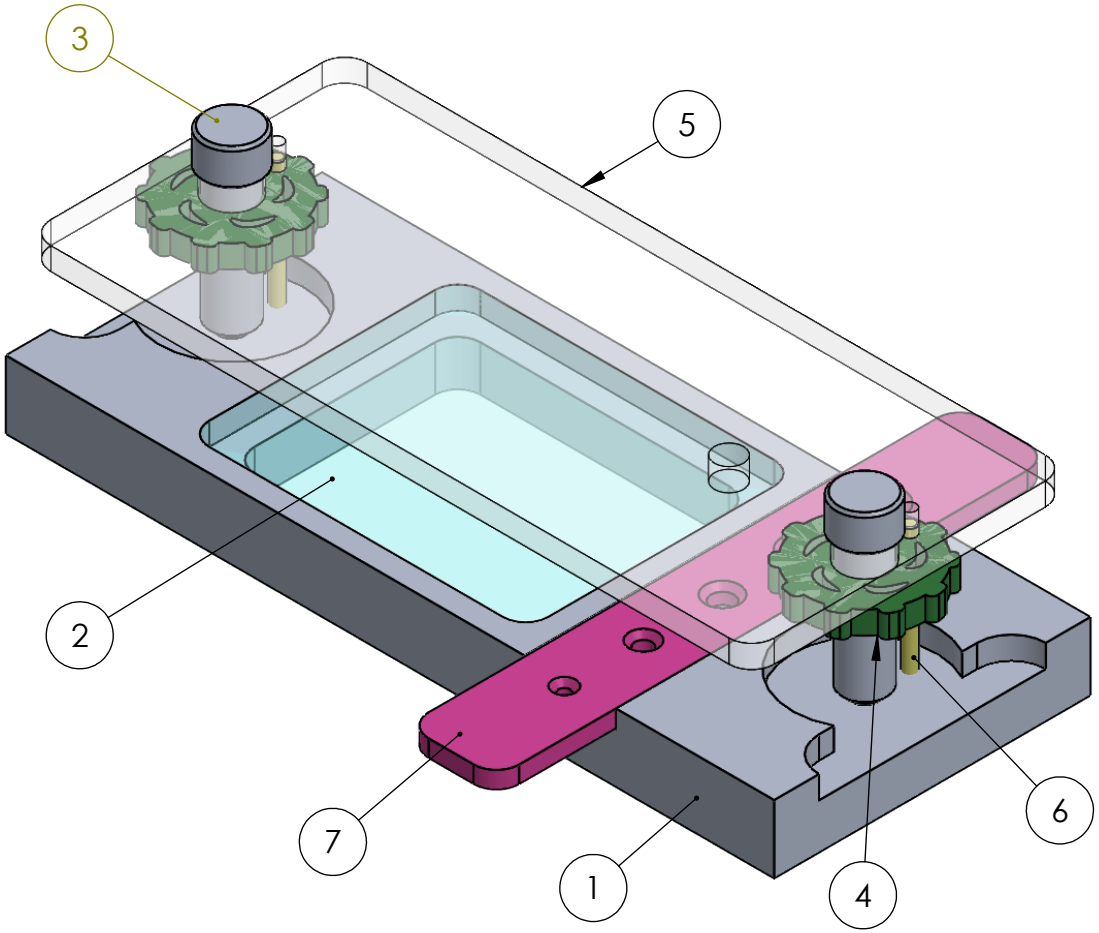
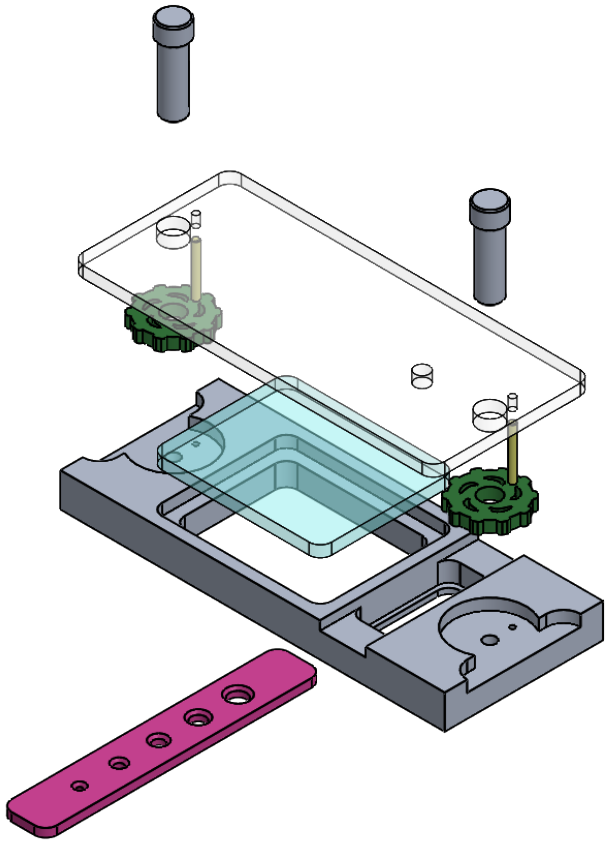




Part #	Properties	Quantity
1	Base	1
2	Center Cover	1
3	Guide Rod	2
4	Knob	2
5	Platform	1
6	Guide Pin	2
7	Aperture	1

