



## CONFERENCE 2024 | IMPLEMENTING INNOVATION & THINKING

13 - 16 April | Ōtautahi Christchurch | Te Whare Wānanga o Waitaha University of Canterbury

Tukuna a whakaaro auaha kia rere kia whakaumutia ai te ao | Through creativity and innovation we intervene to transform the world



Fusion360 with reference to output devices.

3d Printers (*Bambu, Prusa, Ultimaker, Upbox*) Laser Cutters and CNC.

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Overview of software. Top down design. Components and bodies.

The Tile area - Naming conventions for components and file name.

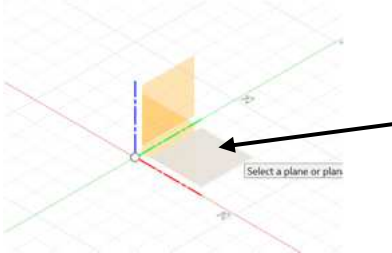
Toolbars – Adding tools to the toolbar.

Parametric - The benefits of this capability (show with dims) Explain Parameters.

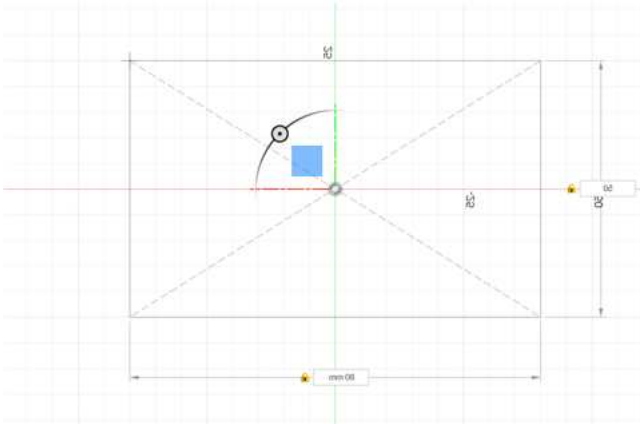
## Start an Earbud Case



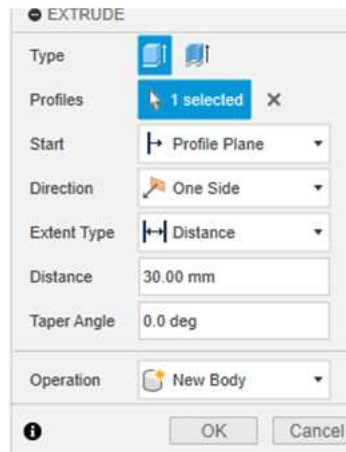
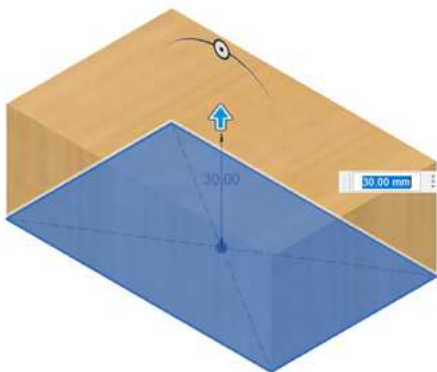
New component named Base. Pick a plane depending on method of manufacture, more important with CNC.



Centre rectangle about origin 80mm tab key 50mm - finish sketch

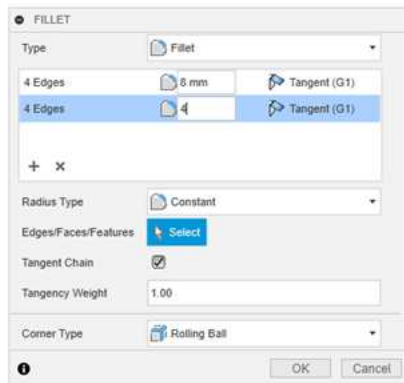
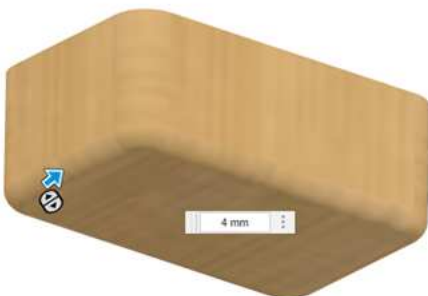


Extrude 30mm up "new body".



