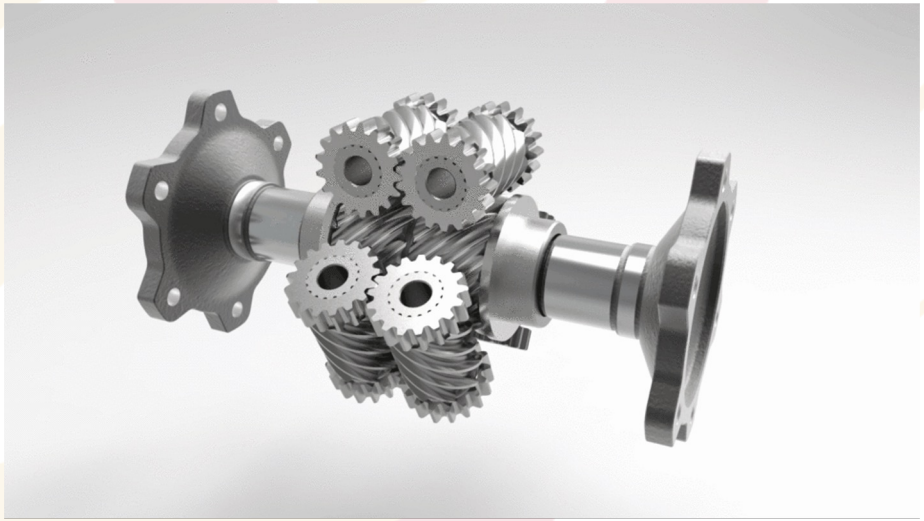
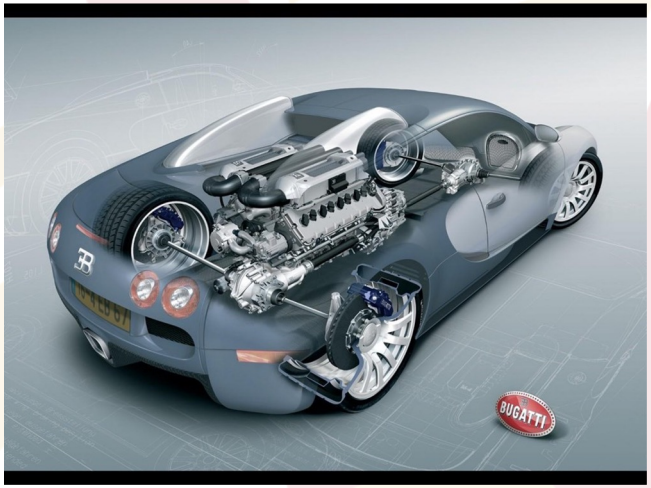
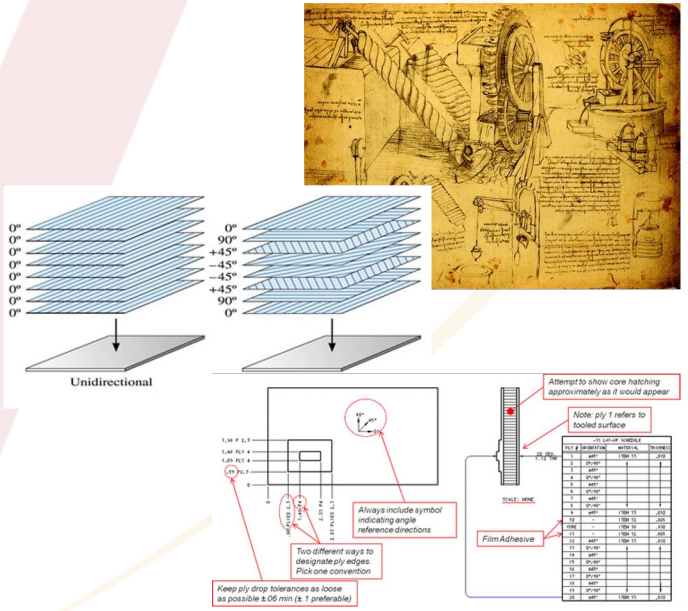
Welcome to SolidWorks



Computer Aided Design (CAD)