BIM 110L
Digital Microscope

DWG. NO. Assembly

DATE 12-3-18

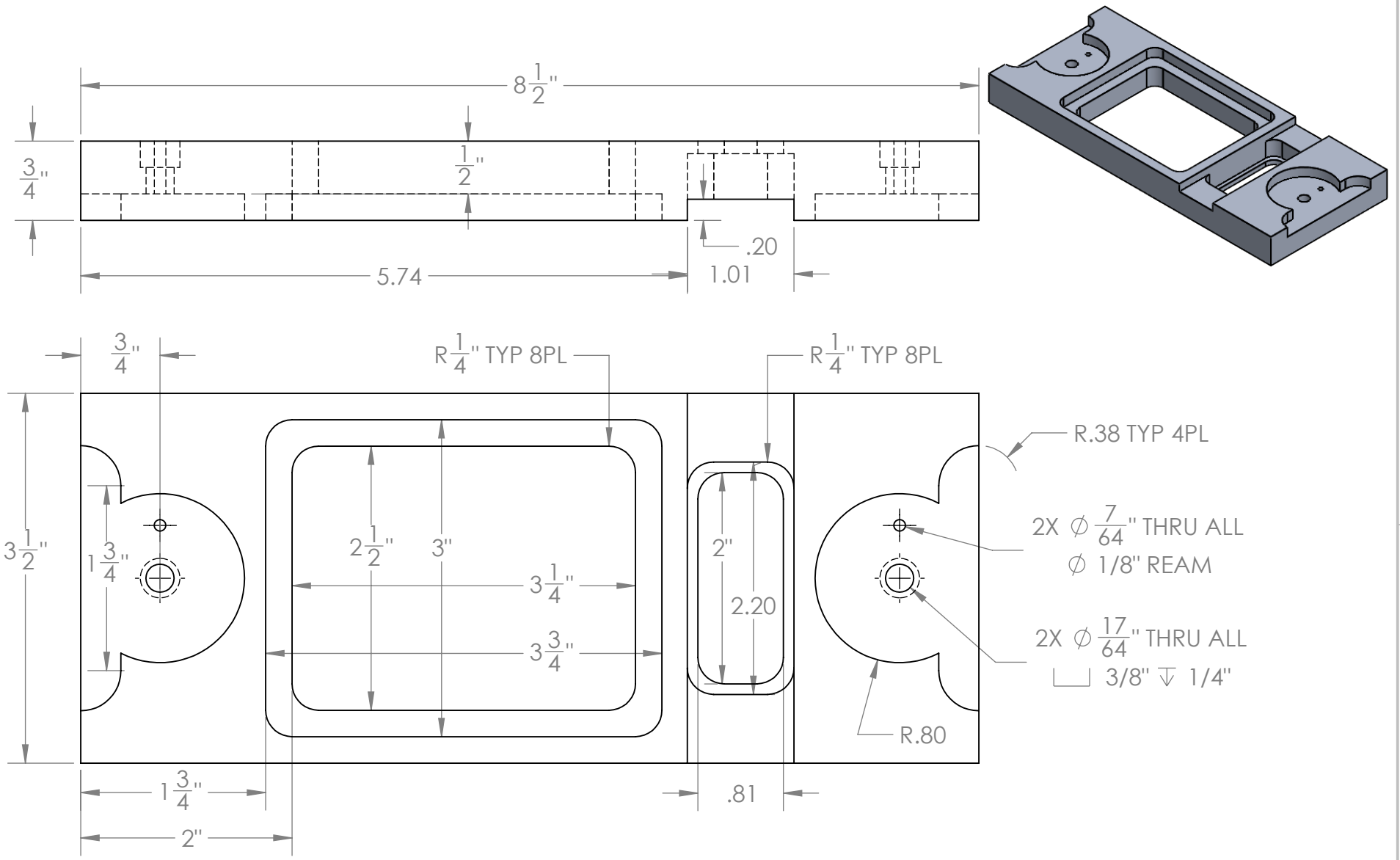
REV 3

DESIGNER: Laura Oelsner

SCALE: 2:3

MATERIAL

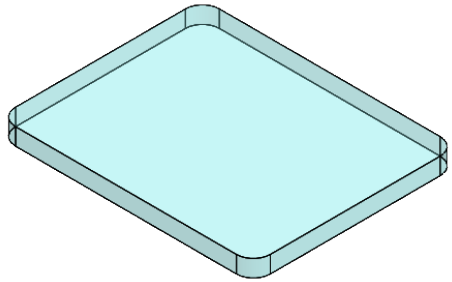
SHEET 1 OF 8



BIM 110L - Digital Microscope

DWG. NO.		DATE	REV
Part 1 - Base		12-3-18	3
DESIGNER: Laura Oelsner	SCALE 3:4	MATERIAL: Aluminum	SHEET 2 OF 8

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS
OTHERWISE NOTED:
FRACTIONAL ±/32"
TWO PLACED DECIMAL ±0.01
THREE PLACED DECIMAL ±0.005

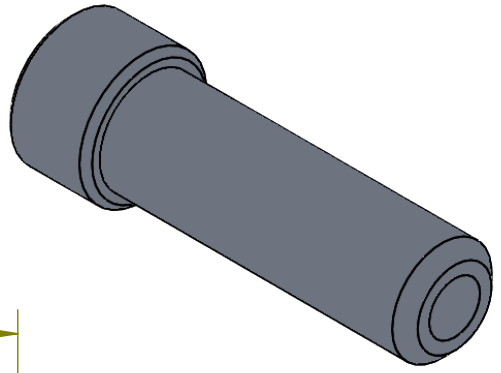


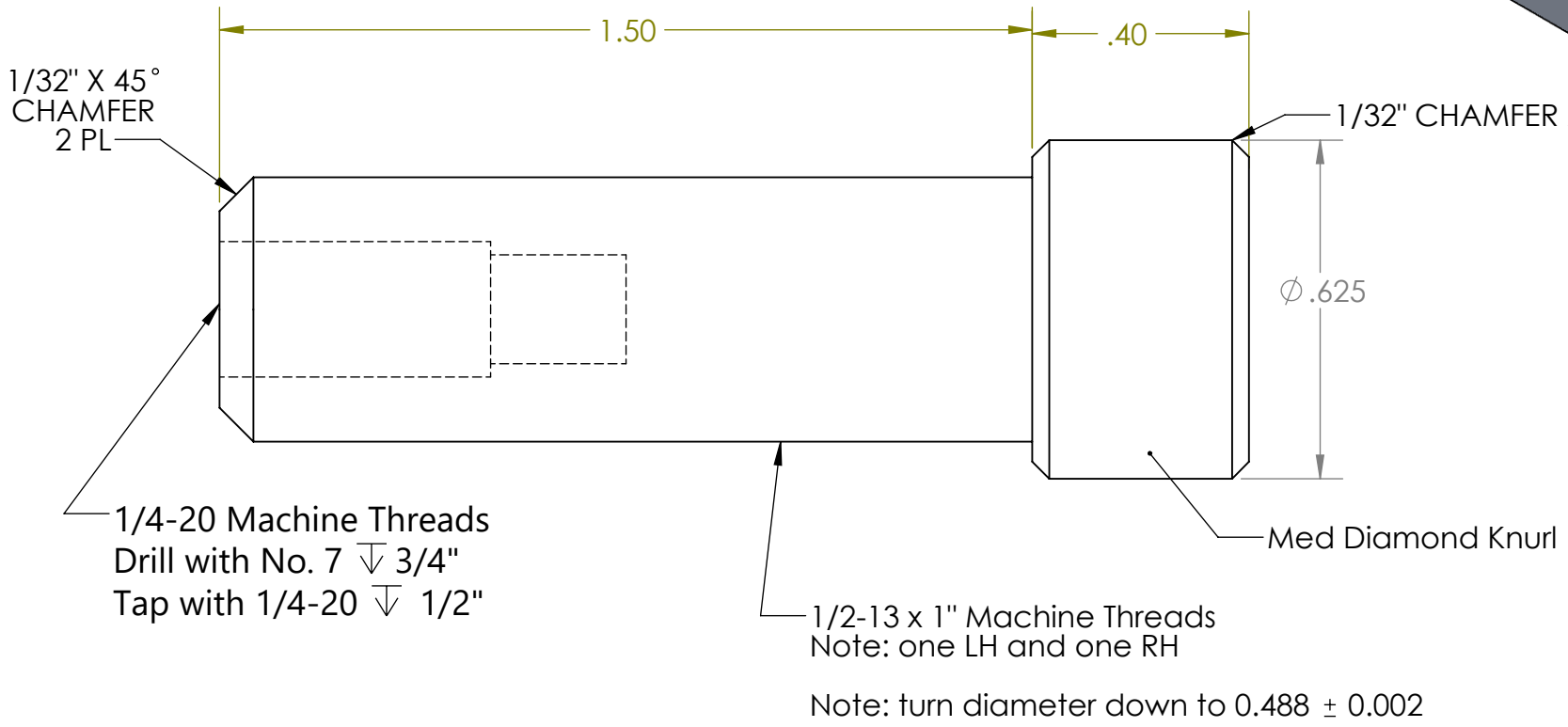
BIM 110L - Digital Microscope

DWG. NO.	DATE	REV
Part 2 - Center Cover	12-3-18	3

DESIGNER:	SCALE: 3:2	MATERIAL:	SHEET 3 OF 8
Laura Oelsner		1/4" Acrylic	

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS
OTHERWISE NOTED:
FRACTIONAL ±/32"
TWO PLACED DECIMAL ±0.01
THREE PLACED DECIMAL ±0.005





