15-294 Rapid Prototyping Technologies:

Certified SolidWorks Associate Exam Problems

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CSWA Exam

- Five parts:
  - Drafting Competencies (3 questions)
  - Basic Part Creation (2 questions)
  - Intermediate Part Creation (2 questions)
  - Advanced Part Creation (3 questions)
  - Assembly Creation (4 questions)
- Maximum time 3 hours
- Total points 240; passing score 165 (68.75%)

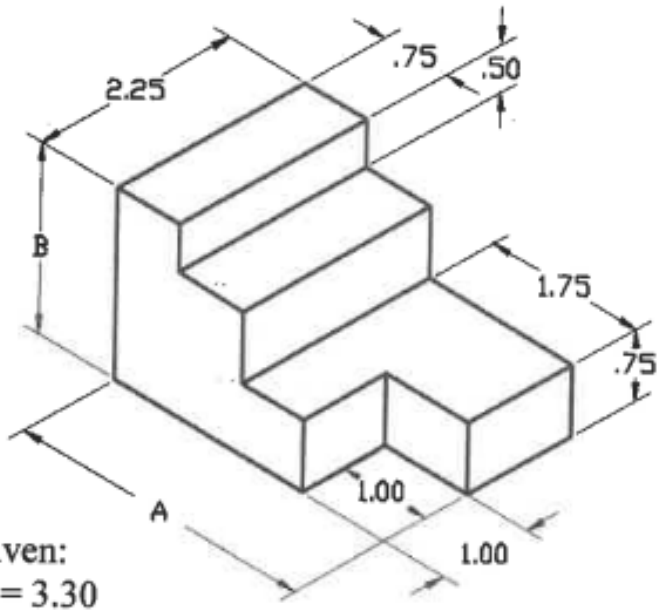
Knowledge Elements

- Drafting Competencies
  - Recognizing views such as Section View, Crop, Alternate Position, Detail View, Broken-Out Section, etc.
- Basic Part Creation
  - Sketching, Extruded Boss, Extruded Cut, Tangency
- Intermediate Part Creation
  - Revolved Boss, Circular Pattern
- Advanced Part Creation
  - Sketch Offset, Reference Geometry, Coordinate Systems
- Assembly Creation
  - Placing of Base Part, Mates

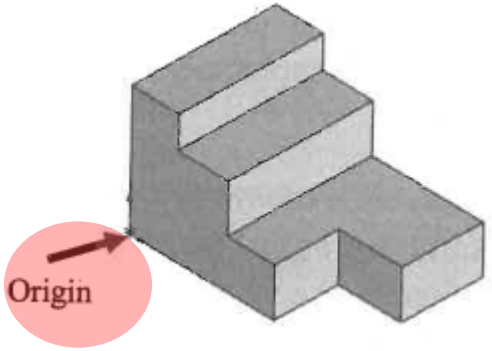
How It Works

- Given drawings and dimensions of a part.
- Make the part in SolidWorks.
- Assign the specified material.
- Calculate weight, volume, center of mass.
- Exam checks if you got the right numbers.
  - Must agree within 1%

Basic Part 1



Given:
A = 3.30
B = 2.00
Material: 2014 Alloy
Density = .101 lb/in^3
Units: IPS
Decimal places = 2

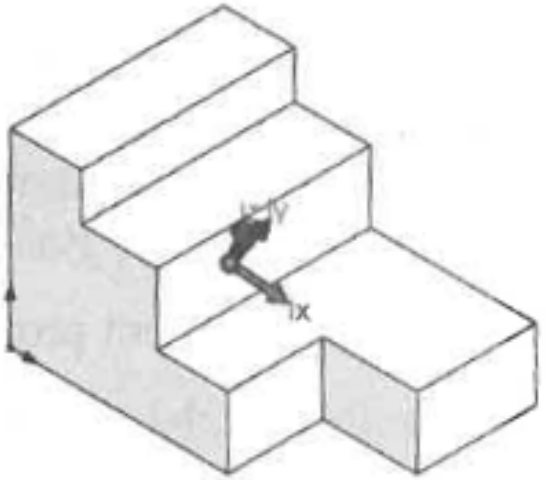


Mass = 0.84 pounds

Volume = 8.28 cubic inches

Surface area = 29.88 square inches

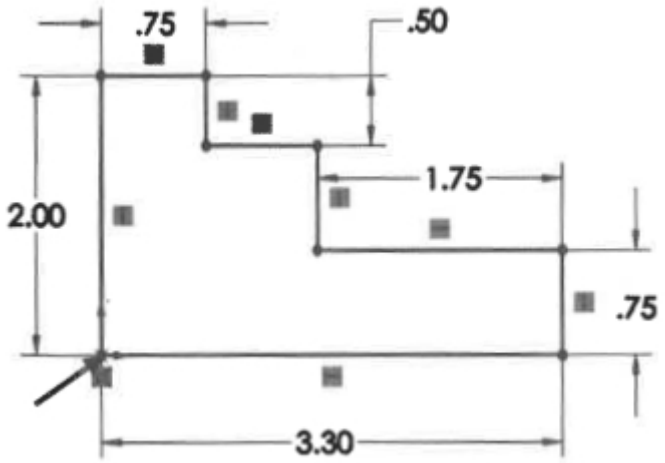
Center of mass: (inches)
X = 1.14
Y = 0.75
Z = -1.18



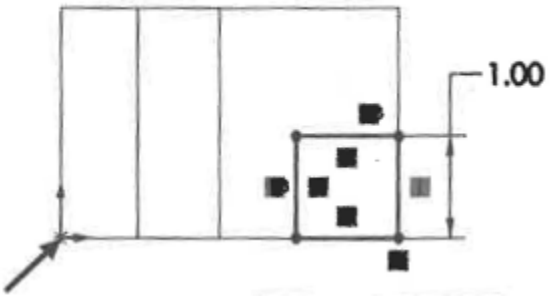
Set the units: IPS in this case.

Set up “A” and “B” as global variables in the Equation Manager.

