Sign in: https://tinyurl.com/mknCAD or >

How To: CAD 1 (BASICS)

Welcome!

What You’re in For:

> What is CAD? Options?

> Setting Up / Tips & Tricks

> Demo: How Does It Work

> Demo: Motor Mount

What is CAD? Options?

CAD = Computer Aided Design

> Lets us design without using materials

> Options (Green = Free):

DOWNLOADED:

> Solidworks

> Autodesk Inventor

> Autodesk Fusion 360

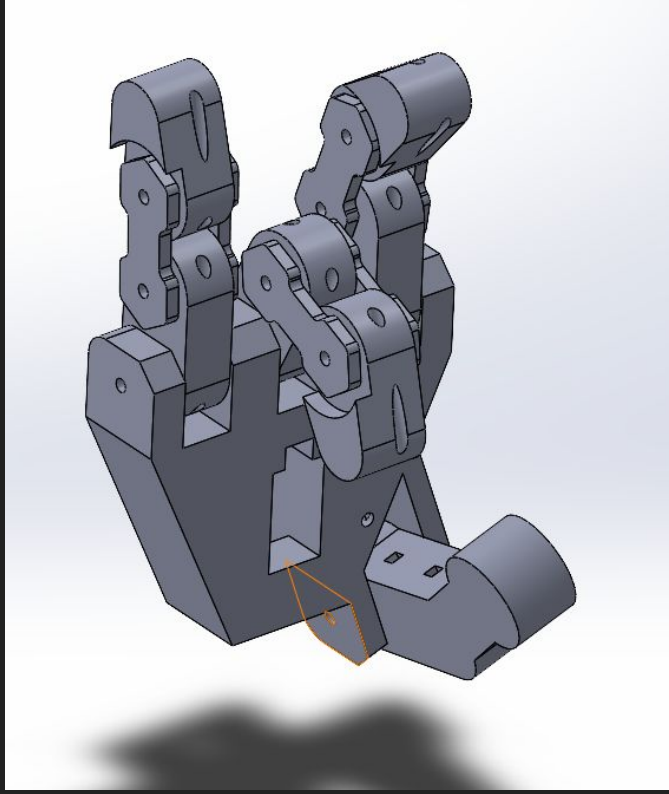
> SketchUp

ONLINE:

> OnShape

> Autodesk TinkerCAD

> SelfCAD



Setting Up / Tips & Tricks

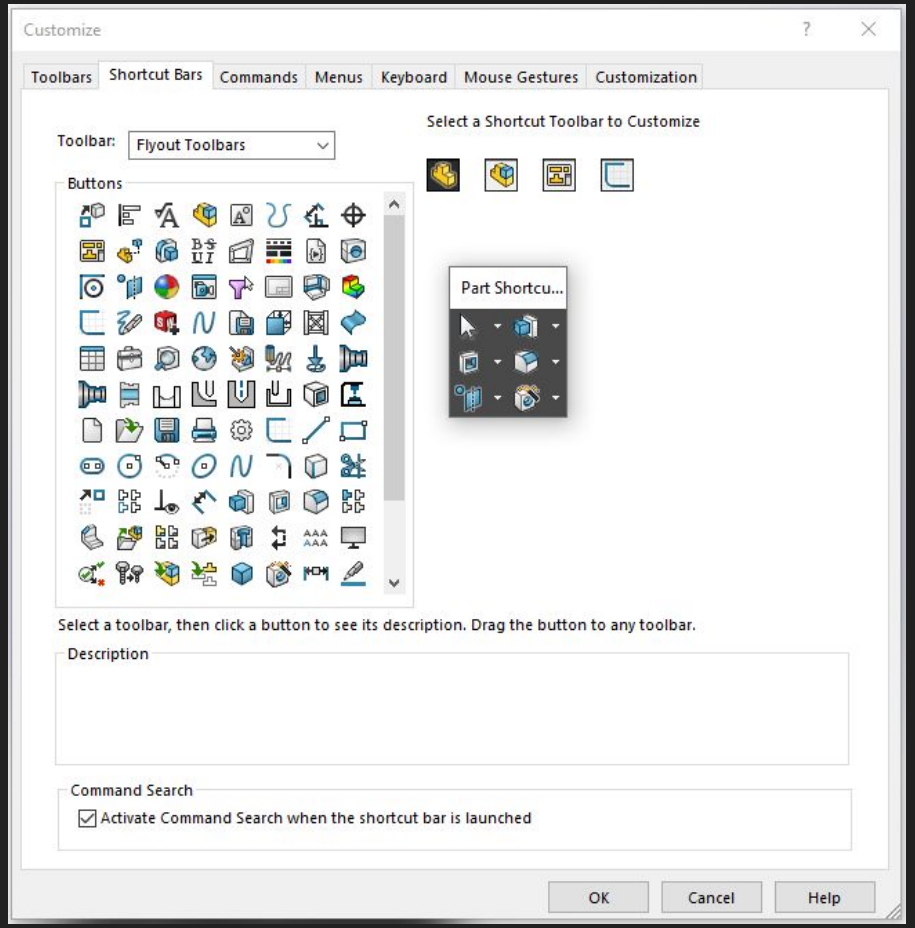
Just some basics to make life easier

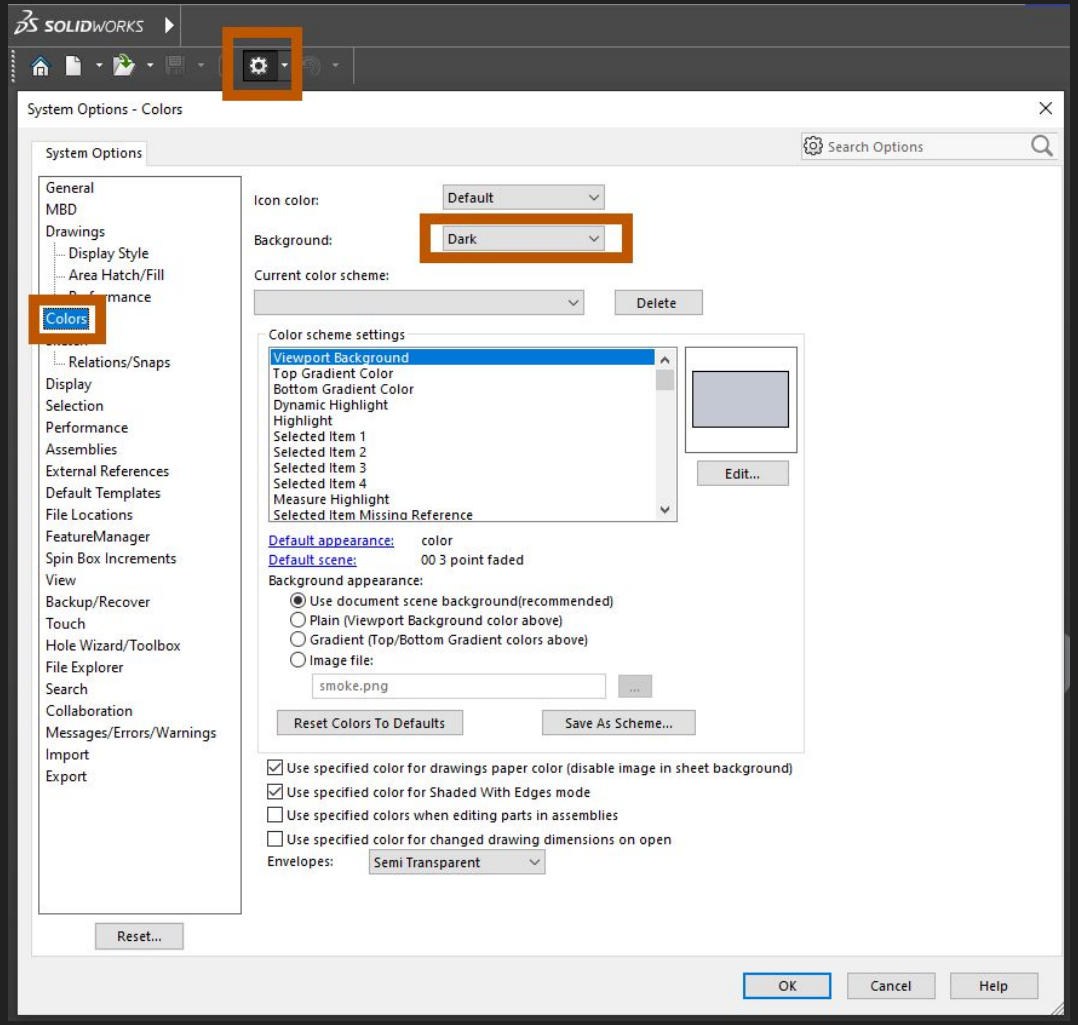
> Light/Dark UI

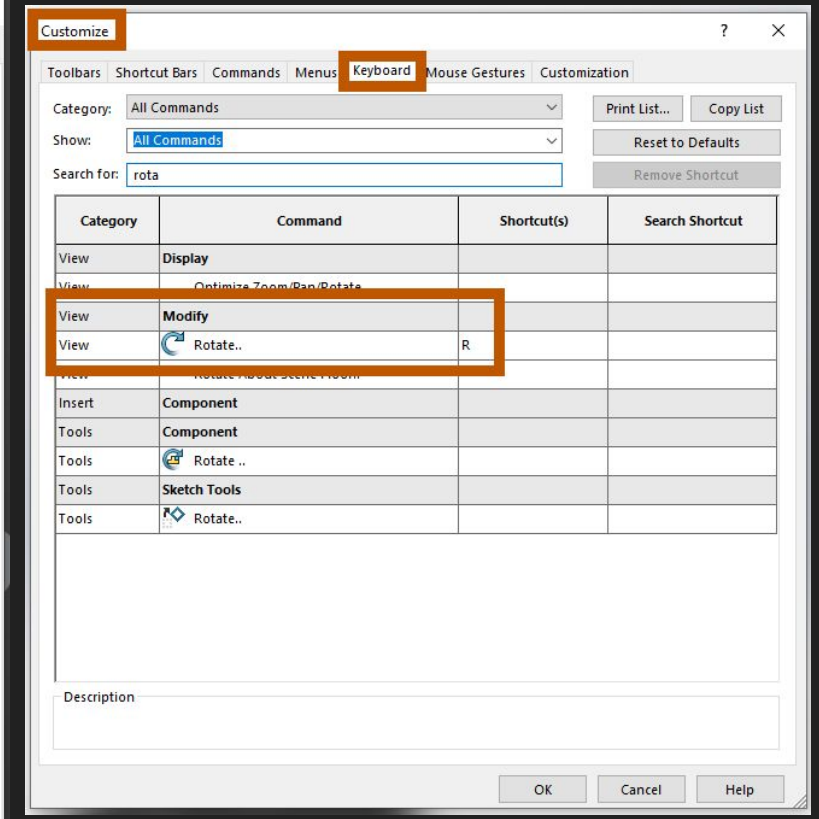
> Tools on UI

> Tools > Customize

> Bind Rotation




SOLIDWORKS
System Options - Colors
System Options
Search Options
General
MBD
Drawings
Display Style
Area Hatch/Fill
Colors
Relations/Snaps
Display
Selection
Performance
Assemblies
External References
Default Templates
File Locations
FeatureManager
Spin Box Increments
View
Backup/Recover
Touch
Hole Wizard/Toolbox
File Explorer
Search
Collaboration
Messages/Errors/Warnings
Import
Export
Icon color:
Default
Background:
Dark
Current color scheme:
Delete
Color scheme settings
Viewport Background
Top Gradient Color
Bottom Gradient Color
Dynamic Highlight
Highlight
Selected Item 1
Selected Item 2
Selected Item 3
Selected Item 4
Measure Highlight
Selected Item Missing Reference
Edit...
Default appearance:
color
Default scene:
00 3 point faded
Background appearance:
Use document scene background(recommended)
Plain (Viewport Background color above)
Gradient (Top/Bottom Gradient colors above)
Image file:
smoke.png
Reset Colors To Defaults
Save As Scheme...
Use specified color for drawings paper color (disable image in sheet background)
Use specified color for Shaded With Edges mode
Use specified colors when editing parts in assemblies
Use specified color for changed drawing dimensions on open
Envelopes:
Semi Transparent
Reset...
OK
Cancel
Help


Customize
Toolbars
Shortcut Bars
Commands
Menus
Keyboard
Mouse Gestures
Customization
Category:
All Commands
Show:
All Commands
Search for:
rota
Print List...
Copy List
Reset to Defaults
Remove Shortcut
Category
Command
Shortcut(s)
Search Shortcut
View
Display
View
Modify
View
Rotate..
R
Insert
Component
Tools
Component
Tools
Rotate ..
Tools
Sketch Tools
Tools
Rotate..
Description
OK
Cancel
Help

