

Machining Workshop

Week 1



The Ten Commandments of Machining

1. Thou shalt not commit stupid acts, and shalt ask if unsure.
2. Thou shalt listen to thy mentors.
3. Thou shalt remember all the safety features of the shop.
4. Thou shalt not distract others.
5. Thou shalt remember to clean up after thyself.
6. Thou shalt wear proper attire.
7. Thou shalt always double-check thy work.
8. Thou shalt correctly distinguish tools.
9. Thou shalt operate machines at a safe speed.
10. Thou shalt read machinist drawings properly.

1. Thou shalt not commit stupid acts, and shalt ask if unsure.

Common sense!

2. Thou shalt listen to thy mentors.



Mr. David Giandomenico
Joined 2004

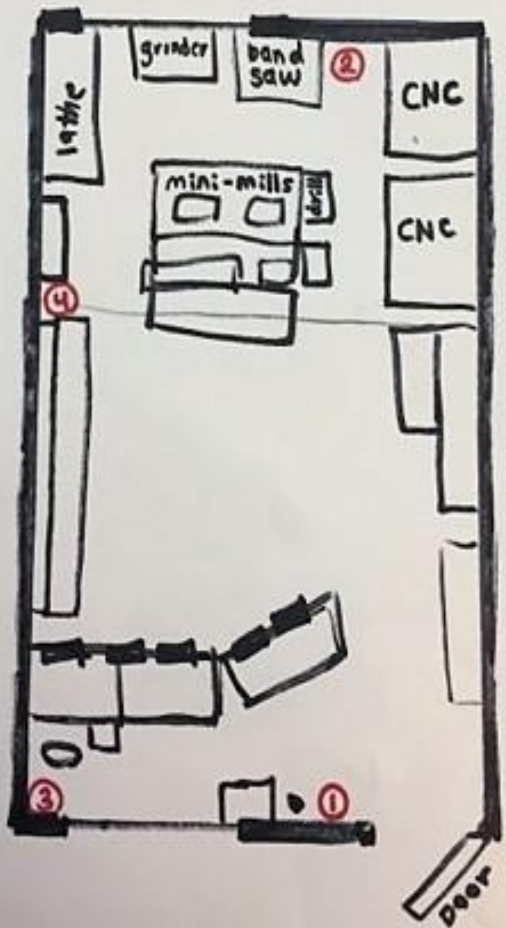


Mr. Ralph Lowd
Joined 2010



Mr. Payton Wong (Payton)
Joined 2004

3. Thou shalt remember all the safety features of the shop.



Fire Extinguisher - 1

Fire Alarm - 1

First Aid Kit - 1

Safety Goggles - 1

Air conditioning - 2

Tool shelf - 4

E-stop - on all machines

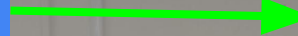
4. Thou shalt not distract others.

5. Thou shalt remember to clean up after thyself.



6. Thou shalt wear proper attire.

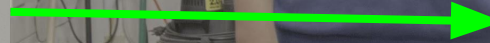
Safety glasses



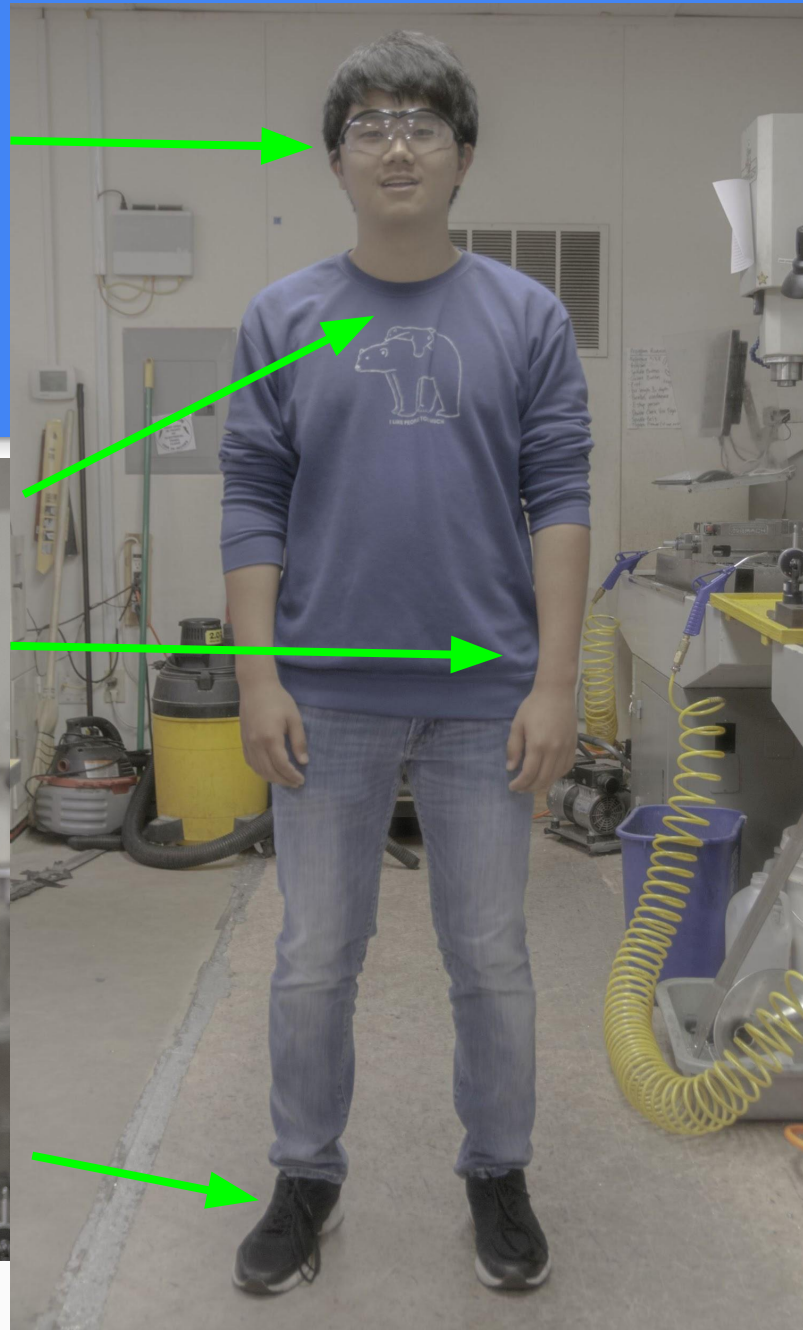
No drawstrings



Rolled-up sleeves



Closed-toed shoes



7. Thou shalt always double-check thy work.

It's not a wrench, a hammer, or something that you stab Caesar with



This tool can be your best friend or your worst enemy, so use it properly!

8. Thou shalt correctly distinguish tools.

Drill v.s. Endmill



Chuck vs. Collar



9. Thou shalt operate machines at a safe speed.

Recommended Speeds and Feeds for Drilling

Drilling Speeds (High-Speed Steel Drills)

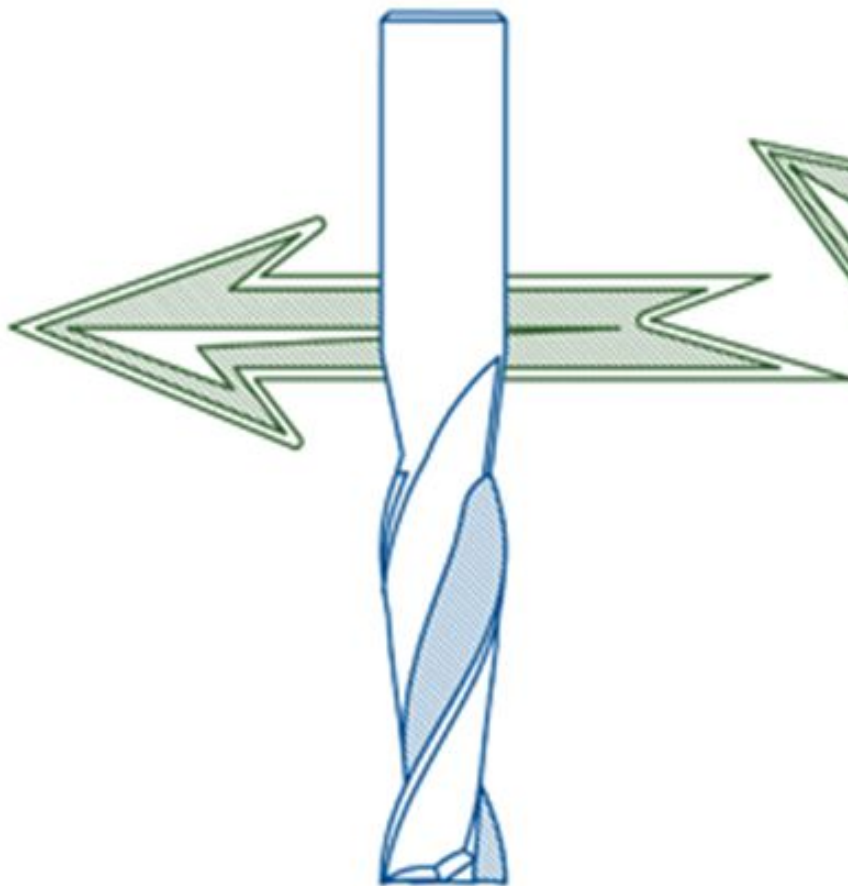
Material	Average Drill Speed (sfm)
Magnesium	300
Aluminum	250
Brass/Bronze	200
Copper	70
Cast Iron (soft)	120
Cast Iron (hard)	80
Mild Steel	110
Cast Steel	50
Alloy Steels (hard)	60
Tool Steel	60
Stainless Steel	30
Titanium	30
High manganese steel	15

**Note: for carbide drills, double the average speeds*

**# OF
FLUTES**



FEED RATE



RPM's



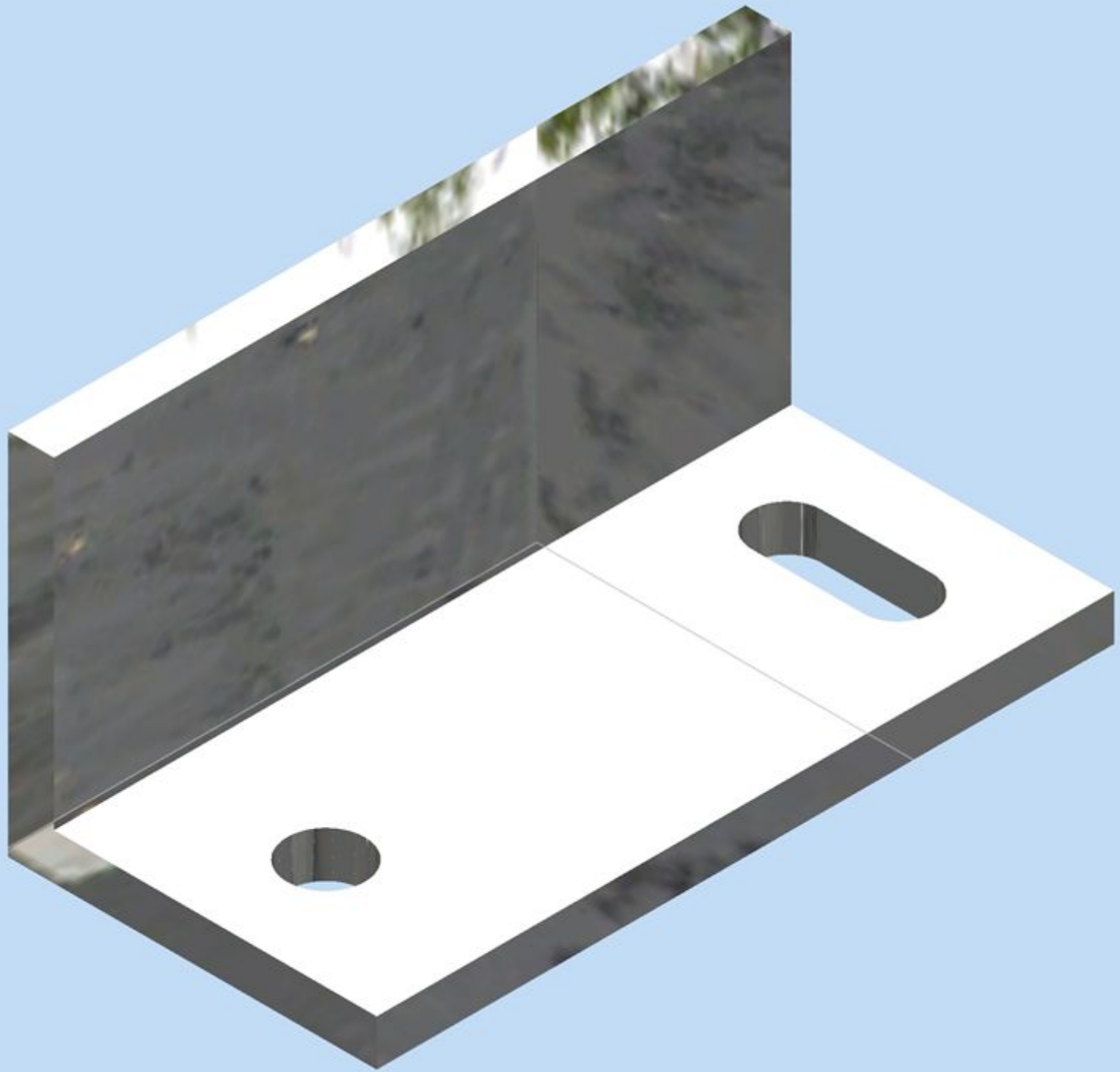


Milling Feeds

Tool Feed (inch/tooth)

Material	Face Mills	Side Mills	End Mills
Magnesium	0.005-0.020	0.004-0.010	0.005-0.010
Aluminum	0.005-0.020	0.004-0.010	0.005-0.010
Brass/Bronze	0.004-0.020	0.004-0.010	0.005-0.010
Copper	0.004-0.010	0.004-0.007	0.004-0.008
Cast Iron (soft)	0.004-0.016	0.004-0.009	0.004-0.008
Cast Iron (hard)	0.004-0.010	0.002-0.006	0.002-0.006
Mild Steel	0.004-0.010	0.002-0.007	0.002-0.010
Alloy Steels (hard)	0.004-0.010	0.002-0.007	0.002-0.006
Tool Steel	0.004-0.008	0.002-0.006	0.002-0.006
Stainless Steel	0.004-0.008	0.002-0.006	0.002-0.006
Titanium	0.004-0.008	0.002-0.006	0.002-0.006
High manganese steel	0.004-0.008	0.002-0.006	0.002-0.006

10. Thou shalt read machinist drawings properly.



4

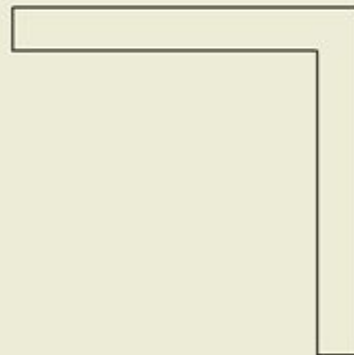
3

2

1

D

D

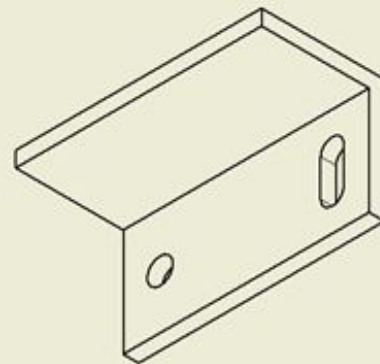


C

C

B

B



B

B

NOT READY to MACHINE

Delete this text after creating final pdf

Material: 6063 Aluminum 1"x1" angle

A

A

X.XX: ±.010
 X.XXX: ±.005
 X.XXXX: ±.001
 For #10 Screws: .201

Lynbrook Robotics:		FILENAME	
FIRST 846		LwithHoleSlot.idw	
DRAWN	DATE	SUBSYSTEM	REV
David Giandomenico	9/23/2017	Training17	
DESIGNED BY:	QTY	MADE BY:	DATE COMPLETED
	1		