Basic Part 1: How to Make It

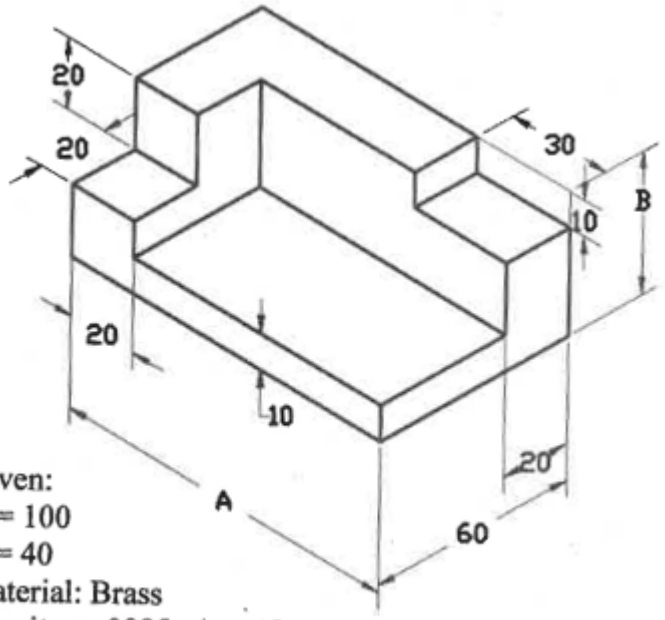


Extruded Base

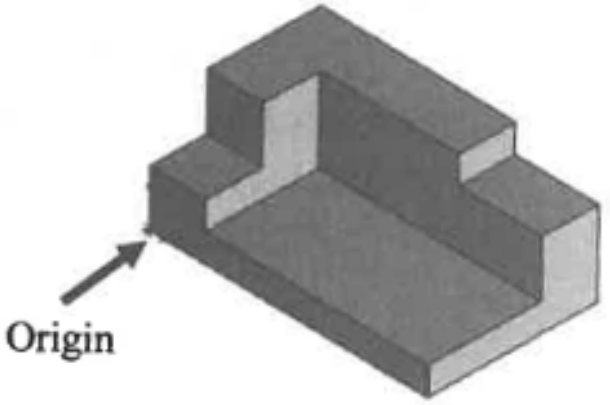


Extruded Cut

Basic Part 2



Given:
A = 100
B = 40
Material: Brass
Density = .0085 g/mm^3
Units: MMGS



Density = 0.01 grams per cubic millimeter

Mass = 1105.00 grams

Volume = 130000.00 cubic millimeters

Surface area = 23400.00 square millimeters

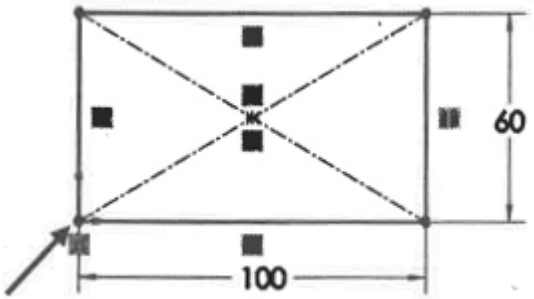
Center of mass. (millimeters)
X = 43.46
Y = 15.00
Z = -37.69

Set the units: MMGS in this case.

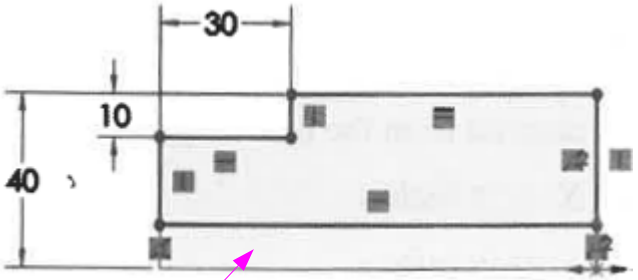
Set up “A” and “B” as global variables in the Equation Manager.

Basic Part 2: How To Make It

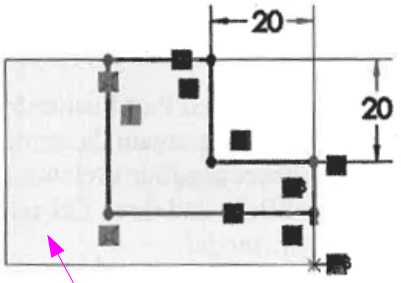
Extruded Base 1



Extruded Base 2

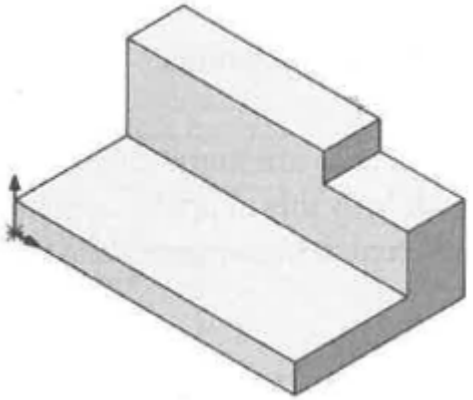


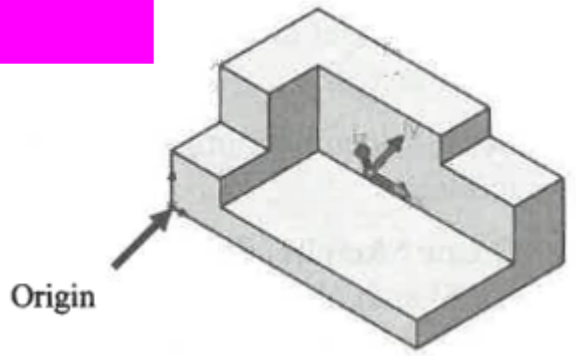
Extruded Base 3



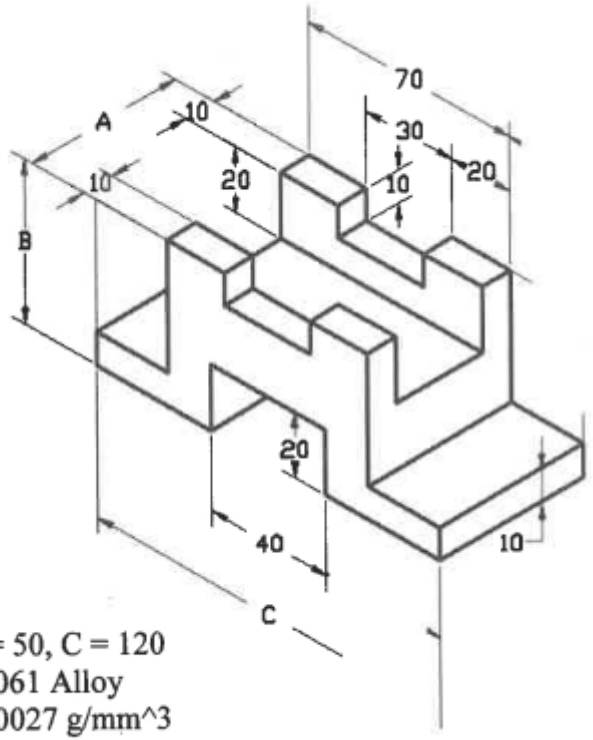
10 mm base

Extruded Base 2

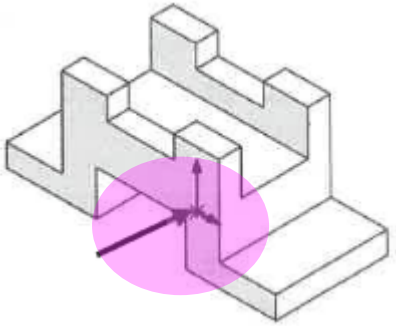




Basic Part 3



Given:
A = 50, B = 50, C = 120
Material: 6061 Alloy
Density = .0027 g/mm^3
Units: MMGS



