

EP1000

3D Models

Essential Tools in Fusion 360

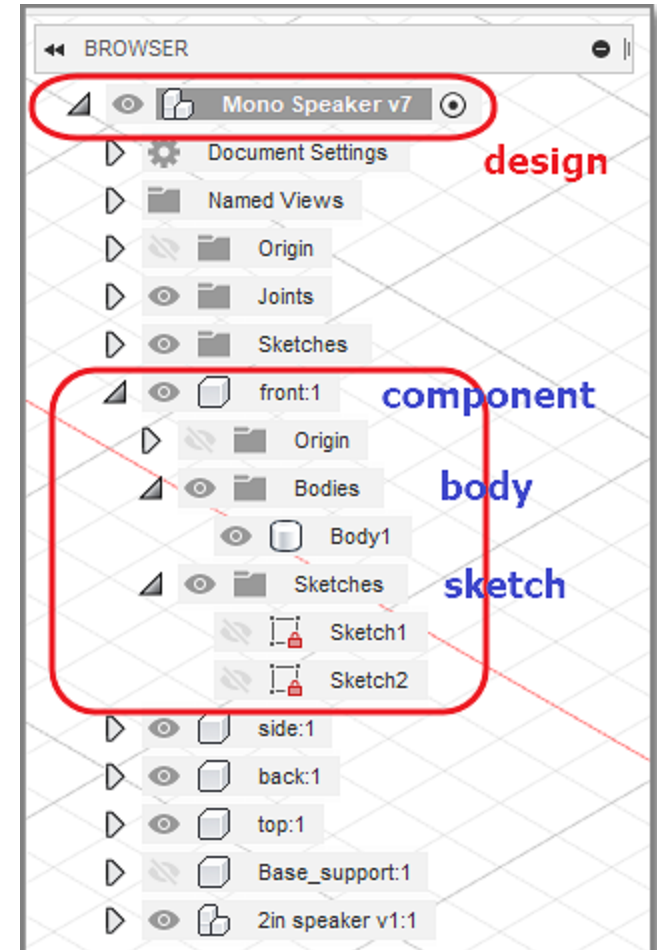
- From Autodesk Training
 - [Introduction to Fusion 360](#)
 - [User Interface Overview](#)
 - [Open, close, export, upload, and save designs](#)
 - [Set Preferences](#)
 - [Adjust Display settings](#)
 - [Use the Marking Menu](#)
 - [Use the Toolbox](#)
- [Create A Project](#)
- [Open a Design created 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

