

# Stress Analysis Report



Analyzed File:	Braceless Bracket - Cast style rev15 Analysis.iam
Autodesk Inventor Version:	2025 (Build 290162010, 162A)
Creation Date:	7/23/2024, 11:38 AM
Study Author:	mfurdyk
Summary:	

## Static Analysis:1

### General objective and settings:

Design Objective	Single Point
Study Type	Static Analysis
Last Modification Date	7/23/2024, 11:38 AM
Model State	[Primary]
Design View	Default
Positional	[Primary]
Detect and Eliminate Rigid Body Modes	No
Separate Stresses Across Contact Surfaces	No
Motion Loads Analysis	No

## iProperties

### Summary

Author	mfurdyk
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### Project

Part Number	Braceless Bracket - Cast style rev15 Analysis
Designer	mfurdyk
Estimated Cost	\$0.00
Creation Date	7/23/2024

### Status

Design State	WorkInProgress
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## Physical

Mass	108.669 lbmass
Area	1855.49 in <sup>2</sup>
Volume	5038.39 in <sup>3</sup>
Center of Gravity	x=3.84359 in y=22.156 in z=-11.7099 in

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

## 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)

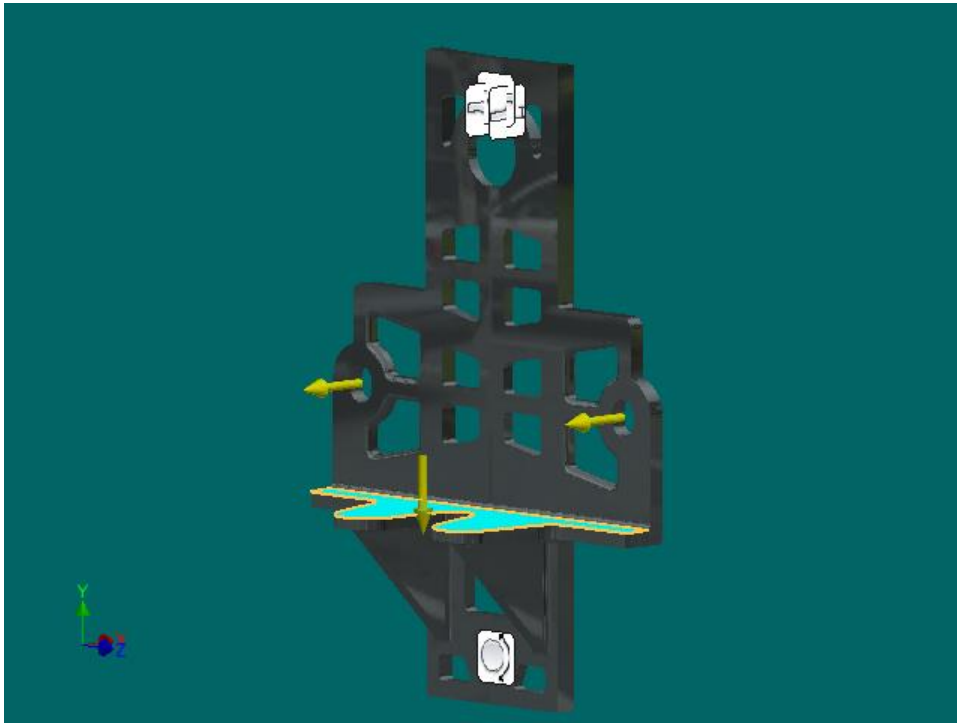
Name	Iron, Ductile	
General	Mass Density	0.25831 lbmass/in <sup>3</sup>
	Yield Strength	117626 psi
	Ultimate Tensile Strength	144603 psi
Stress	Young's Modulus	24366.3 ksi
	Poisson's Ratio	0.29 ul
	Shear Modulus	9444.32 ksi
Part Name(s)	Braceless Bracket - Cast style rev15.ipt	
Name	Douglas Fir	
General	Mass Density	0.0201968 lbmass/in <sup>3</sup>
	Yield Strength	0.00145038 psi
	Ultimate Tensile Strength	0.00145038 psi
Stress	Young's Modulus	1830.1 ksi
	Poisson's Ratio	0.0001 ul
	Shear Modulus	914.957 ksi
Part Name(s)	Pole Braceless Test.ipt	

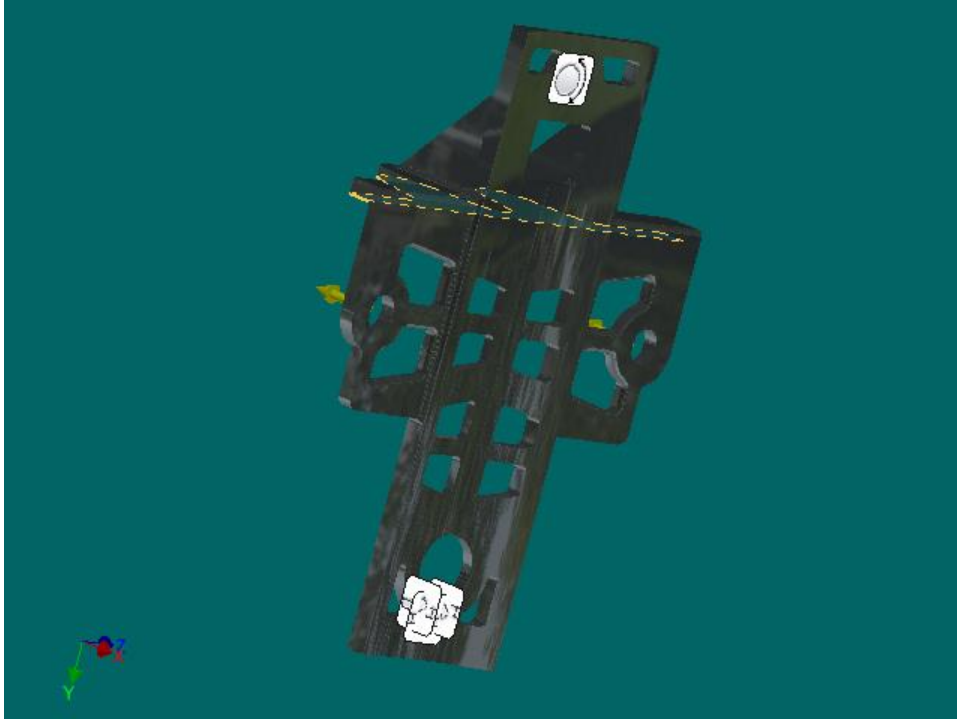
## Operating conditions

**Remote Force:1**

Load Type	Remote Force
Magnitude	9486.000 lbf
Vector X	165.554 lbf
Vector Y	-9484.555 lbf
Vector Z	-0.000 lbf
Remote Point X	-6.000 in
Remote Point Y	20.000 in
Remote Point Z	-11.750 in

**Selected Face(s)**

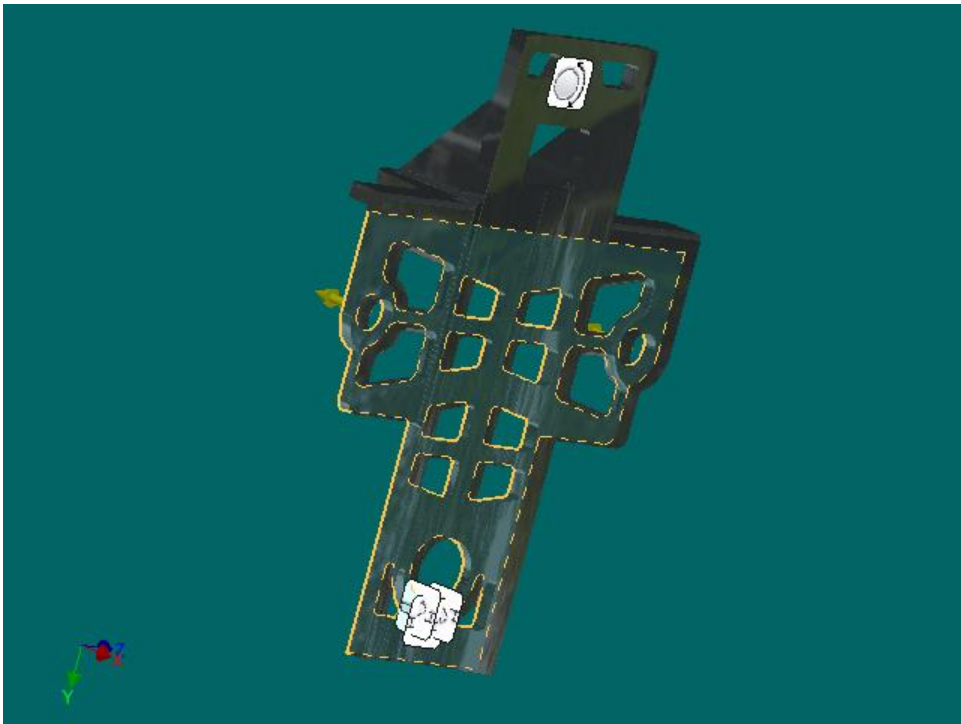
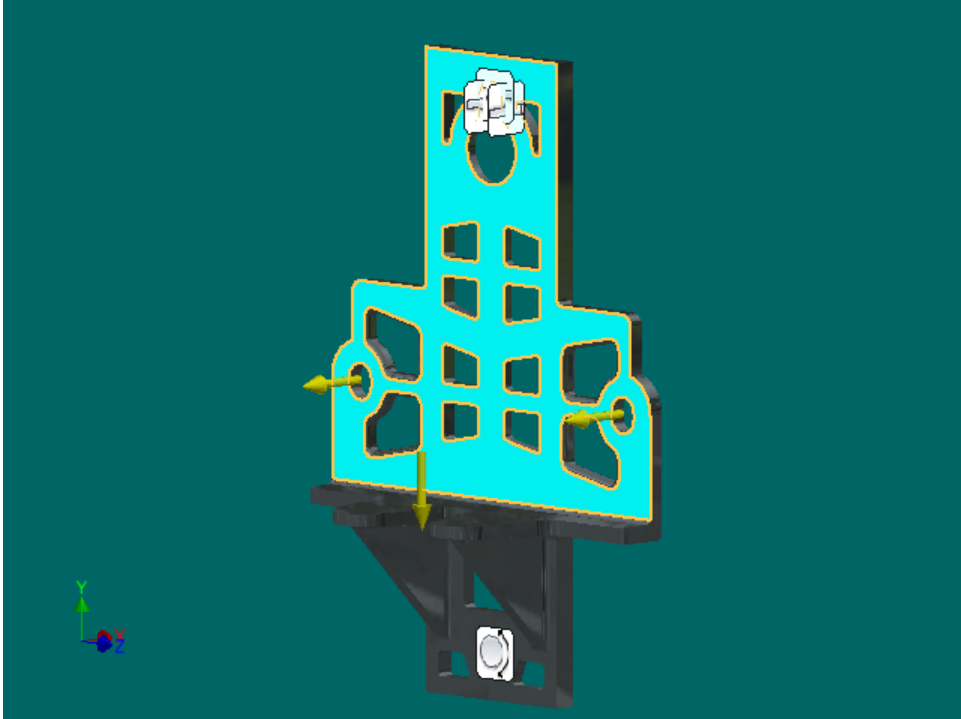




### Remote Force:2

Load Type	Remote Force
Magnitude	3271.000 lbf
Vector X	-3271.000 lbf
Vector Y	0.000 lbf
Vector Z	0.000 lbf
Remote Point X	-4.000 in
Remote Point Y	22.750 in
Remote Point Z	-7.700 in

### Selected Face(s)

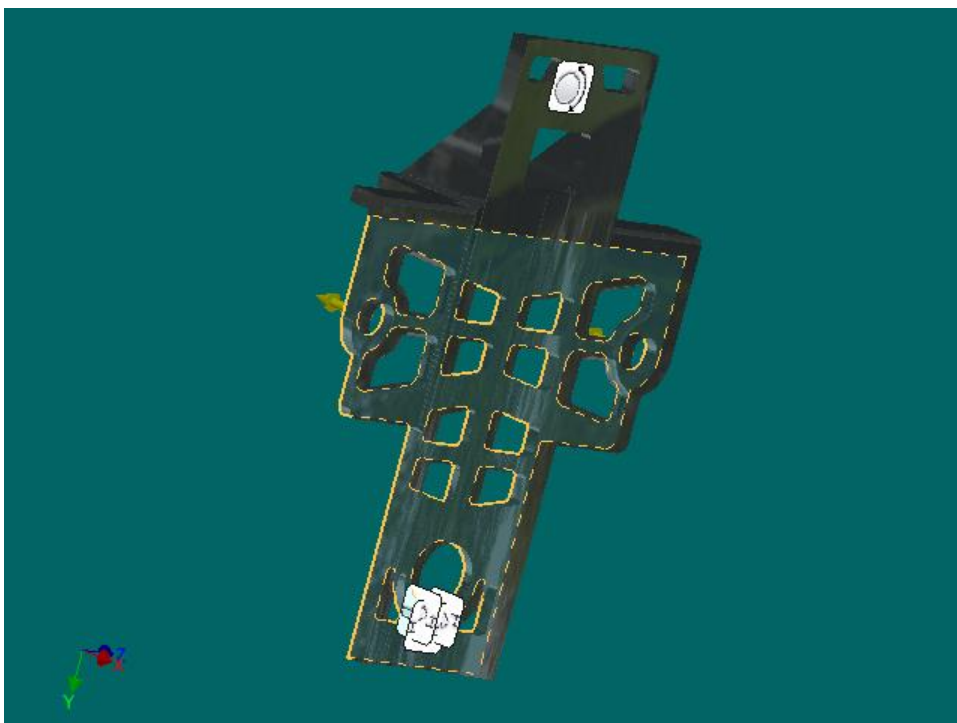
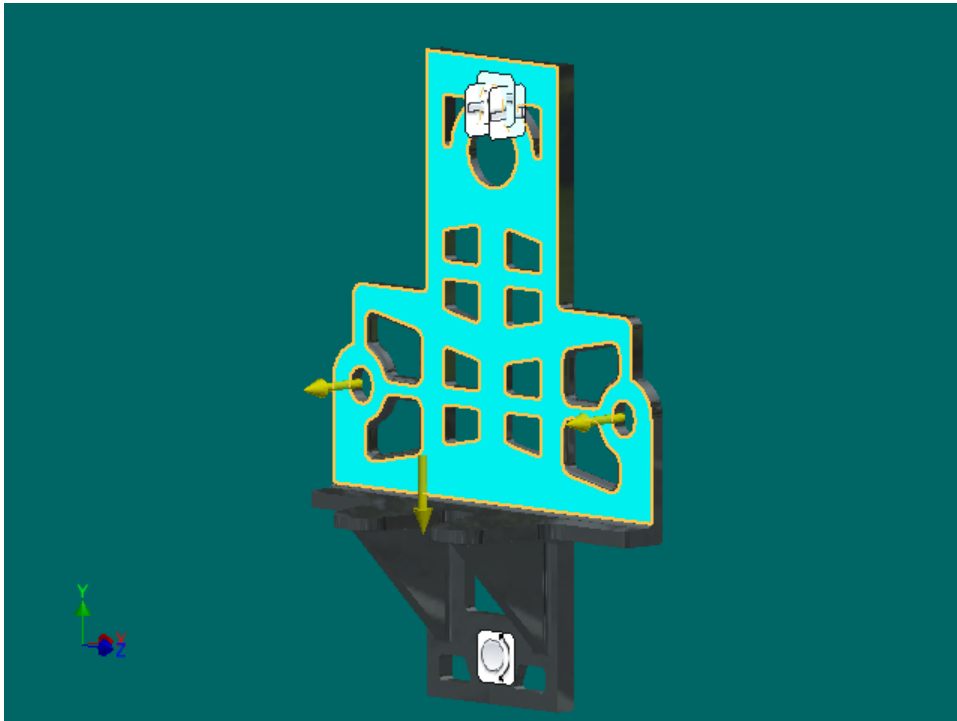


**Remote Force:3**

Load Type	Remote Force
Magnitude	3271.000 lbforce
Vector X	-3271.000 lbforce
Vector Y	0.000 lbforce

Vector Z	0.000 lbf force
Remote Point X	-4.000 in
Remote Point Y	22.750 in
Remote Point Z	-15.700 in

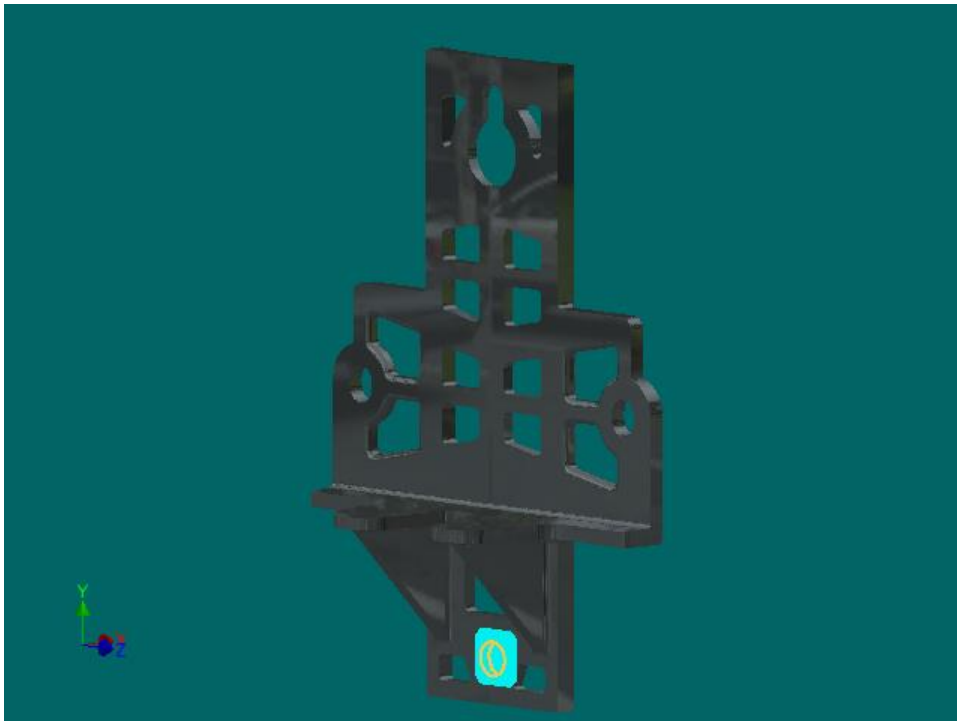
**Selected Face(s)**

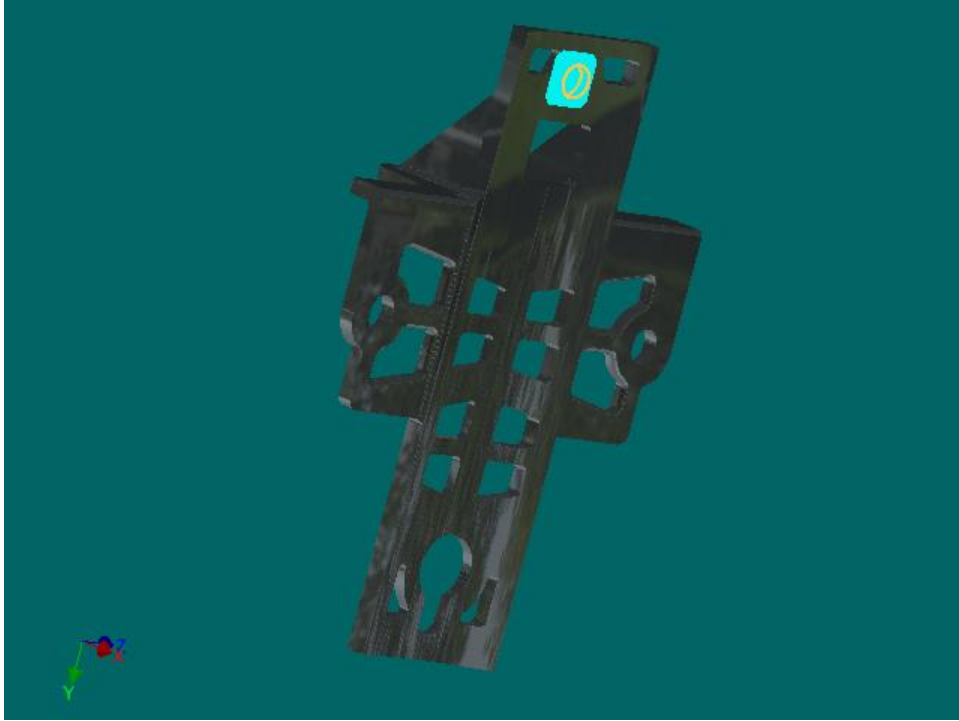


### Pin Constraint:1

Constraint Type	Pin Constraint
Fix Radial Direction	Yes
Fix Axial Direction	Yes
Fix Tangential Direction	No