Note: turn diameter down to 0.488 ± 0.002

BIM 110L - Digital Microscope

DWG. NO. Part 3 - Guide Rod

DATE 12-3-18

REV 3

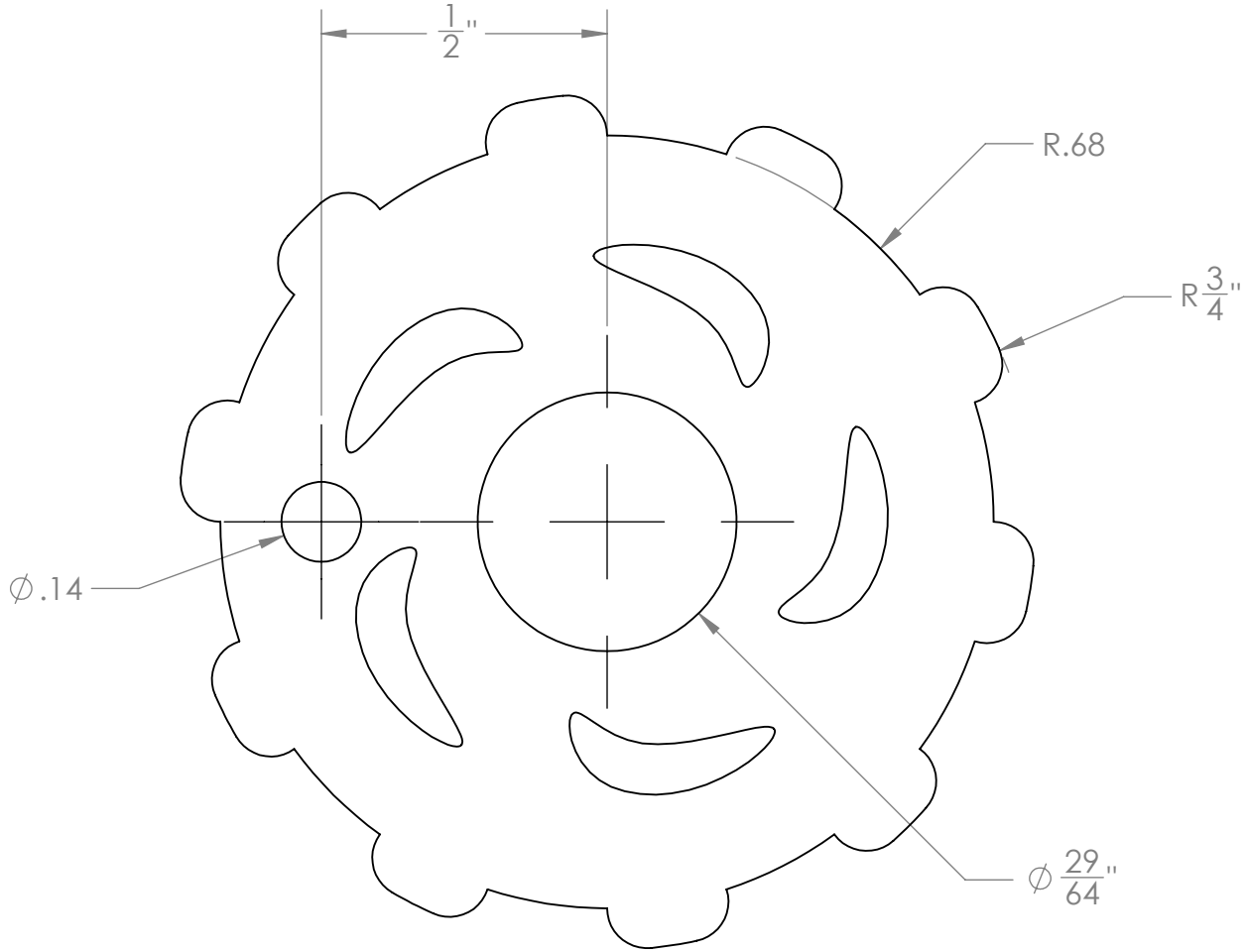
DESIGNER: Laura Oelsner

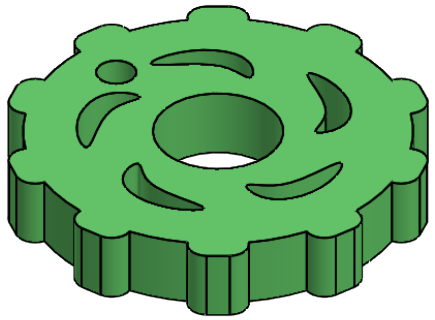
SCALE: 3:1

MATERIAL: Aluminum

SHEET 4 OF 8

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS
OTHERWISE NOTED:
FRACTIONAL ±/32"
TWO PLACED DECIMAL ±0.01
THREE PLACED DECIMAL ±0.005