Mass = 302.40 grams

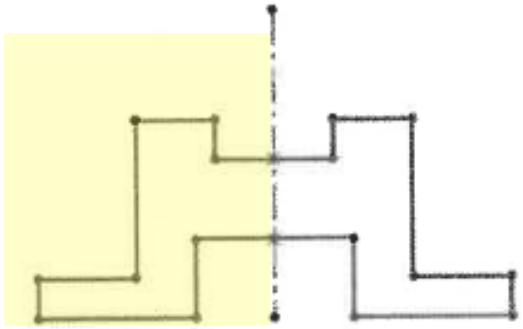
Volume = 112000.00 cubic millimeters

Surface area = 26200.00 square millimeters

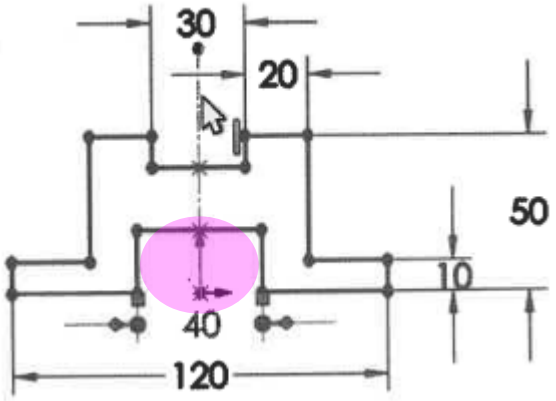
Center of mass: (millimeters)
X = 0.00
Y = 19.20
Z = 0.00

Where is the origin?