SHEET 2 OF 2

4

3

2

1

4

3

2

1

D

D

C

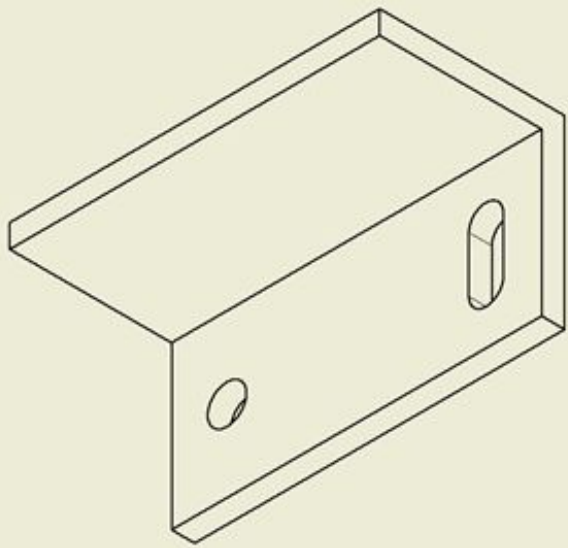
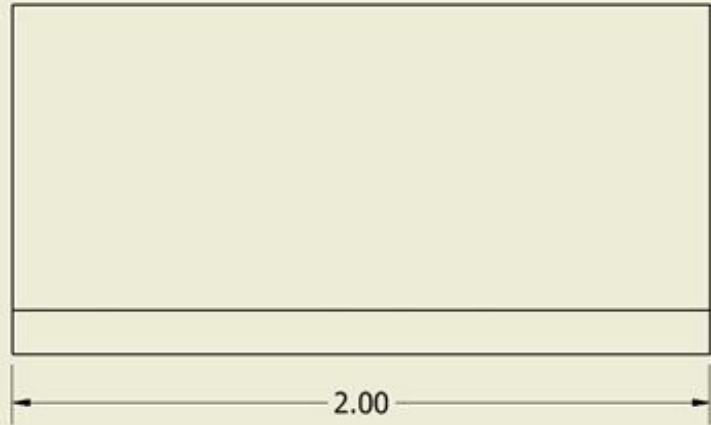
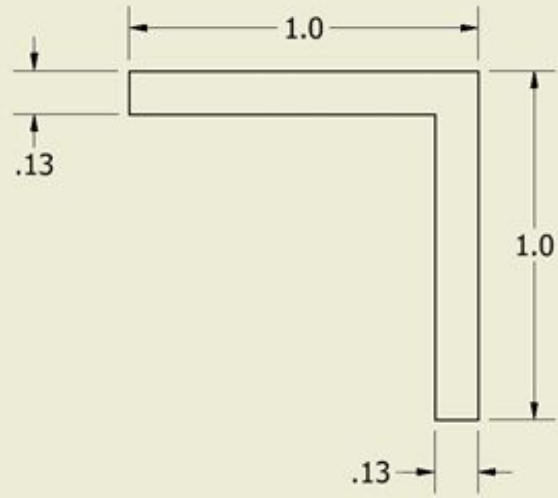
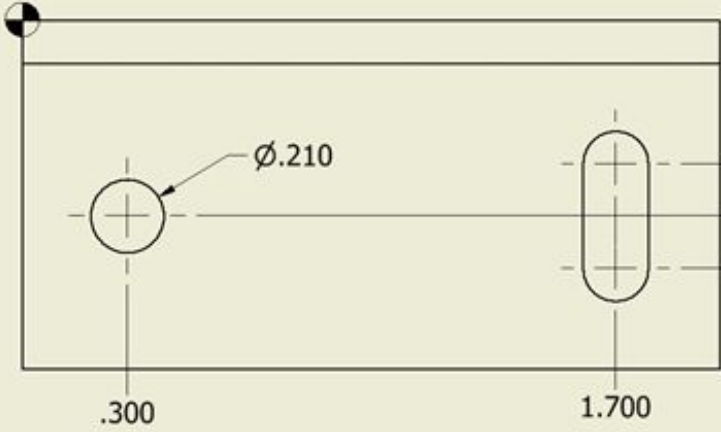
C

B

B

A

A



Material: 6063 Aluminum 1"x1" angle

X.XX: $\pm .010$
 X.XXX: $\pm .005$
 X.XXXX: $\pm .001$
 For #10 Screws: $.201$

Lynbrook Robotics: FIRST 846		FILENAME LwithHoleSlot.idw	
DRAWN David Giandomenico	9/23/2017	SUBSYSTEM Training17	REV
DESIGNED BY: David Giandomenico		QTY 1	MADE BY: DATE COMPLETED
		SHEET 1 OF 2	

<https://tinyurl.com/machining2019>

CAM Workshop

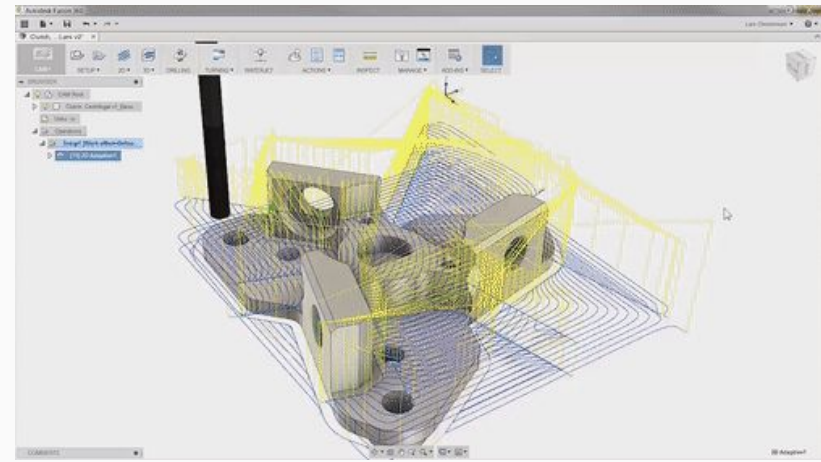


G-Code

G0 X0 Y0 Z0 - Move (feedrate is predetermined, and it is fast!) will use tool heights

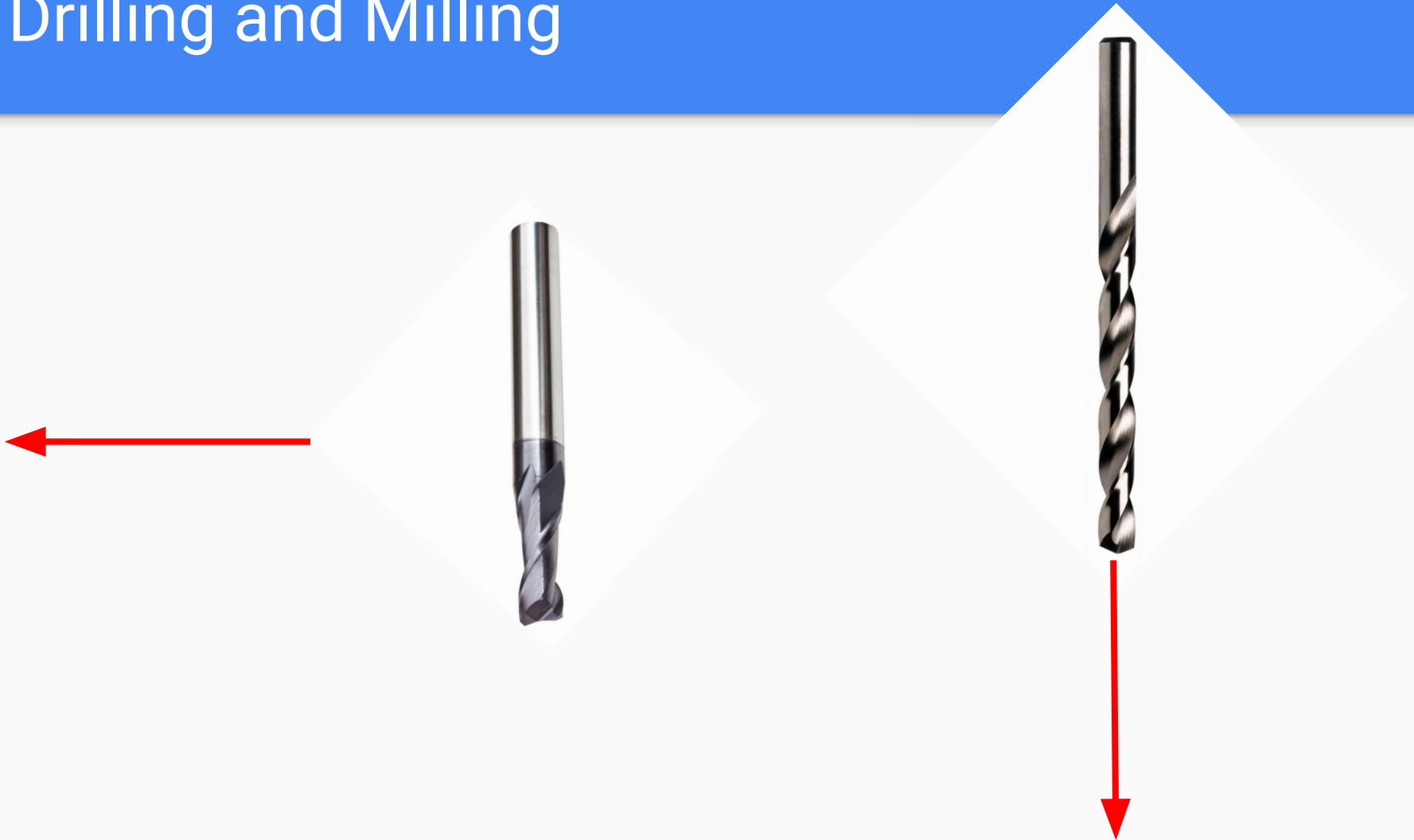
G1 X0 Y0 Z0 F___ - Move but you set feedrate

<https://en.wikipedia.org/wiki/G-code>



CAM - Computer Aided Manufacturing

Drilling and Milling



Feeds and Speeds

Depends on material, amt you are cutting away, and diameter of your tool and also what kind of tool it is

Be smart, use rule of thumb but make sure you check with someone

Lots of online charts

Useful numbers for aluminum:

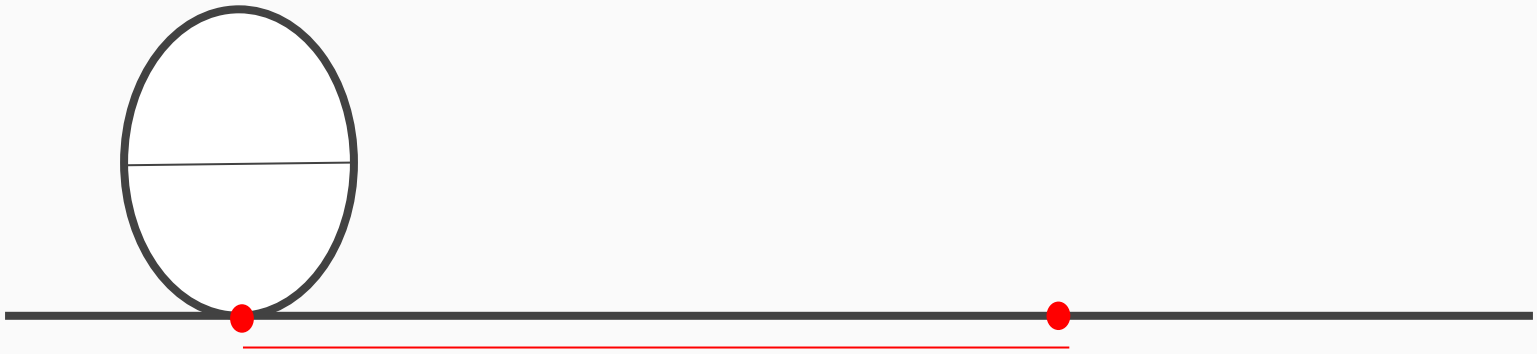
Chip load (feed per tooth) = 0.002 ~ 0.006

Vertical load should be in that range but lower than chip load

Surface Speed in Surface Feet Per Minute (sfm)

What happens when you try whittle on a piece of wood and your cut angle is too deep?

What happens when it is too shallow?



Surface Feet per Minute (SFM)

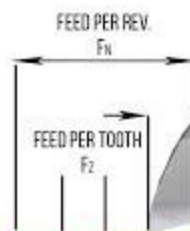
$$SFM = \frac{RPM \cdot C}{12}$$

RPM = Revolutions per Minute

C = Circumference



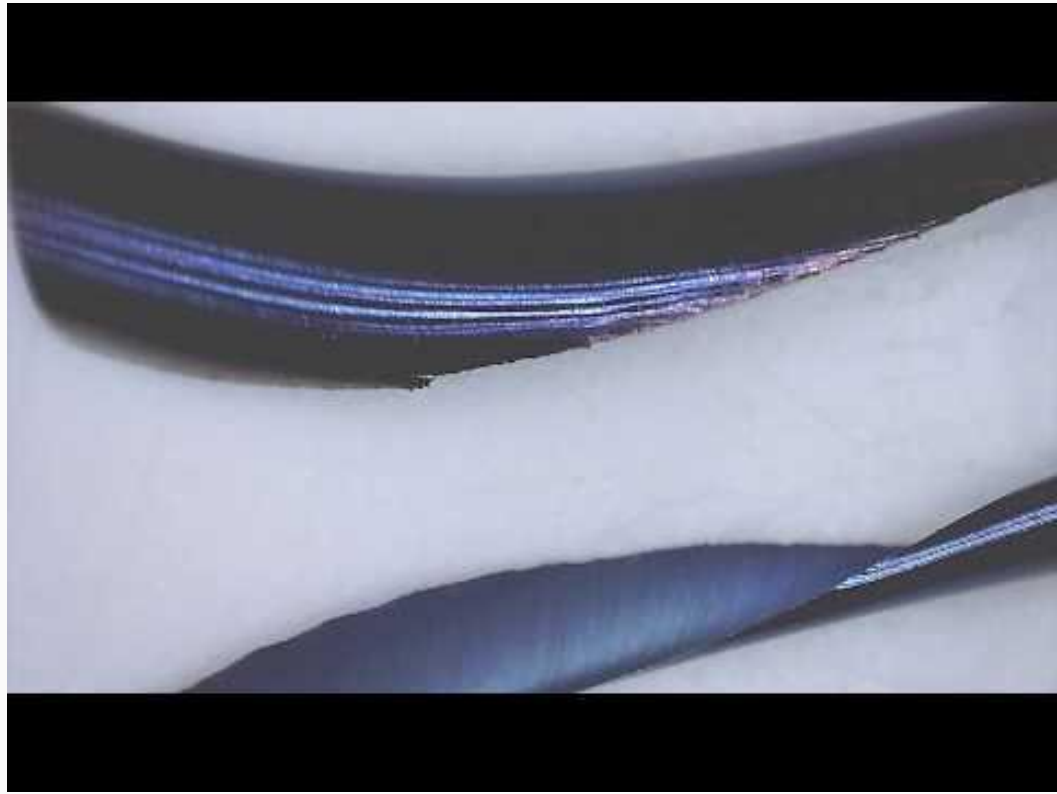
**TIP
OF THE
DAY**



INCH

**MILL SPEEDS
AND FEEDS**





Amount of Flutes

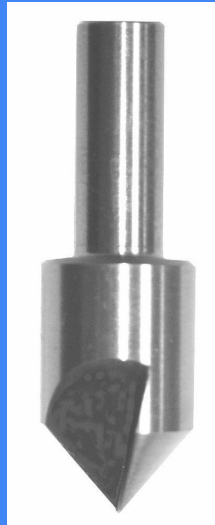
Finisher



Rougher



6 flute vs 1 flute Countersink Drill Press Rattling story

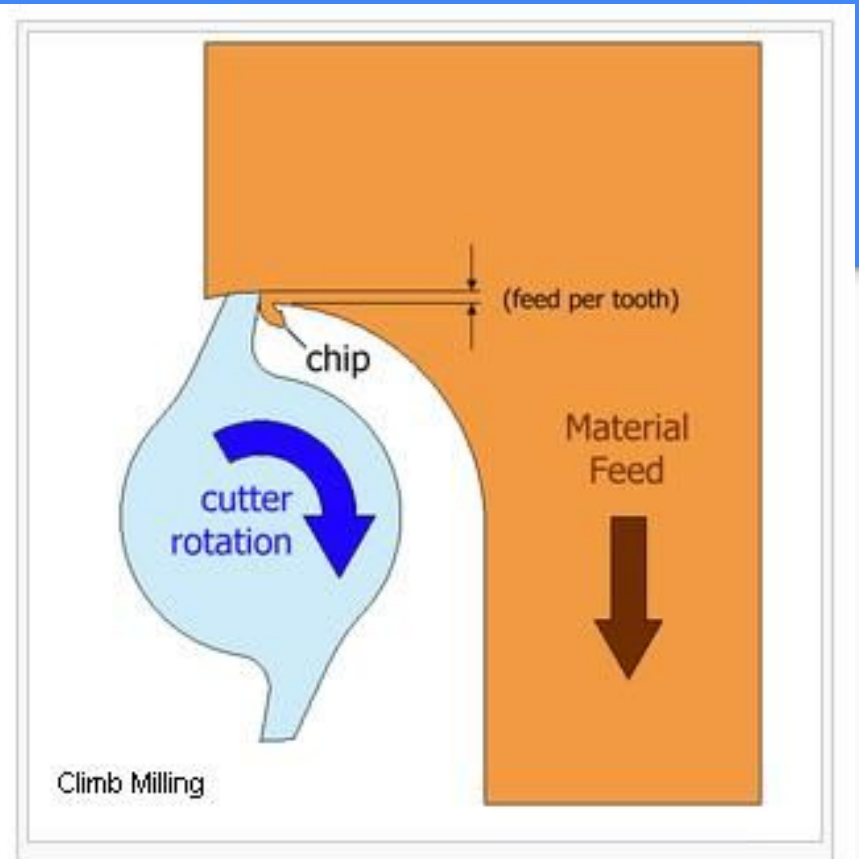
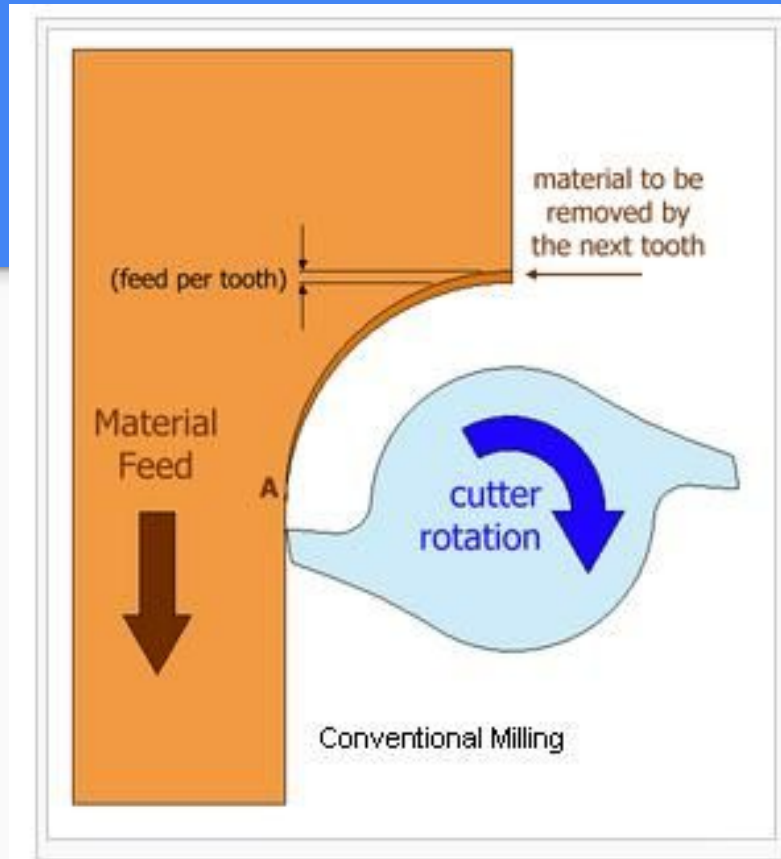