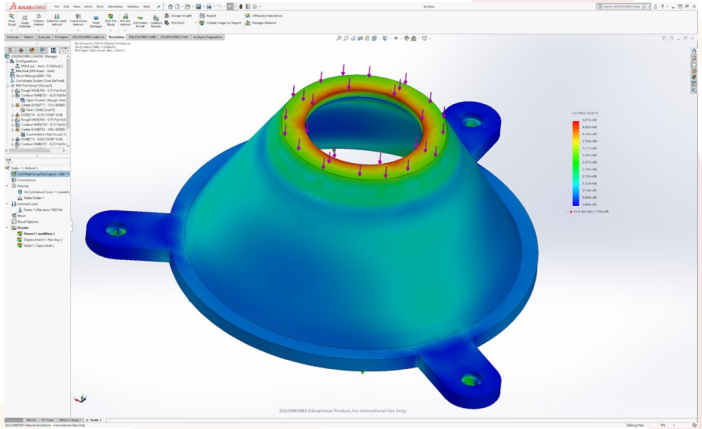


Part

Assemblies

Drawings

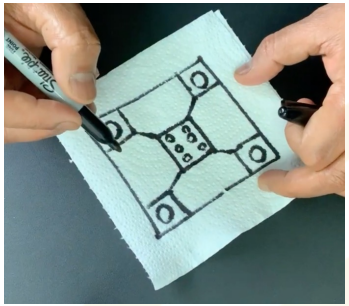
Design Analyses

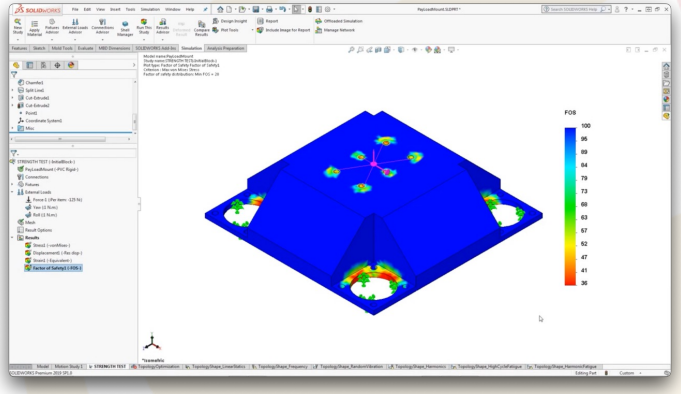


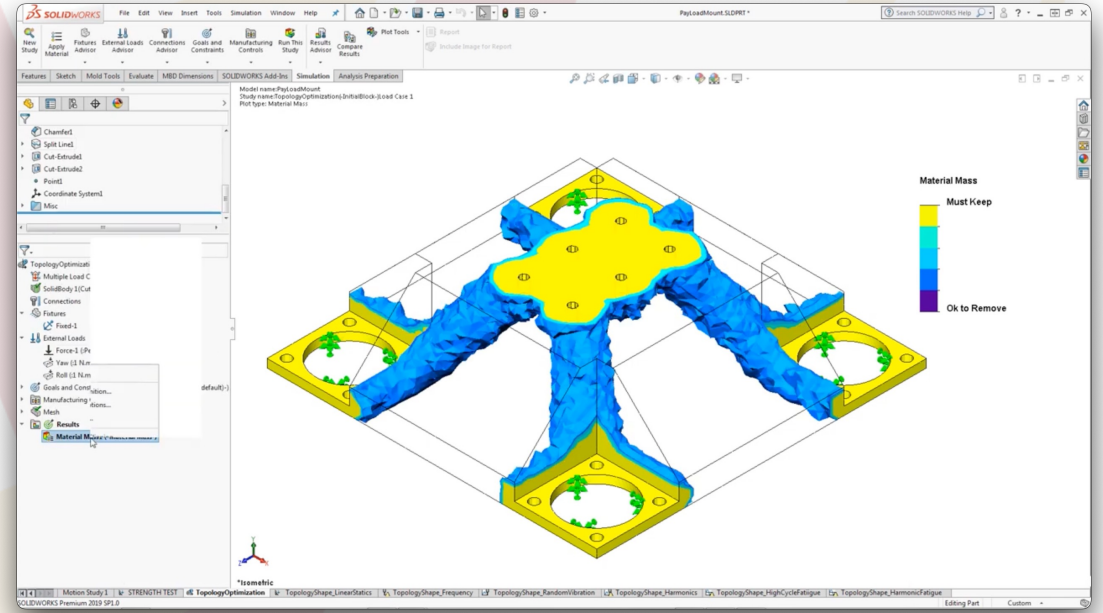
Finite Element Analysis (FEA)