NOTE: ONE WILL BE RIGHT HAND TAPPED AND THE SECOND WILL BE LEFT HAND TAPPED

BIM 110L - Digital Microscope

DWG. NO. Part 4 - Knob

DATE 12-3-18

REV 3

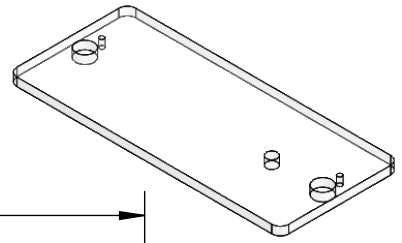
DESIGNER: Laura Oelsner

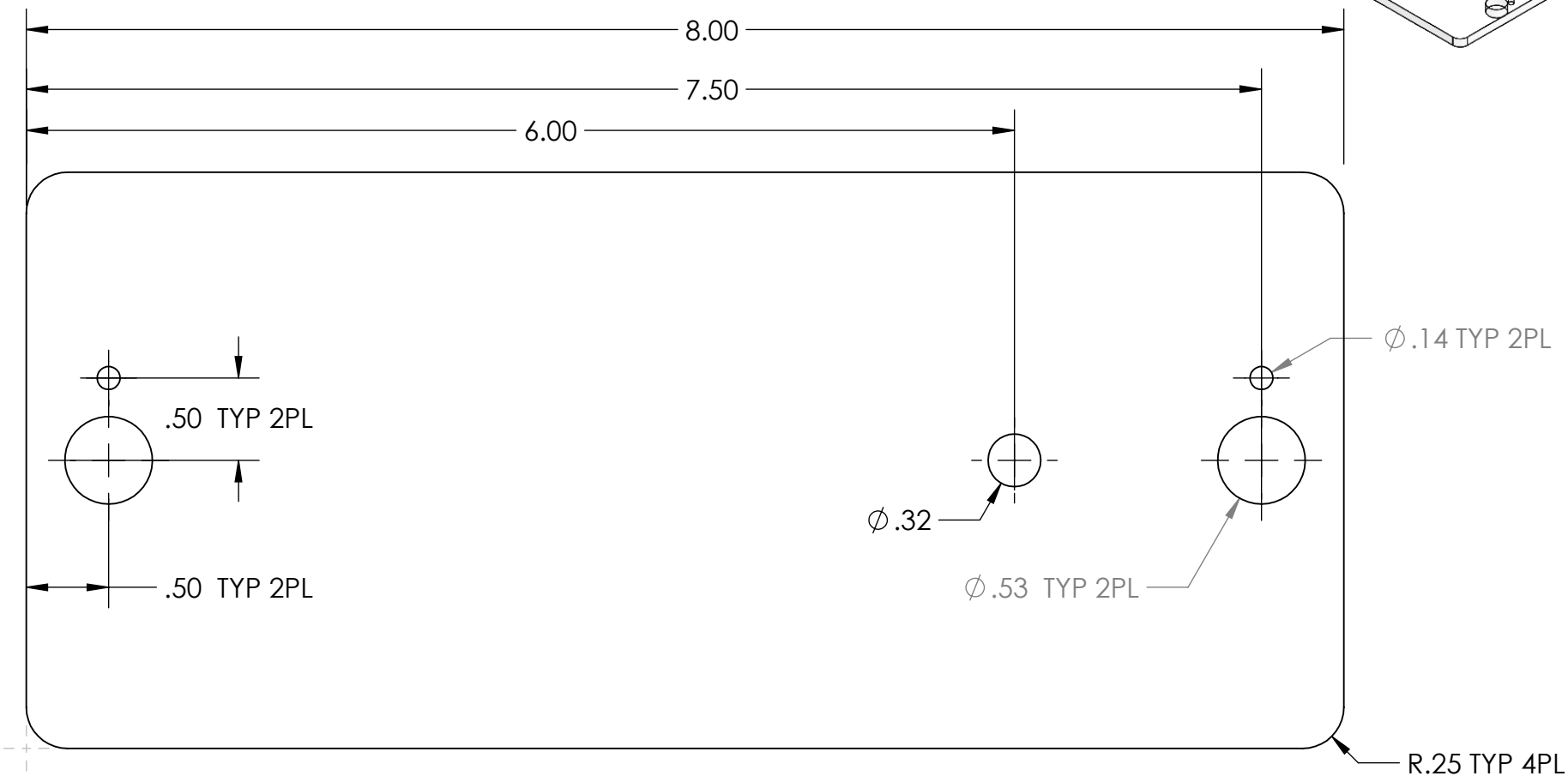
SCALE: 2:1

MATERIAL: 1/4" Acrylic

SHEET 5 OF 8

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS
OTHERWISE NOTED:
FRACTIONAL ±/32"
TWO PLACED DECIMAL ±0.01
THREE PLACED DECIMAL ±0.005



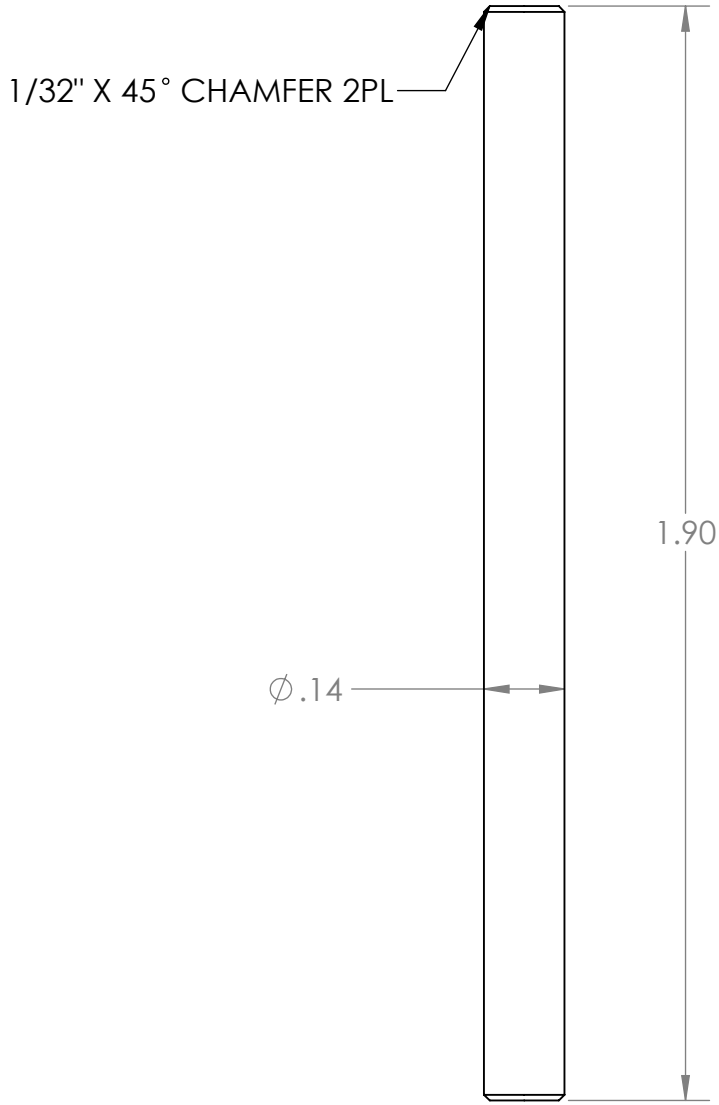


BIM 110L - Digital Microscope

Part 5 - Platform

DWG. NO.			DATE 12-3-18	REV 3
DESIGNER: Laura Oelsner	SCALE: 1:1	MATERIAL: 1/4" Acrylic	SHEET 6 OF 8	

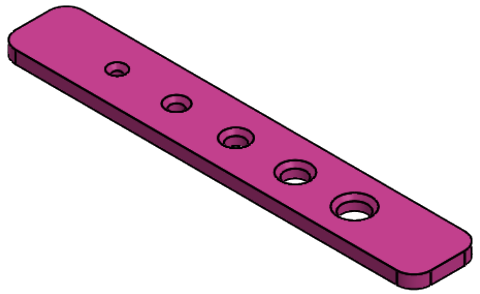
DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS
OTHERWISE NOTED:
FRACTIONAL ±/32"
TWO PLACED DECIMAL ±0.01
THREE PLACED DECIMAL ±0.005

