

15-294 Rapid Prototyping Technologies:

Certified SolidWorks Associate Exam Problems

Dave Touretzky
Computer Science
Carnegie Mellon University

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%)

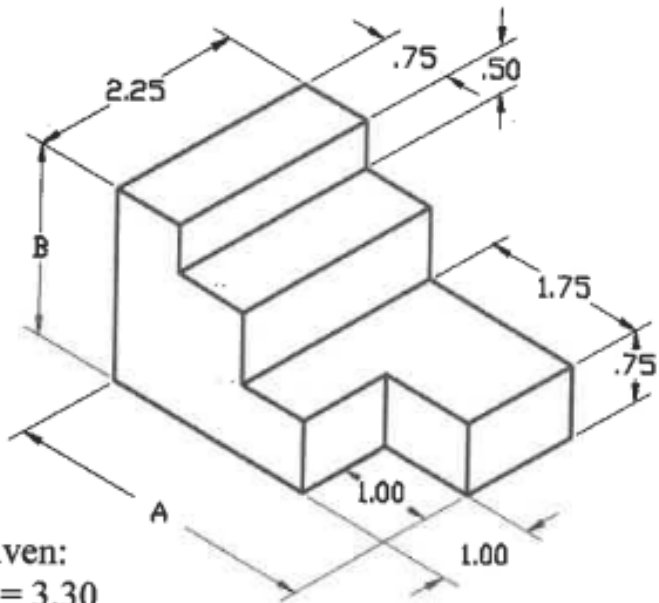
Knowledge Elements

- 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

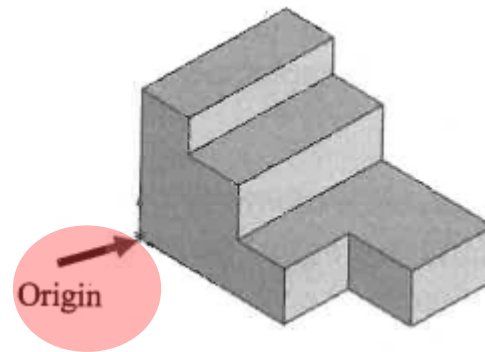
How It Works

- 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%

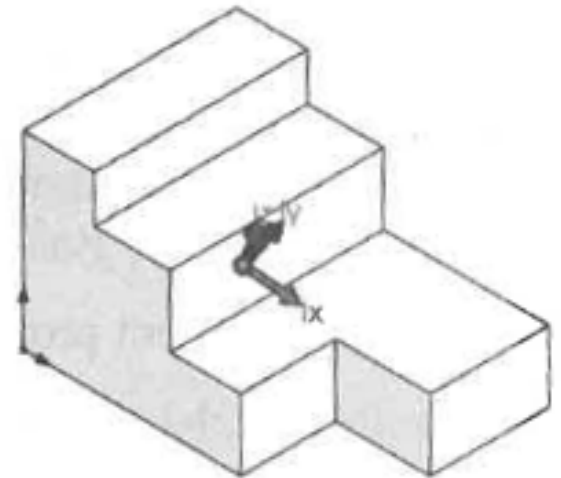
Basic Part 1



Given:
A = 3.30
B = 2.00
Material: 2014 Alloy
Density = .101 lb/in³
Units: IPS
Decimal places = 2



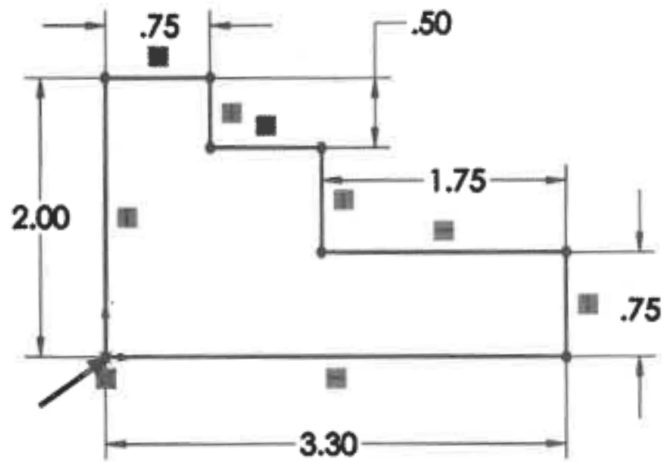
Mass = 0.84 pounds
Volume = 8.28 cubic inches
Surface area = 29.88 square inches
Center of mass: (inches)
X = 1.14
Y = 0.75
Z = -1.18



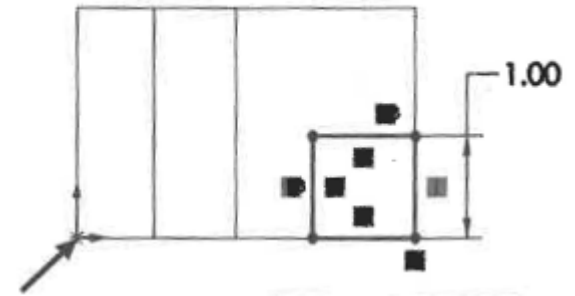
Set the units: IPS in this case.

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

Basic Part 1: How to Make It

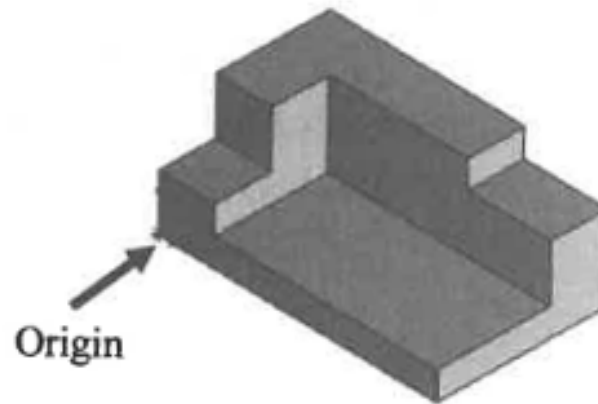
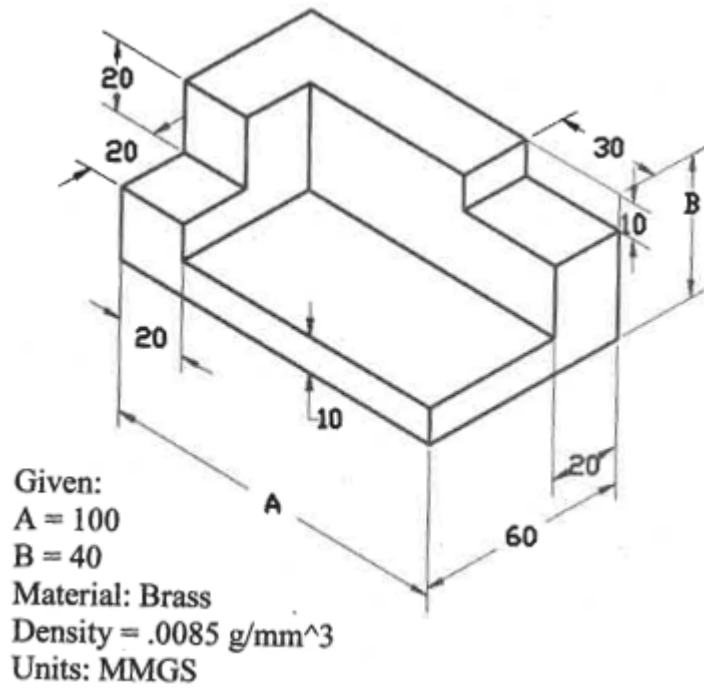


