

# Die Set Stress Analysis Report



Analyzed File:	Assembly.iam
Autodesk Inventor Version:	2020 (Build 240168000, 168)
Creation Date:	7/25/2021, 12:43 PM
Study Author:	Bisqwit
Summary:	

## Project Info (iProperties)

### Summary

Author joelm

### Project

Part Number	Assembly
Designer	joelm
Cost	\$0.00
Date Created	6/13/2021

### Status

Design Status WorkInProgress

### Physical

Mass	3.41811 kg
Area	115977 mm <sup>2</sup>
Volume	475495 mm <sup>3</sup>
Center of Gravity	x=173.763 mm y=174.907 mm z=43.9911 mm

Note: Physical values could be different from Physical values used by FEA reported below.

## Static Analysis:1

### General objective and settings:

Design Objective	Single Point
Study Type	Static Analysis
Last Modification Date	7/25/2021, 12:35 PM
Detect and Eliminate Rigid Body Modes	No
Separate Stresses Across Contact Surfaces	No
Motion Loads Analysis	No

### Mesh settings:

Avg. Element Size (fraction of model diameter)	0.1
Min. Element Size (fraction of avg. size)	0.2
Grading Factor	1.5
Max. Turn Angle	60 deg

Create Curved Mesh Elements	No
Use part based measure for Assembly mesh	Yes

## Material(s)

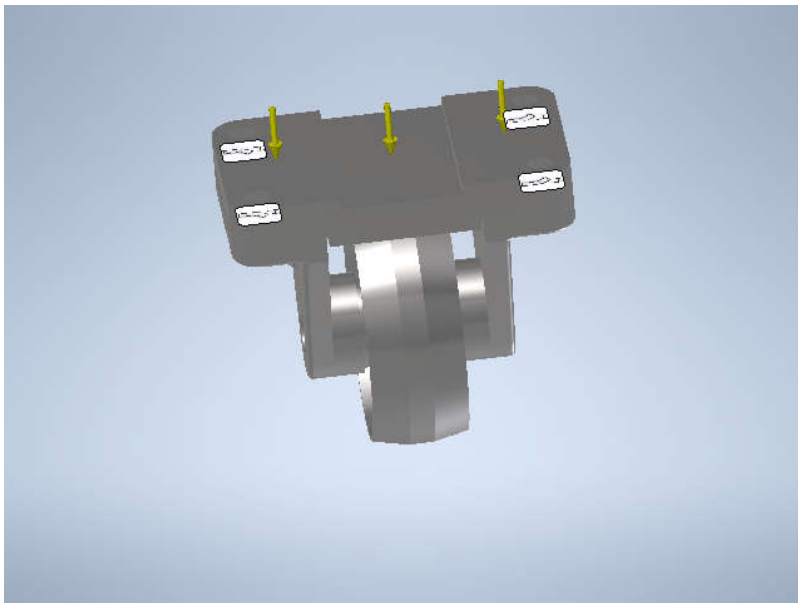
Name	Steel, Carbon	
General	Mass Density	7.85 g/cm <sup>3</sup>
	Yield Strength	350 MPa
	Ultimate Tensile Strength	420 MPa
Stress	Young's Modulus	200 GPa
	Poisson's Ratio	0.29 ul
	Shear Modulus	77.5194 GPa
Part Name(s)	axle.ipt	
Name	Iron, Malleable	
General	Mass Density	7.15 g/cm <sup>3</sup>
	Yield Strength	483 MPa
	Ultimate Tensile Strength	586 MPa
Stress	Young's Modulus	110 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	42.3077 GPa
Part Name(s)	axleSupport.ipt topPlate.ipt wheel.ipt axleSupport.ipt	

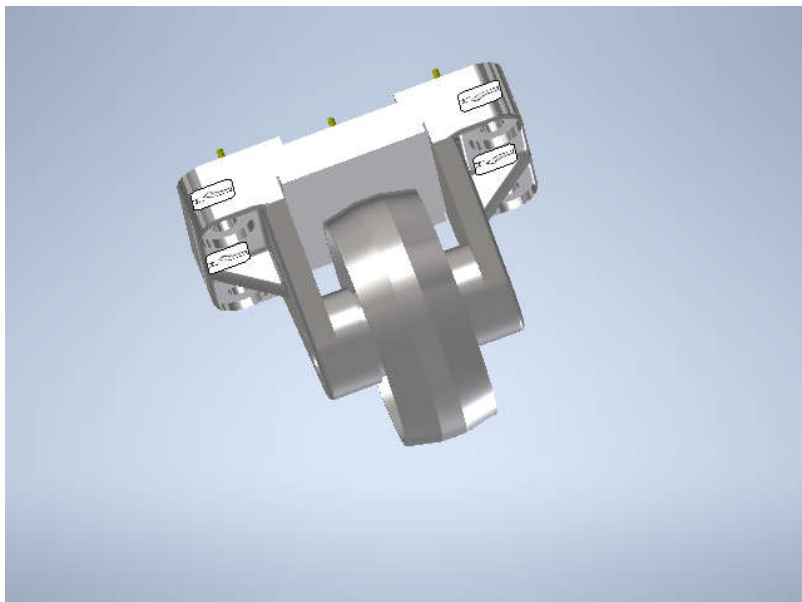
## Operating conditions

### Gravity

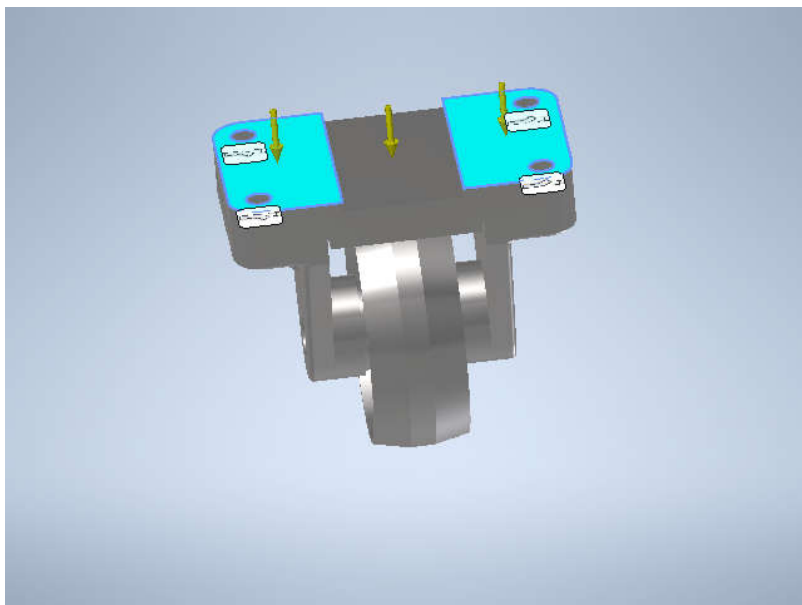
Load Type	Gravity
Magnitude	9810.000 mm/s <sup>2</sup>
Vector X	0.000 mm/s <sup>2</sup>
Vector Y	-9810.000 mm/s <sup>2</sup>
Vector Z	0.000 mm/s <sup>2</sup>

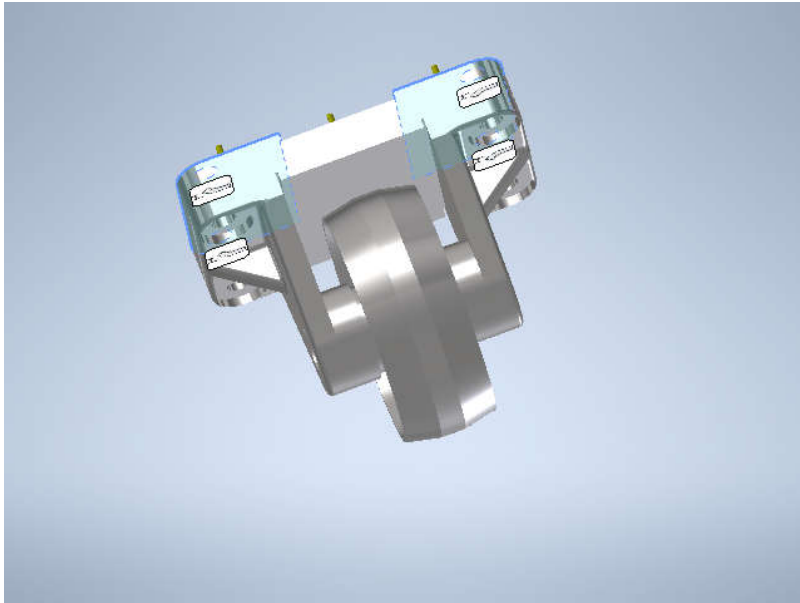
### Selected Face(s)



**Force:1**

Load Type	Force
Magnitude	100000.000 N
Vector X	0.000 N
Vector Y	-100000.000 N
Vector Z	0.000 N

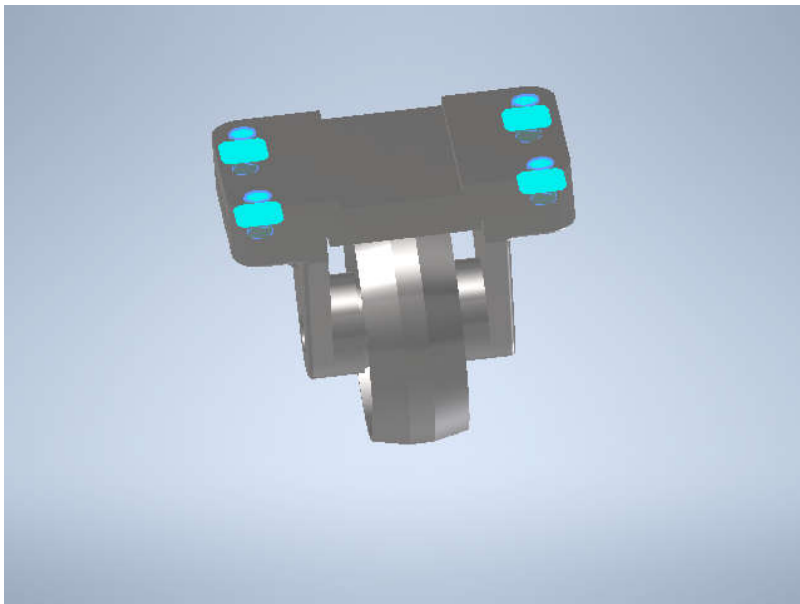
**Selected Face(s)**

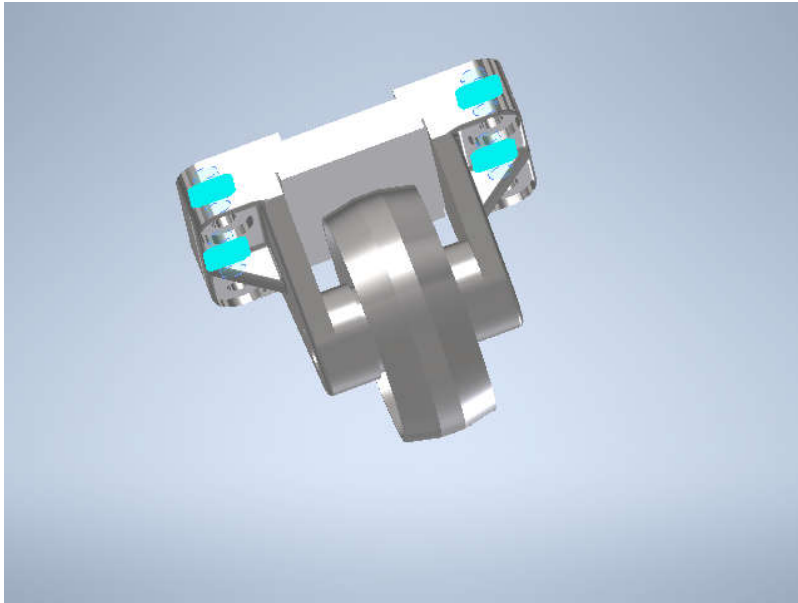


### Fixed Constraint:1

Constraint Type	Fixed Constraint
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### Selected Face(s)





### ☐ Contacts (Bonded)

Name	Part Name(s)
Bonded:1	axleSupport:1 topPlate:1
Bonded:2	topPlate:1 axleSupport:2
Bonded:3	axle:1 axleSupport:2
Bonded:4	axle:1 axleSupport:1
Bonded:5	axle:1 wheel:1
Bonded:6	axle:1 axleSupport:1
Bonded:7	axle:1 axleSupport:2

