EP1000
3D Models

Essential Tools in Fusion 360

- From Autodesk Training
  - Introduction to Fusion 360
  - User Interface Overview
  - Open, close, export, upload, and save designs
  - Set Preferences
  - Adjust Display settings
  - Use the Marking Menu
  - Use the Toolbox
- Create A Project
- Open a Design created in another CAD system
- Components and Bodies
- Parametric vs. direct modeling
- Working with Design versions
- Sketch Constraints

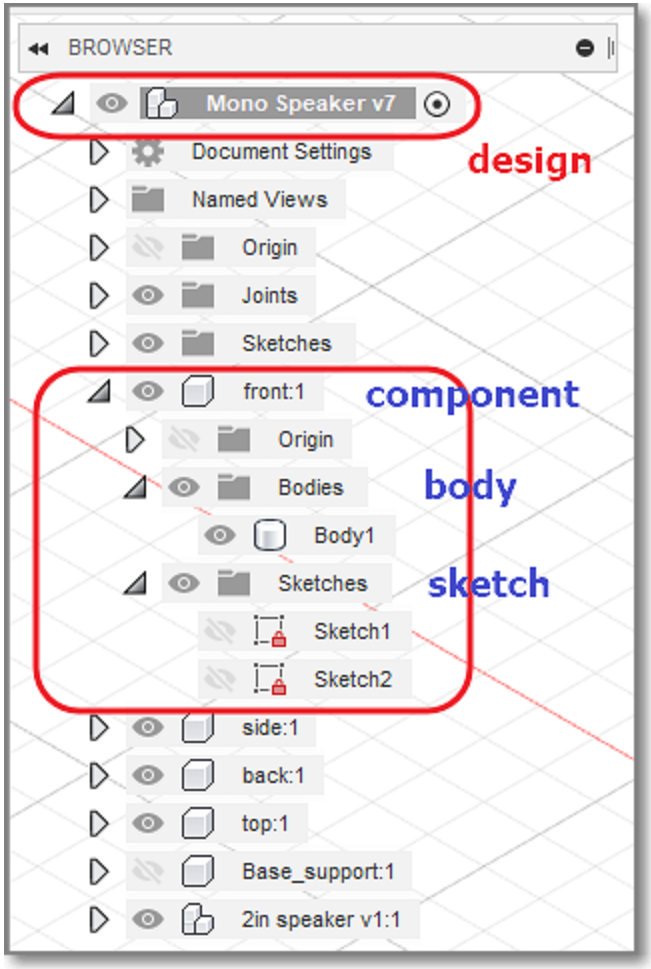
Fast Track for Engineers

- Kevin Kennedy Product Design Online
  - Recommended: Learn Fusion 360 in 30 days

  - Highlighted Topics
    - Navigating the Fusion 360 User Interface (sections explained) - REVISED 2019
    - Default settings for Fusion 360
    - How to Manually Add Sketch Constraints - Learn Autodesk Fusion 360 in 30 Days: Day #16
    - How to Create text in Fusion 360
    - How and Why to Fully Constrain Your Sketches

Fusion 360 Building Blocks

- Sketch
  - Created in a 2D plane
  - Sketches should be constrained and closed
  - Forms the building block of all models
- Body
  - Usually created from a sketch(s)
  - Is a SOLID
  - Can combine to form other bodies
- Component
  - Made up of bodies and sketches
  - Usually "joined" or "combined“
  - Can be used to form other components

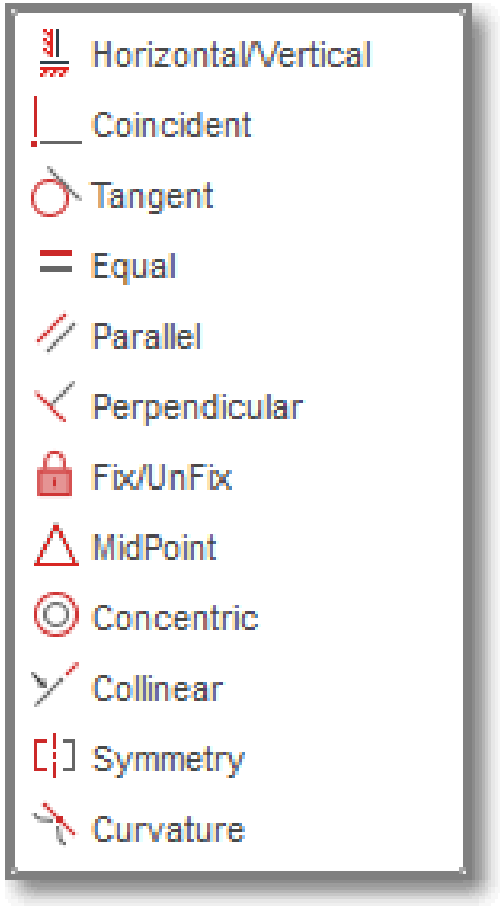


Constraints

- Why constrain a sketch?
  - A constrained sketch cannot be changed (accidentally).
  - Each segment is locked by a dimension or a constraint.
  - Constrained segments are drawn in BLACK

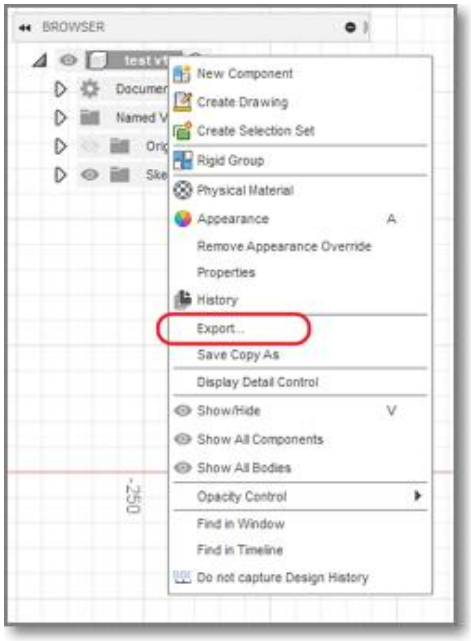
Kevin Kennedy: How and Why to Fully Constrain Your Sketches