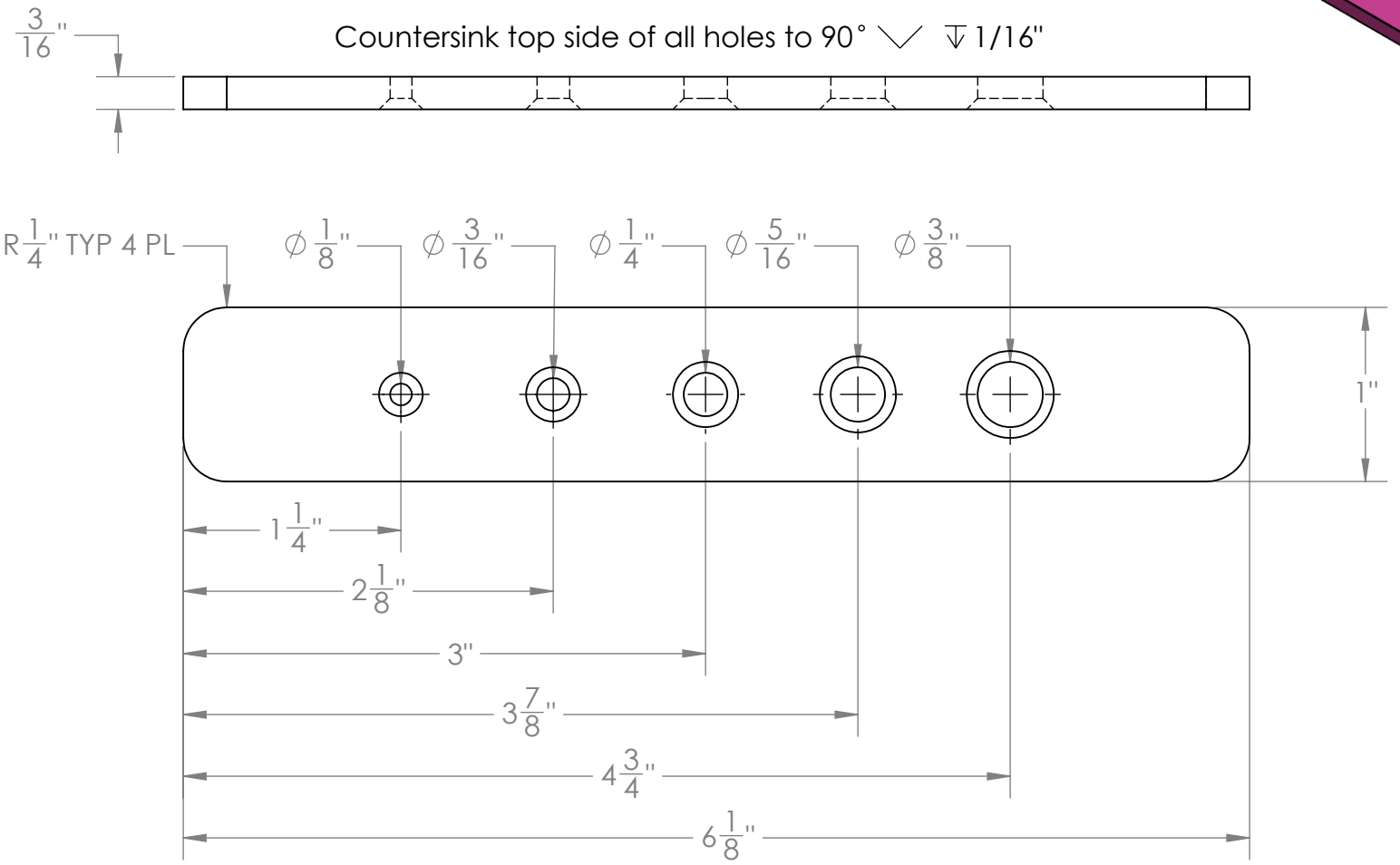


BIM 110L - Digital Microscope

DWG. NO. Part 6 - Guide Pin			Date 12-3-18	REV 3
DESIGNER: Laura Oelsner	SCALE: 3:1	MATERIAL: Aluminum	SHEET 7 OF 8	

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS
OTHERWISE NOTED:
FRACTIONAL ±/32"
TWO PLACED DECIMAL ±0.01
THREE PLACED DECIMAL ±0.005





NOTE: ALL EDGES ARE TO BE DEBURRED

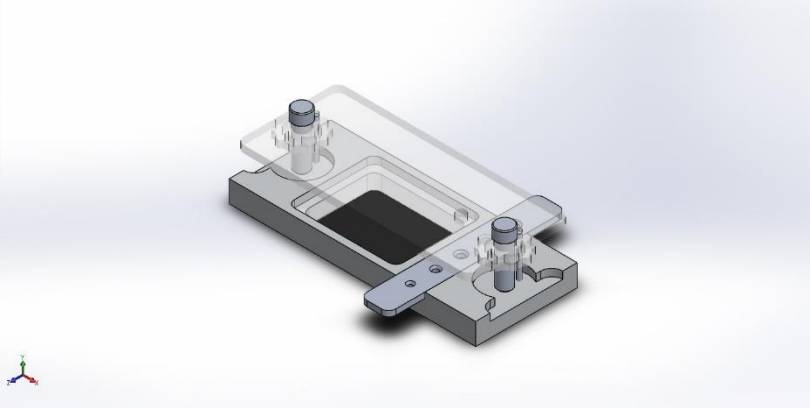
BIM 110L - Digital Microscope

Part 7 - Aperture

DWG. NO.	DATE	REV
	12-3-18	3

DESIGNER:	SCALE	MATERIAL:	SHEET
Laura Oelsner	1:1	3/16" Sheet Aluminum	8 OF 8

DIMENSIONS ARE IN INCHES
TOLERANCES UNLESS
OTHERWISE NOTED:
FRACTIONAL ±/32"
TWO PLACED DECIMAL ±0.01
THREE PLACED DECIMAL ±0.005



Simulation of Microscope Assembly

Date: Monday, December 3, 2018
Designer: Solidworks
Study name: Static 2
Analysis type: Static

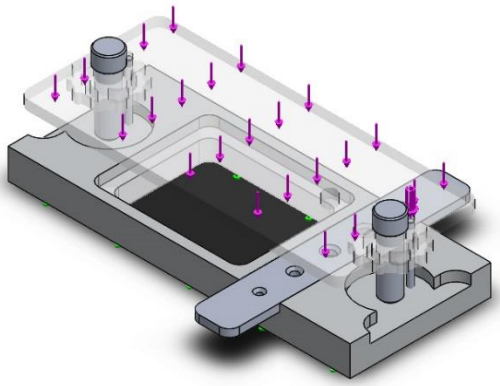
Table of Contents

Description

No Data

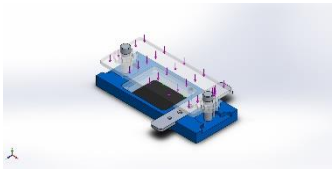
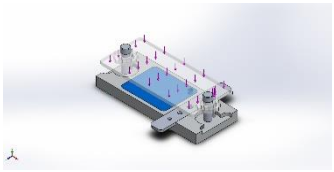
Assumptions

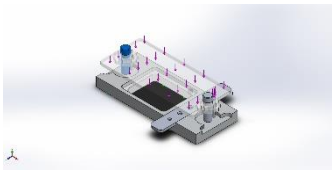
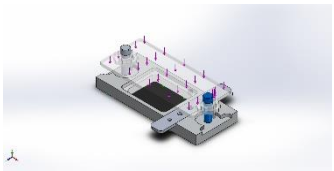
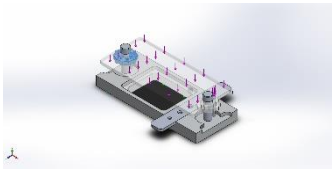
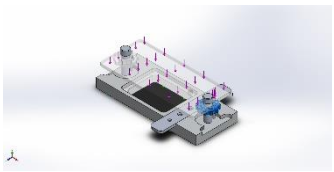
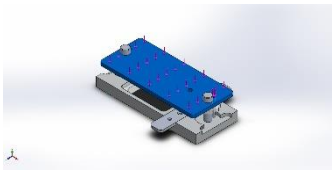
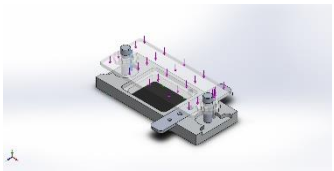
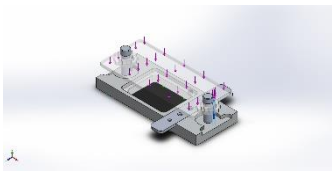
Model Information