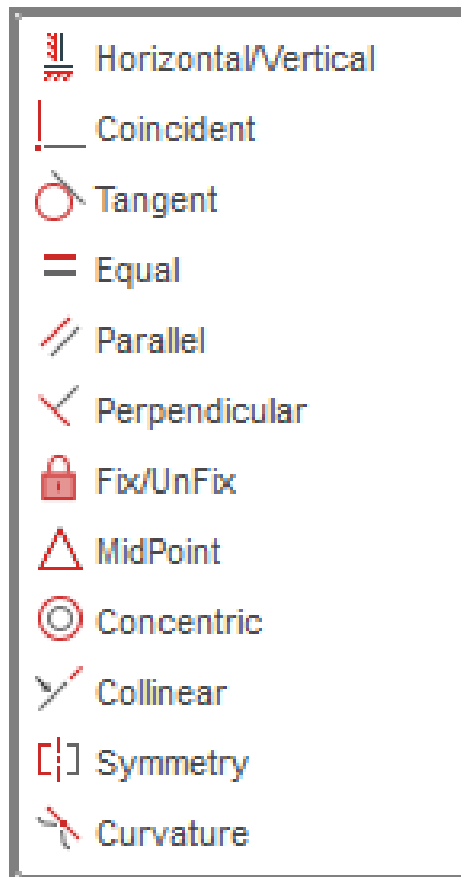


Constraints

- 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**

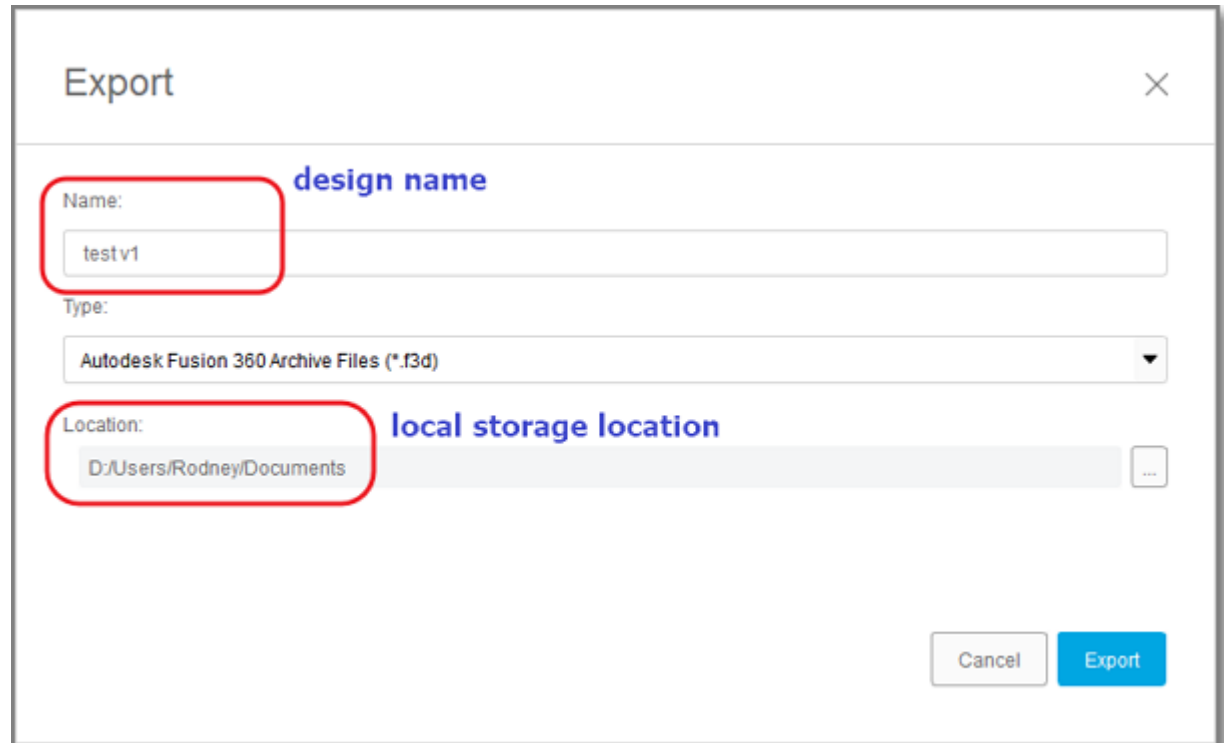
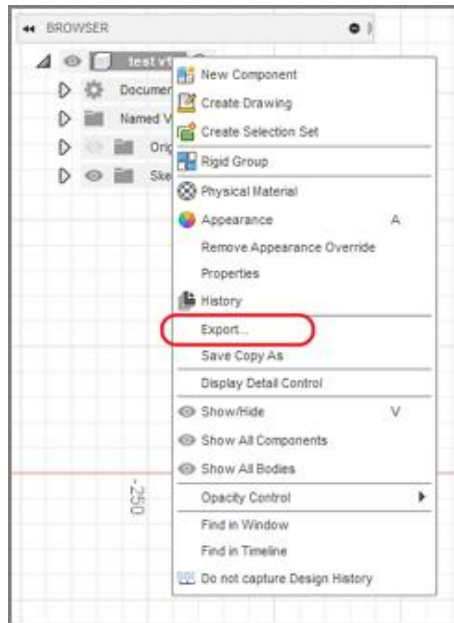
[Kevin Kennedy: How and Why to Fully Constrain Your Sketches](#)

Types Of Constraints



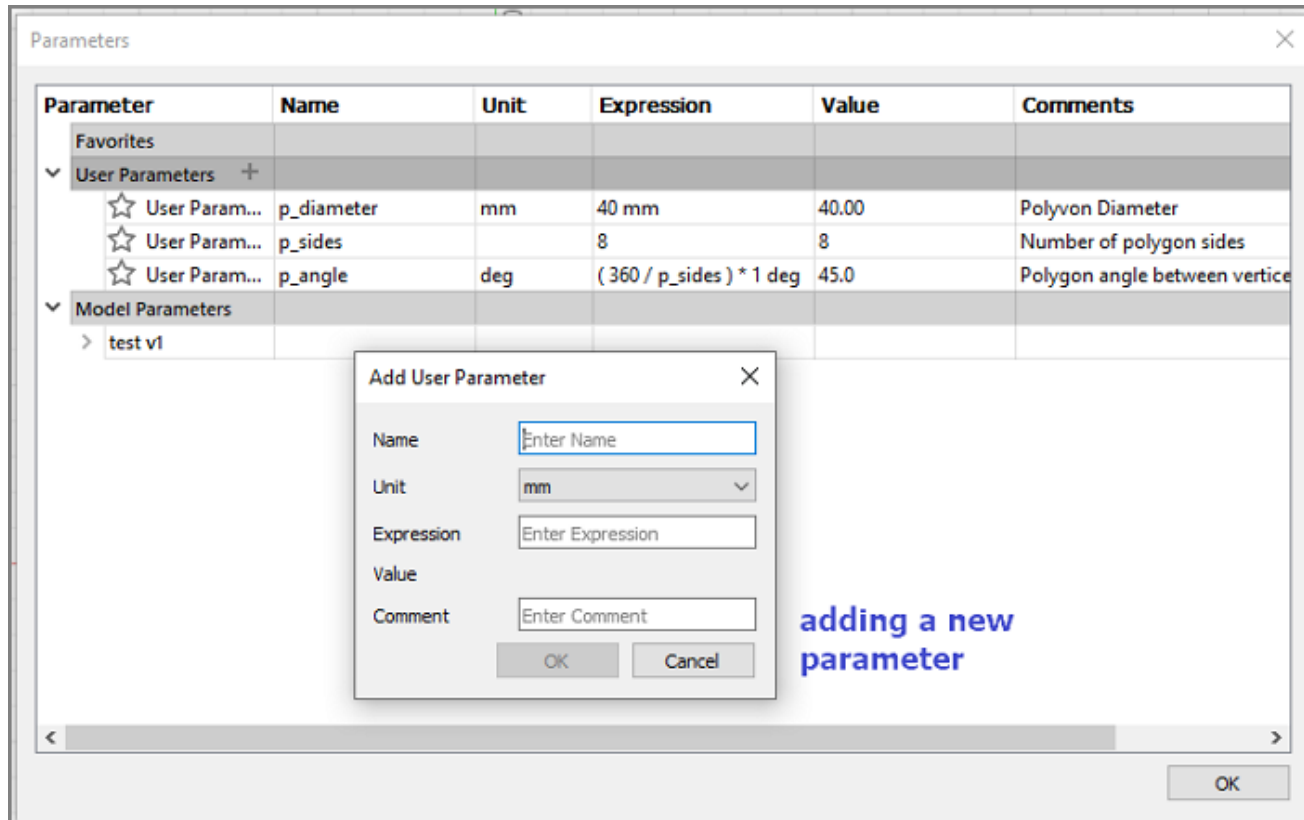
- Dimension
- Horizontal, Vertical
- Coincident (constrains a point to another point, line, arc, or curve.)
- Tangent
- Equal
- Parallel
- Perpendicular
- Fix / UnFix
- MidPoint
- Concentric
- Colinear (constrains a line to another line, so that both lines fall onto the same line)
- Symmetry
- Curvature

