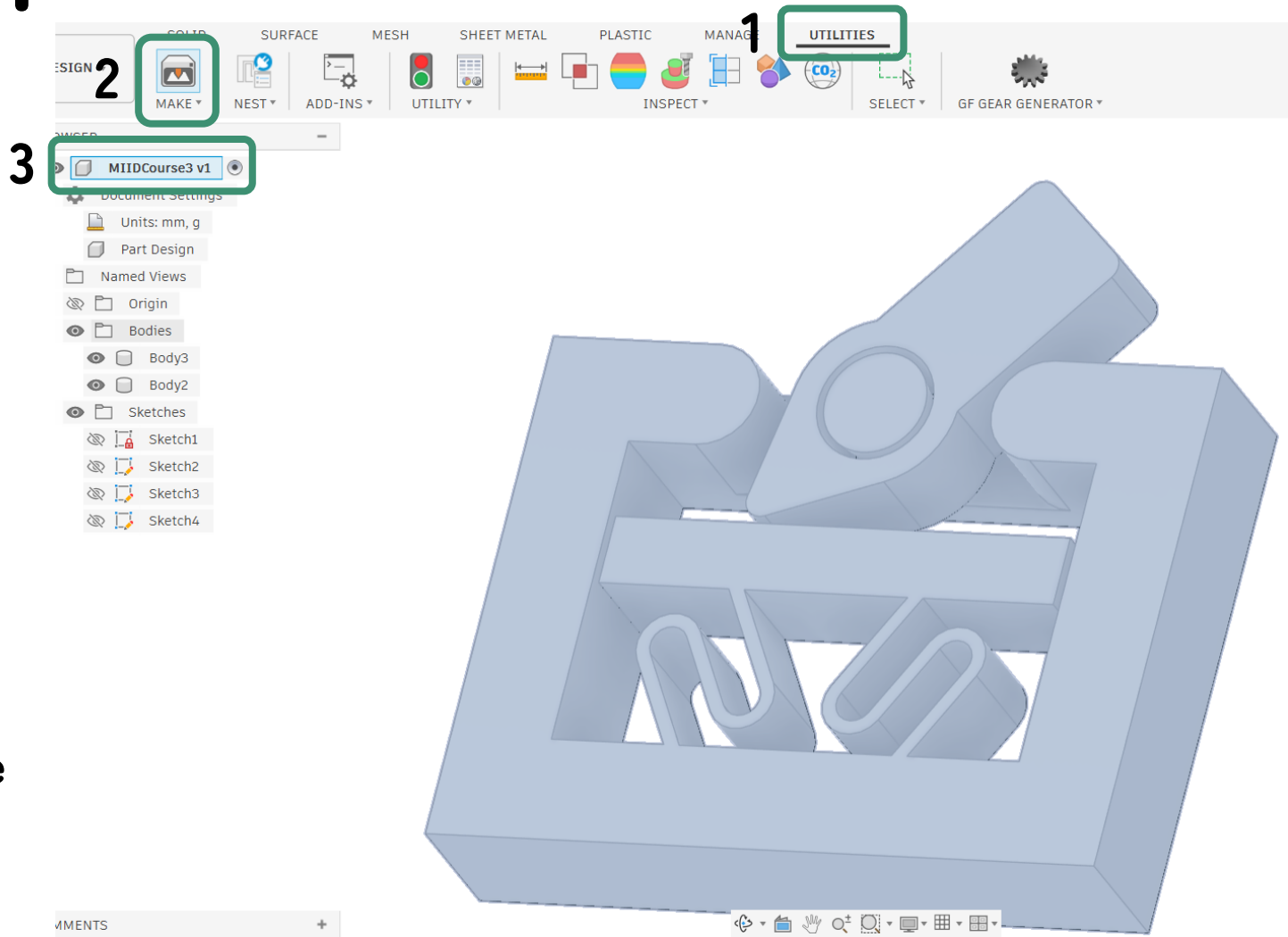


 Click Here

Done!