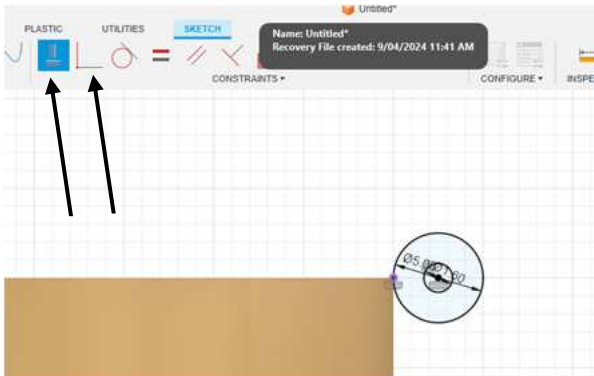
Now is a good time to use the orbit tool: Hold the shift key and push down the mouse wheel.

Fillet edges 8mm and base 3mm.

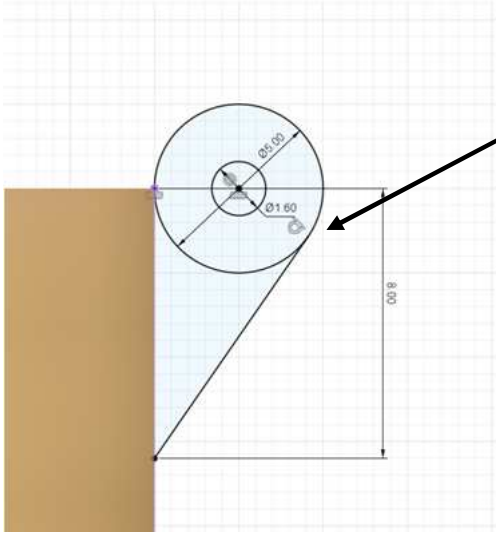


Click the House/Home. Pick mid plane for new sketch of hinge (turn off visibility if an issue)

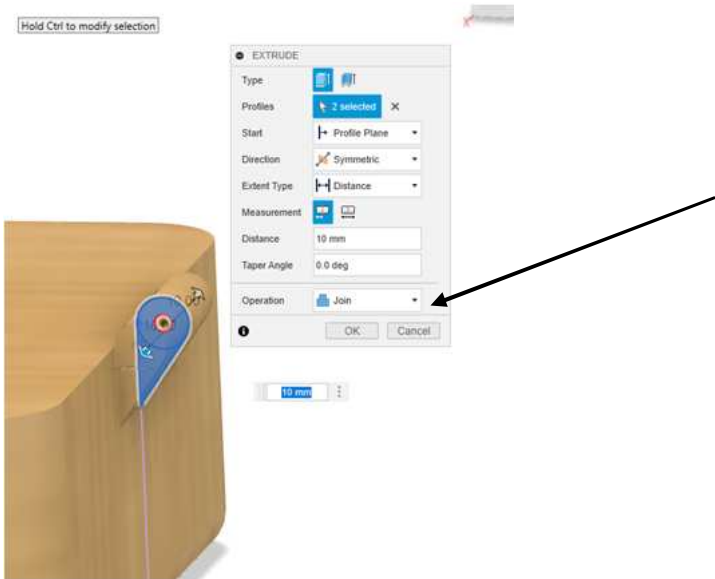
Draw 5mm circle and 1.6mm concentric circle as shown and constrain with a coincident and horizontal constraint.



Draw a line as a web and dimension 8mm and add a Tangential constraint.

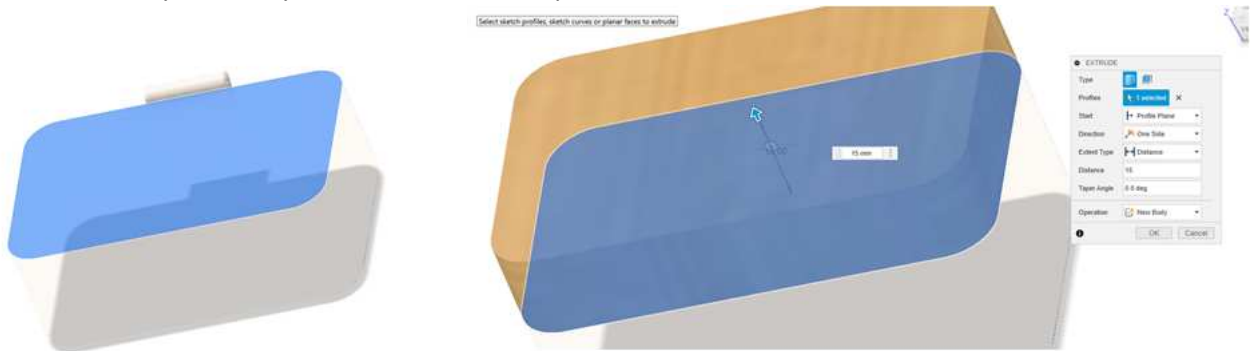


Extrude symmetrical 10mm and operation is join.