Extruded Base



Extruded Cut

Basic Part 2



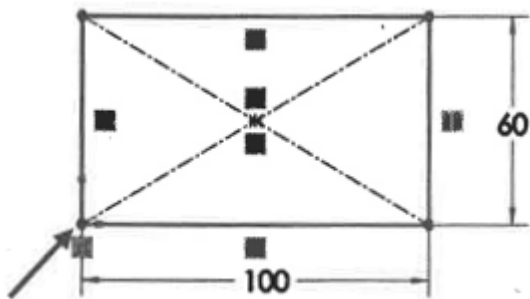
Density = 0.01 grams per cubic millimeter
Mass = 1105.00 grams
Volume = 130000.00 cubic millimeters
Surface area = 23400.00 square millimeters
Center of mass. (millimeters)
X = 43.46
Y = 15.00
Z = -37.69

Set the units: MMGS in this case.

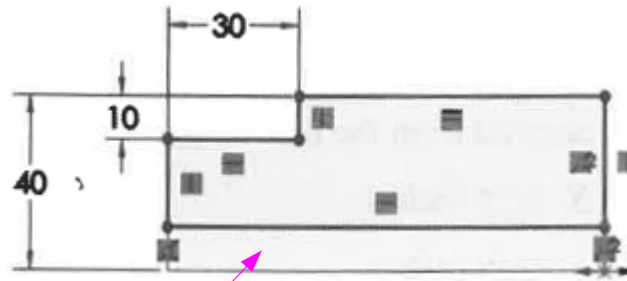
Set up “A” and “B” as global variables in the Equation Manager.

Basic Part 2: How To Make It

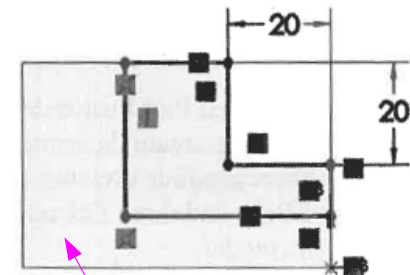
Extruded Base 1



Extruded Base 2

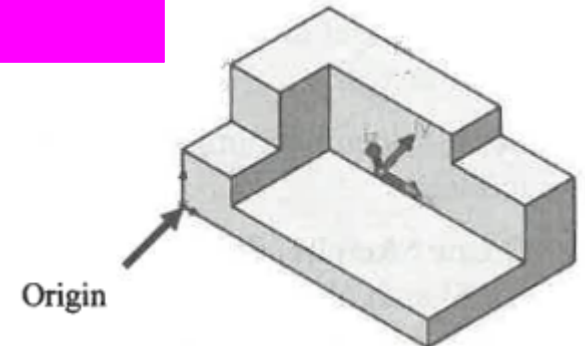
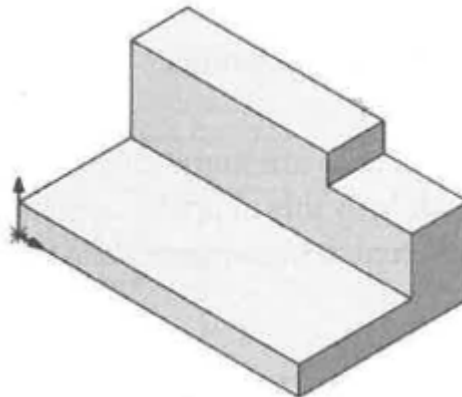


Extruded Base 3

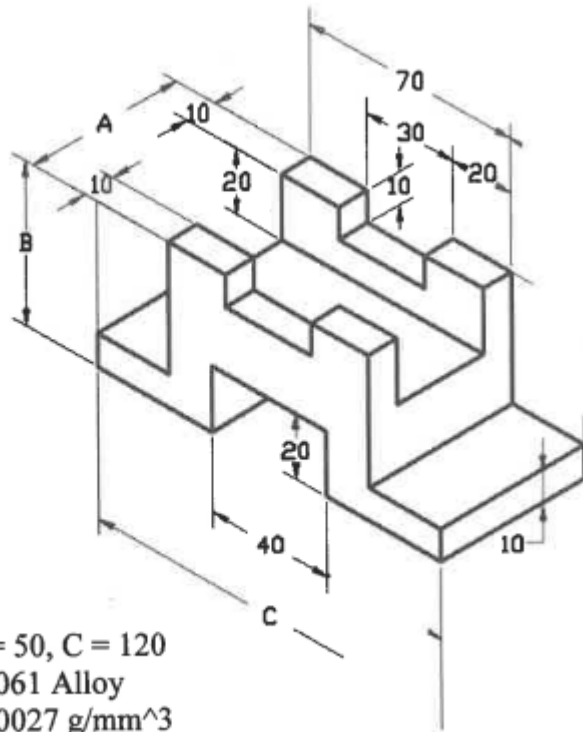


10 mm
base

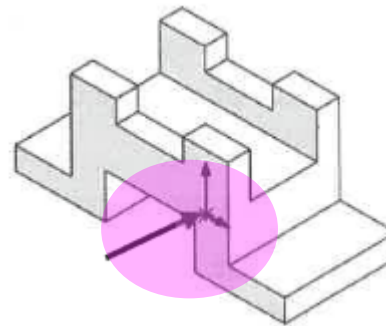
Extruded
Base 2



Basic Part 3



Given:
A = 50, B = 50, C = 120
Material: 6061 Alloy
Density = .0027 g/mm³
Units: MMGS