Topology Optimization

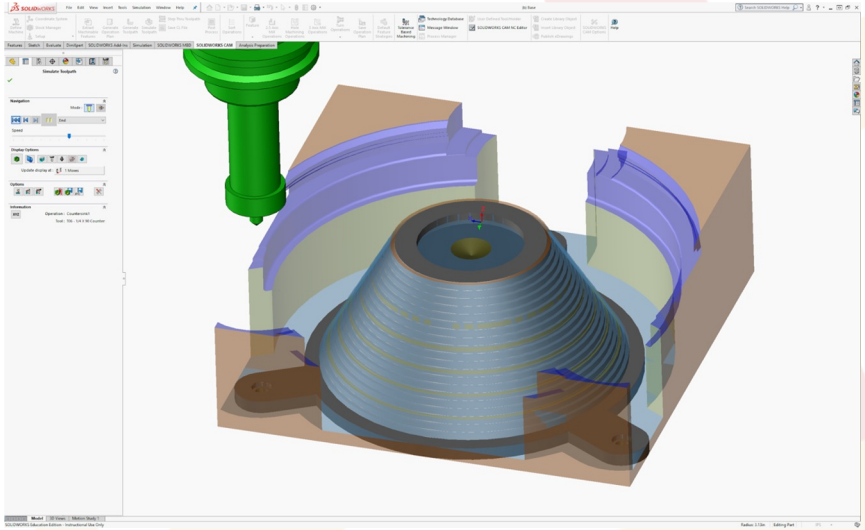
Topology Optimization







Production Preparation

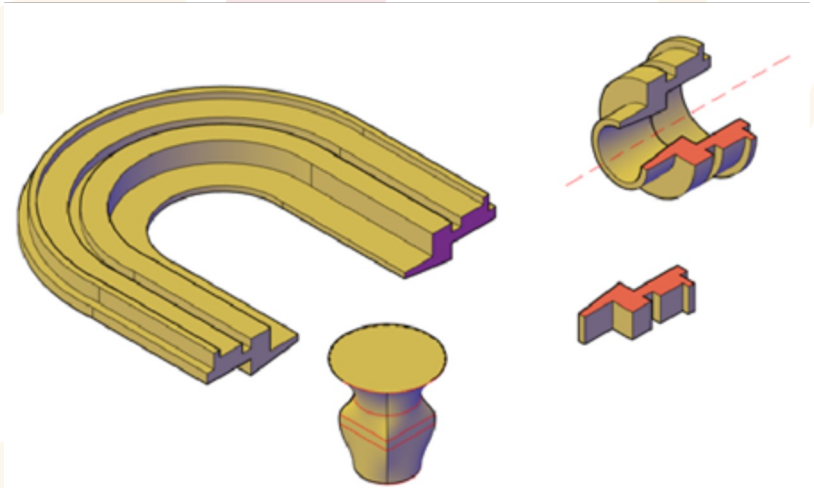


Computer Aided Manufacturing (CAM) Simulation

CAD to XR (AR/VR/MR/Web)

Solid Modeling

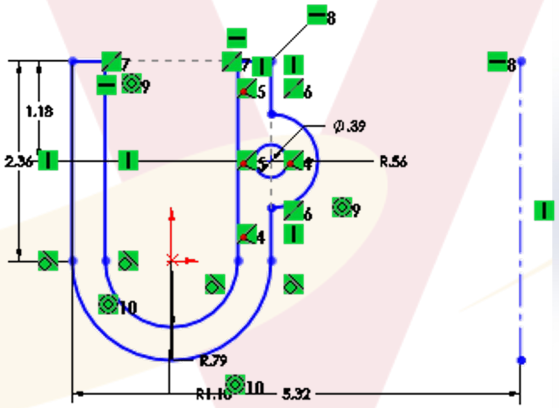
- Defined by:
  - Boundary representation (B-rep)
    - connected surfaces create an inside and outside of the part
- Have these properties:
  - Mass
  - Volume
  - Moment of inertia

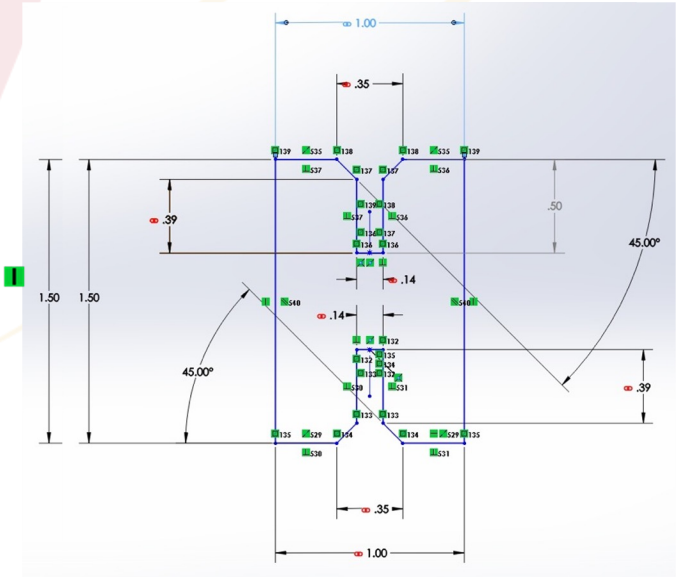


Constraints

- Defined as a limitation or restriction
- Apply constraints to any geometry drawn in Solidworks (under the discretion of the user)

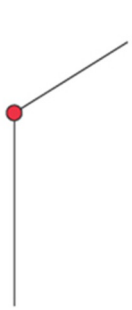
*Constraints in Solidworks look like this.



