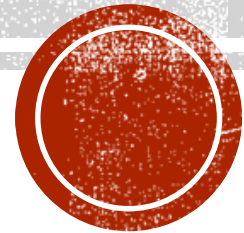


CAD

(Computer Aided Design)



WHAT IS CAD

- Computer Aided Design
 - Used in the creation, modification, analysis, or optimization of a **design**
 - Used primarily by Architects, Industrial Designers, graphic designers and Engineers creating mechanical parts or structures
- Why we learned it:
 - Nearly all engineers or anyone working in a technical company will likely encounter CAD in some manner



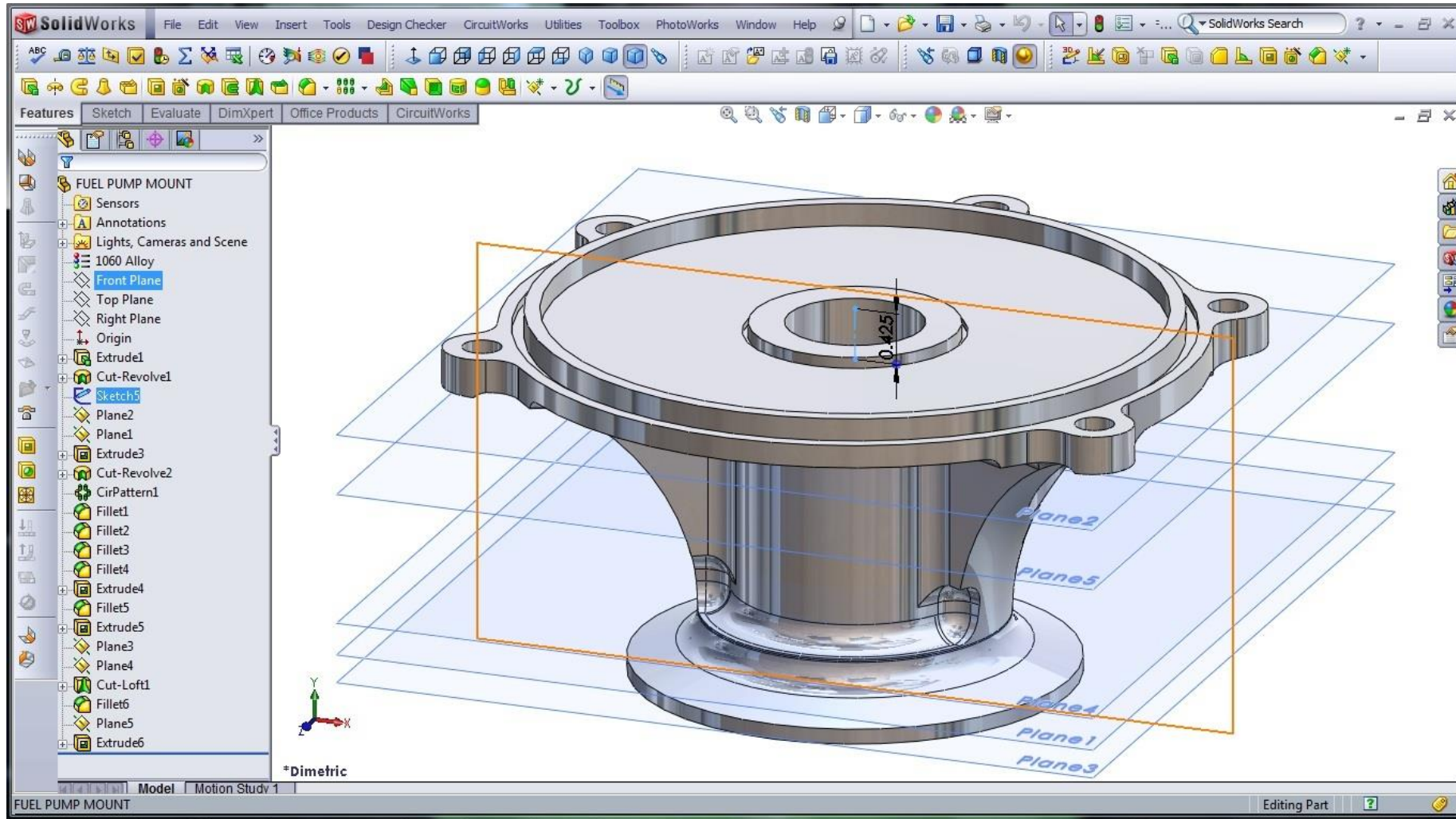
SOME COMMON CAD SOFTWARE

- CAD Software for Mechanical Design
 - SolidWorks
 - AutoCAD
 - Fusion
 - Inventor