Mass = 302.40 grams

Volume = 112000.00 cubic millimeters

Surface area = 26200.00 square millimeters

Center of mass: (millimeters)

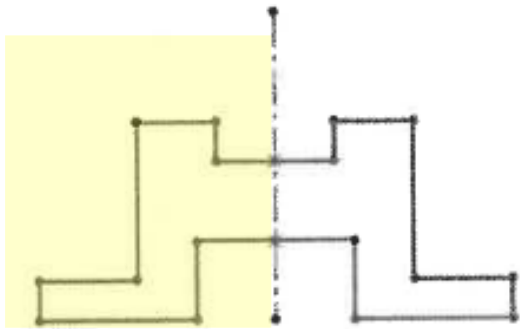
X = 0.00

Y = 19.20

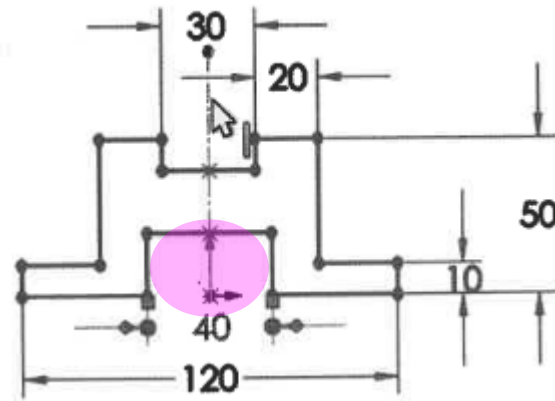
Z = 0.00

Where is the origin?