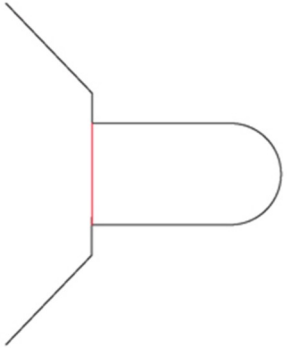


Implicit Constraints

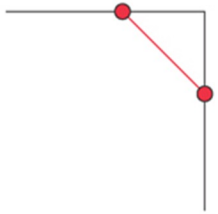
- Geometric relationships implied by the way the profile is drawn and interpreted by SolidWorks
  - Note: SolidWorks only makes closed profiles, so your profiles must have closure.



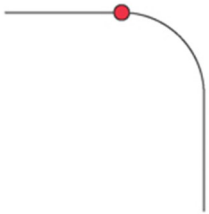
Closure



Segment Overlap

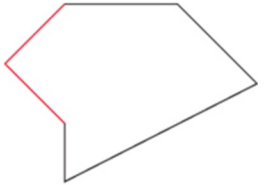


Endpoint / Line Overlap



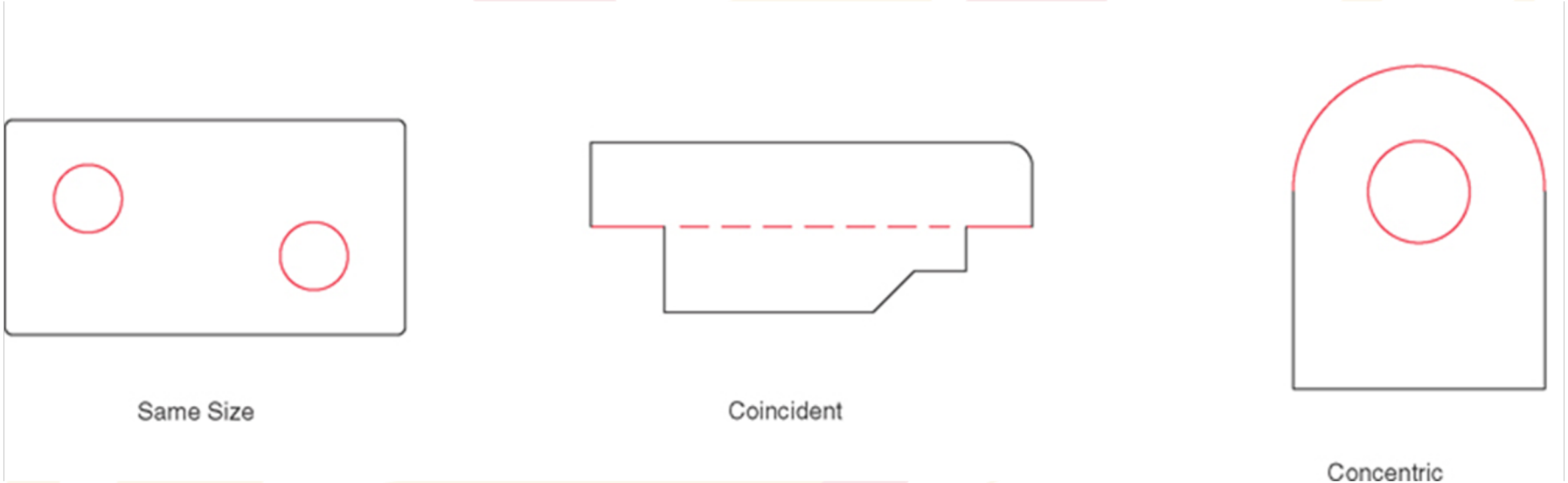
Tangency

Parallelism



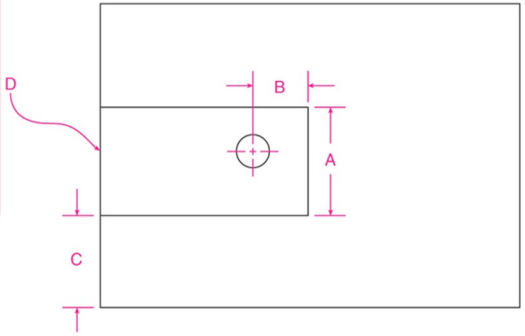
Perpendicularity

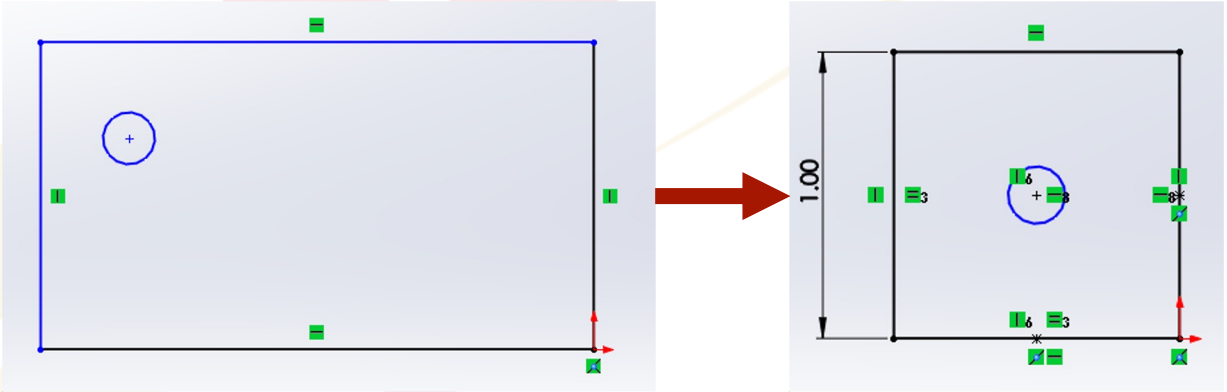
More Implicit Constraints



Explicit Constraints

- Defined by the operator
  - Dimensional constraints: assigning a specific length to a line, radius to a circle, etc.