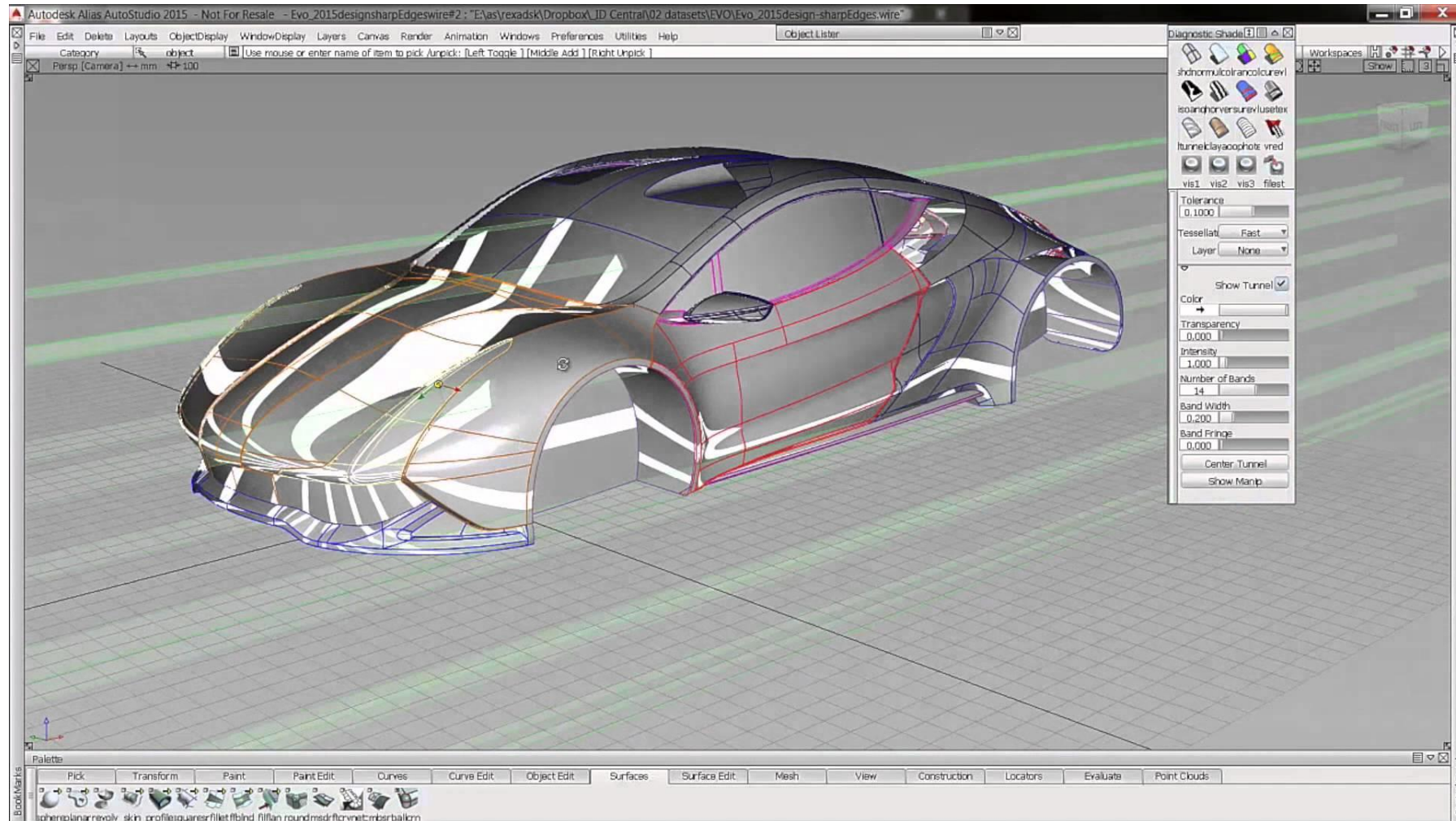
- Other types
 - CAD for Electrical design
 - Eagle