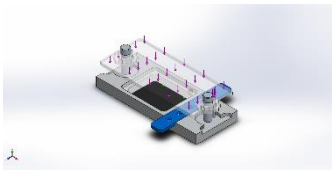


Model name: Assem1FEA
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude4 	Solid Body	**Mass:0.545295 kg** **Volume:0.000201961 m^3** **Density:2700 kg/m^3** **Weight:5.34389 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item1.SLDPRT** Nov 16 15:03:12 2018
Boss-Extrude1 	Solid Body	**Mass:0.0550426 kg** **Volume:4.58688e-05 m^3** **Density:1200 kg/m^3** **Weight:0.539417 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item2.SLDPRT** Nov 30 16:50:14 2018

Chamfer1 	Solid Body	**Mass:0.0162028 kg Volume:6.00105e-06 m^3 Density:2700 kg/m^3 Weight:0.158788 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item3.SLDPRT** Dec 3 01:31:01 2018
Chamfer1 	Solid Body	**Mass:0.0162028 kg Volume:6.00105e-06 m^3 Density:2700 kg/m^3 Weight:0.158788 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item3.SLDPRT** Dec 3 01:31:01 2018
Boss-Extrude1 	Solid Body	**Mass:0.00607953 kg Volume:5.06631e-06 m^3 Density:1199.99 kg/m^3 Weight:0.0595794 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item4FEA.SLDPRT** Dec 3 03:05:31 2018
Boss-Extrude1 	Solid Body	**Mass:0.0060795 kg Volume:5.06631e-06 m^3 Density:1199.98 kg/m^3 Weight:0.0595791 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item4FEA.SLDPRT** Dec 3 03:05:31 2018
Boss-Extrude1 	Solid Body	**Mass:0.134661 kg Volume:0.000112218 m^3 Density:1200 kg/m^3 Weight:1.31968 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item5.SLDPRT** Dec 3 18:43:53 2018
Boss-Extrude1 	Solid Body	**Mass:0.00129224 kg Volume:4.78606e-07 m^3 Density:2700 kg/m^3 Weight:0.0126639 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item6.SLDPRT** Dec 3 18:30:53 2018
Boss-Extrude1 	Solid Body	**Mass:0.00129224 kg Volume:4.78606e-07 m^3 Density:2700 kg/m^3 Weight:0.0126639 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item6.SLDPRT** Dec 3 18:30:53 2018

Chamfer3 	Solid Body	**Mass:0.0476811 kg Volume:1.76597e-05 m^3 Density:2700 kg/m^3 Weight:0.467274 N**	**\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope\item7.SLDPRT** Nov 30 17:02:28 2018

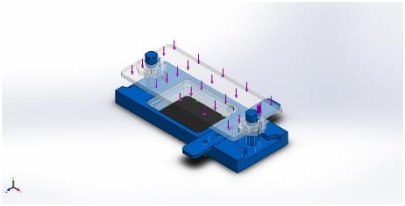
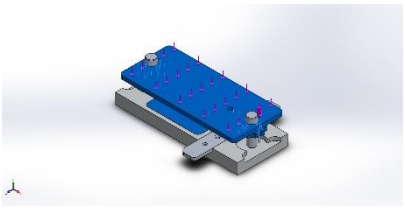
Study Properties

Study name	Static 2
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	FFEPlus
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (\\coe-itss-bfs.engr.ucdavis.edu\StudentDocs$\lroelsne\Documents\2018-19\BIM 110L\microscope)

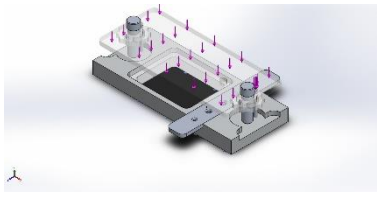
Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

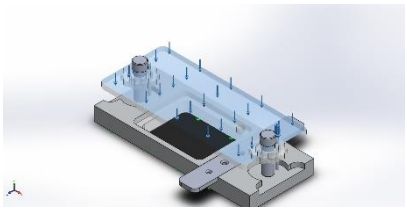
Model Reference	Properties	Components
	**Name:** 6061 Alloy **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 5.51485e+07 N/m^2 **Tensile strength:** 1.24084e+08 N/m^2 **Elastic modulus:** 6.9e+10 N/m^2 **Poisson's ratio:** 0.33 **Mass density:** 2700 kg/m^3 **Shear modulus:** 2.6e+10 N/m^2 **Thermal expansion coefficient:** 2.4e-05 /Kelvin	SolidBody 1(Cut-Extrude4)(item1-1), SolidBody 1(Chamfer1)(item3-1), SolidBody 1(Chamfer1)(item3-2), SolidBody 1(Boss-Extrude1)(item6-1), SolidBody 1(Boss-Extrude1)(item6-2), SolidBody 1(Chamfer3)(item7-1)
Curve Data:N/A		
	**Name:** Acrylic (Medium-high impact) **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 4.5e+07 N/m^2 **Tensile strength:** 7.3e+07 N/m^2 **Elastic modulus:** 3e+09 N/m^2 **Poisson's ratio:** 0.35 **Mass density:** 1200 kg/m^3 **Shear modulus:** 8.9e+08 N/m^2 **Thermal expansion coefficient:** 5.2e-05 /Kelvin	SolidBody 1(Boss-Extrude1)(item2-1), SolidBody 1(Boss-Extrude1)(item4FEA-1), SolidBody 1(Boss-Extrude1)(item4FEA-2), SolidBody 1(Boss-Extrude1)(item5-1)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 1 face(s) **Type:** Fixed Geometry

Resultant Forces

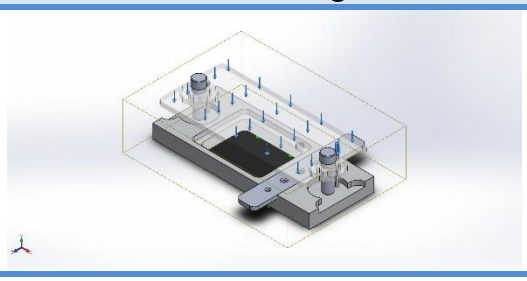
Components	X	Y	Z	Resultant
Reaction force(N)	-1.74607	40002.9	-0.327819	40002.9
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 40000 N

Connector Definitions

No Data

Contact Information

Contact	Contact Image	Contact Properties
Global Contact		**Type:** Bonded **Components:** 1 component(s) **Options:** Incompatible mesh

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points	4 Points
Element Size	0.551472 in
Tolerance	0.0275736 in
Mesh Quality Plot	High

Sensor Details

No Data

Resultant Forces

Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	-1.74607	40002.9	-0.327819	40002.9