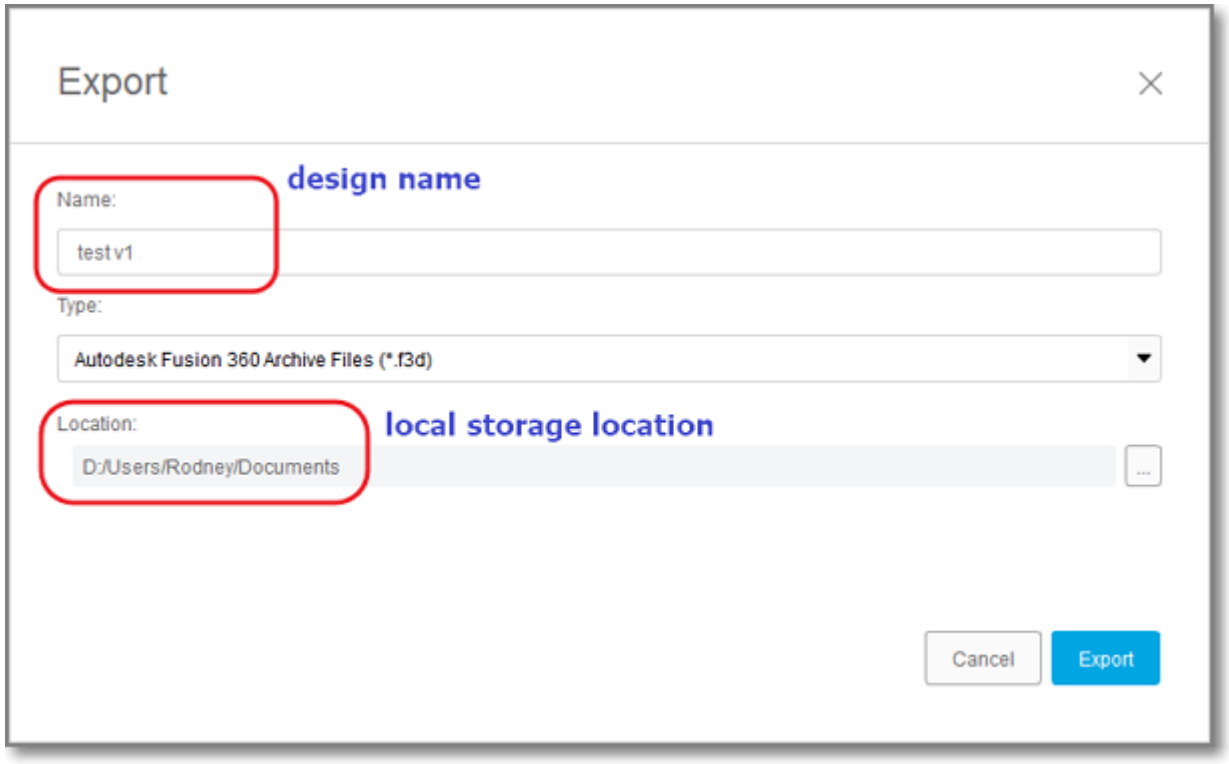
Types Of Constraints



- Dimension
- Horizontal, Vertical
- Coincident (constrains a point to another point, line, arc, or curve.)
- Tangent
- Equal
- Parallel
- Perpendicular
- Fix / UnFix
- MidPoint
- Concentric
- Colinear (constrains a line to another line, so that both lines fall onto the same line)
- Symmetry
- Curvature