### Selected Face(s)

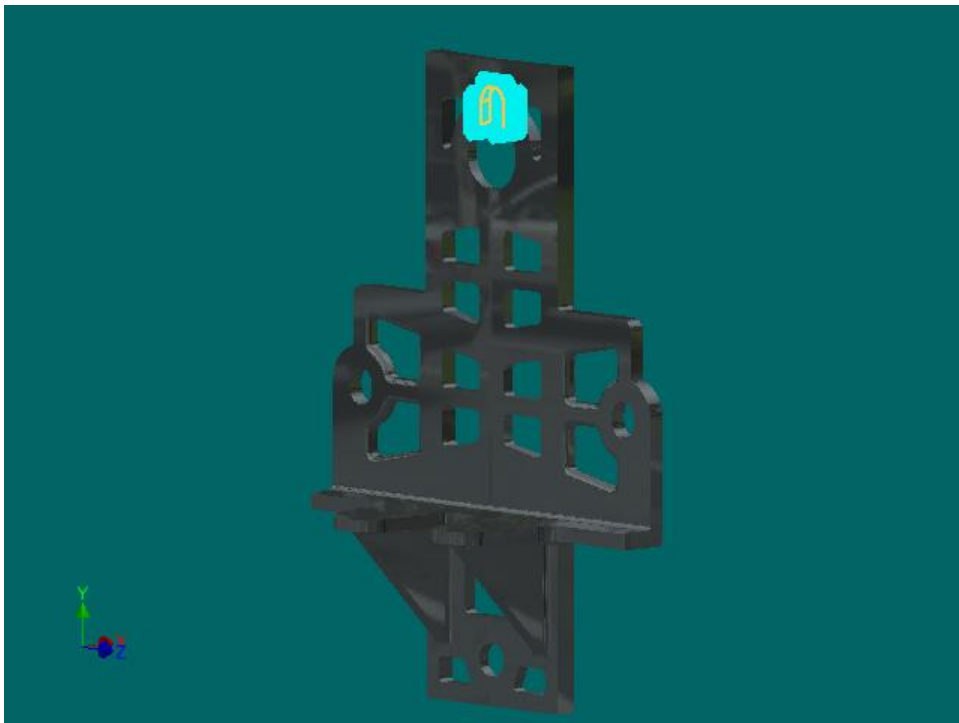




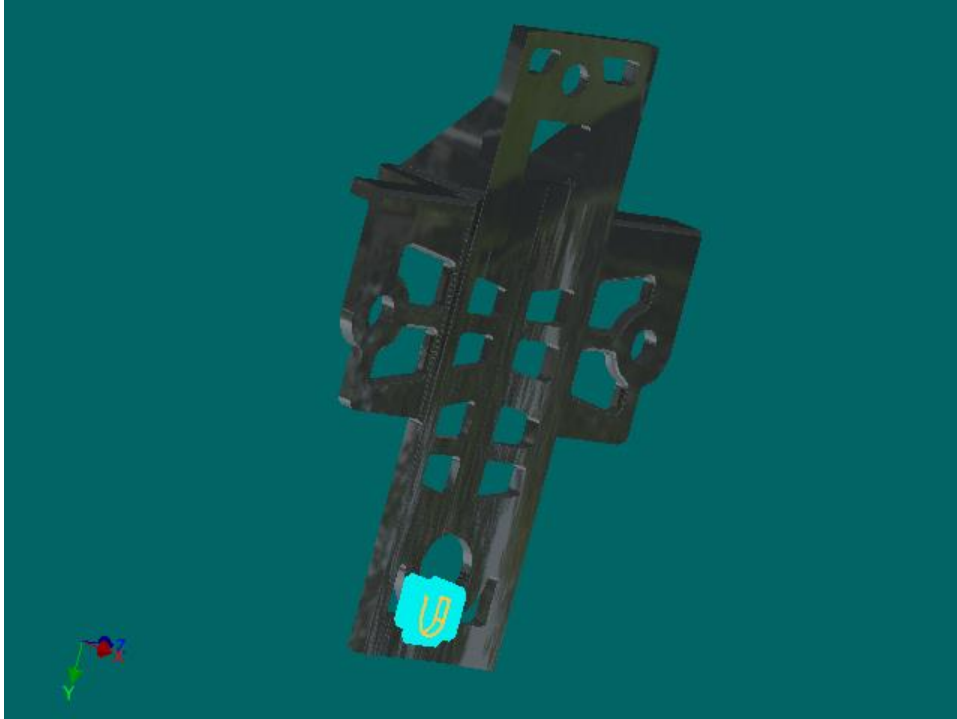
**Fixed Constraint:1**

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







### Contacts (Bonded)

Name	Part Name(s)
Bonded:1	Braceless Bracket - Cast style rev15:1 Pole Braceless Test:1

### Results

#### Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Pin Constraint:1	7127.97 lbf	1696.99 lbf	41.9696 lbf ft	1.68975 lbf ft
		6922.94 lbf		-2.99809 lbf ft
		-33.0526 lbf		41.8282 lbf ft
Fixed Constraint:1	5151.52 lbf	4694.6 lbf	74.9898 lbf ft	-0.990411 lbf ft
		2120.77 lbf		7.10534 lbf ft
		34.8039 lbf		74.6458 lbf ft

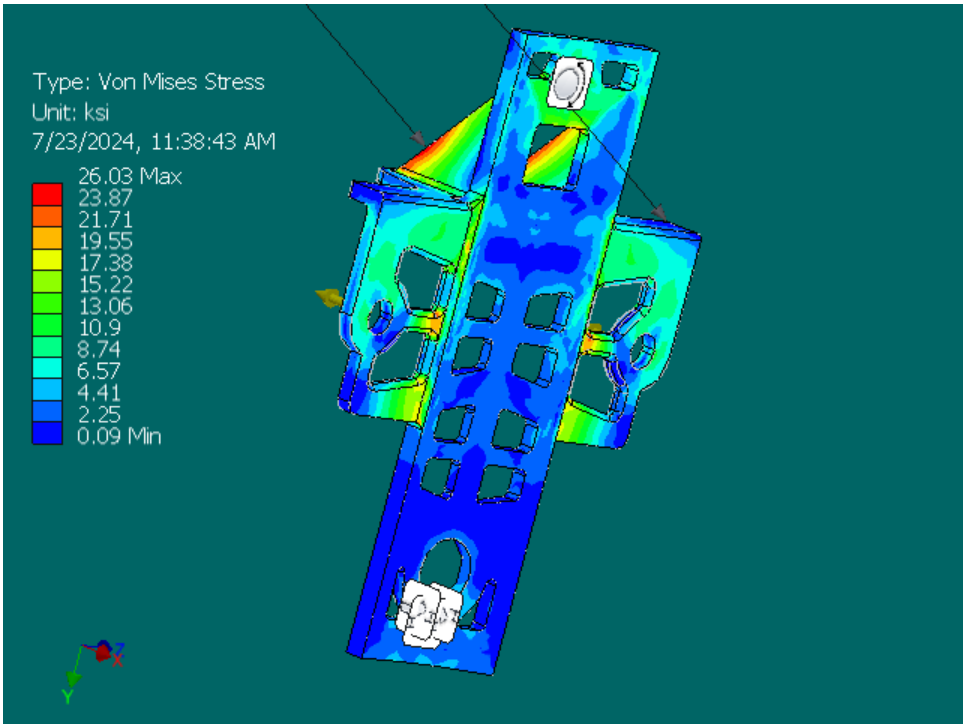
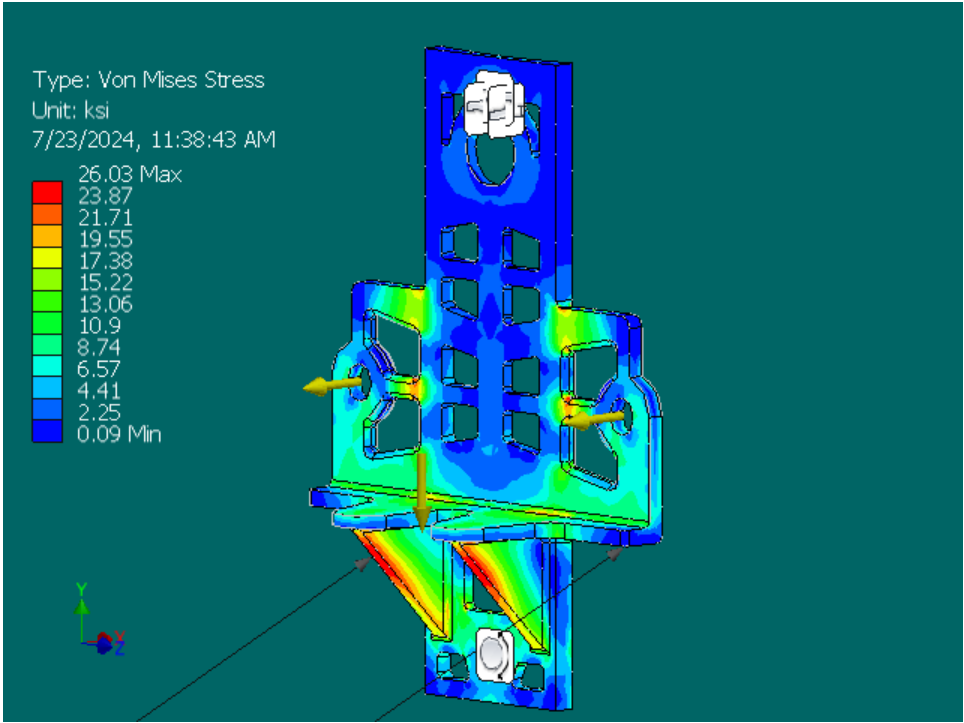
#### Result Summary

Name	Minimum	Maximum
Volume	5038.39 in <sup>3</sup>	
Mass	108.669 lbmass	

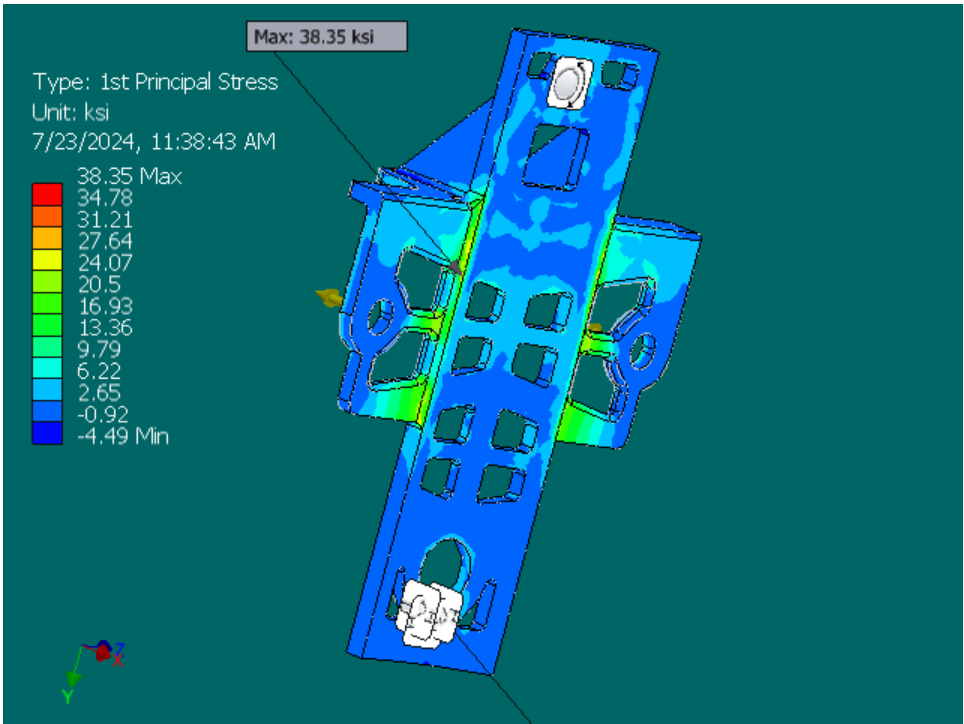
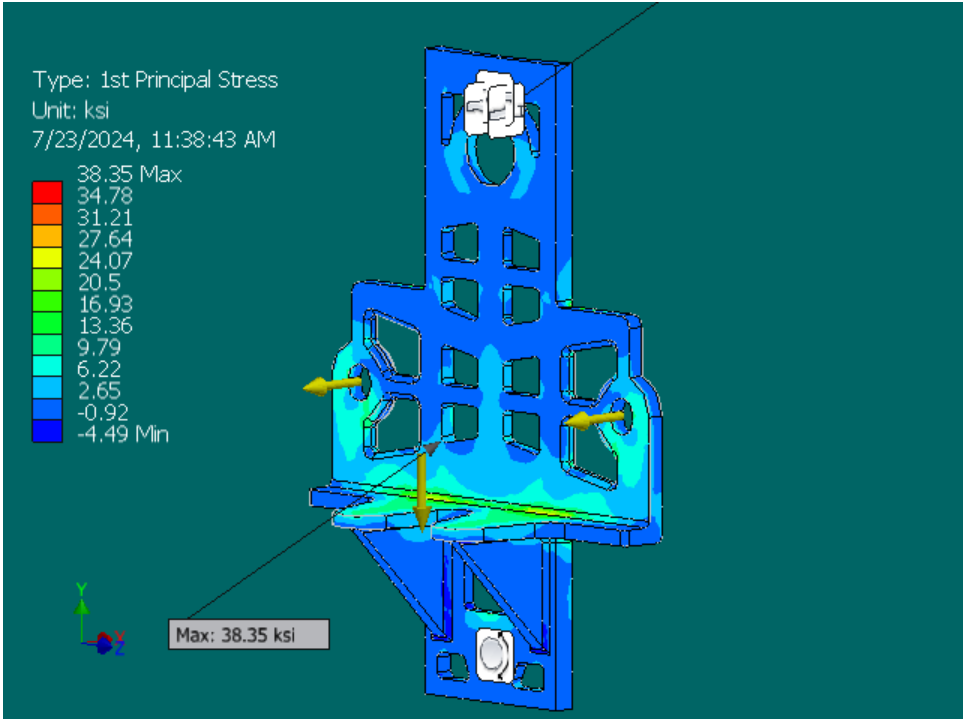
Von Mises Stress	0.000303737 ksi	26.0323 ksi
1st Principal Stress	-4.48638 ksi	38.352 ksi
3rd Principal Stress	-27.7177 ksi	14.3734 ksi
Displacement	0 in	0.013704 in
Safety Factor	0.000000847392 ul	15 ul
Stress XX	-12.9144 ksi	34.8165 ksi
Stress XY	-9.80625 ksi	12.9432 ksi
Stress XZ	-10.6047 ksi	10.8288 ksi
Stress YY	-23.1213 ksi	16.6448 ksi
Stress YZ	-9.13907 ksi	10.7446 ksi
Stress ZZ	-25.8058 ksi	24.8808 ksi
X Displacement	-0.0136616 in	0.000186936 in
Y Displacement	-0.00868829 in	0.000527663 in
Z Displacement	-0.00158006 in	0.0014224 in
Equivalent Strain	0.000000161349 ul	0.00101752 ul
1st Principal Strain	-0.00000269151 ul	0.00123853 ul
3rd Principal Strain	-0.00107478 ul	0.0000744845 ul
Strain XX	-0.000748895 ul	0.00105136 ul
Strain XY	-0.000519161 ul	0.000685239 ul
Strain XZ	-0.000561432 ul	0.000573296 ul
Strain YY	-0.000847974 ul	0.000507837 ul
Strain YZ	-0.000483839 ul	0.000568841 ul
Strain ZZ	-0.000975292 ul	0.000963028 ul
Contact Pressure	0 ksi	151.538 ksi
Contact Pressure X	-67.1324 ksi	83.8919 ksi
Contact Pressure Y	-94.1224 ksi	93.2644 ksi
Contact Pressure Z	-109.258 ksi	127.643 ksi