  - Geometric constraints: specifying the ways in which lines/shapes/features relate to one another





Show and tell

LMB: select

RMB: change view

MMB *scroll*: zoom

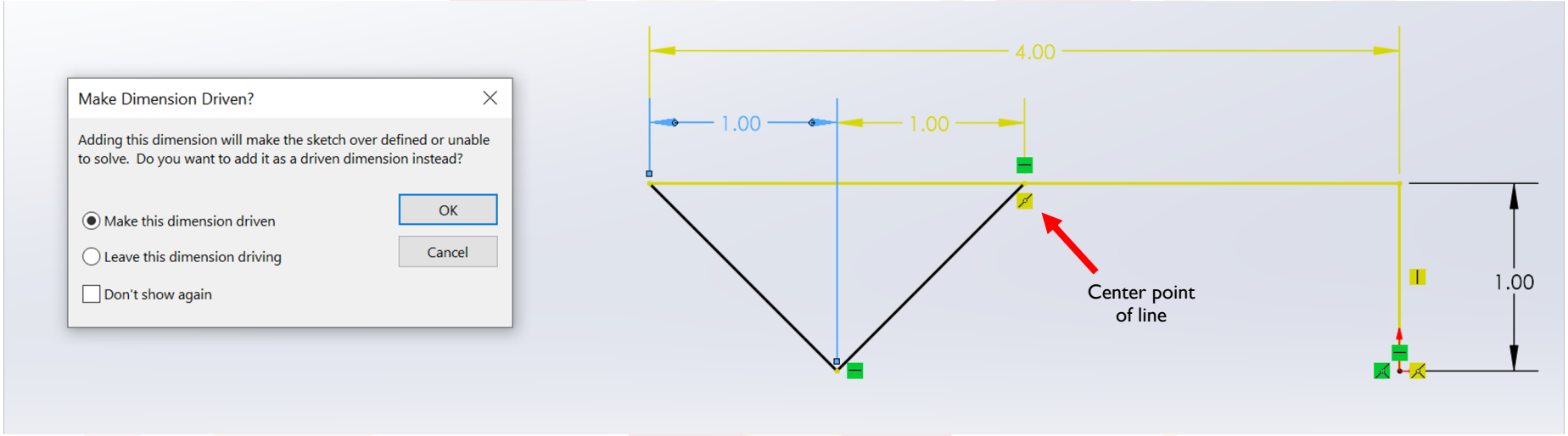
MMB *click/hold*: rotate part

MMB click/hold + *Control*: pan

MMB click/hold + *Shift*: precise zoom

Levels of Constraint

- Fully constrained
  - Every element has been completely dimensioned/specified
- Underconstrained
  - Not all elements are dimensioned/specified (leaves interpretation up to Solidworks)
- Overconstrained
  - Adding a new constraint would conflict with existing constraints (Solidworks won't let another dimension be added)



Driven Dimension: is *driven by* the model *Changing the model changes this driven dimension value

Driving Dimension: *drives* the model *Changing this driving dimension changes the model