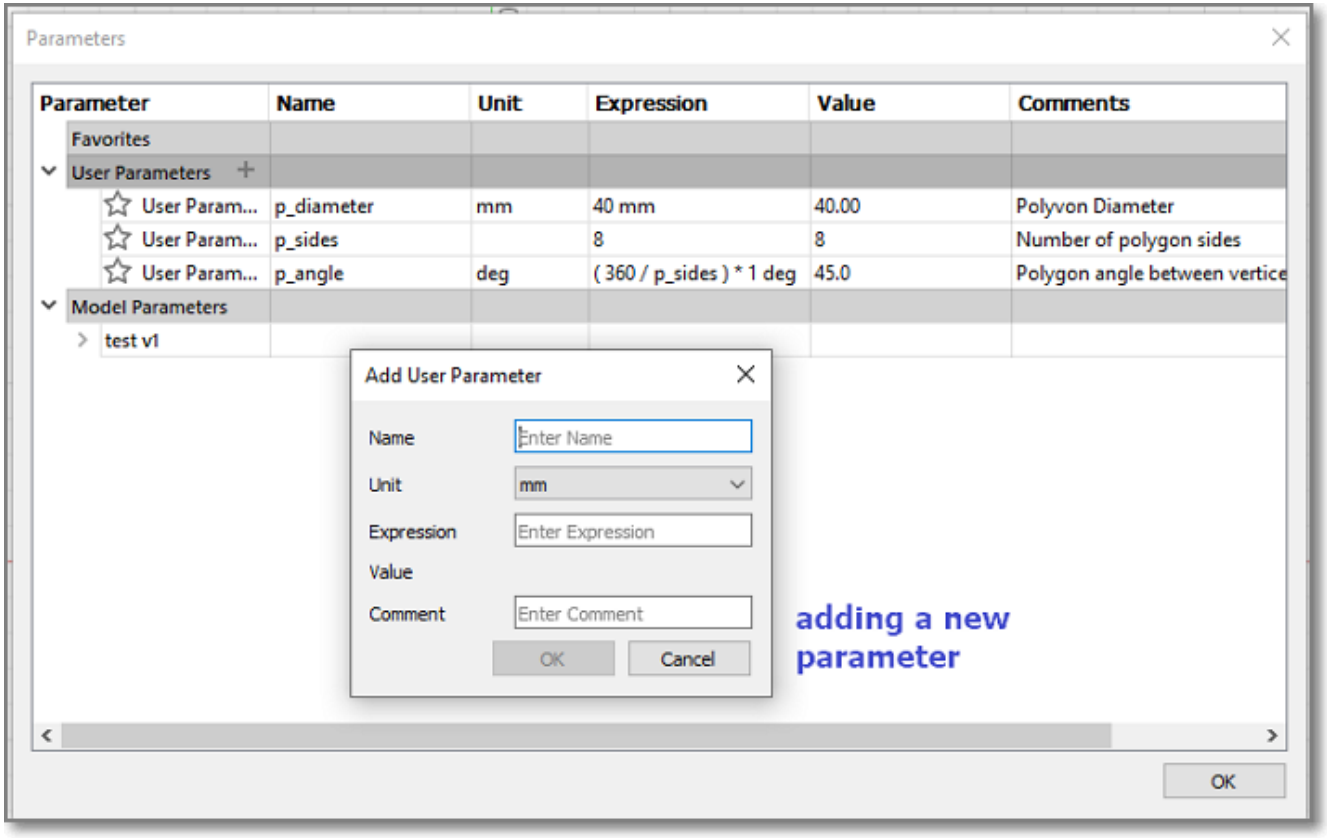
Saving Designs





- Fusion 360 saves all files into the cloud
  - You can share your files within the cloud
  - You can export your design file to the local storage using export.
  - Output format is .f3d

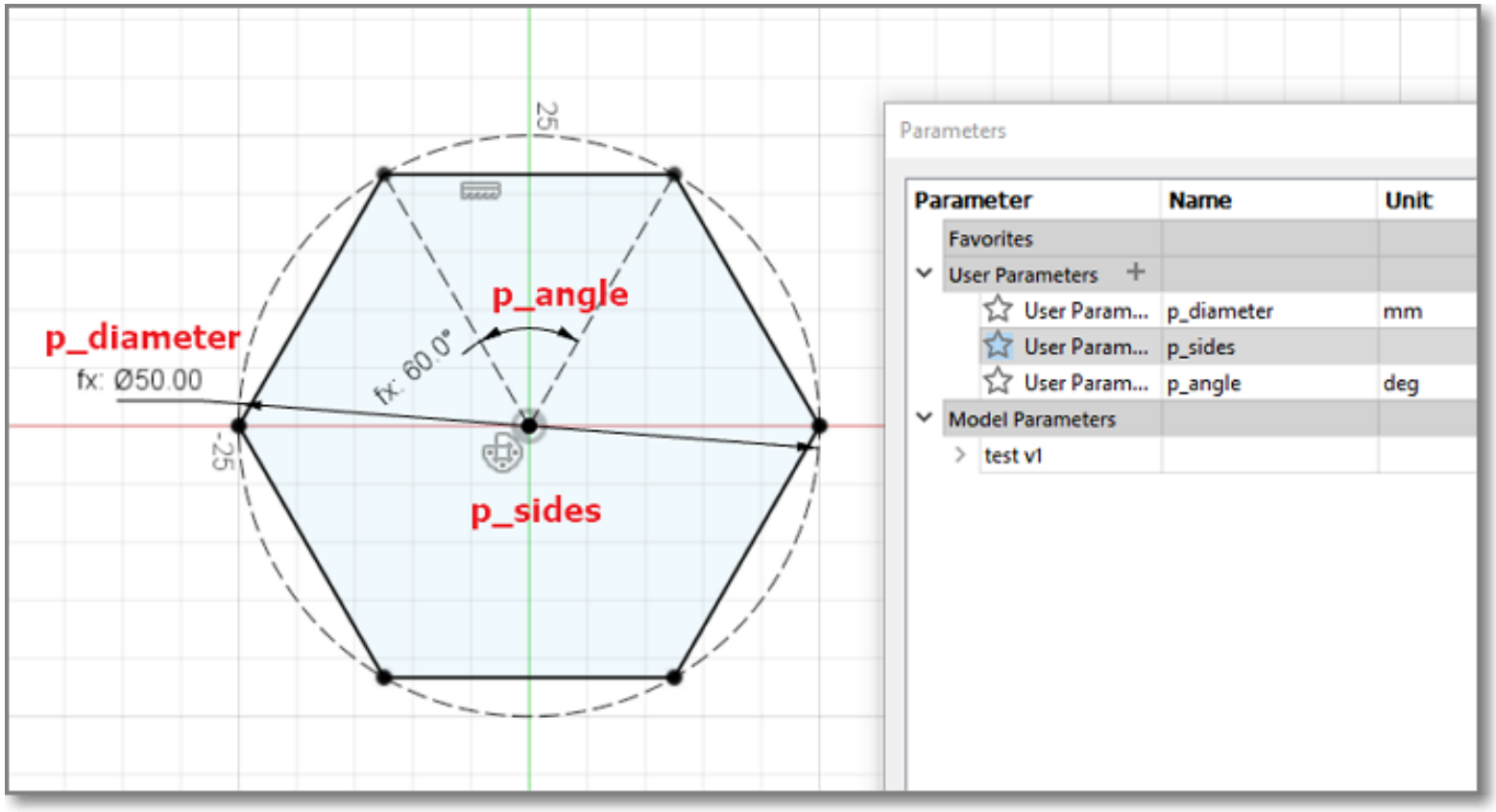
Parametric Design



- Enter variables as parameters
- Use parameters in your design
- Design becomes very flexible

E.g. Parametric Polygon

- A fully configurable polygon with parametric sides and size.
- Try changing the parameters