## Figures

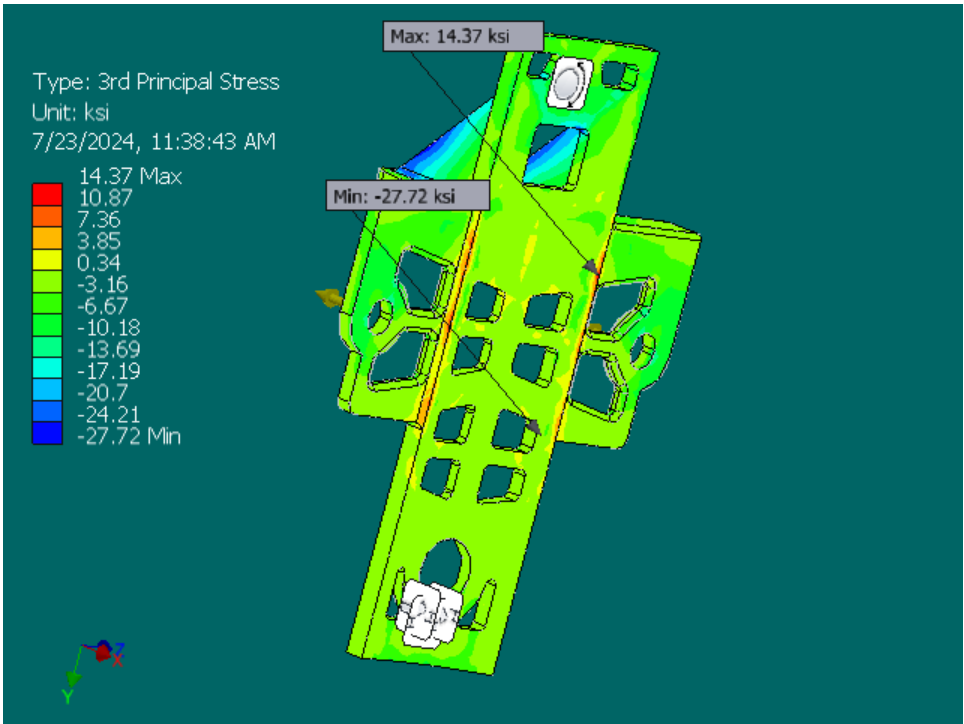
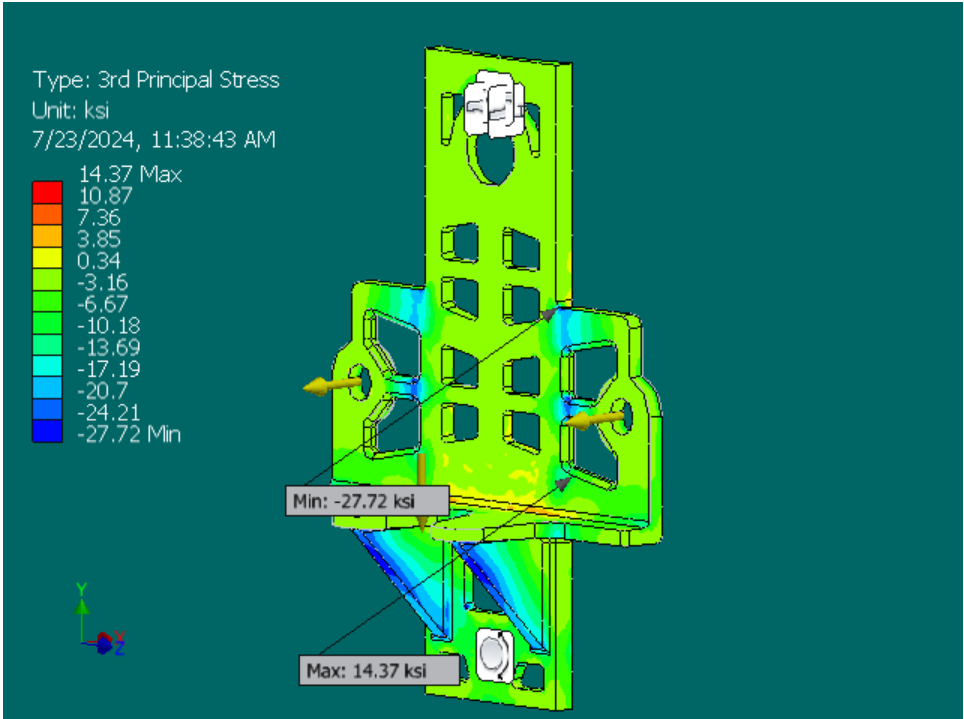
### Von Mises Stress



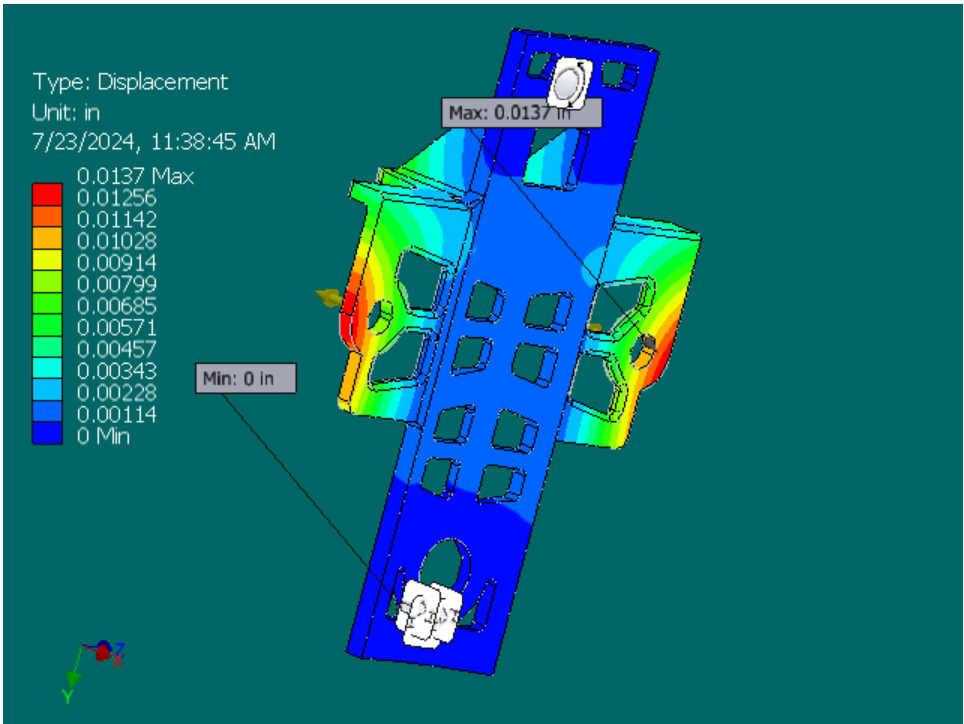
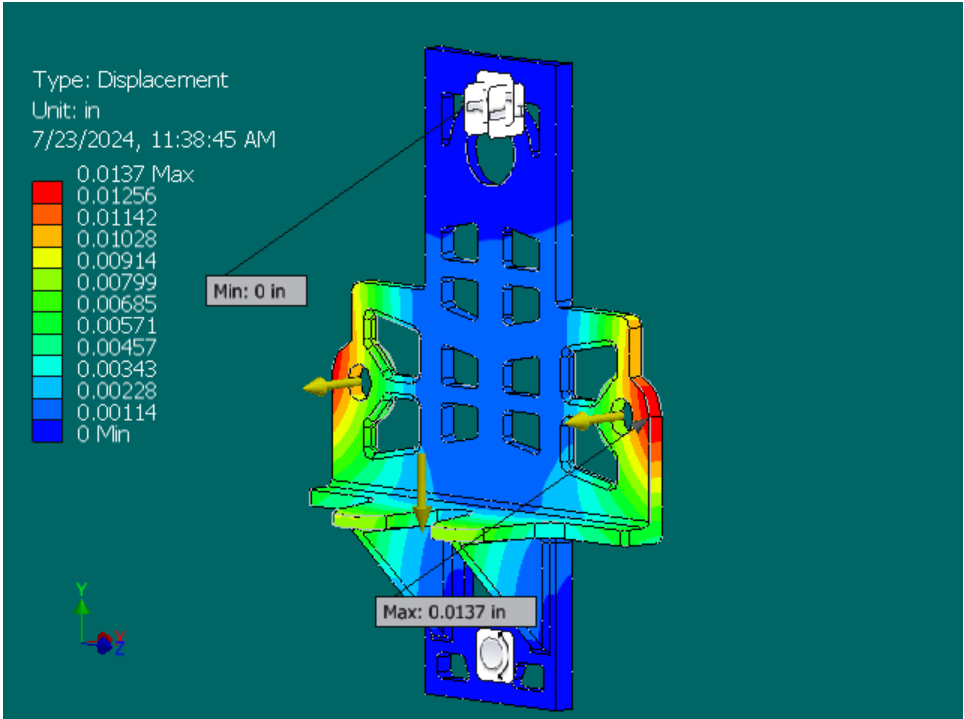
**1st Principal Stress**



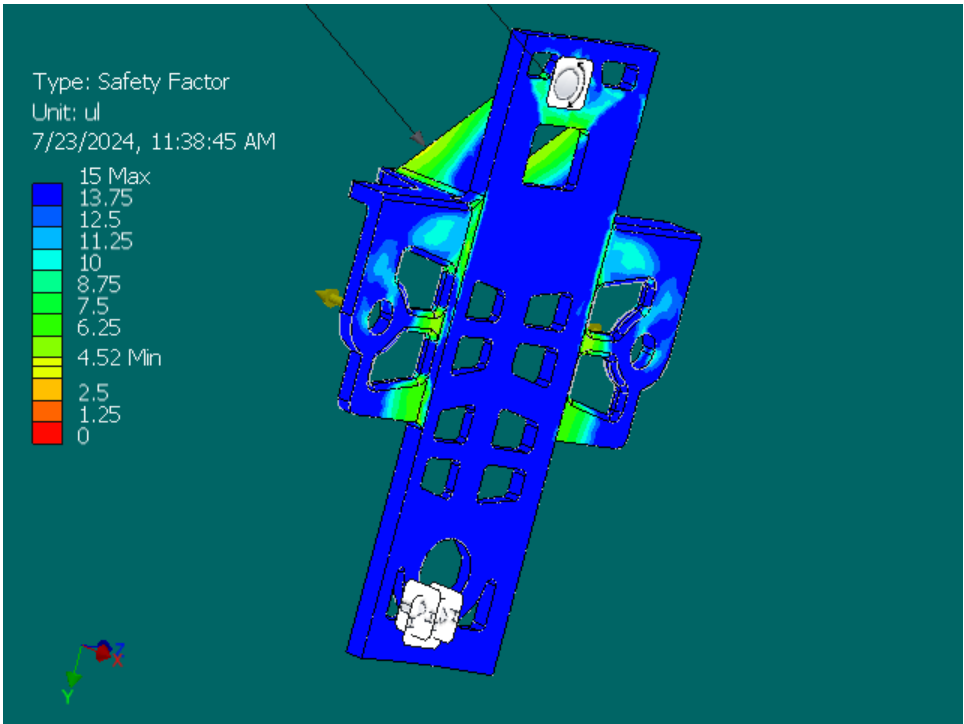
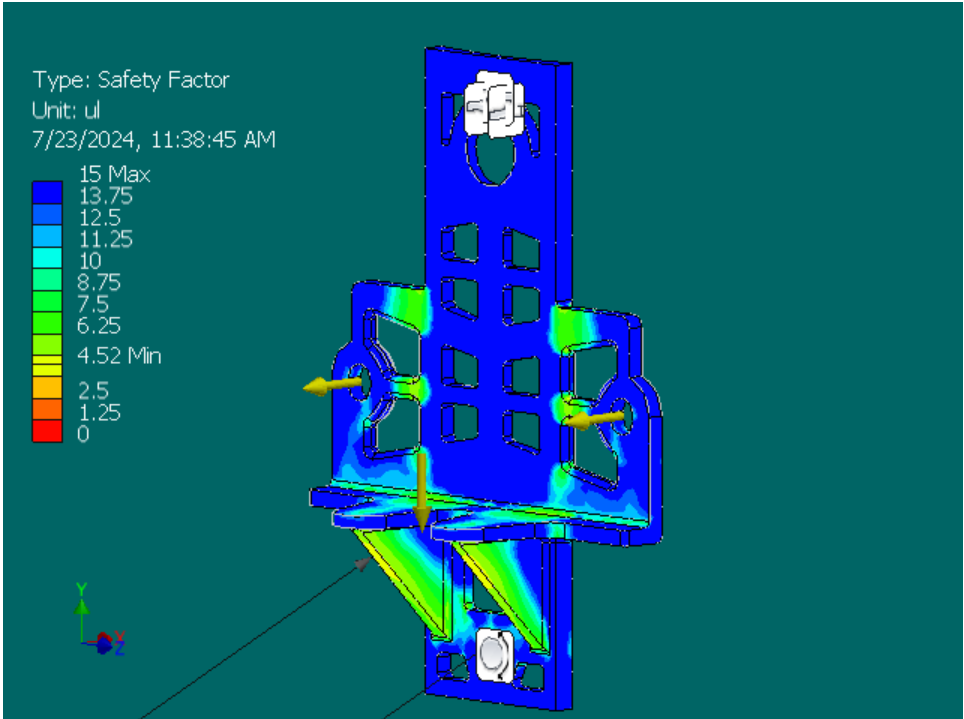
**3rd Principal Stress**



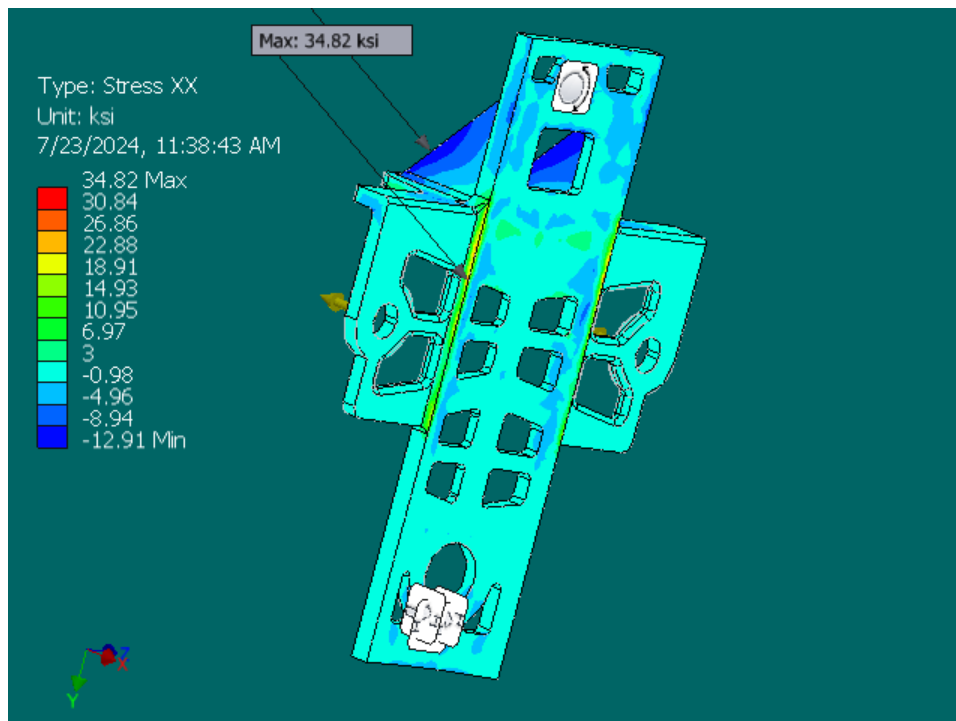
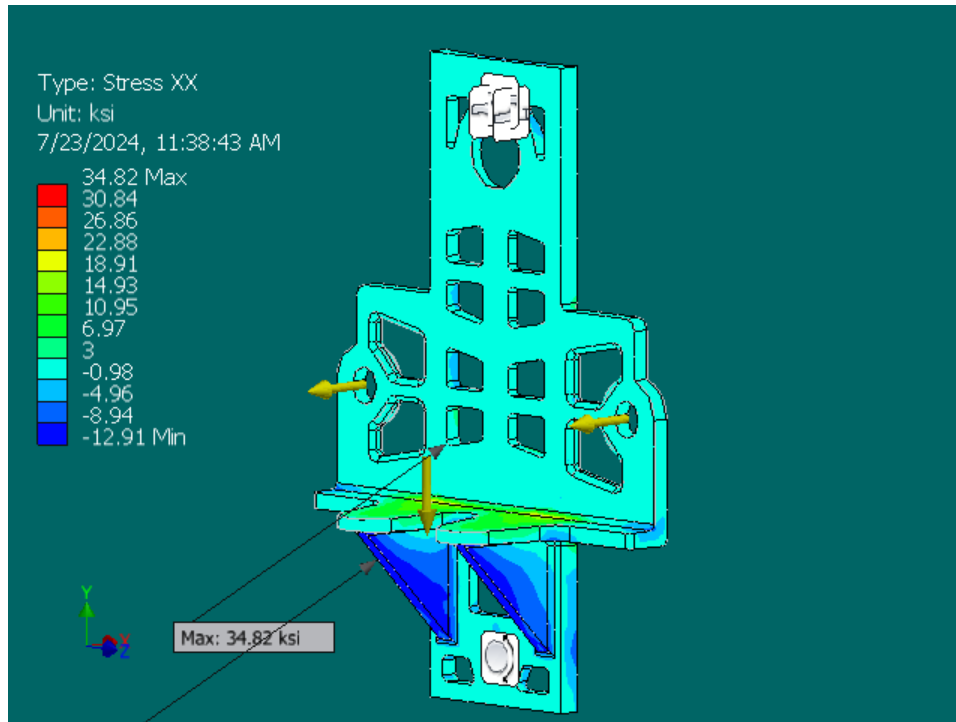
**Displacement**