Take a Break Buddy!
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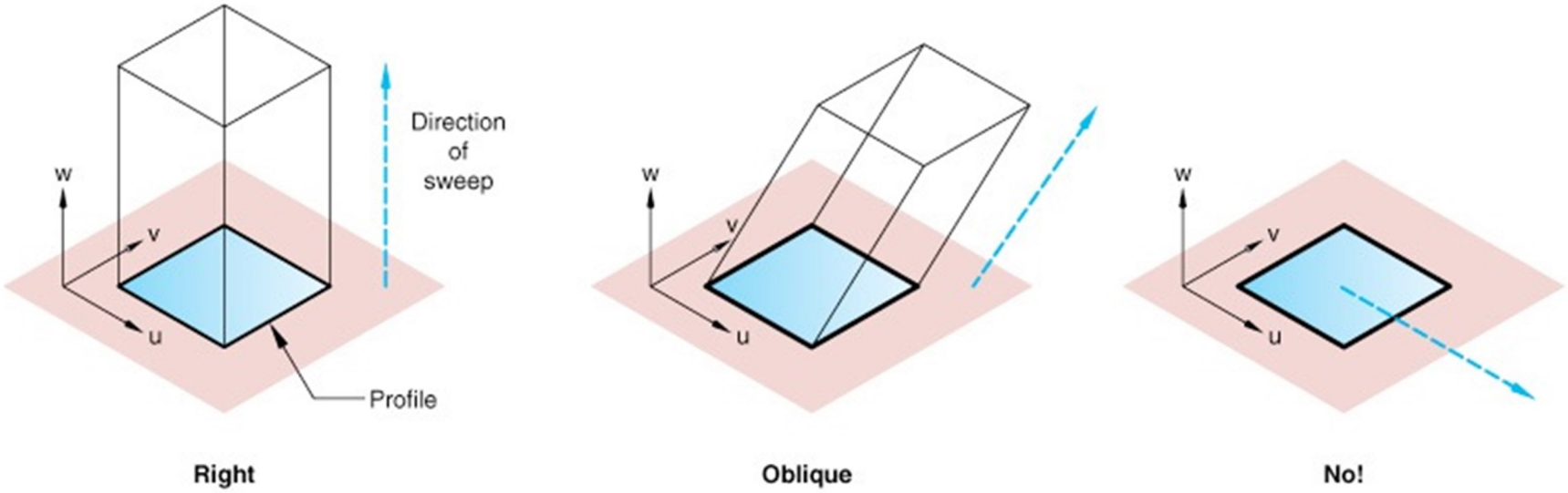
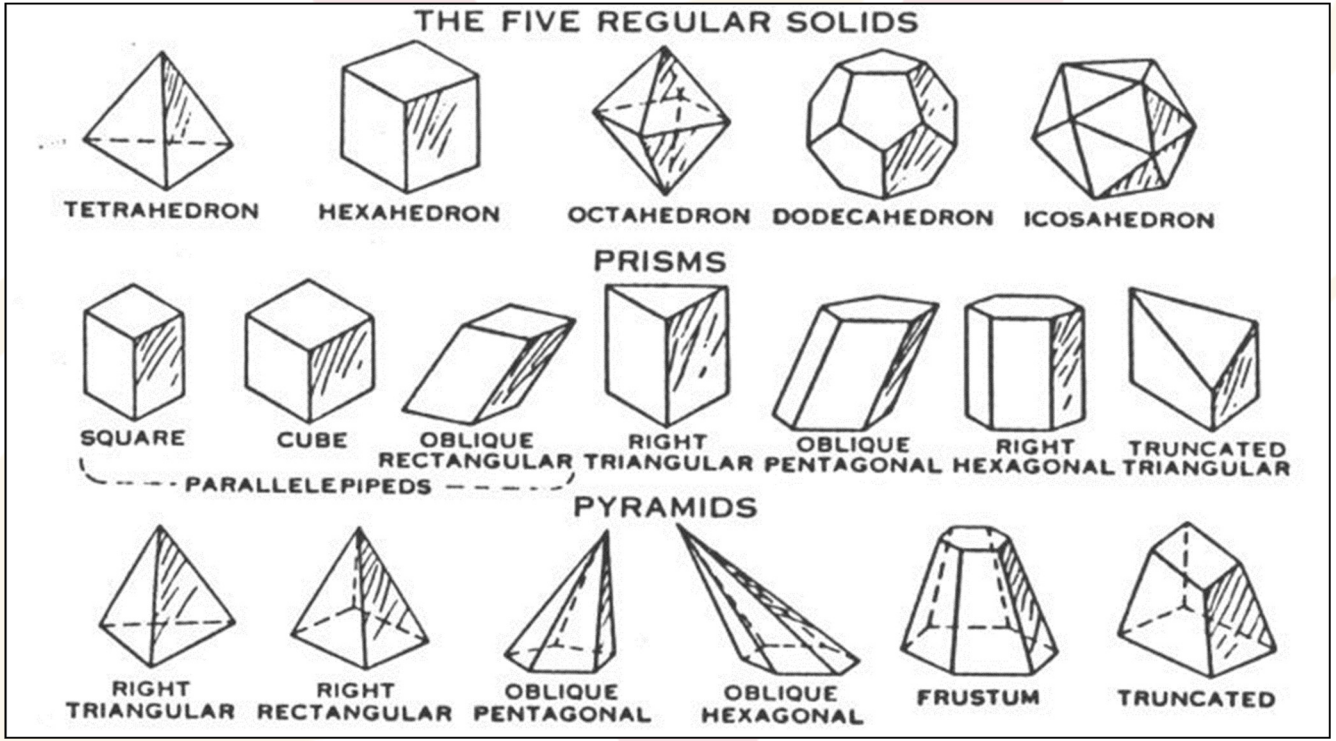
One of the basic steps…Extrusion