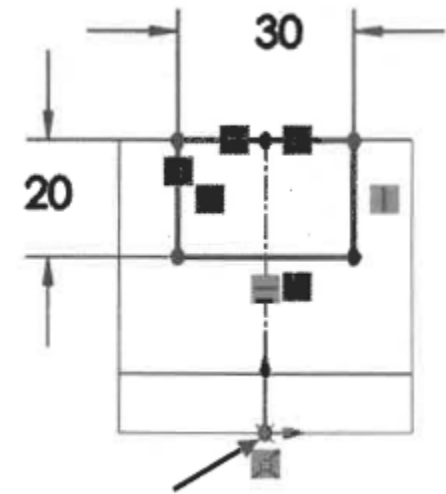
Basic Part 3: How To Make It



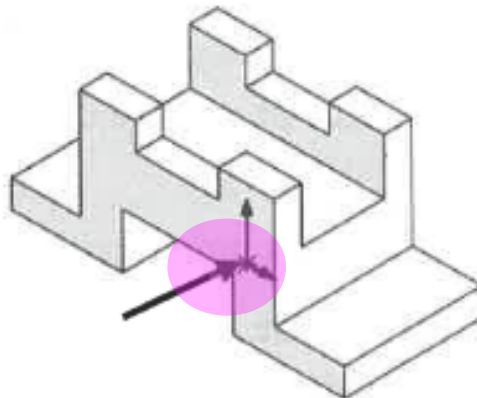
Mirror Sketch Elements



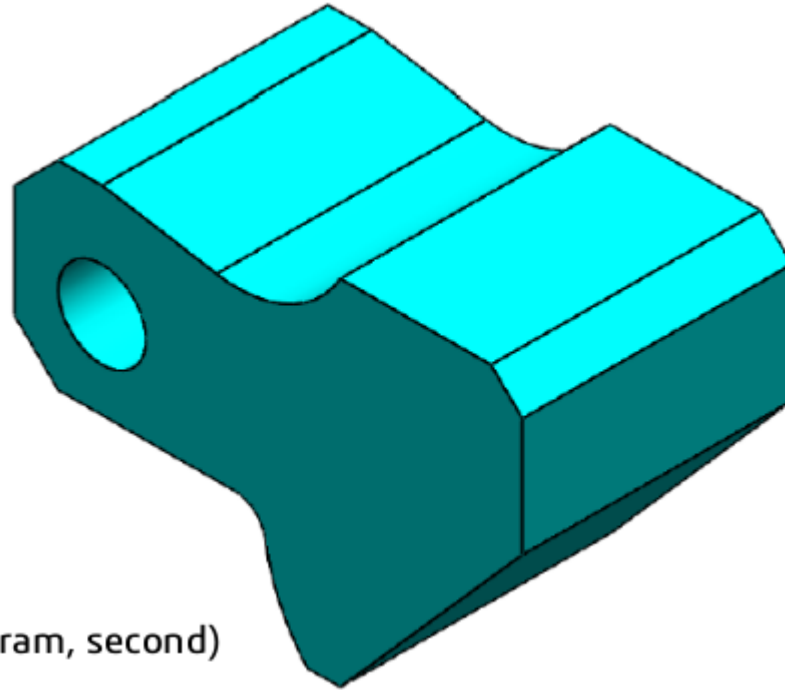
Extruded Base



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/mm³

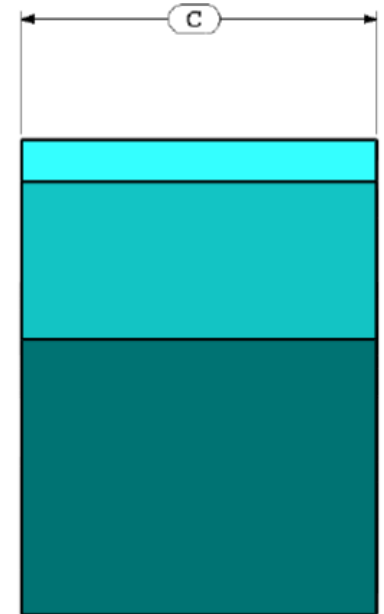
A = 81.00

B = 57.00

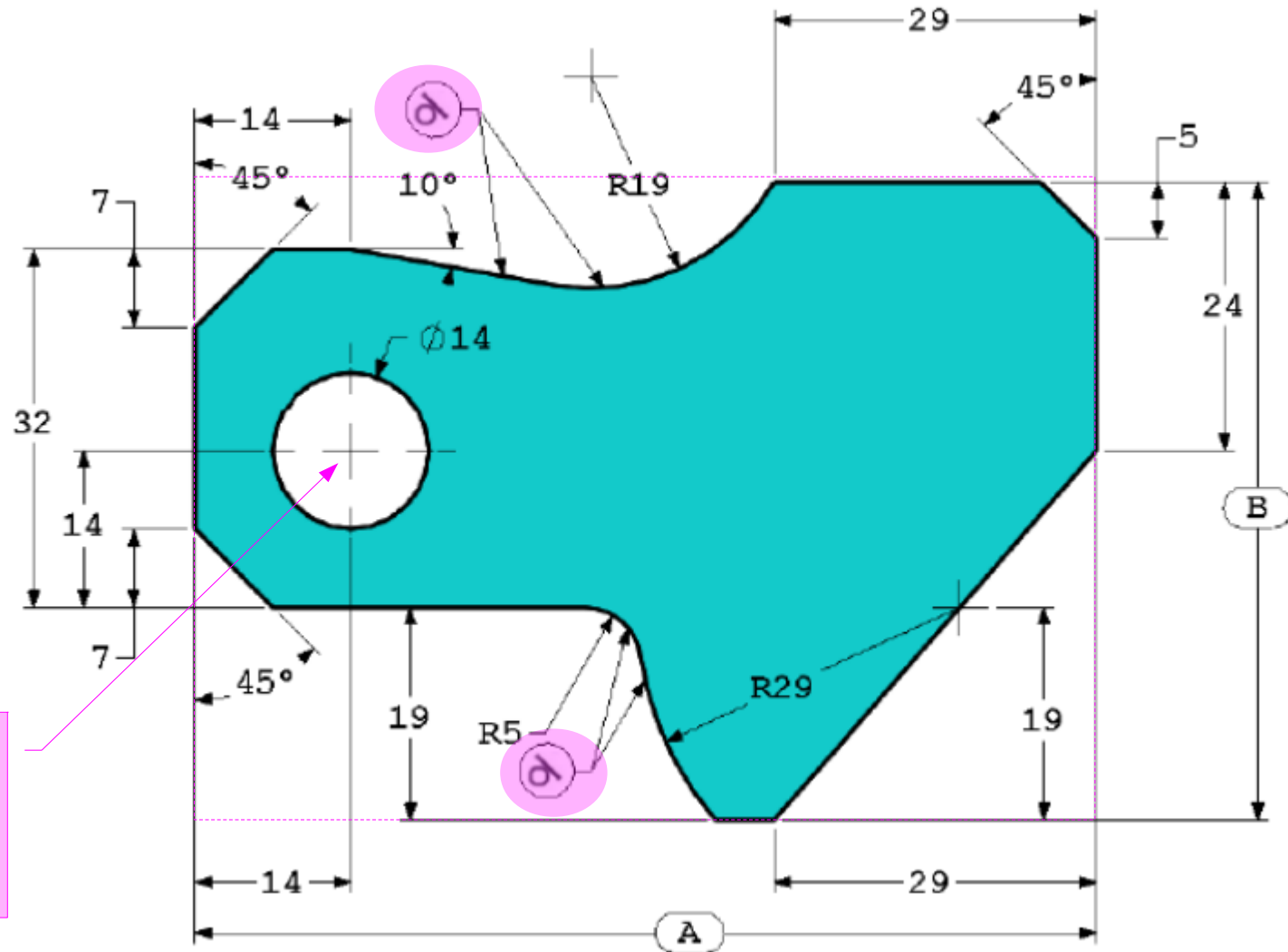