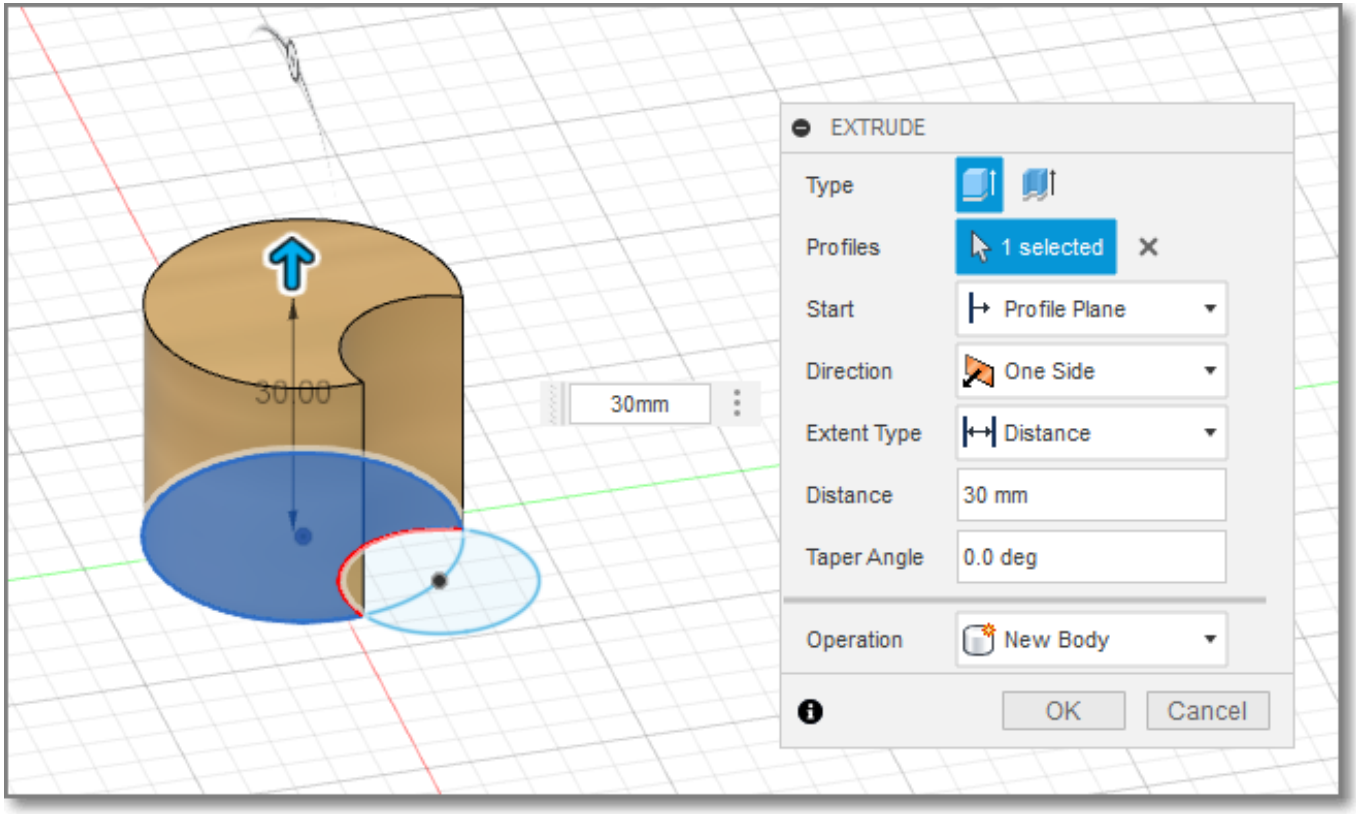


Methods of Creating 3D Models

- Extrusion
  - Use a 2D plane profile
  - Extend into the 3rd plane
- Rotation
  - Use a 2D plane profile
  - Rotate the plane around an axis
- Sculpting
  - Start with a 3D object
  - Add, remove 3D objects
  - Subdivide the surface into sections
  - Push, pull, extend, contract sections