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

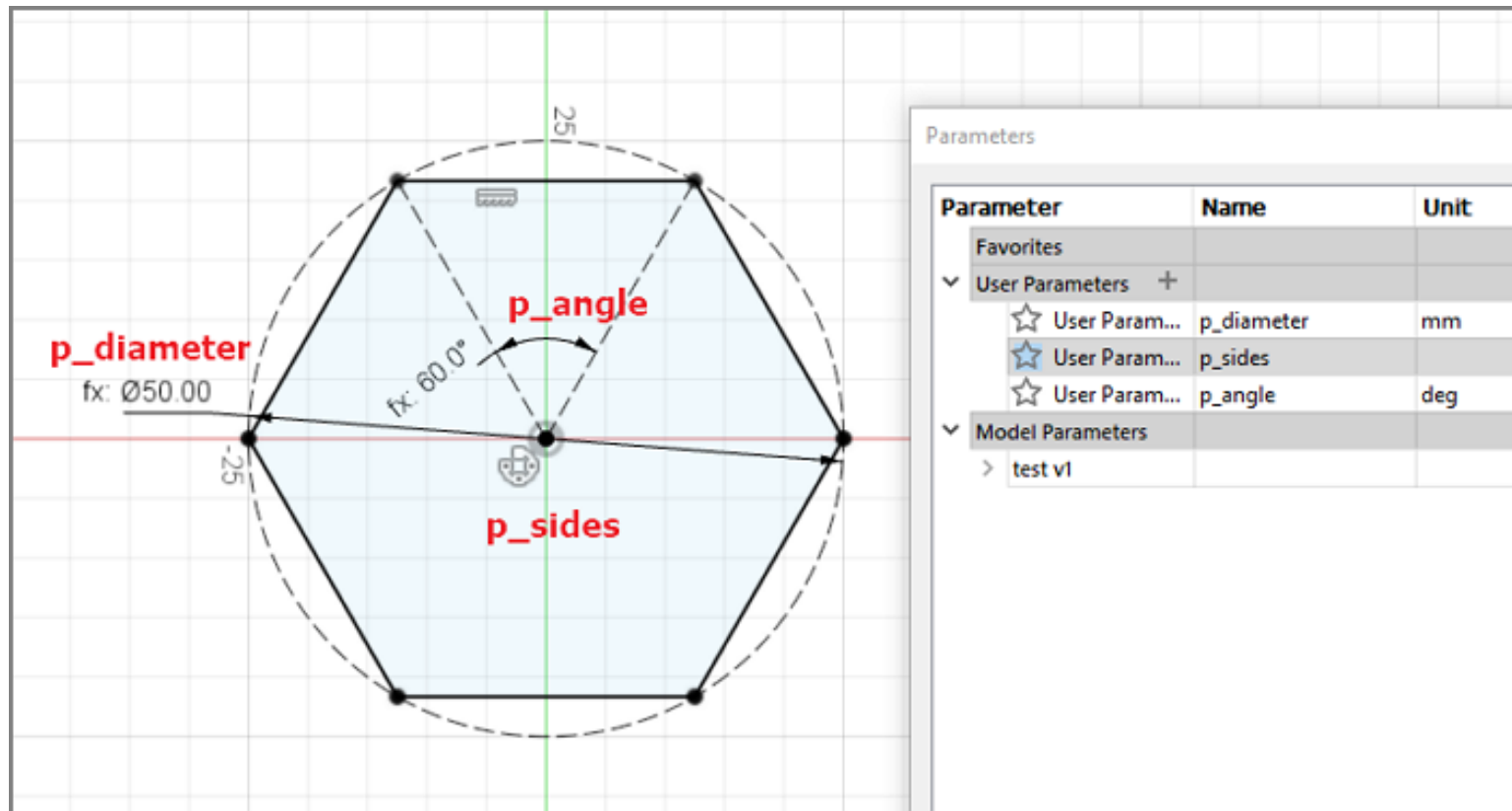
Parametric Design



- 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

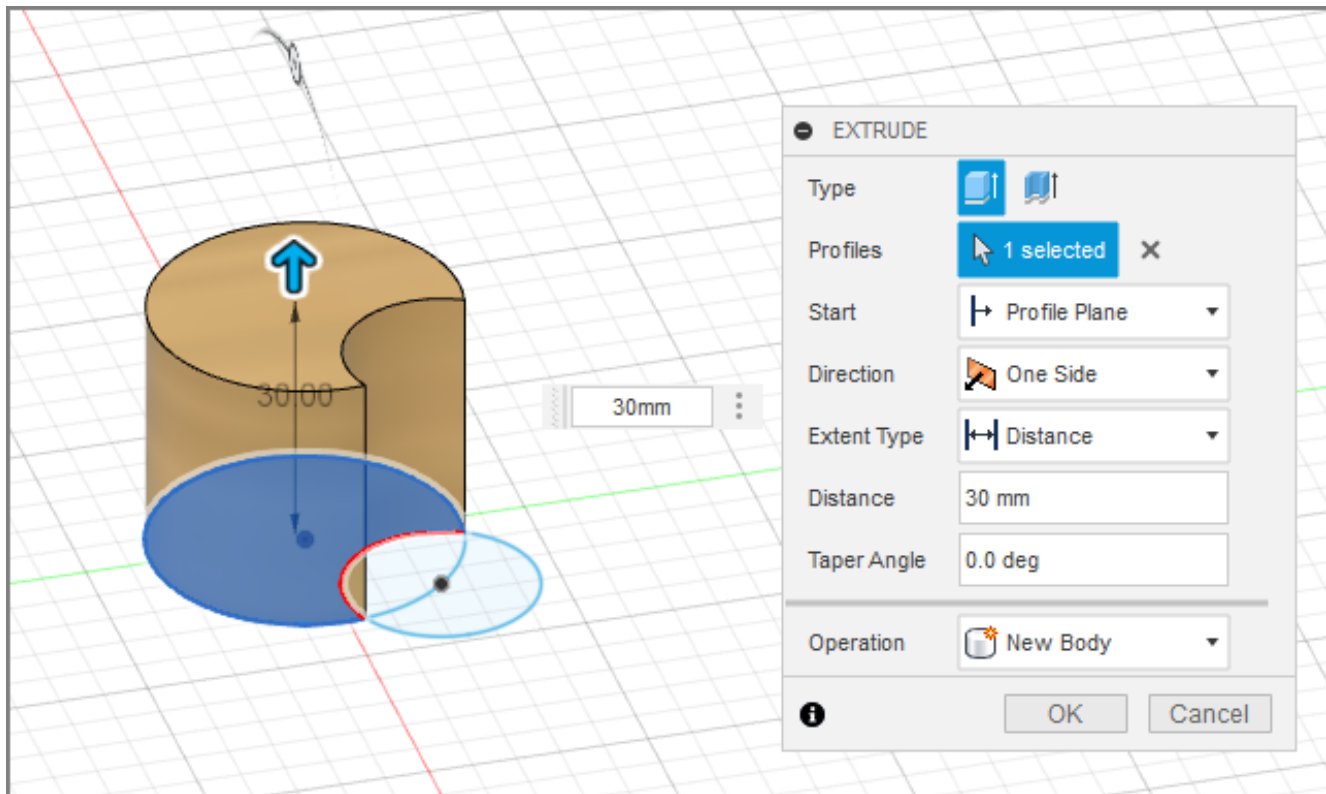