- Linear Extrusion: starts with closed polygon (profile) drawn on a plane, and then swept along a defined path for a defined length

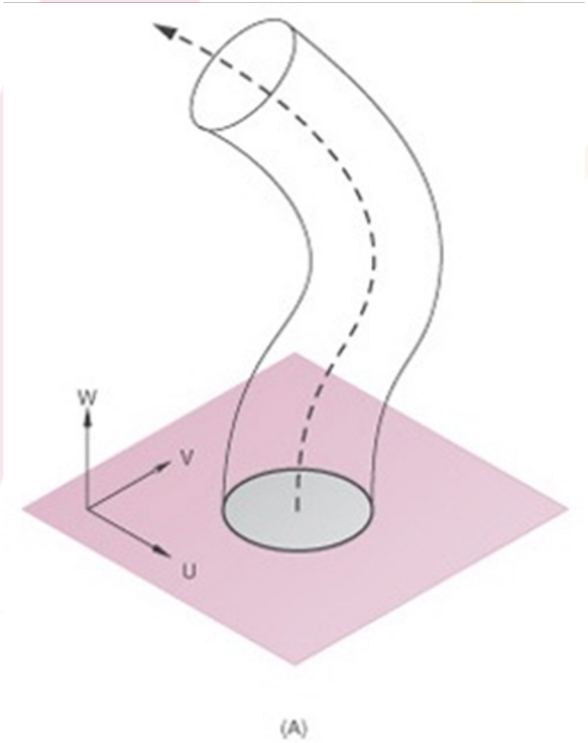


Extruding a primitive shape allows you to make some of these 3D objects…



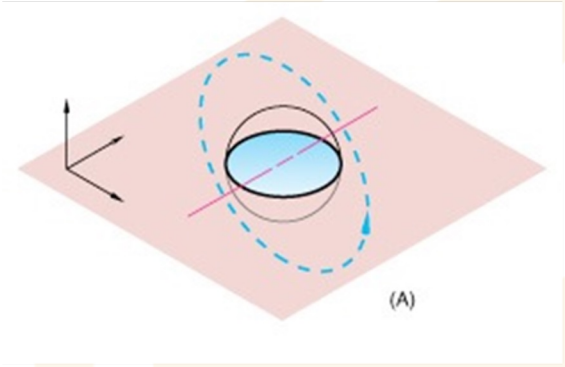
Path-based Extrusion

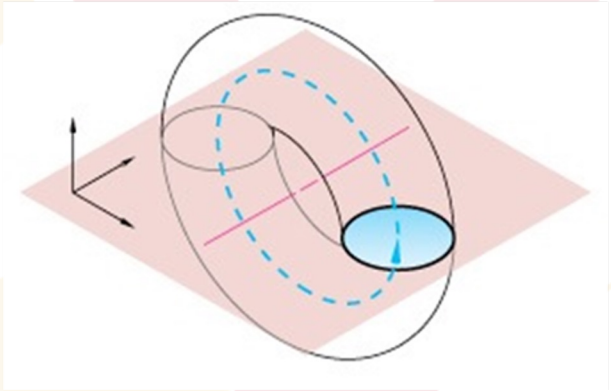
- Sweep: create a profile and define its path to be extruded along

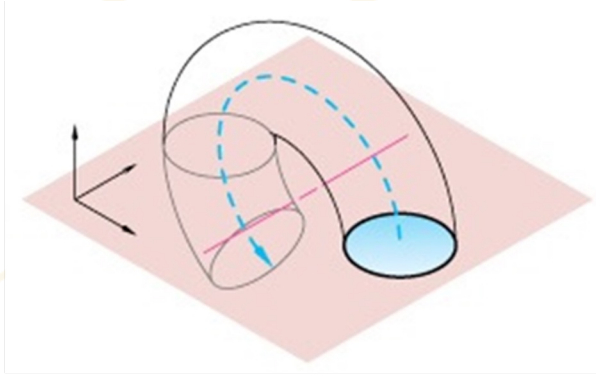


Revolute Extrusions

- Start with a drawn profile and define an axis of rotation about which the profile is rotated for a defined angle.