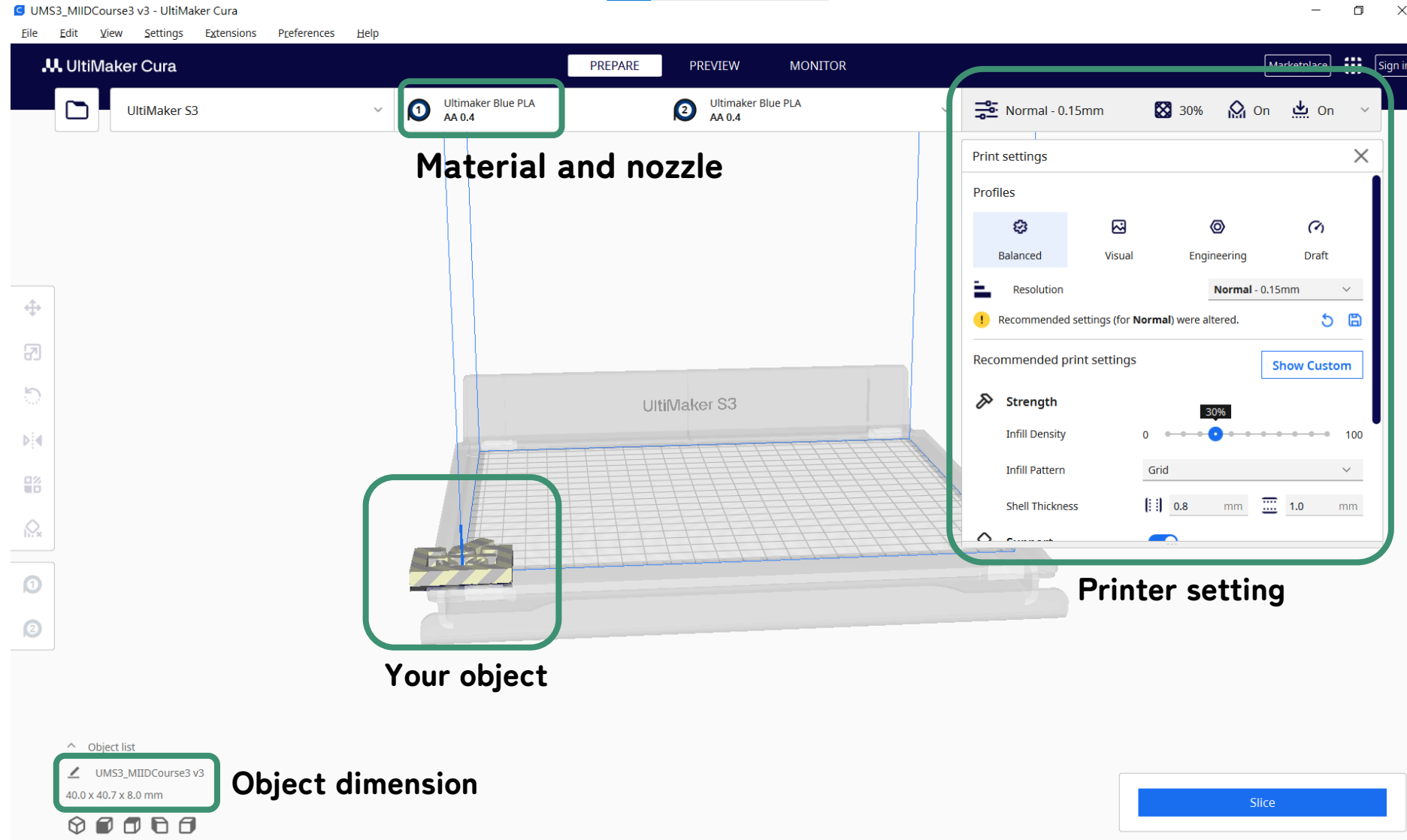


Step 9: Export

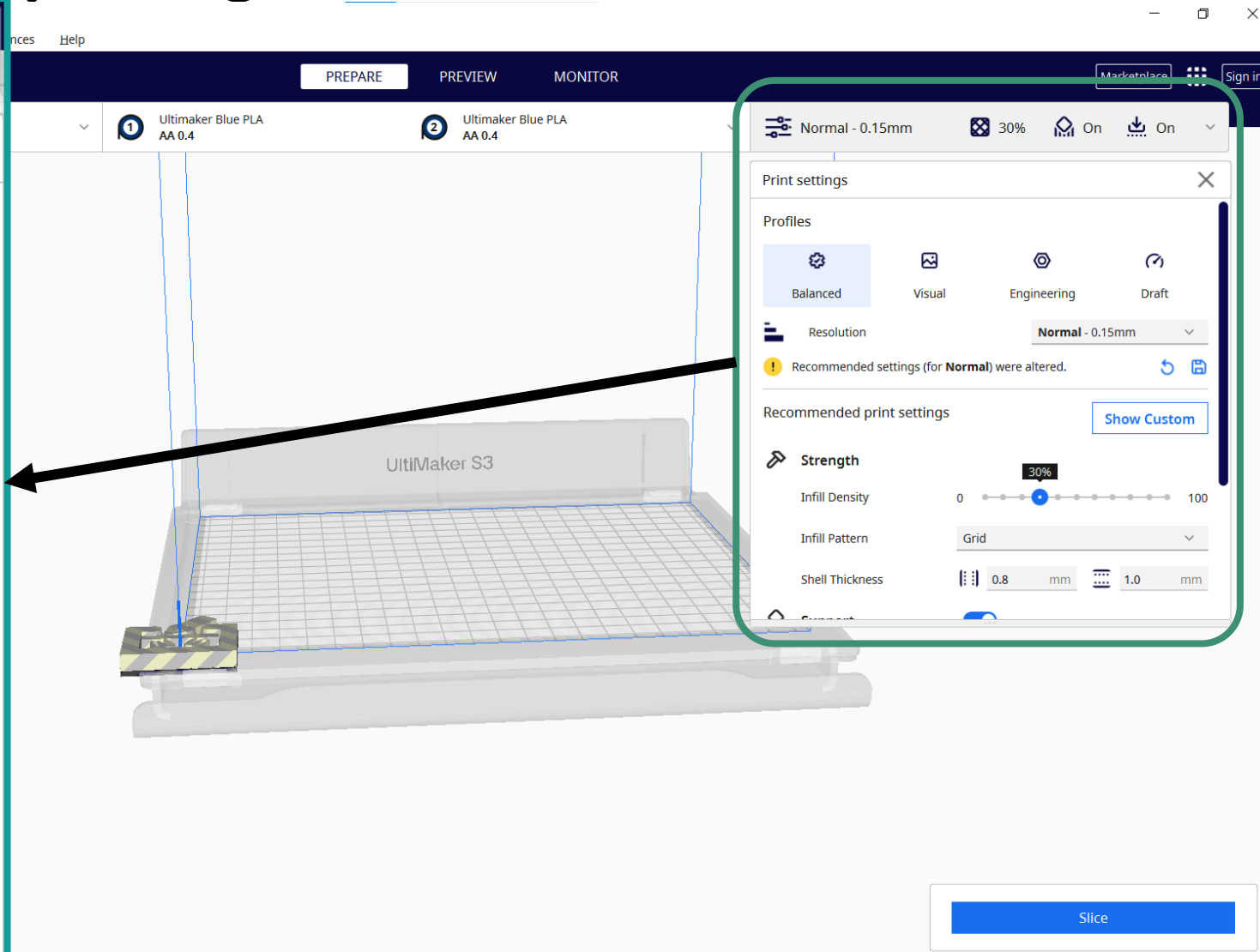
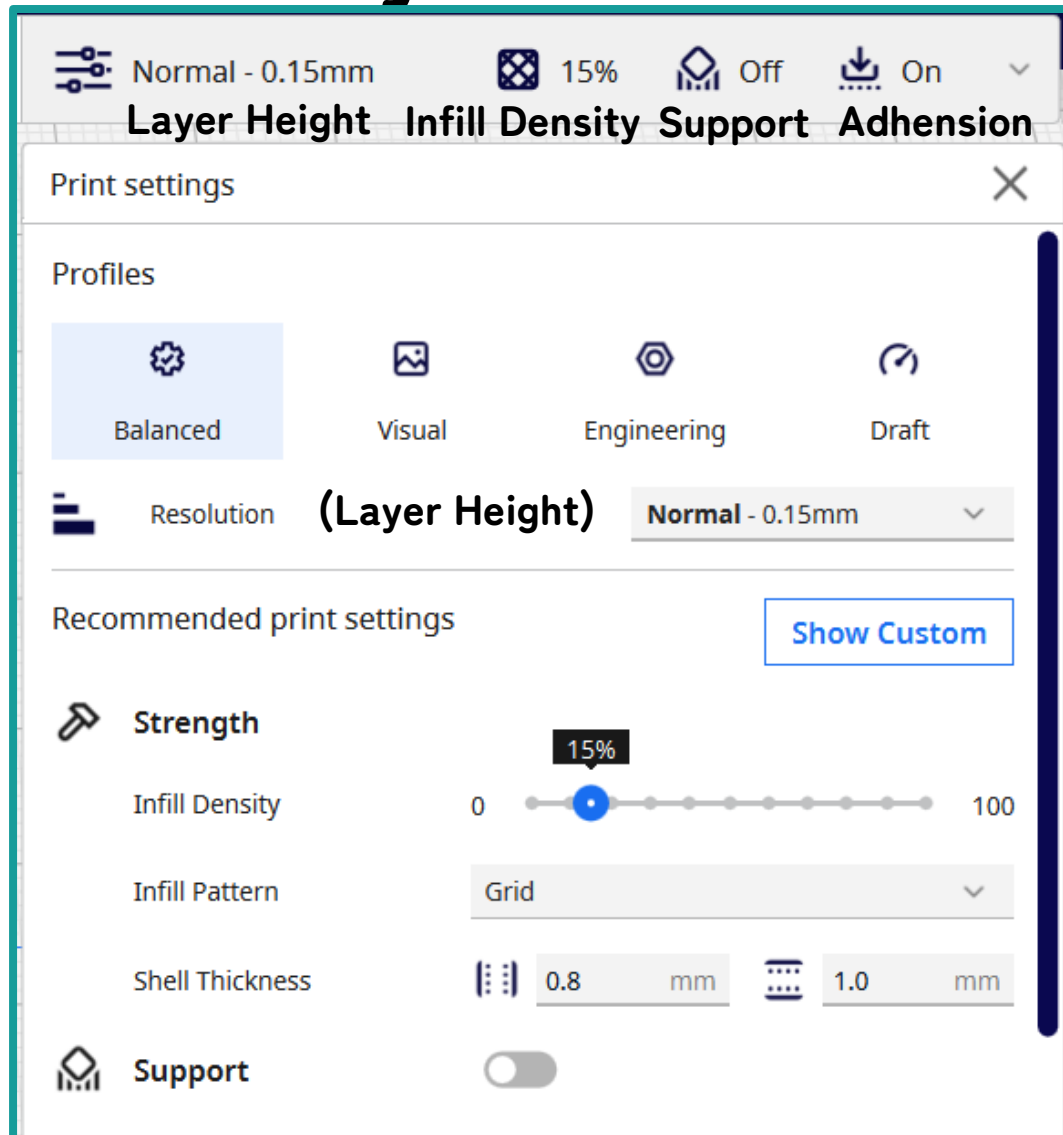