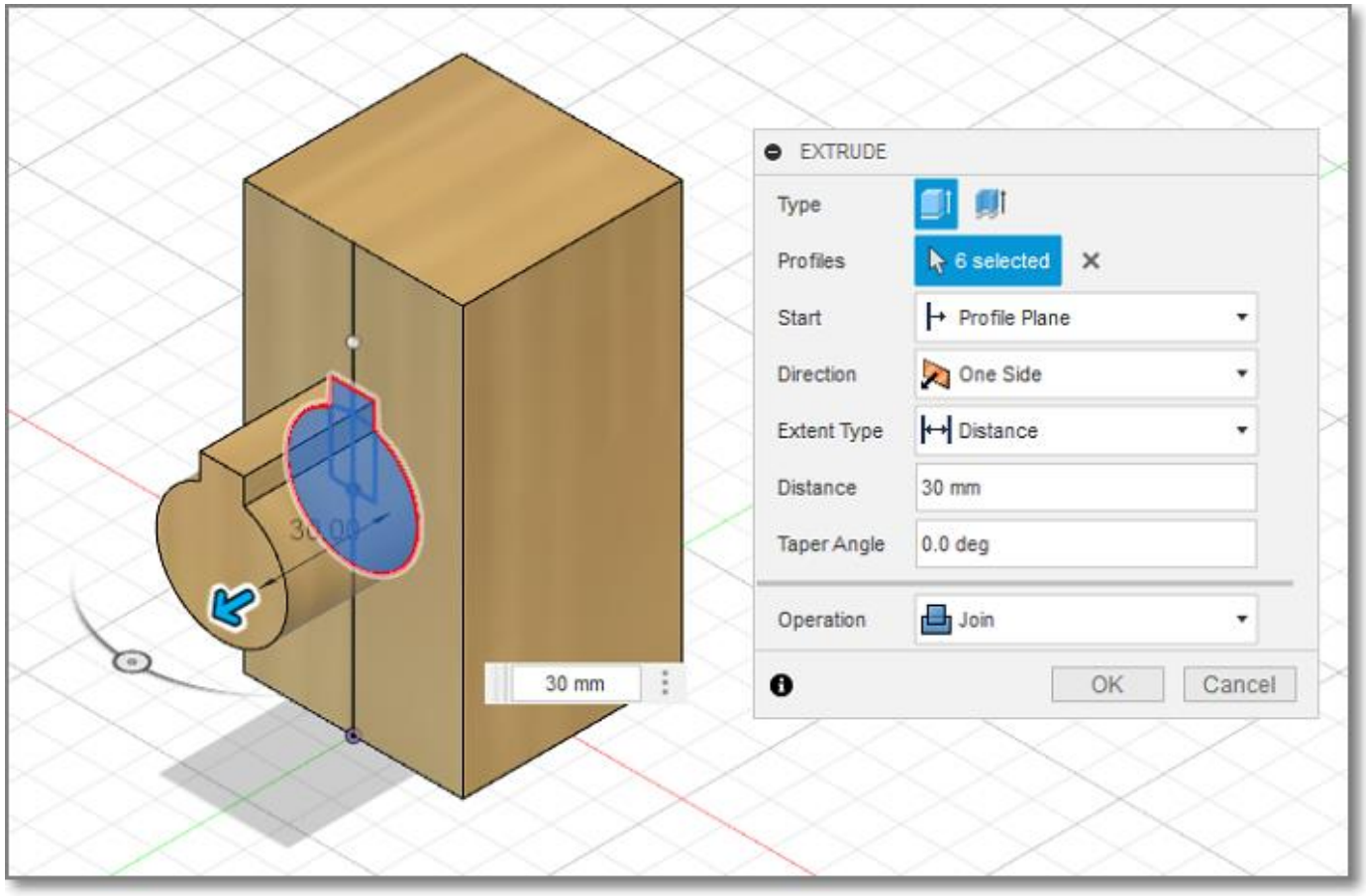
Extrusion

- Start with a 2D closed profile in plane
- Stop Sketch
- Create > Extrude in 3rd axis



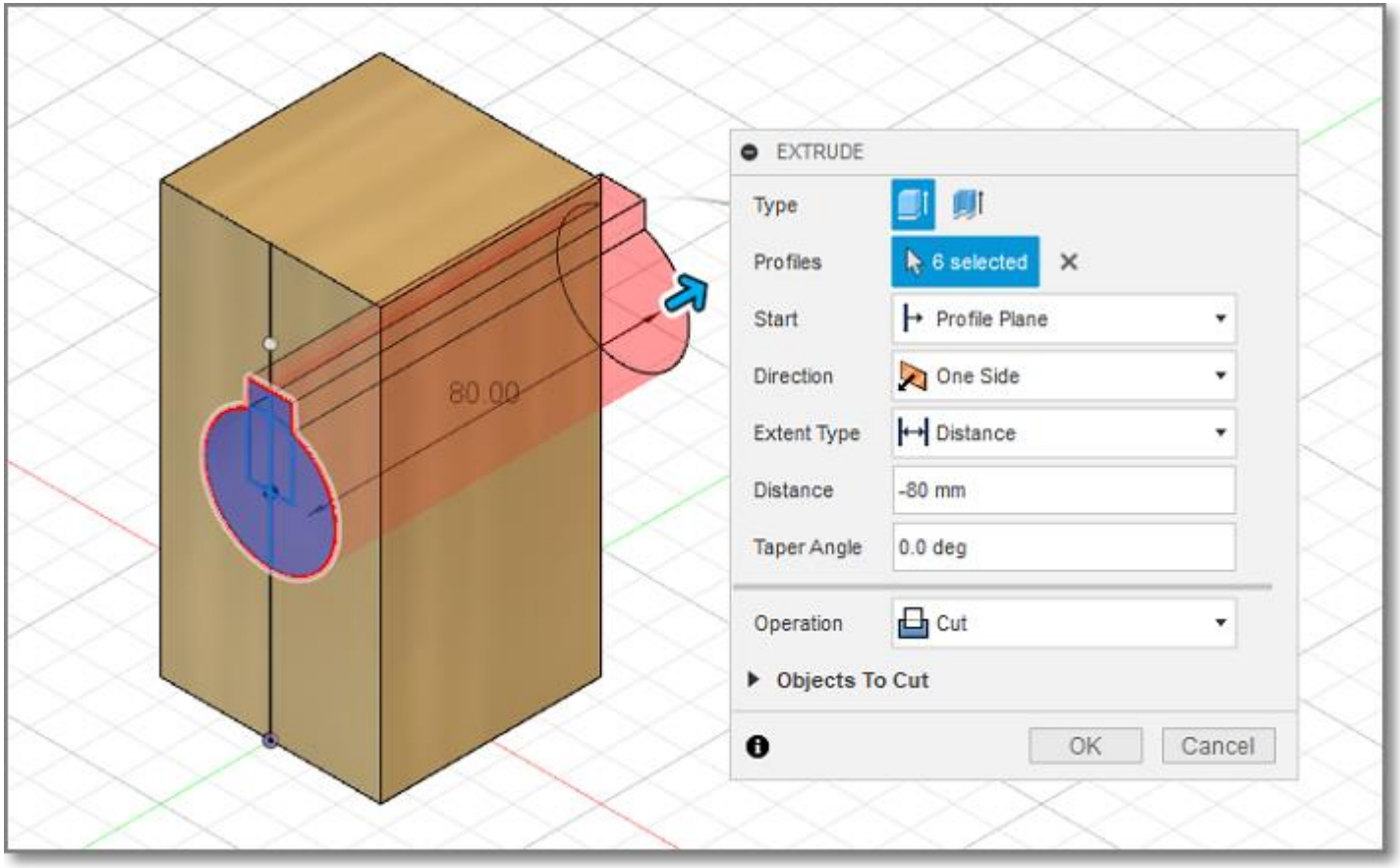
Extrude – Join / New Body

- You can build new bodies by adding/creating the original.