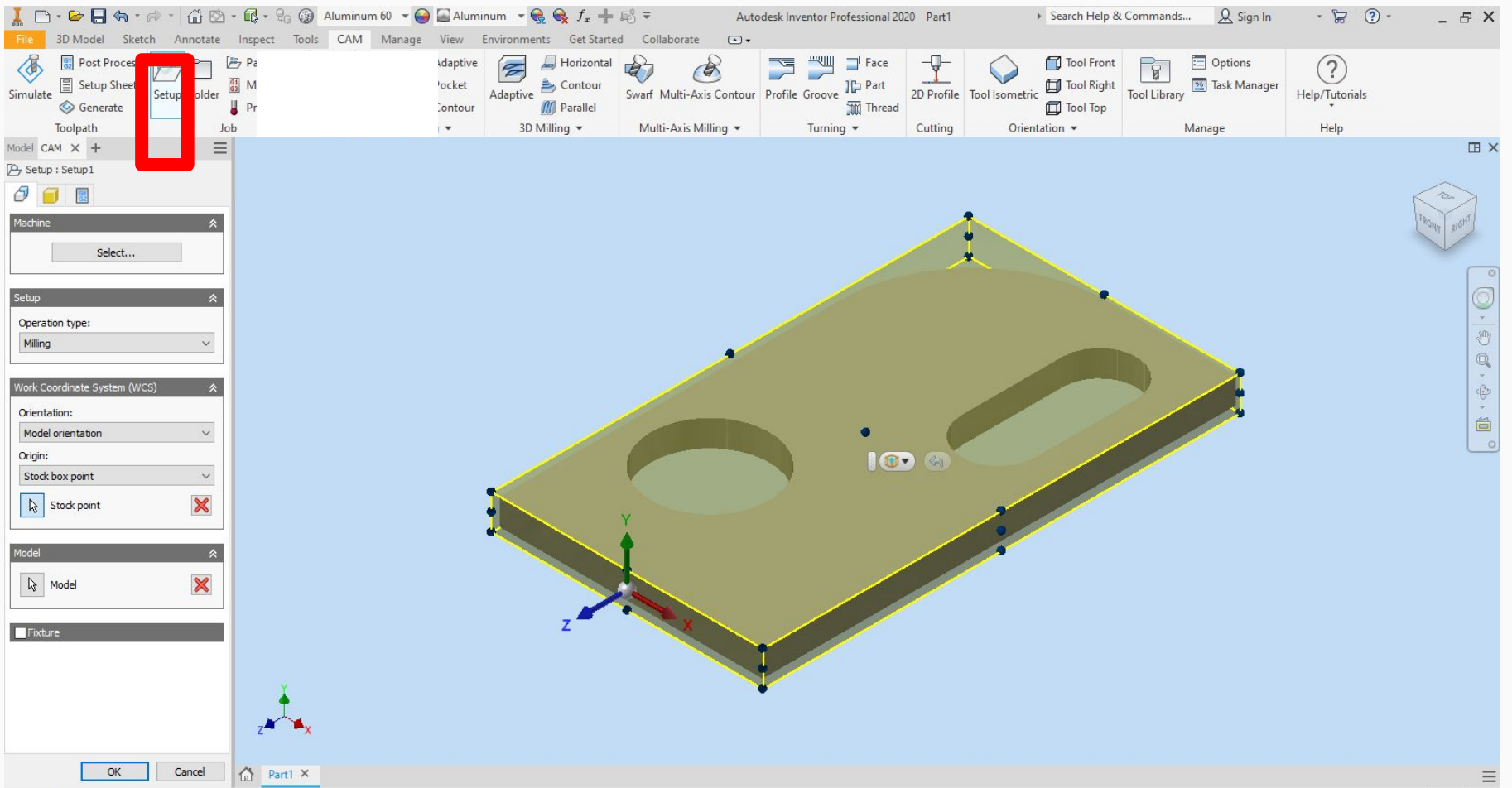
Rigidity of Setup

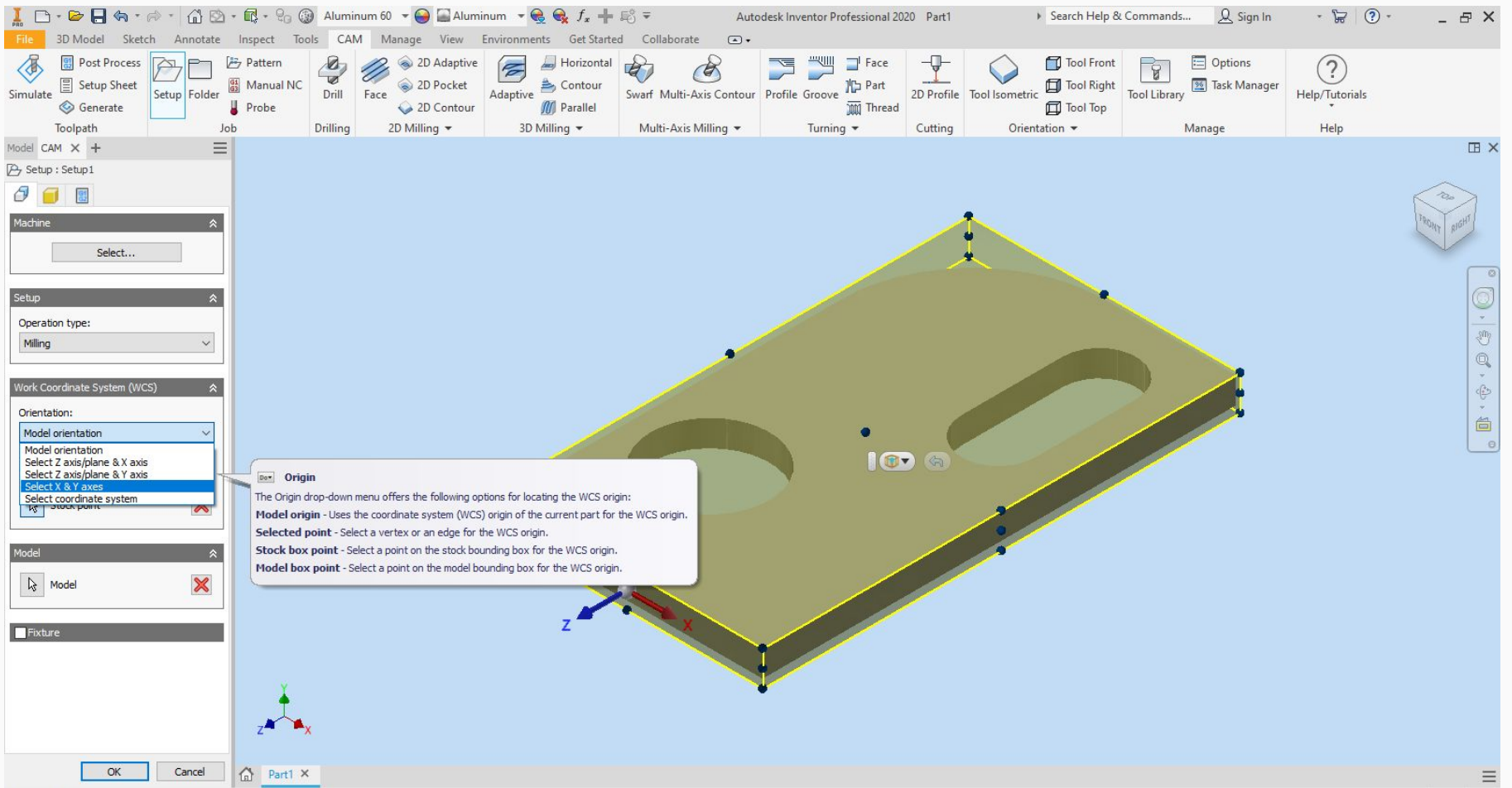
Always choke up on your tools!

Take the stubbiest tools in the shop

Climb vs. Conventional Milling



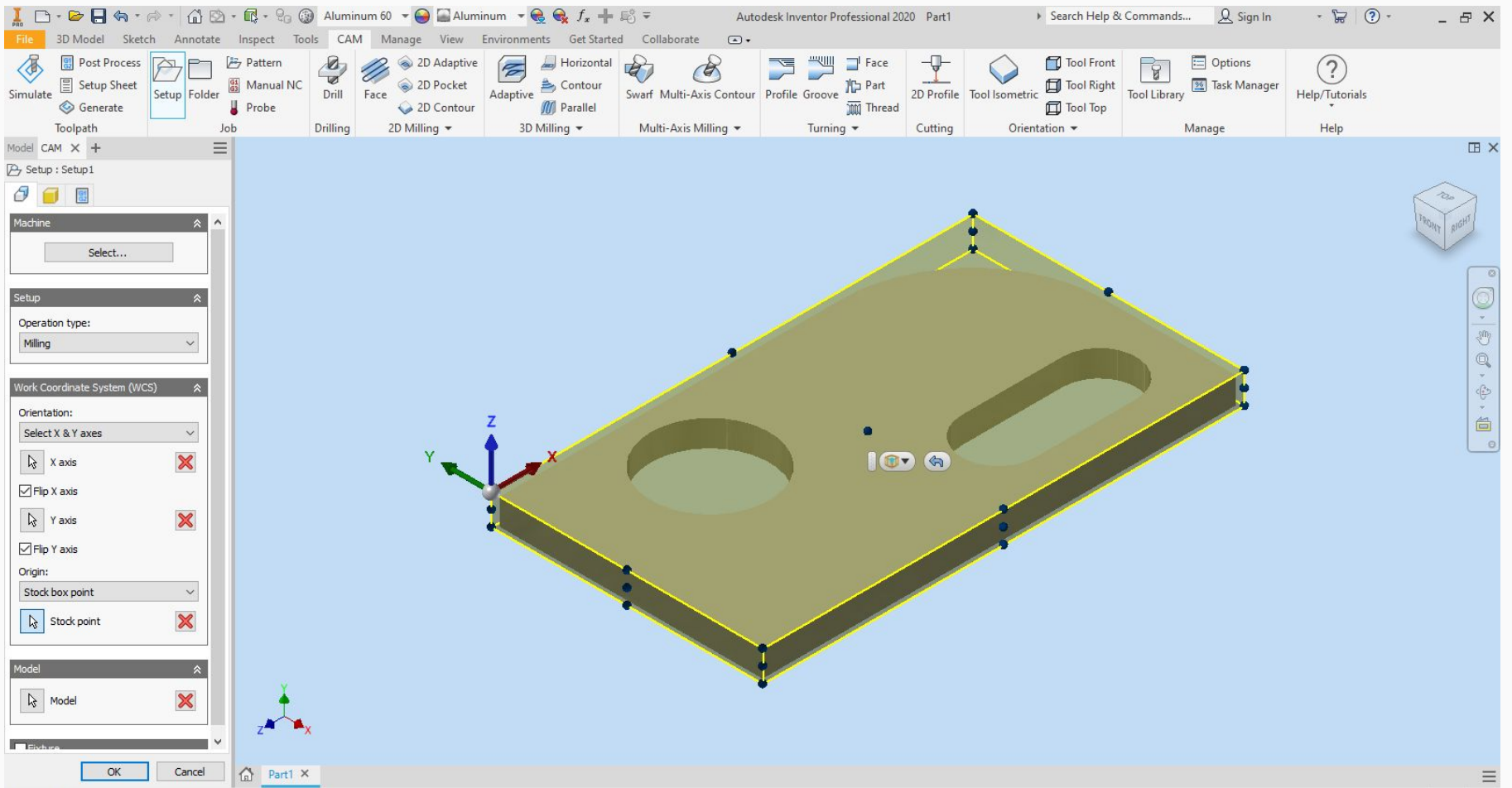




Origin

The Origin drop-down menu offers the following options for locating the WCS origin:

- Model origin** - Uses the coordinate system (WCS) origin of the current part for the WCS origin.
- Selected point** - Select a vertex or an edge for the WCS origin.
- Stock box point** - Select a point on the stock bounding box for the WCS origin.
- Model box point** - Select a point on the model bounding box for the WCS origin.



Model CAM X +

Setup : Setup1

Stock

Mode:
Relative size box

Stock offset mode:
Add stock to sides and top-bottom
No additional stock
Add stock to sides and top-bottom
Add stock to all sides

Top offset: 0.04 in

Bottom offset: 0 in

Round up to nearest: 0 in

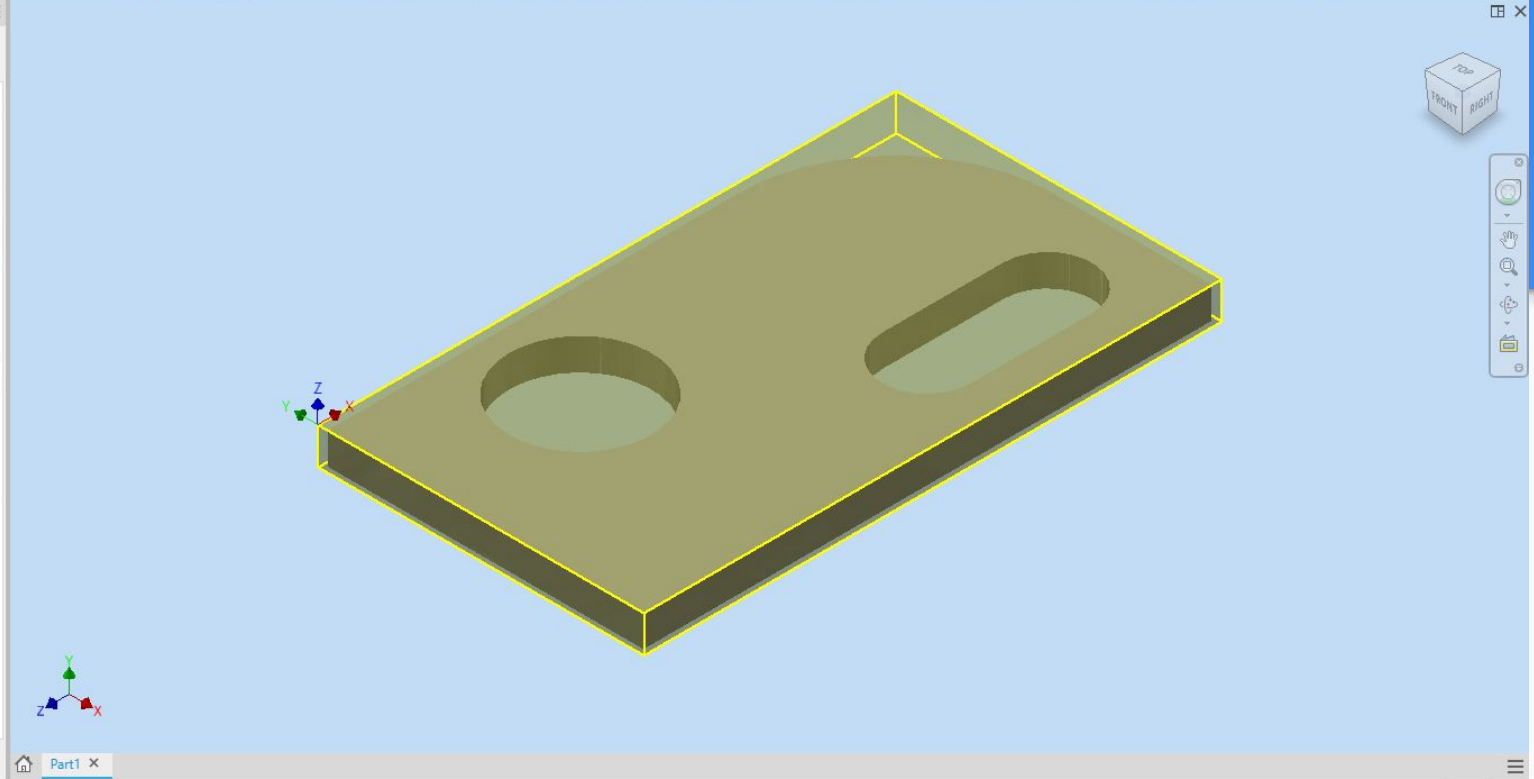
Dimensions



Width (X): 4.58 in

Depth (Y): 2.58 in

Height (Z): 0.29 in

OK Cancel



 2D Adaptive 2D Pocket 2D Contour

Autodesk Inventor Professional 2018 WorkshopPart.ipt

File 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Autodesk A360

Drills: Select Tool

Text contains: Show Operations

Name	Number	Diameter	Corner Radius	Angle	Type	Vendor	Product ID	Description	Comment
#1 - Ø5/32" drill (5/32)	1	0.1562		118°	Drill			5/32	
0.15625 fixture tapped h...									
#2 - Ø1/4" flat (.25 Finish)	2	0.25"			Flat Mill			.25 Finish	.25 Finish
1/4 Finisher Enlarge Holes									
1/4 Finisher Enlarge Hole...									
#4 - Ø5/32" center drill (...)	4	0.1562		118°	Center Drill			.125 Center Drill	.125 Cent...
Center Drill (3)									
Center Drill (4)									
Center Drill									
#5 - Ø0.129" drill (.129 D...	5	0.129"		118°	Drill			.129 Drill	.129 Drill
Rivet Holes									
#6 - Ø0.196" drill (.196 D...	6	0.196"		118°	Drill			.196 Drill	.196 Drill
Motor Mount									
#7 - Ø3/8" flat (.375 Rou...	7	0.375"			Flat Mill			.375 Rougher	.375 Roug
Bearing Holes									
Outside Contour									
#8 - Ø1/4" flat (1/4" Rou...	8	0.25"			Flat Mill			1/4" Rougher	1/4" Roug
lightening									
motor holes									
#13 - Ø0.189" drill (.189 Drill)	13	0.189"		118°	Drill			.189 Drill	.189 Drill
0.25 part to fixture mounts									
1/4 hole									
1/4 hole contour									
#45 - Ø7/16" flat (7/16 F...	45	0.4375"			Flat Mill			7/16 Finisher GOOD	7/16 Finis

WorkshopPart.ipt CIM_Plate_CAM.ipt

1 2

ENG 3:29 PM 11/15/2018

Select cylindrical or conical faces

Type here to search

Fixture plate!