Methods of Creating 3D Models

- 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

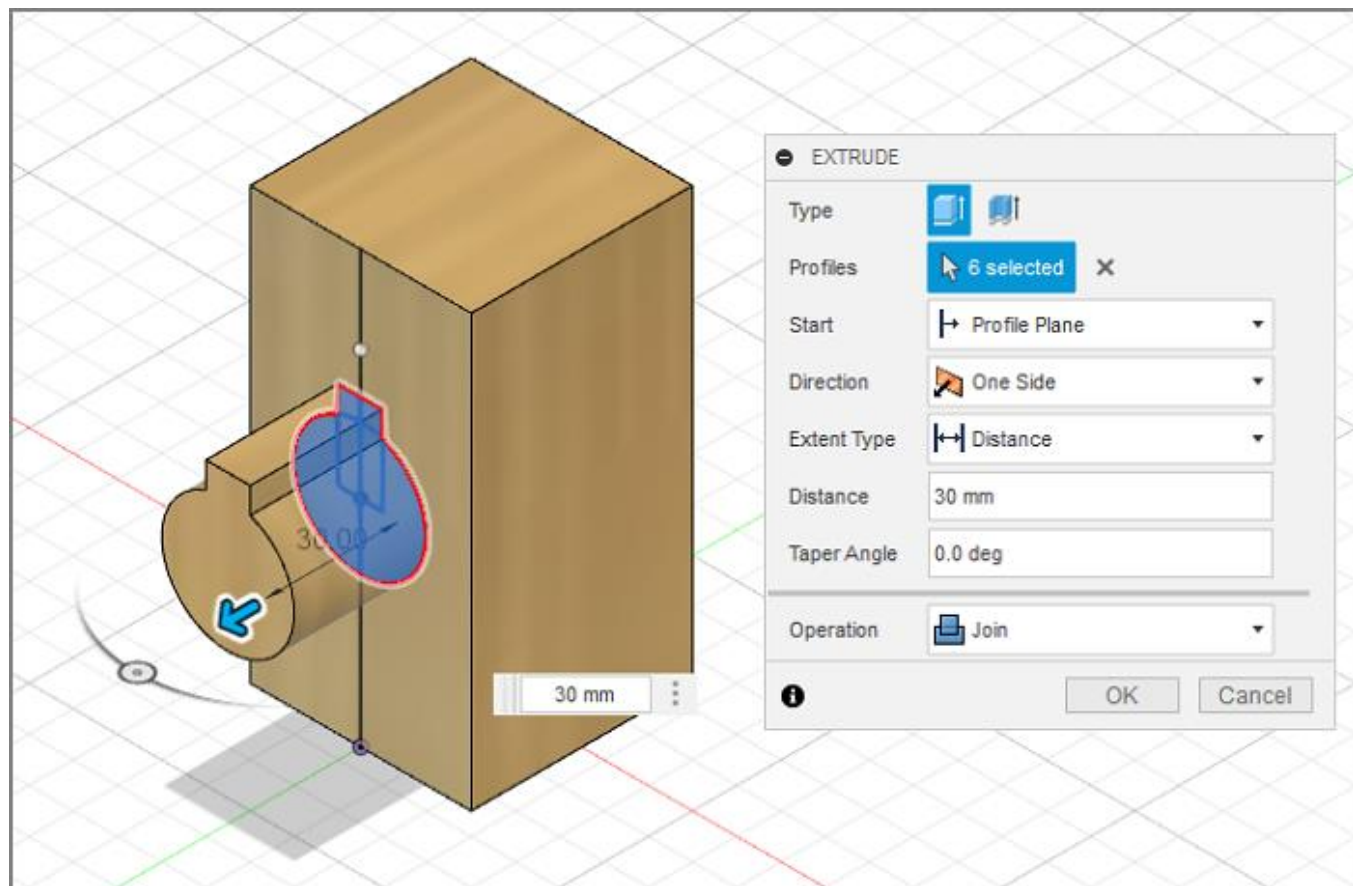
Extrusion

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