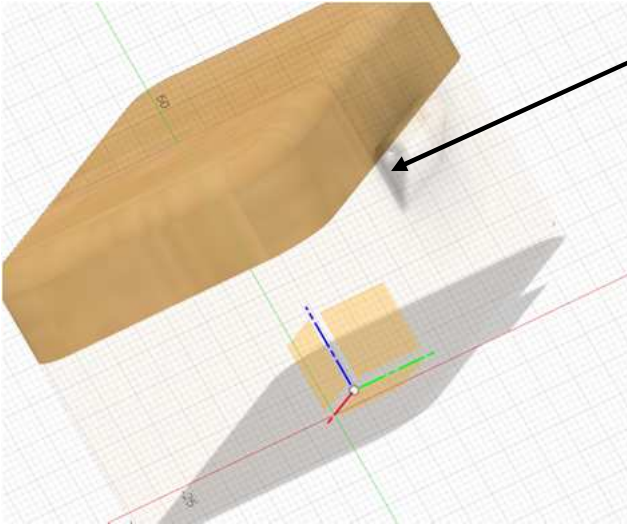
Click in the top hierarchy to make new component LID.

With the lid actioned click on the top surface of the base and extrude 15mm.  
This will mean if you modify the base the lid will update to follow suit .

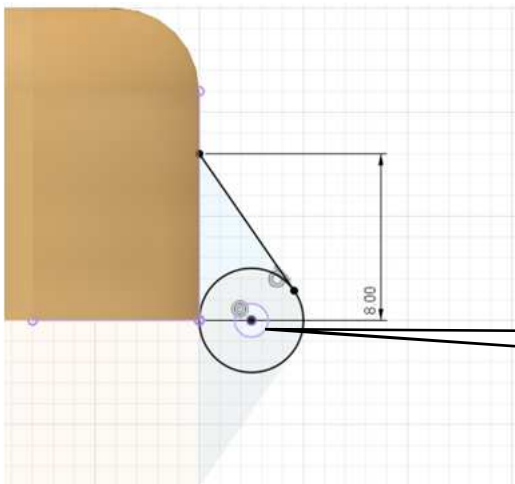


Add radius to the top 4mm

Still with the lid actioned. Now to sketch on the side of the hinge of the base

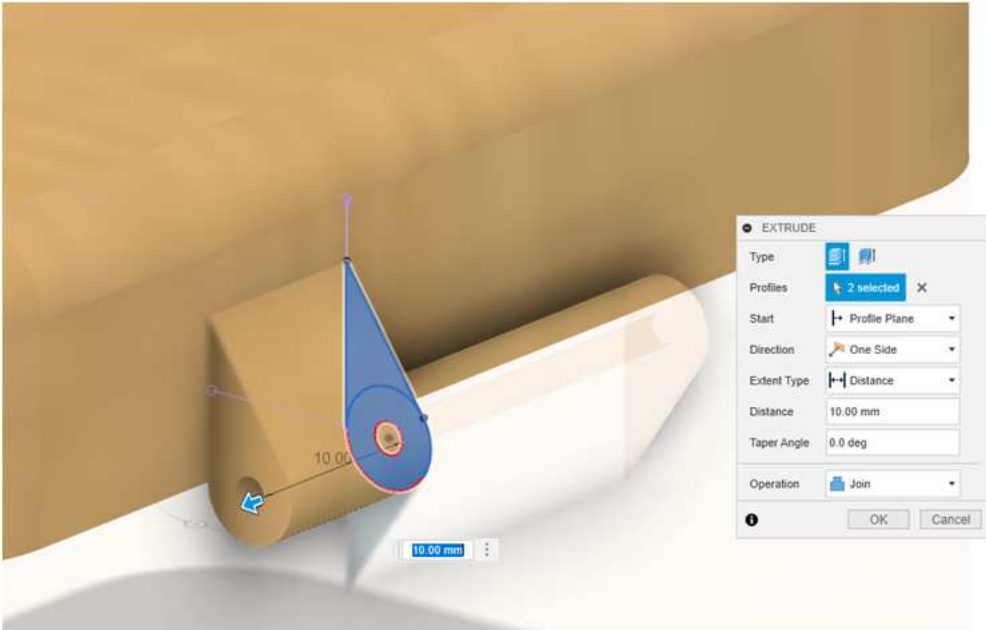


Again we are deriving the dims from another component part. Make web tangential and 8 mm.  
So if we change the pin diameter it changes for both.