CAM for carving out many plates at once

In development, may not be final

File Assemble Design 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Collaborate Electromechanical

Place Create Free Move Free Rotate Joint Constrain Show Show Sick Hide All Pattern Mirror Copy Bill of Materials Parameters Create Derived Substitutes Plane Axis Point UCS Shrinkwrap Shrinkwrap Substitute

Component Position Relationships Pattern Manage Productivity Work Features Simplification

Model x +

Assembly | Modeling

Assembly1

- Relationships
- Representations
- Origin
- 712.1-09...:1
- fixture plate:1
 - Origin
 - travel
 - fixturemount
 - Toe Clamp Holes.sk
 - Work Point1
 - Work Point2
 - Flush:1
 - Mate:1
 - Mate:2 (-1.000 in)

Create New File

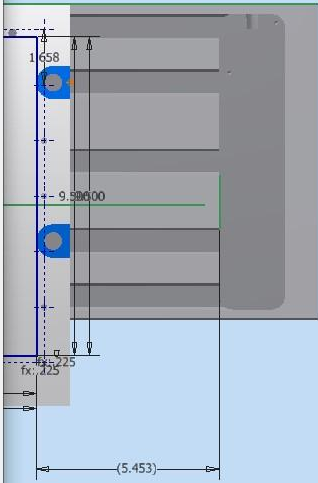
D:\Robotics\2020\cad2020_projects\trunk\templates_lynbrook\

- templates_lynbrook
 - Fixture Plate
 - Part - Create 2D and 3D objects
 - Aluminum.ipt
 - Gear_Template.ipt
 - Sheet Metal.ipt
 - Sprocket_Template.ipt
 - Assembly - Assemble 2D and 3D component
 - fixture plate assembly.iam
 - Standard.iam
 - Weldment.iam
 - Drawing - Create an annotated document
 - Lynbrook_2019_A.idw
 - Lynbrook_2020_B_SP.ic

File: fixture plate assembly .iam
 Display Name: Assembly
 Units: inch

This template creates a collection of precisely aligned parts and other assemblies.

Project File: [20cadprojects-template - Jooper, nooo.ipj] Projects... Create Cancel



File Assemble Design 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Collaborate Electromechanical

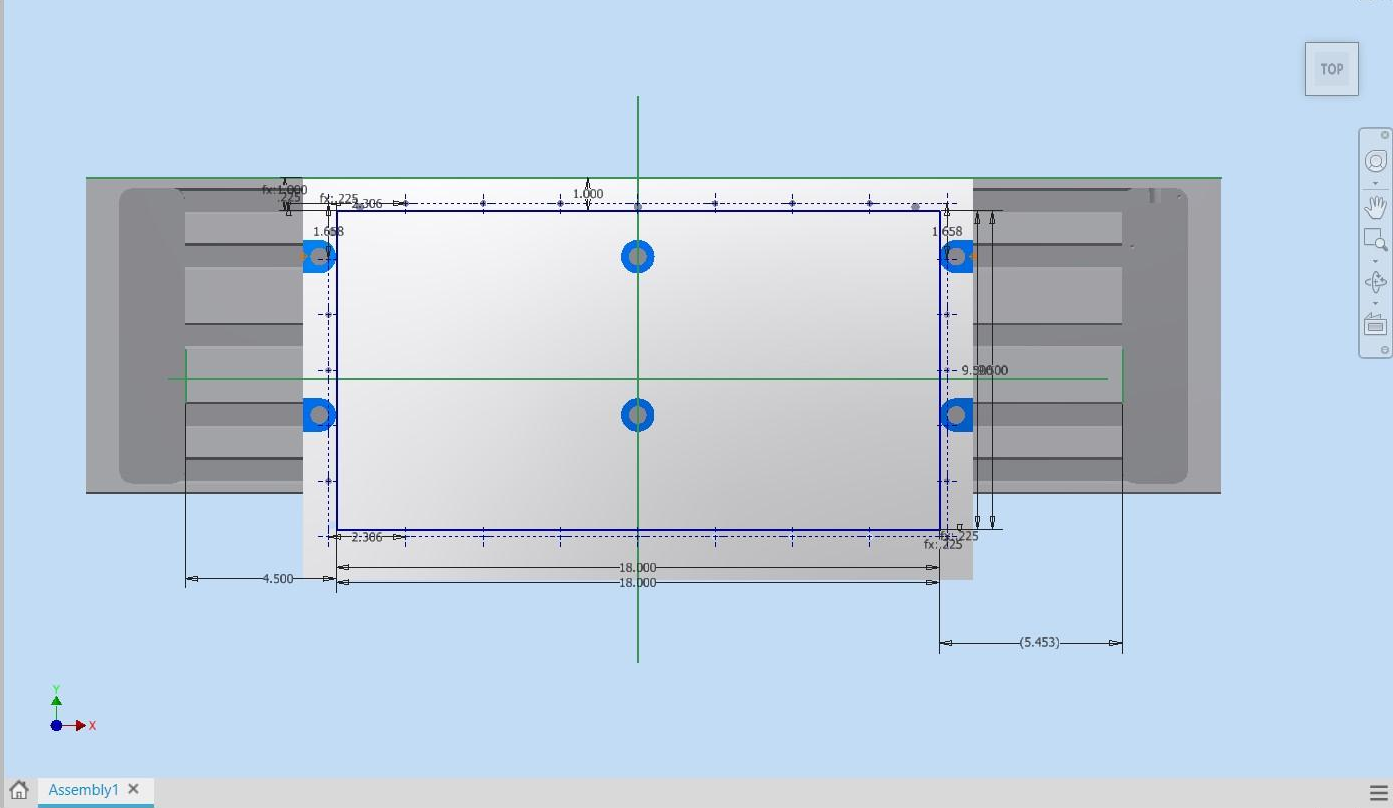
Place Create Free Move Free Rotate Joint Constrain Show Show Sick Hide All Pattern Mirror Copy Bill of Materials Parameters Create Derived Substitutes Plane Axis Point UCS Shrinkwrap Shrinkwrap Substitute

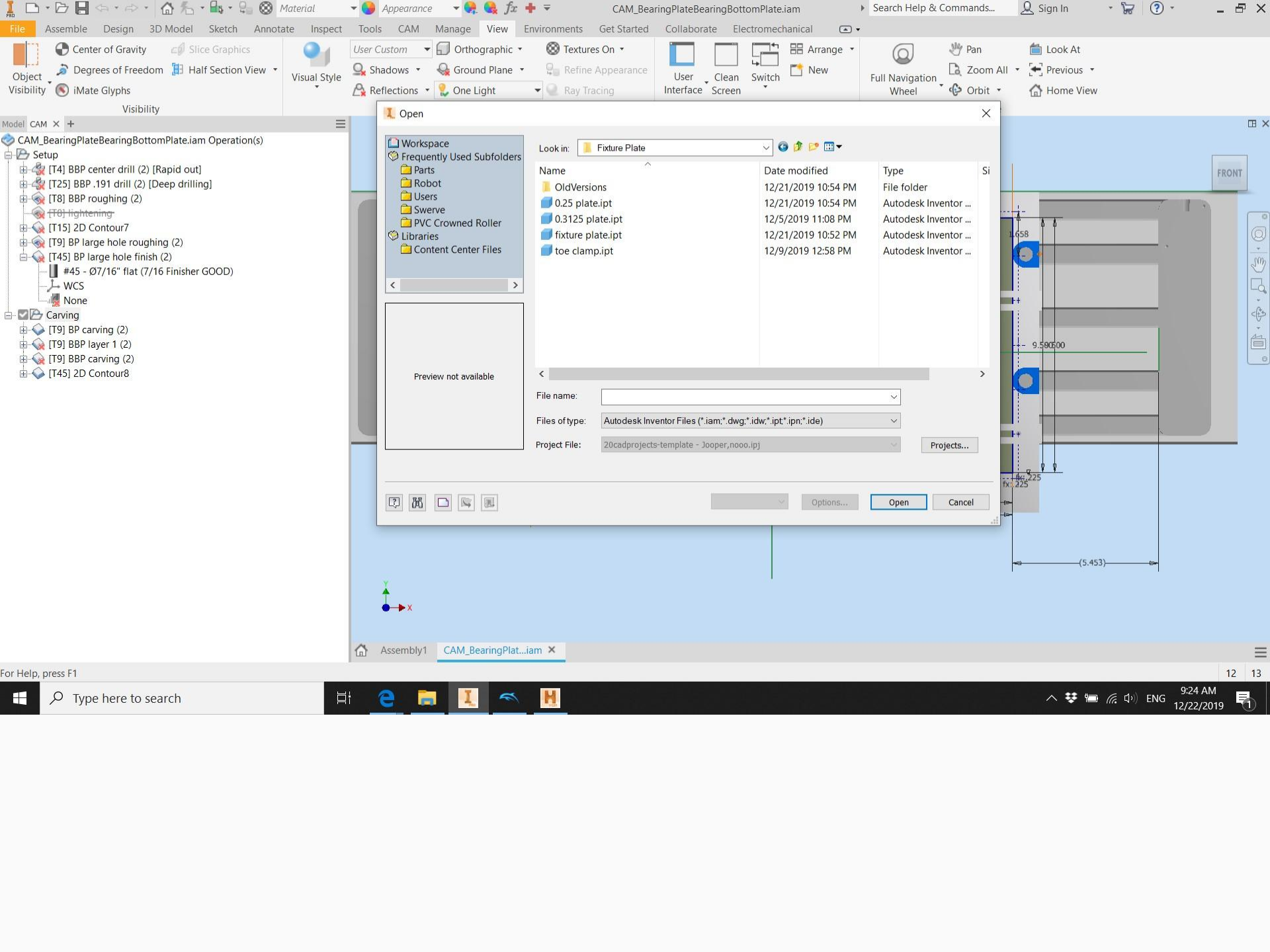
Component Position Relationships Pattern Manage Productivity Work Features Simplification

Model x +

Assembly | Modeling

- Assembly1
 - Relationships
 - Representations
 - Origin
 - 712.1-09...:1
 - fixture plate:1
 - Origin
 - travel
 - fixturemount
 - Toe Clamp Holes.sk
 - Work Point1
 - Work Point2
 - Flush:1
 - Mate:1
 - Mate:2 (-1.000 in)





Model CAM x +

CAM_BearingPlateBearingBottomPlate.iam Operation(s)

- Setup
 - [T4] BBP center drill (2) [Rapid out]
 - [T25] BBP .191 drill (2) [Deep drilling]
 - [T8] BBP roughing (2)
 - [F0] lightening
 - [T15] 2D Contour7
 - [T9] BP large hole roughing (2)
 - [T45] BP large hole finish (2)
 - #45 - Ø7/16" flat (7/16 Finisher GOOD)
 - WCS
 - None
 - Carving
 - [T9] BP carving (2)
 - [T9] BBP layer 1 (2)
 - [T9] BBP carving (2)
 - [T45] 2D Contour8

Open

Look in: Fixture Plate

Name	Date modified	Type
OldVersions	12/21/2019 10:54 PM	File folder
0.25 plate.ipt	12/21/2019 10:54 PM	Autodesk Inventor ...
0.3125 plate.ipt	12/5/2019 11:08 PM	Autodesk Inventor ...
fixture plate.ipt	12/21/2019 10:52 PM	Autodesk Inventor ...
toe clamp.ipt	12/9/2019 12:58 PM	Autodesk Inventor ...

File name:

Files of type: Autodesk Inventor Files (*.iam;*.dwg;*.idw;*.ipt;*.ipn;*.ide)

Project File: 20cadprojects-template - Jooper, nooo.ipj

FRONT

4.658

9.590500

14.225

5.453

Y Z X

Object Visibility iMate Glyphs Center of Gravity Slice Graphics Degrees of Freedom Half Section View Visual Style User Custom Orthographic Textures On Shadows Ground Plane Refine Appearance Reflections One Light Ray Tracing Appearance Windows User Interface Clean Screen Switch Arrange Full Navigation Wheel Pan Look At Zoom All Previous Orbit Home View Navigate

CAM CAM x +

CAM_BearingPlateBearingBottomPlate.iam Operation(s)

- Setup
 - [T4] BBP center drill (2) [Rapid out]
 - [T25] BBP .191 drill (2) [Deep drilling]
 - [T8] BBP roughing (2)
 - [F0] lightening
 - [T15] 2D Contour7
 - [T9] BP large hole roughing (2)
 - [T45] BP large hole finish (2)
 - WCS
 - None
 - Carving
 - [T9] BP carving (2)
 - [T9] BBP layer 1 (2)
 - [T9] BBP carving (2)
 - [T45] 2D Contour8

Assembly1 CAM_BearingPlat...iam x

Create New File

D:\Robotics\2020\cad2020_projects\trunk\templates_lynbrook\

- templates_lynbrook
 - Fixture Plate
 - OldVersions

Part - Create 2D and 3D objects

- Aluminum.ipt
- Gear_Template.ipt
- Sheet Metal.ipt
- Sprocket_Template.ipt

Assembly - Assemble 2D and 3D components

- fixture plate assembly.iam
- Standard.iam
- Weldment.iam

Drawing - Create an annotated document

- Lynbrook_2019_A.idw
- Lynbrook_2020_B_SP.idw

Presentation - Create an exploded projection

File: Aluminum.ipt
 Display Name: Part
 Units: inch
 Material: Aluminum 6061

This template creates a 2D or 3D object composed of features and one or more bodies.

Project File: 20cadprojects-template - Jooper, nooo.ipj Projects... Create Cancel

FRONT

Open

Look in: Fixture Plate

Name	Date modified	Type
OldVersions	12/21/2019 10:48 PM	File folder
0.3125 plate.ipt	12/5/2019 11:08 PM	Autodesk Inventor ...
fixture plate.ipt	12/21/2019 10:48 PM	Autodesk Inventor ...
toe clamp.ipt	12/9/2019 12:58 PM	Autodesk Inventor ...