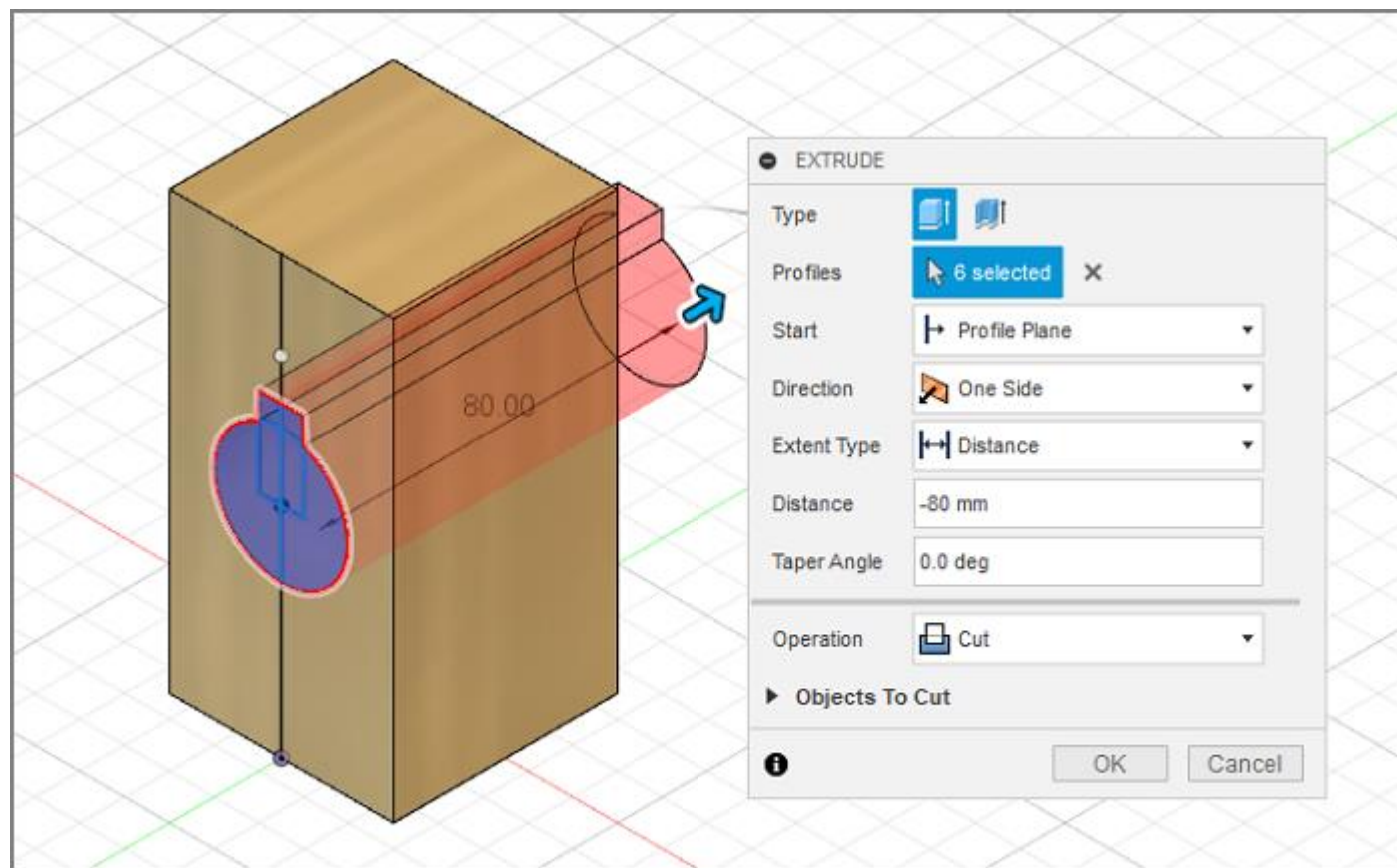
Extrude – Join / New Body

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



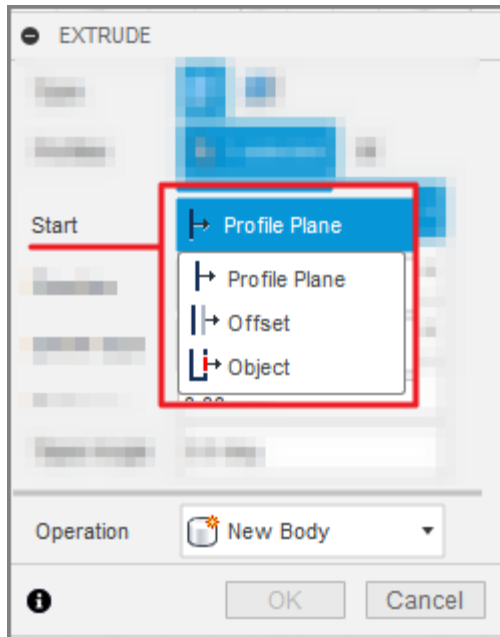
Extrude – Cut

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