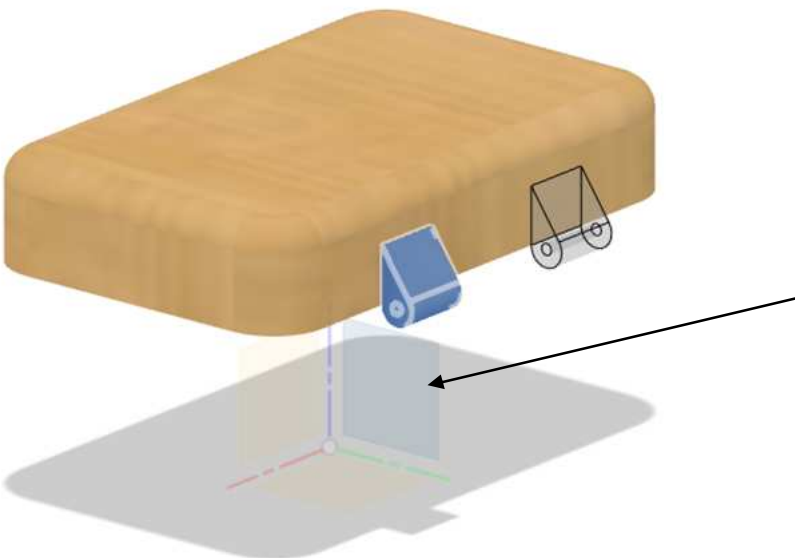
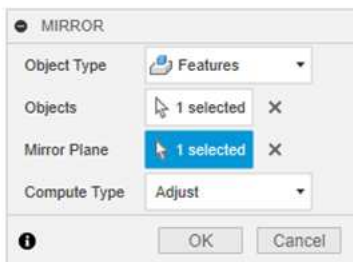


The pin can be projected from the base pin.

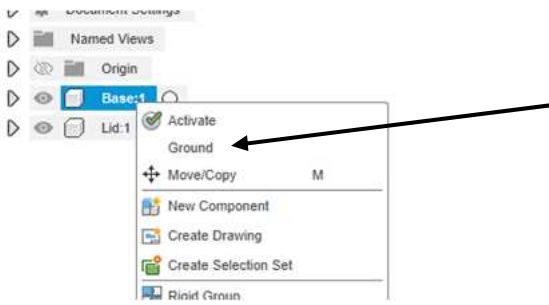
Extrude out 10mm and ensure operation is join.



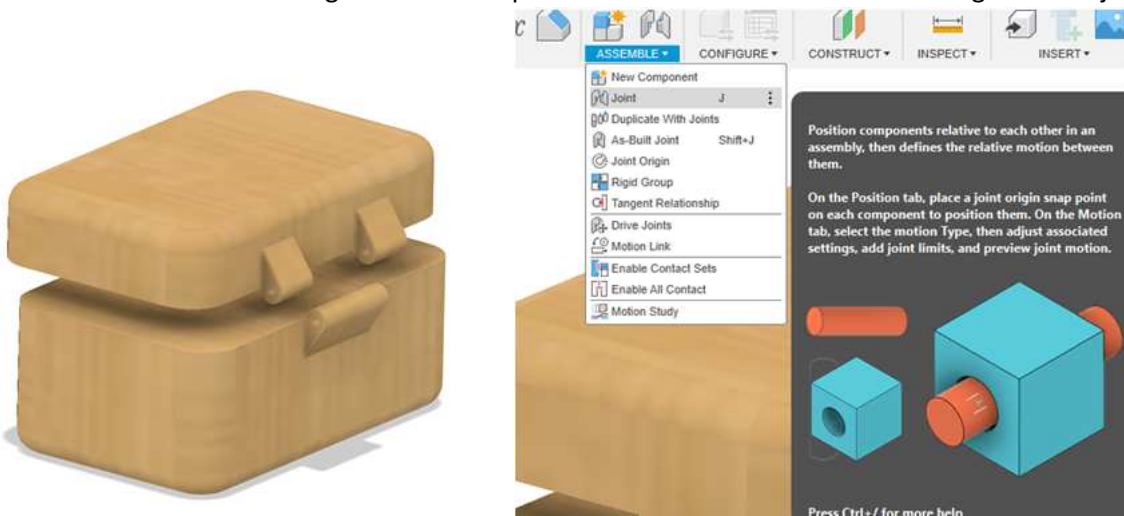
Mirror 10mm hinge (note (turned off visibility of base to see work planes)).