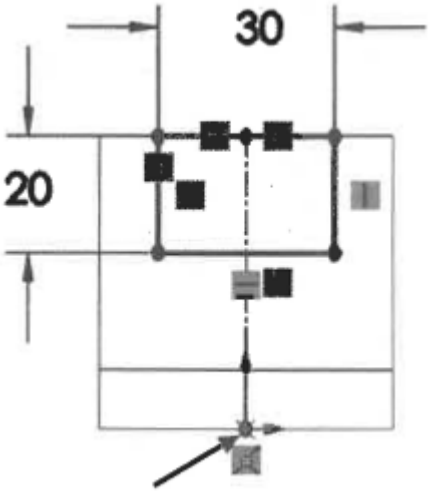
Basic Part 3: How To Make It



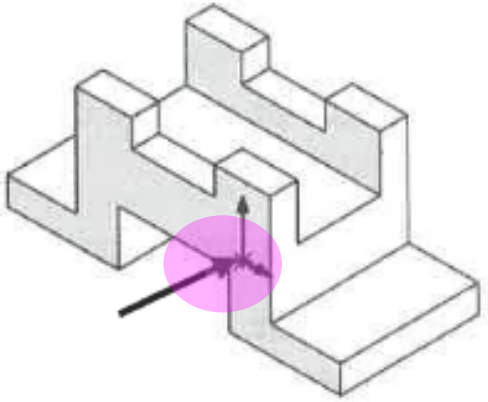
Mirror Sketch Elements



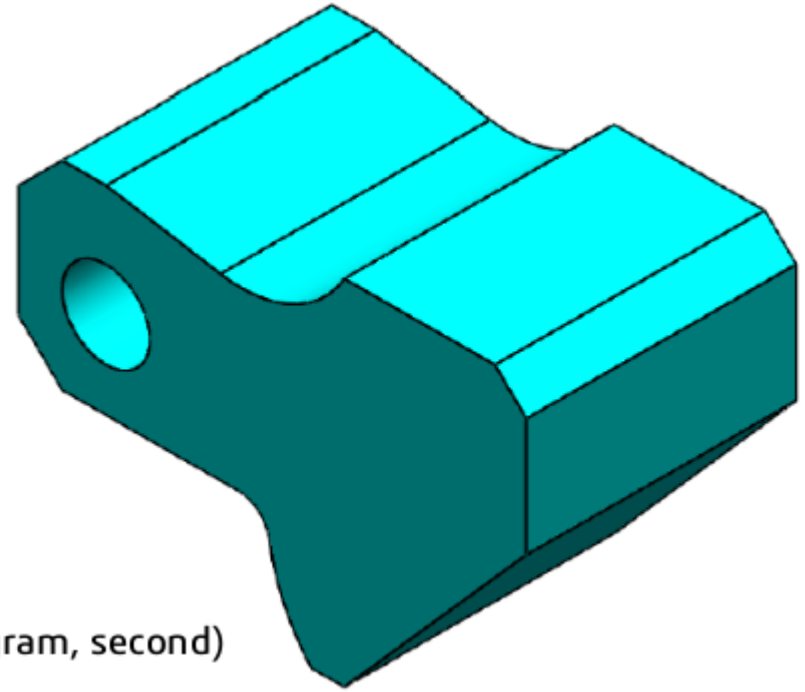
Extruded Base

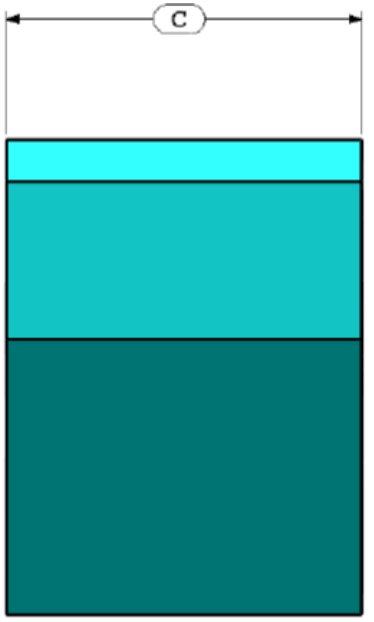


Extruded Cut



Basic Part 4





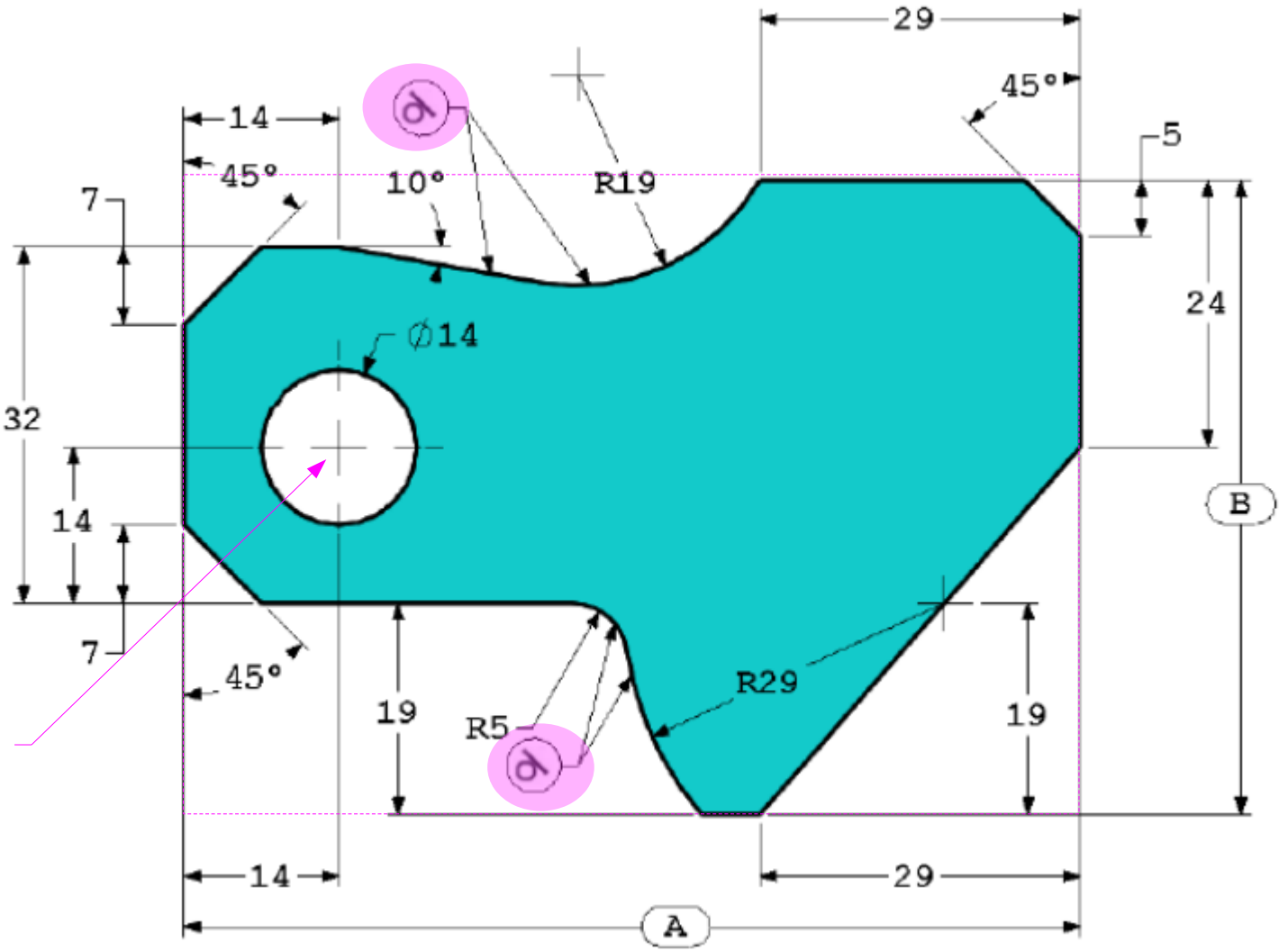
Unit system: MMGS (millimeter, gram, second)
Decimal places: 2
Part origin: Arbitrary
All holes through all unless shown otherwise.
Material: AISI 1020 Steel
Density = 0.0079 g/mm^3

A = 81.00
B = 57.00
C = 43.00

See video tutorial linked from lecture schedule.

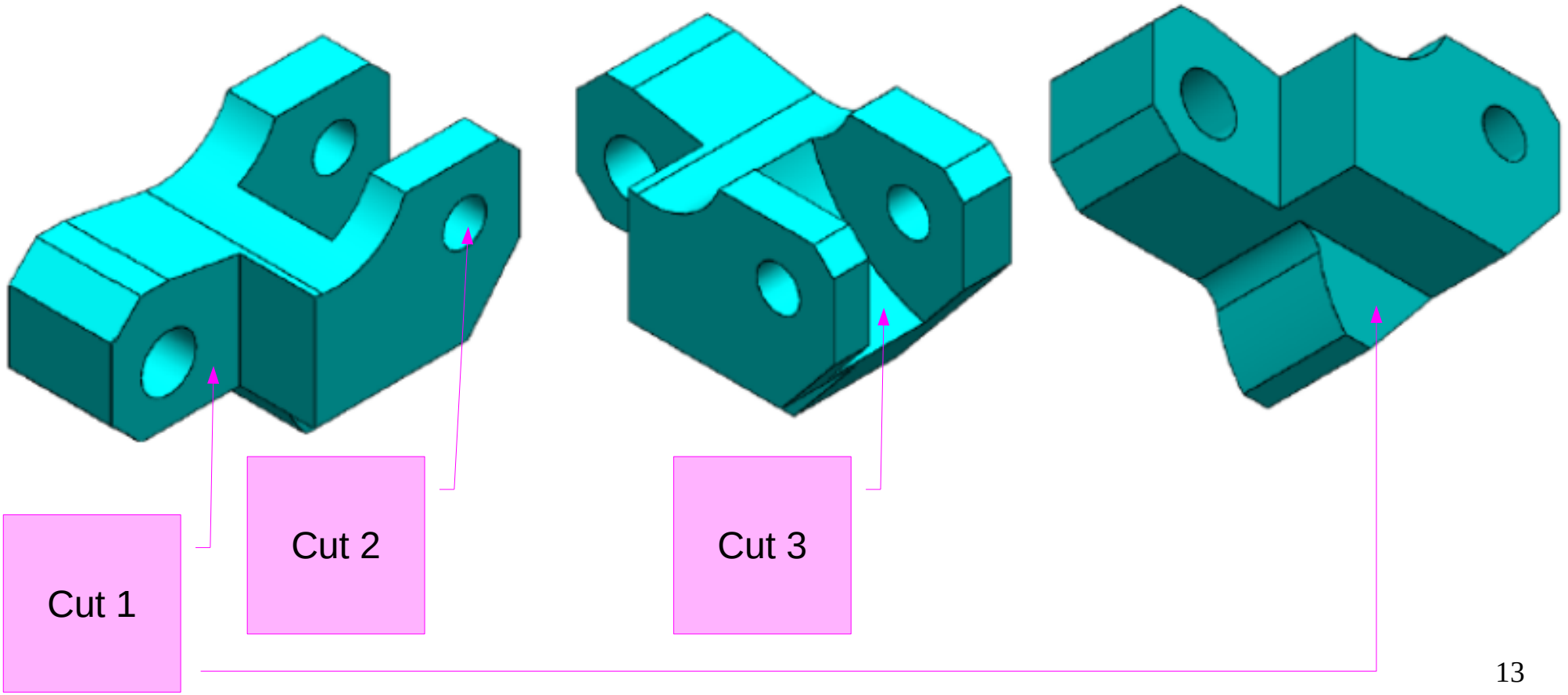
https://www.youtube.com/watch?v=CWbDrbiepSE