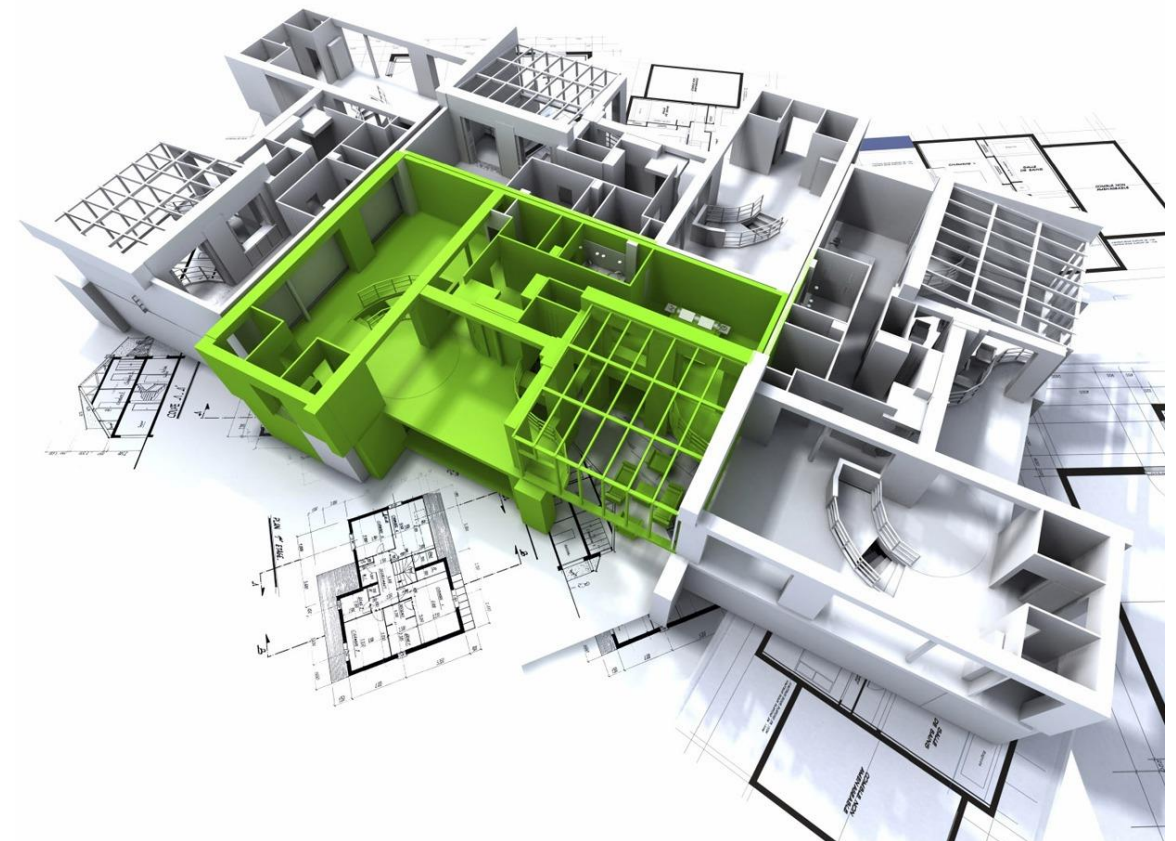
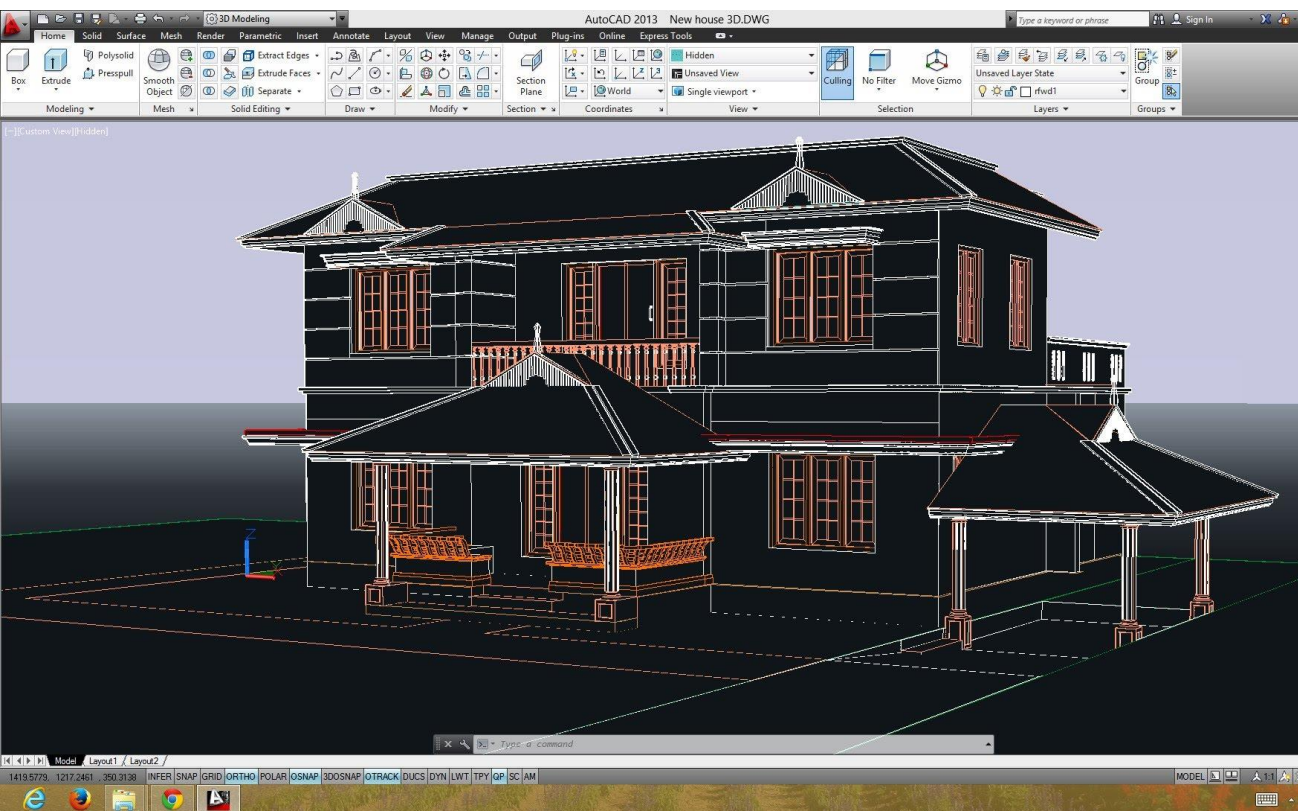
SOME EXAMPLES OF CAD PROJECTS – COMPLEX PARTS