File name: fixture plate.ipt

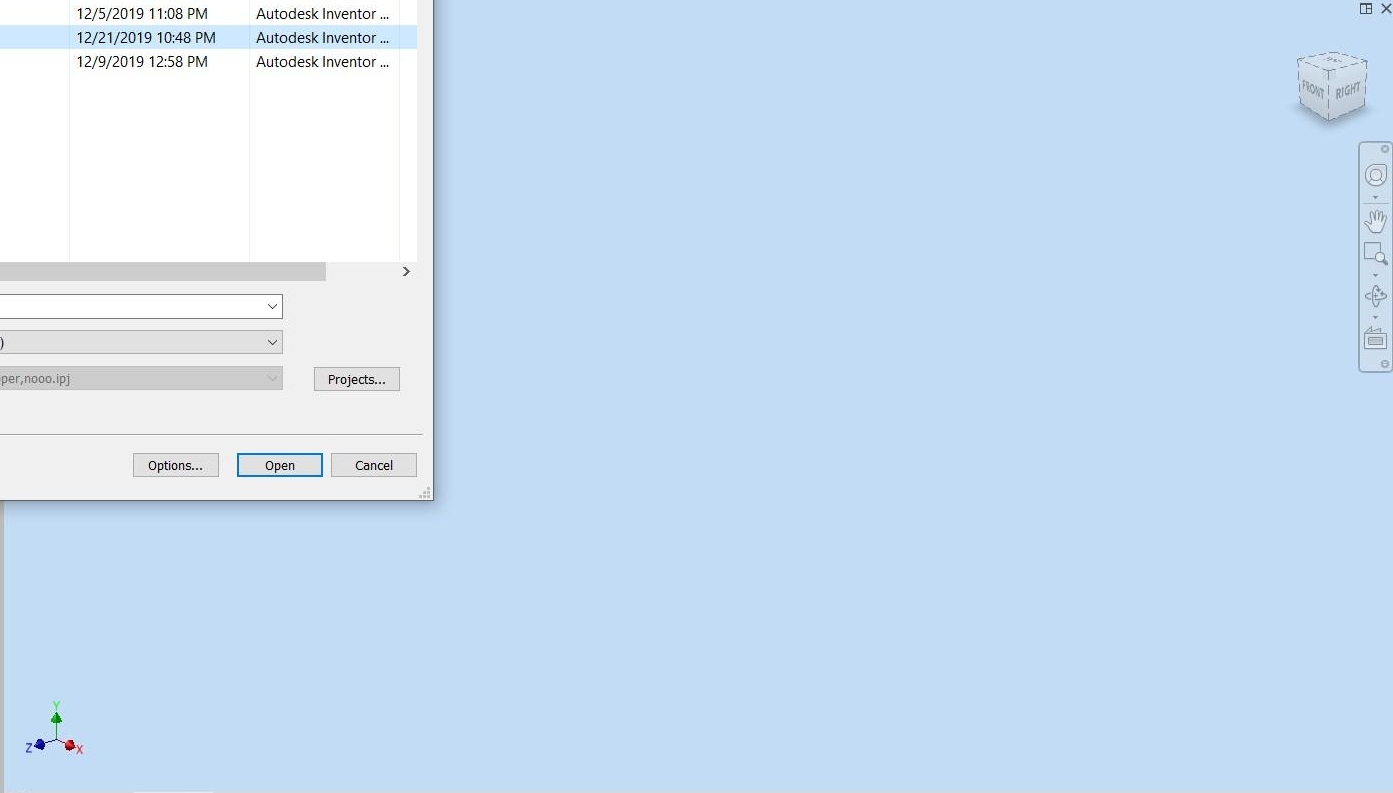
Files of type: Component Files (*.ipt;*.iam)

Project File: 20cadprojects-template - Jooper,nooo.ipj

Last Saved: Autodesk Inventor 2020 (24.0.16891.0000)

Options... Open Cancel

Autodesk Inventor Professional 2020 ribbon: Shape generator, Plane, Axis, Point, UCS, Pattern, Face, Box, Convert, Stitch, Ruled Surface, Patch, Trim, Sculpt, Extend, Surface, Stress Analysis, Simulation, Convert to Sheet Metal, Convert.



Assembly1 Part1 x

File 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Collaborate

Start 2D Sketch Sketch Create

Extrude Revolve Sweep Loft Derive Import Hole Fillet Chamfer Thread Split Shape Generator Plane Axis Point UCS Box Face Patch Trim Sculpt Extend Stress Analysis Convert to Sheet Metal

Decal Emboss Decal Import Unwrap Shell Combine Direct Draft Thicken/Offset Delete Face Modify

Stitch Ruled Surface Patch Trim Sculpt Extend Surface Simulation Convert

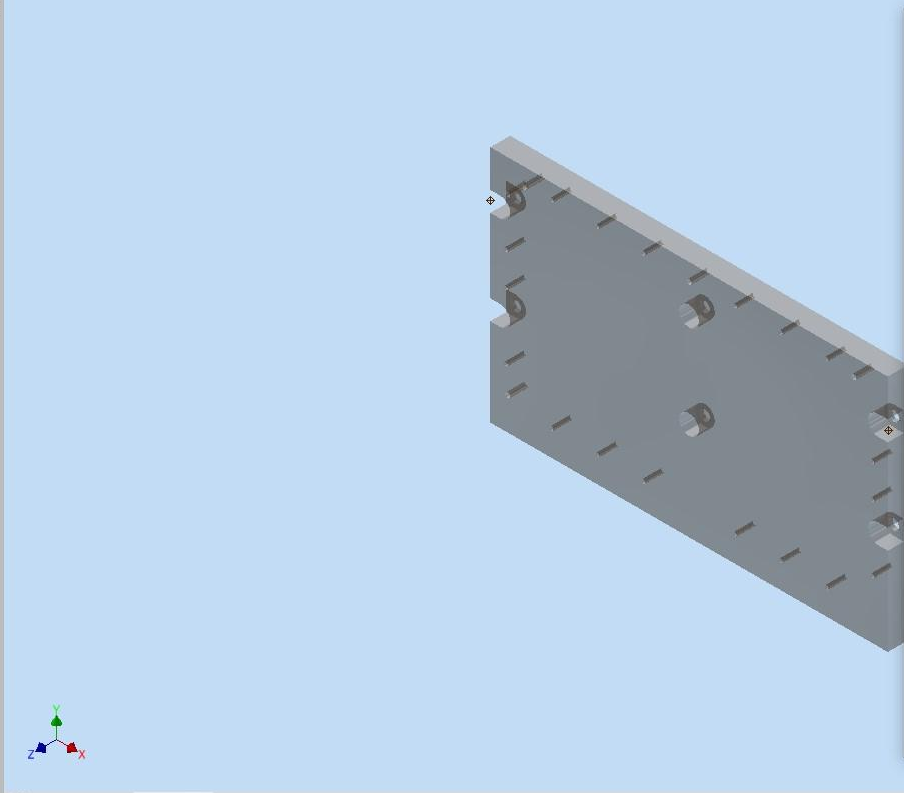
Model x +

Part1

View: Master

Origin

End of Part



Derived Part

Derive style: [Icons]

Status: [Icons]

- Blocks
- Sketches
- 3D Sketches
- Work Geometry
- Mates
- Parameters
 - Model Parameters
 - User Parameters
 - ScrewBottomThickness
 - plateWidth
 - plateLength
 - Reference Parameters
 - External Parameters

Show all objects

Use color override from source component

Link sheet metal styles

Reduced Memory Mode

Design View: Master

Scale factor: 1.000 ul

Mirror part

XY Plane

OK Cancel

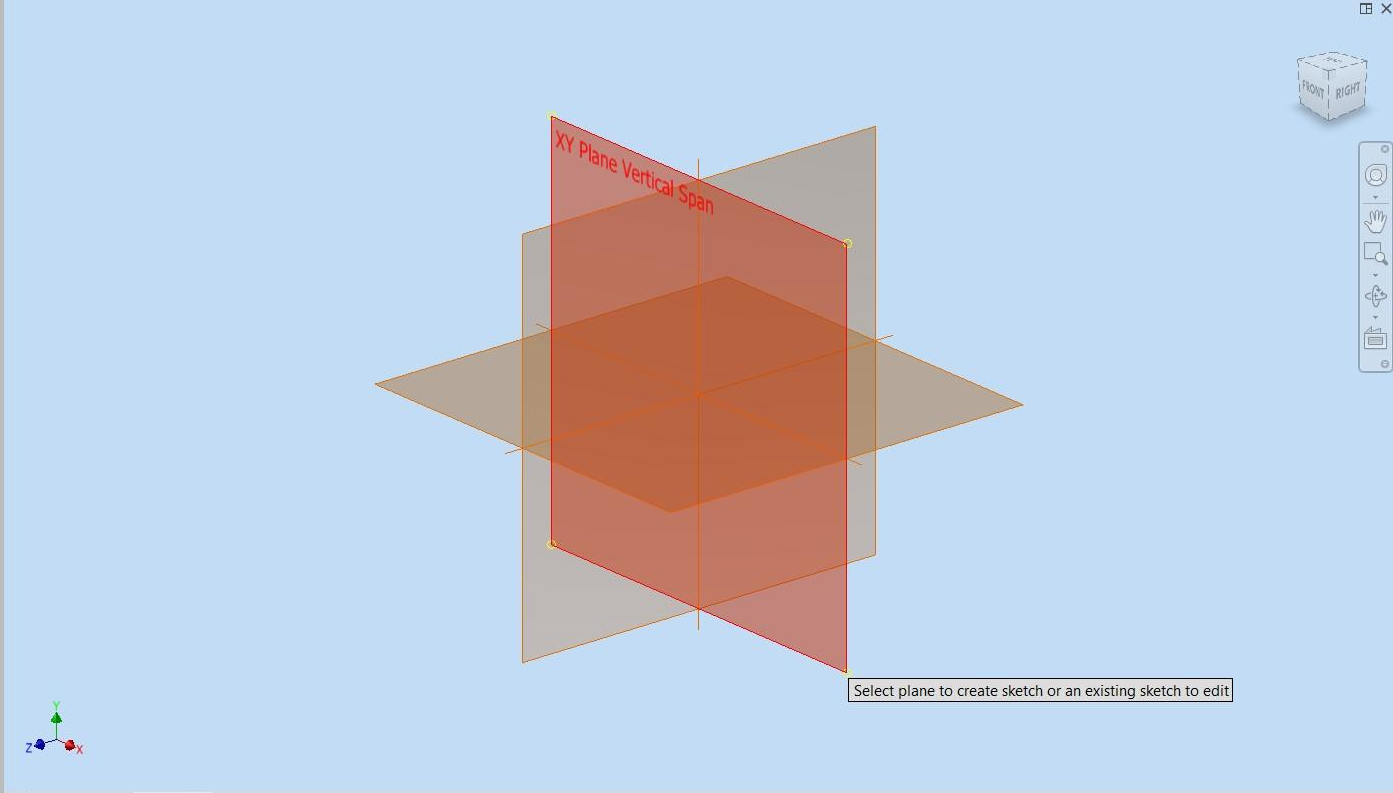
File 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Collaborate

Start 2D Sketch Extrude Revolve Sweep Emboss Decal Hole Fillet Chamfer Thread Split Shape Generator Plane Axis Point UCS Box Face Convert Patch Trim Sculpt Extend Stress Analysis Convert to Sheet Metal Convert

Sketch Create Modify

Model x +

- Part1
 - View: Master
 - Origin
 - fixture plate.ipt
 - End of Part



File 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Collaborate

Start 2D Sketch Line Circle Arc Rectangle Fillet Text Point Project Geometry Move Trim Scale Rectangular Dimension Image Points ACAD Show Format Finish Sketch Exit

Copy Extend Stretch Circular Mirror Pattern Constrain Insert Format

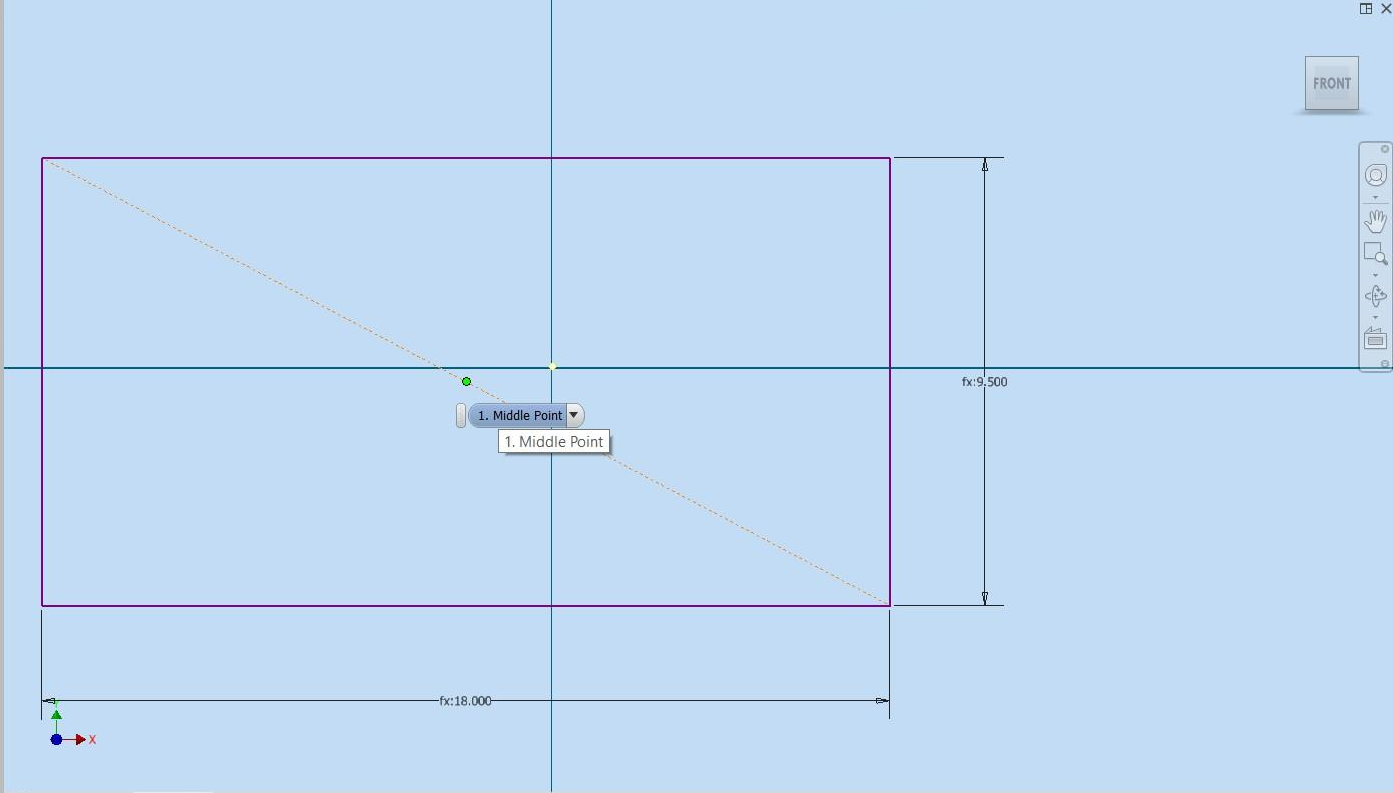
Rotate Split Offset Mirror Pattern Constrain Insert Format

Model x +

Part1

View: Master

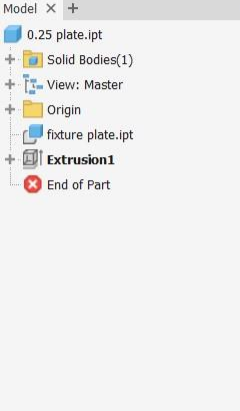
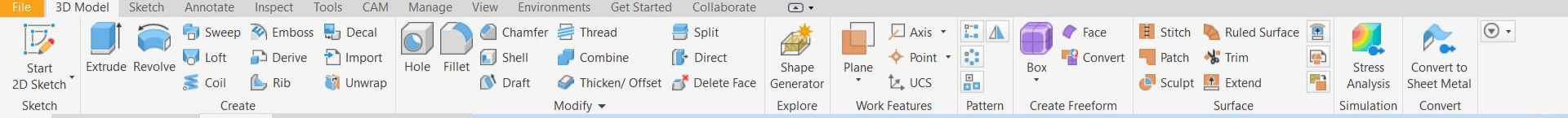
- Origin
 - YZ Plane Vertical Spine
 - XZ Plane Horizontal
 - XY Plane Vertical Span
 - X Axis Left/Right
 - Y Axis Up/Down
 - Z Axis Fore/Aft
 - Center Point
- fixture.plate.ipt
- Sketch1
- End of Part



Assembly1 Part1 x

Select first curve or point

-1.186 in, -0.967 in 2 dimensions needed 1 4



Properties > Extrusion1 > Sketch1

Input Geometry

Profiles: 1 Profile

From: 1 Sketch Plane

Behavior

Direction: [Icon]

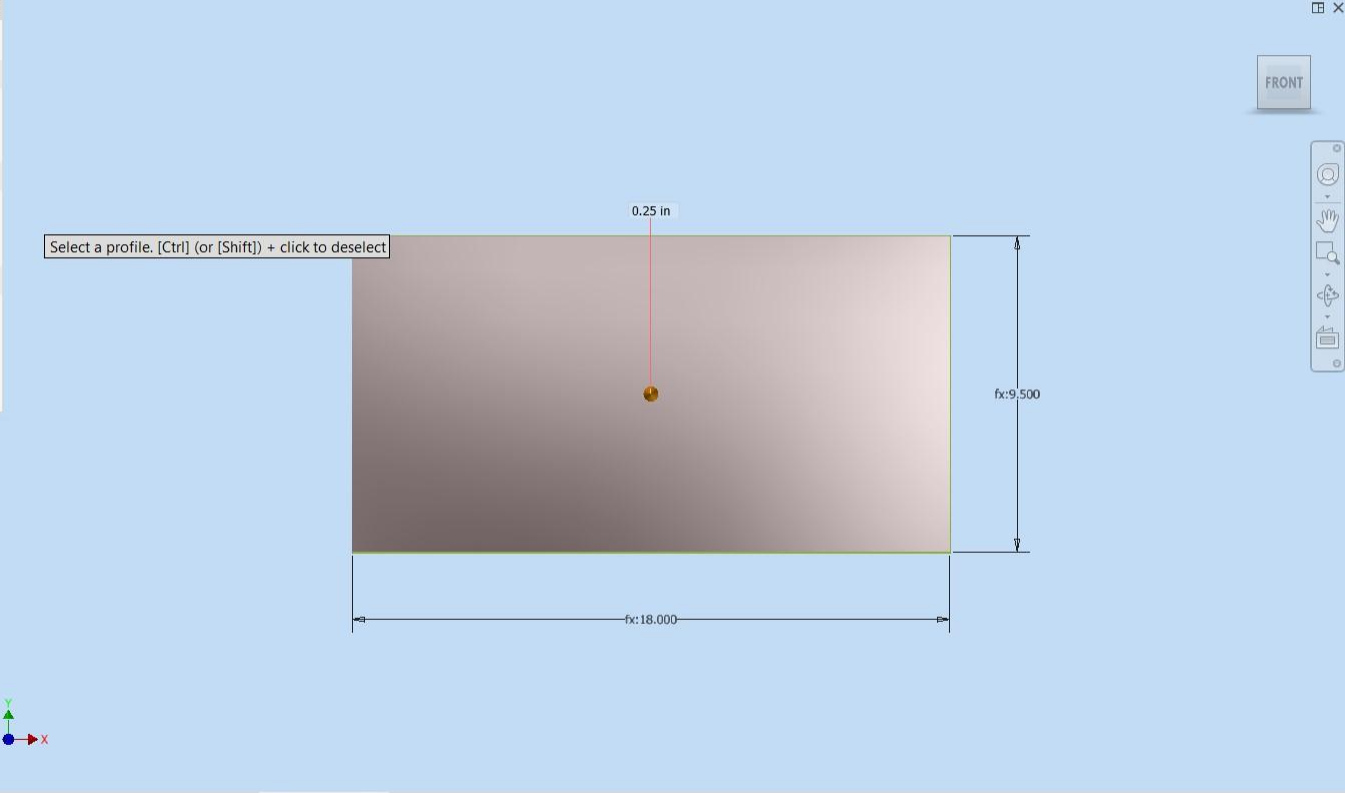
Distance A: 0.25 in

Advanced Properties

Taper A: 0.00 deg

Match Shape

OK Cancel +



File 3D Model Sketch Annotate Inspect Tools CAM Manage

Start 2D Sketch Sketch Extrude Revolve Sweep Loft Derive Import Hole Fillet Emboss Decal Coil Rib Unwrap Create