### ☐ Results

#### ☐ Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	100033 N	0 N	0 N m	0 N m
		100033 N		0 N m
		0 N		0 N m

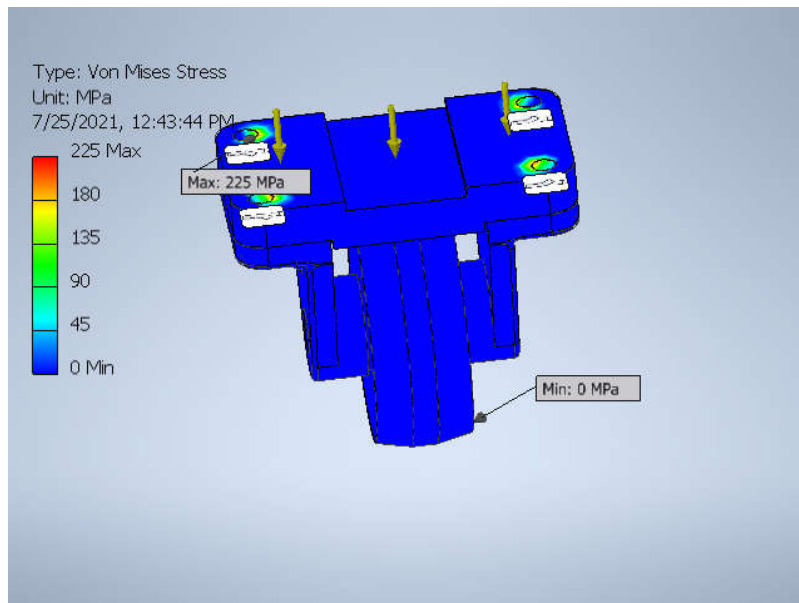
#### ☐ Result Summary

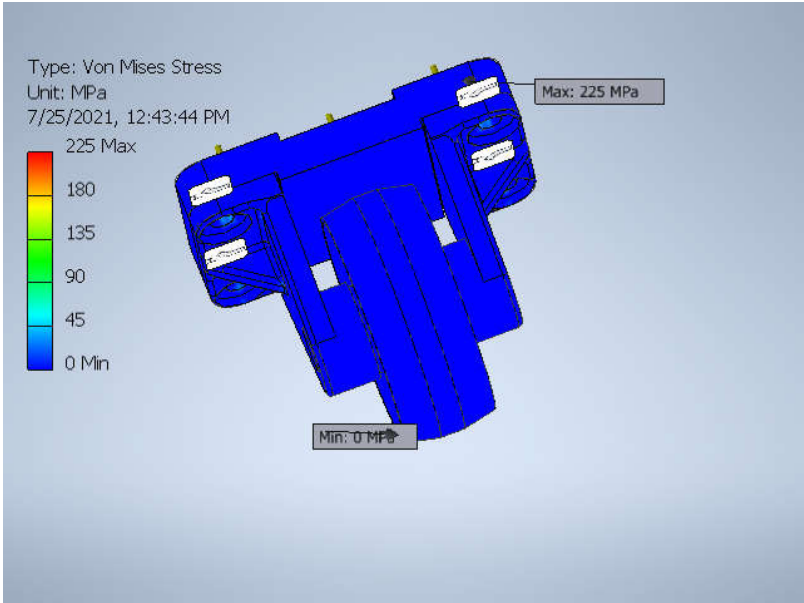
Name	Minimum	Maximum
Volume	475494 mm <sup>3</sup>	
Mass	3.4181 kg	
Von Mises Stress	0.00517791 MPa	225.006 MPa
1st Principal Stress	-18.5131 MPa	298.331 MPa
3rd Principal Stress	-107.021 MPa	51.3881 MPa
Displacement	0 mm	0.0393609 mm
Safety Factor	2.14661 ul	15 ul
Stress XX	-82.2451 MPa	234.561 MPa
Stress XY	-93.5291 MPa	90.3097 MPa
Stress XZ	-65.6267 MPa	68.7326 MPa

Stress YY	-31.3063 MPa	104.916 MPa
Stress YZ	-77.1359 MPa	82.5531 MPa
Stress ZZ	-47.9003 MPa	143.564 MPa
X Displacement	-0.0188037 mm	0.0188353 mm
Y Displacement	-0.0393609 mm	0.00258723 mm
Z Displacement	-0.00409659 mm	0.00410538 mm
Equivalent Strain	0.0000000412911 ul	0.00193652 ul
1st Principal Strain	-0.0000198047 ul	0.00228582 ul
3rd Principal Strain	-0.0010723 ul	-0.0000000198287 ul
Strain XX	-0.000782055 ul	0.00164446 ul
Strain XY	-0.00110534 ul	0.0010673 ul
Strain XZ	-0.000775588 ul	0.000812295 ul
Strain YY	-0.000558251 ul	0.000586775 ul
Strain YZ	-0.000911606 ul	0.000975628 ul
Strain ZZ	-0.000439438 ul	0.000869663 ul
Contact Pressure	0 MPa	110.964 MPa
Contact Pressure X	-65.1634 MPa	70.833 MPa
Contact Pressure Y	-92.7464 MPa	42.1846 MPa
Contact Pressure Z	-38.9725 MPa	35.5796 MPa

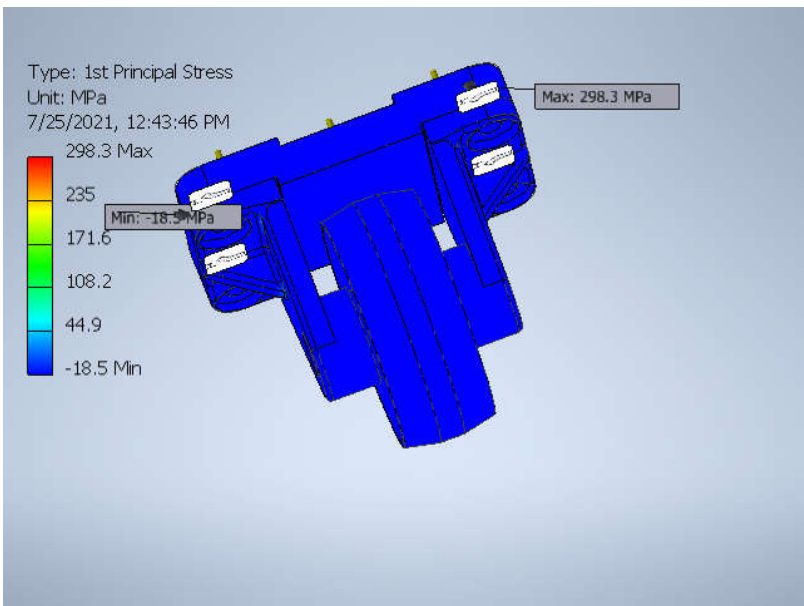
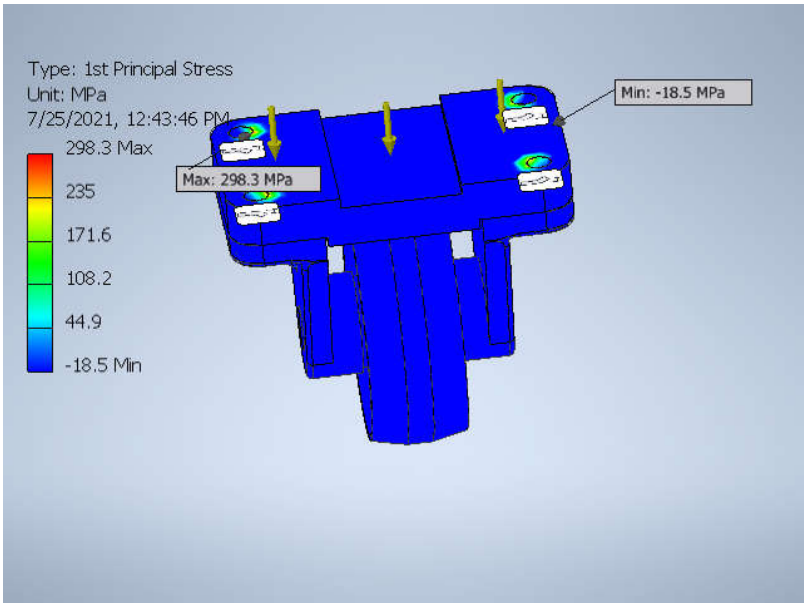
## Figures

### Von Mises Stress

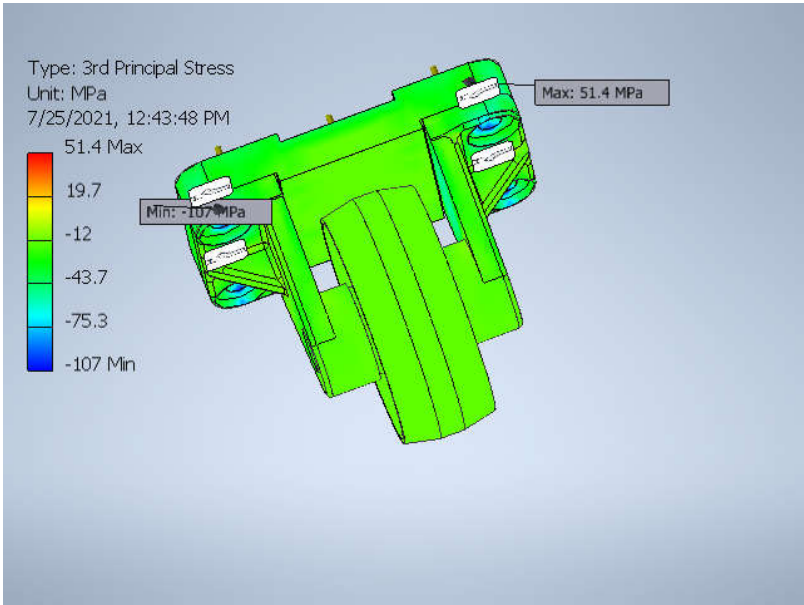
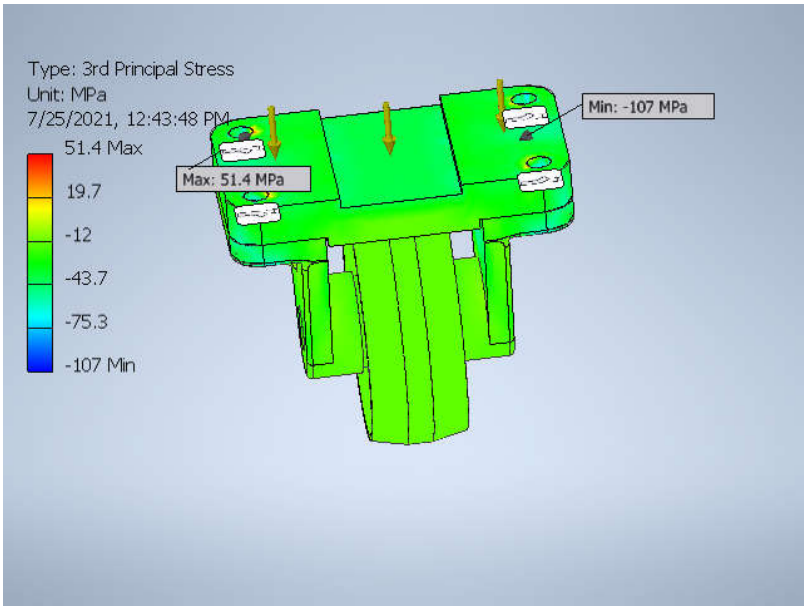