DEMO: How Does It Work

Super quick demo just to show off the essential tools

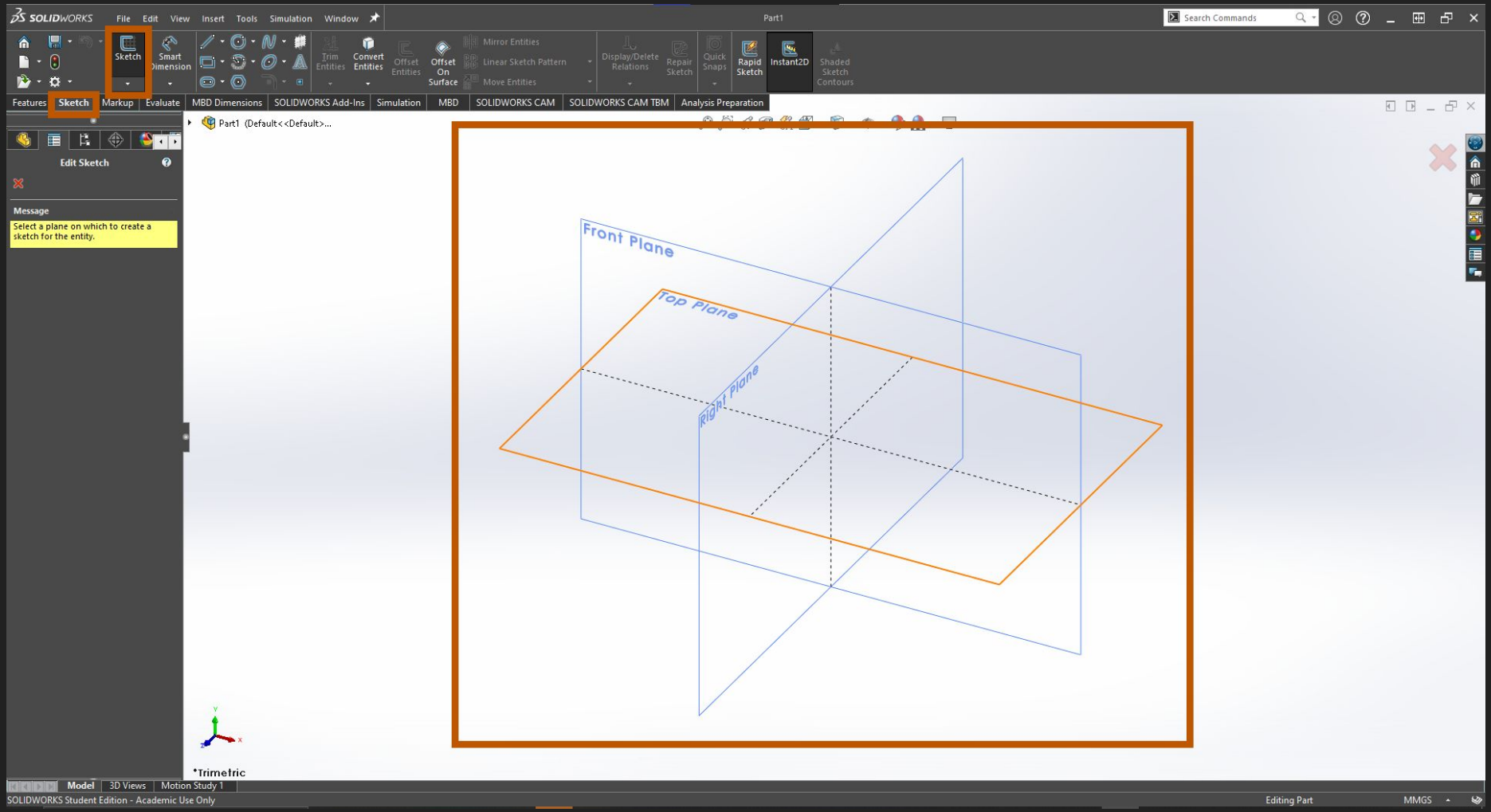
Clicks highlighted in orange

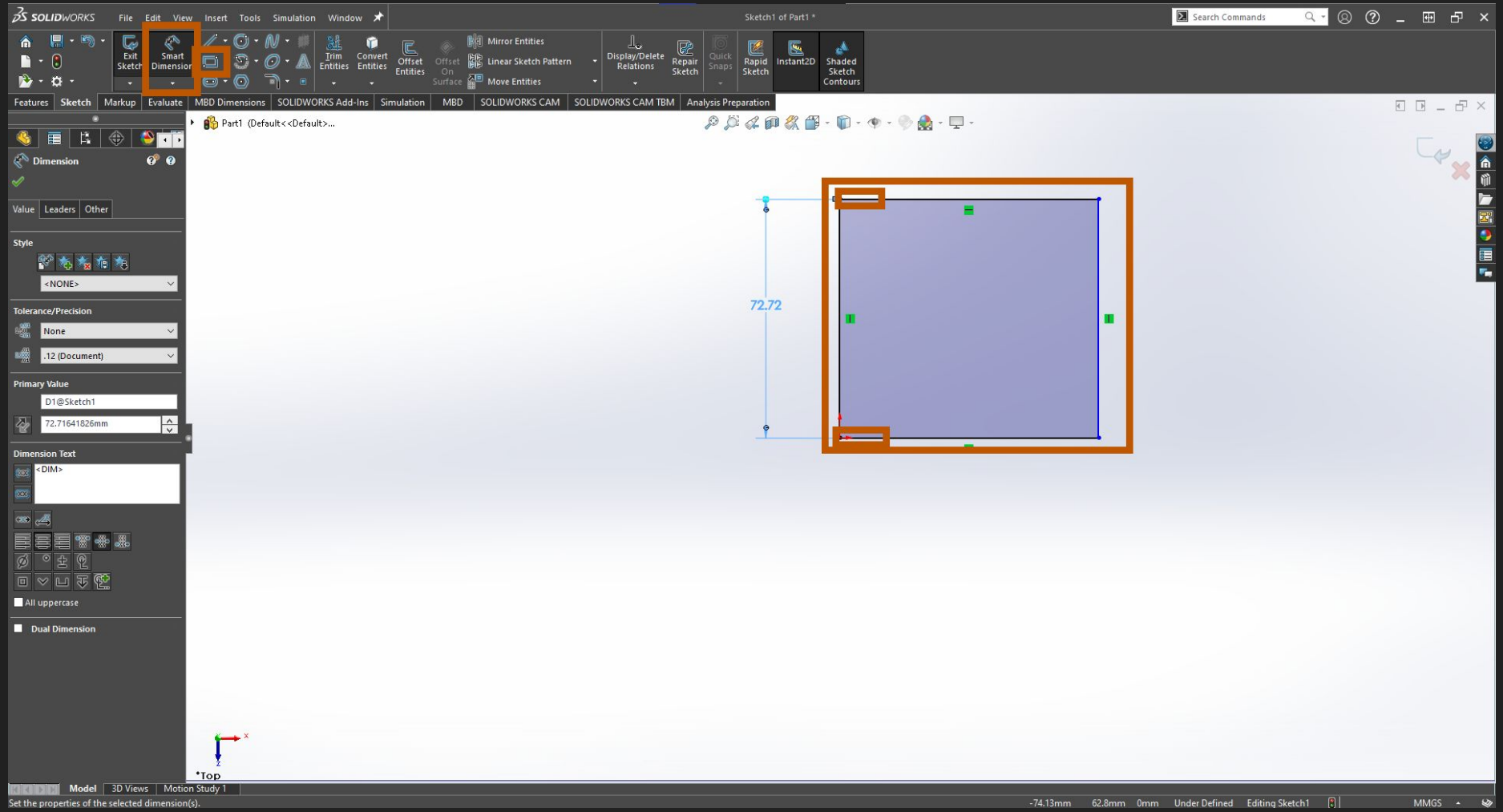
Making:

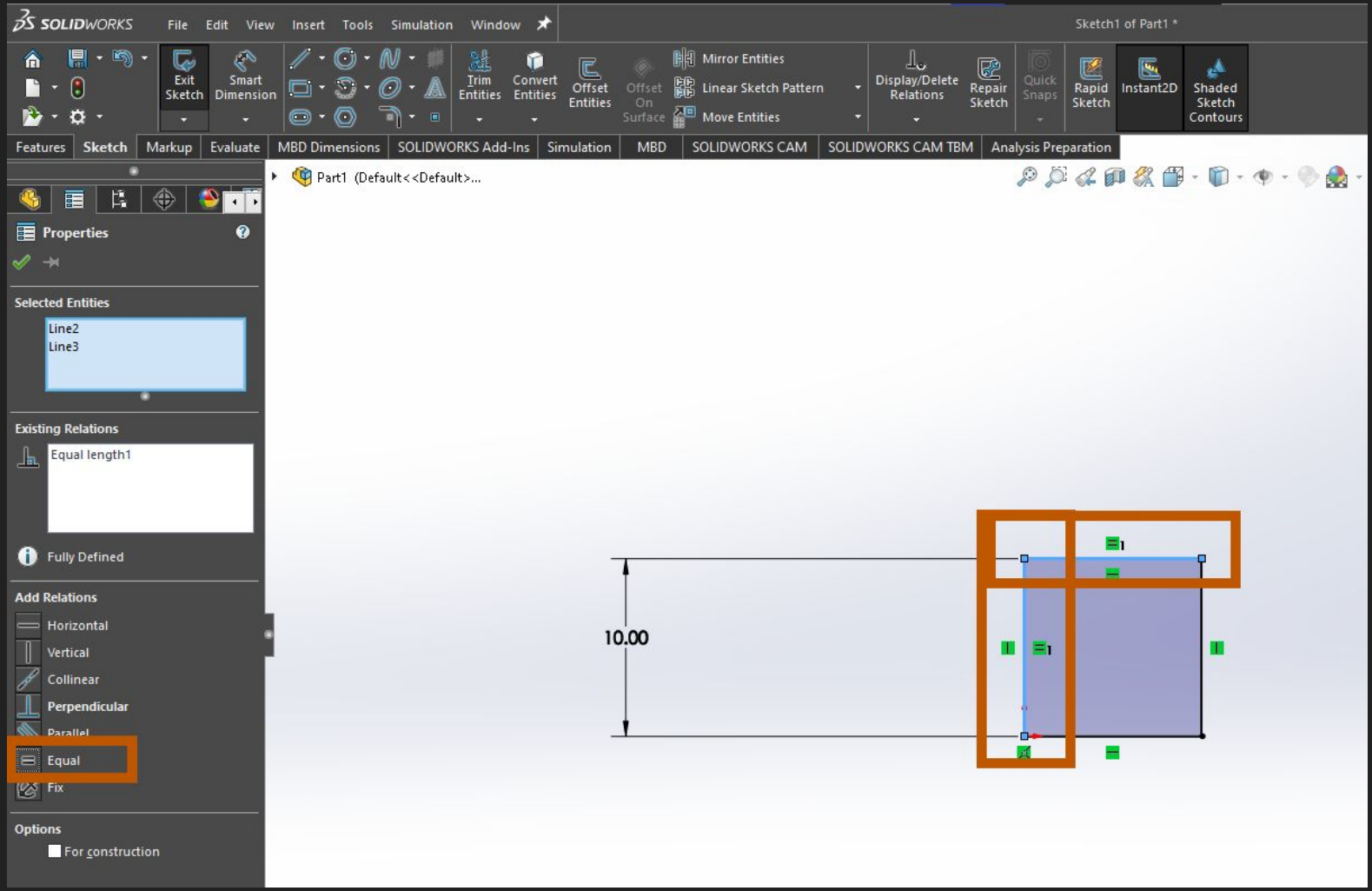
> simple cube

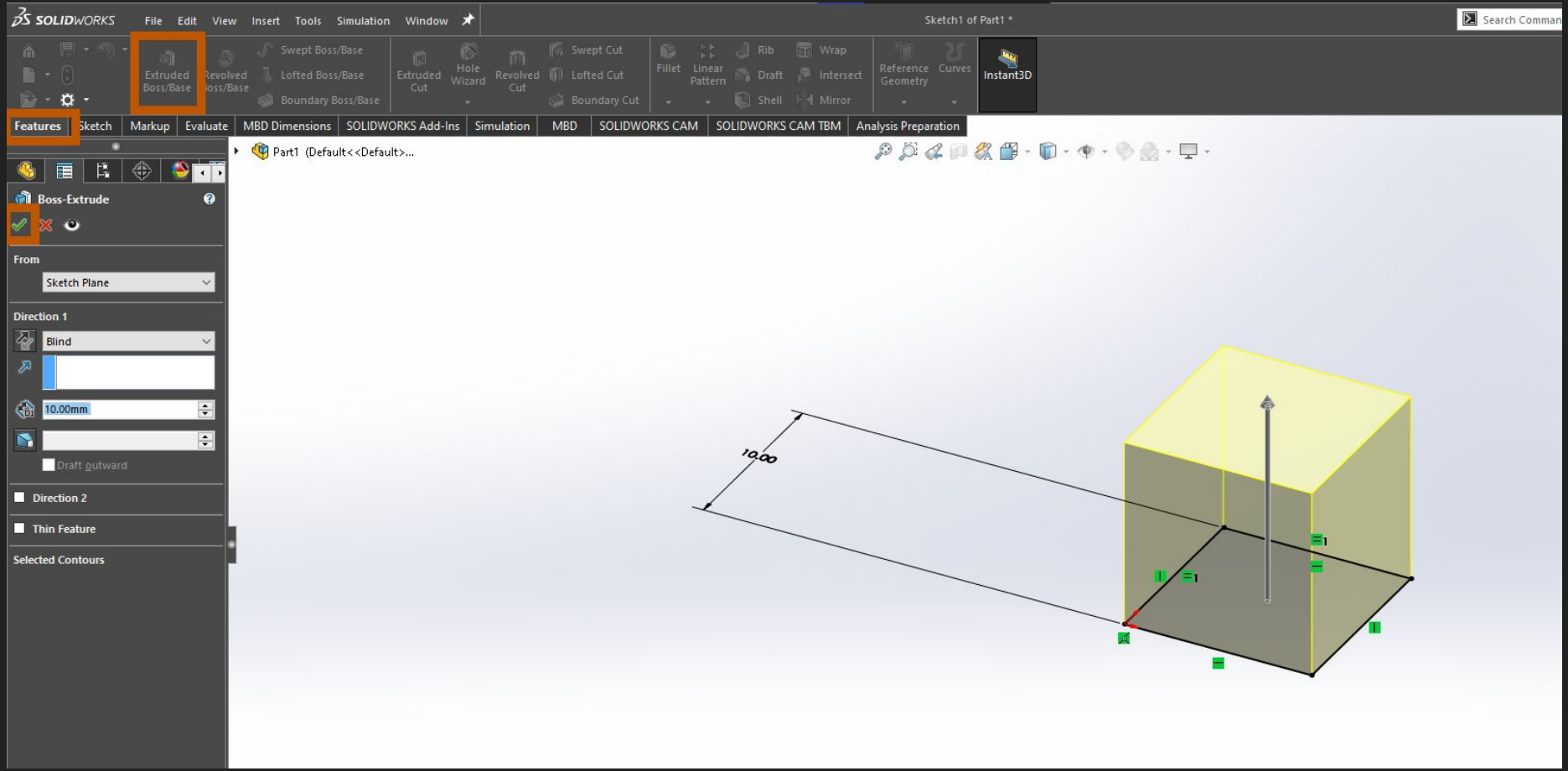
> with a hole in it

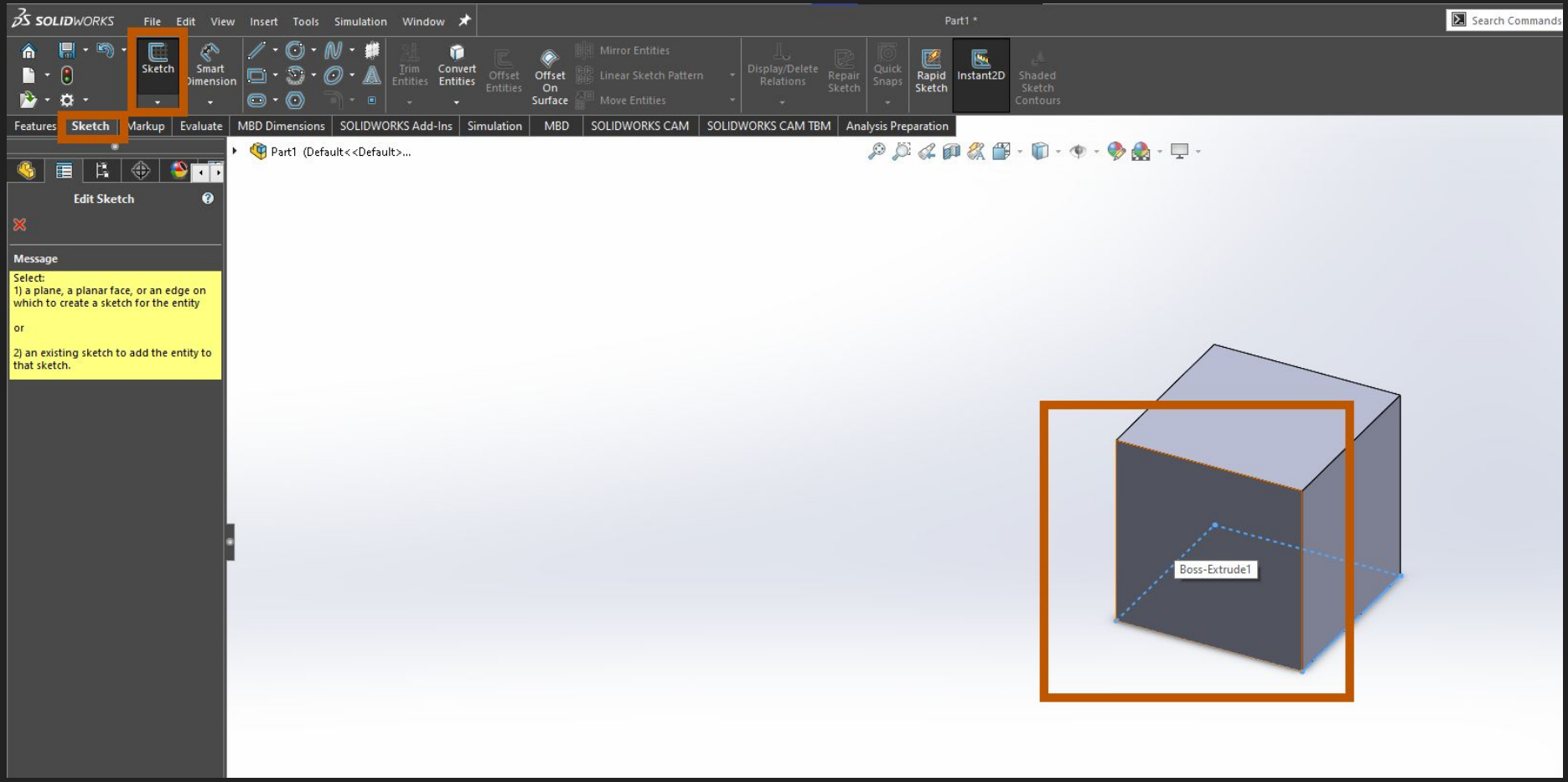
> with chamfers

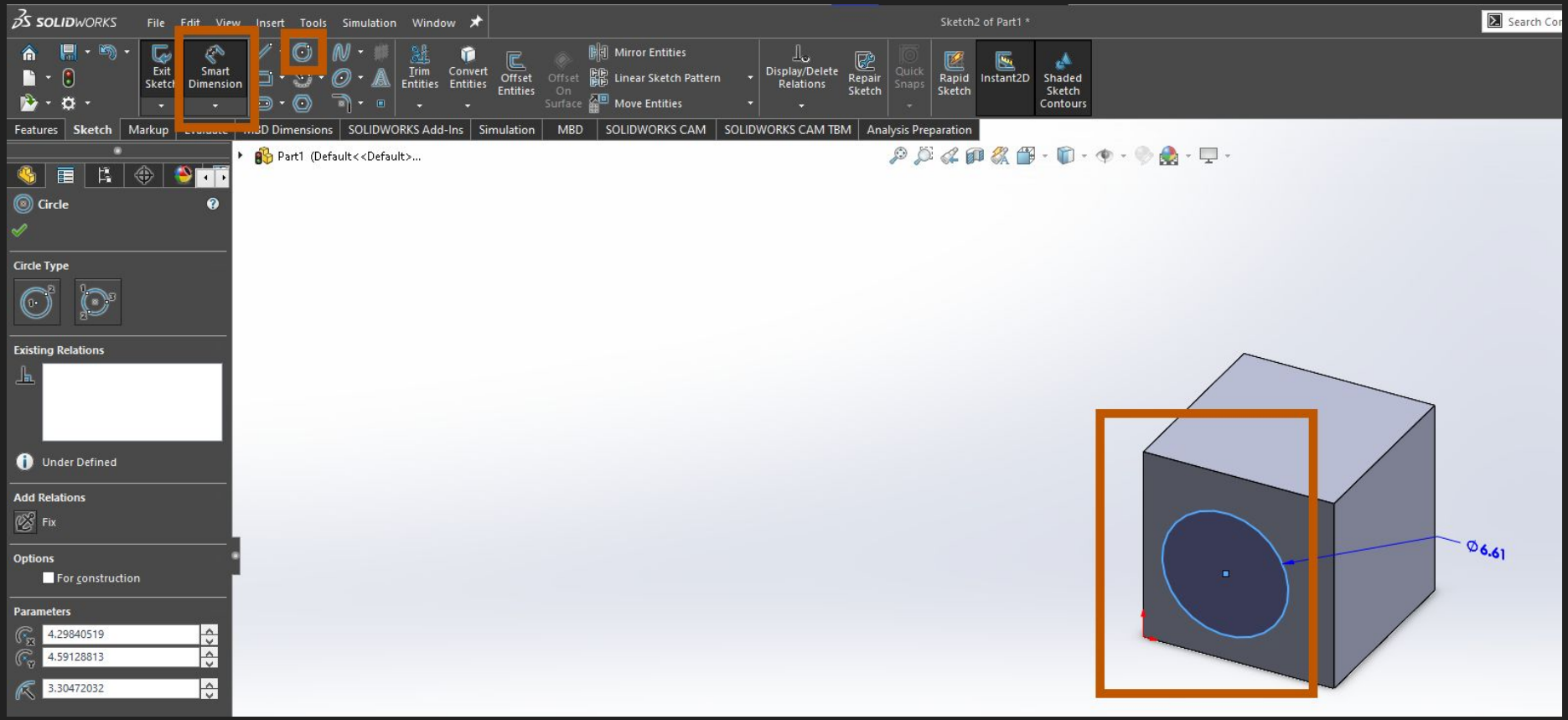

SOLIDWORKS
File Edit View Insert Tools Simulation Window
Part1
Search Commands
Sketch
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Quick Snaps
Rapid Sketch
Instant2D
Shaded Sketch Contours
Features Sketch Markup Evaluate MBD Dimensions SOLIDWORKS Add-Ins Simulation MBD SOLIDWORKS CAM SOLIDWORKS CAM TBM Analysis Preparation
Part1 (Default<<Default>...
Edit Sketch
Message
Select a plane on which to create a sketch for the entity.
Front Plane
Top Plane
Right Plane
*Trimetric
Model 3D Views Motion Study 1
SOLIDWORKS Student Edition - Academic Use Only