 Click Here

What you'll see when opening Cura



What you'll see when opening Cura



Layer Height

- Surface finish
- Ultimate tensile strength
- Time consumption

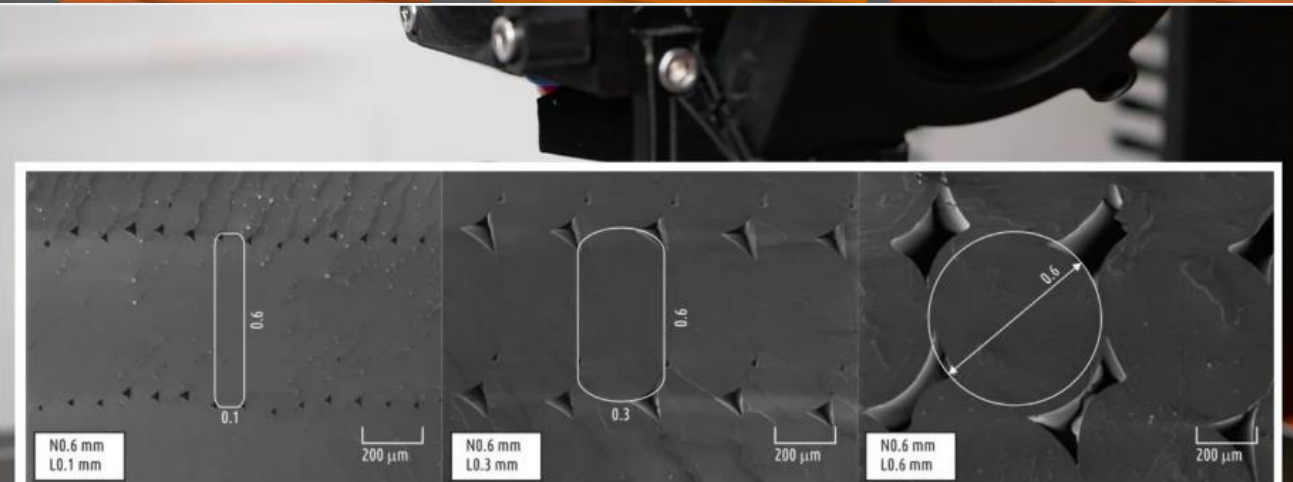
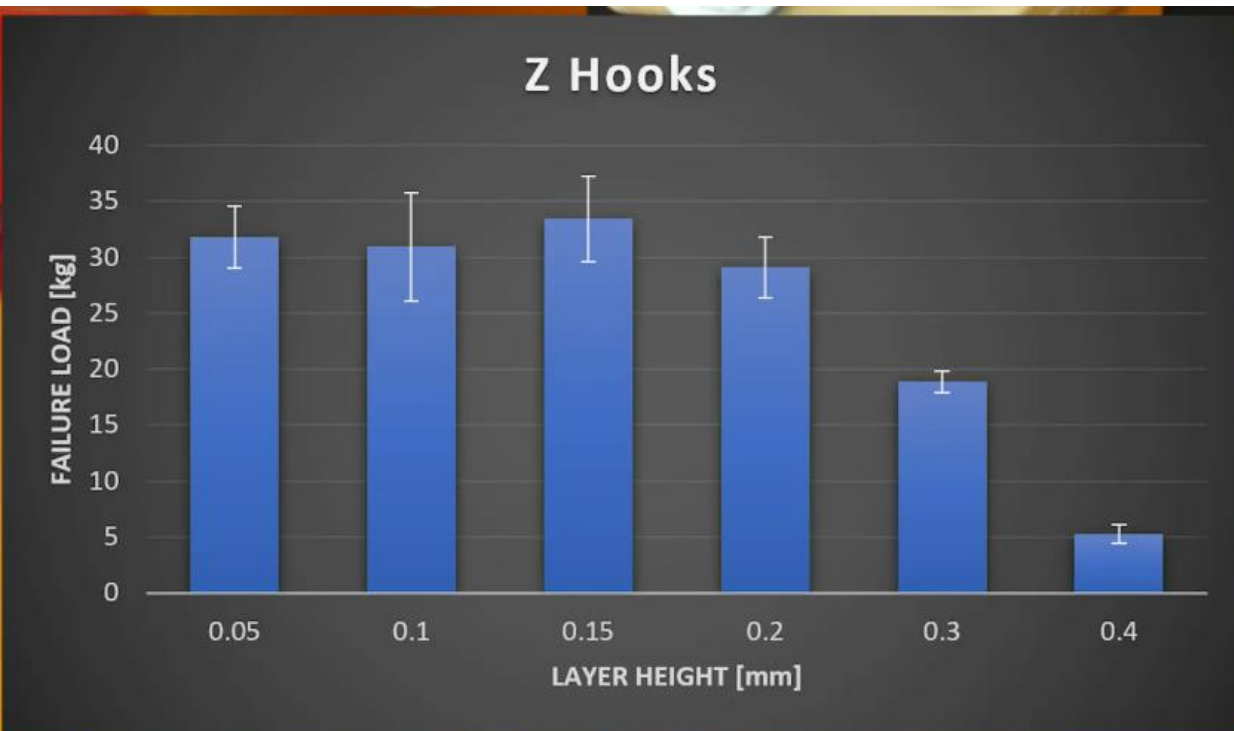
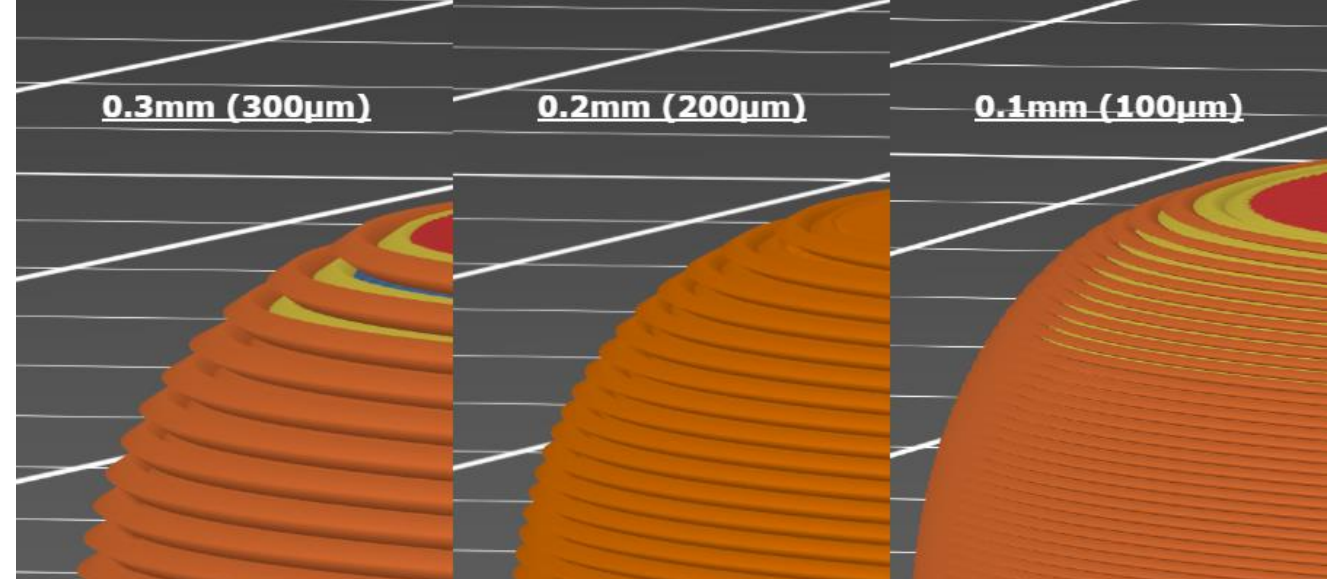