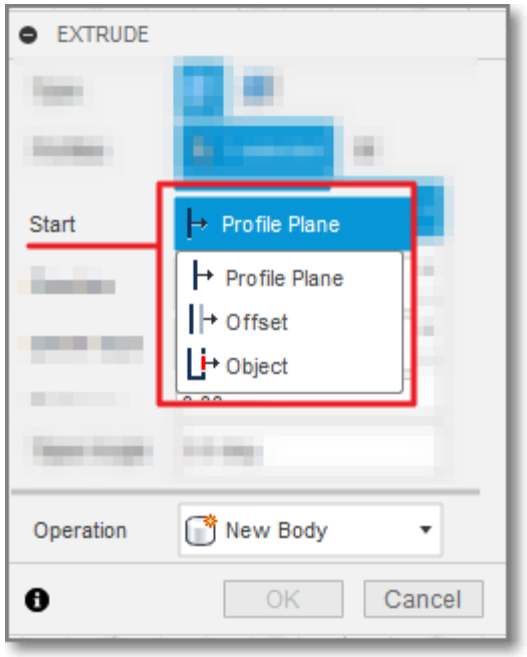
Extrude – Cut

- You can cut holes using subtraction to the original..

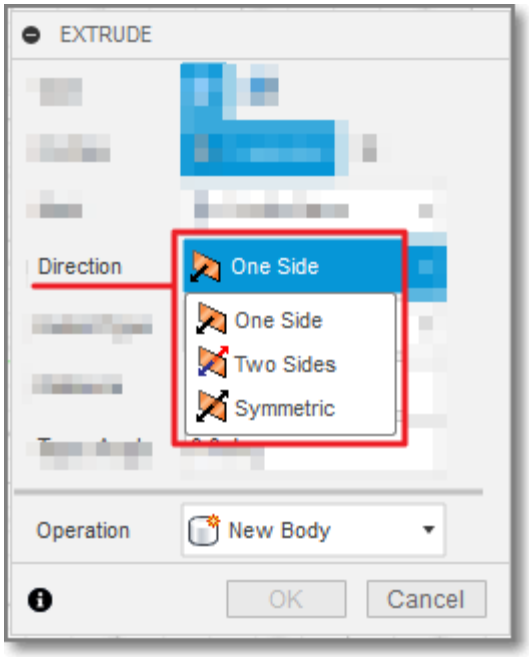


Extrude – options

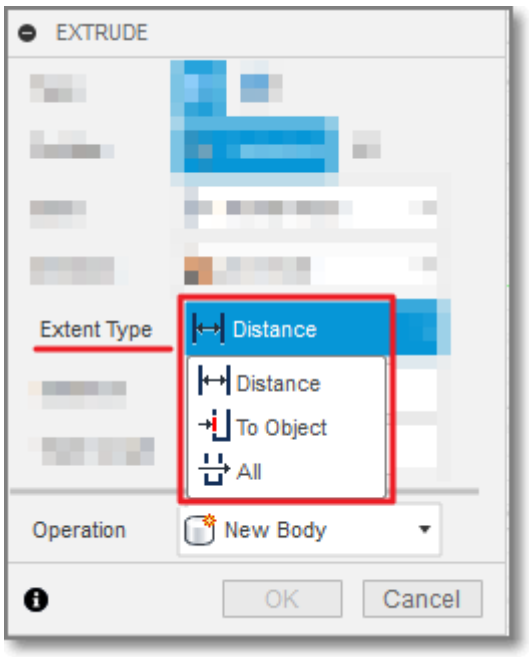
Start



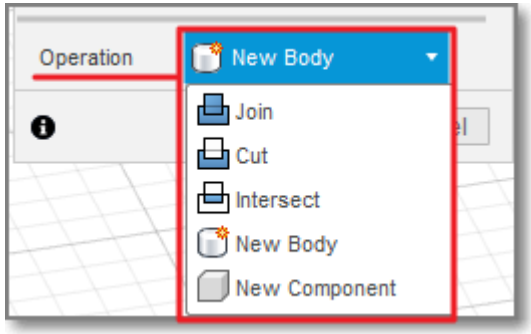
Direction



Extent Type

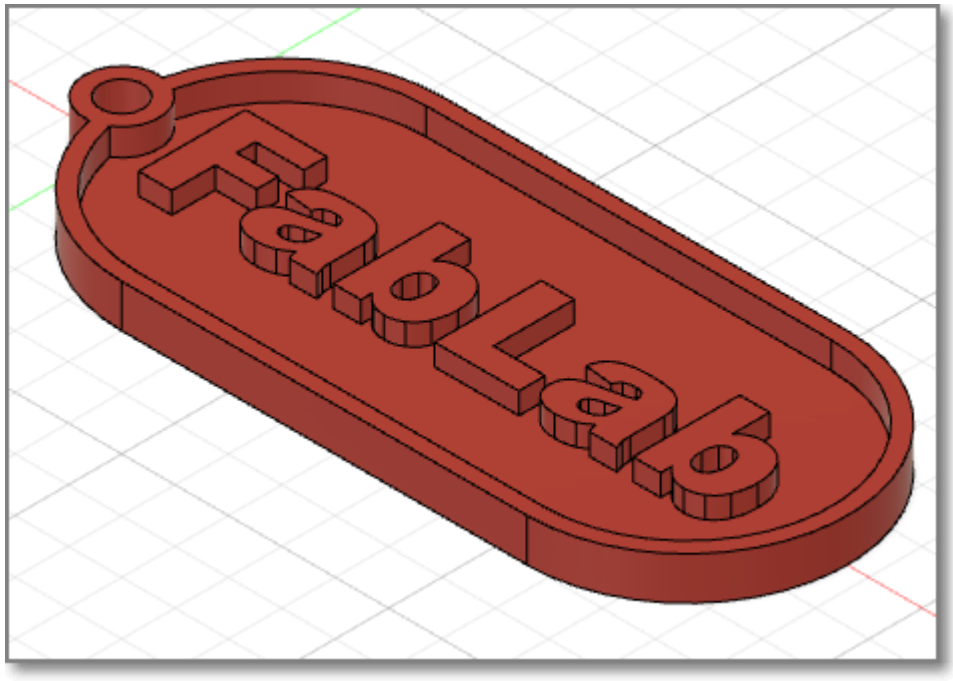