**Safety Factor**

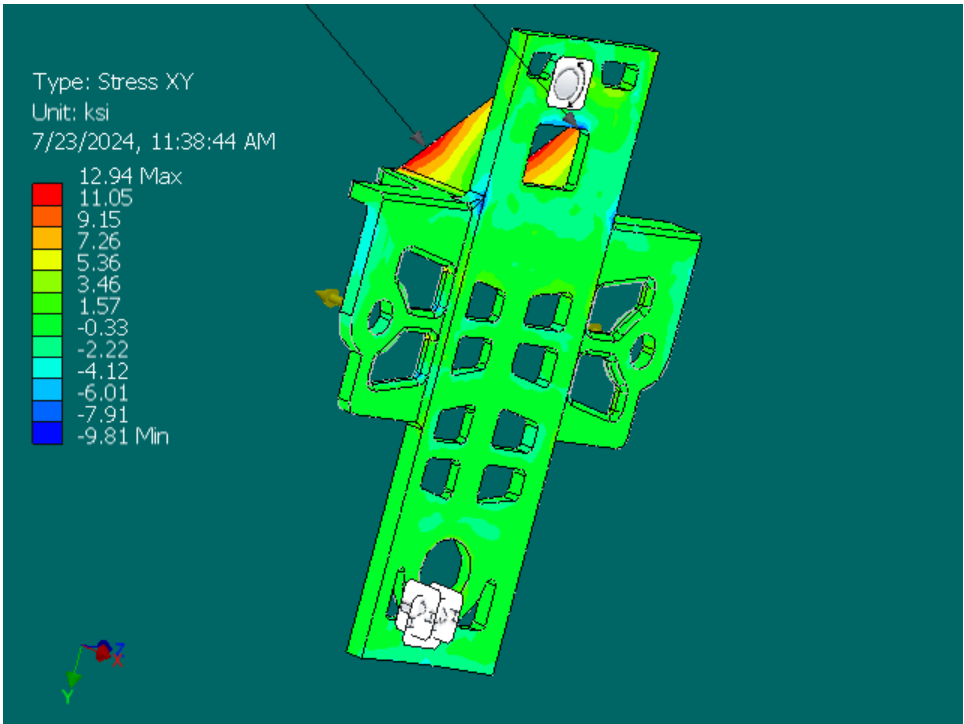
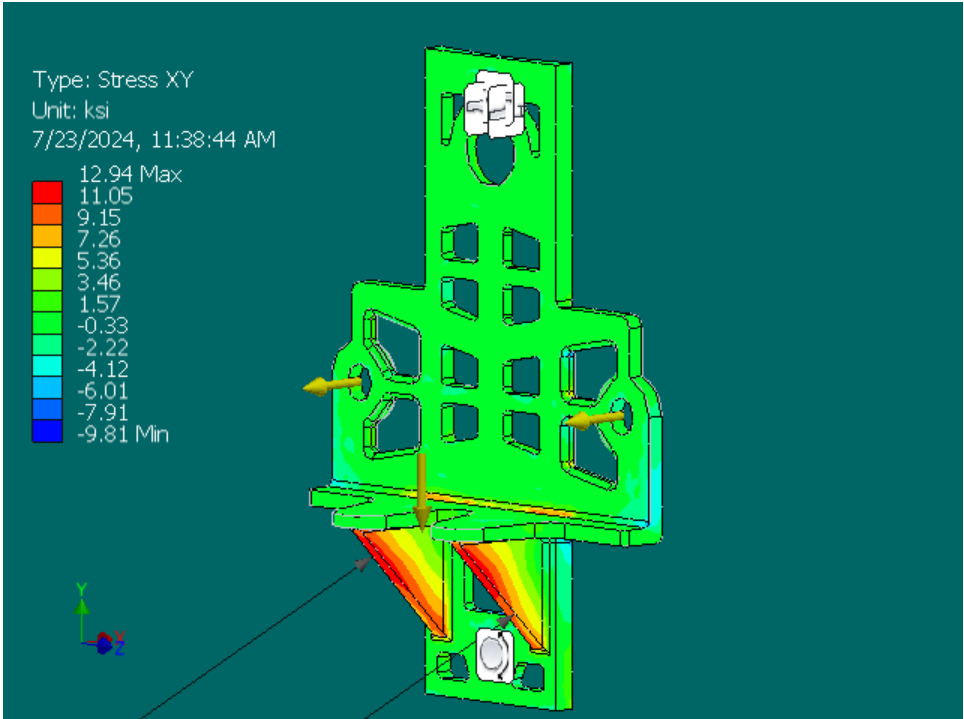


**Stress XX**

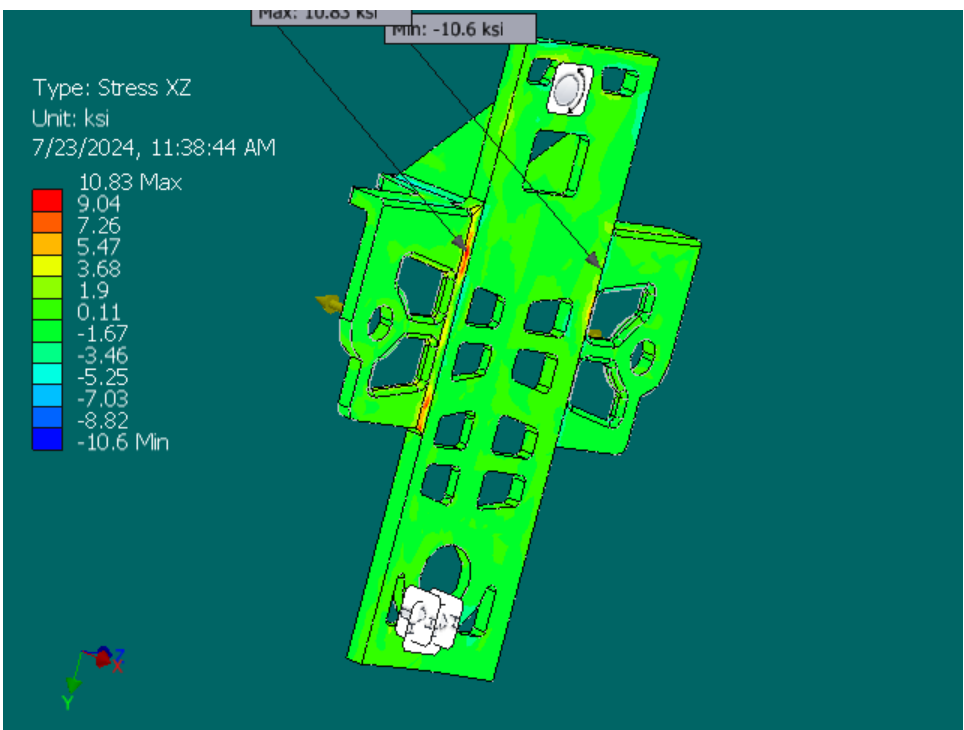
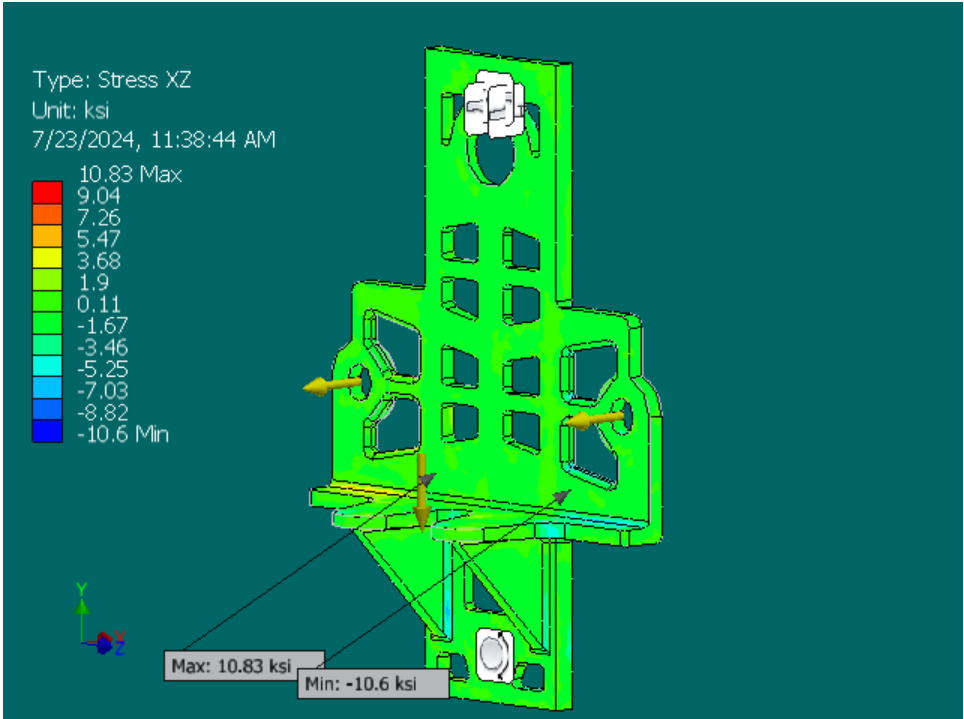


**Stress XY**

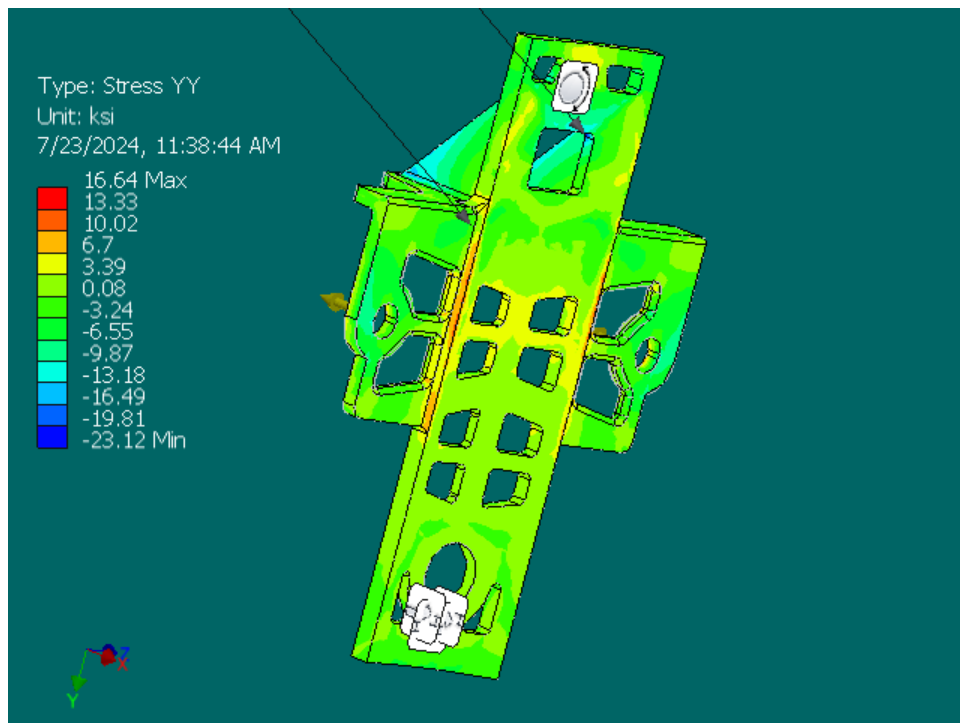
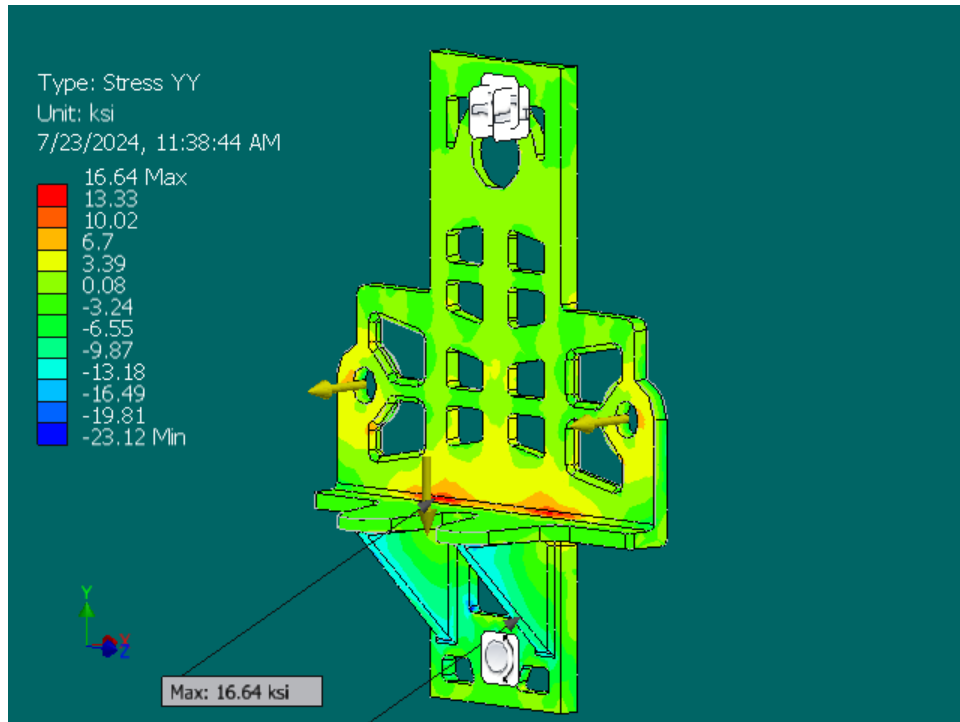




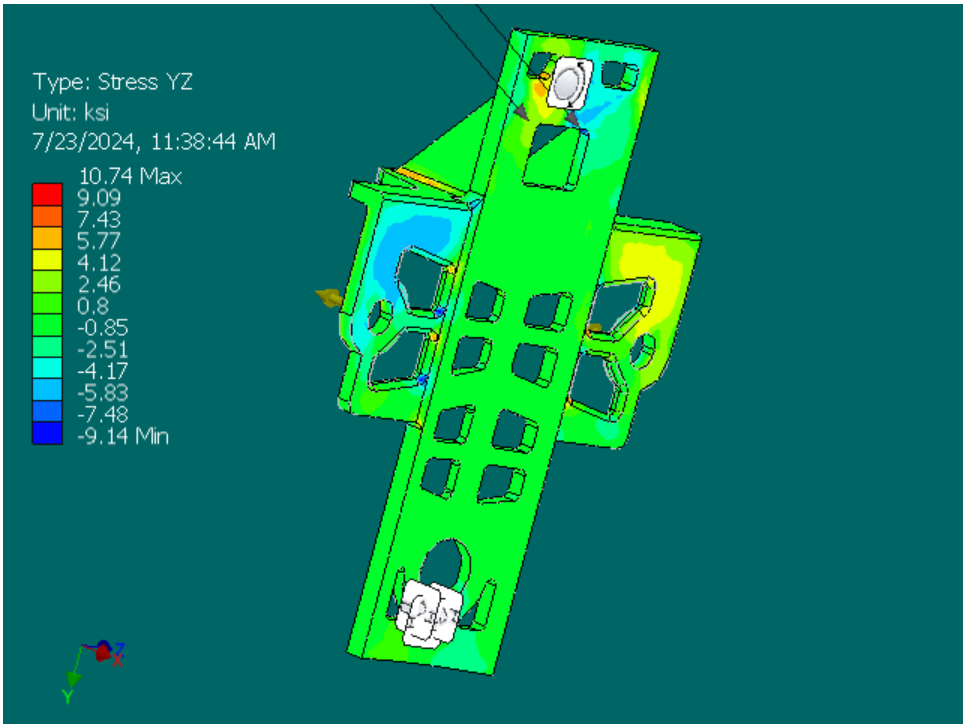
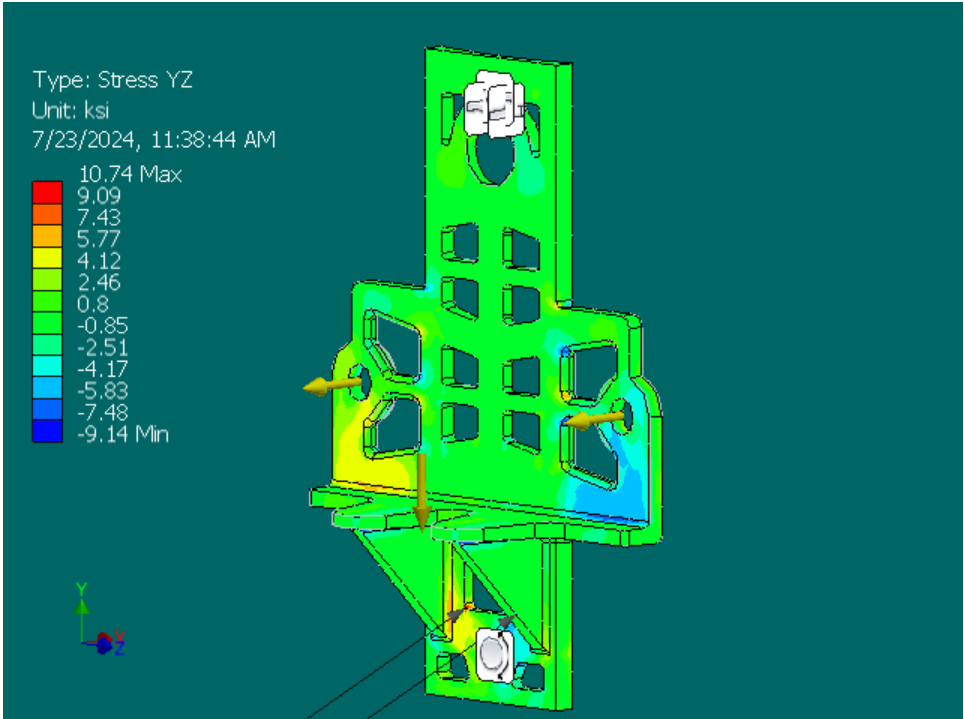
**Stress XZ**