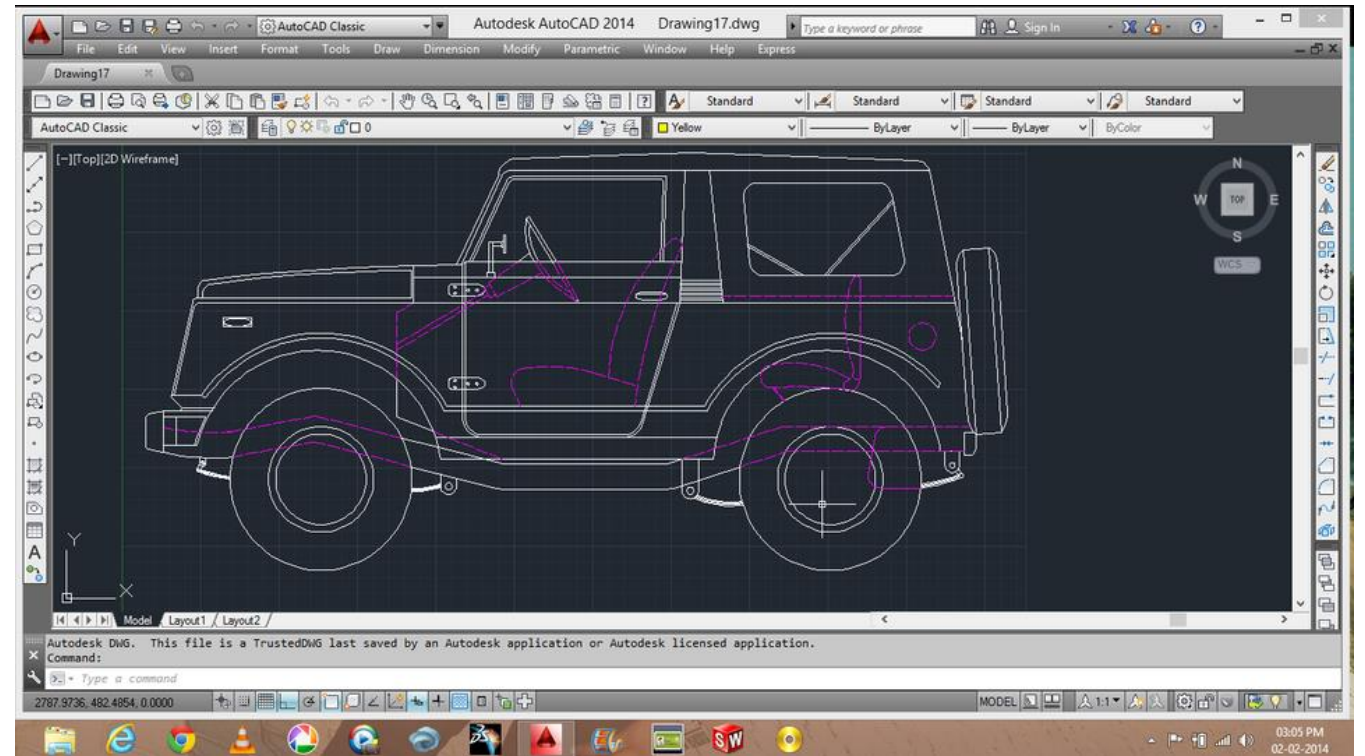
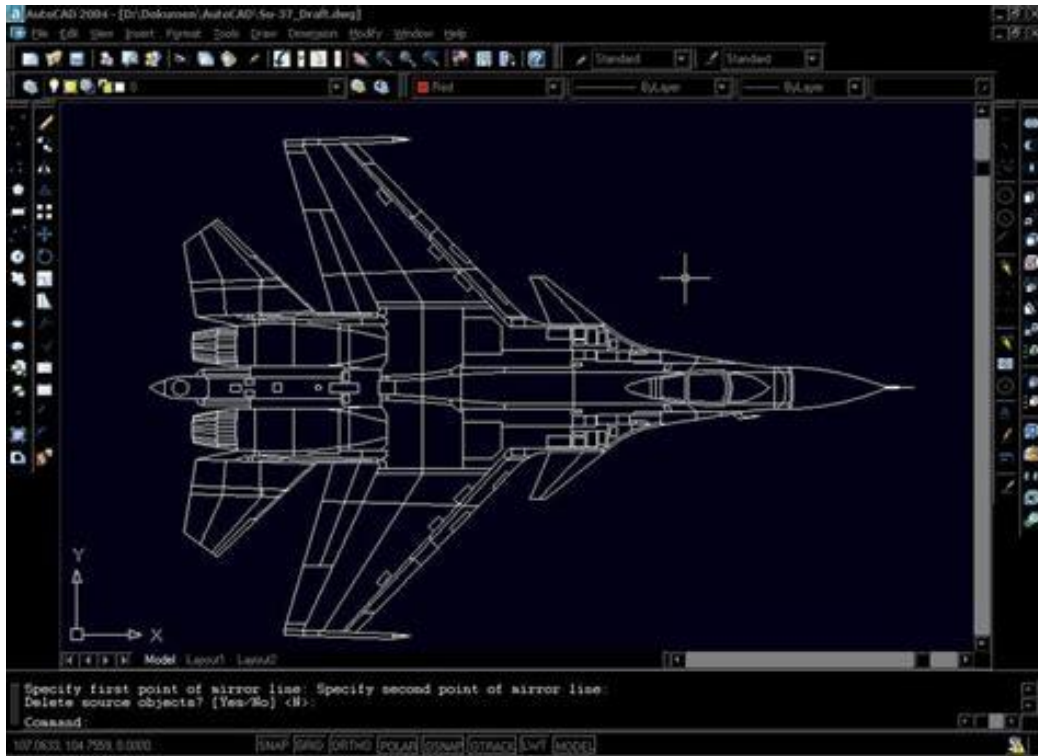
MORE EXAMPLES — A CAR!