Operation



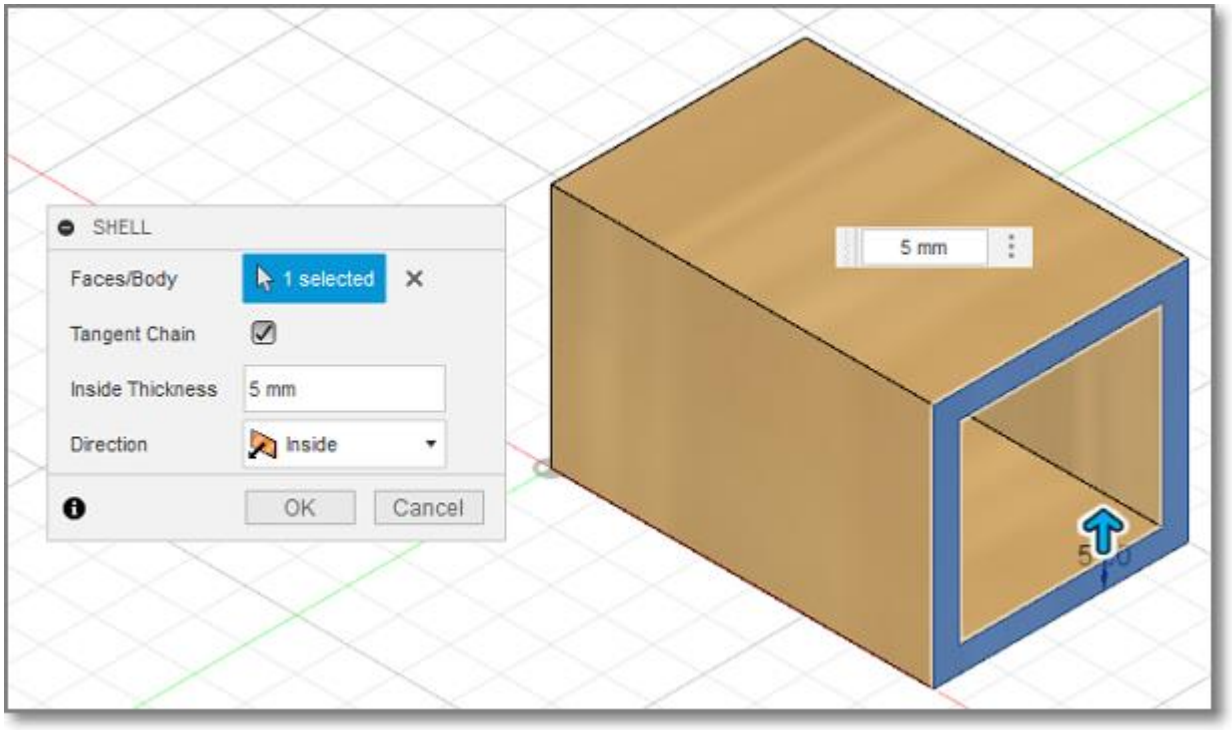
Exercise 1: Name Tag

- Let's make a name tag
  - dimensions: 30mm x 70mm x 4 mm
  - rim of 1.5mm thickness around the edges, height 2.5mm
  - key-ring hole of 4mm, re-enforced with 1.5mm rim
  - name or design/pattern 0.5mm below surface
  - base of name tag 1.5mm thick