C = 43.00

**See video tutorial linked
from lecture schedule.**

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

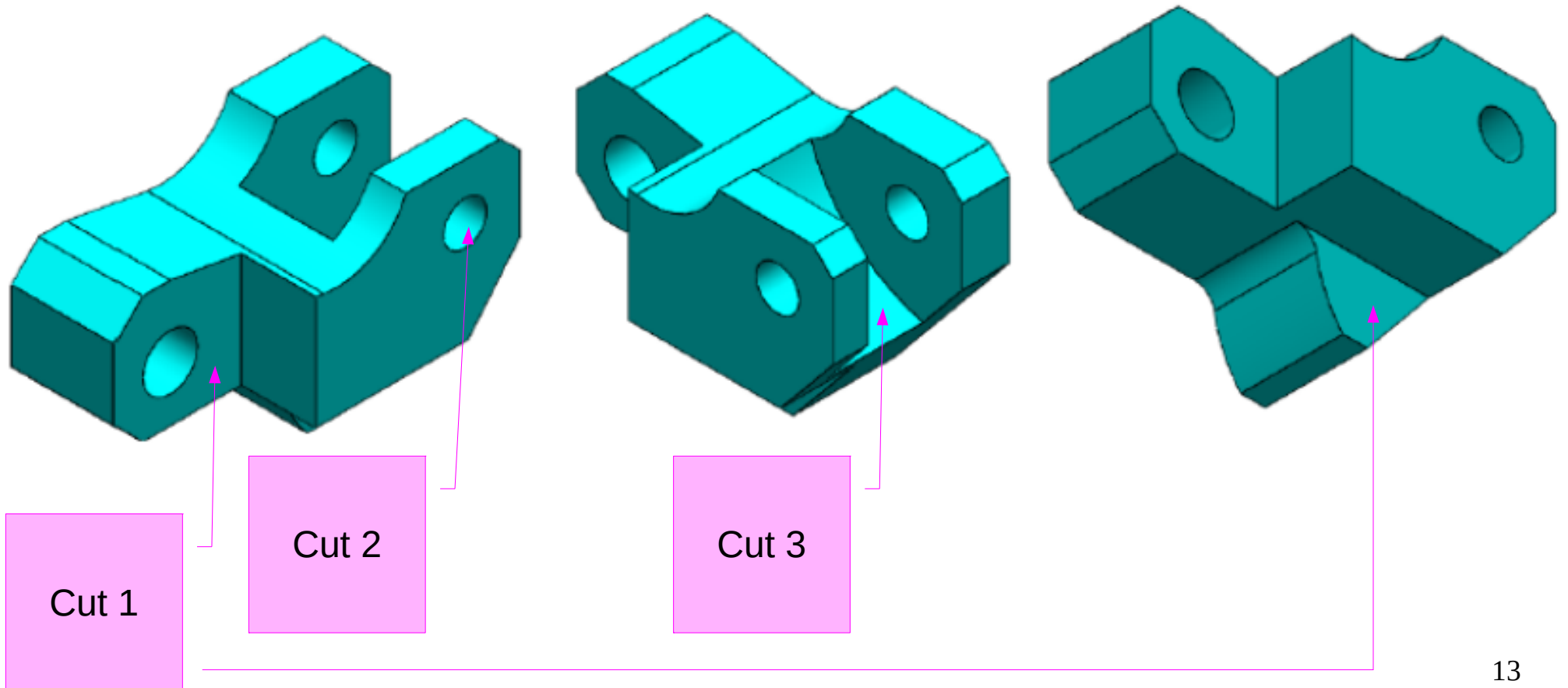


Basic Part 4: Sketch

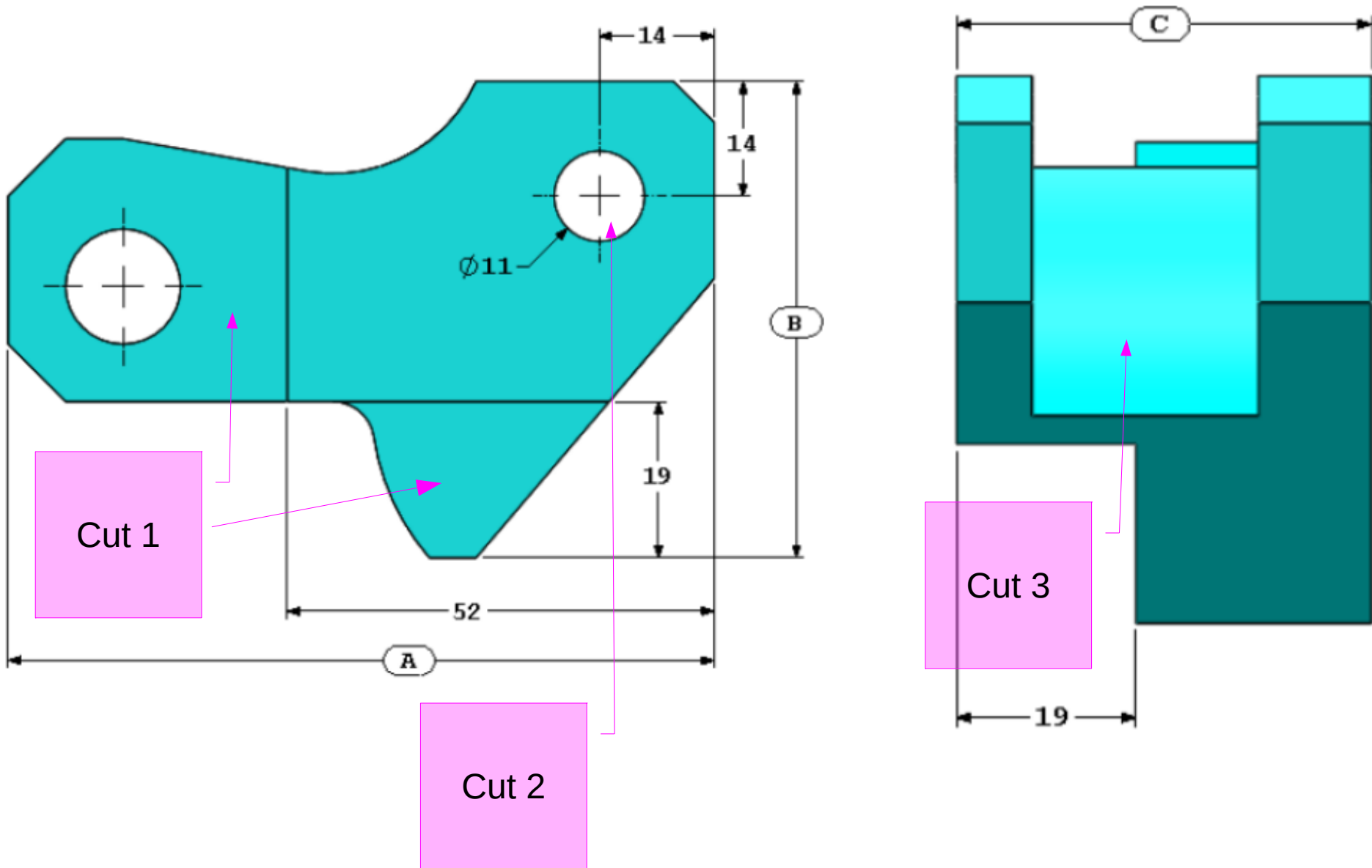


Set origin here

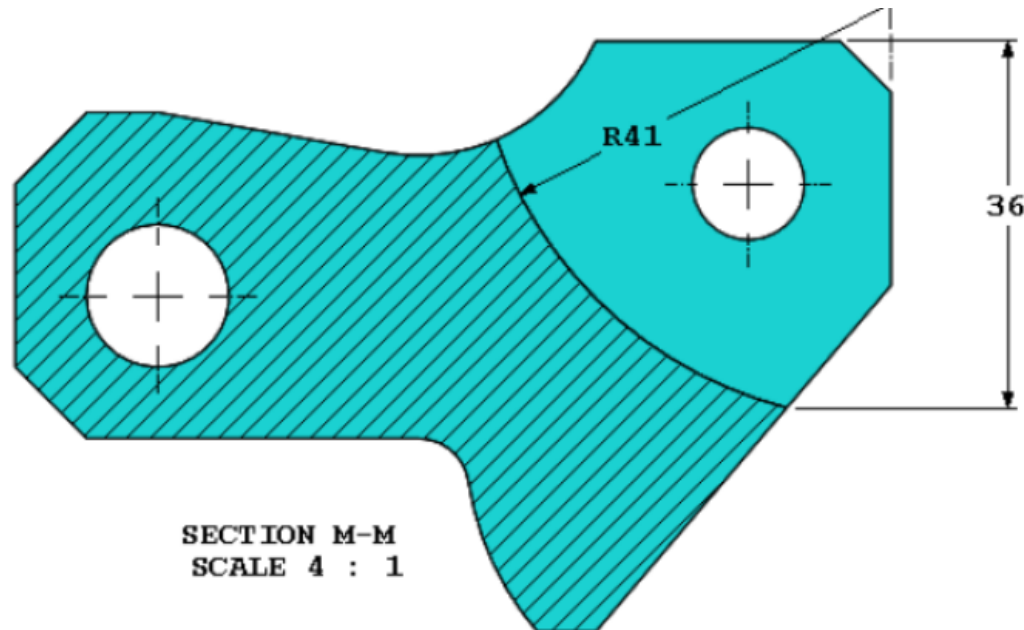
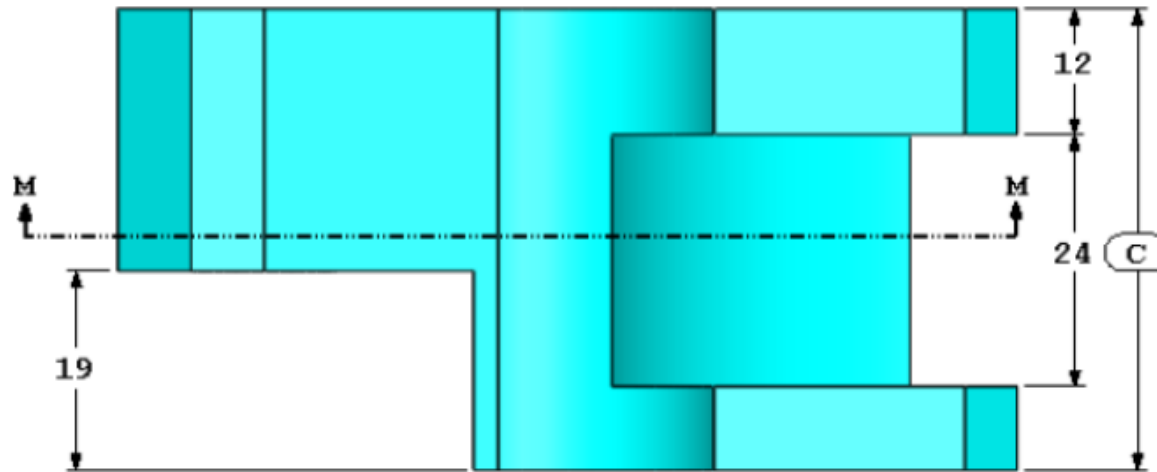
Basic Part 5