Go back up in the hierarchy so both components are showing and ground the base.

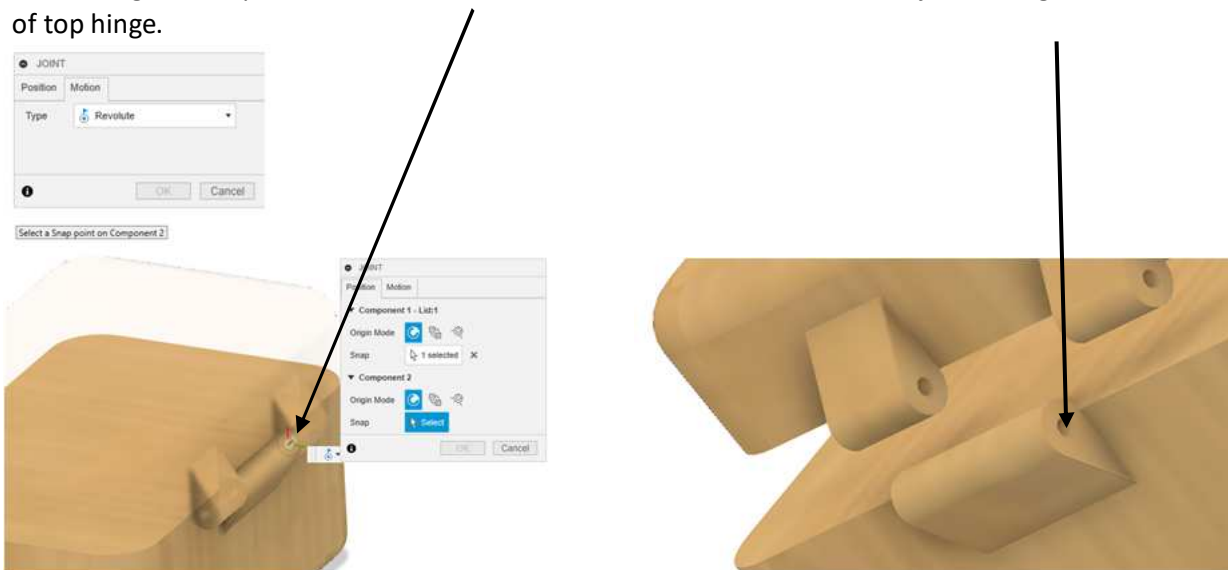


Now we will make the lid hinge. Move the top a bit so we can see what we are doing and click joint.

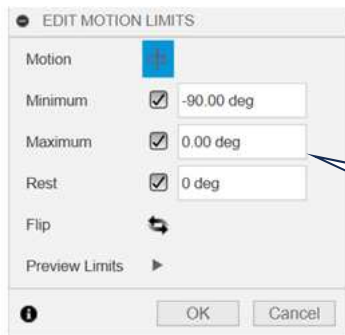


The Joint command has two tabs position and motion, set the motion first up to revolute. Then change to the position tab and click the inside of top hinge.

Then adjacent hinge on the base.