Editing Part
MMGS

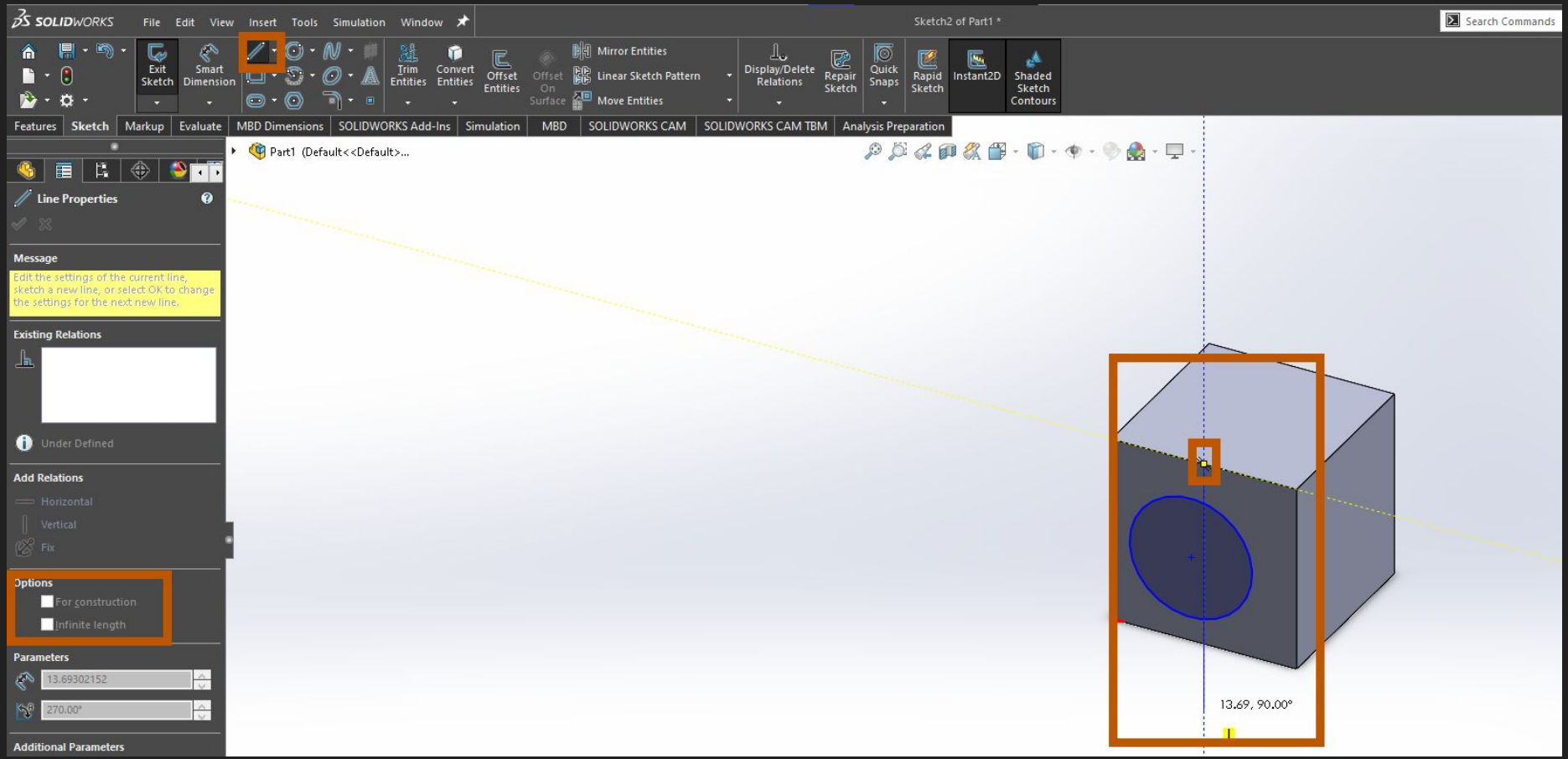

SOLIDWORKS
File Edit View Insert Tools Simulation Window
Sketch1 of Part1 *
Search Commands
Exit Sketch
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Quick Snaps
Rapid Sketch
Instant2D
Shaded Sketch Contours
Features Sketch Markup Evaluate MBD Dimensions SOLIDWORKS Add-Ins Simulation MBD SOLIDWORKS CAM SOLIDWORKS CAM TBM Analysis Preparation
Part1 (Default<<Default>...
Dimension
Value Leaders Other
Style
<NONE>
Tolerance/Precision
None
.12 (Document)
Primary Value
D1@Sketch1
72.71641826mm
Dimension Text
<DIM>
All uppercase
Dual Dimension
72.72
*Top
Model 3D Views Motion Study 1
Set the properties of the selected dimension(s).
-74.13mm 62.8mm 0mm Under Defined Editing Sketch1
MMGS