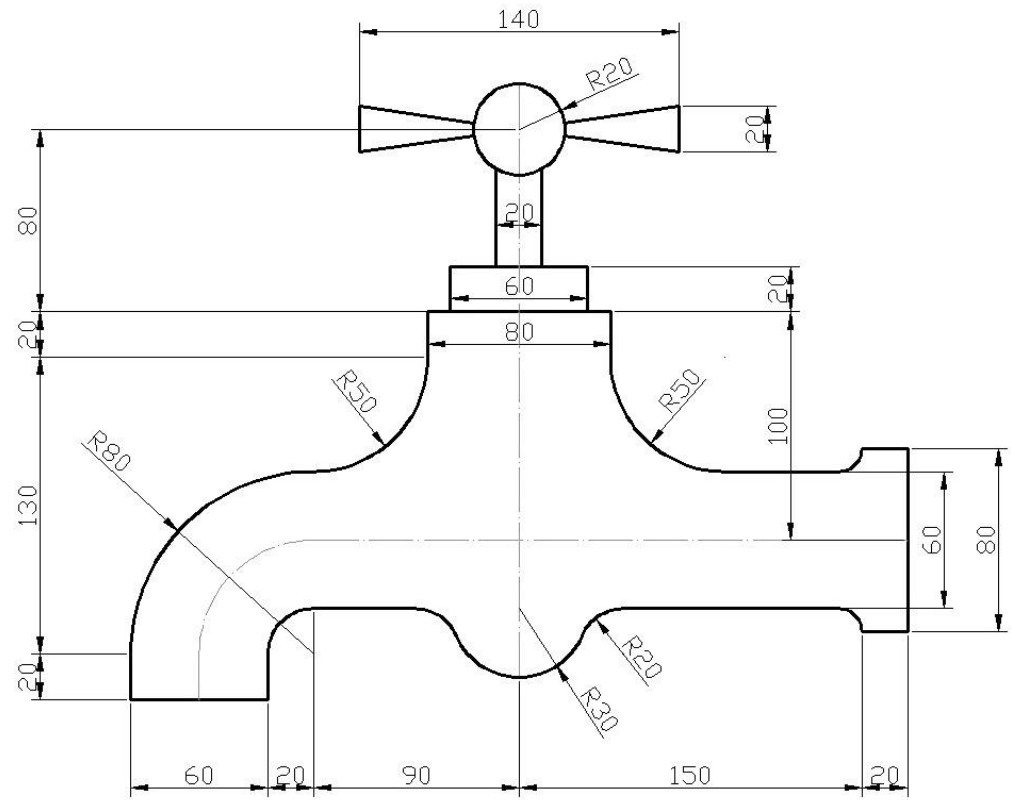
LIVE IN YOUR VERY OWN VIRTUAL HOUSE



2D NOW

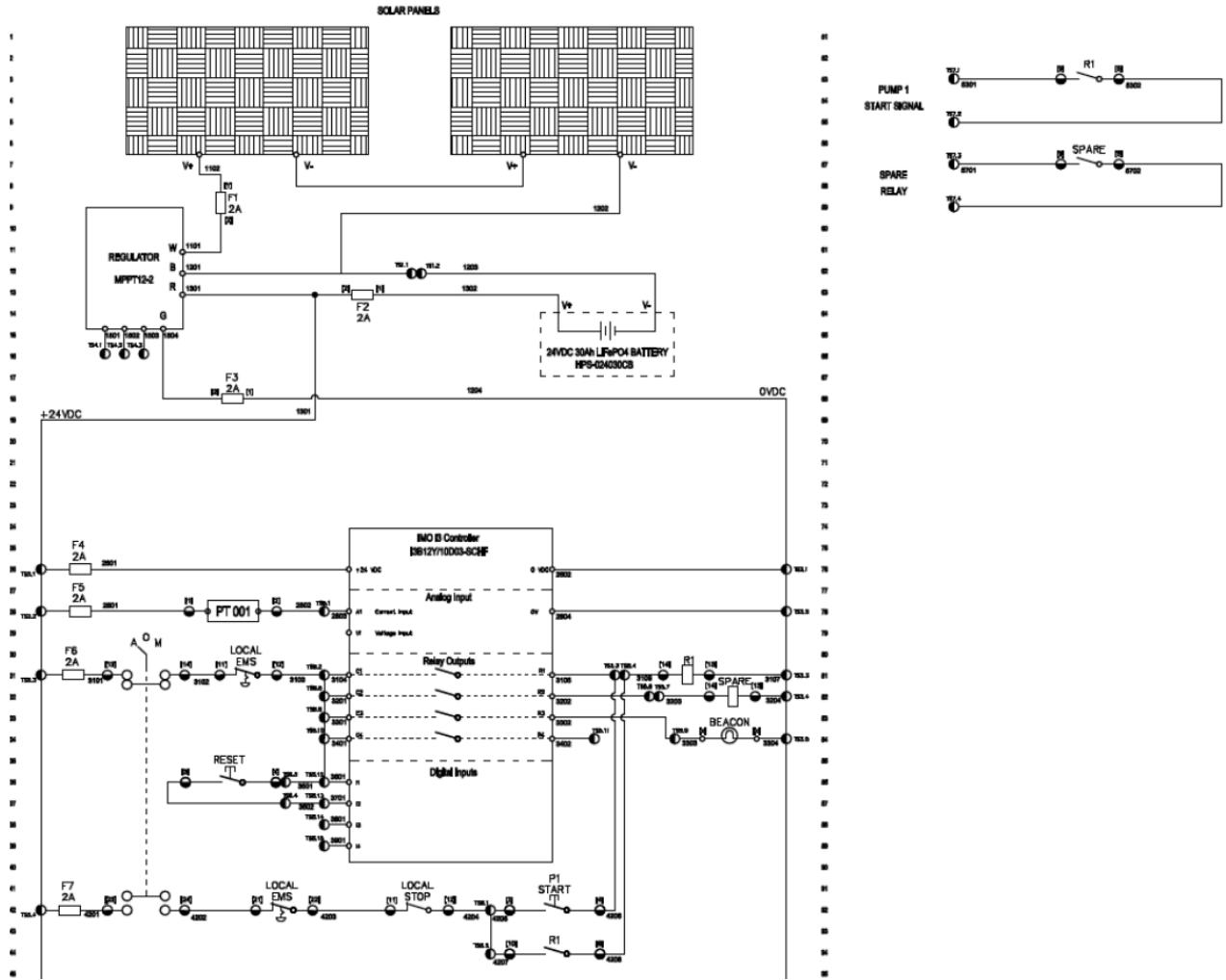


WHAT A BEAUTIFUL FAUCET



NOT JUST MECHANICAL DESIGNS!

EXHIBIT 1: MAKING A SCHEMATIC (~ELECTRICAL DRAWING)



KEY TAKEAWAYS FROM SOLIDWORKS

- Features and basic structure in forming a SolidWorks (or other) part
- Assemblies and drawings
- Views

Parts

sketch/2D

Extrude/3D

Edges

Finishing

Assembly

Drawing

Views

Isometric

Orthographic

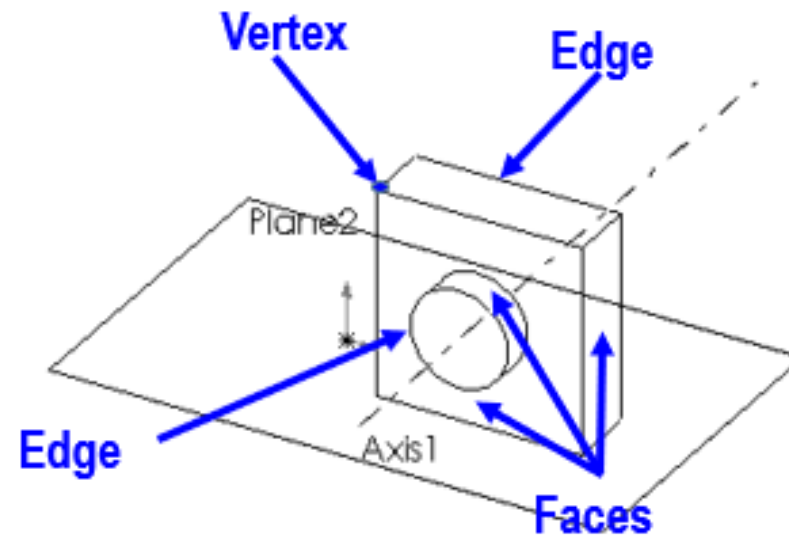
Oblique

Perspective



SKETCHING & BASIC TERMS

- Sketch: Forms the basis of all extruded features
 - Shapes/commands
 - Rectangle
 - Circle
 - Arc
 - Line
- Vertex: Corner where two edges meet
- Face: forms the outside surface of a part
- Edge: boundary of a face



Parts
sketch/2D
Extrude/3D
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Orthographic
Oblique
Perspective



FEATURES — EXTRUSIONS AND CUTS

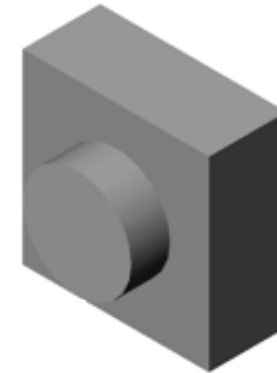
- **Extrusion:**
 - Base extrude: creates “depth” to a sketch
 - Boss extrude: adding to an extruded part
 - Cut extrude: cutting from an extruded part