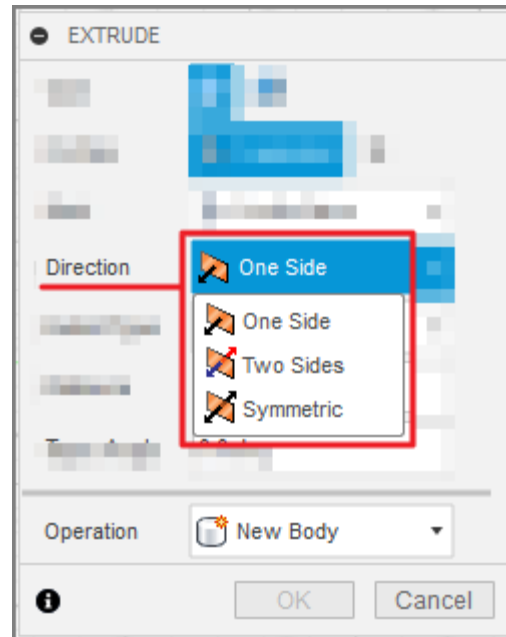


Extrude - options

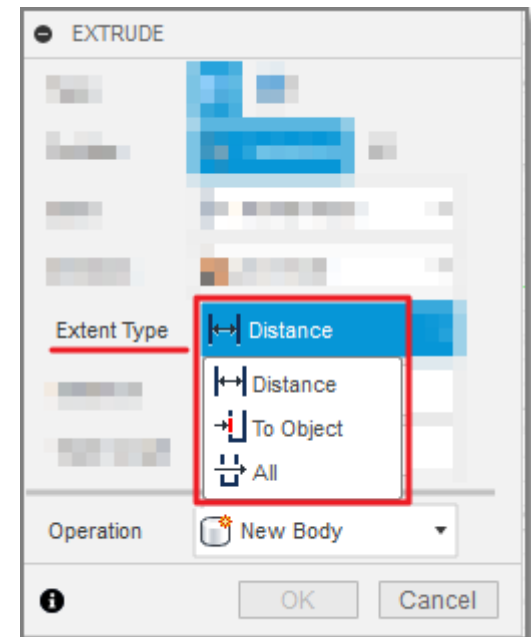
Start



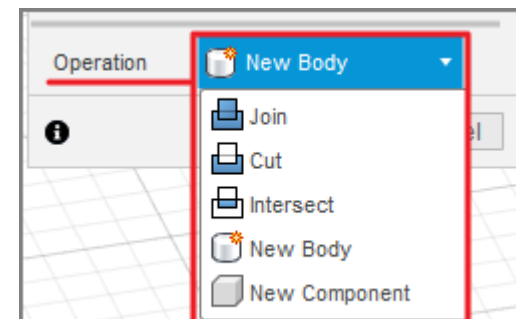
Direction



Extent Type

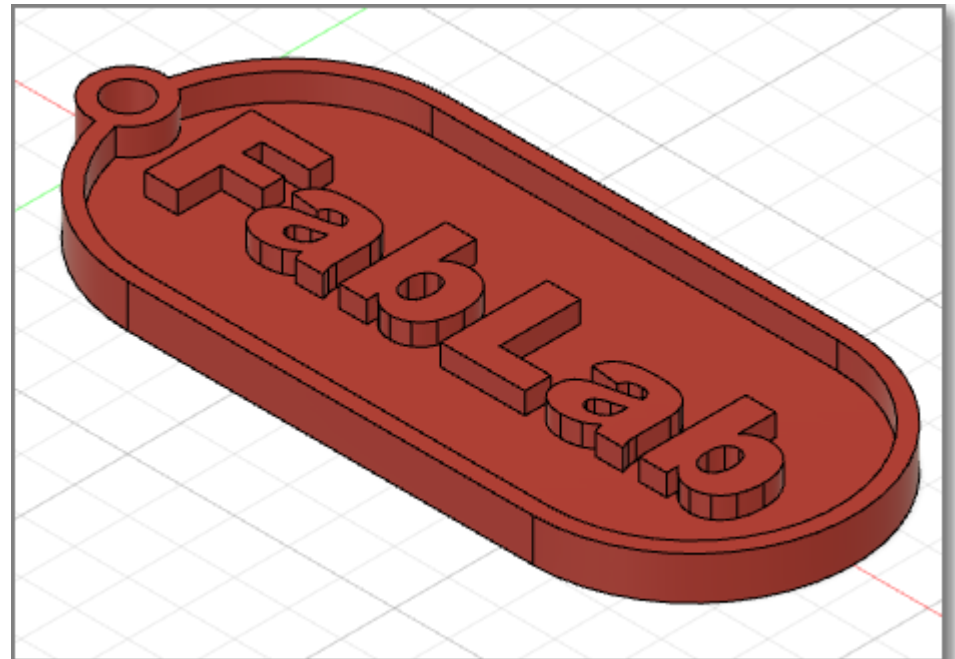