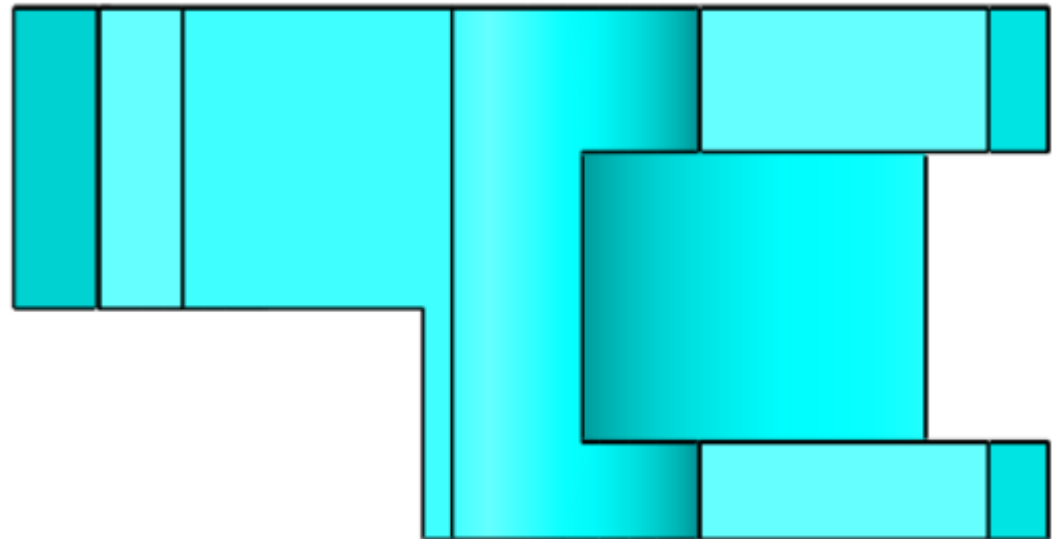
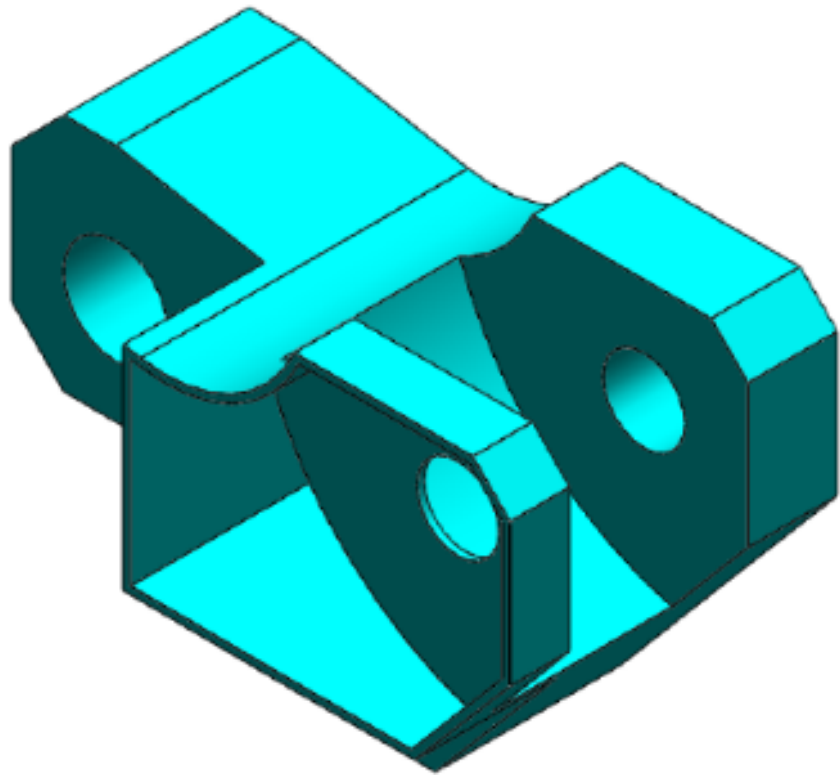
Cut-Outs