Model X +

- 0.25 plate.ipt
- Solid Bodies(1)
 - Solid1
- View: Master
- Origin
- fixture plate.ipt
- Extrusion1
- End of Part

Material

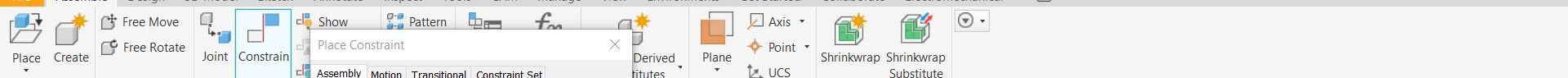
- Birch - Natural Polished
- Black
- Black Cast
- Blocks
- Blue - Glazing
- Blue - Wall Paint - Glossy
- Blue - Yellow
- Brass - Satin
- Brindle
- Bronze - Satin
- Cadet Blue
- Canary
- Carbon Fiber
- Carbon Fiber 1
- Cardboard
- Cherry - Natural Low Gloss
- Chestnut
- Chrome - Polished
- Chrome - Polished Black
- Chrome - Polished Blue
- Circular Mosaic - Black & White
- Clear
- *Clear - Blue
- Clear - Green 1
- Clear - Light
- Clear - Yellow
- Coarse Textured - White
- Cool White

Favorites

- Autodesk Material Library
- Autodesk Appearance Library
- Inventor Material Library

Shape Generator Explore Plane Work Features Axis Point UCS Pattern Create Freeform Face Face Box Convert Surface Surface Patch Trim Extend Stress Analysis Simulation Convert to Sheet Metal Convert





Component Position Relationship Model

Assembly | Modeling

Assembly1 tree view and 3D model

Place Constraint dialog box

Pick geometry to constrain

File Assemble Design 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Collaborate Electromechanical

Place Create Free Move Free Rotate Joint Constrain

Show Pattern

Derived Features Work Features Simplification

Plane Axis Point UCS Shrinkwrap Shrinkwrap Substitute

Component Position Relationship

Model Assembly Modeling

Assembly1 Relationships Representations Origin 712.1-09 :1 fixture plate:1 Origin travel fixturemount Toe Clamp Holes.sk Work Point1 Work Point2 Flush:1 Mate:1 Mate:2 (-1.000 in) 0.25 plate:1

Place Constraint

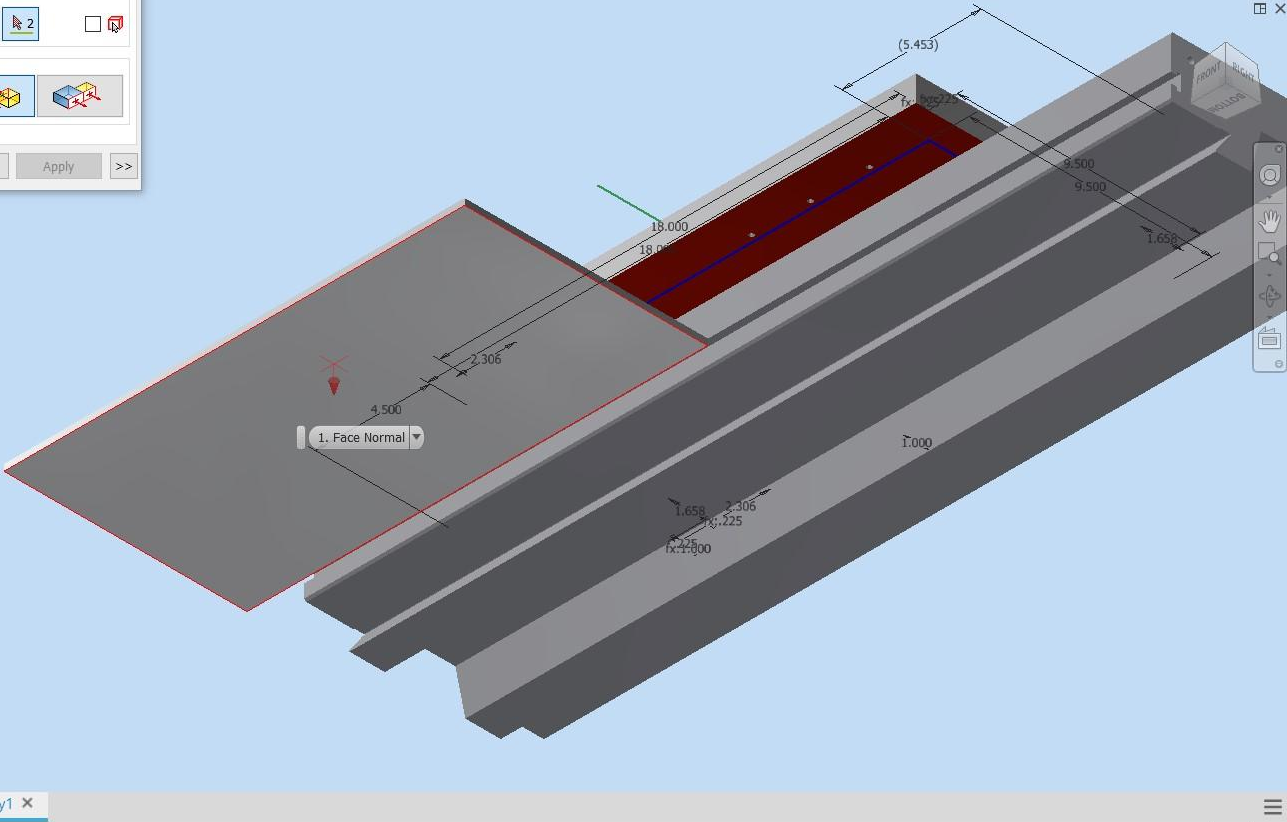
Assembly Motion Transitional Constraint Set

Type Selections

Offset: 0.000 in

Solution

OK Cancel Apply >>



Pan the current view (click to cancel)

Place Create Free Move Free Rotate Joint Constrain

Place Constraint

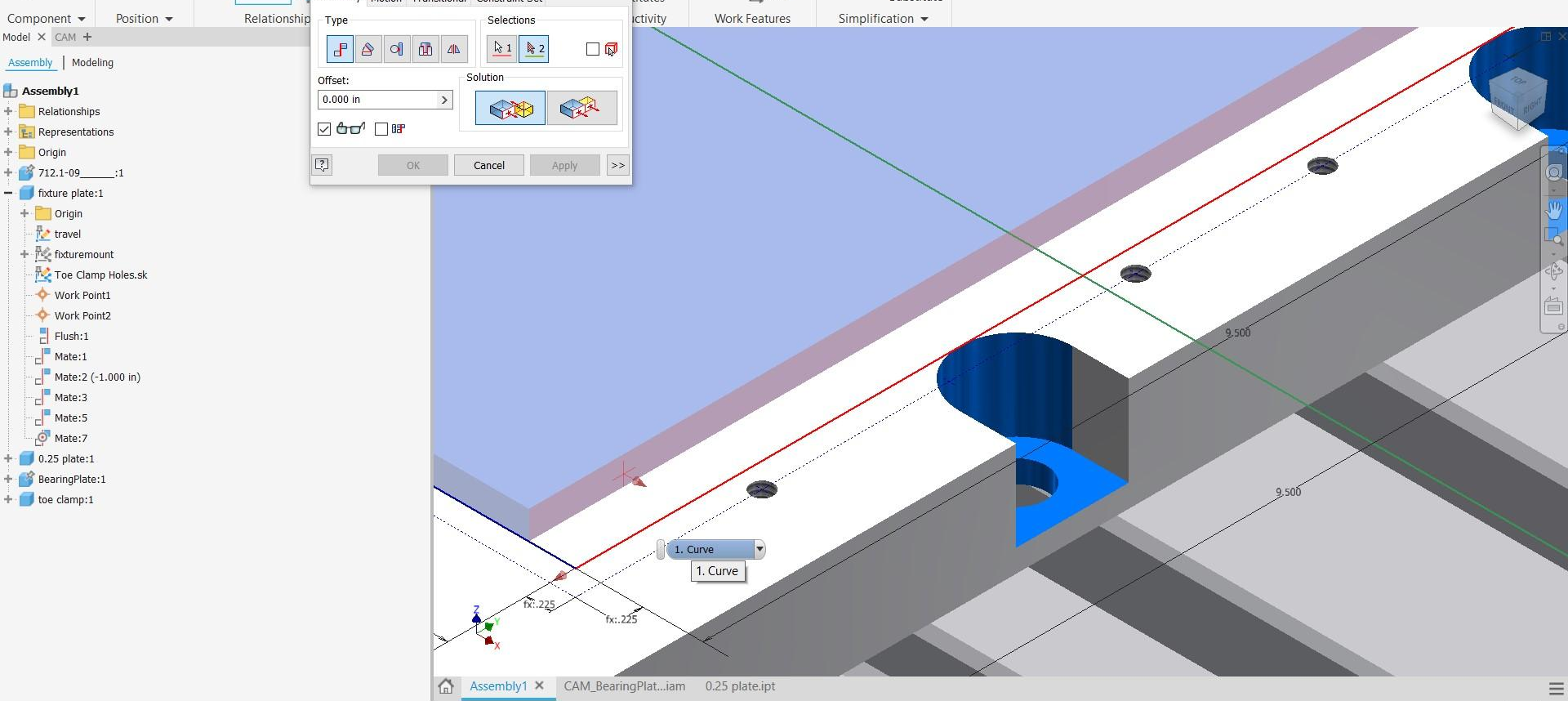
Assembly Motion Transitional Constraint Set

Type: Selections:

Offset: 0.000 in

Solution:

OK Cancel Apply >>



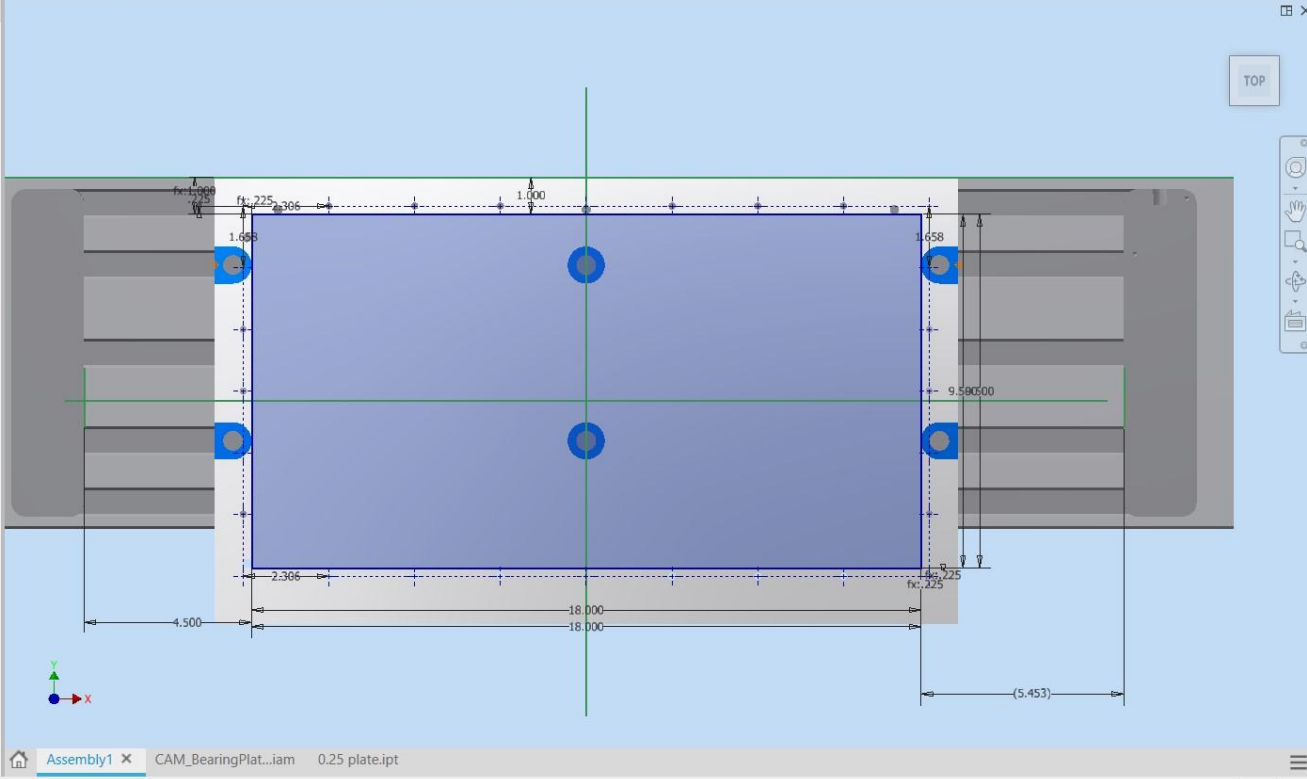
File Assemble Design 3D Model Sketch Annotate Inspect Tools CAM Manage View Environments Get Started Collaborate Electromechanical

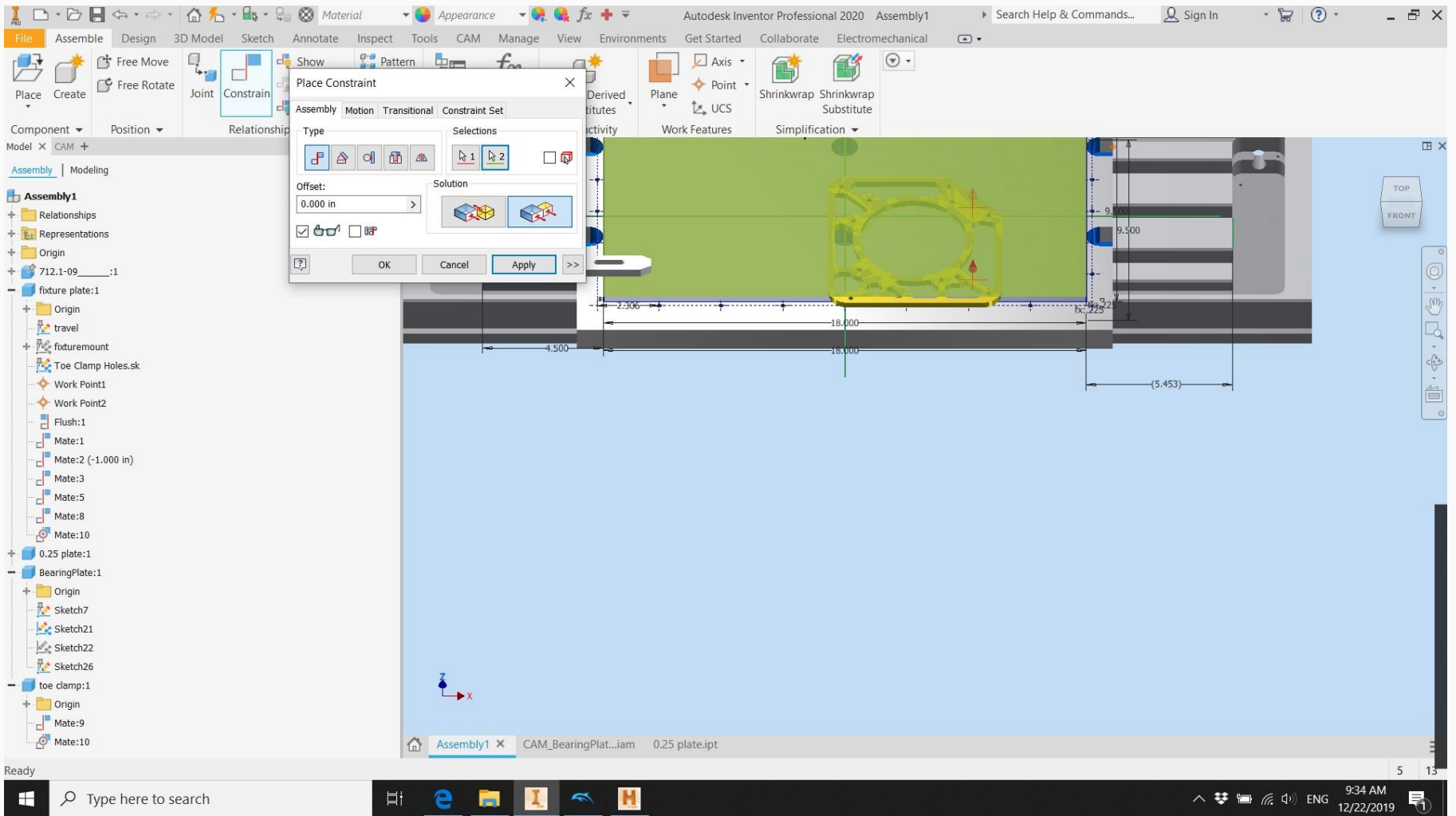
Place Create Free Move Free Rotate Joint Constrain Show Show Sick Hide All Pattern Mirror Bill of Materials Parameters Create Derived Substitutes Plane Axis Point UCS Shrinkwrap Shrinkwrap Substitute