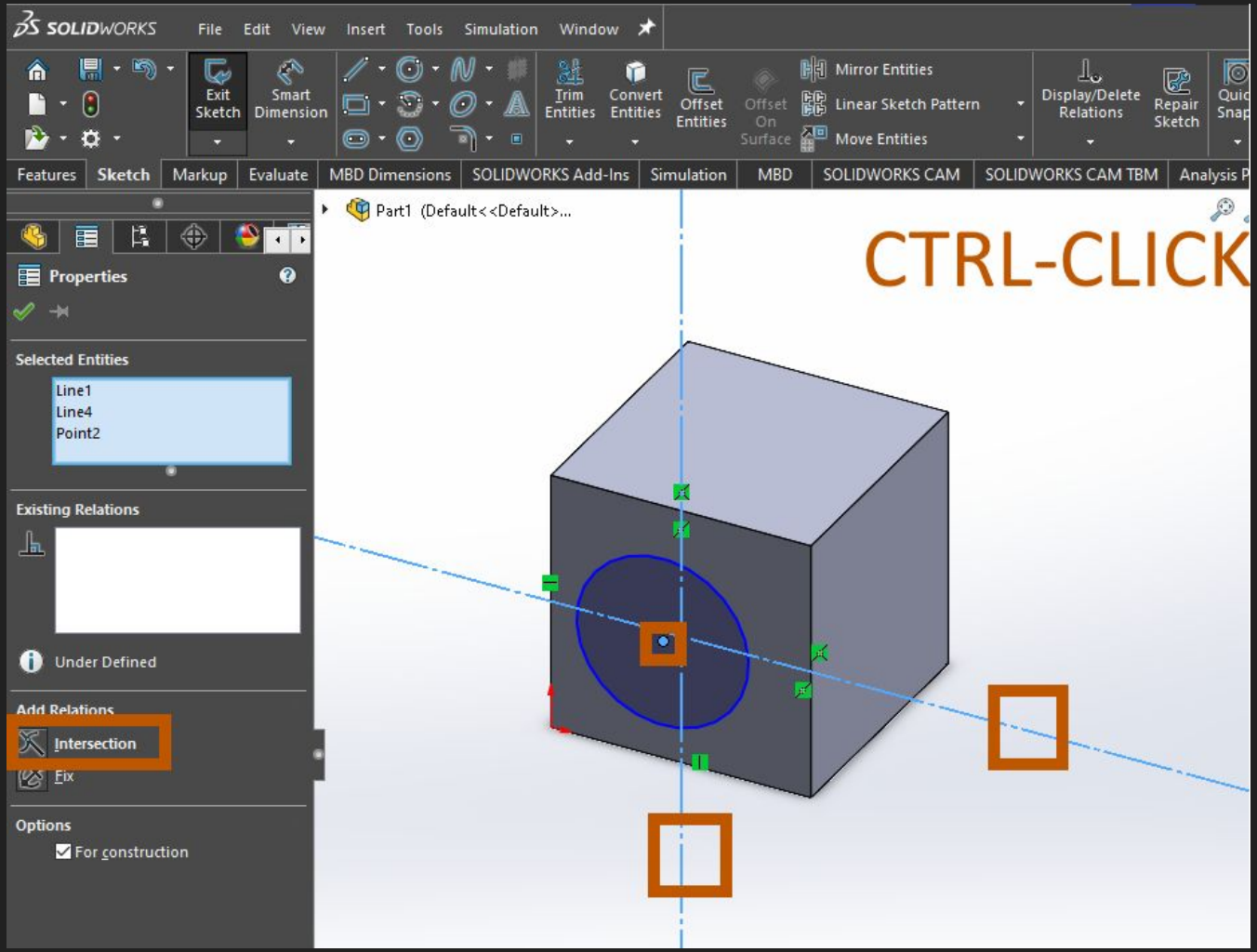

SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Sketch1 of Part1 *
Exit Sketch
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Quick Snaps
Rapid Sketch
Instant2D
Shaded Sketch Contours
Features
Sketch
Markup
Evaluate
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Analysis Preparation
Part1 (Default<<Default>...
Properties
Selected Entities
Line2
Line3
Existing Relations
Equal length1
Fully Defined
Add Relations
Horizontal
Vertical
Collinear
Perpendicular
Parallel
Equal
Fix
Options
For construction
10.00

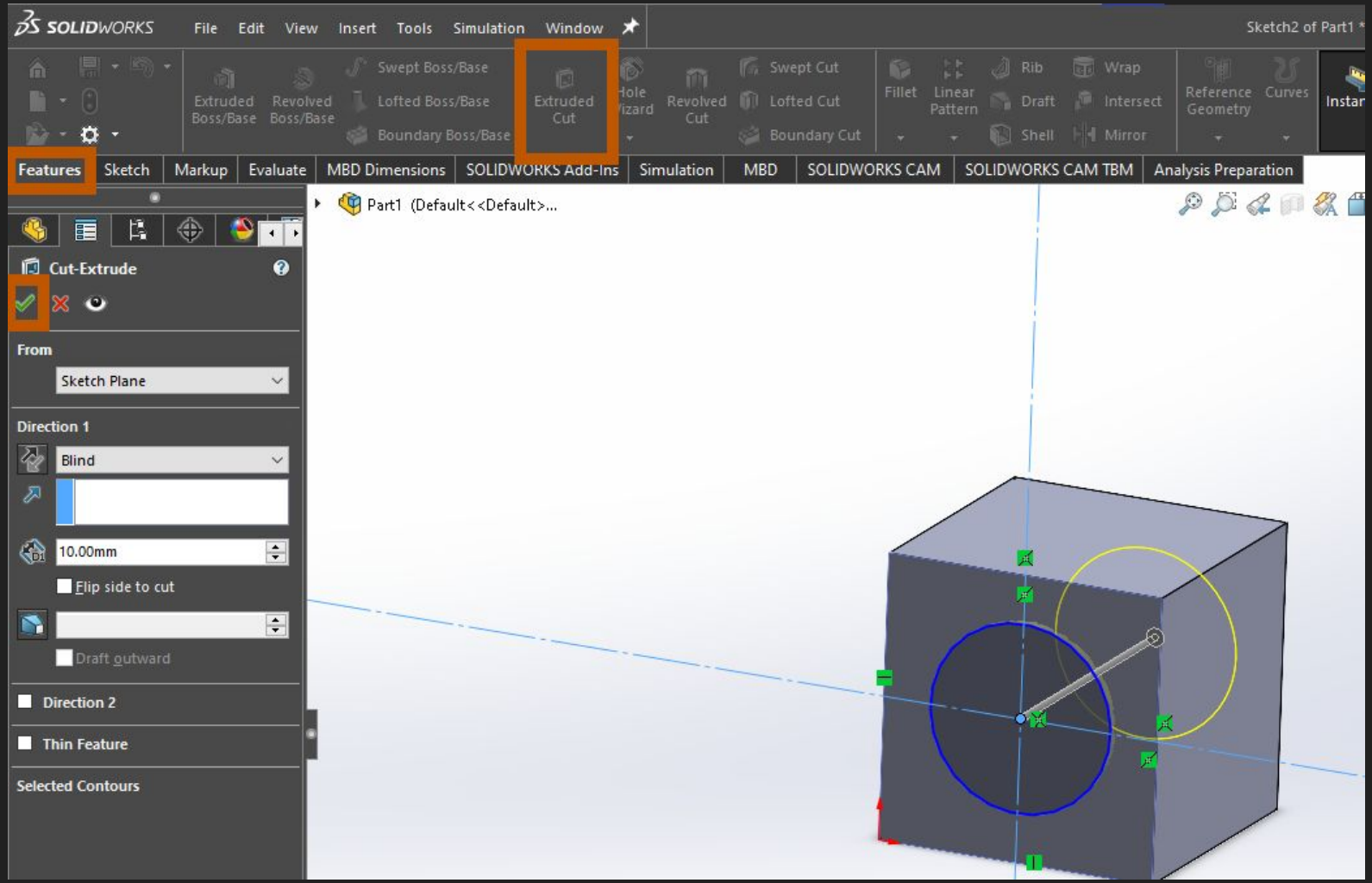

SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Sketch1 of Part1 *
Search Comman
Extruded Boss/Base
Revolved Boss/Base
Swept Boss/Base
Lofted Boss/Base
Boundary Boss/Base
Extruded Cut
Hole Wizard
Revolved Cut
Swept Cut
Lofted Cut
Boundary Cut
Fillet
Linear Pattern
Rib
Draft
Shell
Wrap
Intersect
Mirror
Reference Geometry
Curves
Instant3D
Features
Sketch
Markup
Evaluate
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Analysis Preparation
Part1 (Default<<Default>...
Boss-Extrude
From
Sketch Plane
Direction 1
Blind
10.00mm
Draft outward
Direction 2
Thin Feature
Selected Contours
10.00