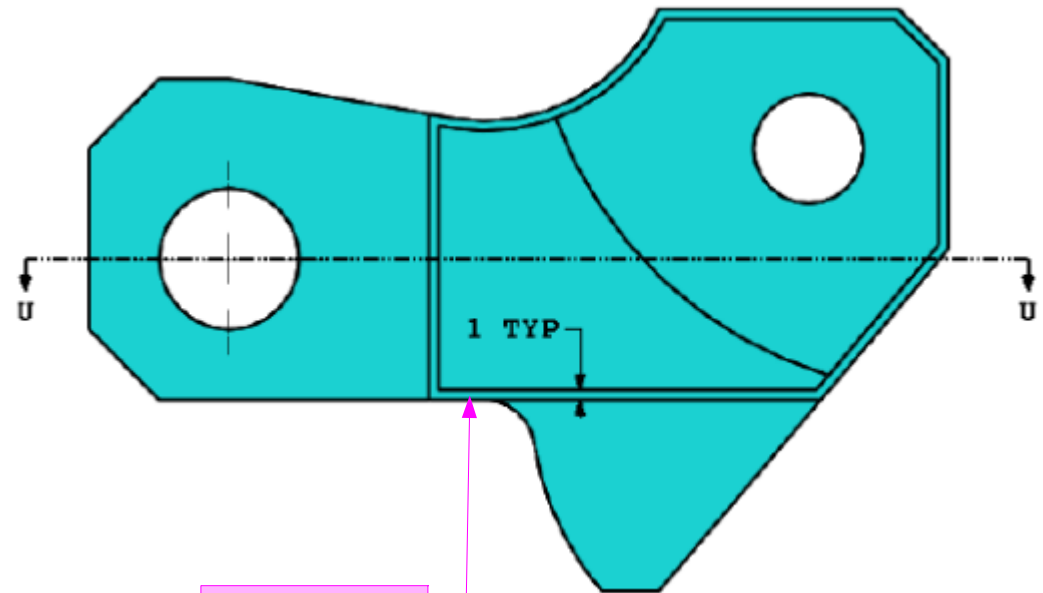
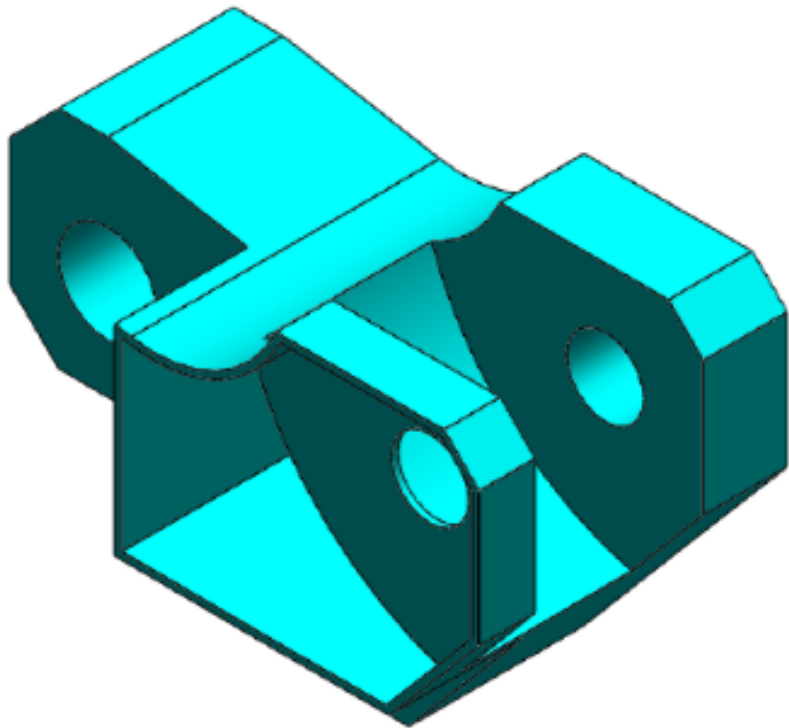
Circular Cut-Out (Cut 3)



Advanced Part 1: Pocket



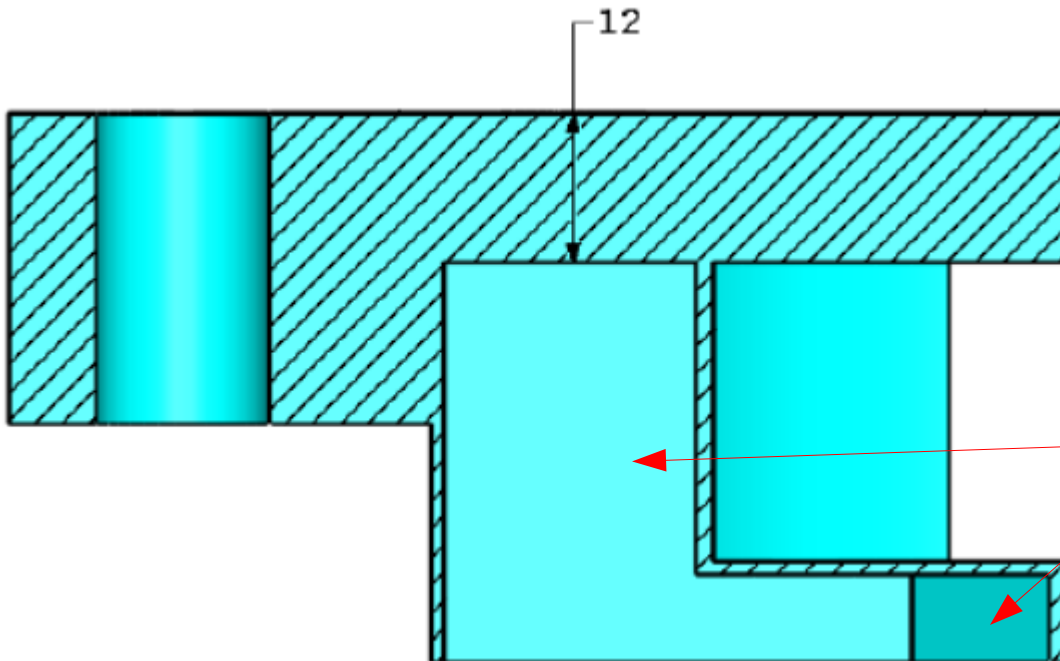
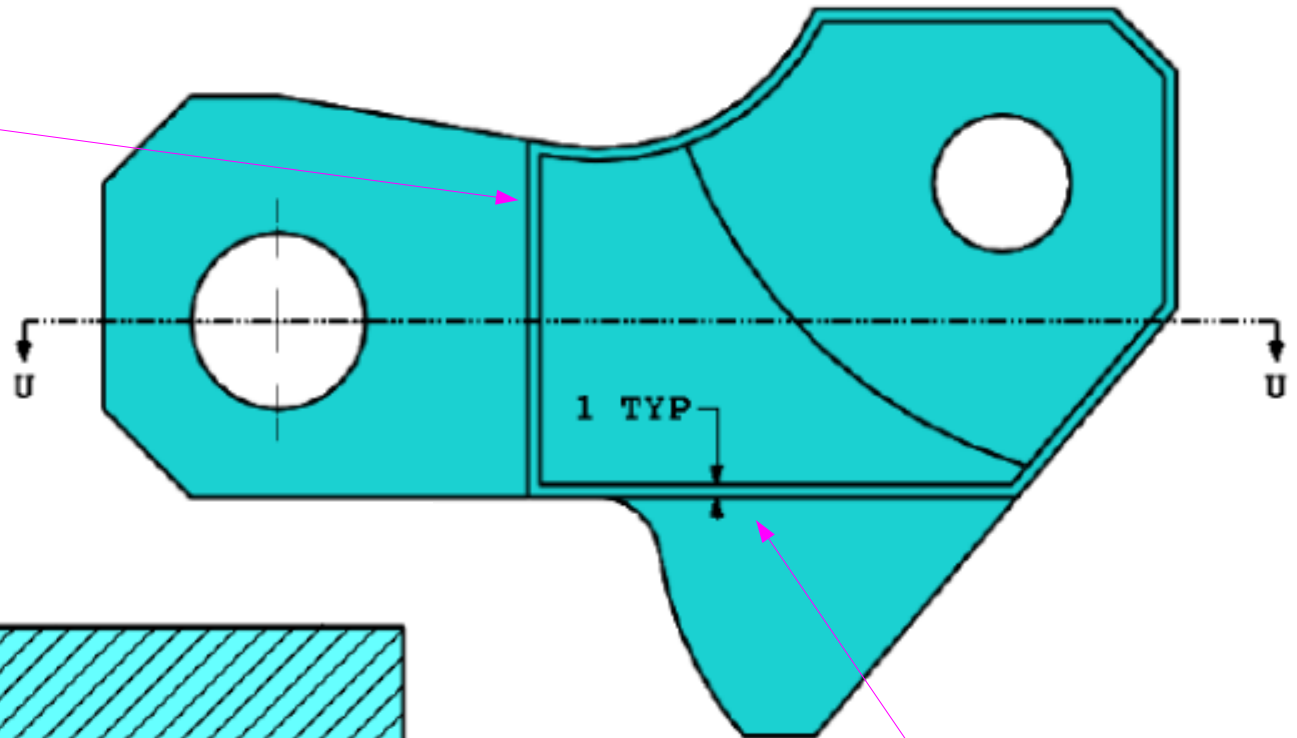
Advanced Part 1: Pocket