Basic Part 4: Sketch

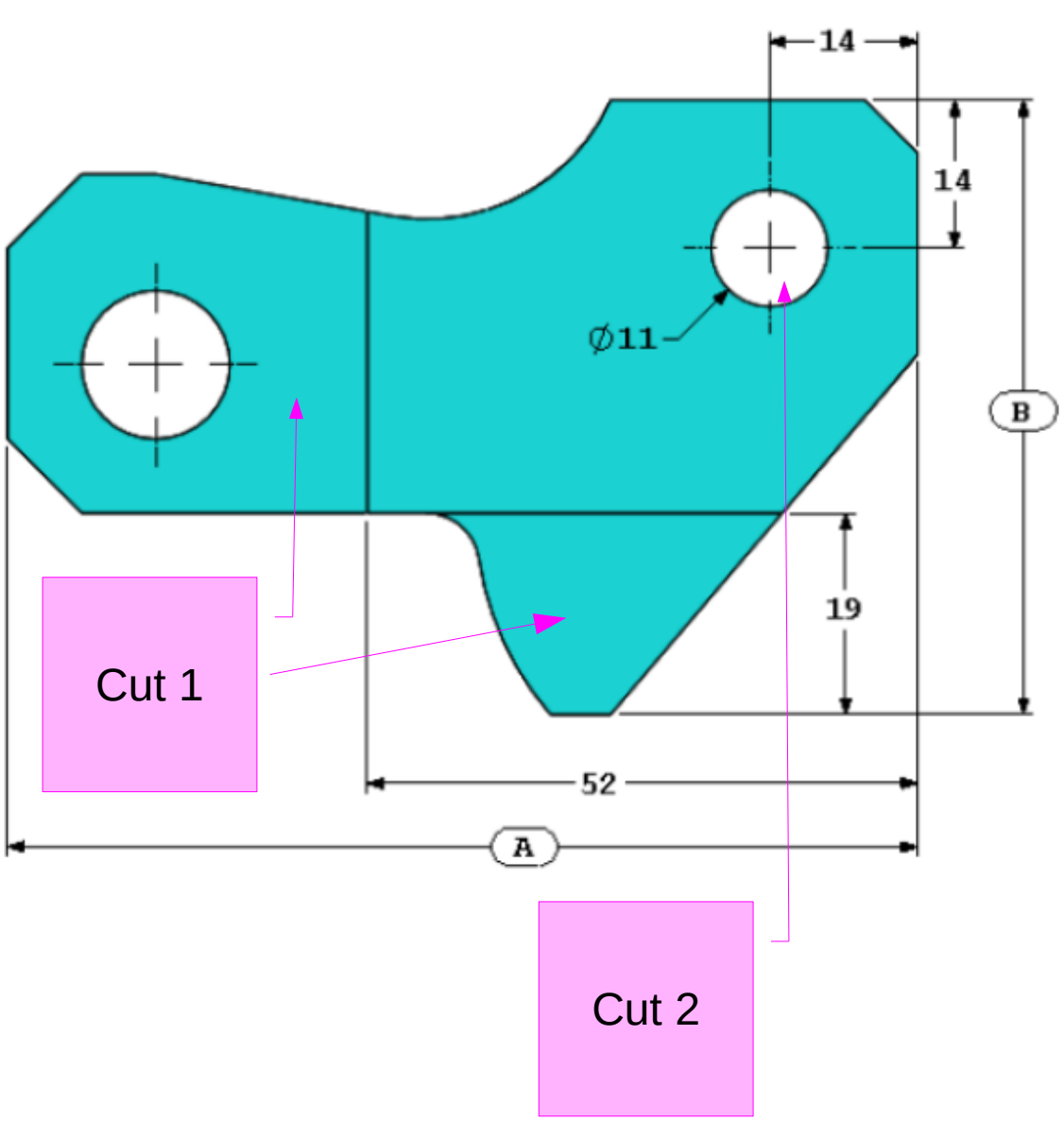


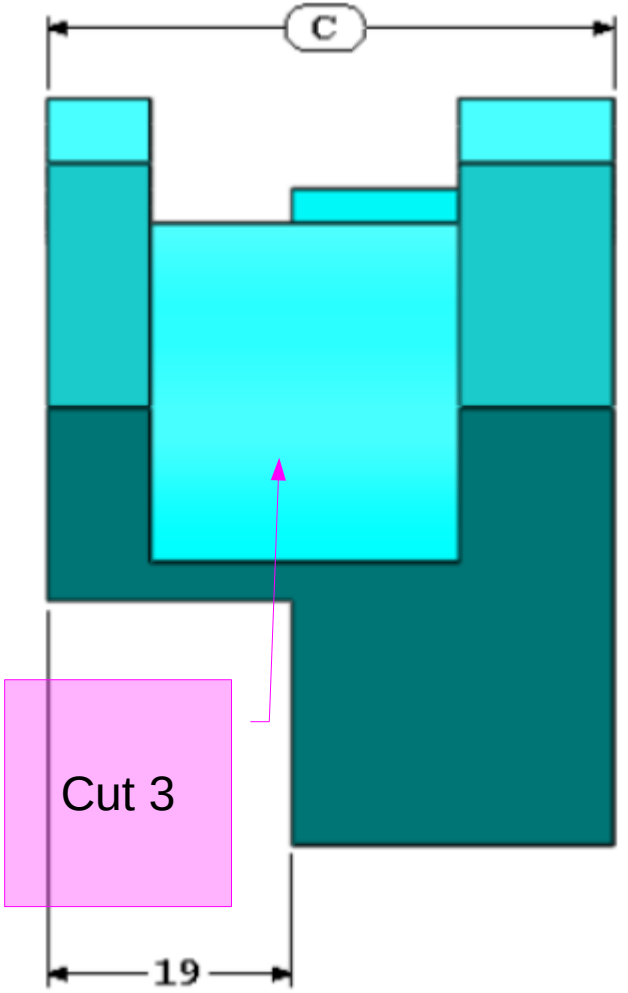
Set origin here

Basic Part 5

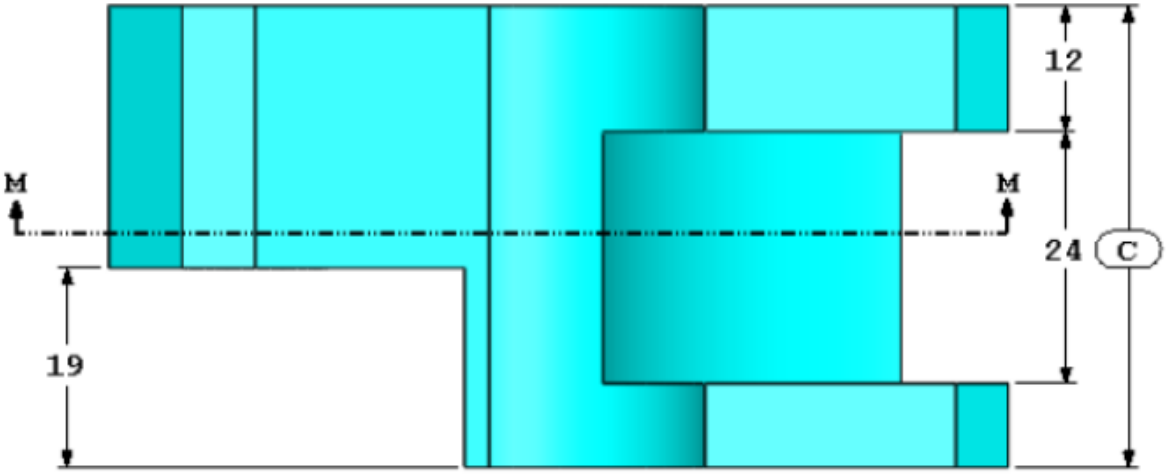