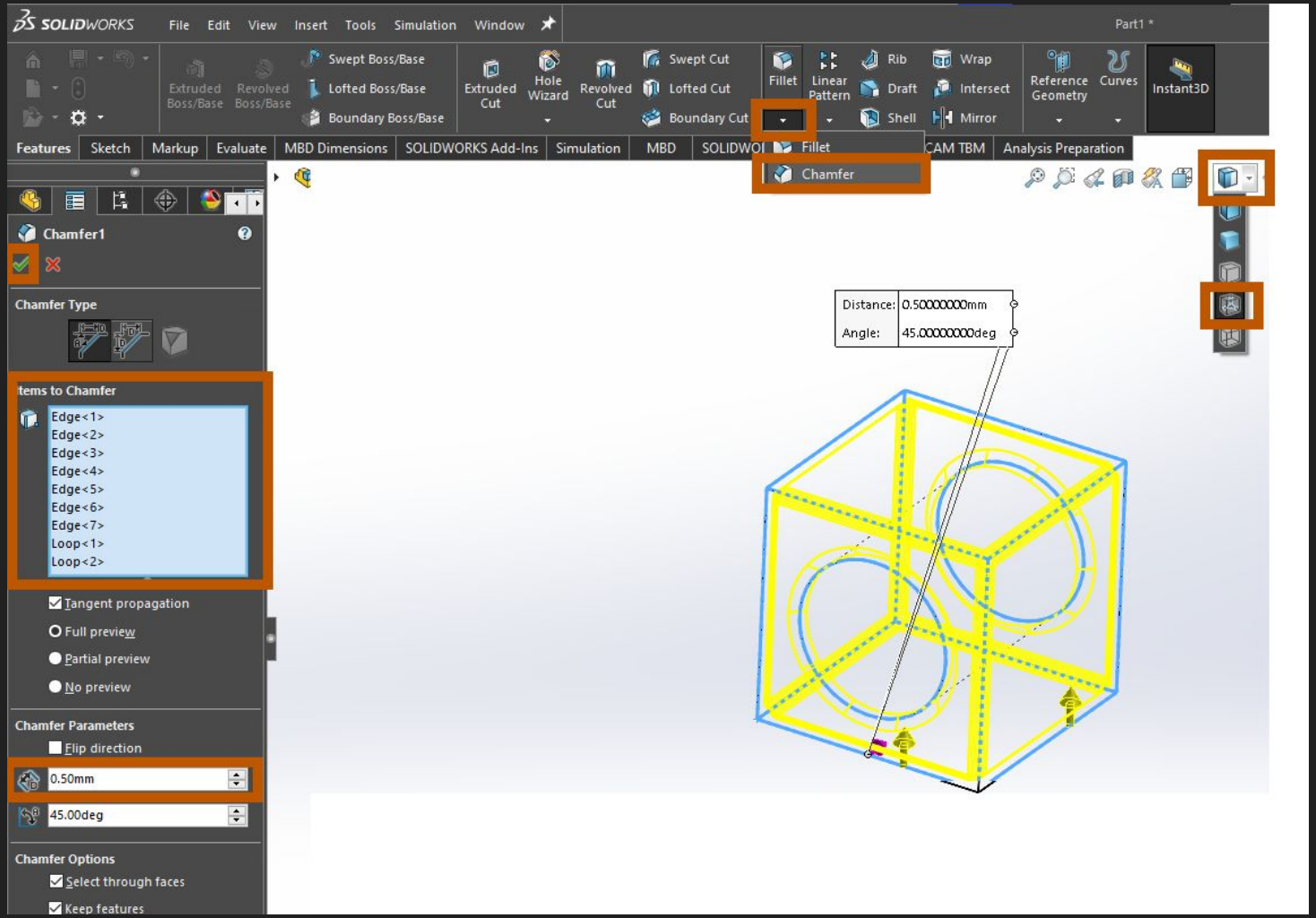

SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Part1 *
Search Commands
Sketch
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Quick Snaps
Rapid Sketch
Instant2D
Shaded Sketch Contours
Features
Sketch
Markup
Evaluate
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Analysis Preparation
Part1 (Default<<Default>...
Edit Sketch
Message
Select:
1) a plane, a planar face, or an edge on which to create a sketch for the entity
or
2) an existing sketch to add the entity to that sketch.
Boss-Extrude1

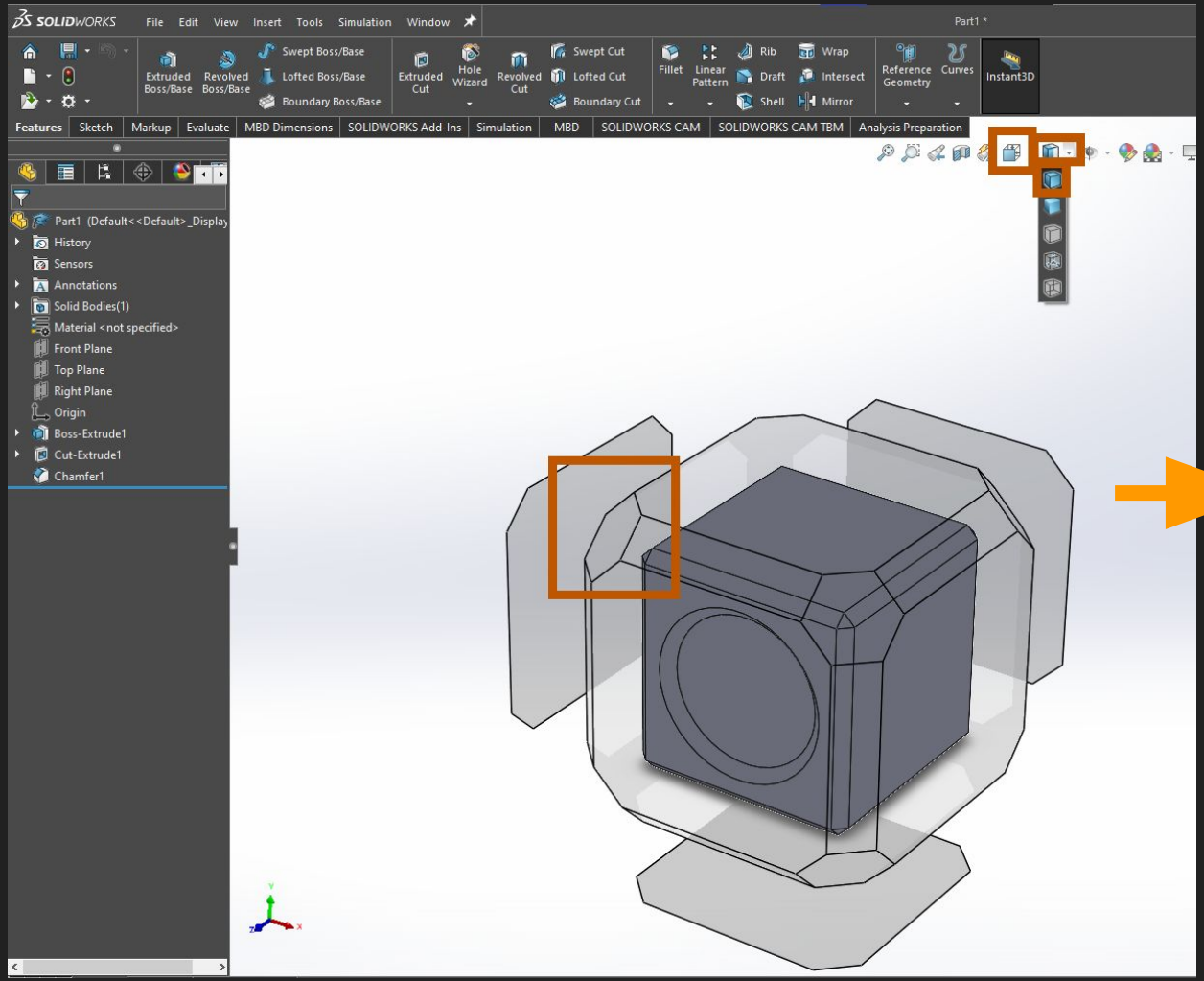

SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Sketch2 of Part1 *
Search Com
Exit Sketch
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Quick Snaps
Rapid Sketch
Instant2D
Shaded Sketch Contours
Features
Sketch
Markup
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Analysis Preparation
Part1 (Default<<Default>...
Circle
Circle Type
Existing Relations
Under Defined
Add Relations
Fix
Options
For construction
Parameters
4.29840519
4.59128813
3.30472032
Ø6.61