Figure 4. Transformation of an individual thread cross-section with layer thickness increase: idealized layer thread shape overlaid on SEM images

Kuznetsov, V. et al. (2018): Strength of PLA Components Fabricated with Fused Deposition Technology Using a Desktop 3D Printer as a Function of Geometrical Parameters of the Process

<https://www.simpler machining.com/blogs/what-project-managers-need-to-know-about-3d-printer-resolution>

<https://pmc.ncbi.nlm.nih.gov/articles/PMC9867140/>

Infill & Infill Pattern

- Different utilities
- Ultimate flexural strength
- Time consumption

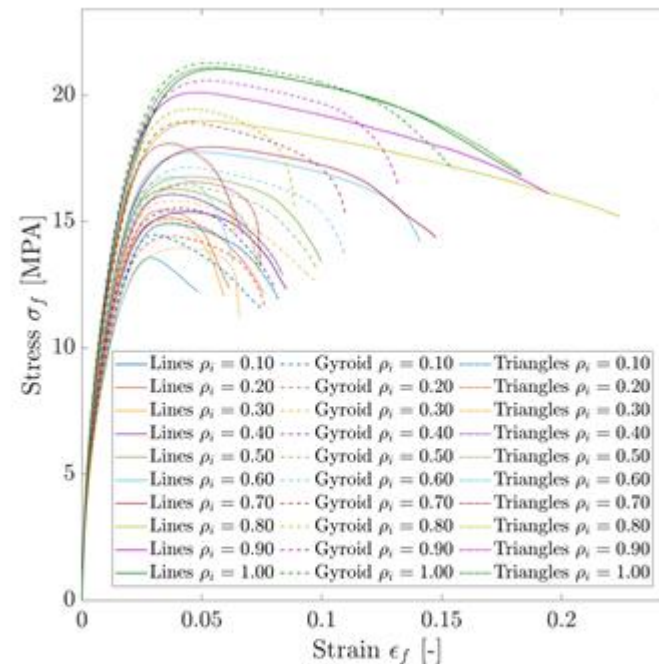
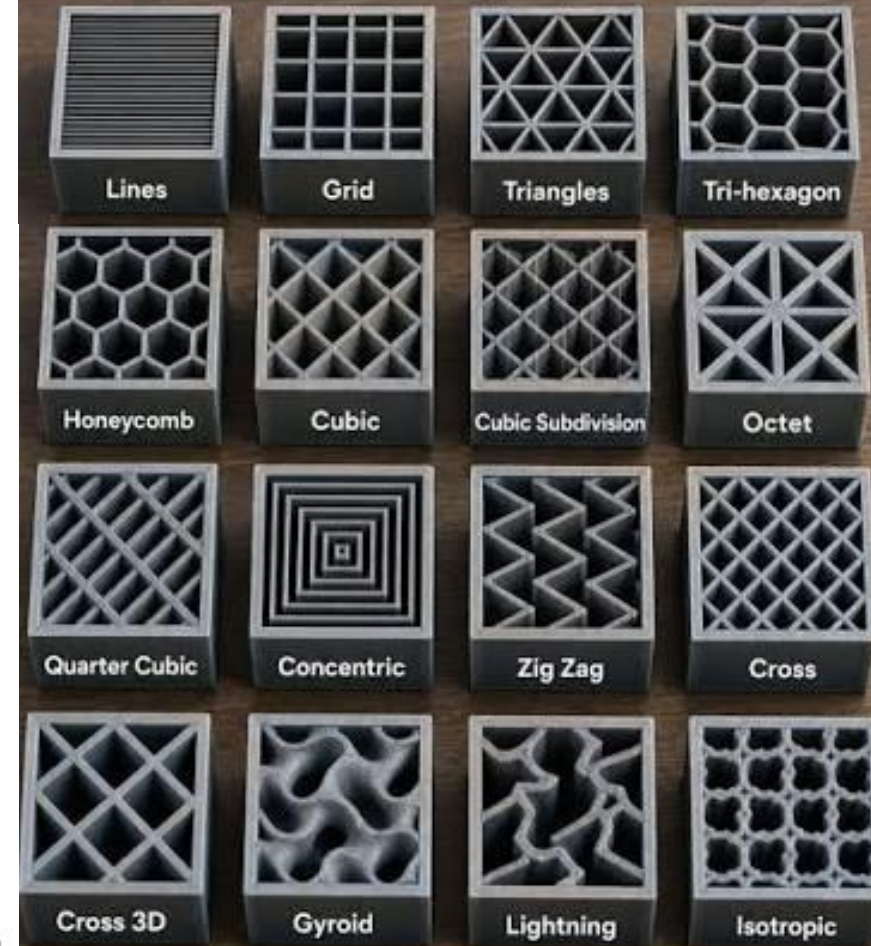