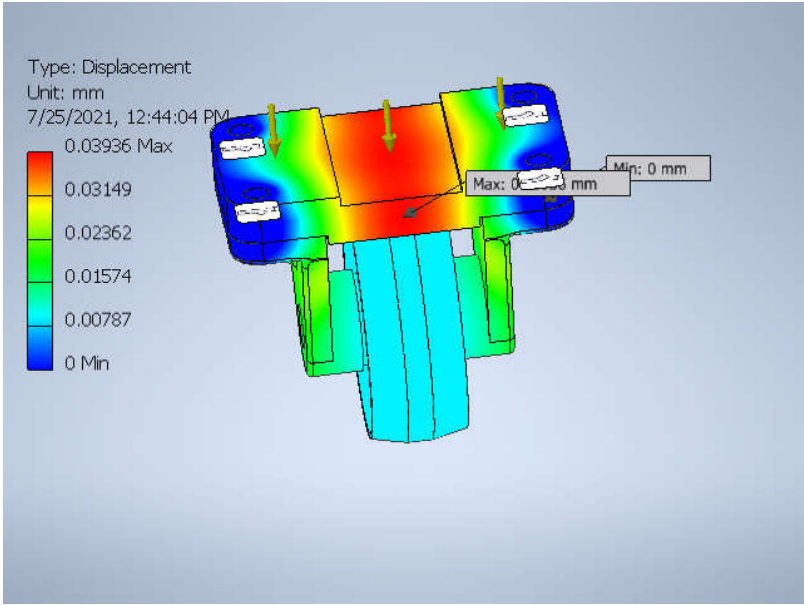
1st Principal Stress



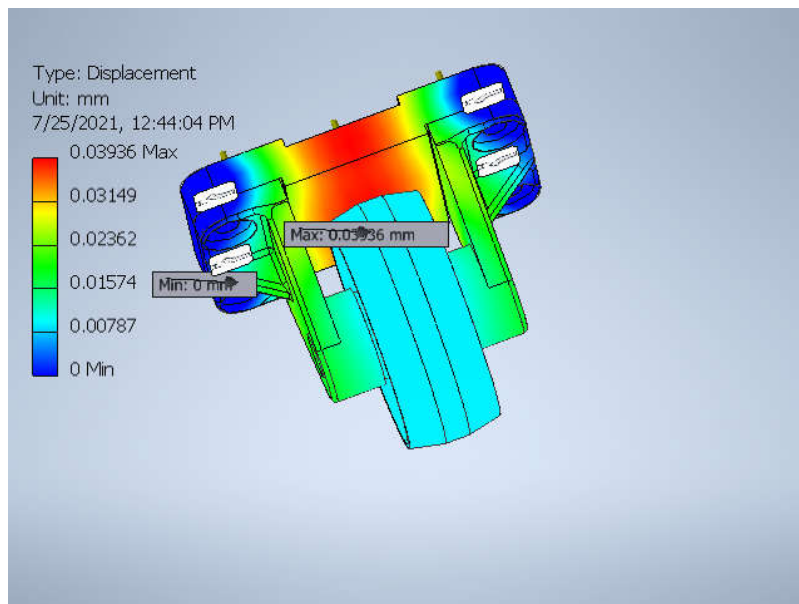
**3rd Principal Stress**



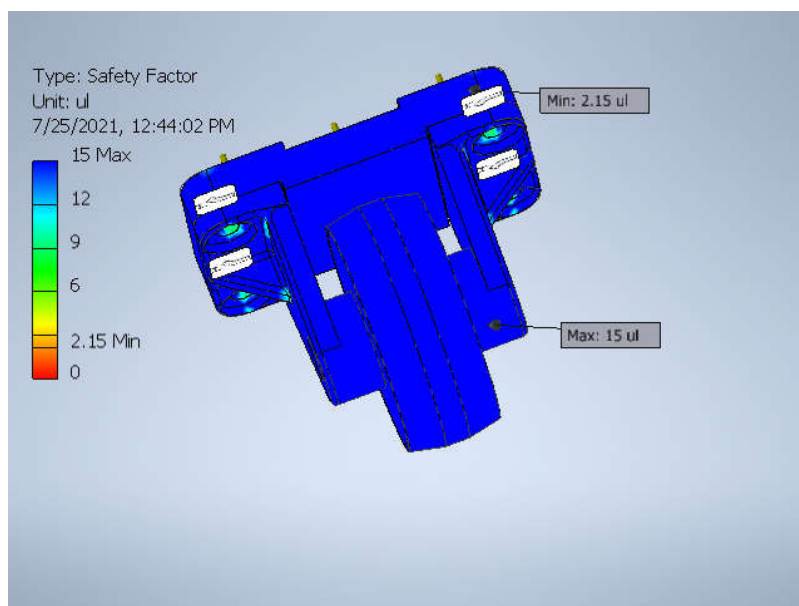
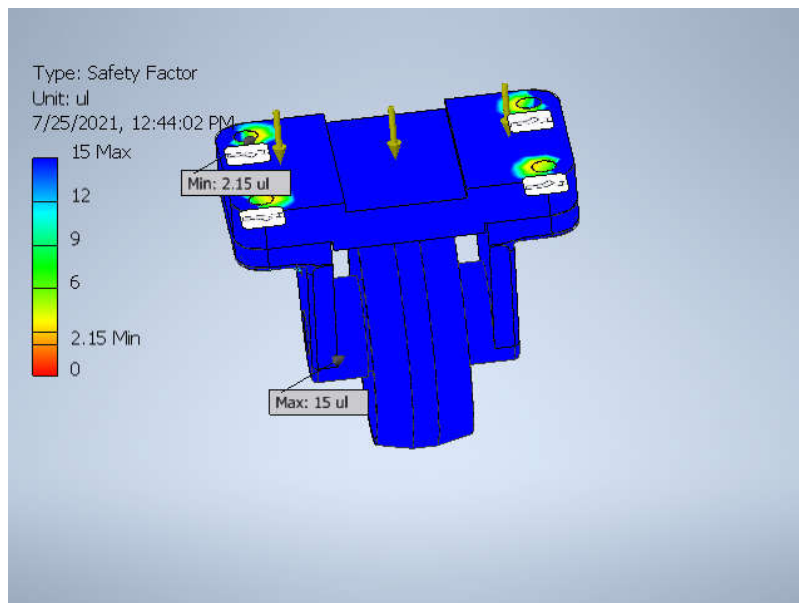
**Displacement**

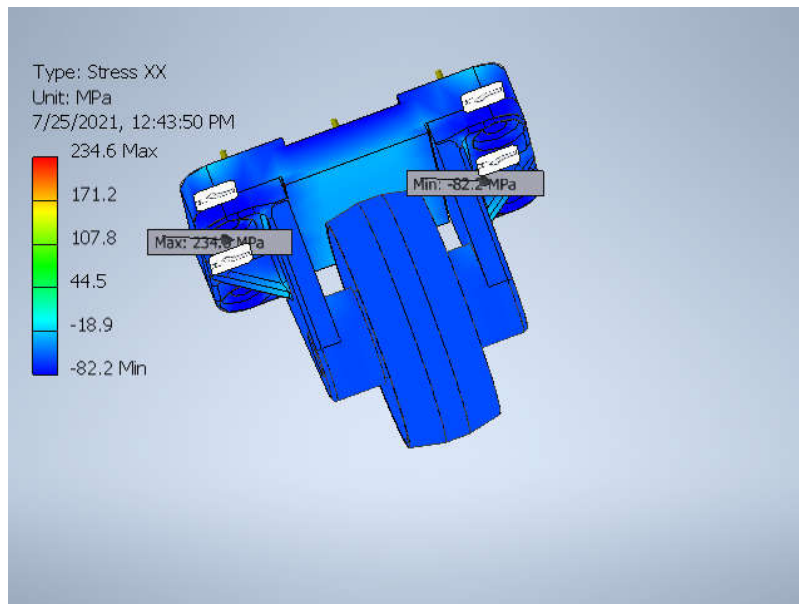
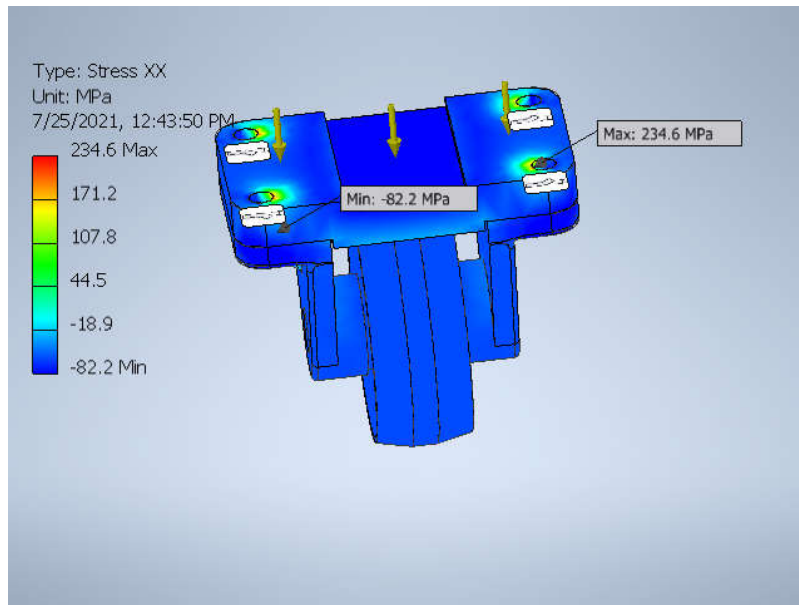
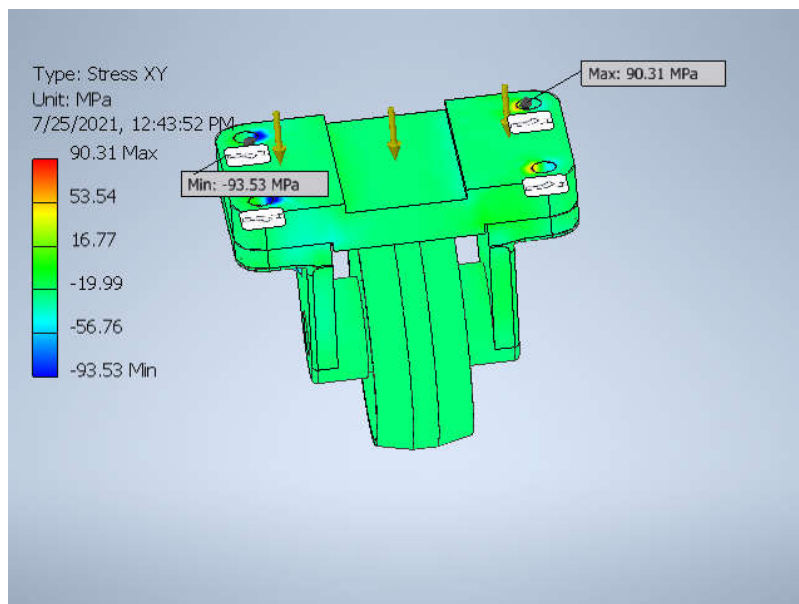