Operation



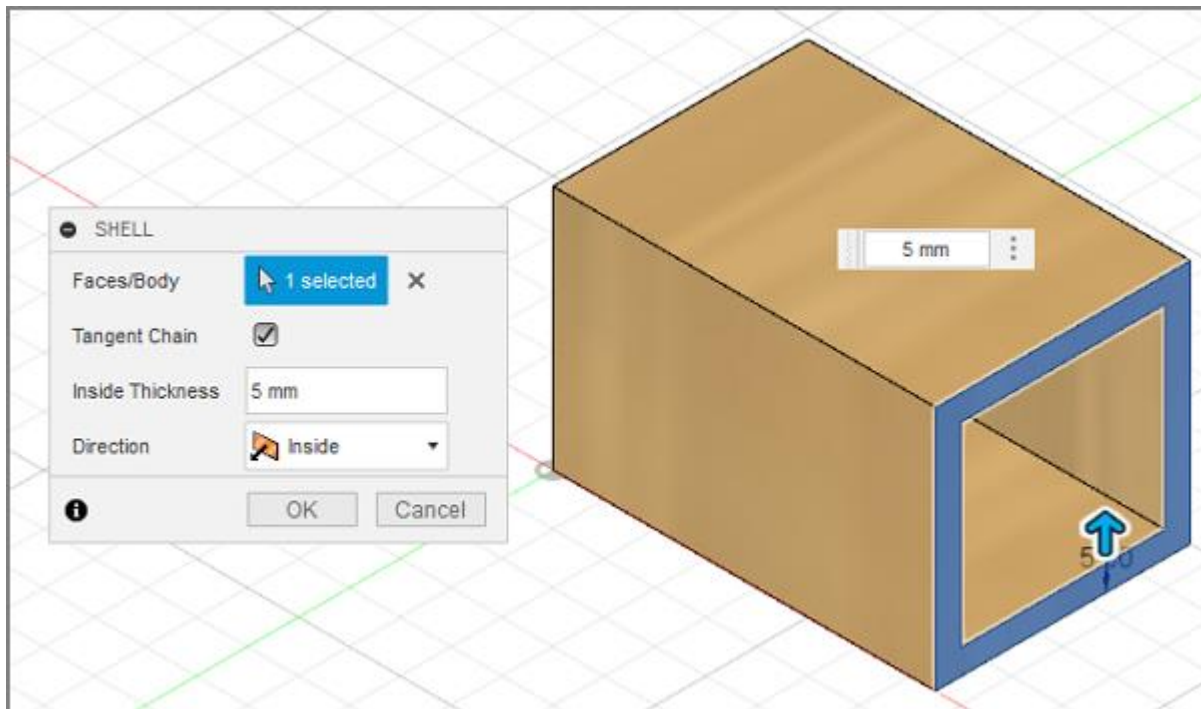
Exercise 1: Name Tag

- 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



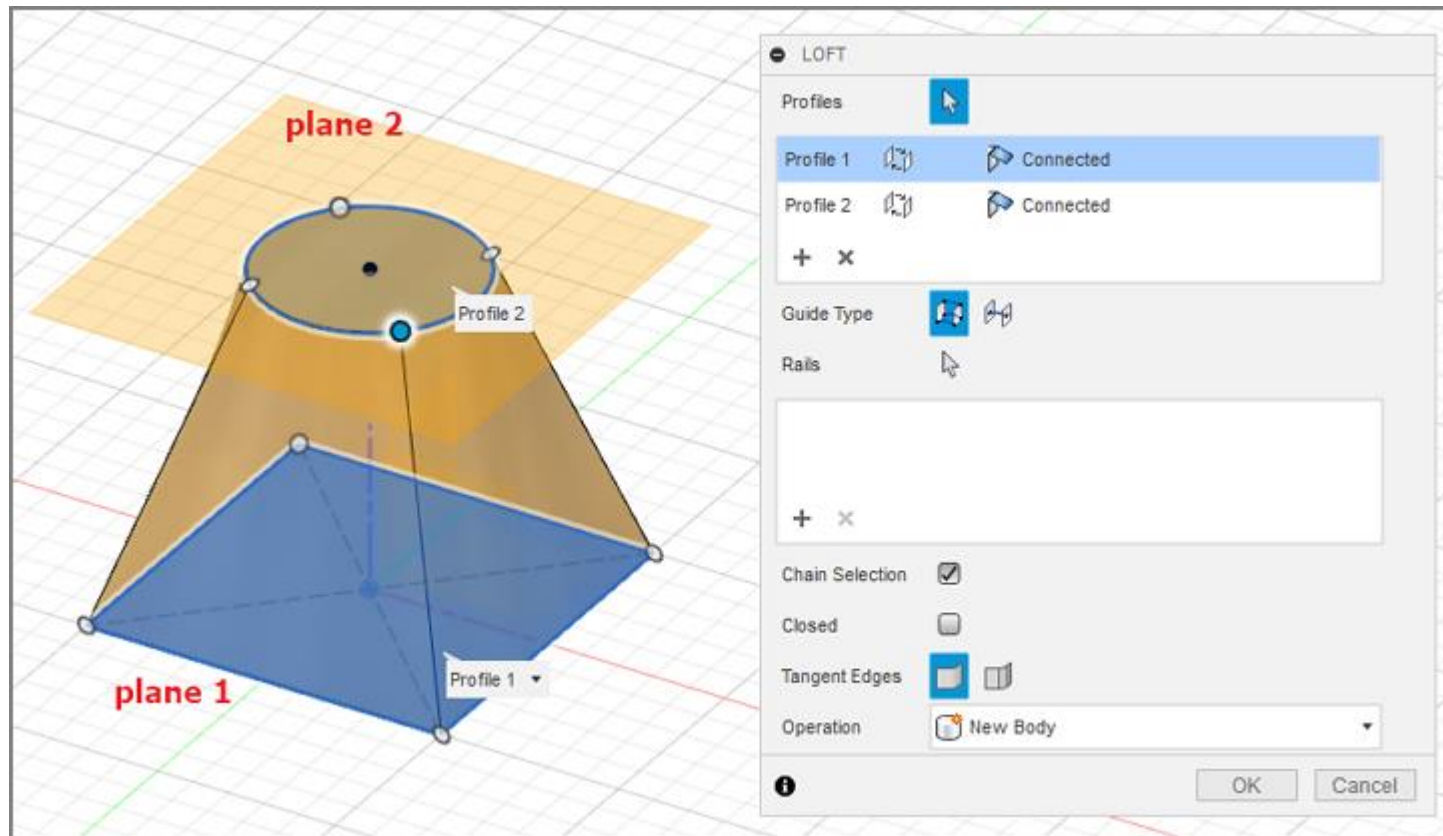
Modify > Shell