Reaction Moments

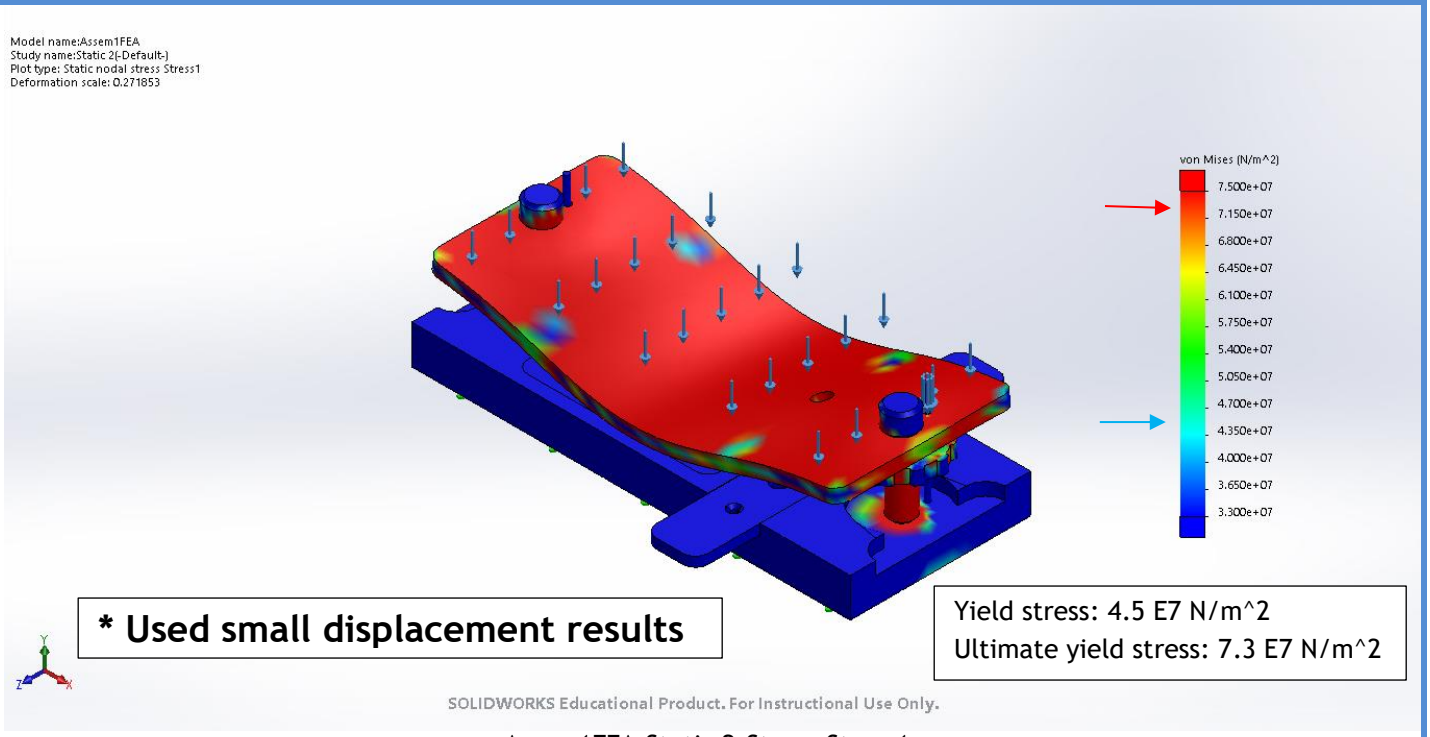
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	0

Beams

No Data

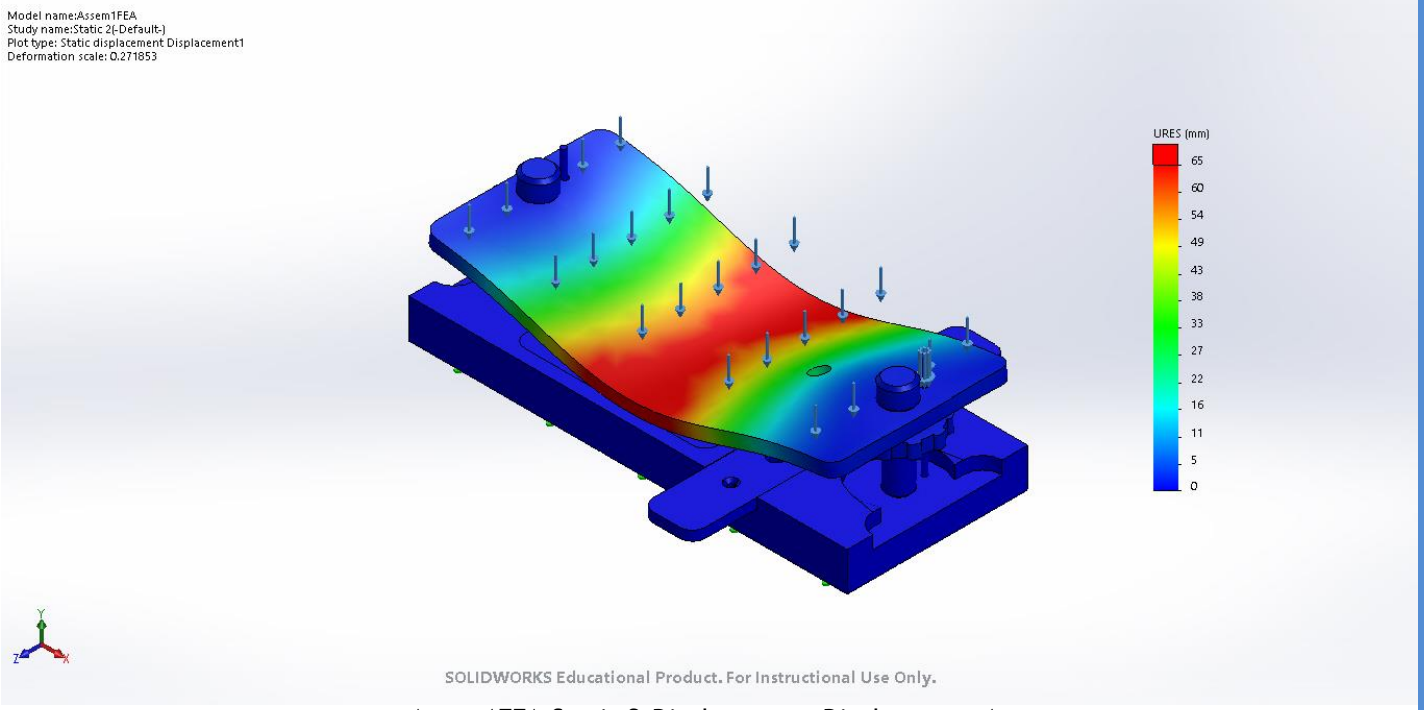
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	3.276e+02 N/m^2 Node: 14634	2.860e+09 N/m^2 Node: 6721