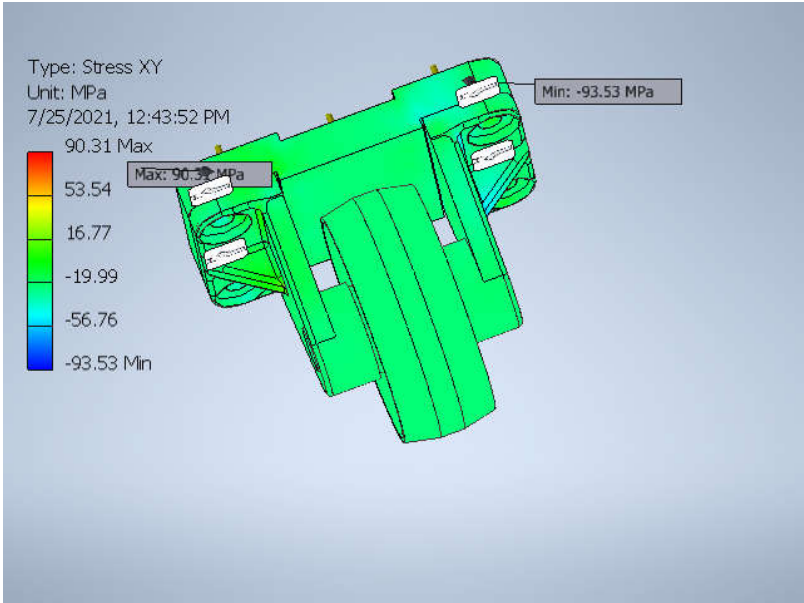




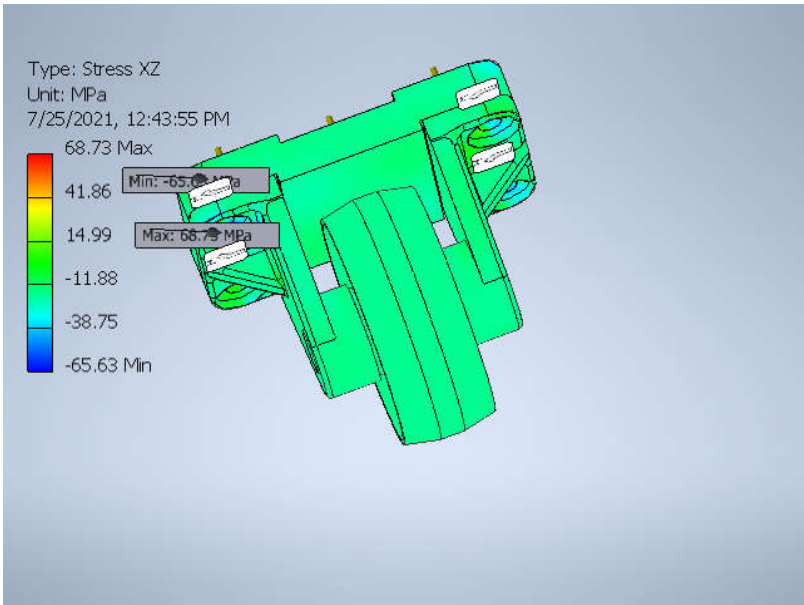
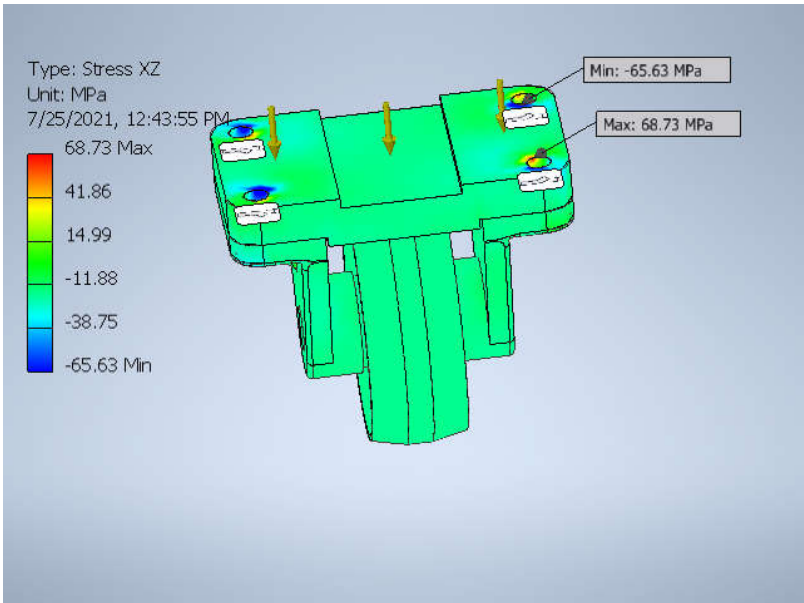
## ☐ Safety Factor



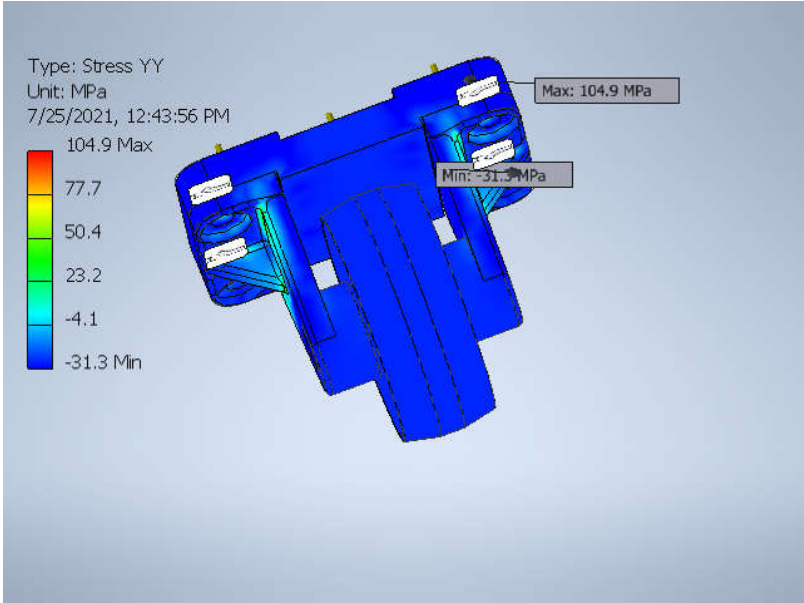
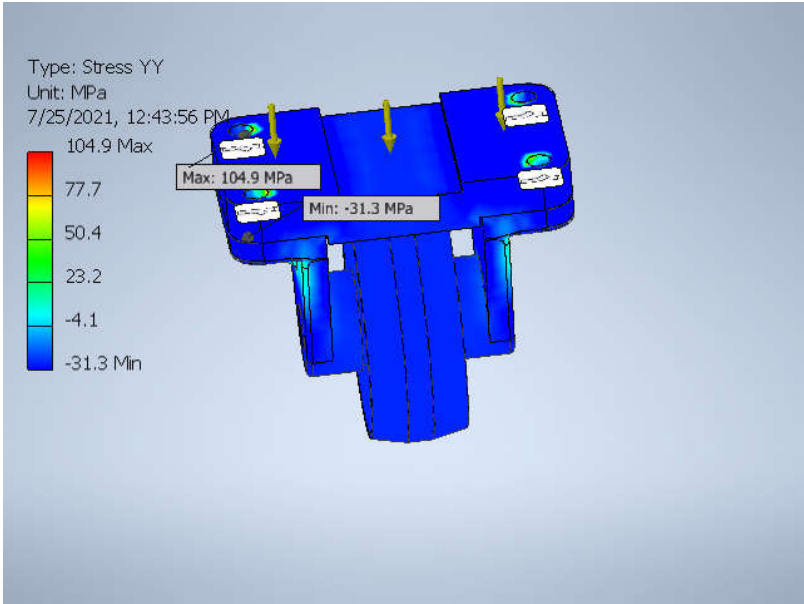
**Stress XX****Stress XY**



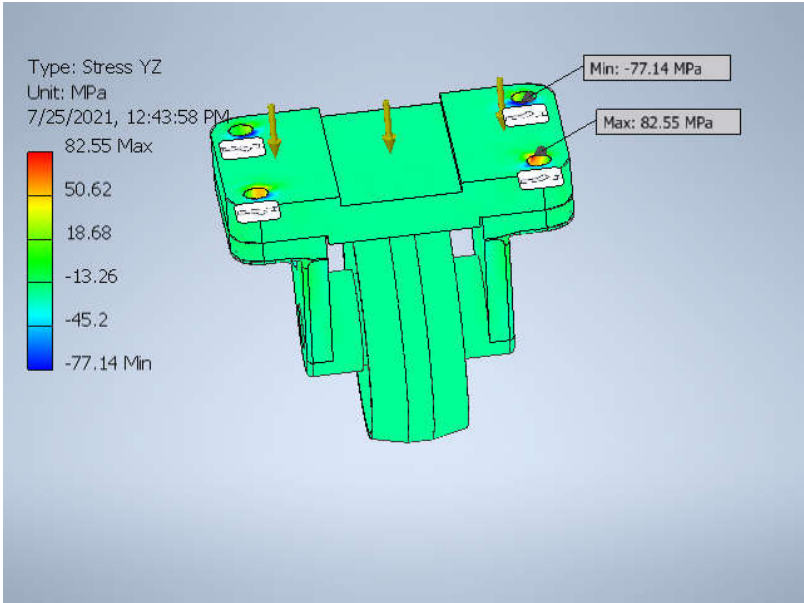
☐ Stress XZ

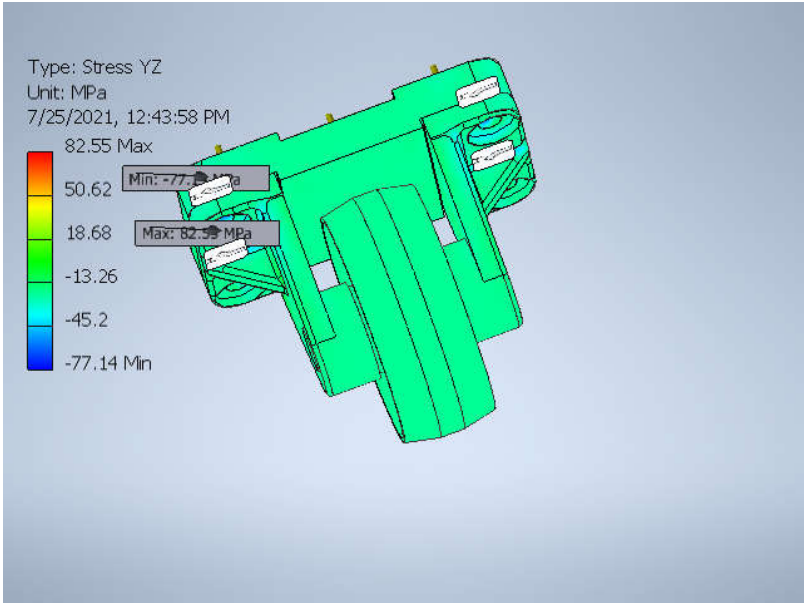


☐ Stress YY

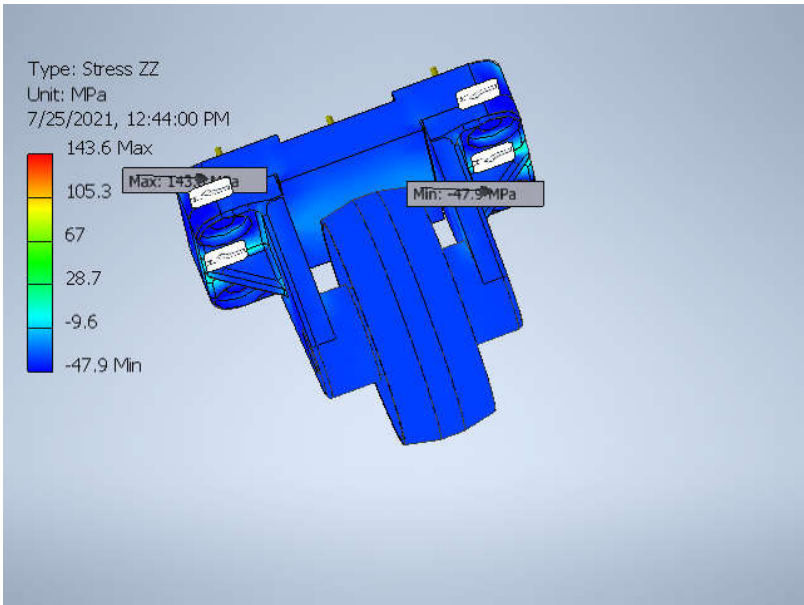
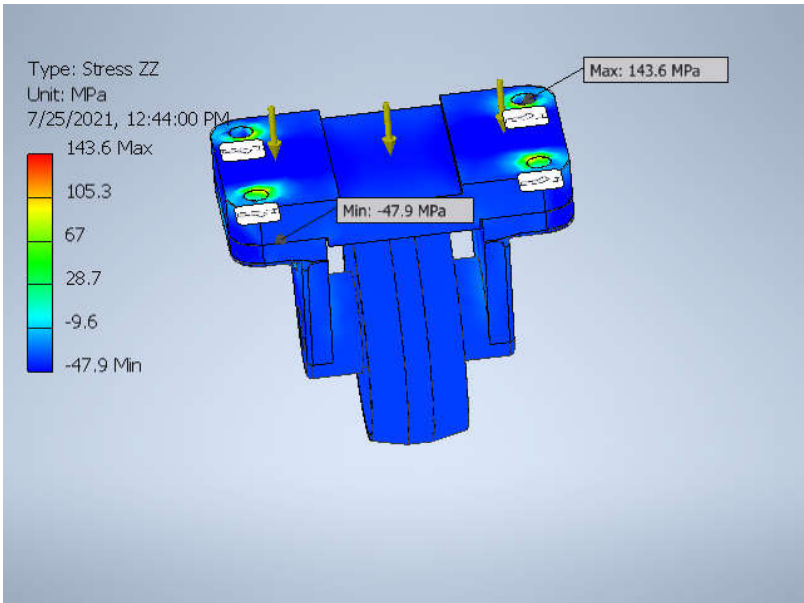