- **Cut:** removes material from a part
- **Shell:** hollows a part

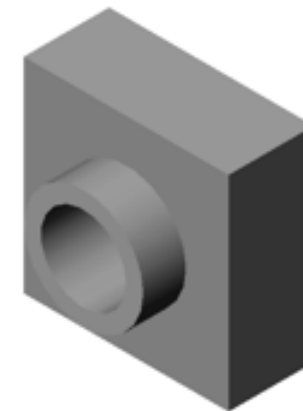
1. Base Extrude



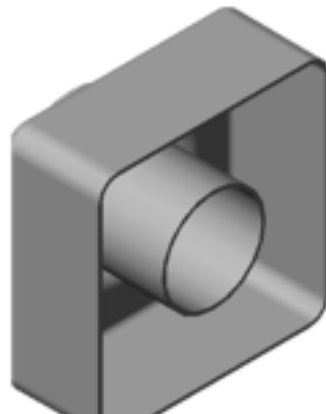
2. Boss Extrude



3. Cut Extrude



.Shell

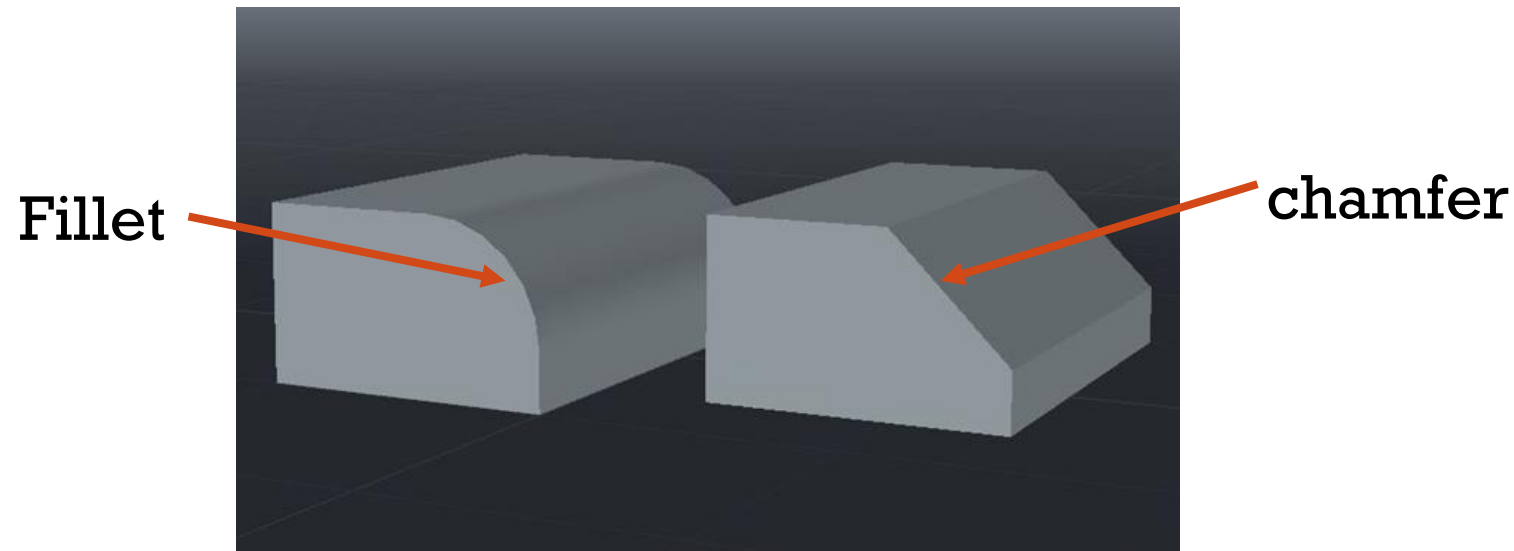


Parts
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FEATURES - EDGES

- Fillet: rounds an edge to make it smoother
- Chamfer: bevels an edge (not smooth)

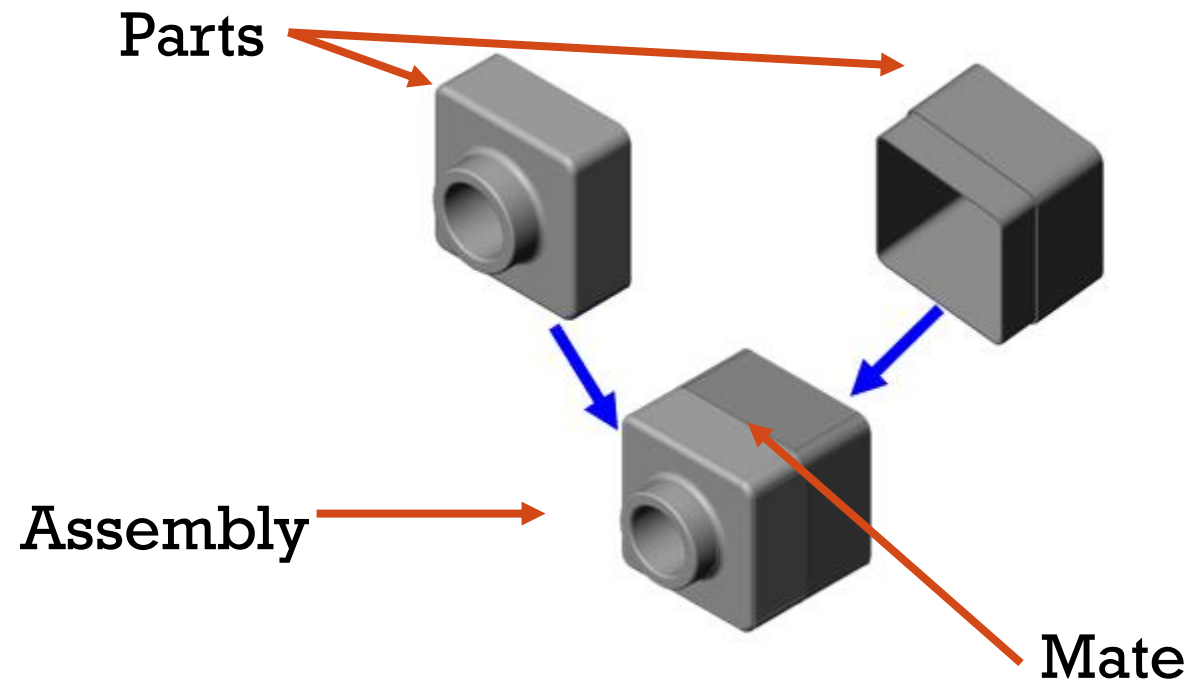


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ASSEMBLY

- Assembly: A composition of multiple parts
- Mate: relationships that align and fit parts together