Use offset
to make
the wall

Advanced Part 1 (cont.)

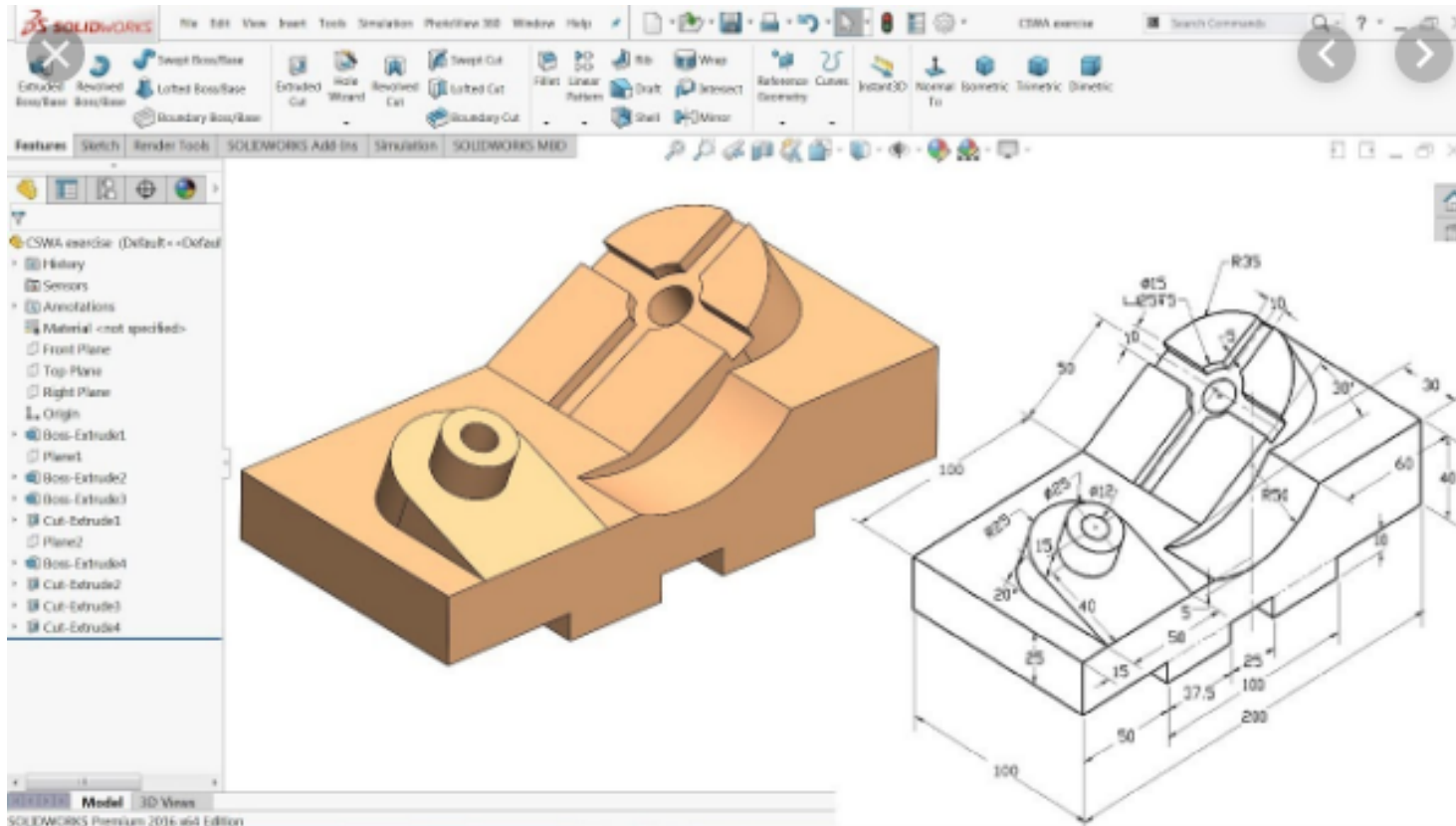
Use offset
to make
the wall



Two depths
for pocket

1 mm wall
thickness

More Complex Geometry



See video tutorial linked from lecture schedule.

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