☐ Stress YZ



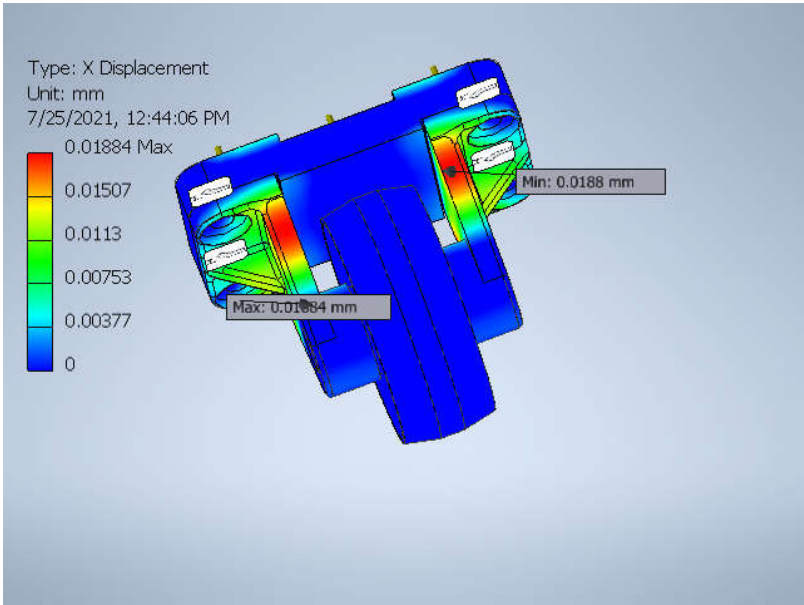
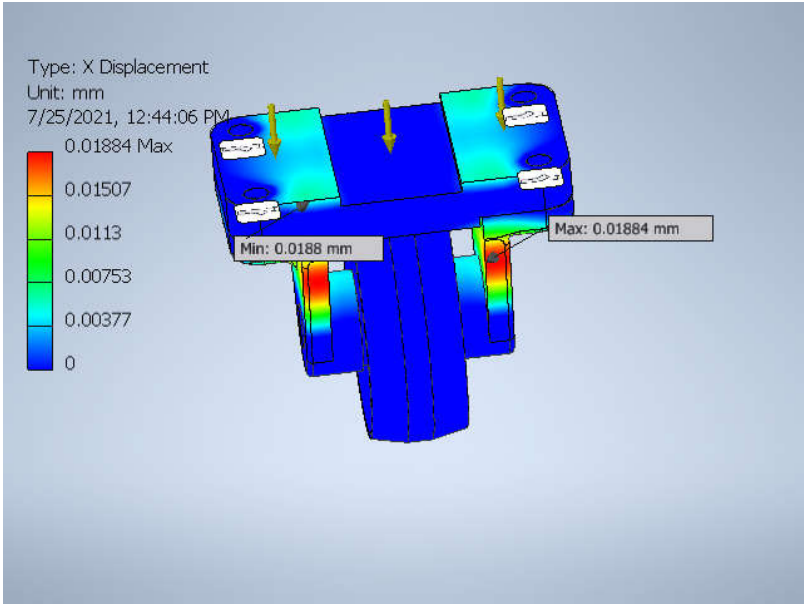


Stress ZZ

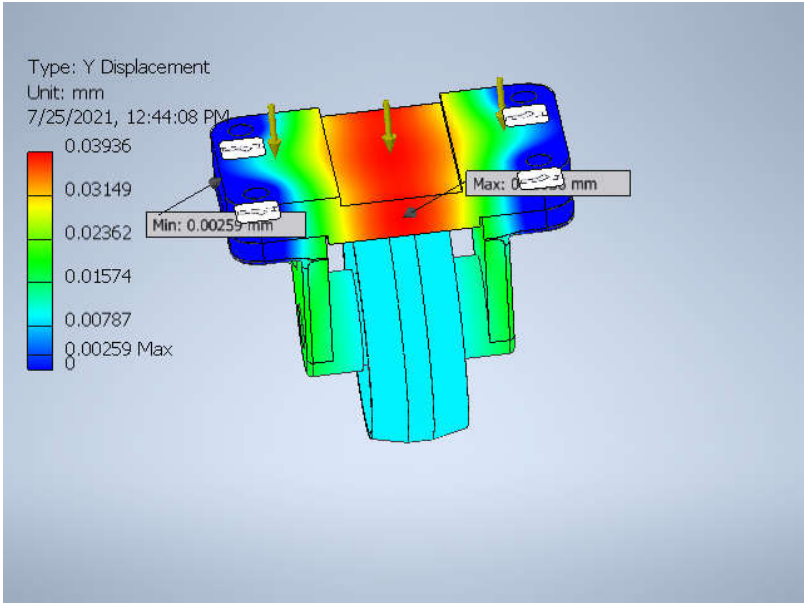


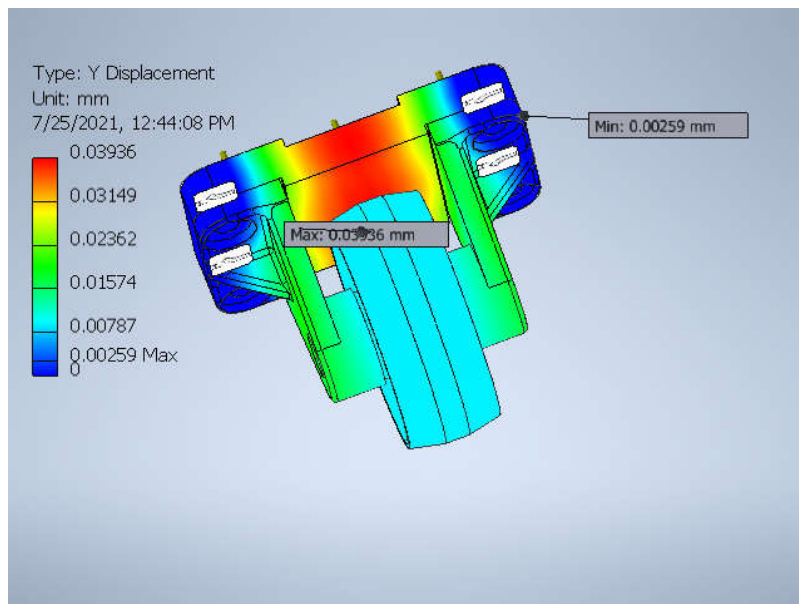


**X Displacement**

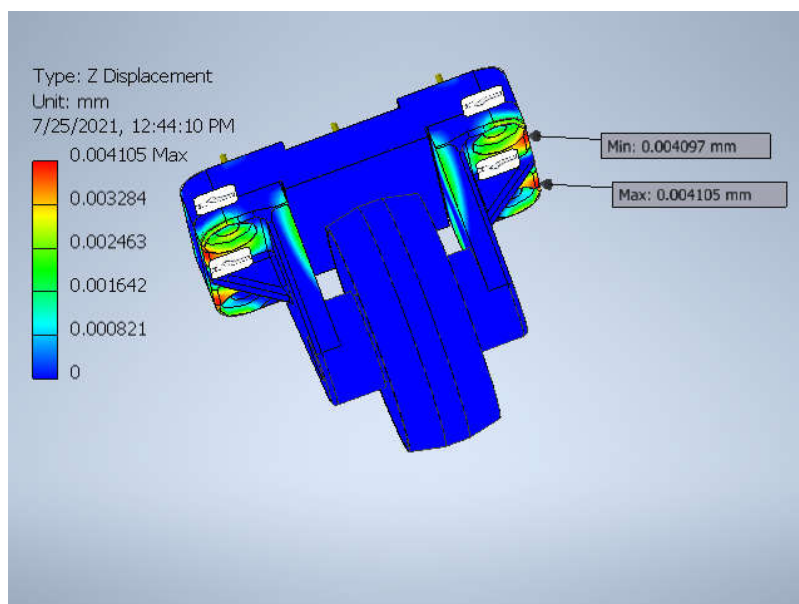
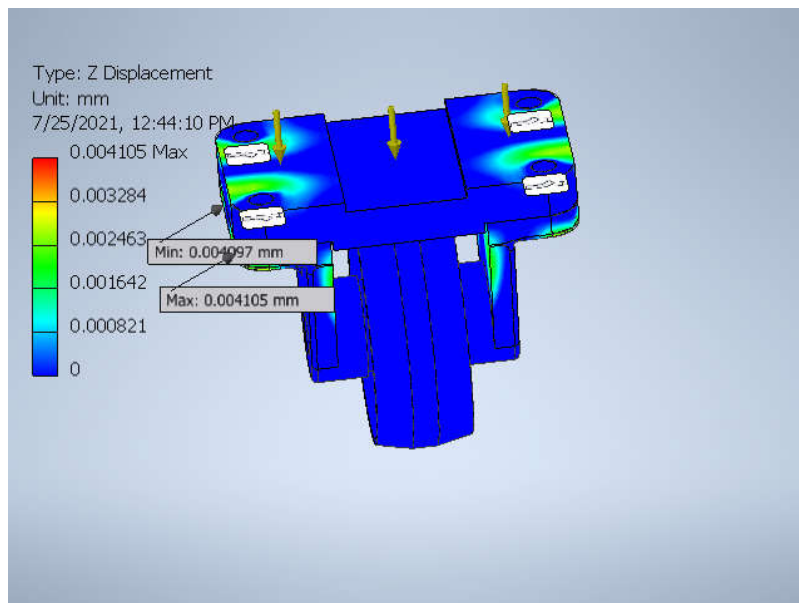


**Y Displacement**

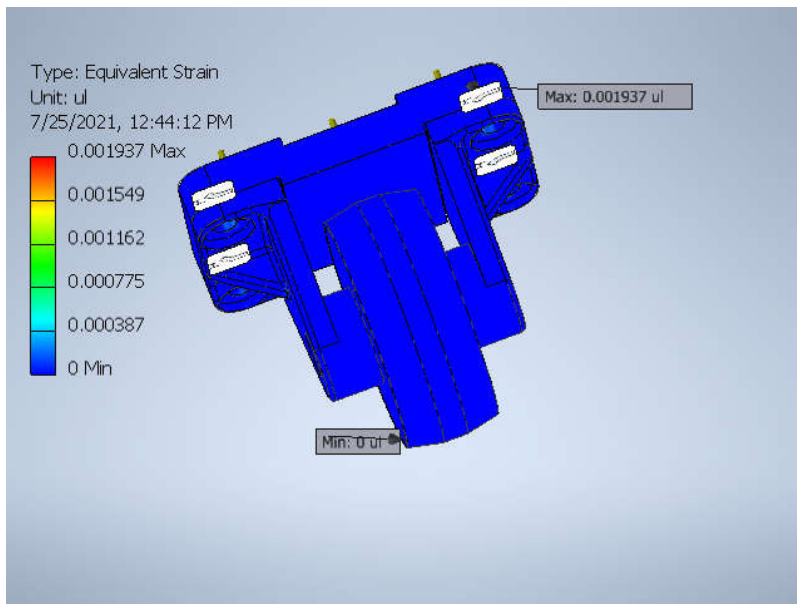
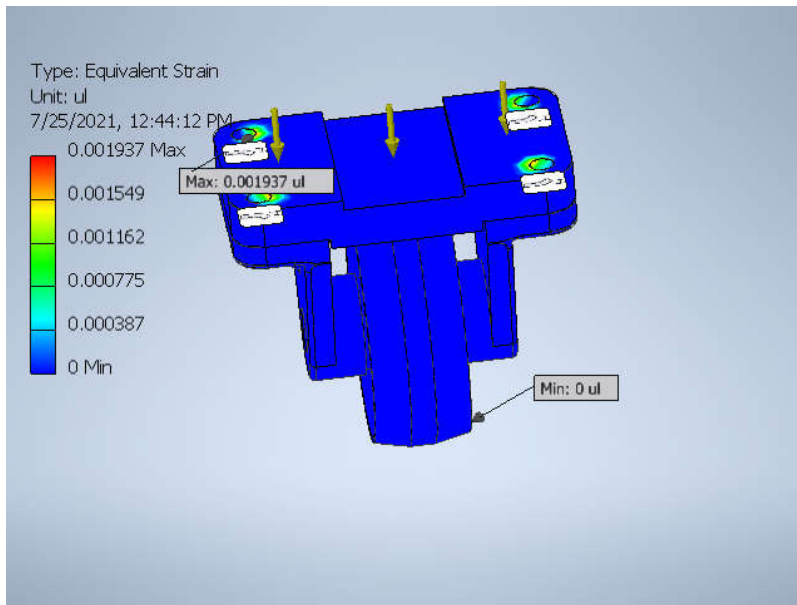