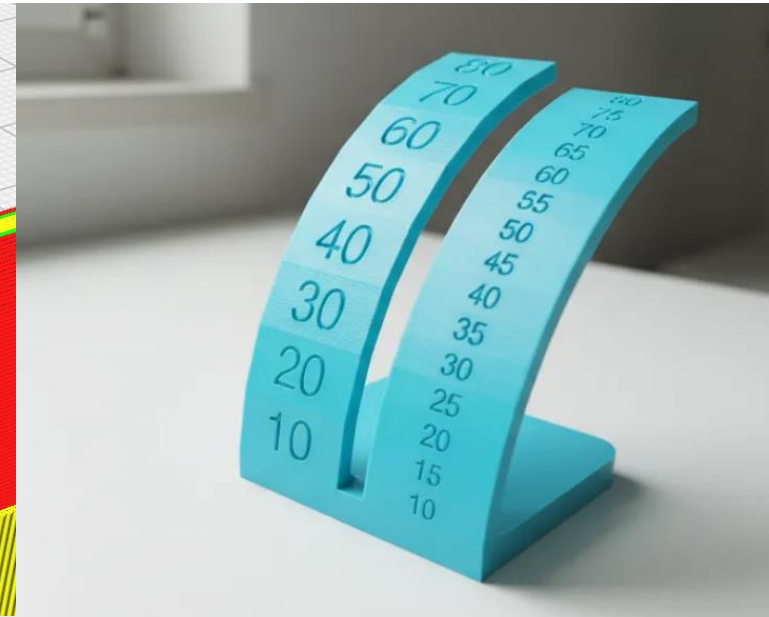
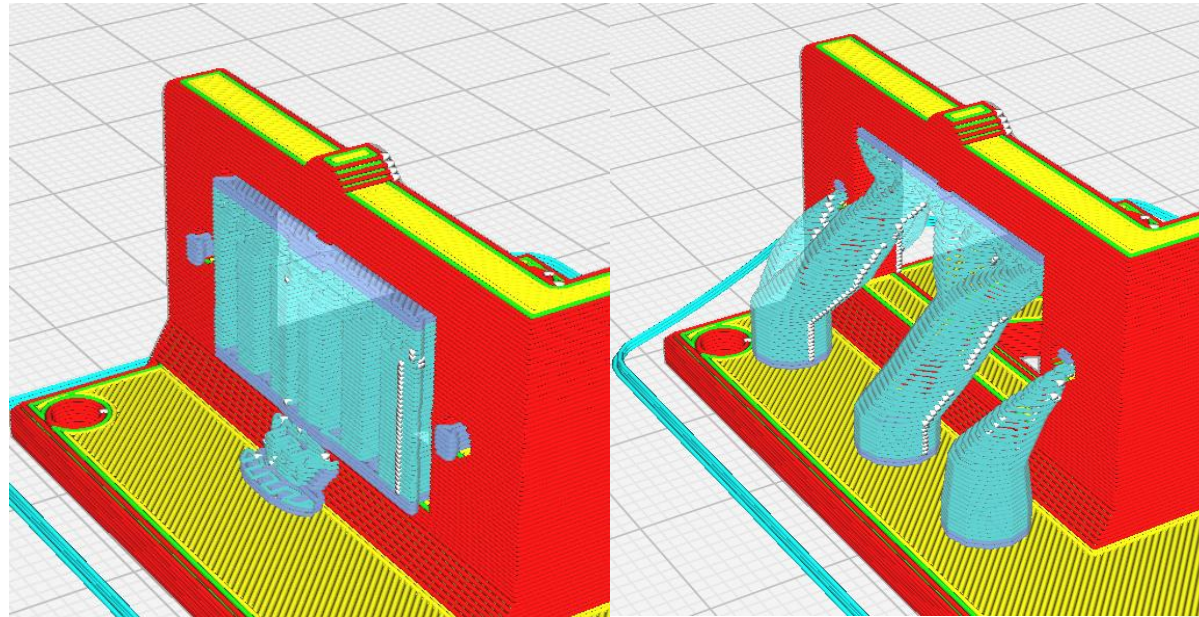
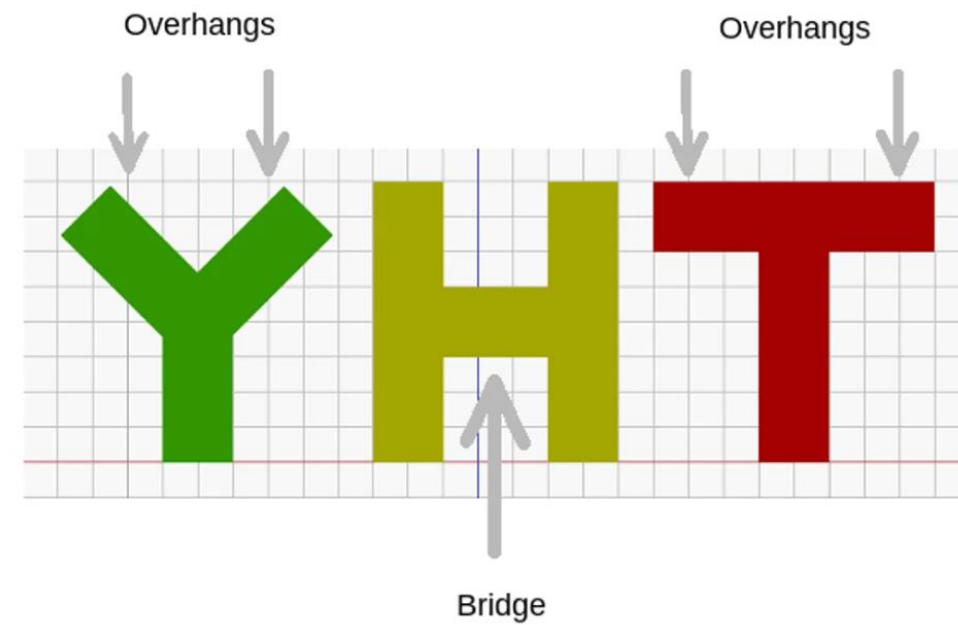
Fig. 4. Average stress-strain curves ($n = 5$) for PLA with lines (solid line), gyroid (dashed line) and triangles (dash-dotted line) infill patterns at $0.10 \leq \rho_i \leq 1.00$.