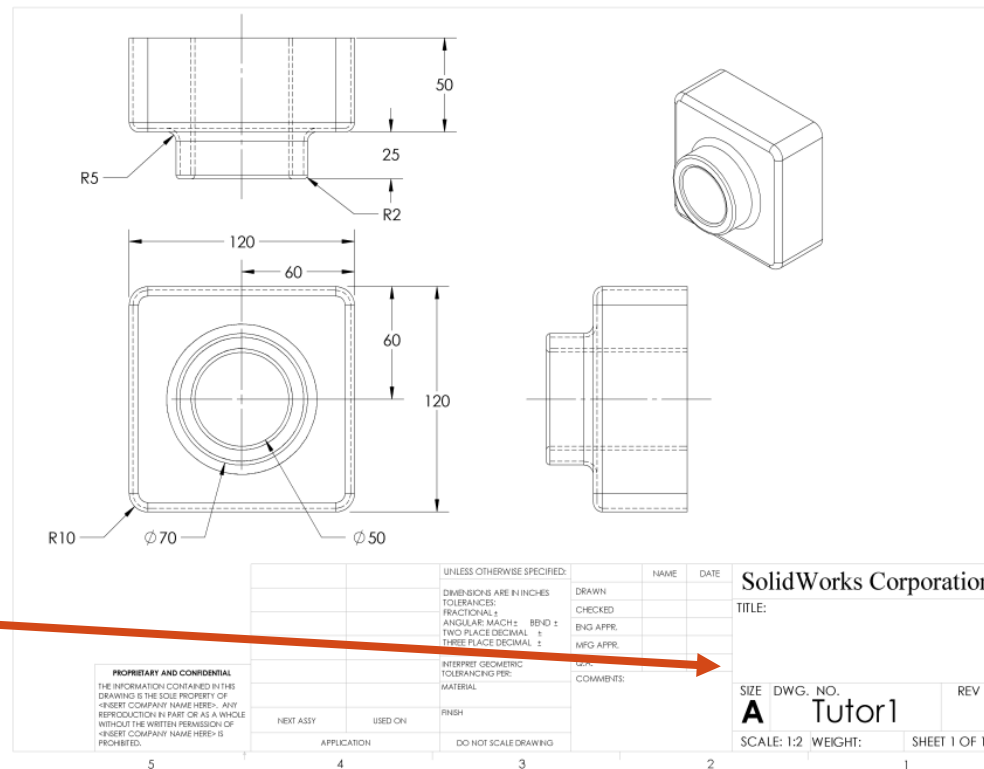


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DRAWING

- Drawing Formal way of showing a part or assembly
 - Should communicate shape, size and vital info
- Title block: label on a drawing (usually has part name, version and company/designer info)



Title block

Parts

sketch/2D

Extrude/3D

Edges

Finishing

Assembly

Drawing

Views

Isometric

Orthographic

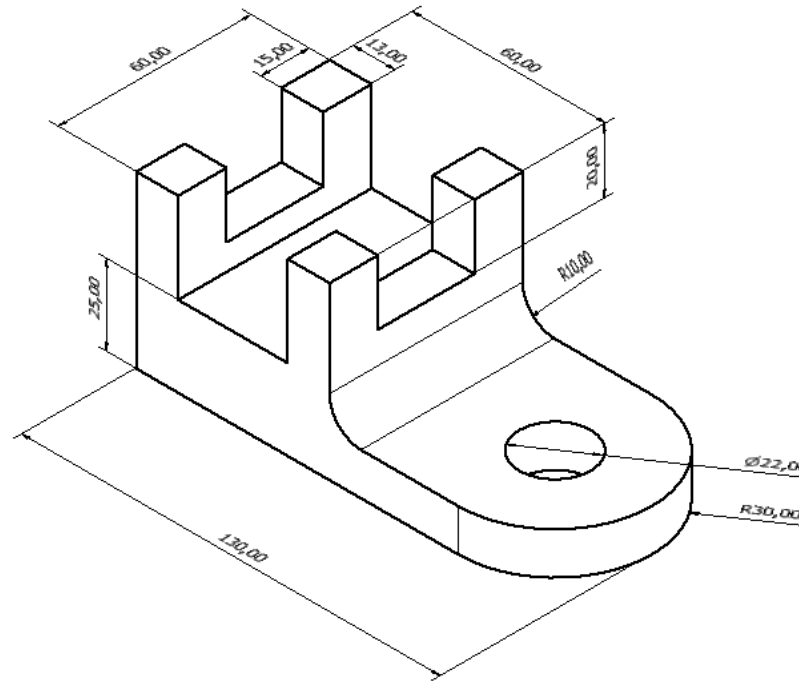
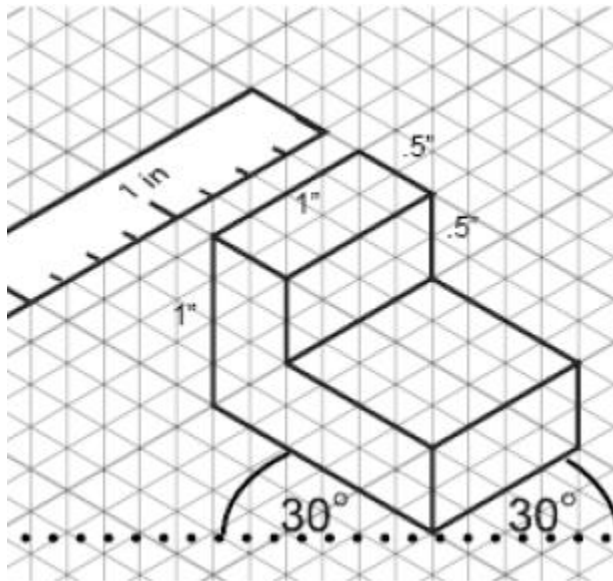
Oblique

Perspective



VIEWS - ISOMETRIC

- “Normal” view you saw in SolidWorks
- Drawn to scale
- Edges usually slanting at 30°