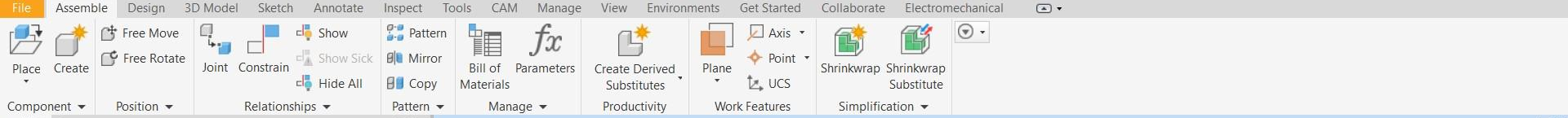
Model X CAM +

Assembly | Modeling

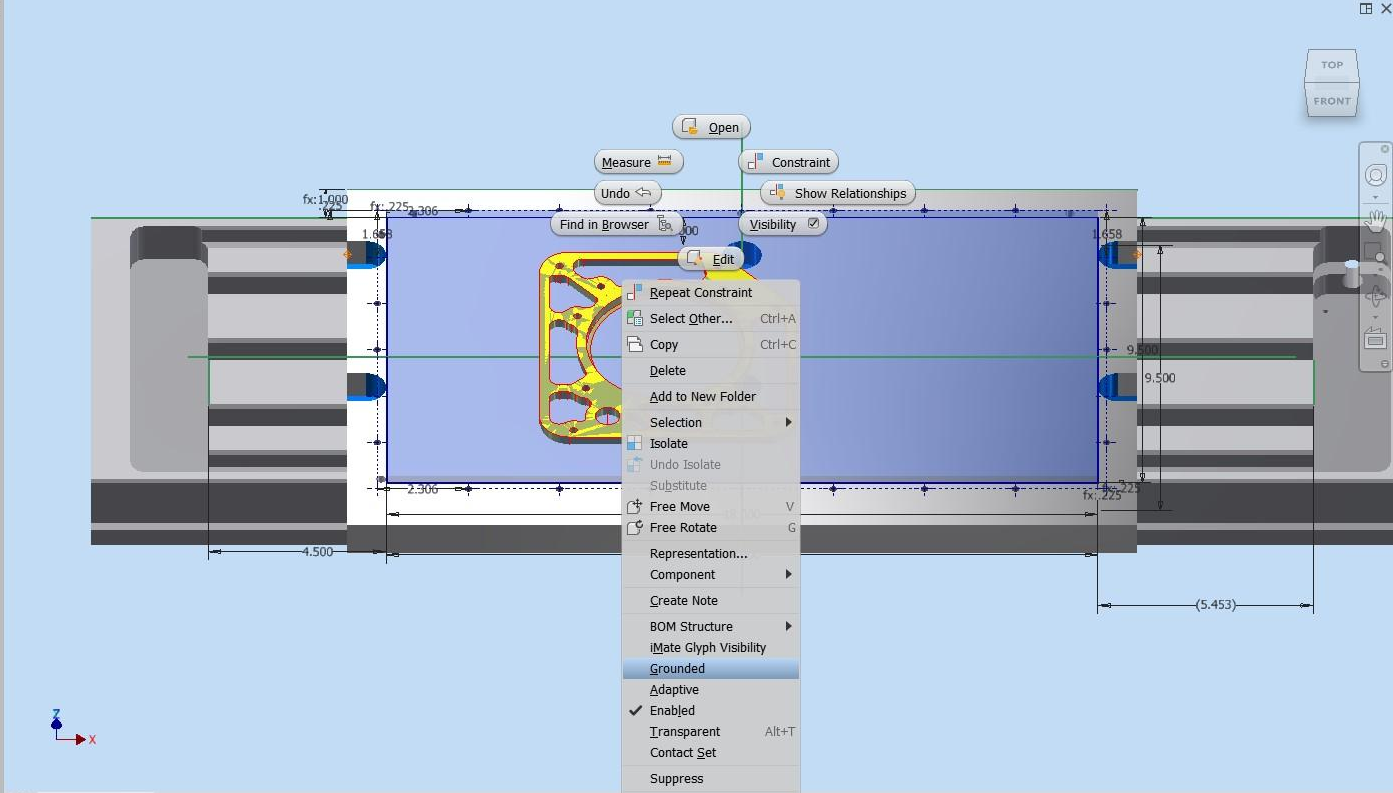
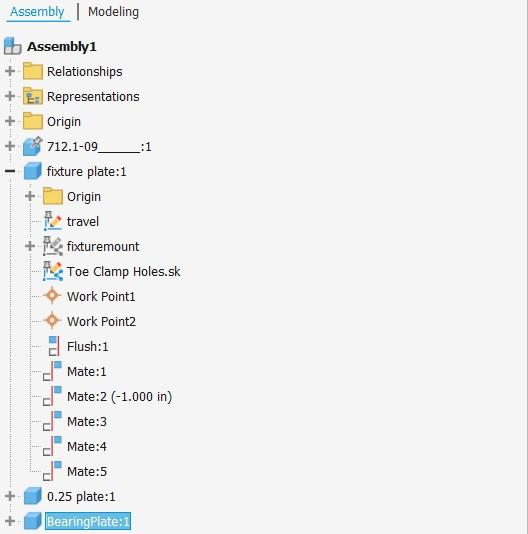
- Assembly1
 - Relationships
 - Representations
 - Origin
 - 712.1-09...:1
 - fixture plate:1
 - Origin
 - travel
 - fixturemount
 - Toe Clamp Holes.sk
 - Work Point1
 - Work Point2
 - Flush:1
 - Mate:1
 - Mate:2 (-1.000 in)
 - Mate:3
 - Mate:5
 - Mate:7
 - Mate:8
 - 0.25 plate:1
 - BearingPlate:1
 - toe clamp:1







Model X +



Assembly1 x

Place Component

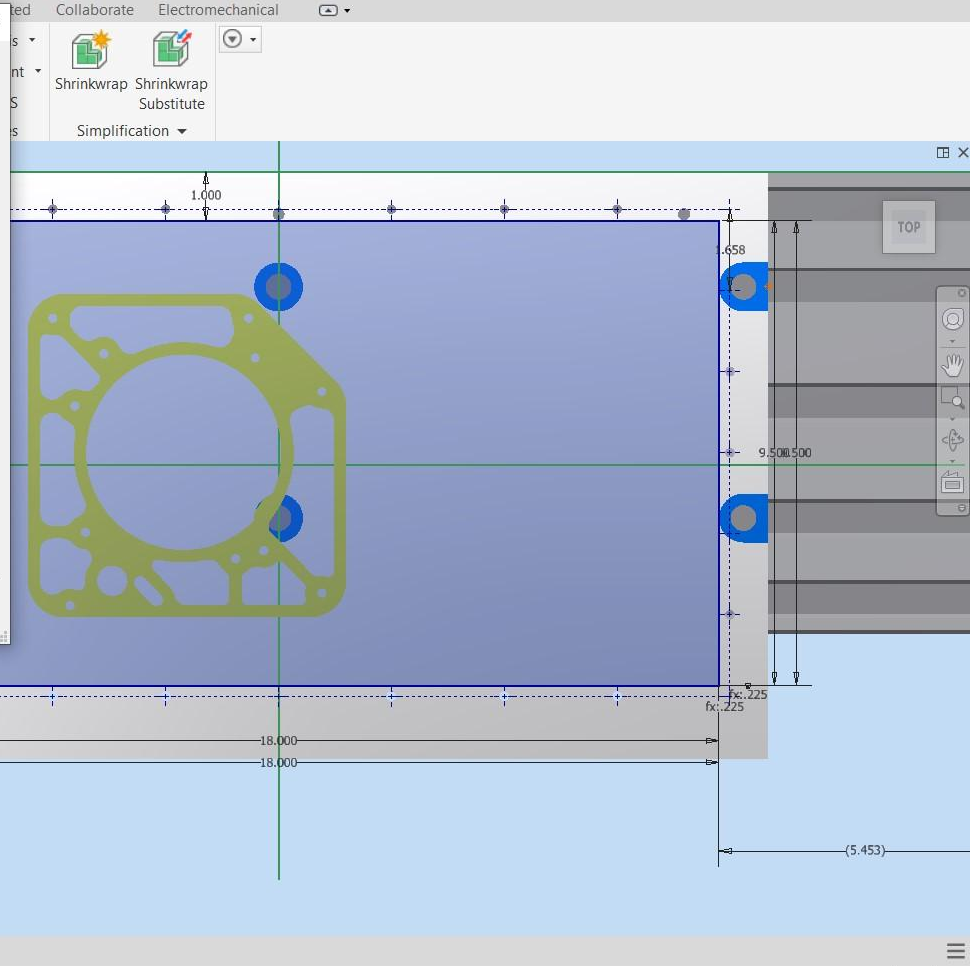
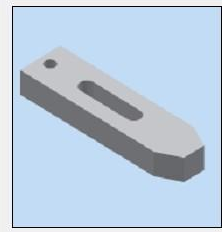
Look in: Fixture Plate

Name	Date modified	Type
OldVersions	12/21/2019 10:54 PM	File folder
0.25 plate.ipt	12/21/2019 10:54 PM	Autodesk Inventor ...
0.3125 plate.ipt	12/5/2019 11:08 PM	Autodesk Inventor ...
fixture plate.ipt	12/21/2019 10:52 PM	Autodesk Inventor ...
toe clamp.ipt	12/9/2019 12:58 PM	Autodesk Inventor ...

File name: toe clamp.ipt
Files of type: Component Files (*.ipt *.iam)
Project File: 20cadprojects-template - Jooper,nooo.ipj

Last Saved: Autodesk Inventor 2020 (24.0.16891.0000)

Options... Open Cancel

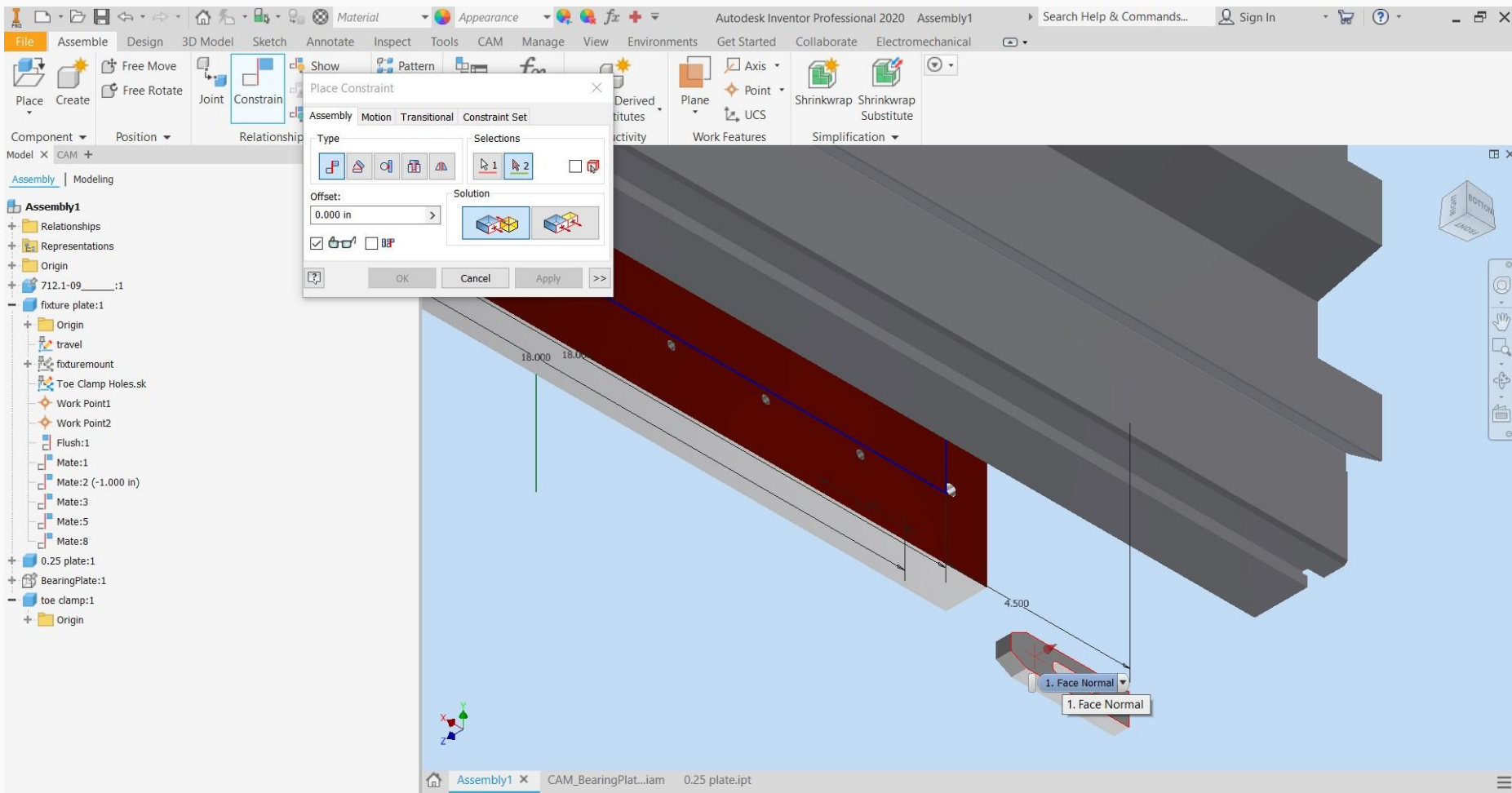


Collaborate Electromechanical

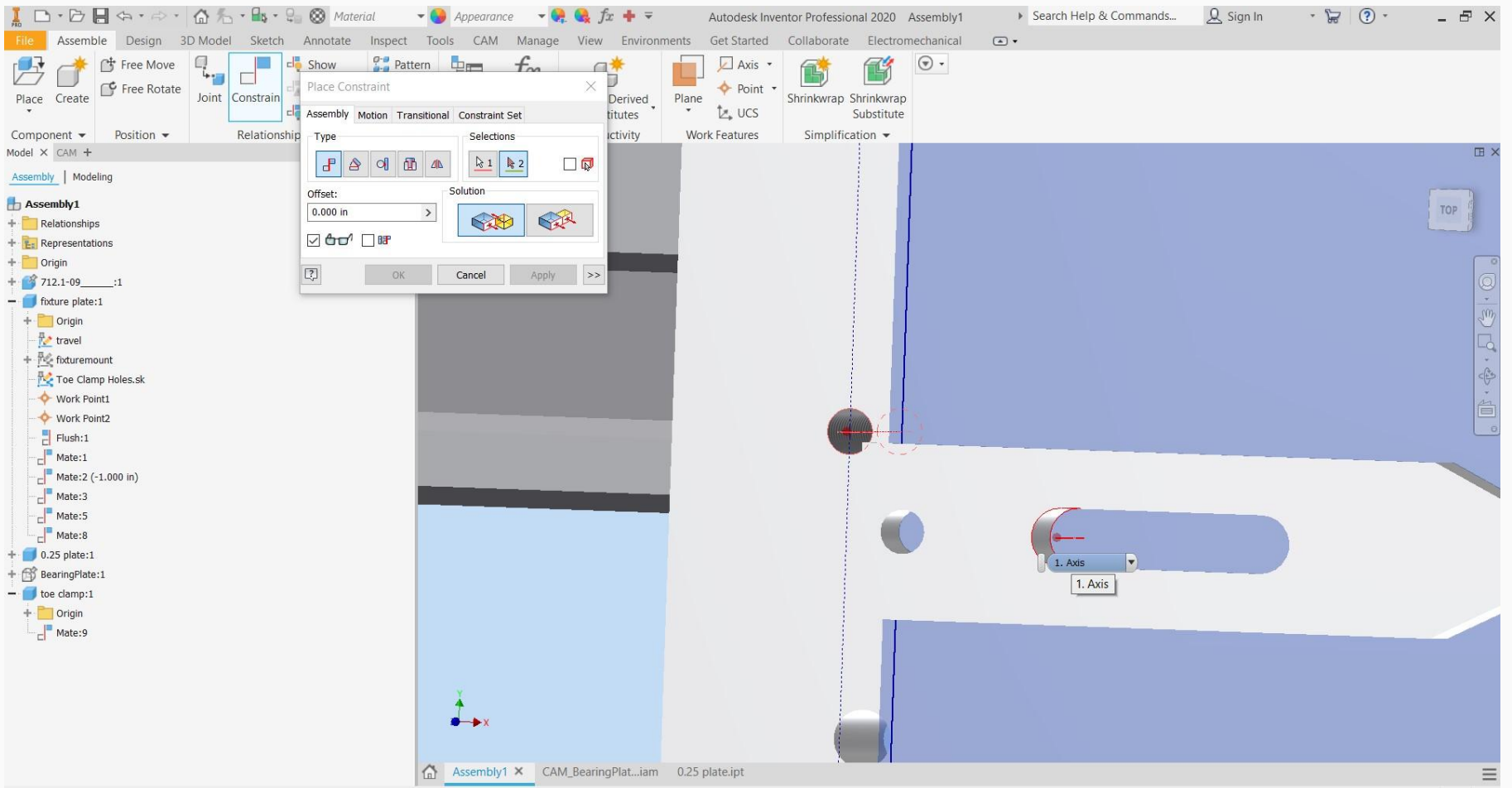
Shrinkwrap Shrinkwrap Substitute Simplification