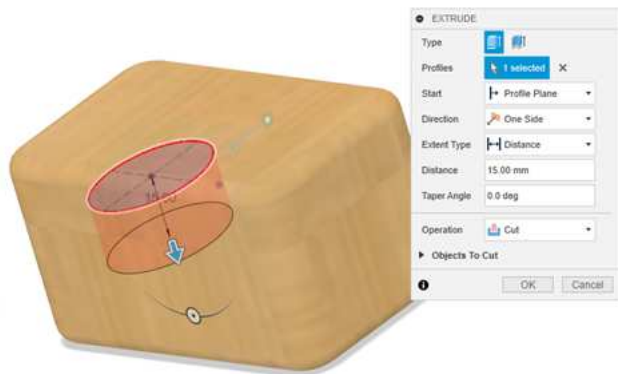
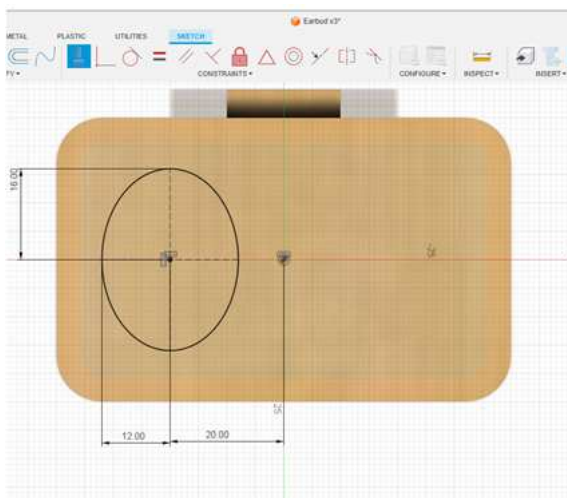


Now it rotates but we need to set degrees of freedom or motion limits. Right click on the joint in the feature timeline at the bottom of the screen and edit motion limits.

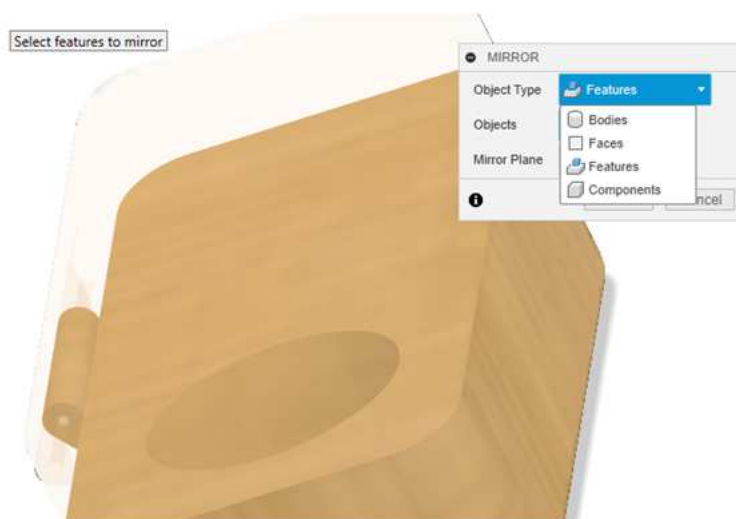


Set the tabs as shown here.

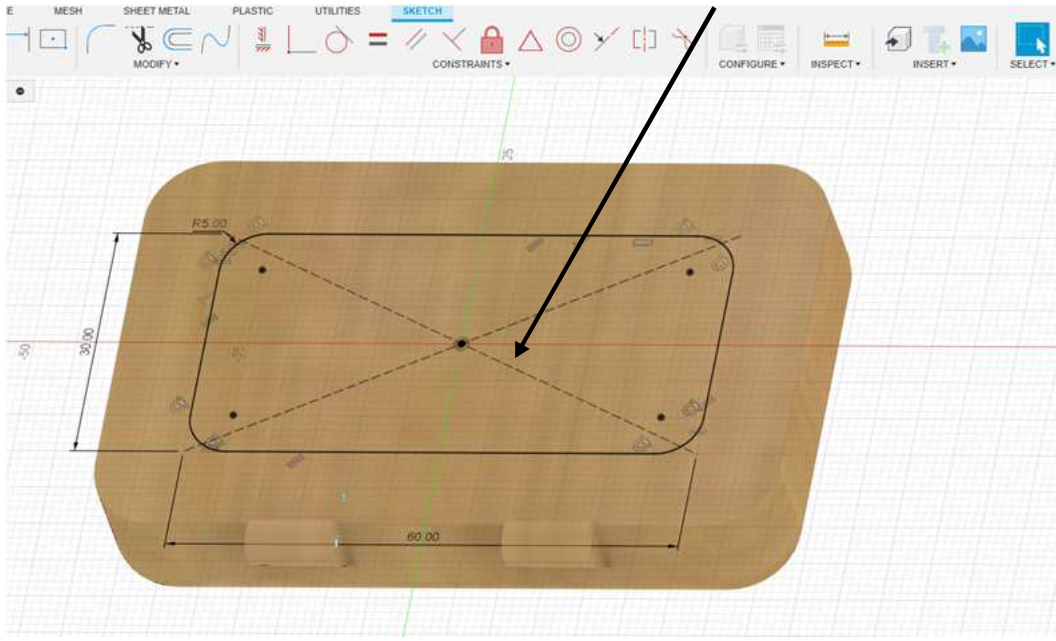
Now we will work on the base you can do what design suits your earbuds, however, I'll draw an ellipse. 3 dimensions and a horizontal constraint. Then extrude cut 15mm maybe some rads in the bottom.