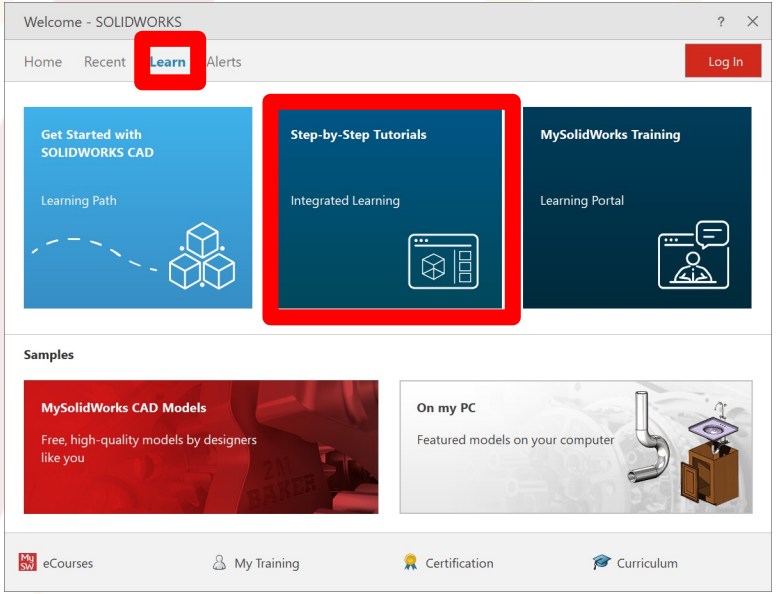






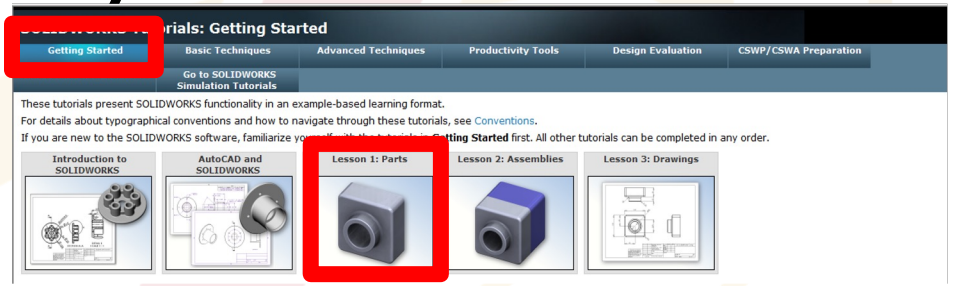
Activity

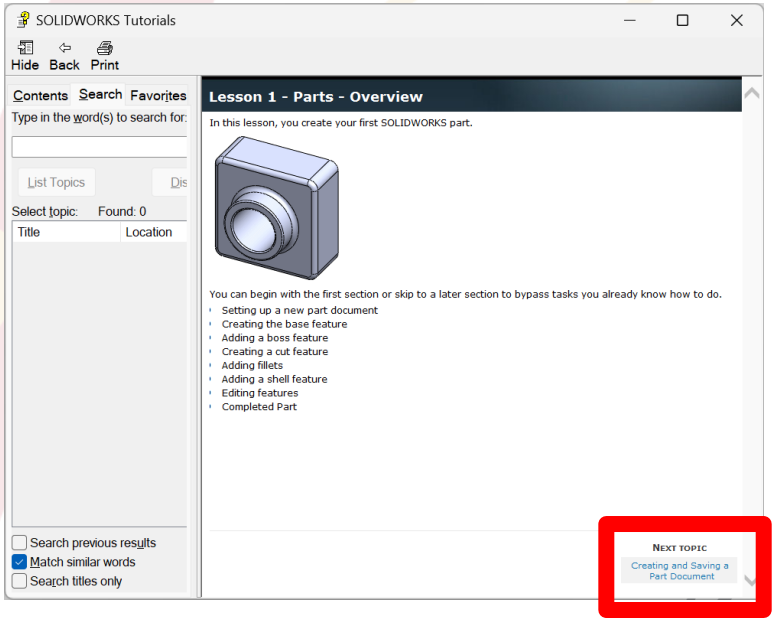
- Use Step-by-Step Tutorials from SolidWorks
- Goal is getting used to the interface
- You'll access tutorials for two parts as seen on the next slides
- We'll be walking around ready to help answer questions and helping complete the parts.



Activity

- Extrusions, cuts, fillets, shell
- Select "Getting Started" tab
- Then choose "Lesson 1: Parts"
- Click "Next Topic" in the bottom right to progress through the lesson
- When done with this part do the next…





Activity

- Select "Basic Techniques" tab
- Then choose " Revolves and Sweeps"
- You may not get done with this part during class time
- Try to finish as much of it as possible before the afternoon class session
- You'll need these skills to make the next parts