TOP

4 6

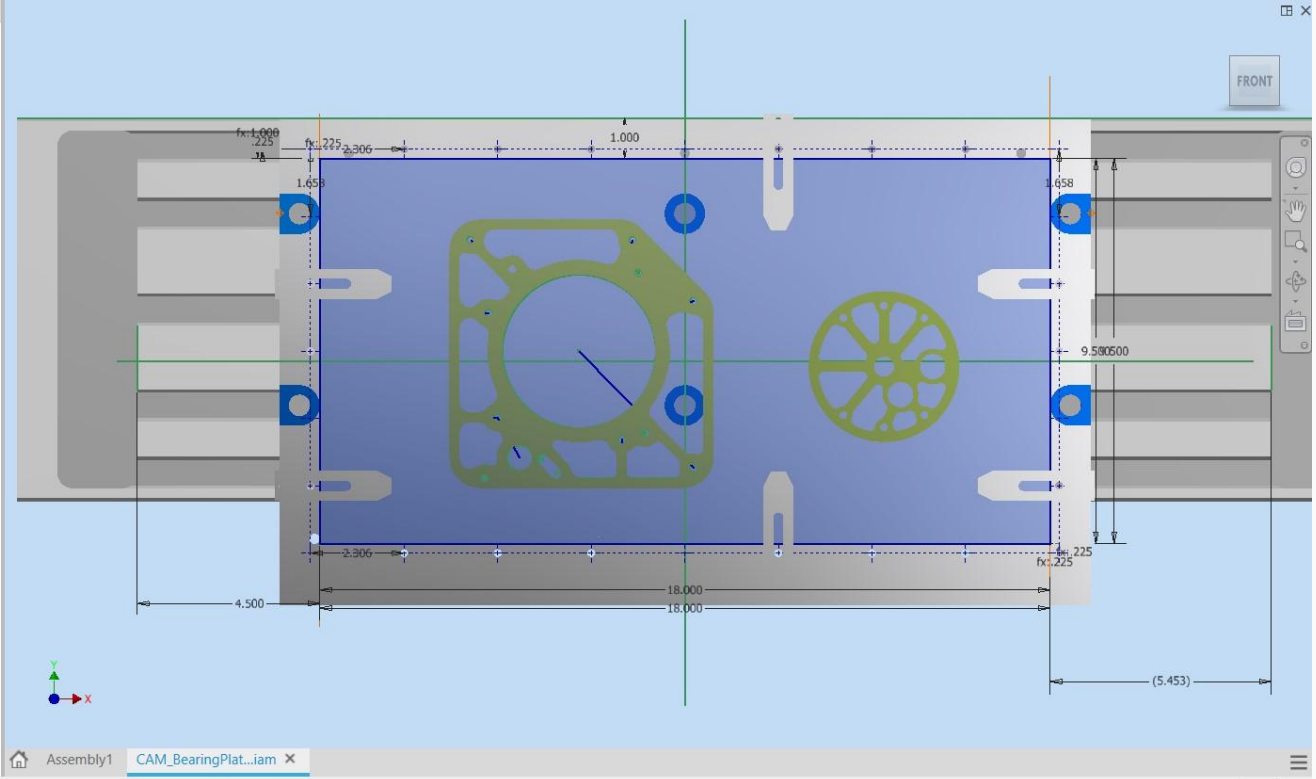


Pan the current view (click to cancel)



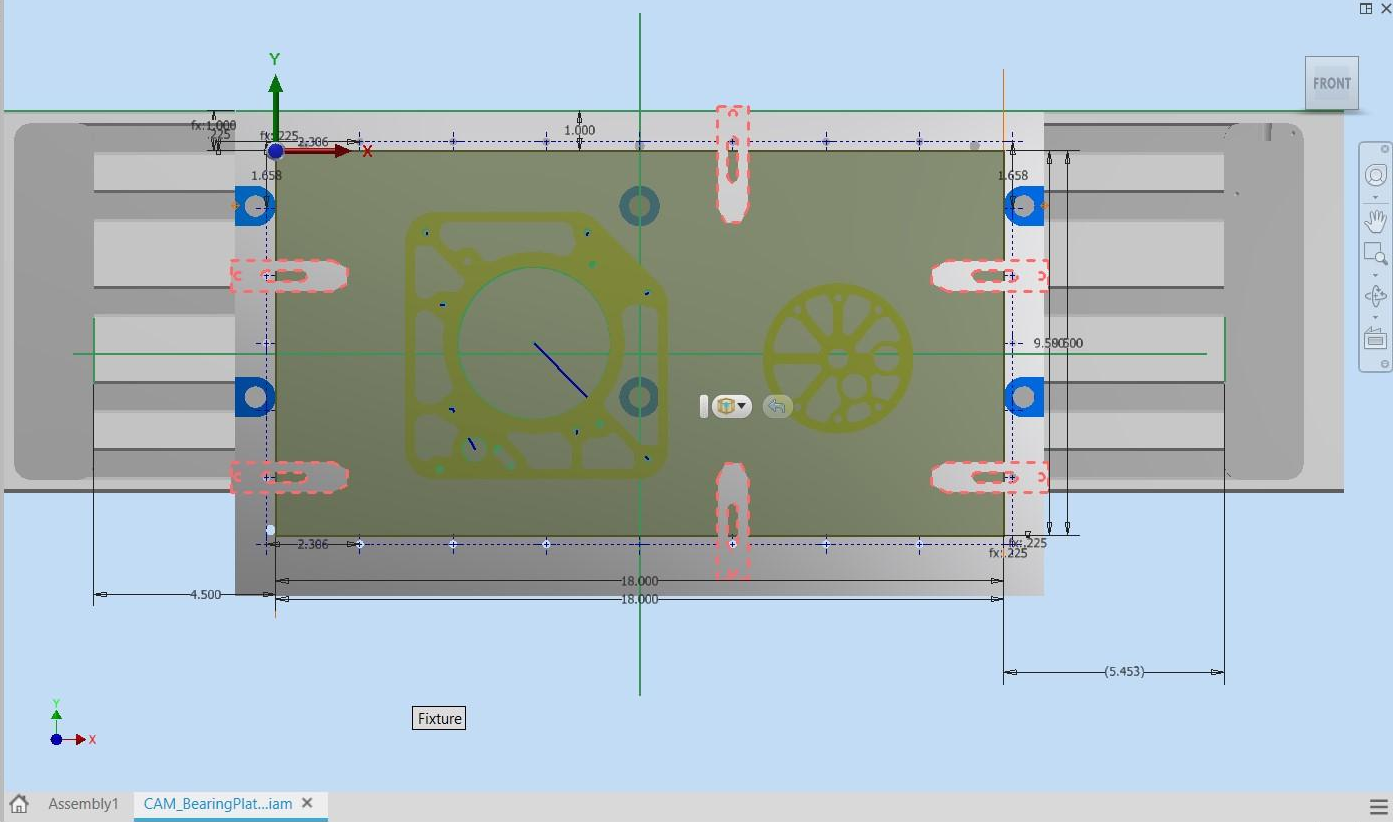
Model CAM X +

- CAM_BearingPlateBearingBottomPlate.iam Operation(s)
 - Setup
 - [T4] BBP center drill (2) [Rapid out]
 - [T25] BBP .191 drill (2) [Deep drilling]
 - [T8] BBP roughing (2)
 - [F0] lightening
 - [T15] 2D Contour7
 - [T9] BP large hole roughing (2)
 - [T45] BP large hole finish (2)
 - #45 - Ø7/16" flat (7/16 Finisher GOOD)
 - WCS
 - None
 - Carving
 - [T9] BP carving (2)
 - [T9] BBP layer 1 (2)
 - [T9] BBP carving (2)
 - [T45] 2D Contour8



Material Appearance User Custom Orthographic Textures On Shadows Ground Plane Refine Appearance User Interface Clean Screen Switch Arrange New Full Navigation Wheel Pan Look At Zoom All Previous Home View Orbit Navigate

Model CAM x +
Setup : Carving
Setup Stock Post Process
Select...
Setup
Operation type: Milling
Work Coordinate System (WCS)
Orientation: Select X & Y axes
X axis Flip X axis
Y axis Flip Y axis
Origin: Stock box point Stock point
Model Model
Fixture Fixture Fixture attachment
OK Cancel



Model CAM x +

Setup : Carving

Setup Stock Post Process

Stock

Mode:

From solid

Stock solid

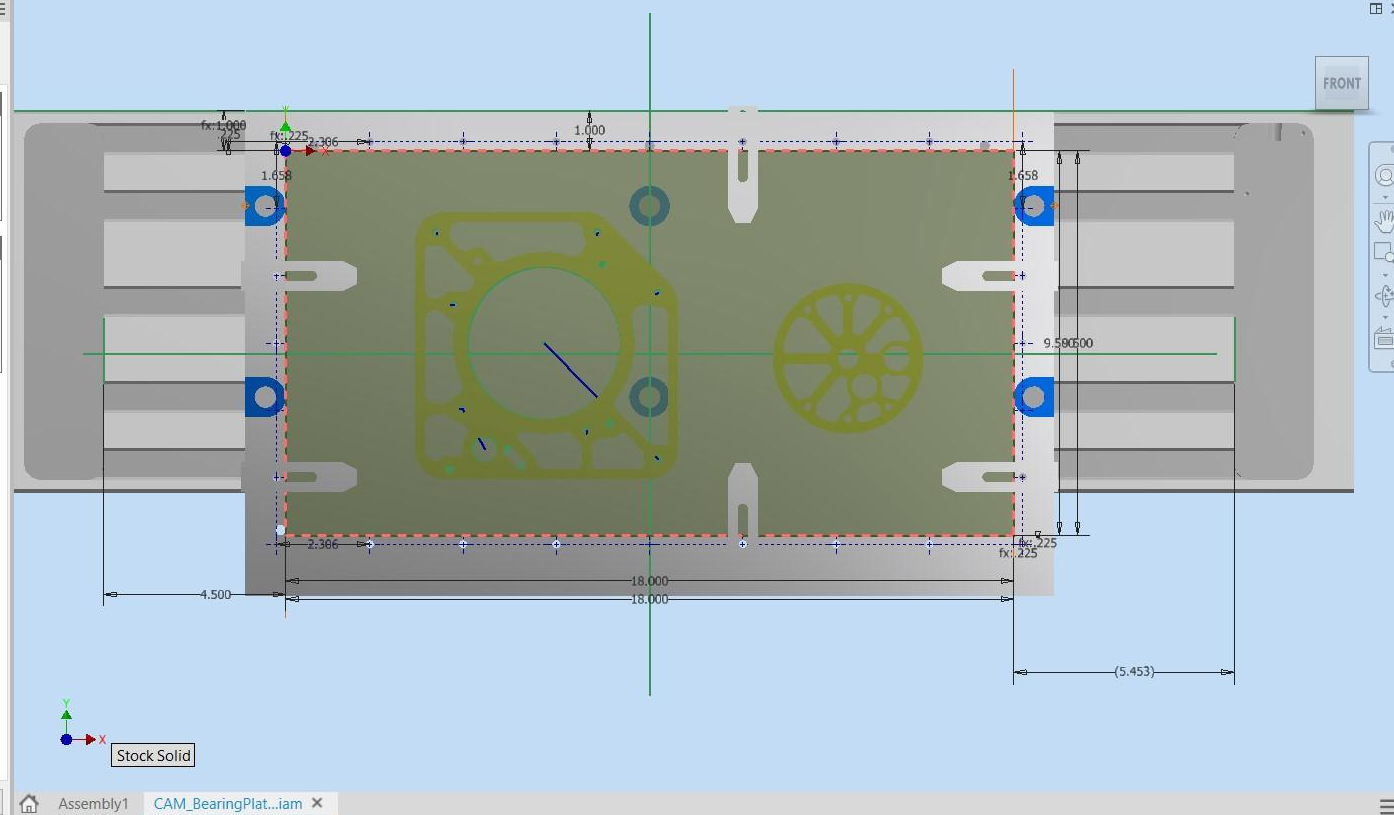
Dimensions

Width (X): 18 in

Depth (Y): 9.5 in

Height (Z): 0.3125 in

OK Cancel



Model CAM x +

2D Contour : BP carving (2)

Tool Geometry Heights Passes Linking

Geometry

Contour selection

Tangential extension distance:

Separate tangential end extension

Stock Contours

Tabs

Shape: Rectangular

Width:

Height:

Positioning: By distance

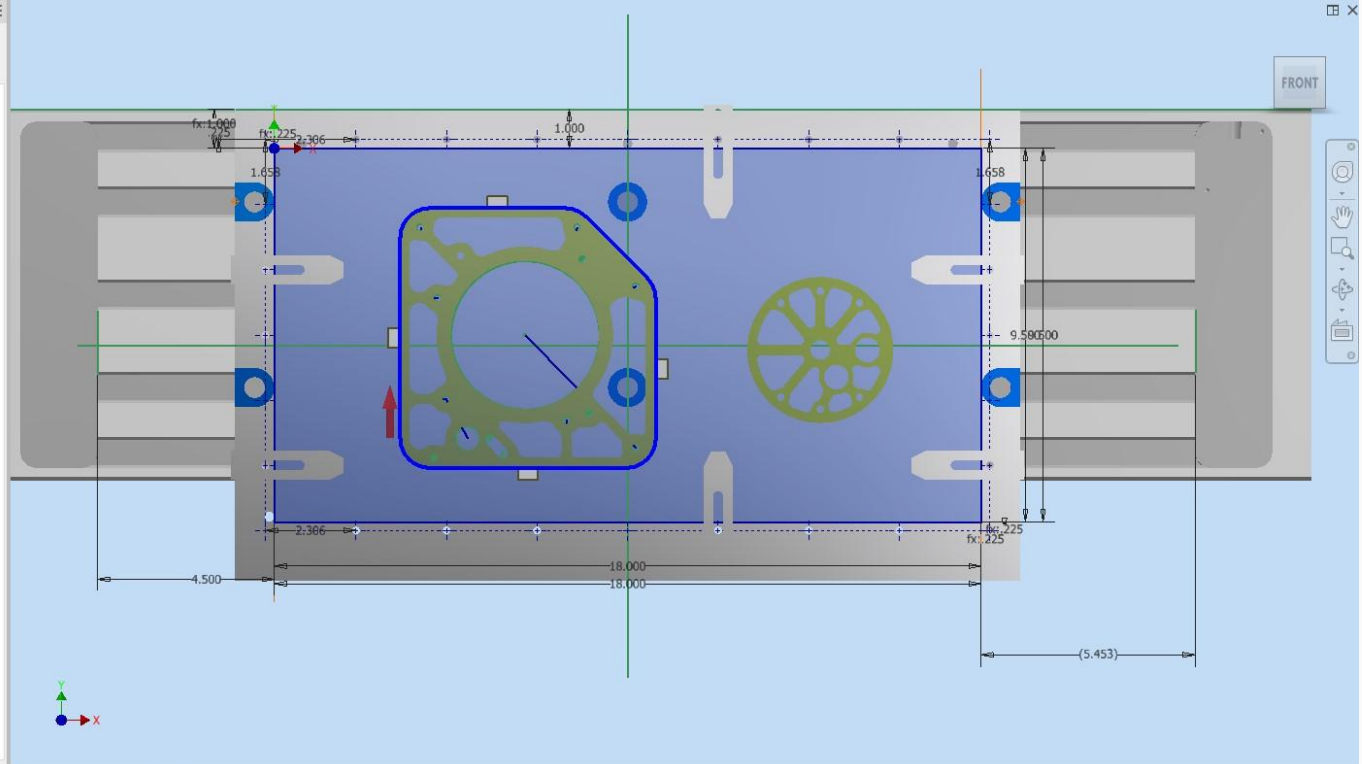
Distance:

Rest Machining

Wrap Toolpath

Tool Orientation

OK Cancel



Model CAM x +

2D Contour : 2D Contour8

Tool Geometry Heights Passes Linking

Geometry

Contour selection

Tangential extension distance: 0 in

Separate tangential end extension

Stock Contours

Tabs

Rest Machining

Wrap Toolpath

Tool Orientation

OK Cancel