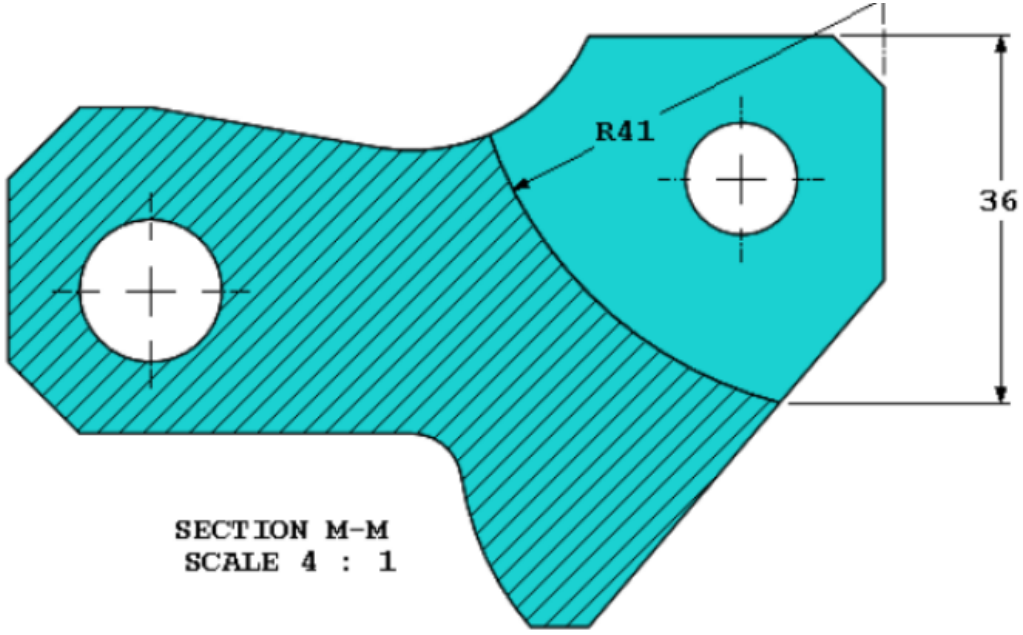
Cut-Outs



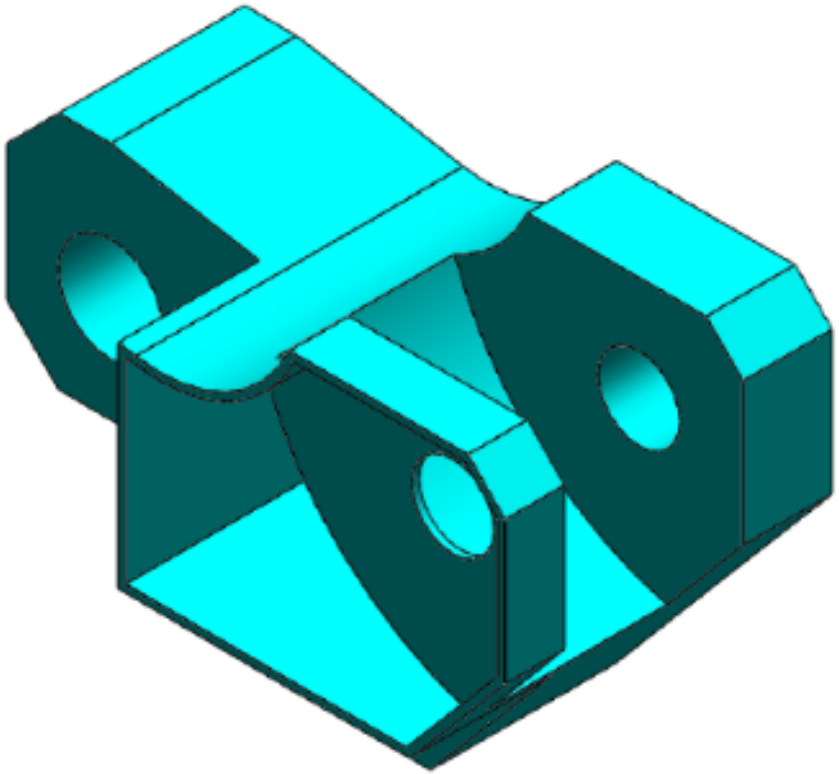


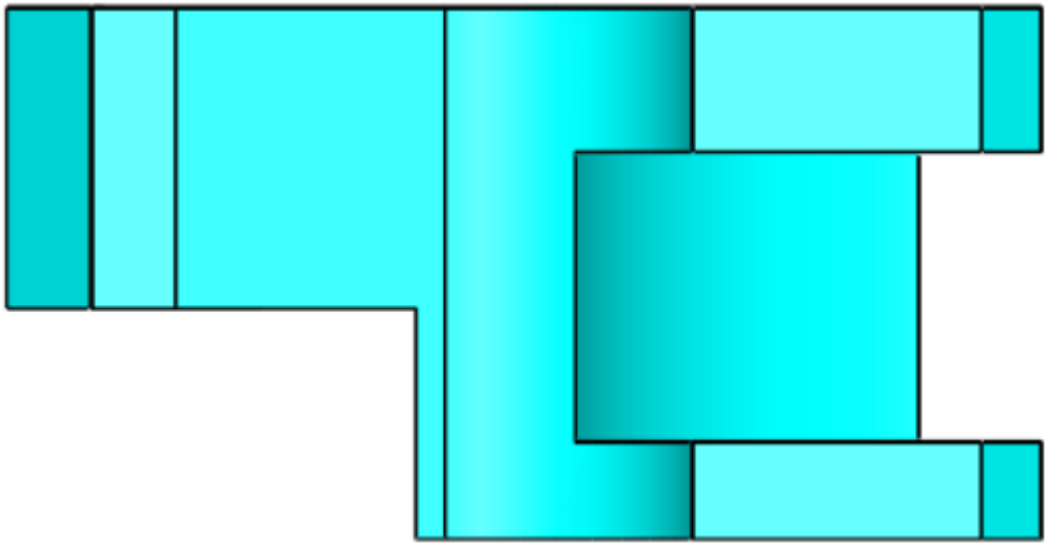
Circular Cut-Out (Cut 3)