- 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



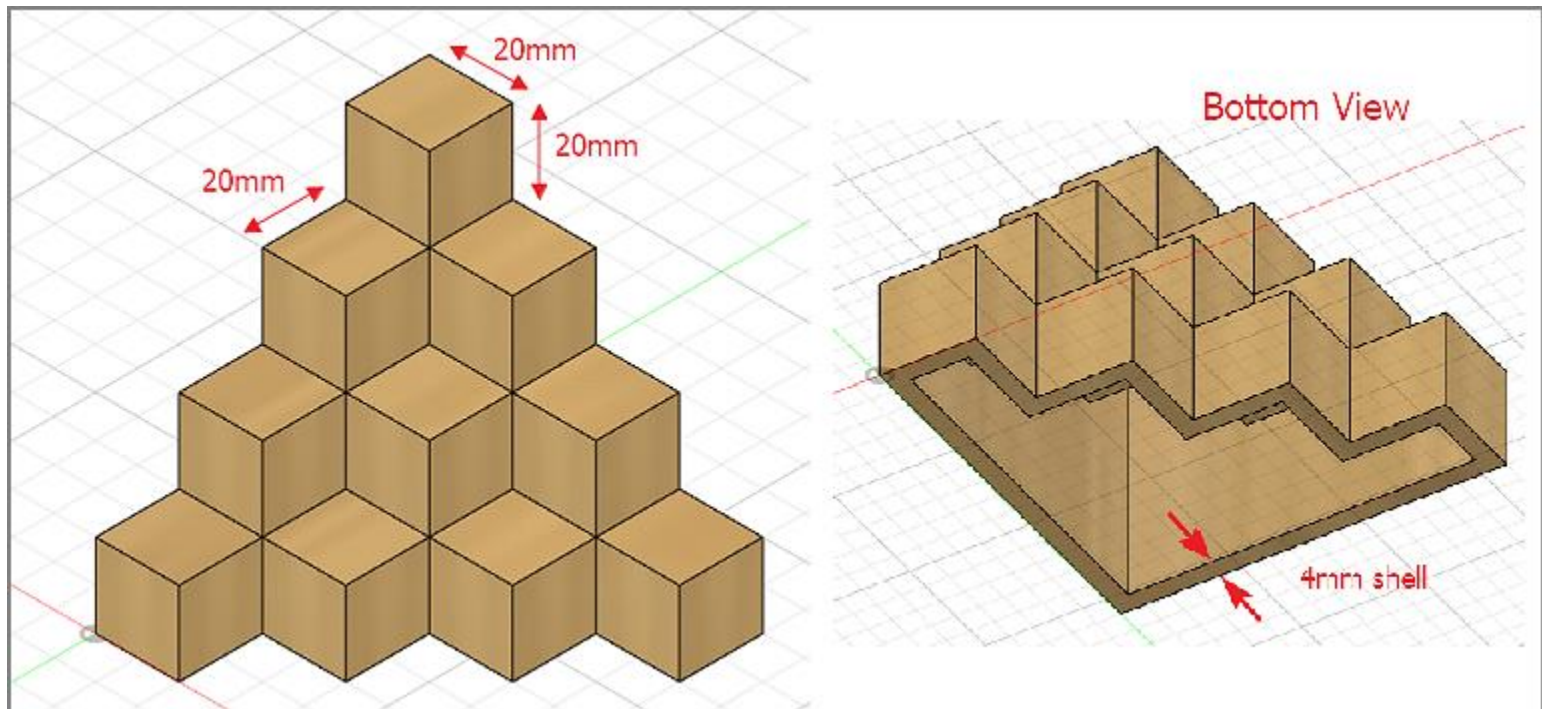
Exercise 2: A Lego brick

- 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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End