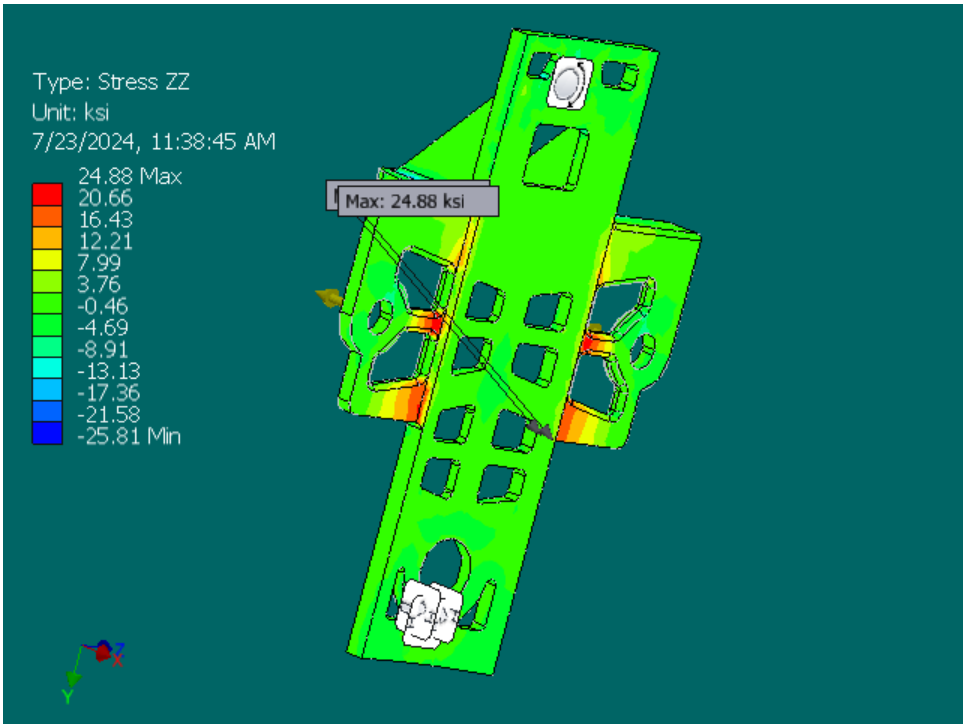
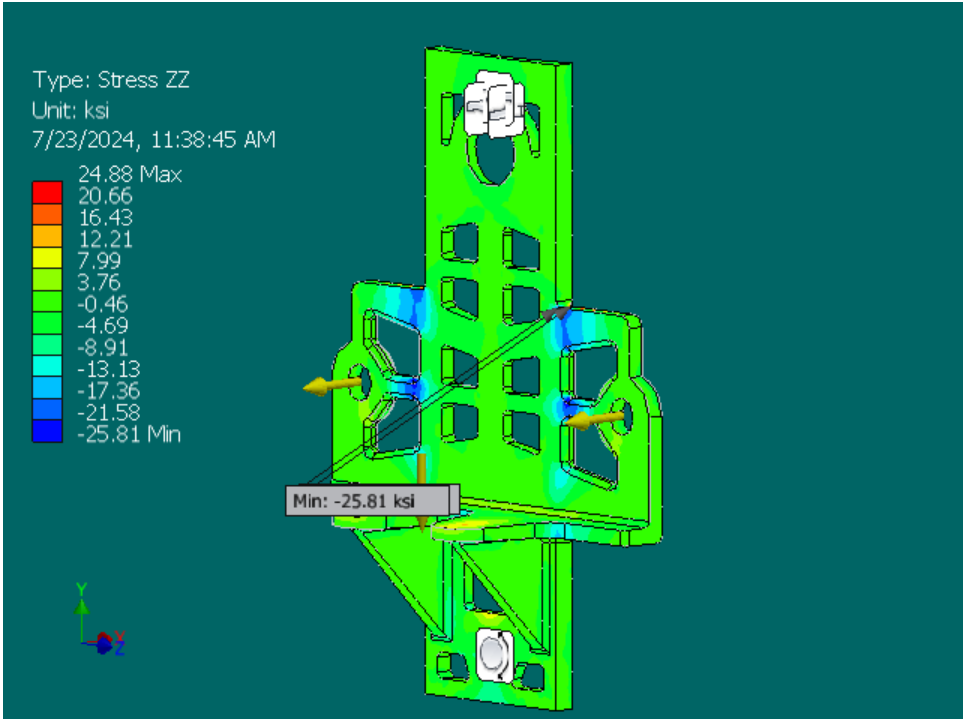
**Stress YY**



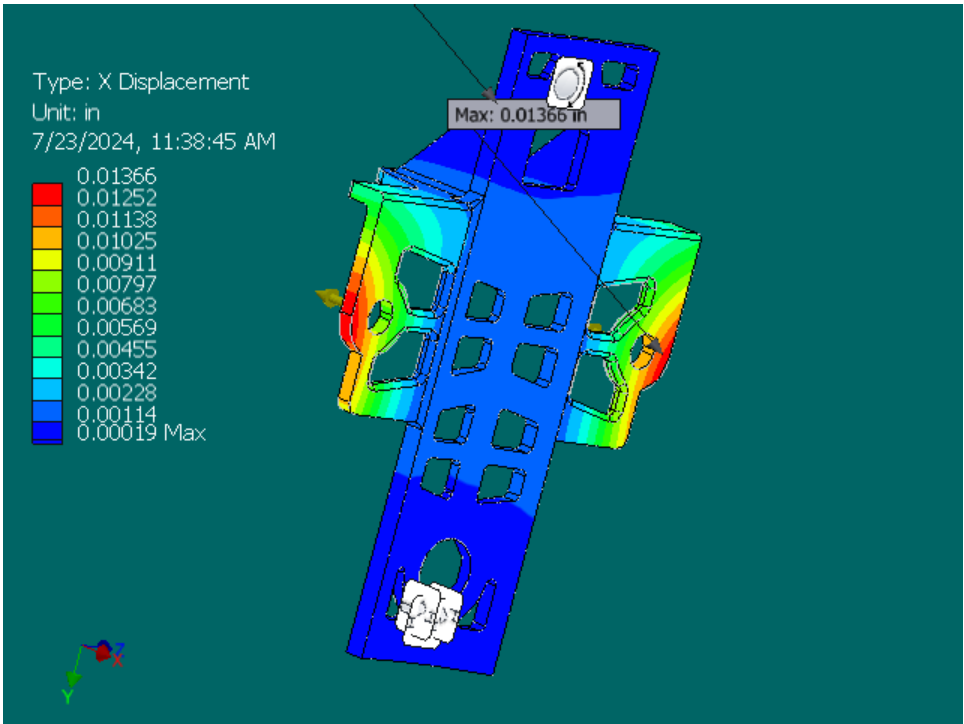
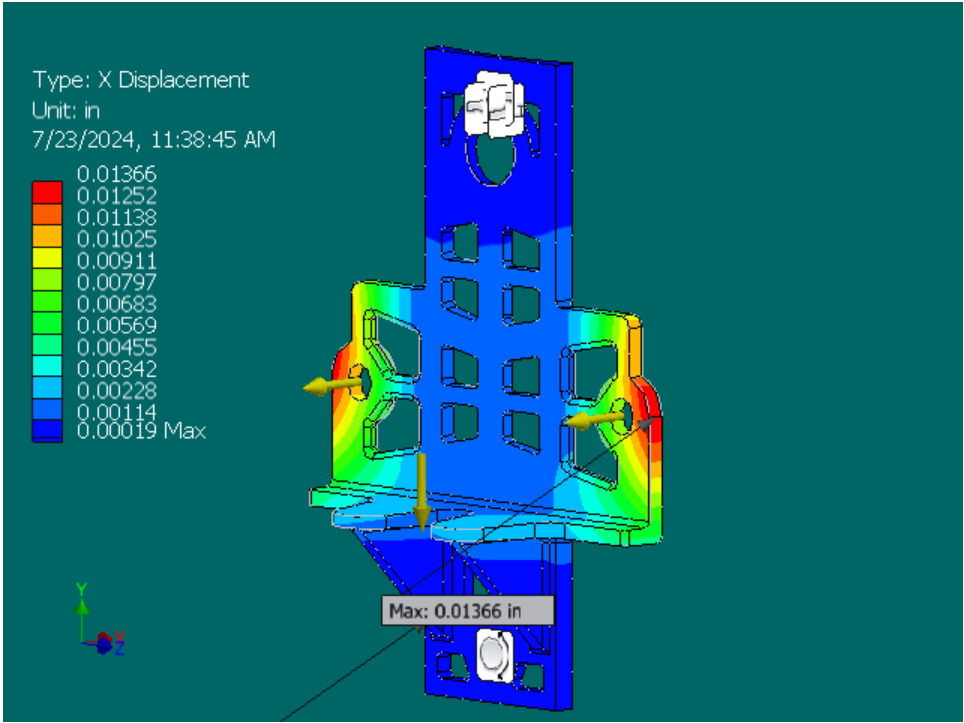
**Stress YZ**



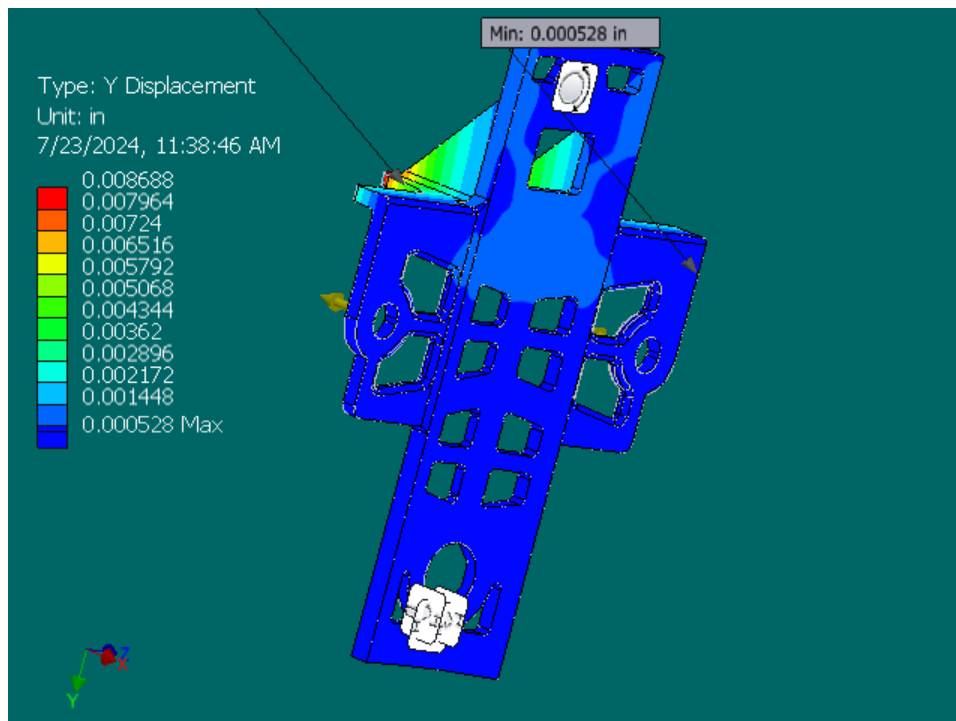
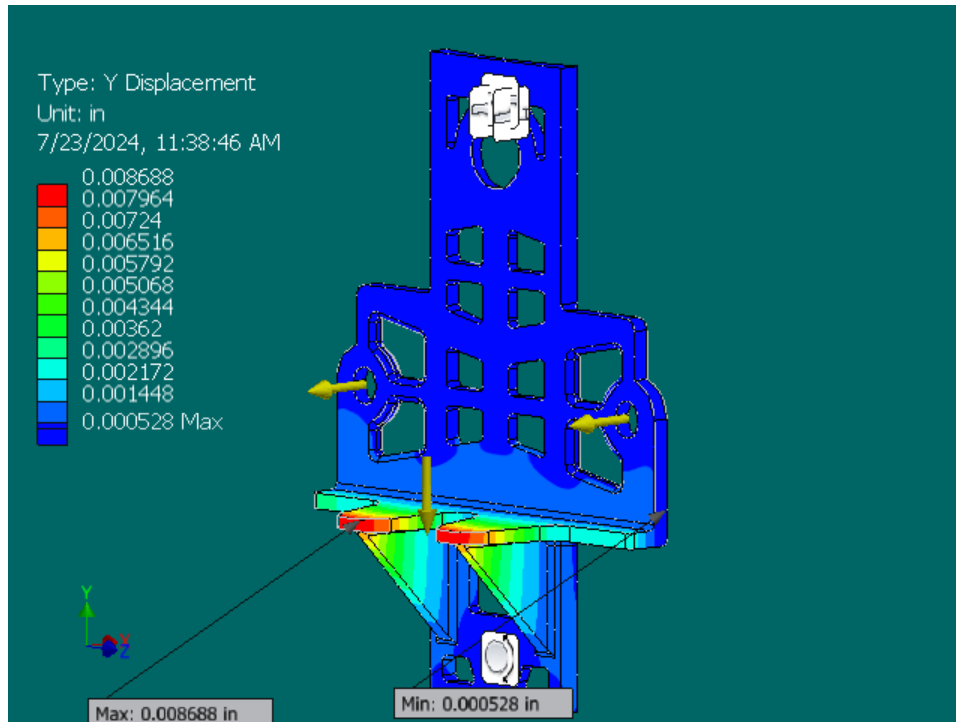
**Stress ZZ**



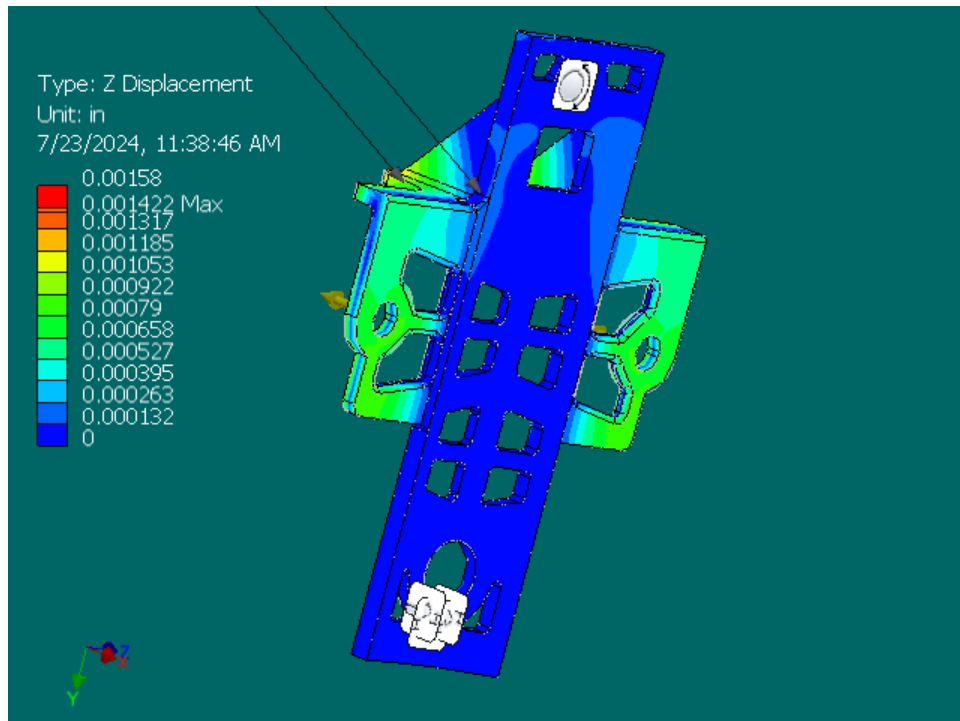
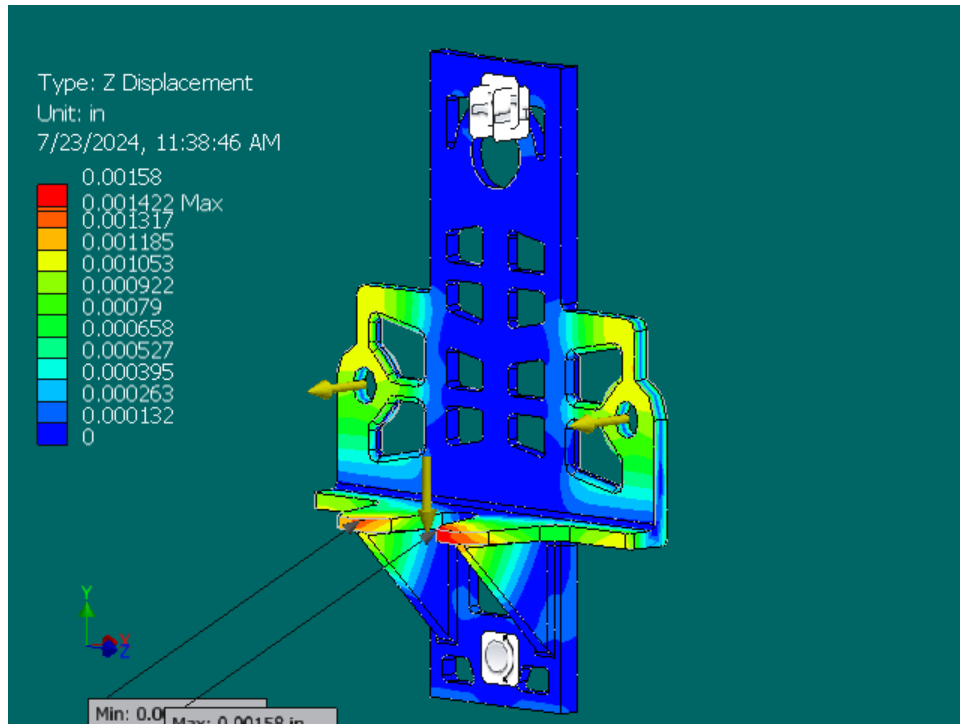
**X Displacement**



**Y Displacement**

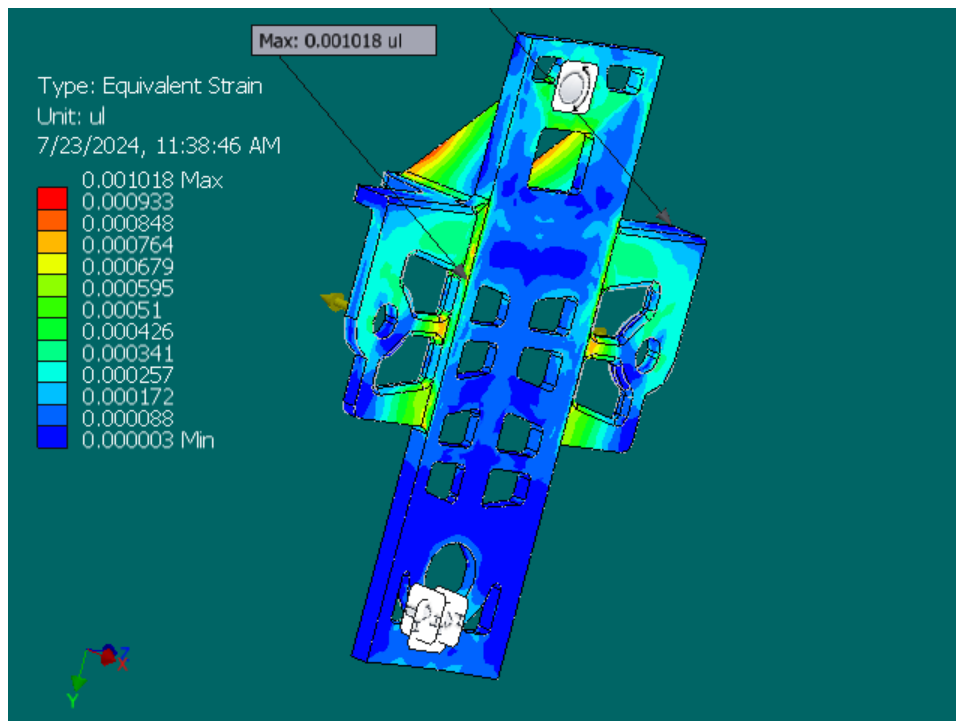
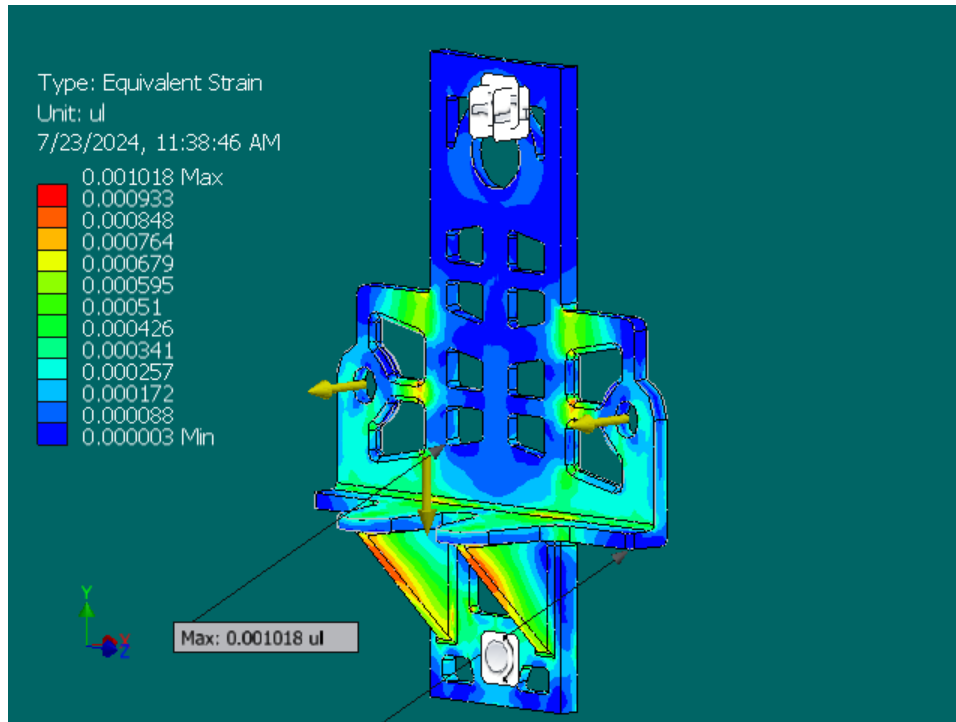