3D Printing Infill Explained

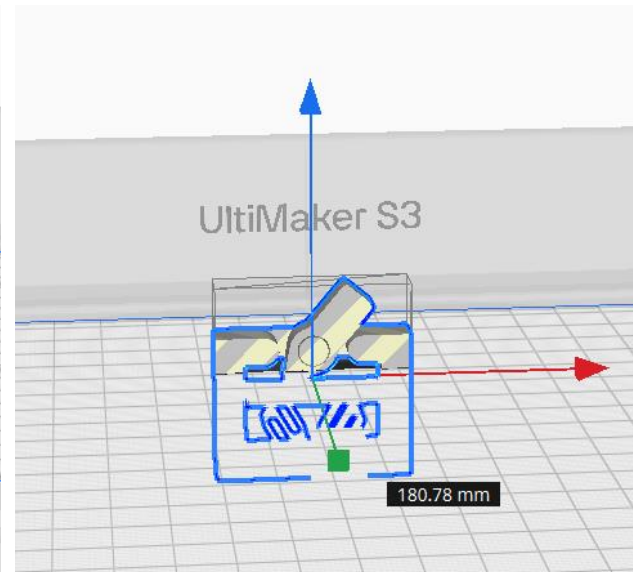
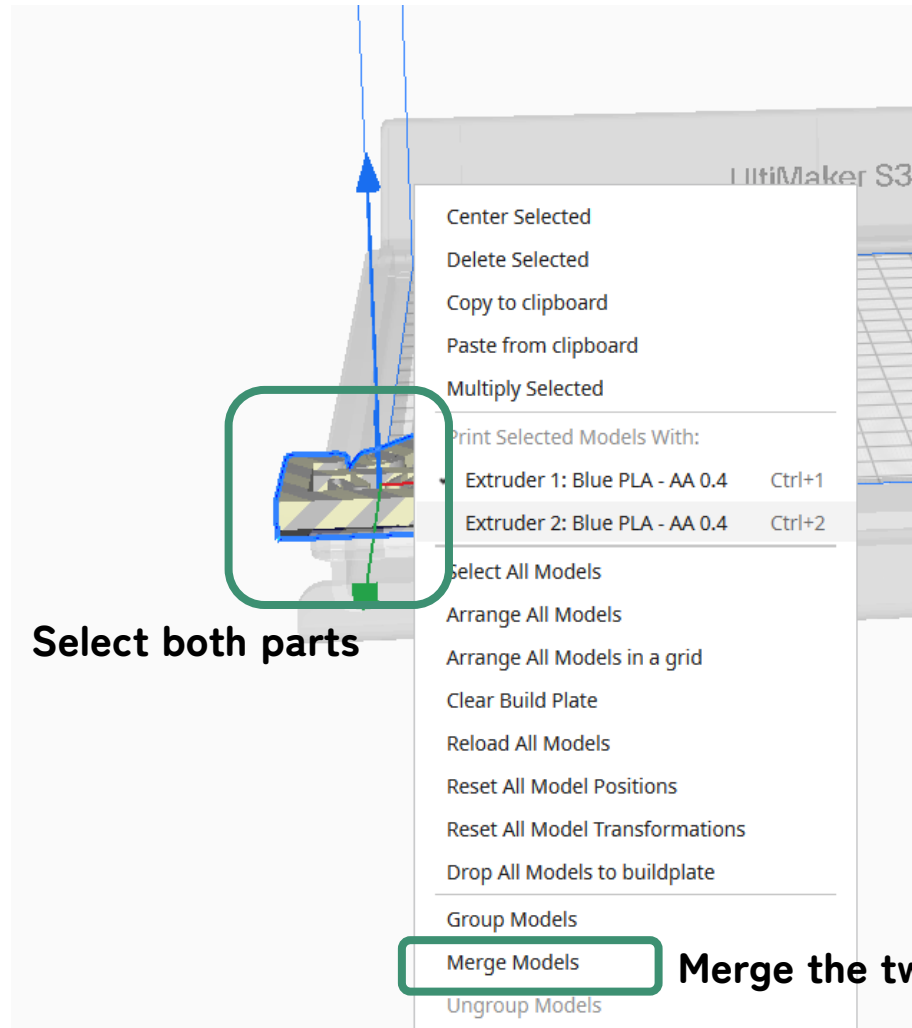