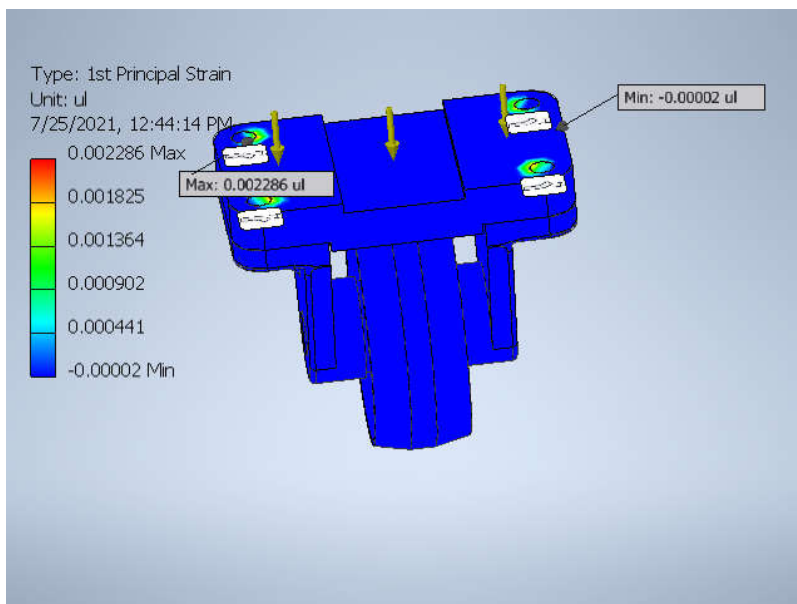
### Z Displacement



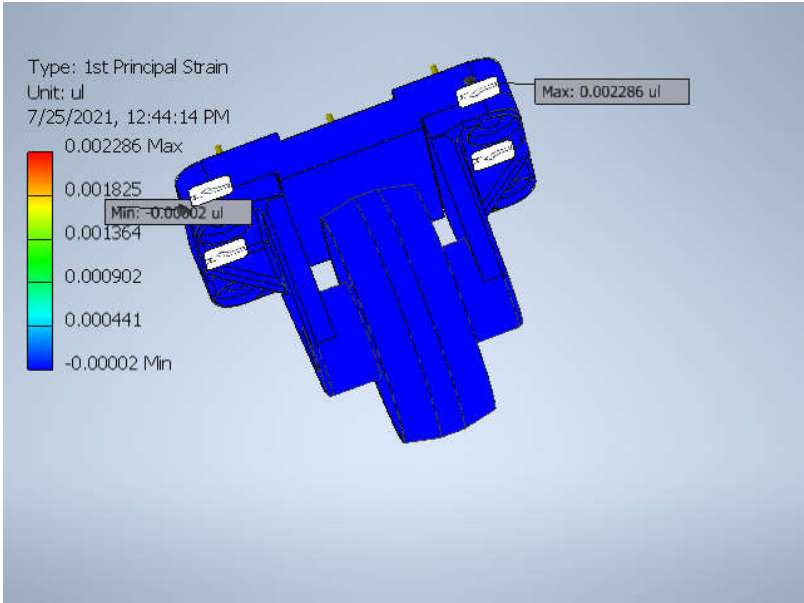
## Equivalent Strain



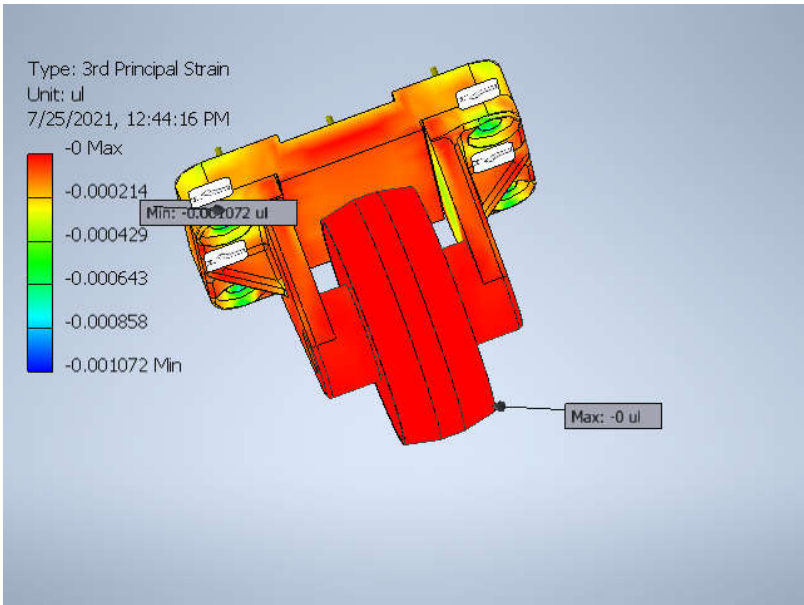
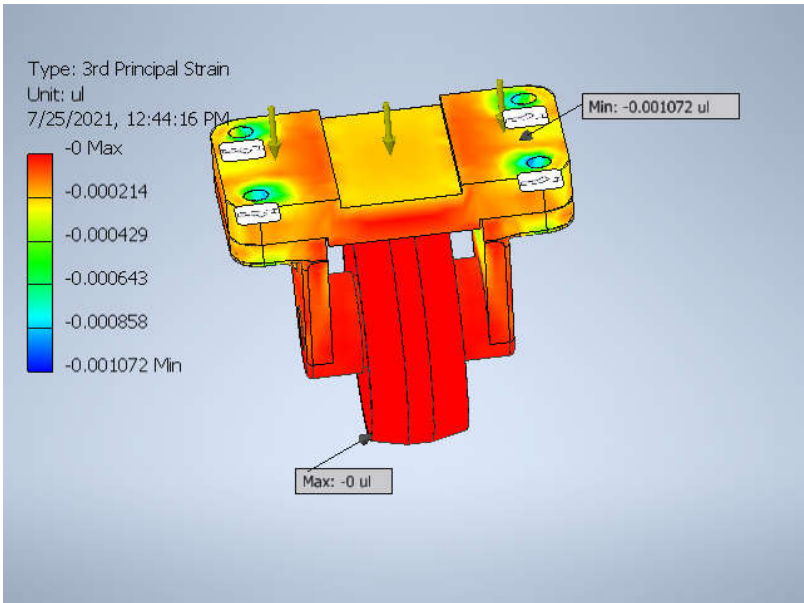
## 1st Principal Strain



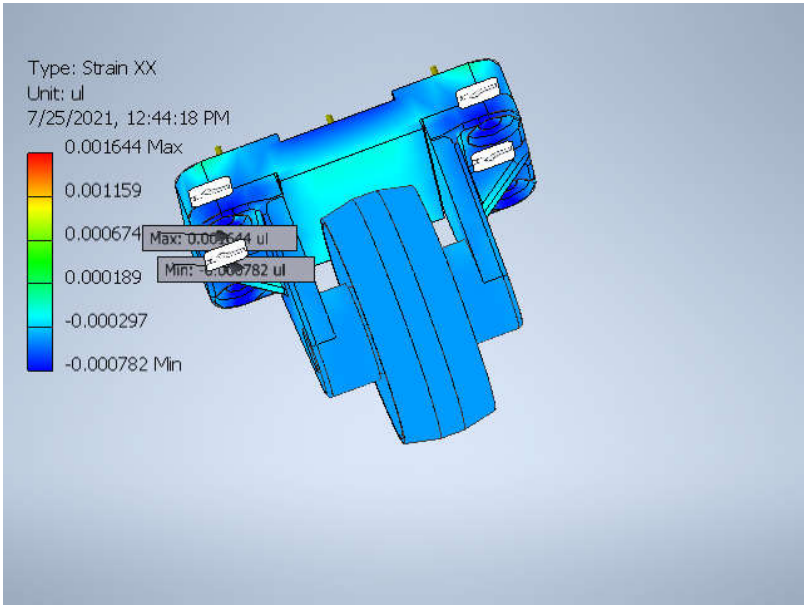
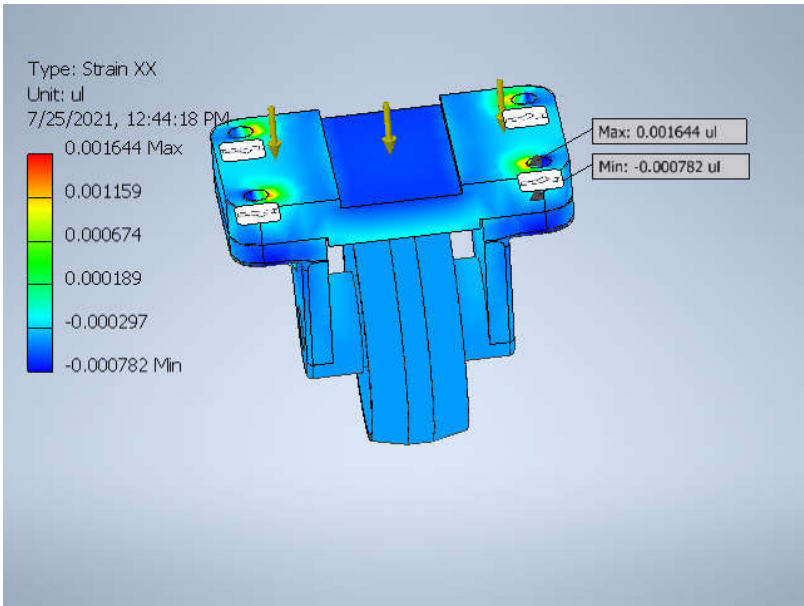