**Z Displacement**

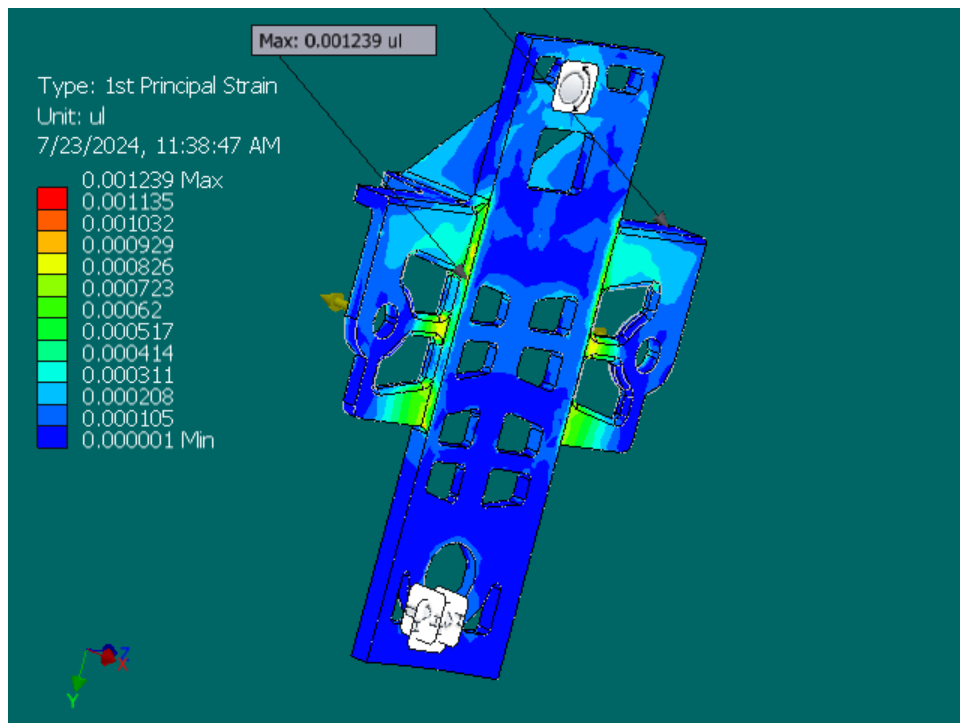
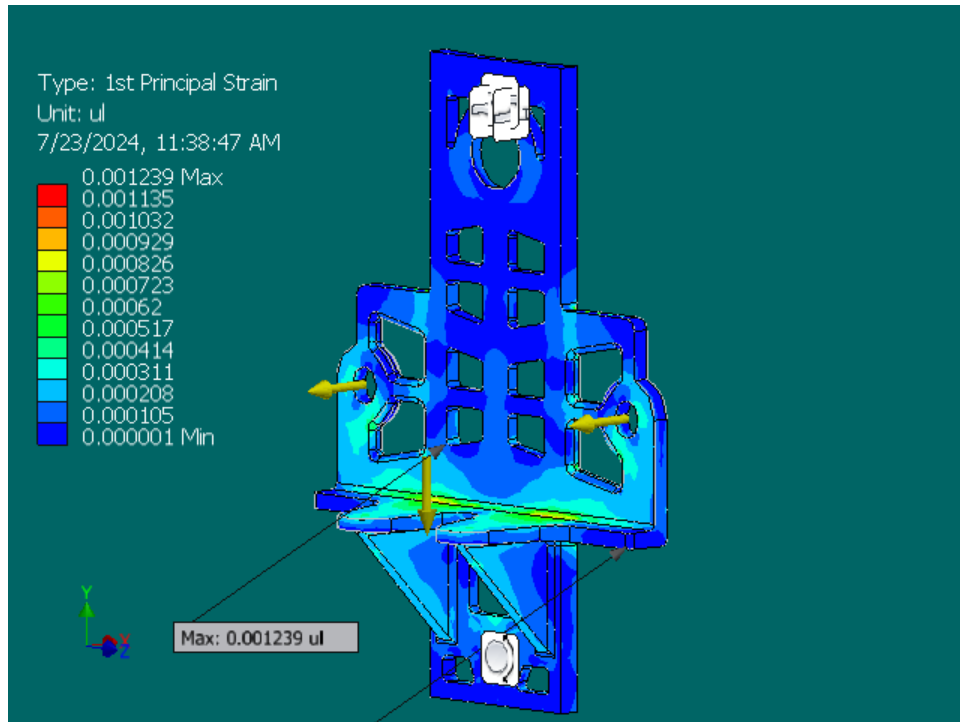


### Equivalent Strain

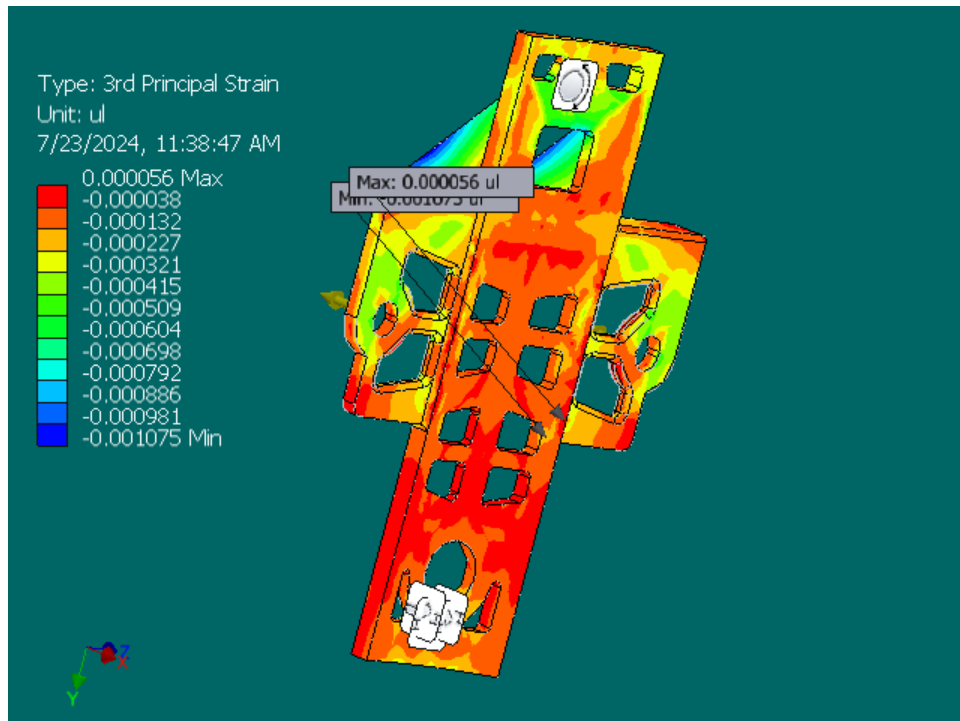
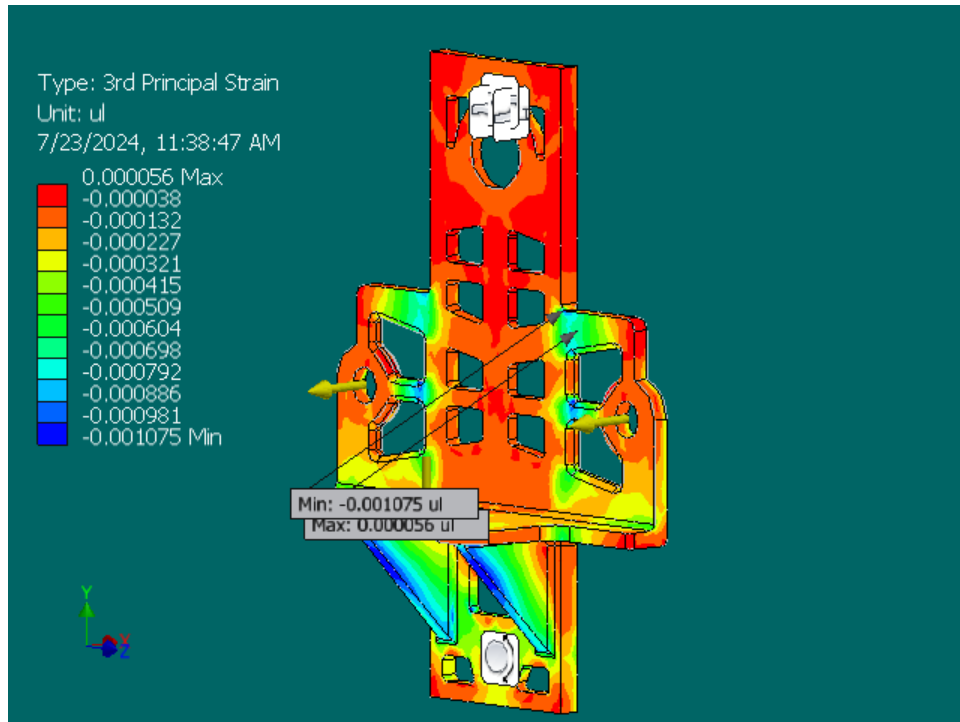




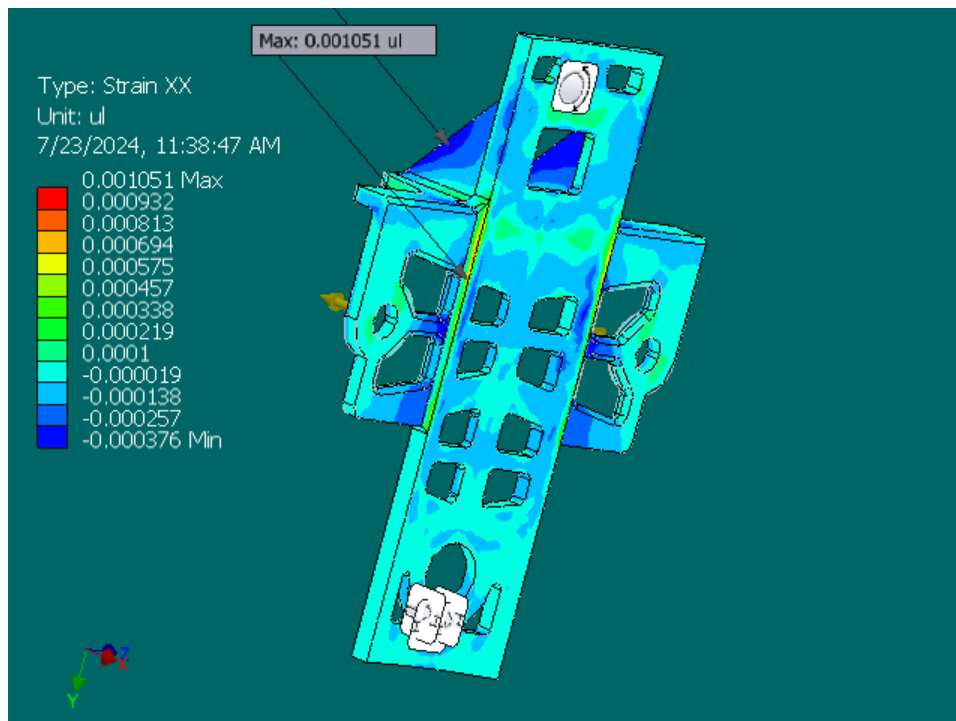
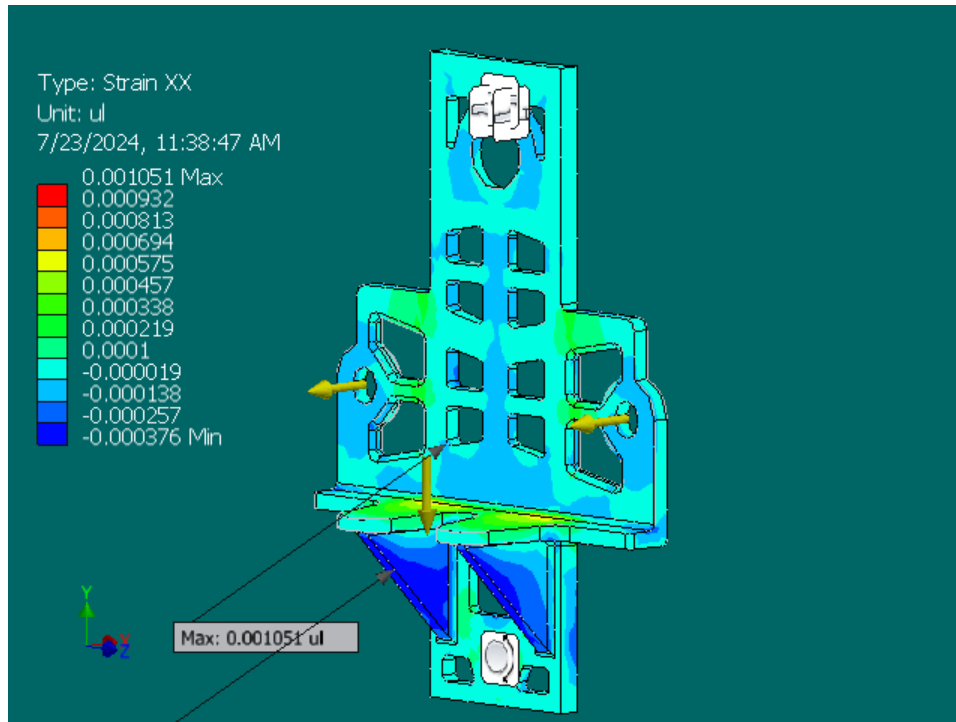
**1st Principal Strain**



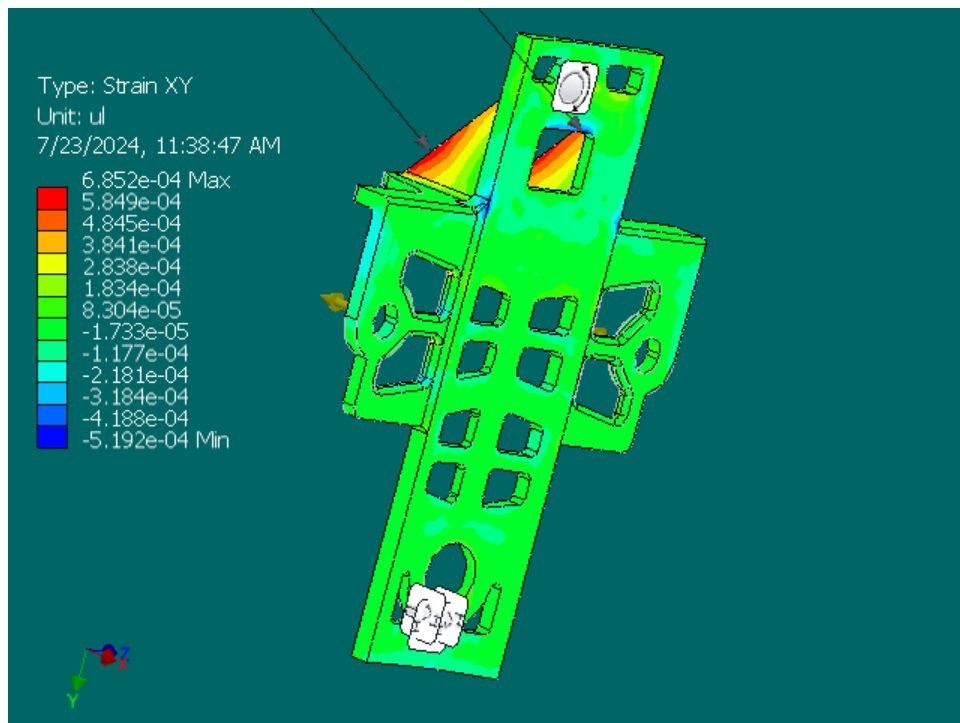
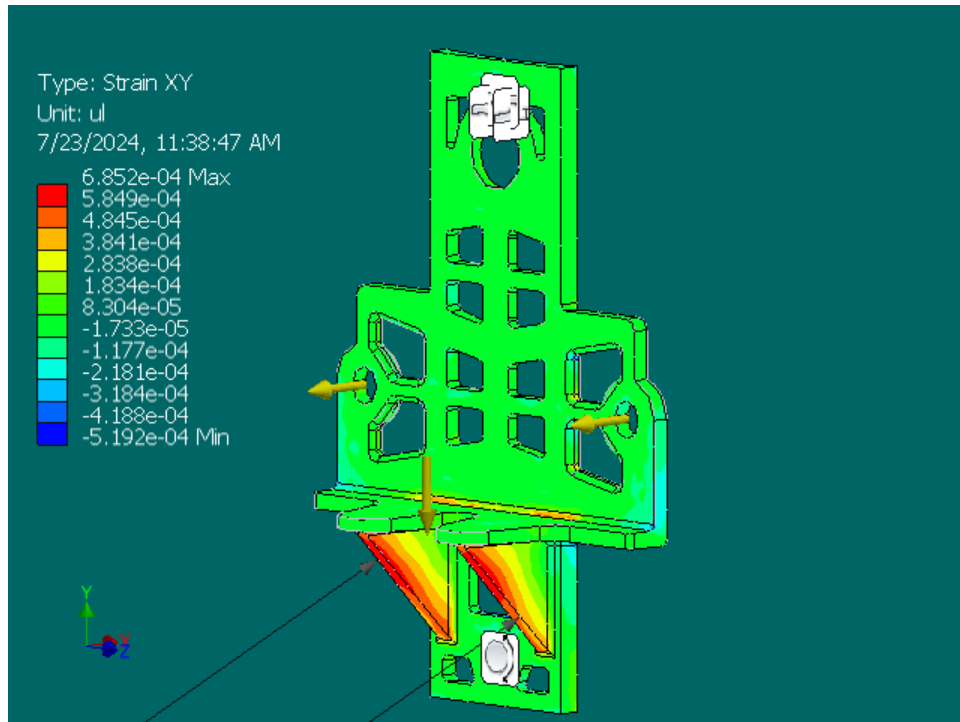
**3rd Principal Strain**