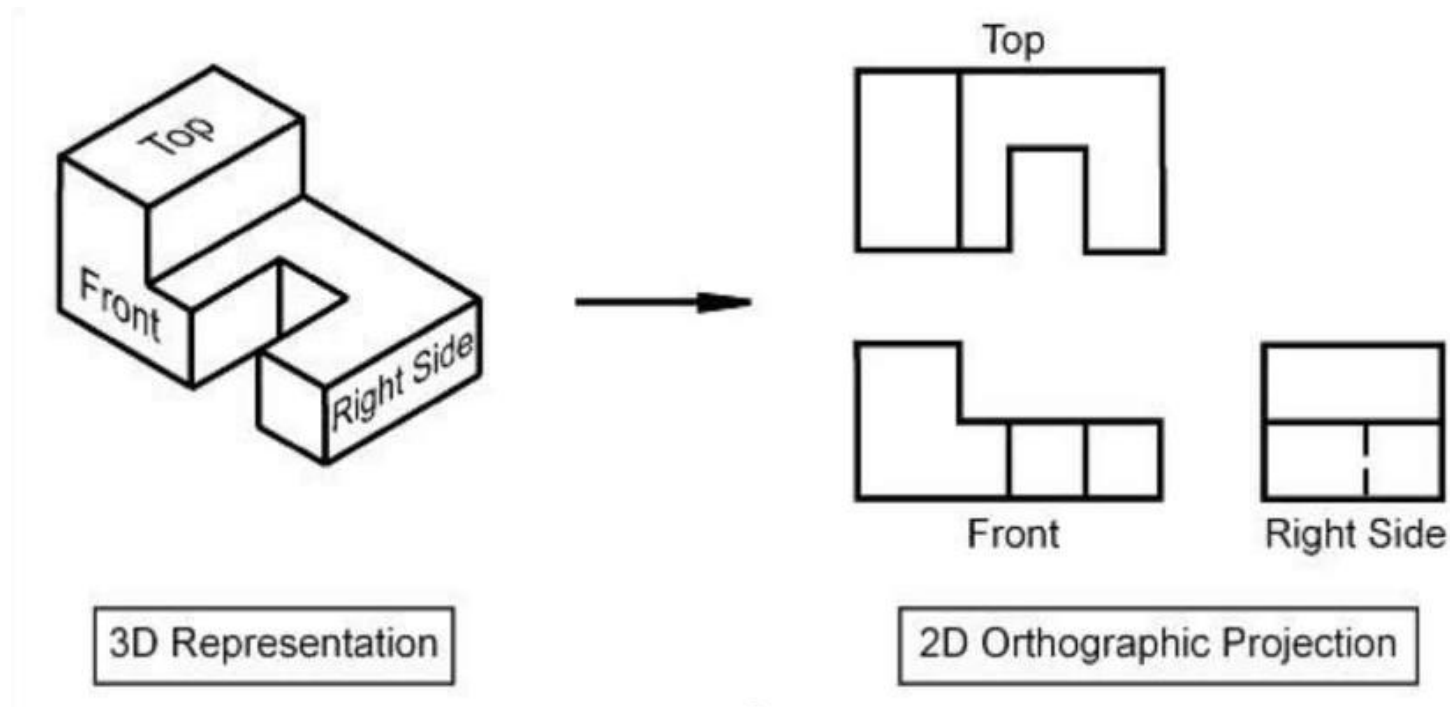


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VIEWS - ORTHOGRAPHIC

- 2D projection of a 3D object
- Shows the front, side and top of an object

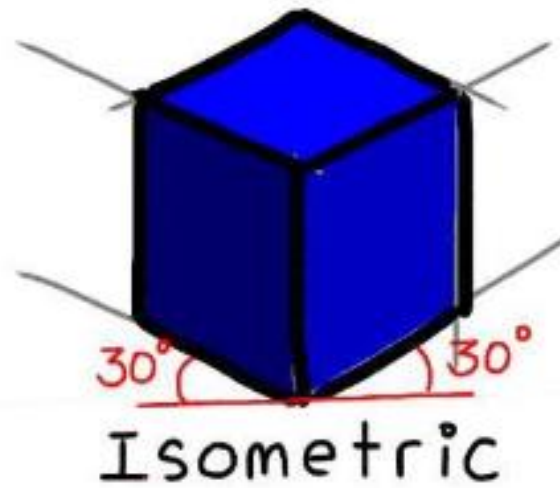
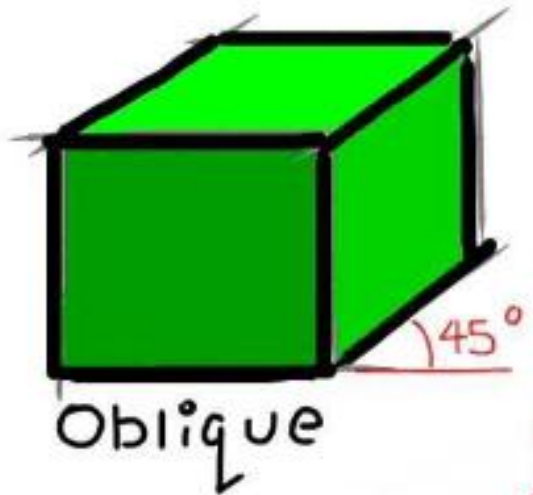


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VIEWS - OBLIQUE

- Similar to isometric, except focus is on face of an object
- Front even to plane and side at 45°
- NOT TO SCALE

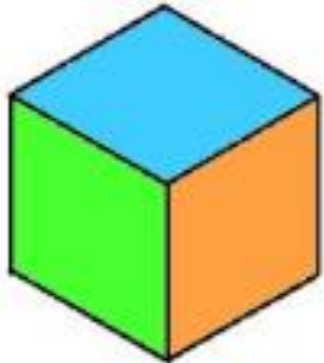


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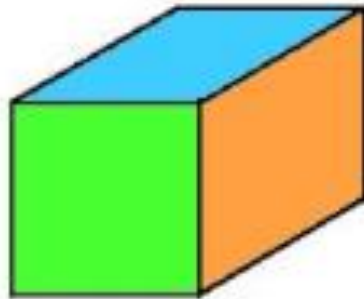


VIEWS - PERSPECTIVE

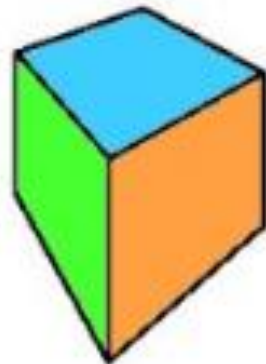
- Similar to isometric/orthographic, except it accounts for perspective i.e. things that are further away appear smaller



Isometric



Oblique



Perspective



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WHAT WE'RE DOING TODAY/TOMORROW:

- Half will log on to a computer to learn SolidWorks basics
 - See instructions on blog
 - Complete checkoff #1 for 80%, checkoff #2 for 100%
- Other ~half will work on paper assignment:
 - Goal: to become familiar with isometric and orthographic drawings
 - I have 11 worksheets (2 copies of each printed) Save a shrub, don't write on my copies
 - On the answer sheet I have, complete each of the worksheets and turn it in
- Looking forward:
 - Tomorrow we will swap
 - Wednesday/Thursday we will continue SolidWorks and also begin learning power tool use! If time allows, you/we can begin this today.