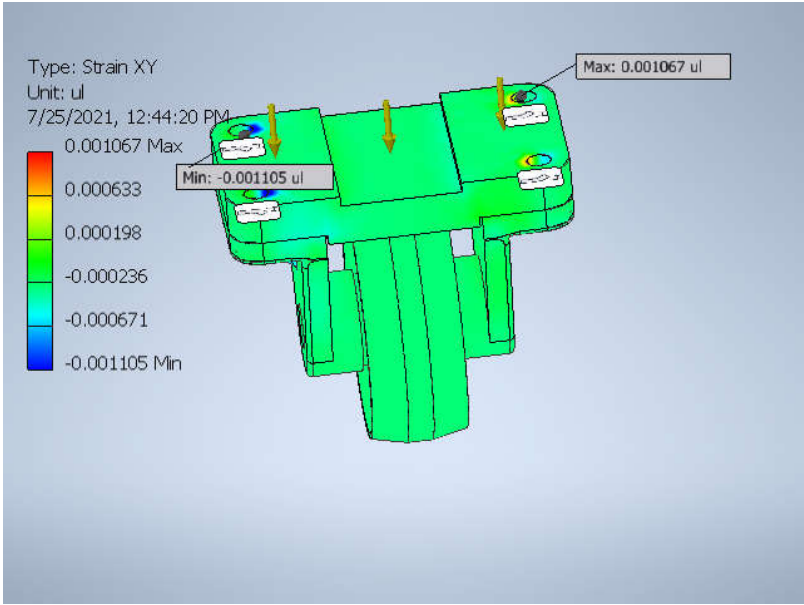
3rd Principal Strain

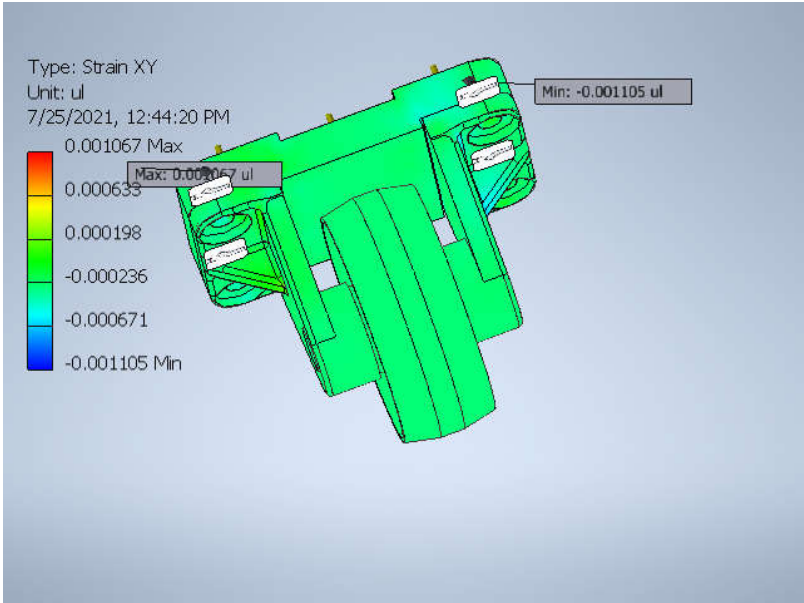


Strain XX

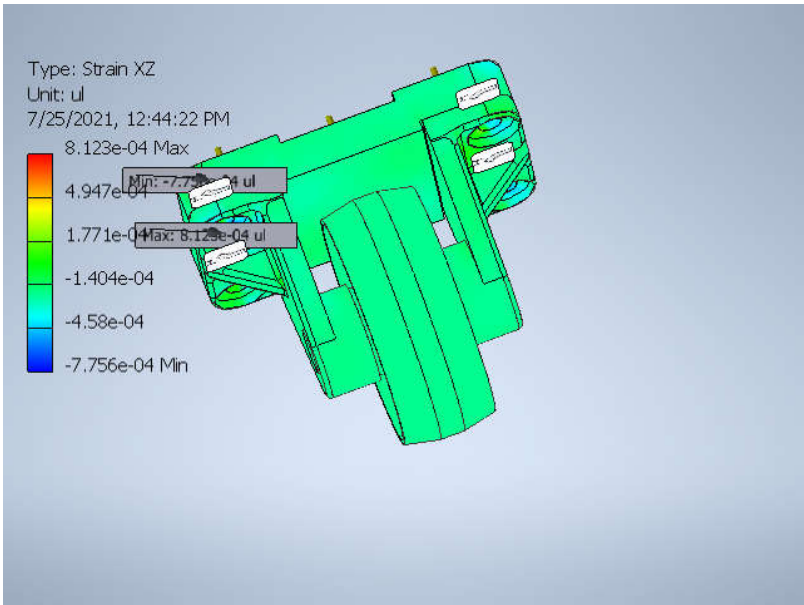
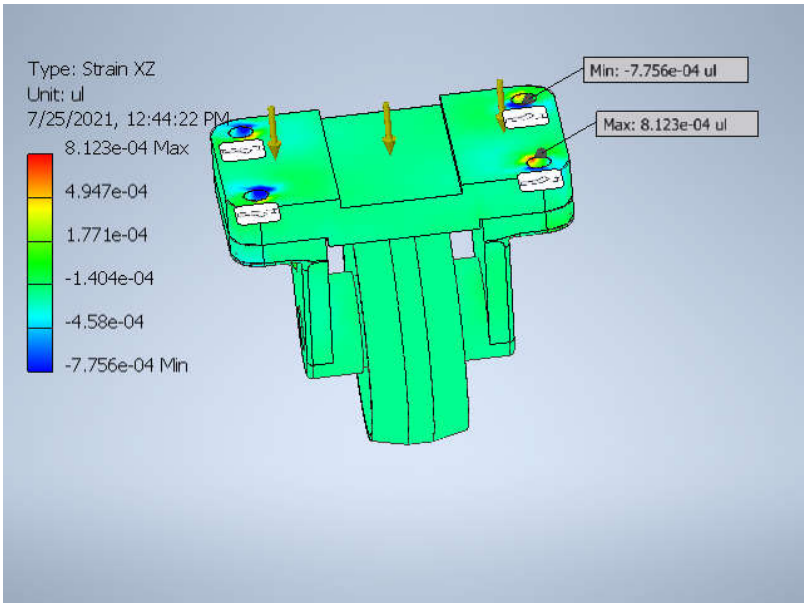


Strain XY

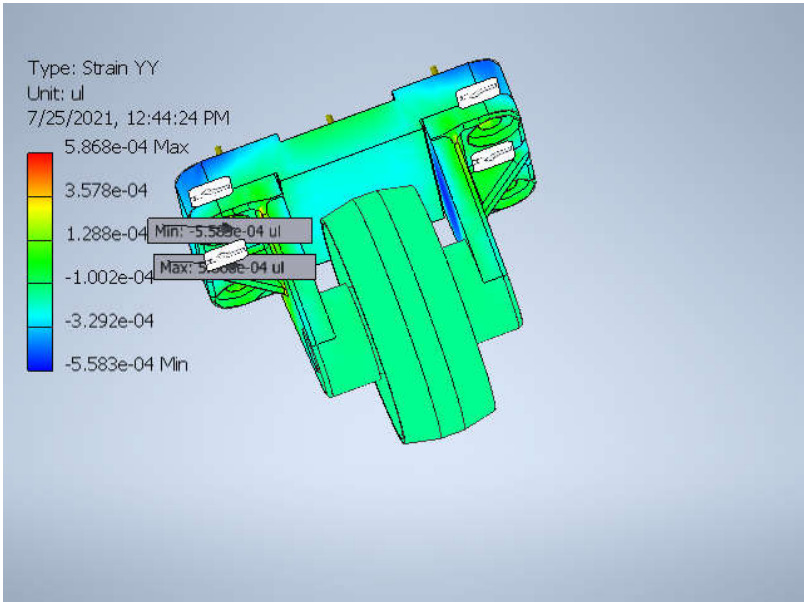
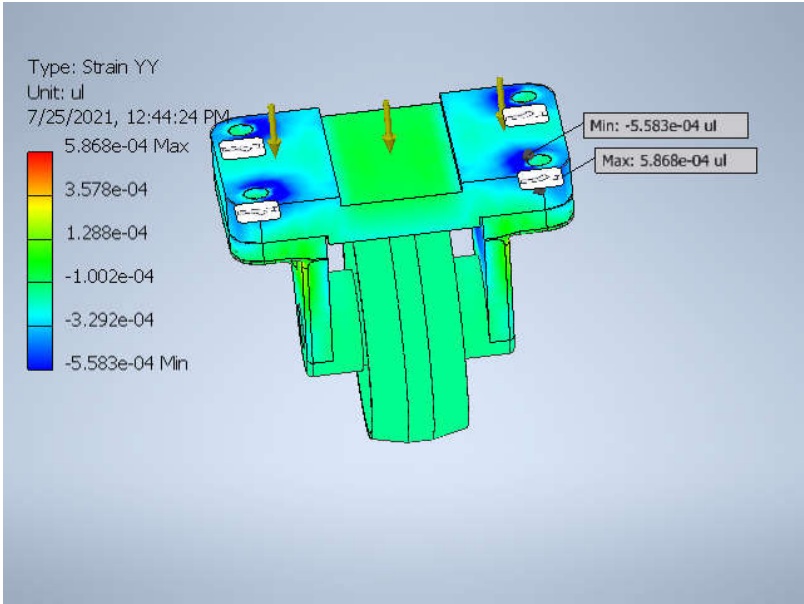




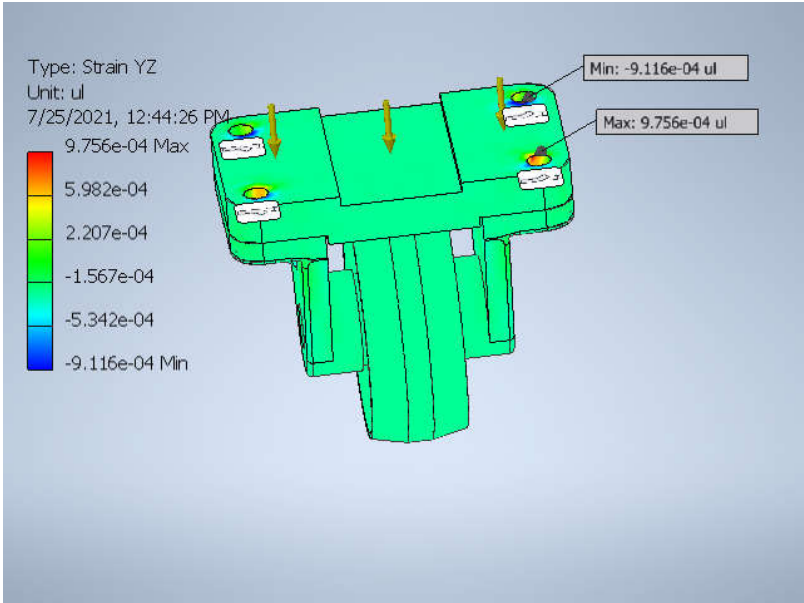
Strain XZ

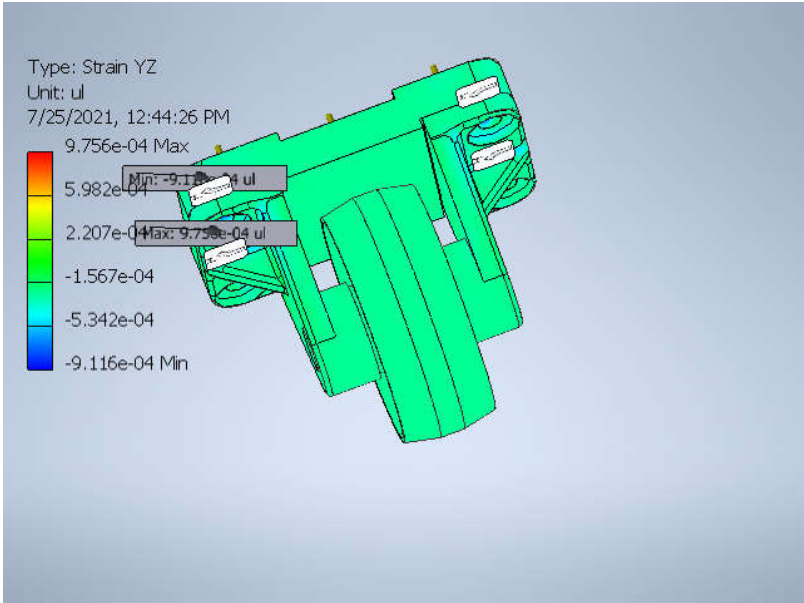


Strain YY

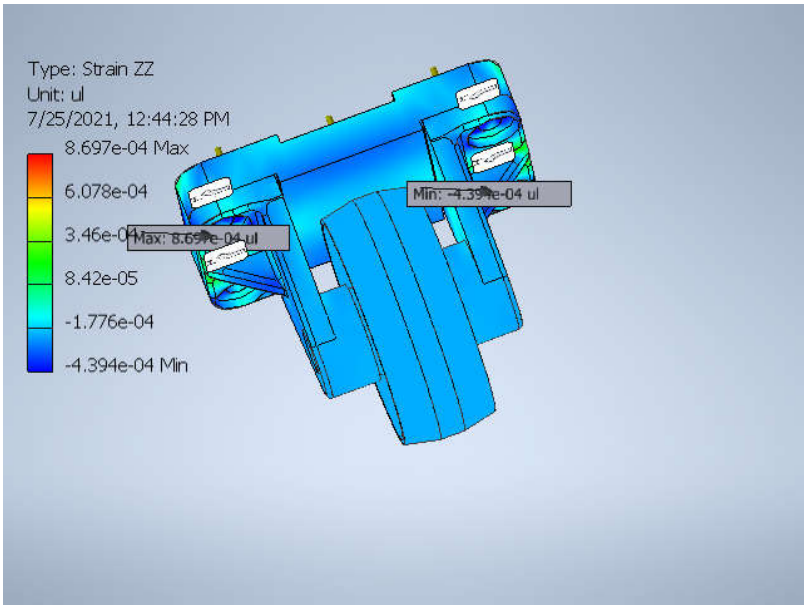
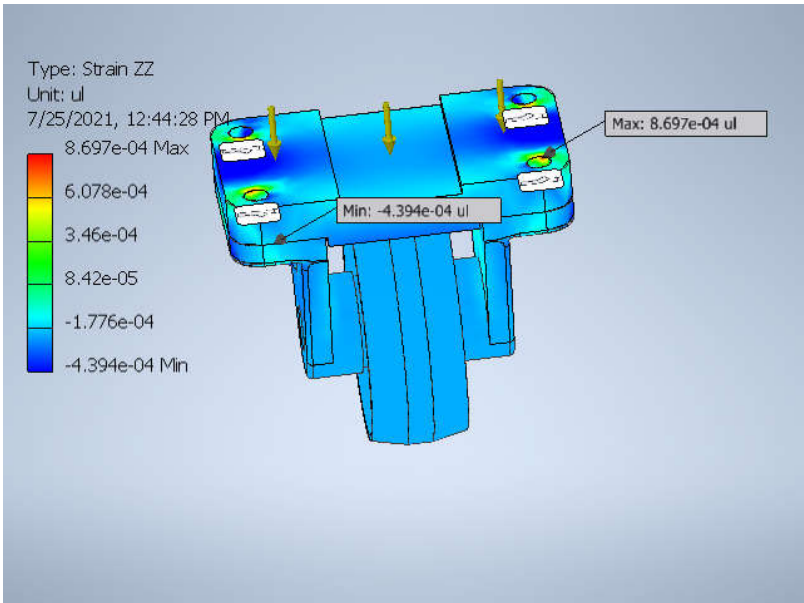