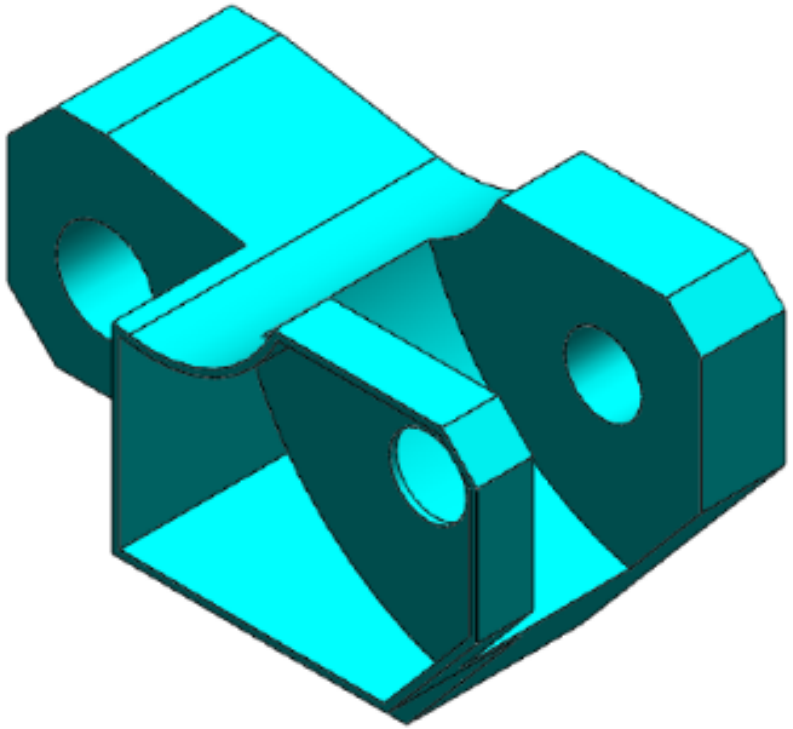


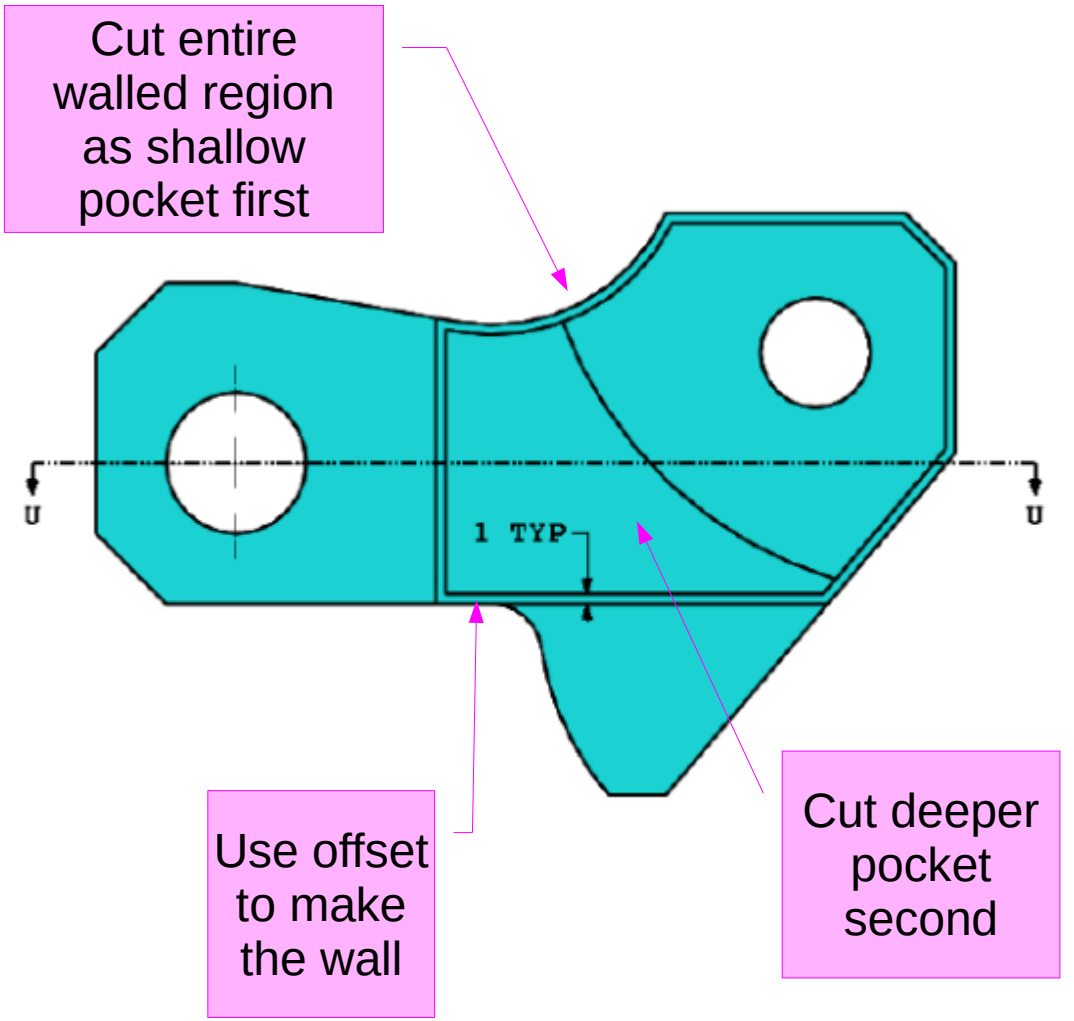
Advanced Part 1: Pocket



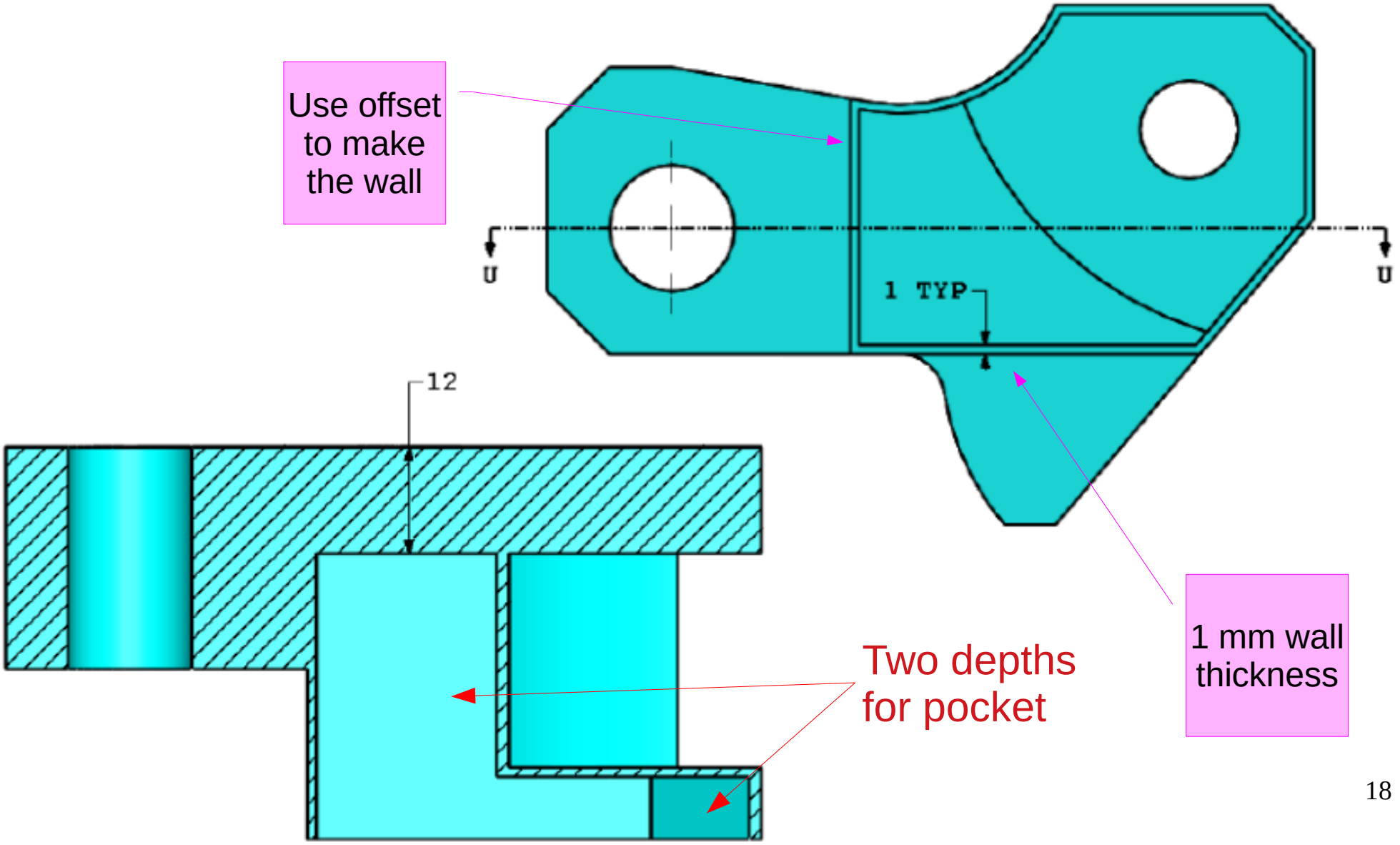


Advanced Part 1: Pocket