Support

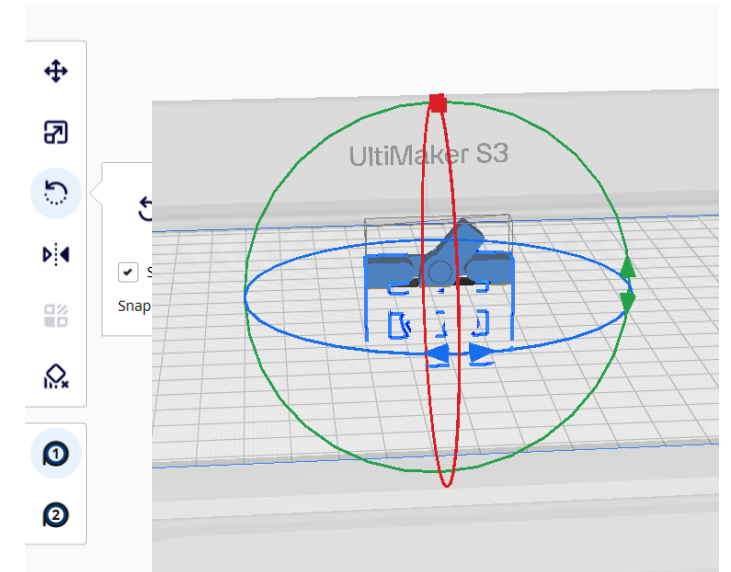
- Overhangs
- Bridges
- Normal vs Tree Support



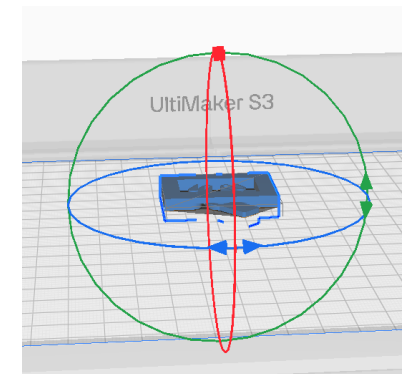
Prepare for printing



Drag them to the center

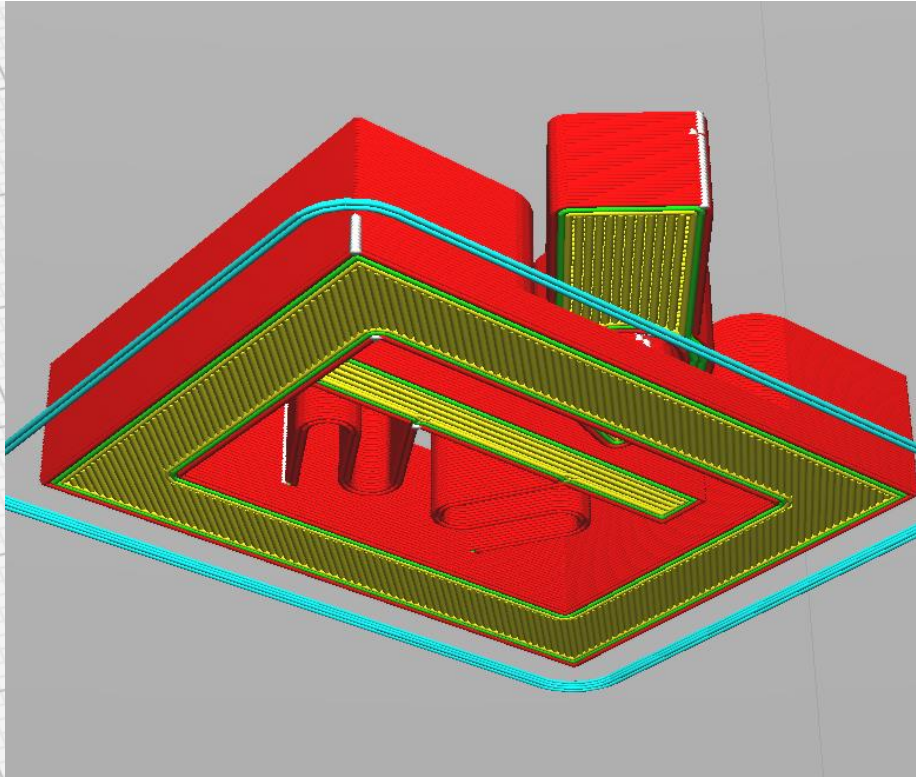
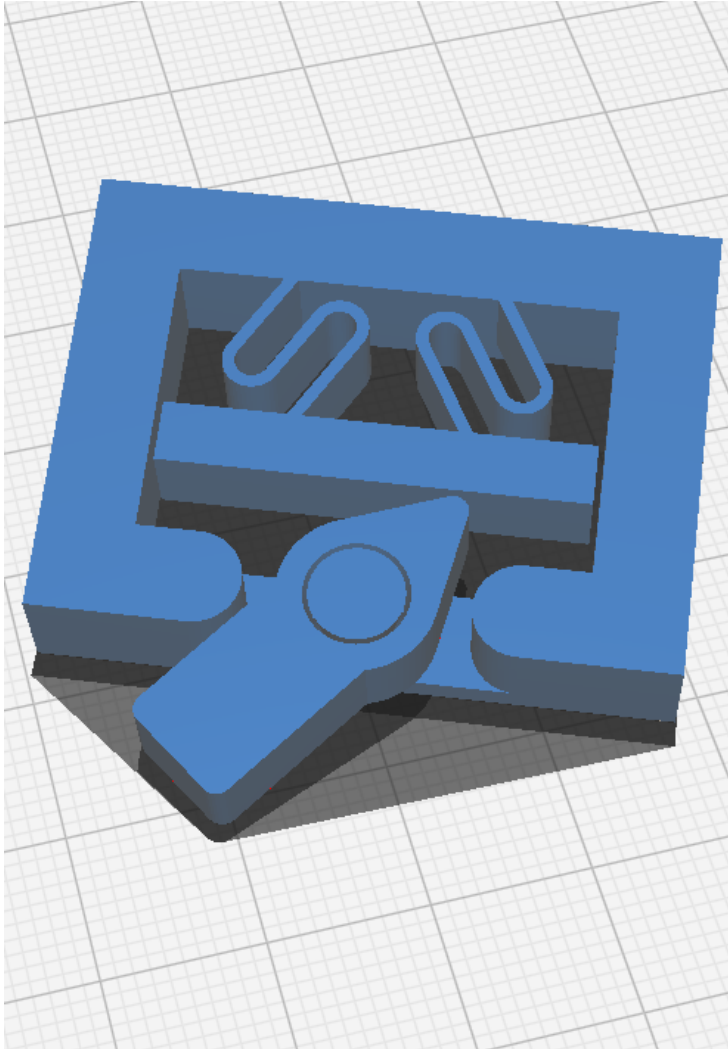