Strain YZ



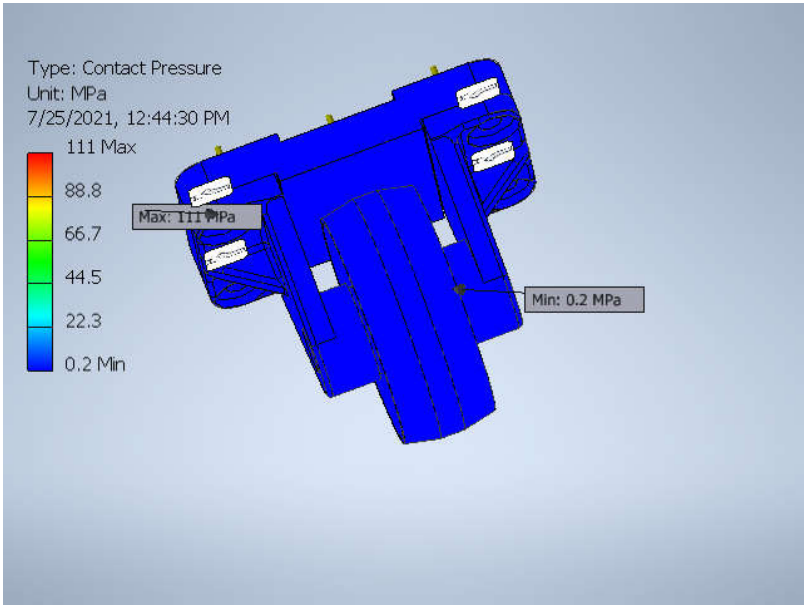
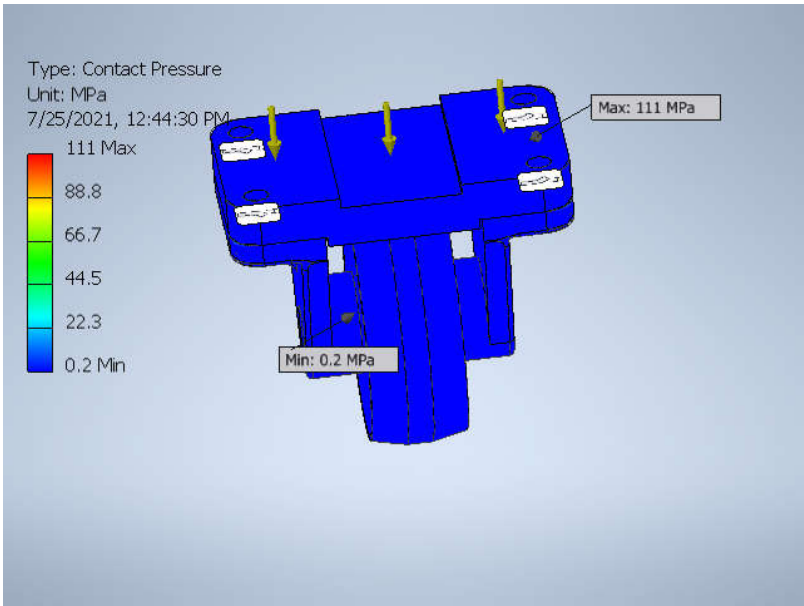


Strain ZZ

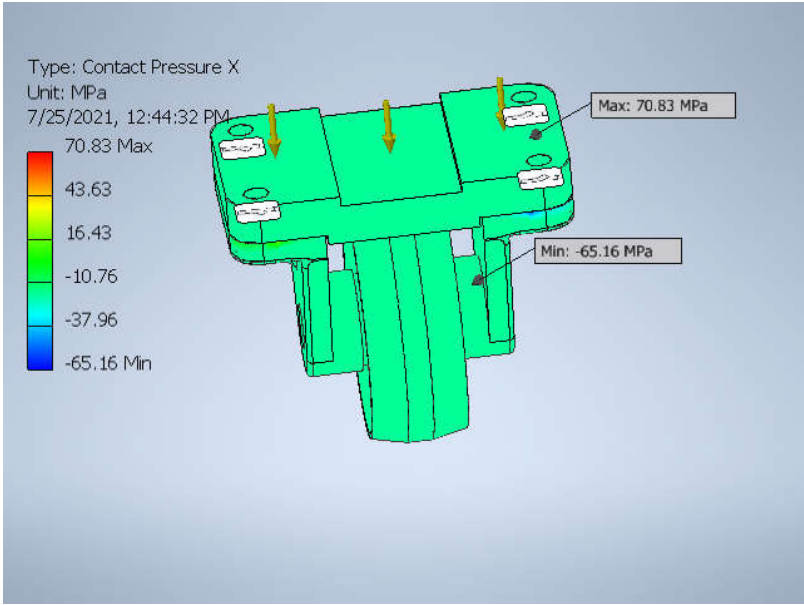


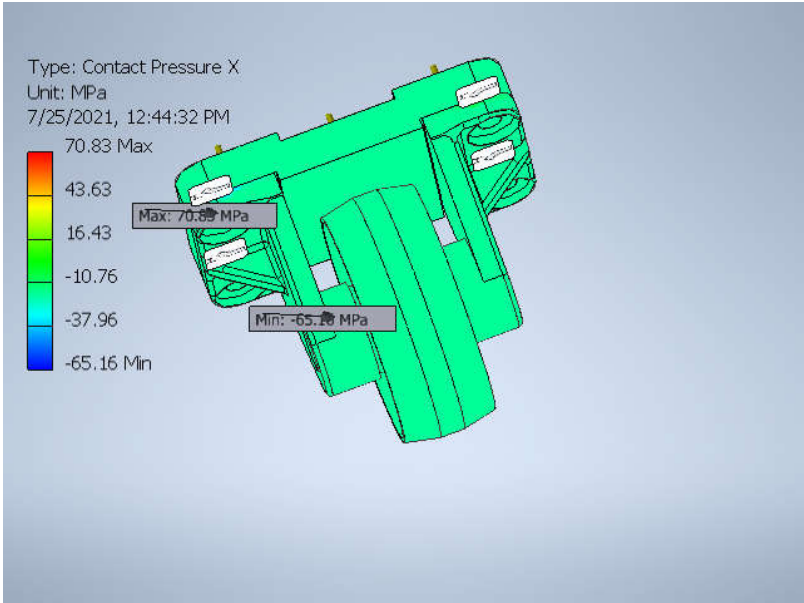


**Contact Pressure**

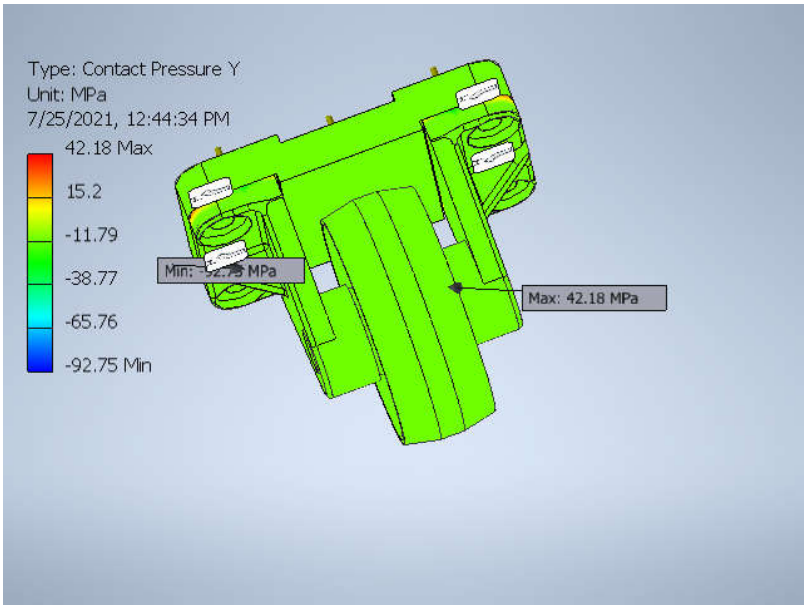
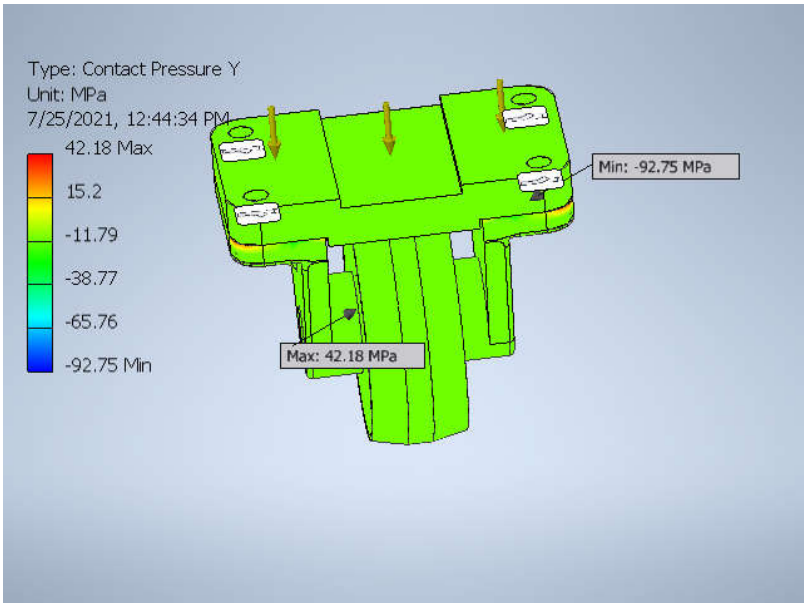


**Contact Pressure X**

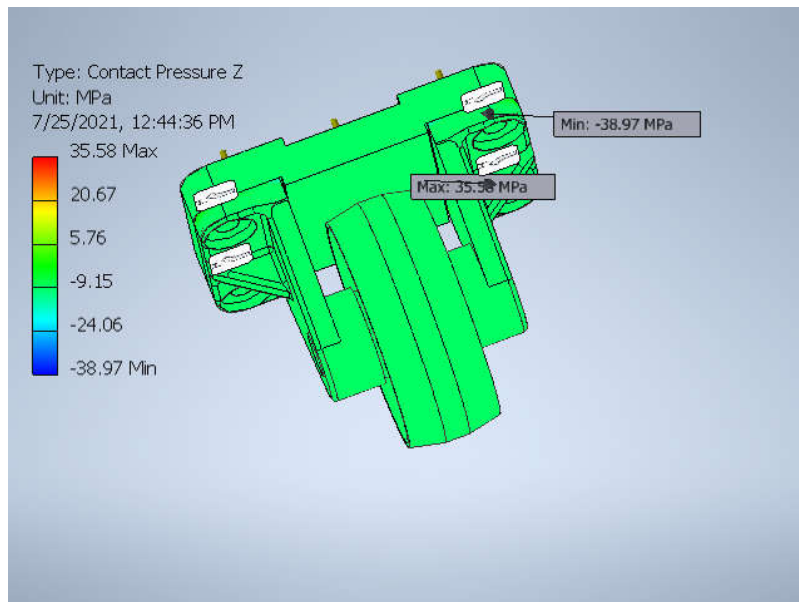
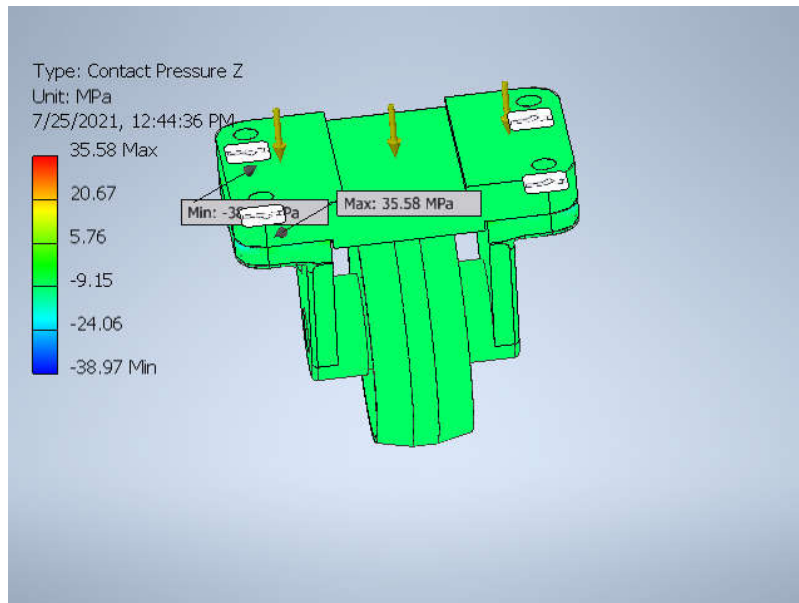




☐ **Contact Pressure Y**



## ☐ Contact Pressure Z



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