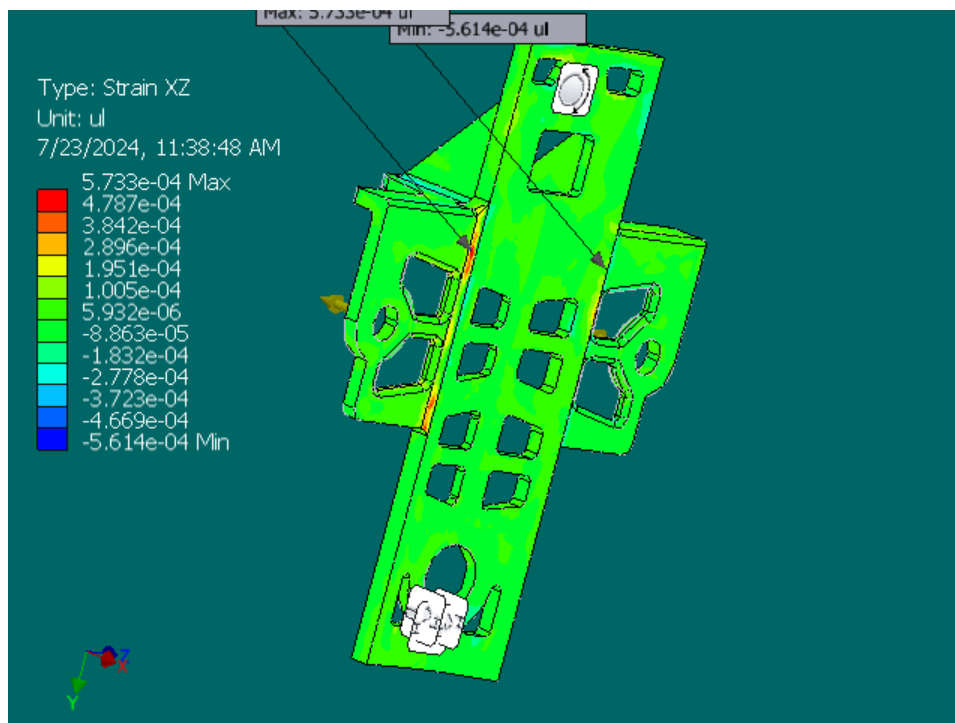
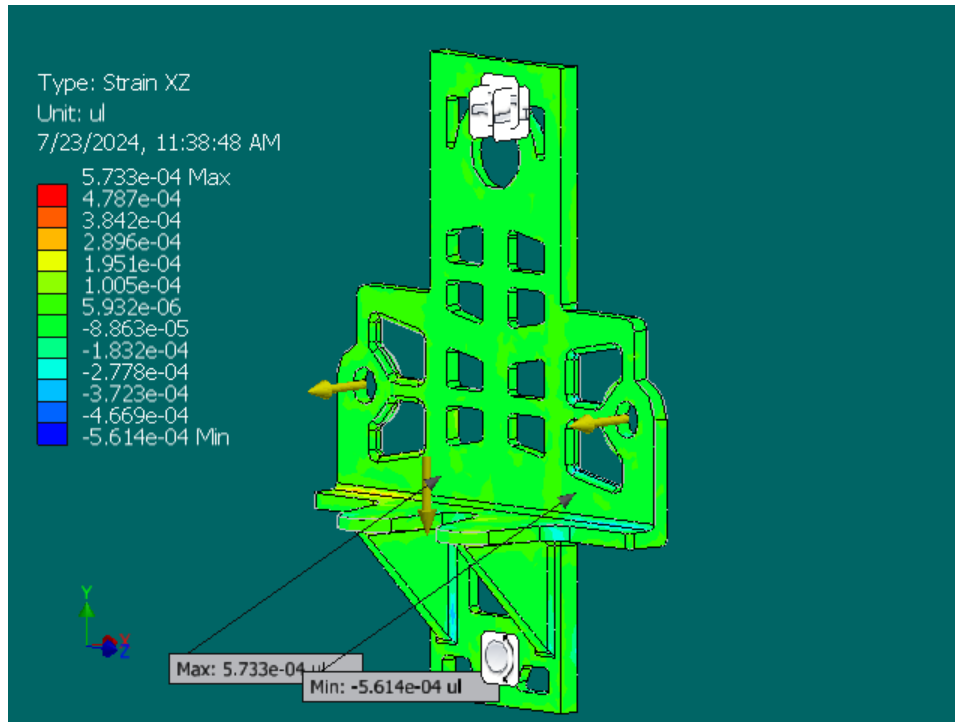
**Strain XX**



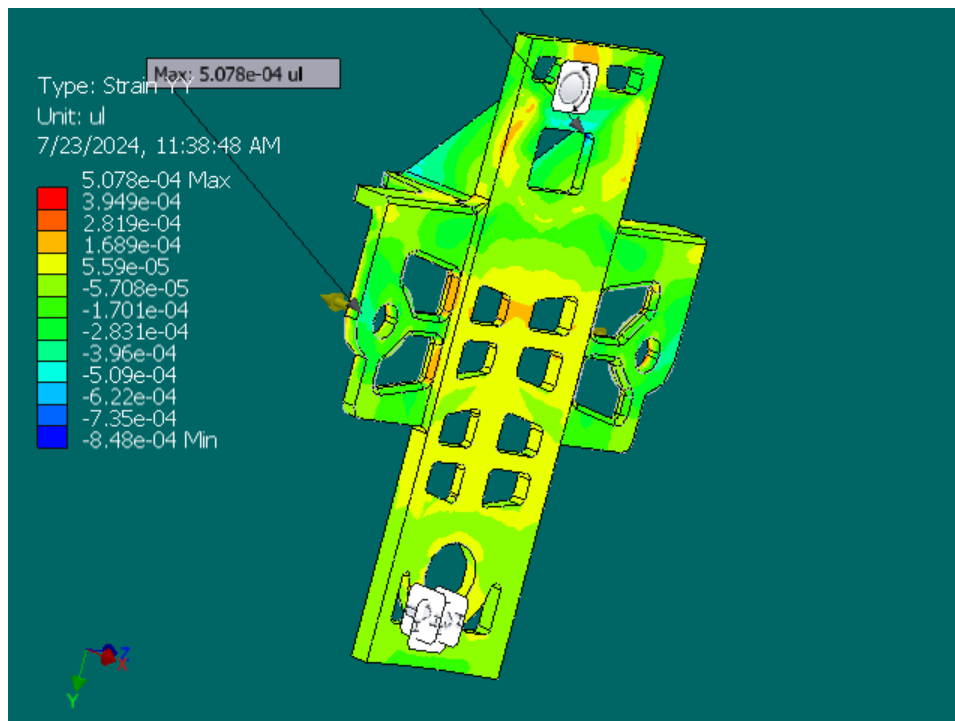
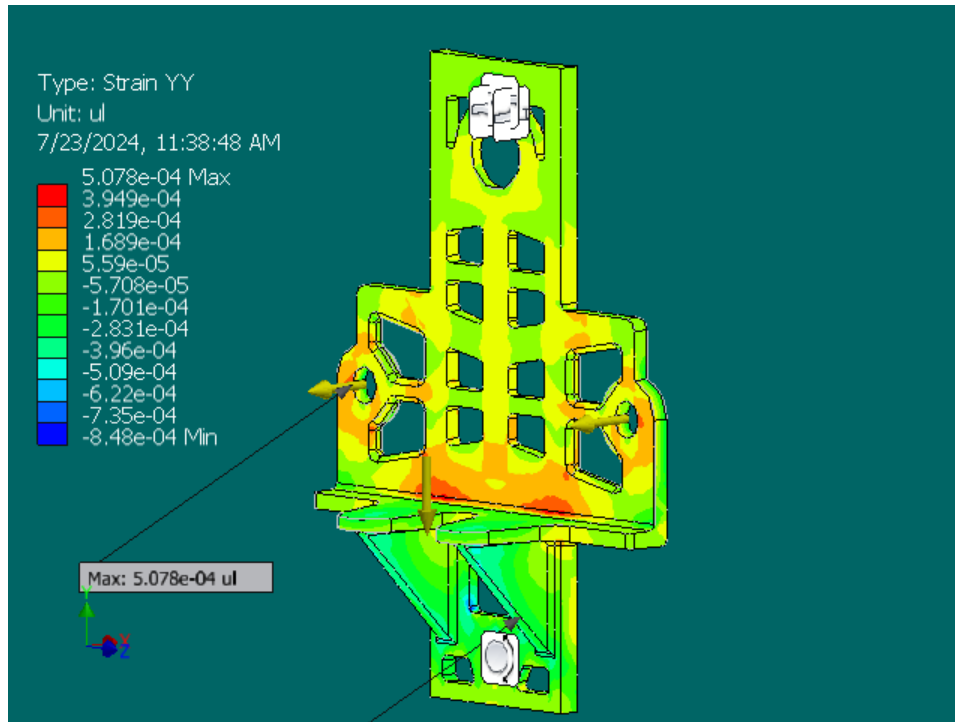
**Strain XY**



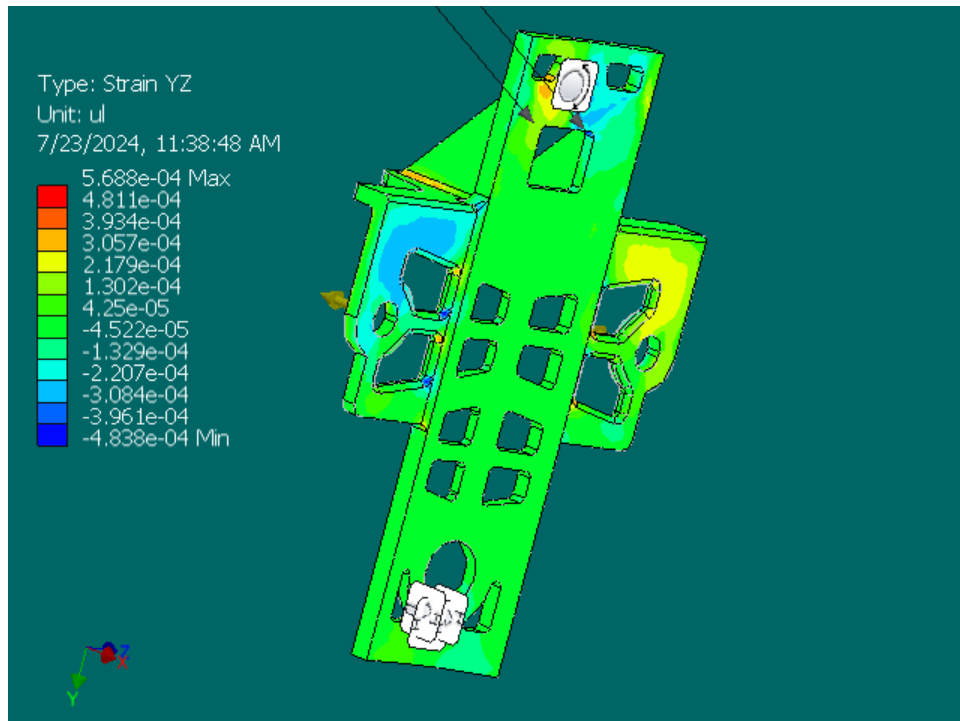
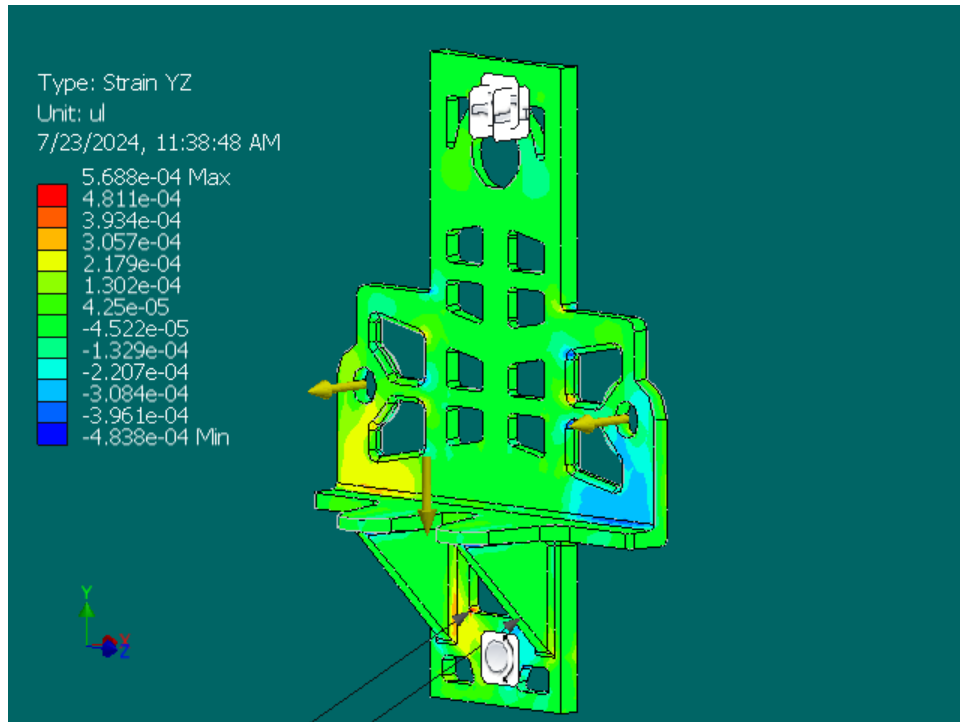
**Strain XZ**



**Strain YY**

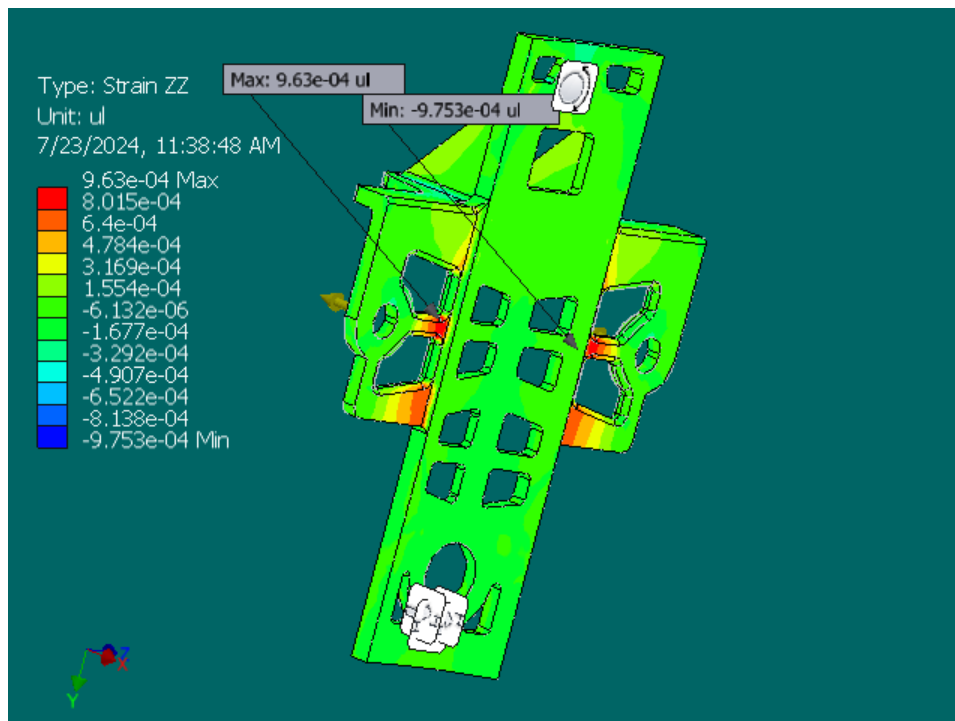
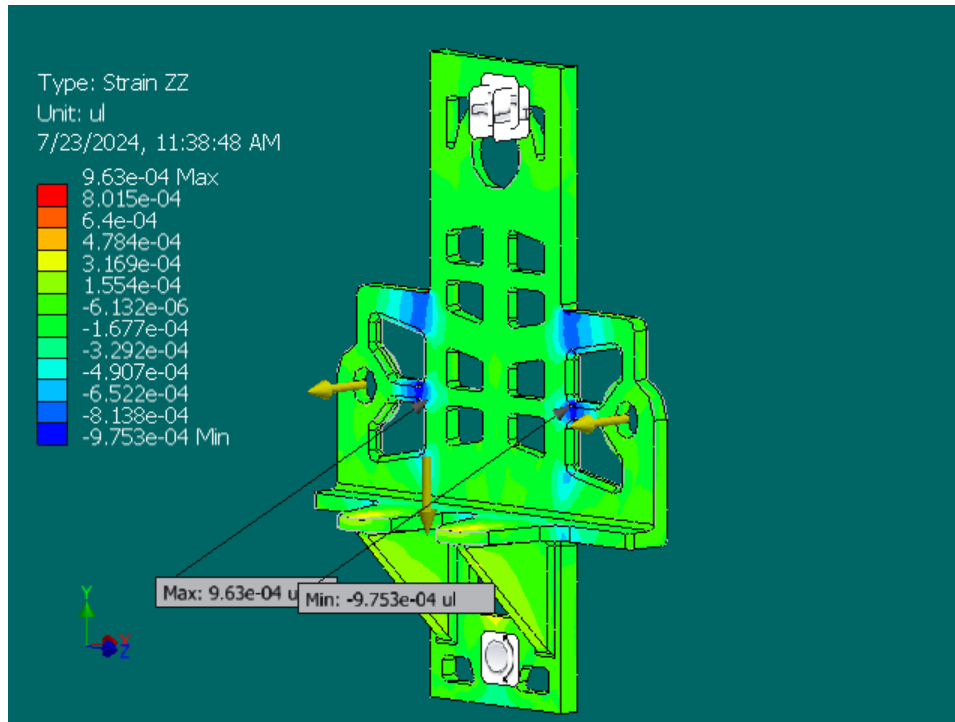