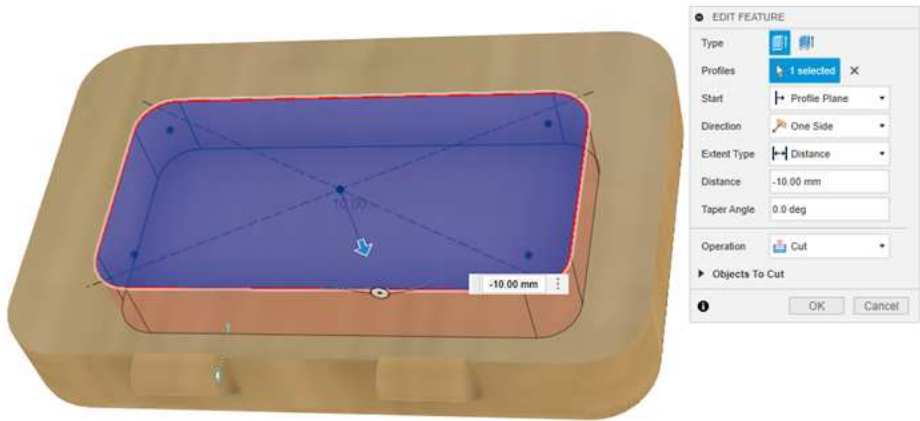
Then mirror the elliptical hole remember it's a feature not a body.



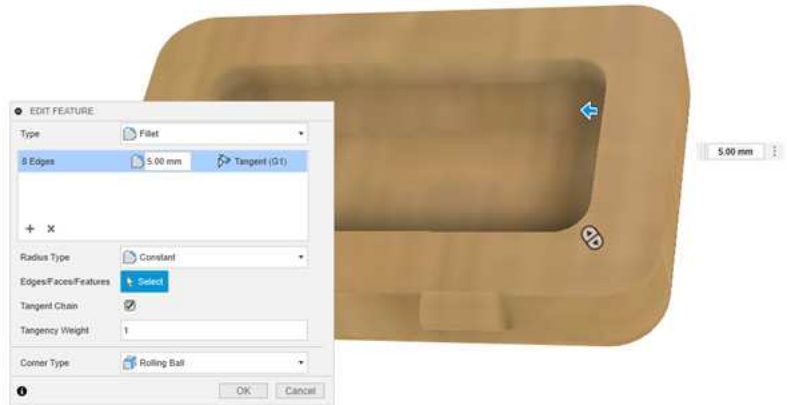
**You can do something similar in the lid or pocket it like the examples, entirely up to you.**



Extrude cut 10mm

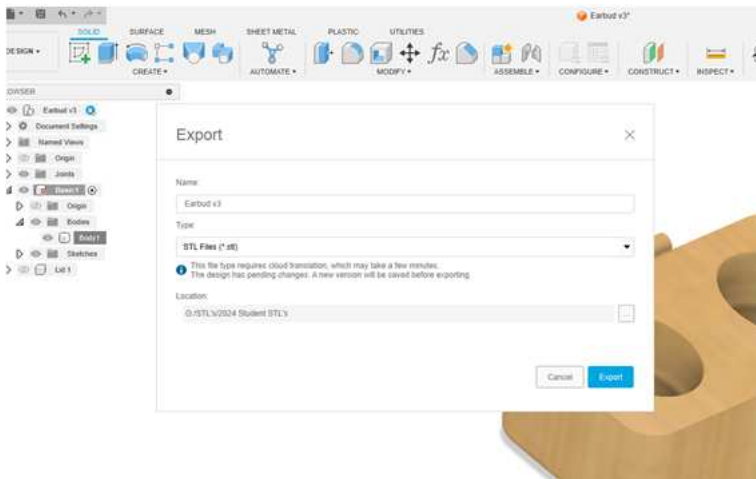


Fillet the internal corners 5mm





For **3d Printing** the base (turn off visibility of the lid) file / export as a .stl