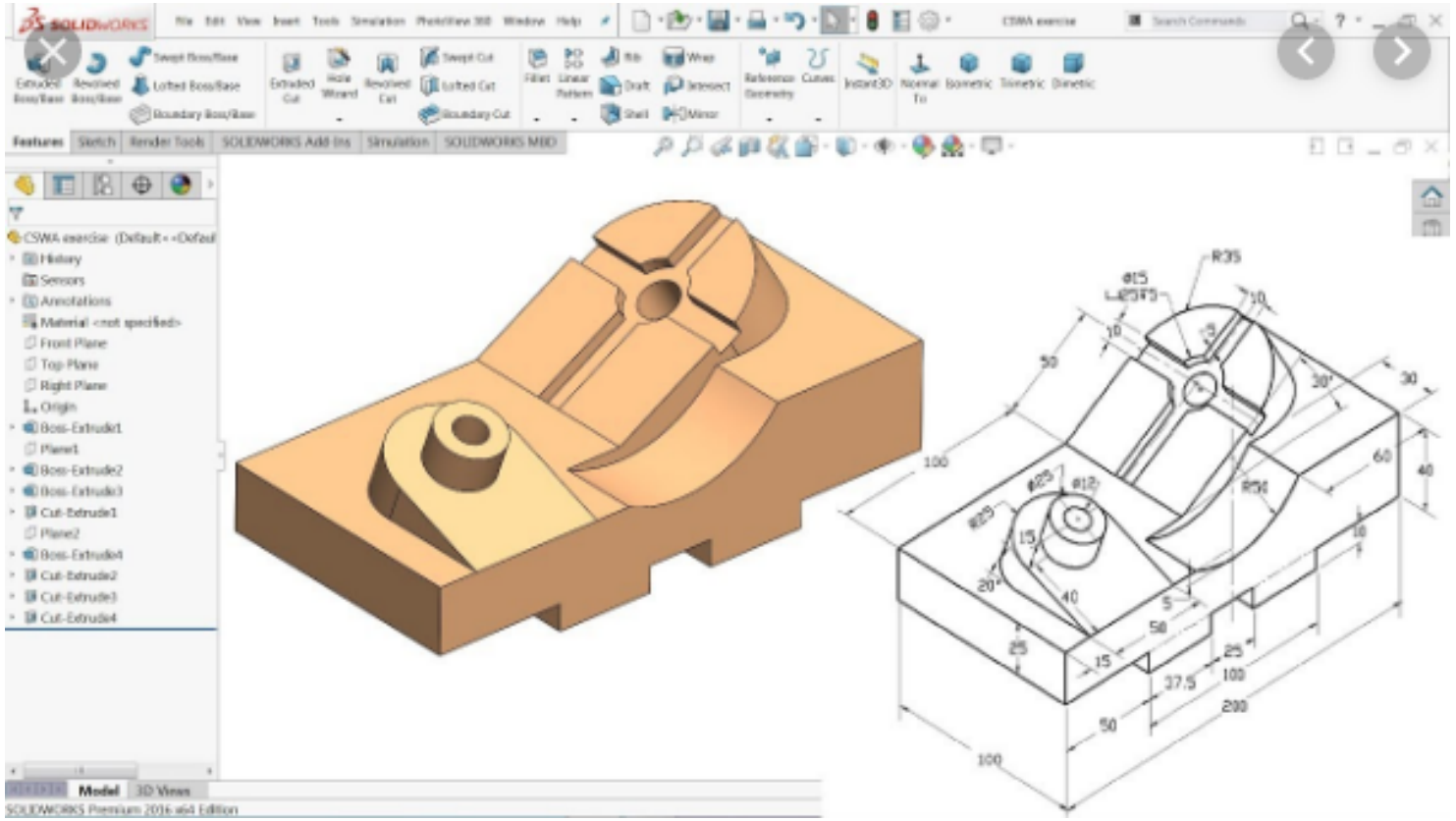




Advanced Part 1 (cont.)



More Complex Geometry



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https://www.youtube.com/watch?v=W9OtdcHyKVc