**Strain YZ**

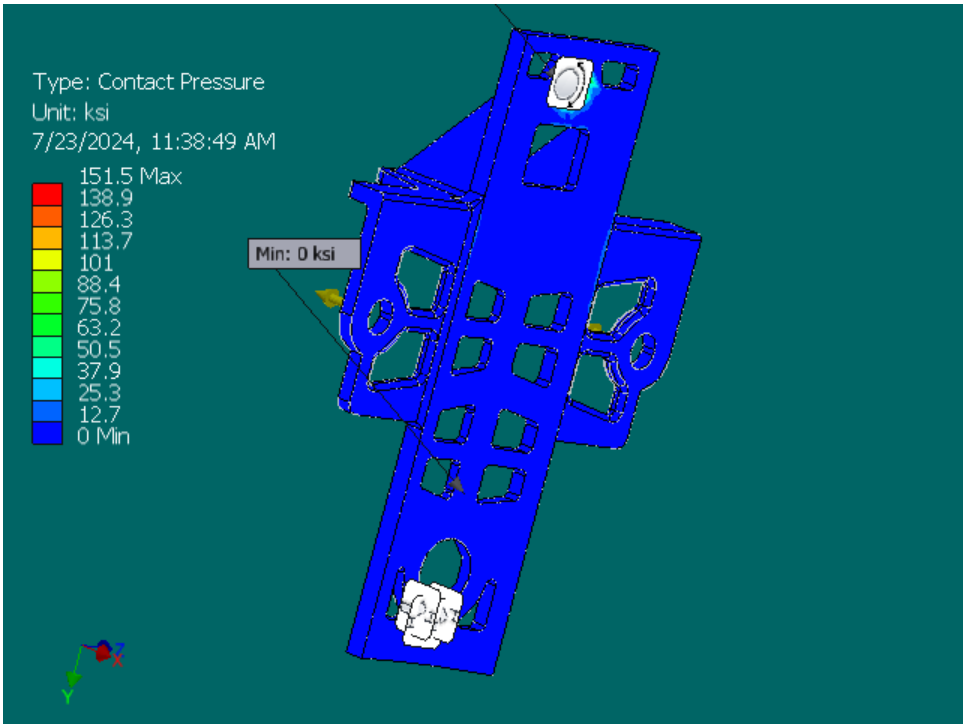
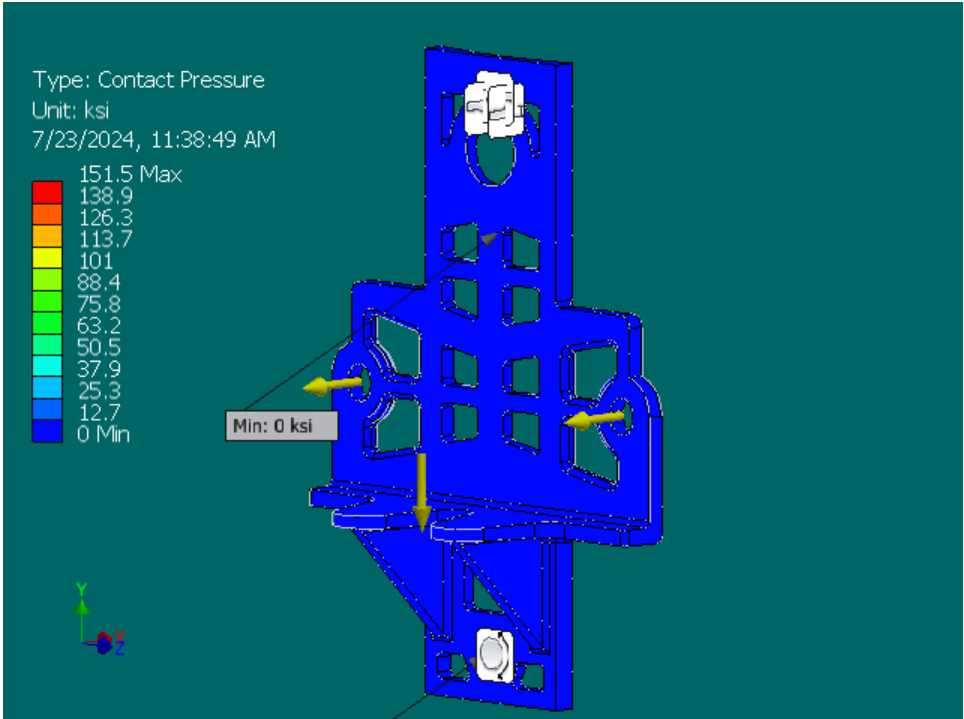


**Strain ZZ**

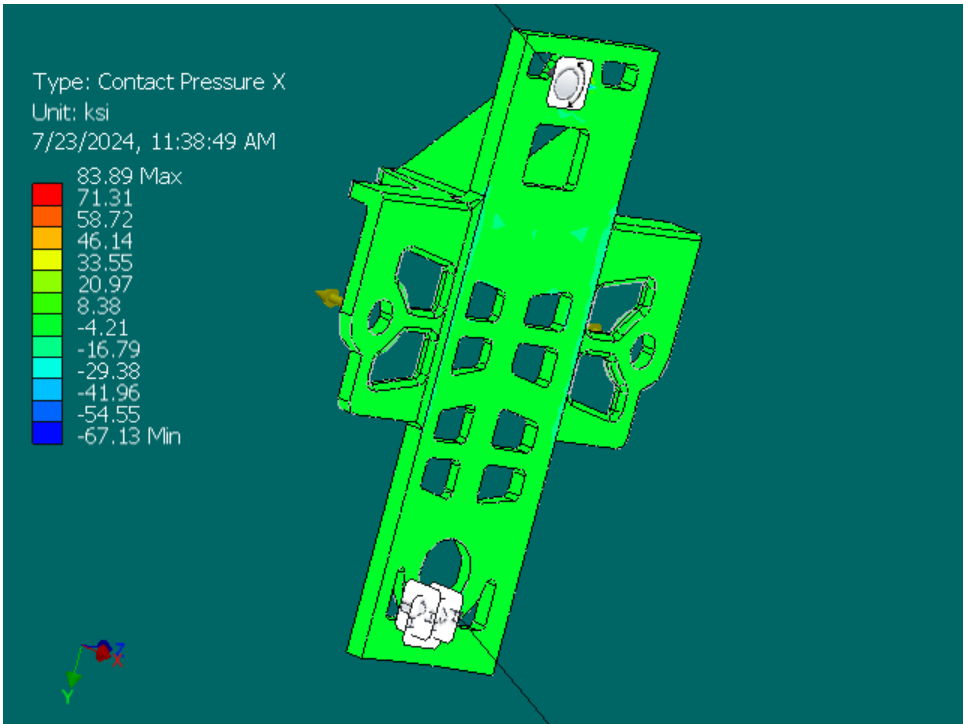
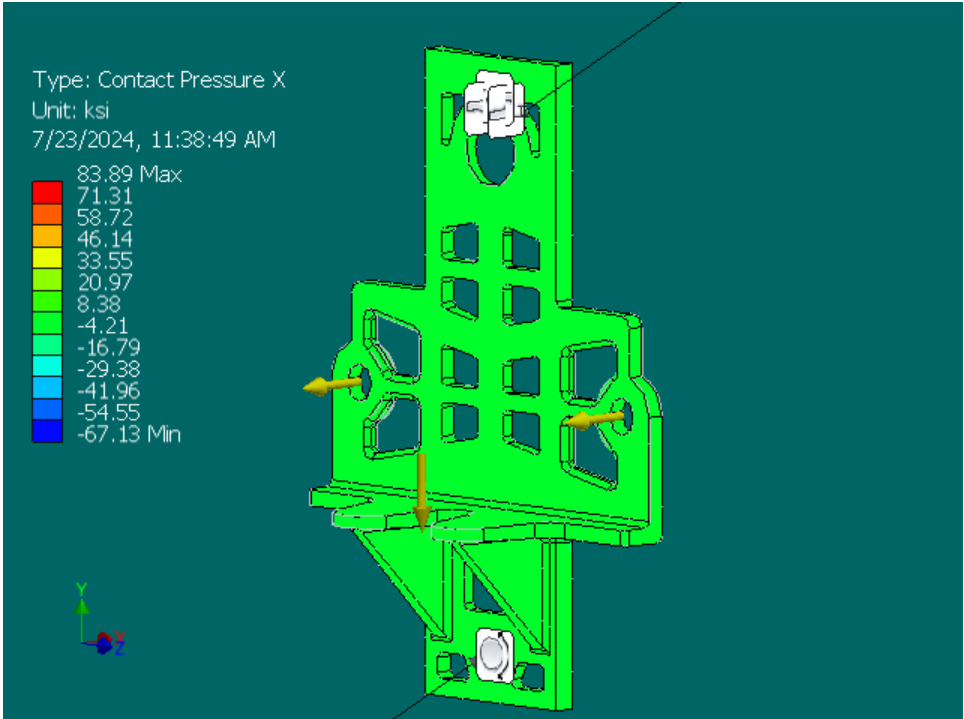




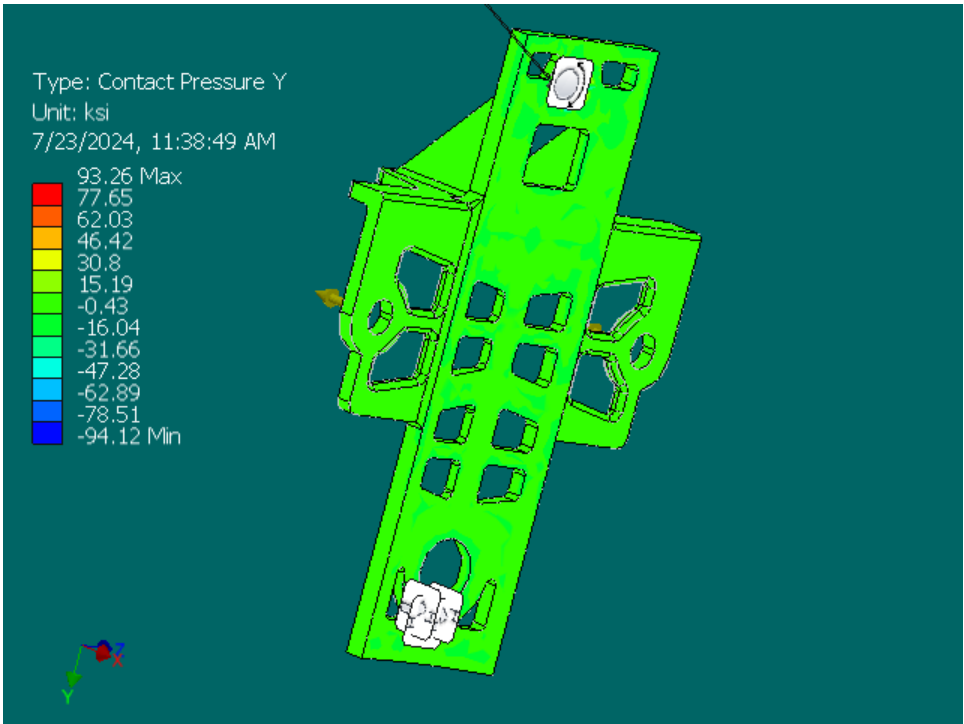
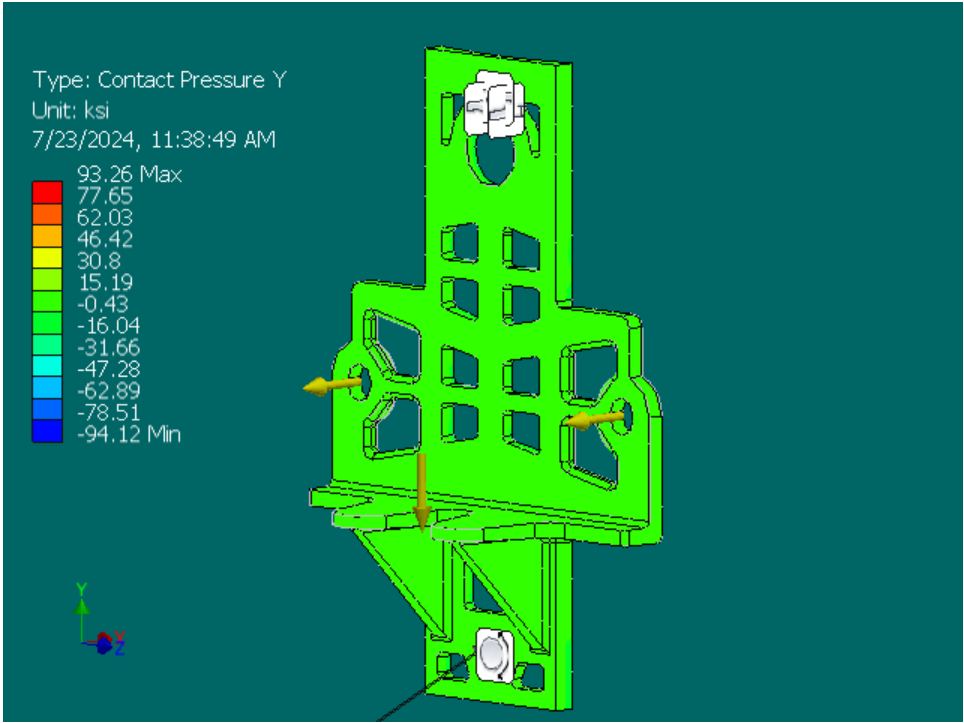
**Contact Pressure**



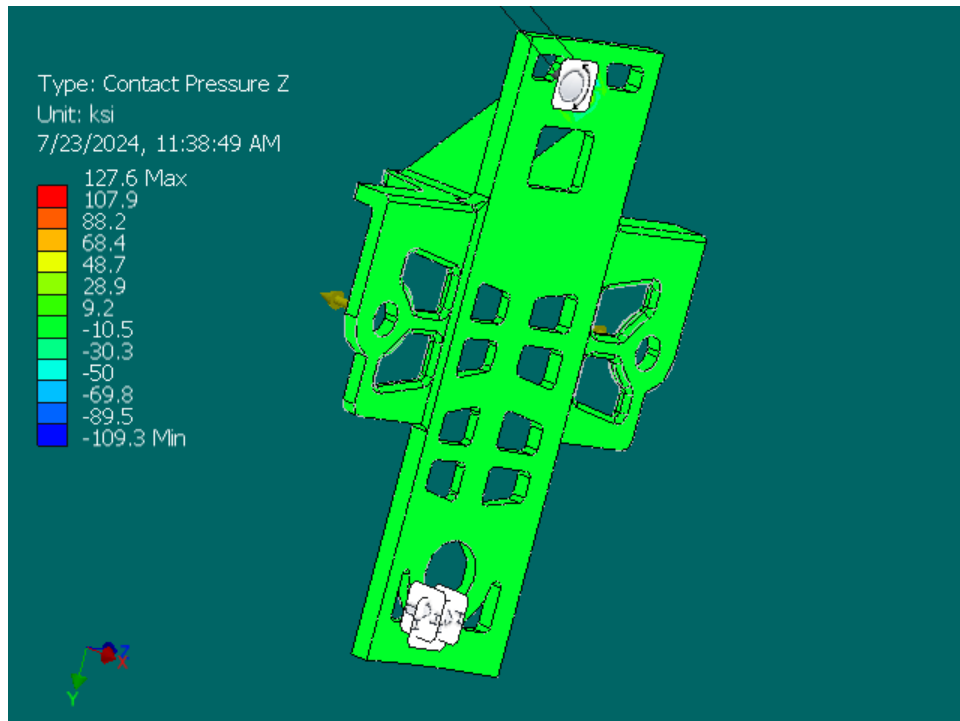
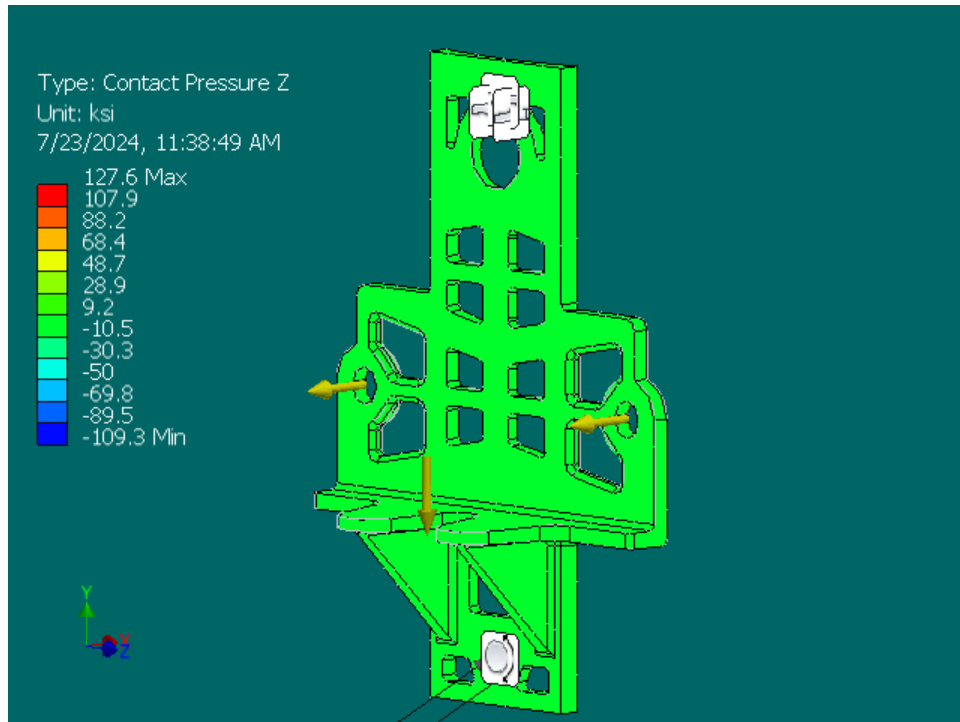
**Contact Pressure X**



**Contact Pressure Y**



**Contact Pressure Z**



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