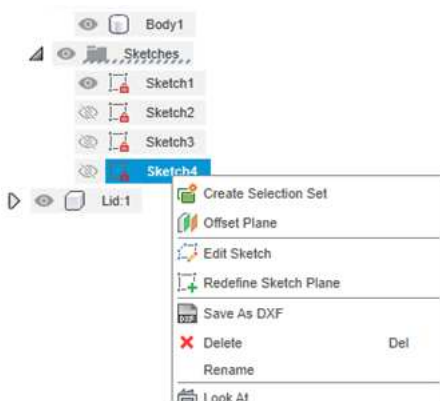


Should you wish to make a gasket and need to make a **dxg** of a face.



Just click on the face and go create sketch this means what you see is what you get, no construction lines.

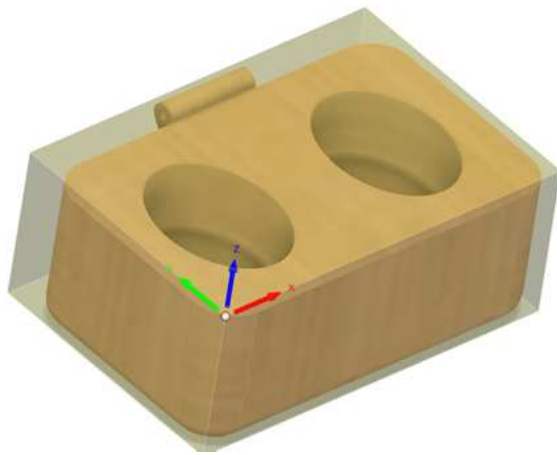
Suggest you name the sketch dxg (for future needs)



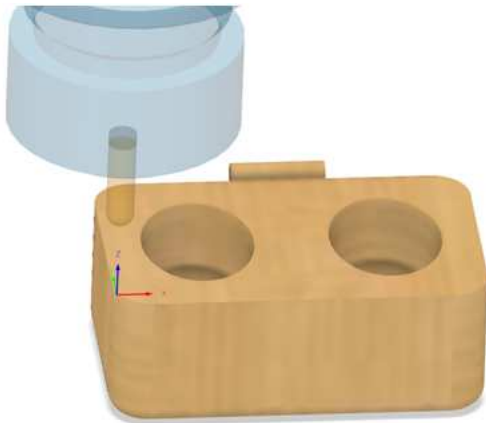
### For CNC.

Go to Manufacture (behind design tab) Set up set materials and machine.

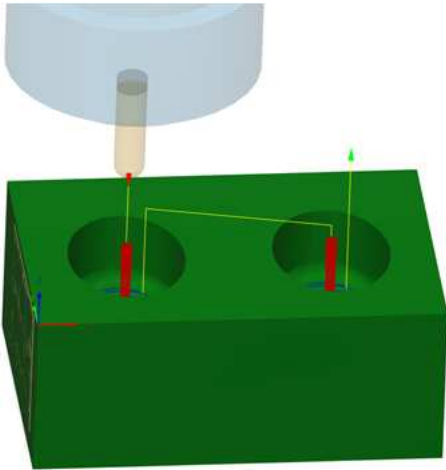
X Axis



Then set toolpath 2d adaptive in this instance.



Simulate cutting to ensure toolpath is suitable for your design.



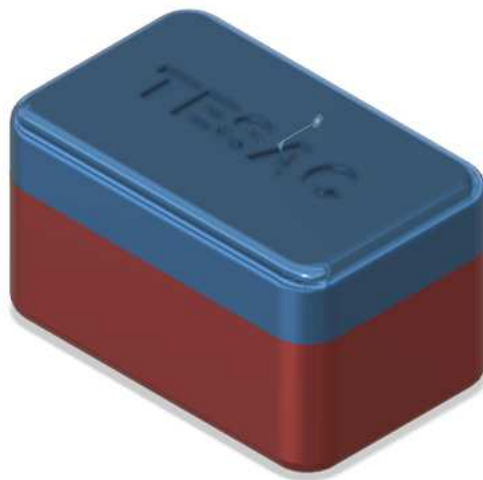
When happy post process G code to a folder/USB.

Other additional features a student could add to the design. Consider foam/fabric inserts.



Emboss the top surface of the Lid with Txt like the example.

Change the Material or Appearance.



Questions?