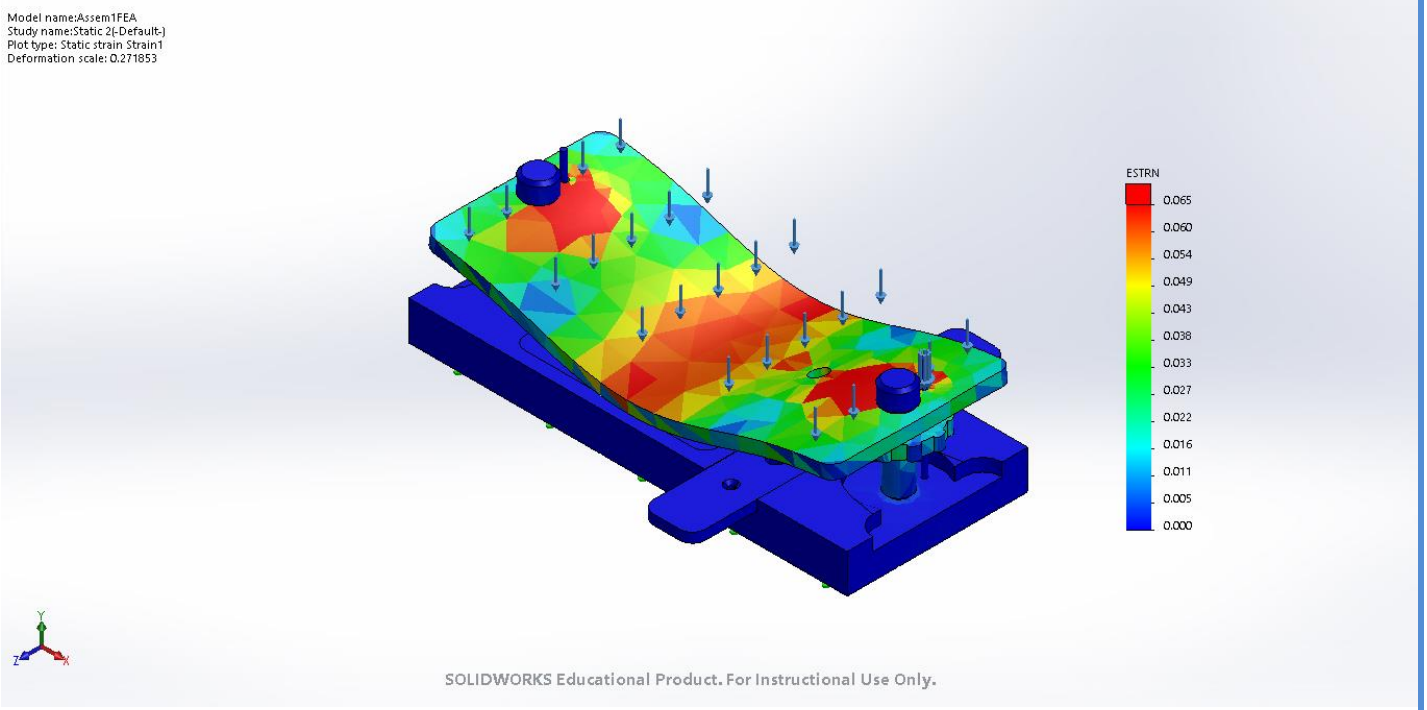
Assem1FEA-Static 2-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0 mm Node: 5	79 mm Node: 13797



Assem1FEA-Static 2-Displacement-Displacement1

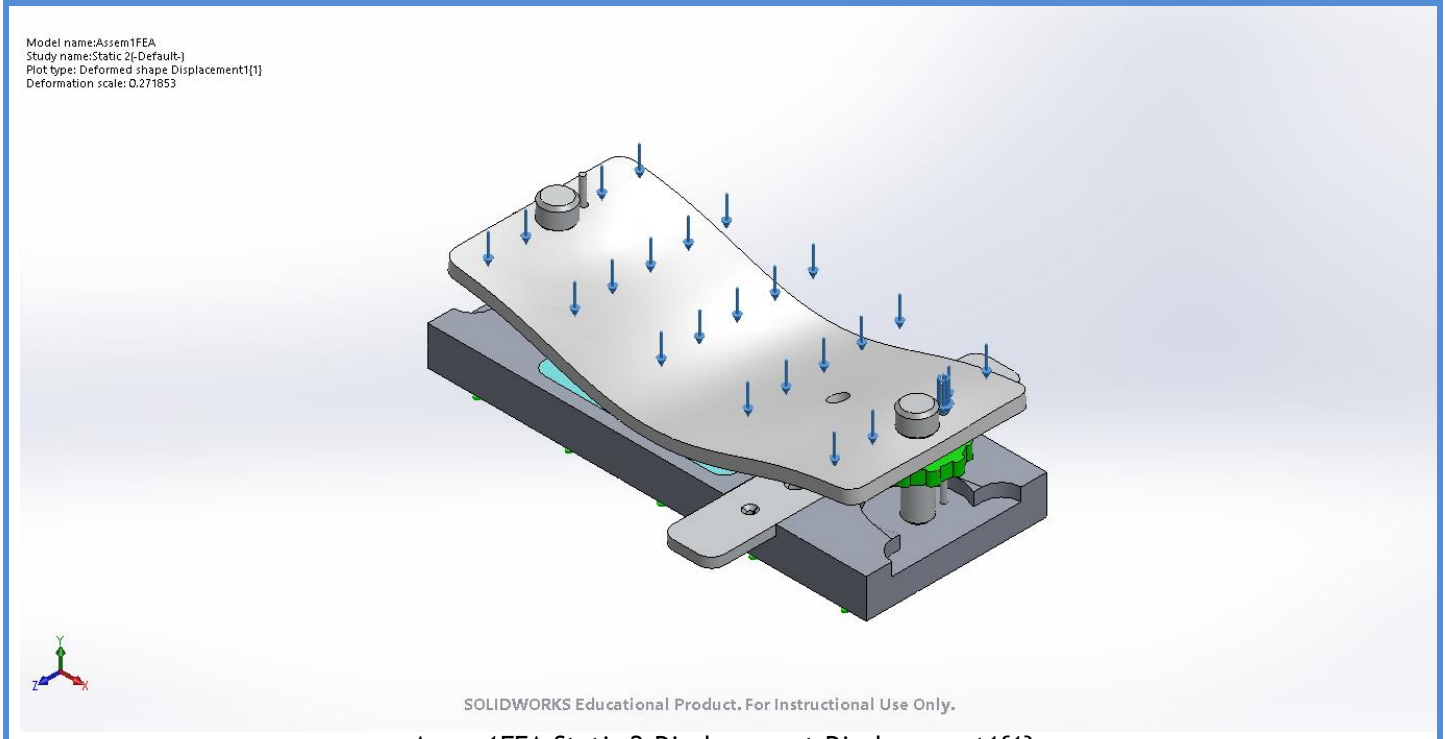
Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	0.000 Element: 7409	0.270 Element: 5506



Assem1FEA-Static 2-Strain-Strain1

Name	Type

Displacement1{1}	Deformed shape



Assem1FEA-Static 2-Displacement-Displacement1{1}

Conclusion

Document Controls

Assembly

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	12-2-18	Laura	Swapped exploded and assembled views
3	12-3-18	Laura	Edited formatting of drawing

Part #1 – Base

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	12-2-18	Laura	Edited formatting of drawing
3	12-3-18	Laura	Increased scale, decluttered drawing

Part #2 – Center Cover

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	12-2-18	Laura	Edited formatting of drawing
3	12-3-18	Laura	Increased drawing scale

Part #3 – Guide Rod

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	11-16-18	Laura	Edited chamfer and hole dimensions
3	12-3-18	Laura	Added more tolerance specifications

Part #4 – Knob

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	12-2-18	Laura	Edited formatting of drawing – removed side view, added material specifications
3	12-3-18	Laura	Edited drawing to display fractions

Part #5 – Platform

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	12-2-18	Laura	Edited formatting of drawing
3	12-3-18	Laura	Increased drawing scale

Part #6 – Guide Pin

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	12-2-18	Laura	Added chamfer. Edited formatting of drawing
3	12-3-18	Laura	Changed part length and diameter, updated in drawing

Part #7 – Aperture

Version	Date Created	Modifier	Notes
1	10-29-18	Laura	First created
2	12-2-18	Laura	Edited formatting of drawing
3	12-3-18	Laura	Edit drawing scale, added side view of countersinks

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Version	Date Created	Modifier	Notes
1	11-5-18	Laura	First created
2	11-21-18	Laura	Edited stress color legend
3	12-3-18	Laura	Added labels to stress image in report