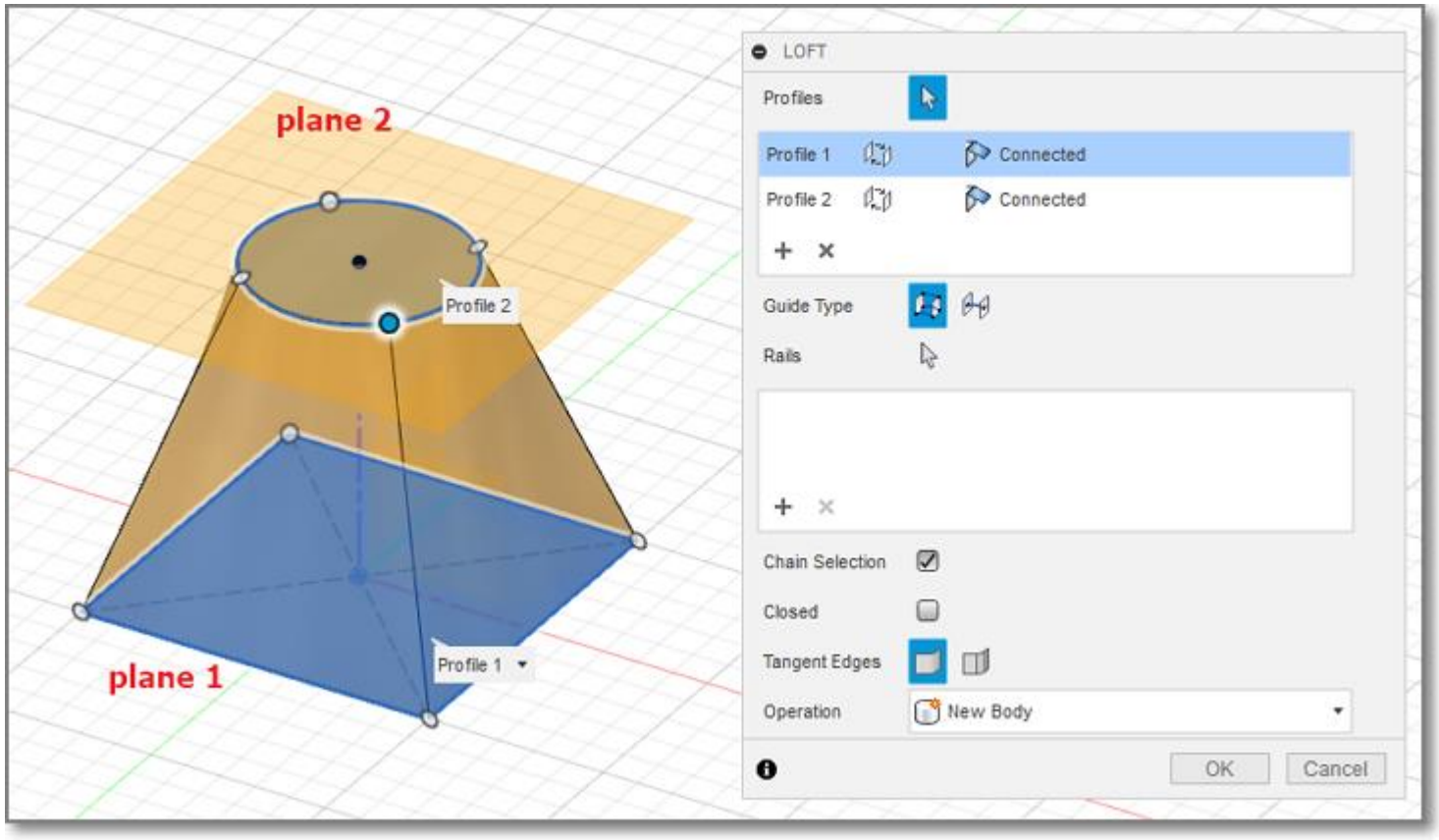
Modify > Shell

- Makes a shell of the solid object
- Starts with the face that was selected
- The shell thickness must be specified



Create > Loft

- Create a solid object from profiles on different planes

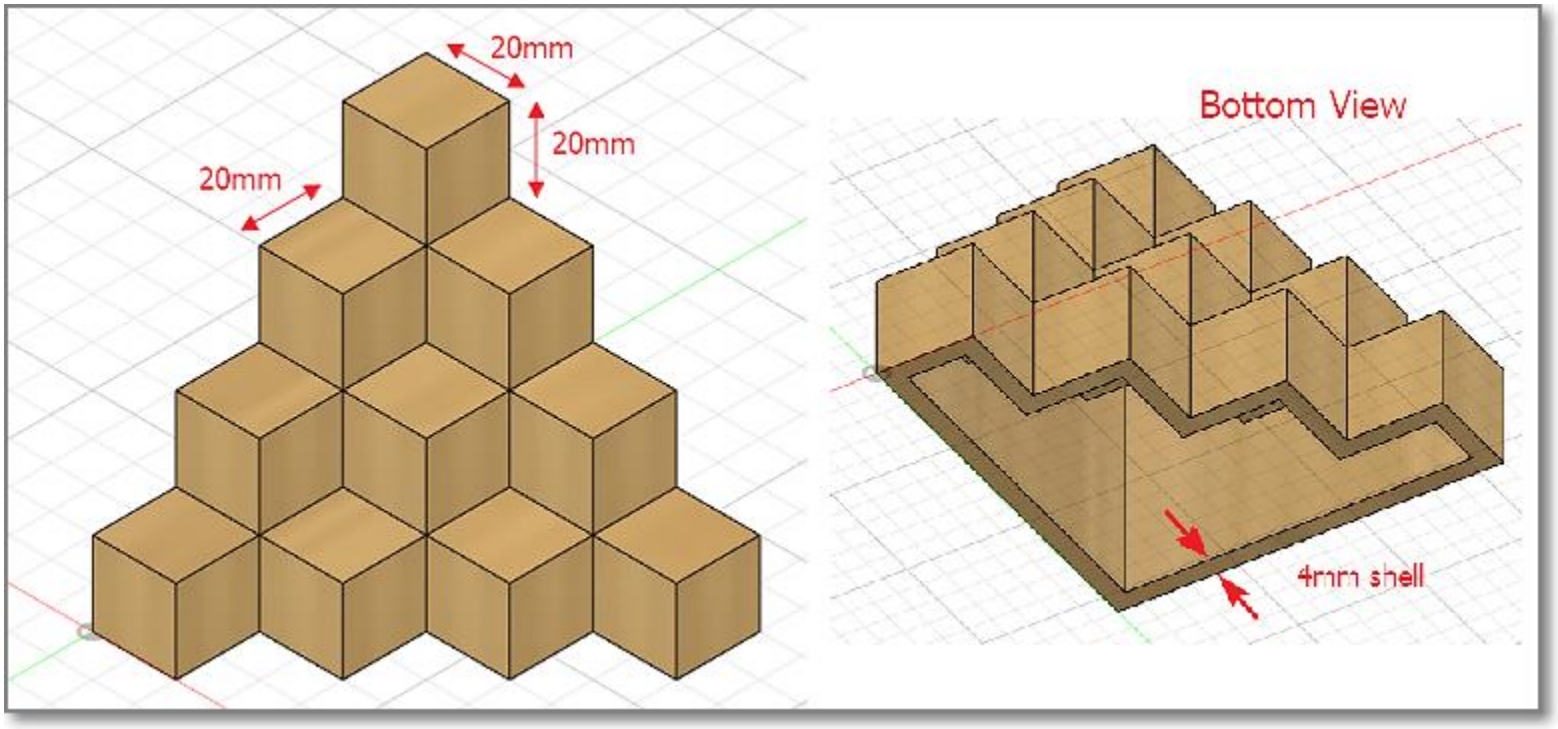


Exercise 2: A Lego brick

- This is Kevin Kennedy's video tutorial on the drawing of a Lego brick. https://youtu.be/6yPKMSb6ja8

Exercise 3: Extrudes & Planes

- This object is made up of 20 cubes (20mm) glued together and then shelled to a thickness of 4mm



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