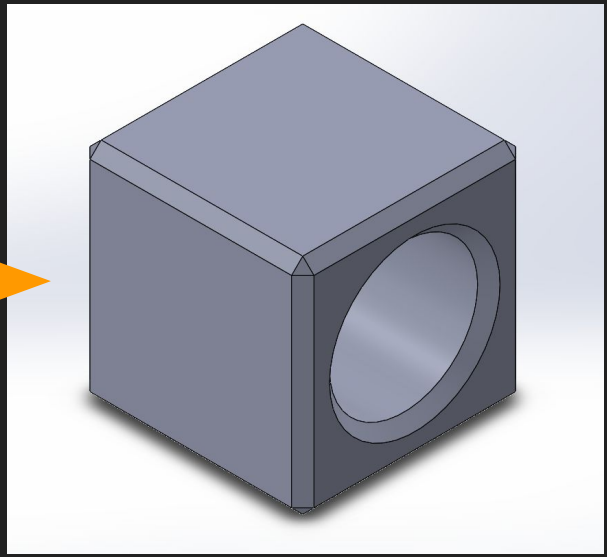

SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Sketch2 of Part1 *
Search Commands
Exit Sketch
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Quick Snaps
Rapid Sketch
Instant2D
Shaded Sketch Contours
Features
Sketch
Markup
Evaluate
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Analysis Preparation
Part1 (Default<<Default>...
Line Properties
Message
Edit the settings of the current line, sketch a new line, or select OK to change the settings for the next new line.
Existing Relations
Under Defined
Add Relations
Horizontal
Vertical
Fix
Options
For construction
Infinite length
Parameters
13.69302152
270.00°
Additional Parameters
13.69, 90.00°


SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Exit Sketch
Smart Dimension
Trim Entities
Convert Entities
Offset Entities
Offset On Surface
Mirror Entities
Linear Sketch Pattern
Move Entities
Display/Delete Relations
Repair Sketch
Features
Sketch
Markup
Evaluate
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Part1 (Default<<Default>...
CTRL-CLICK
Properties
Selected Entities
Line1
Line4
Point2
Existing Relations
Under Defined
Add Relations
Intersection
Fix
Options
For construction


SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Sketch2 of Part1 *
Extruded Boss/Base
Revolved Boss/Base
Swept Boss/Base
Lofted Boss/Base
Boundary Boss/Base
Extruded Cut
Revolved Cut
Swept Cut
Lofted Cut
Boundary Cut
Fillet
Linear Pattern
Rib
Draft
Shell
Wrap
Intersect
Mirror
Reference Geometry
Curves
Features
Sketch
Markup
Evaluate
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
SOLIDWORKS CAM
SOLIDWORKS CAM TBM
Analysis Preparation
Part1 (Default<<Default>...
Cut-Extrude
From
Sketch Plane
Direction 1
Blind
10.00mm
Flip side to cut
Draft outward
Direction 2
Thin Feature
Selected Contours


SOLIDWORKS
File
Edit
View
Insert
Tools
Simulation
Window
Part1 *
Swept Boss/Base
Lofted Boss/Base
Boundary Boss/Base
Extruded Boss/Base
Revolved Boss/Base
Extruded Cut
Hole Wizard
Revolved Cut
Swept Cut
Lofted Cut
Boundary Cut
Fillet
Linear Pattern
Rib
Draft
Shell
Wrap
Intersect
Mirror
Reference Geometry
Curves
Instant3D
Features
Sketch
Markup
Evaluate
MBD Dimensions
SOLIDWORKS Add-Ins
Simulation
MBD
Fillet
Chamfer
Analysis Preparation
Chamfer1
Chamfer Type
Items to Chamfer
Edge<1>
Edge<2>
Edge<3>
Edge<4>
Edge<5>
Edge<6>
Edge<7>
Loop<1>
Loop<2>
Tangent propagation
Full preview
Partial preview
No preview
Chamfer Parameters
Flip direction
0.50mm
45.00deg
Chamfer Options
Select through faces
Keep features
Distance: 0.50000000mm
Angle: 45.00000000deg


SOLIDWORKS
File Edit View Insert Tools Simulation Window
Part1 *
Extruded Boss/Base
Revolved Boss/Base
Swept Boss/Base
Lofted Boss/Base
Boundary Boss/Base
Extruded Cut
Hole Wizard
Revolved Cut
Swept Cut
Lofted Cut
Boundary Cut
Fillet
Linear Pattern
Rib
Draft
Shell
Wrap
Intersect
Mirror
Reference Geometry
Curves
Instant3D
Features Sketch Markup Evaluate MBD Dimensions SOLIDWORKS Add-Ins Simulation MBD SOLIDWORKS CAM SOLIDWORKS CAM TBM Analysis Preparation
Part1 (Default<<Default>_Display
History
Sensors
Annotations
Solid Bodies(1)
Material <not specified>
Front Plane
Top Plane
Right Plane
Origin
Boss-Extrude1
Cut-Extrude1
Chamfer1



DEMO: Motor Mount

Now, something similar but practical

Clicks highlighted in orange

Making:

> Mount shape

> Hole to fit motor dimensions

> Mounting and fixtures

What Motor?

https://www.pololu.com/category/60/micro-metal-gearmotors

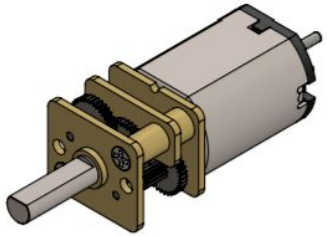
> https://www.pololu.com/product/3037/resources

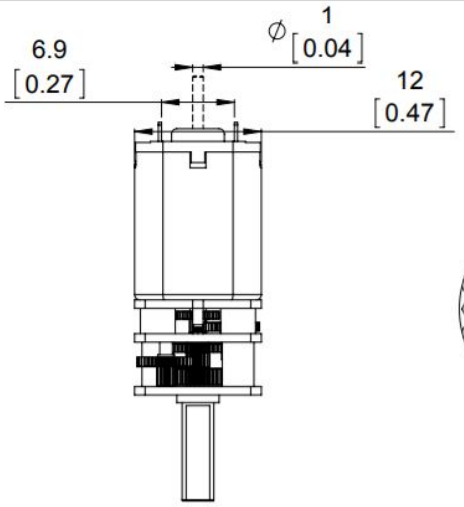
Pololu is great, you can get STEP models and everything from them

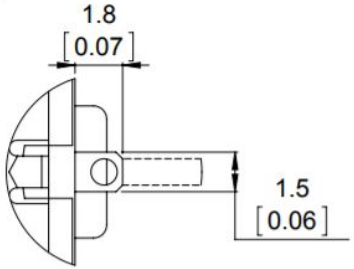
BUT

Usually life’s not that easy, so we’ll do this from the sheet

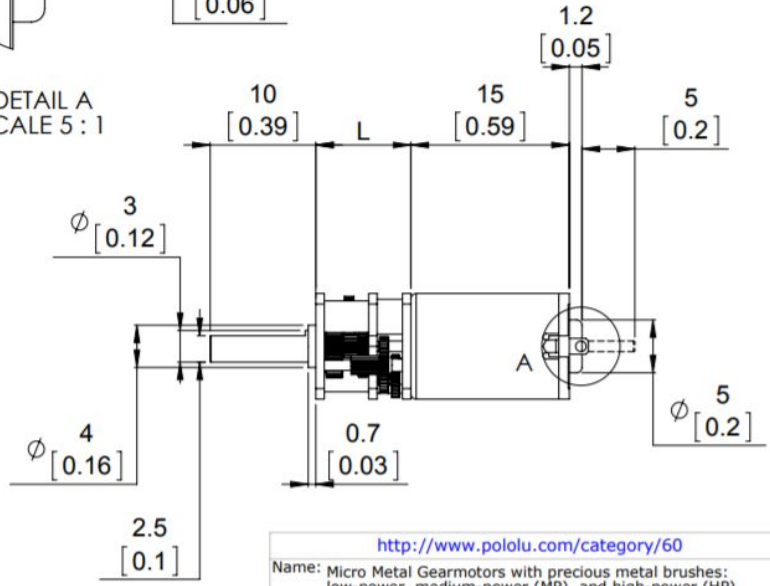
Gear ratio	L
1000:1	12.5 mm [0.49 in]
All others	9 mm [0.35 in]

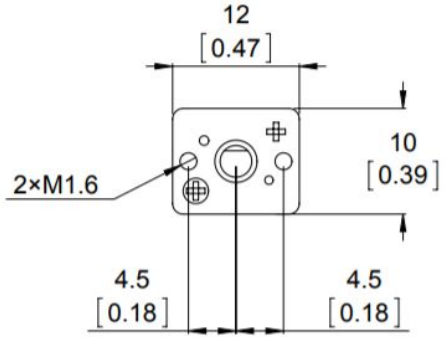






DETAIL A
SCALE 5 : 1





1. To get the specified scale, select 100% in print settings.
2. These dimensions apply to all micro metal gearmotors that are not labeled "HPCB" (i.e. all ones with precious metal brushes)

http://www.pololu.com/category/60

Name: Micro Metal Gearmotors with precious metal brushes: low-power, medium-power (MP), and high-power (HP)

Drawing date: 6 August 2015

Pololu