Select Rotate and drag the **RED** ring

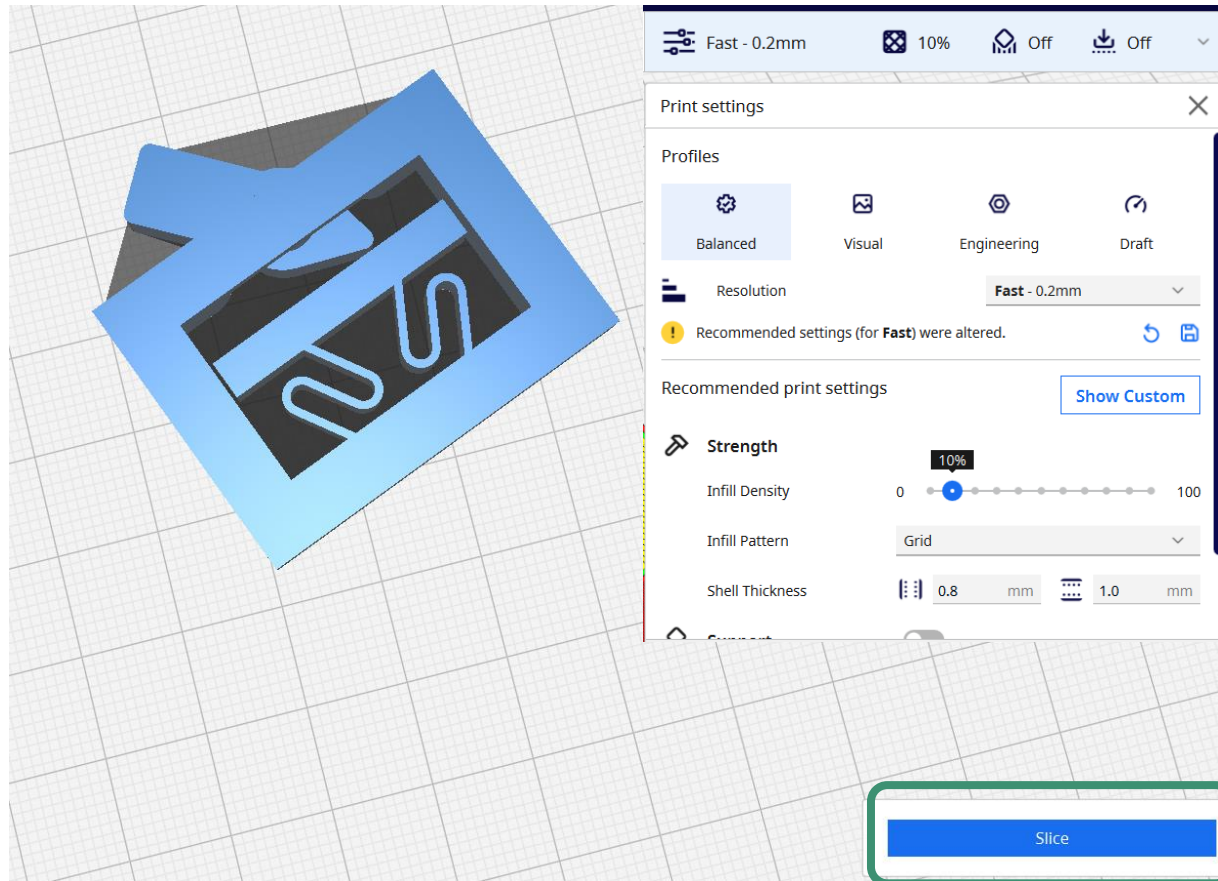


Should be look like this

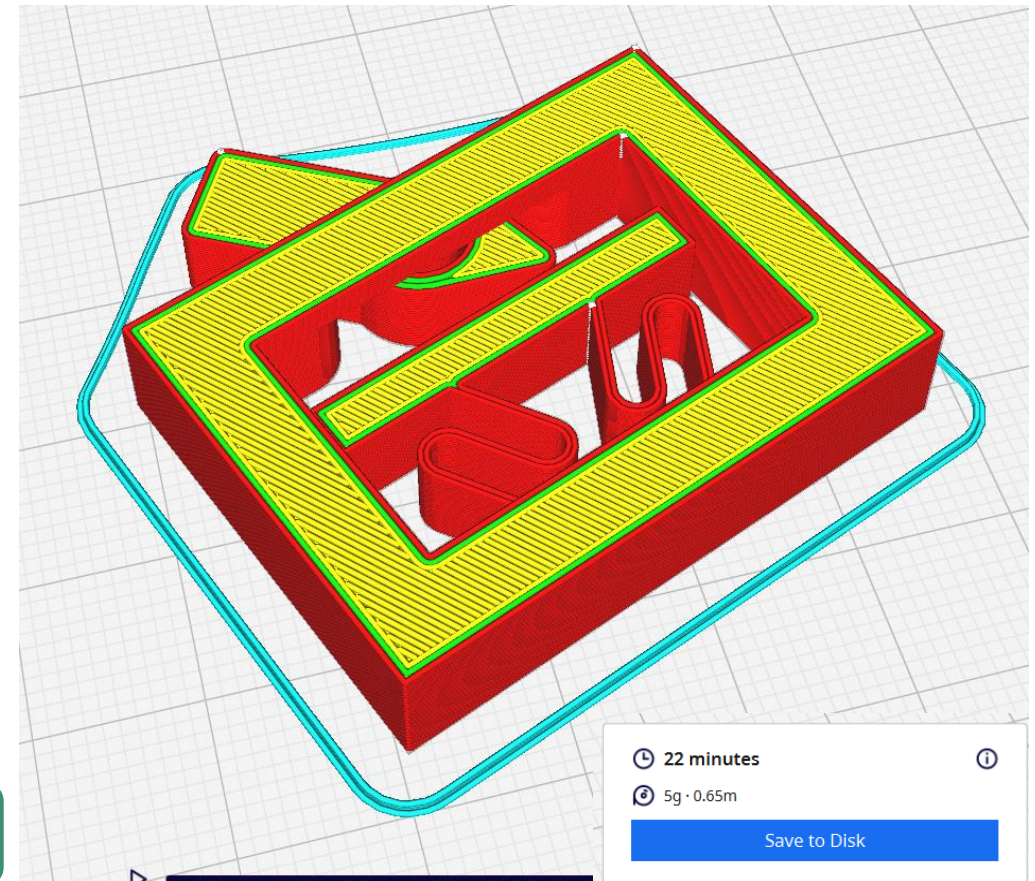
What if selecting the wrong side?



Prepare for printing



SLICE!



DONE

