

# Top Plate Analysis Report



Analyzed File:	topPlate.ipt
Autodesk Inventor Version:	2020 (Build 240168000, 168)
Creation Date:	7/29/2021, 6:51 AM
Study Author:	Bisqwit2.0
Summary:	

## Project Info (iProperties)

### Summary

Author joelm

### Project

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

### Status

Design Status WorkInProgress

### Physical

Material	Stainless Steel
Density	8 g/cm <sup>3</sup>
Mass	1.40291 kg
Area	31493.5 mm <sup>2</sup>
Volume	175364 mm <sup>3</sup>
Center of Gravity	x=0 mm y=10.3391 mm z=-41 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	7/29/2021, 6:50 AM
Detect and Eliminate Rigid Body Modes	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	Yes
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## Material(s)

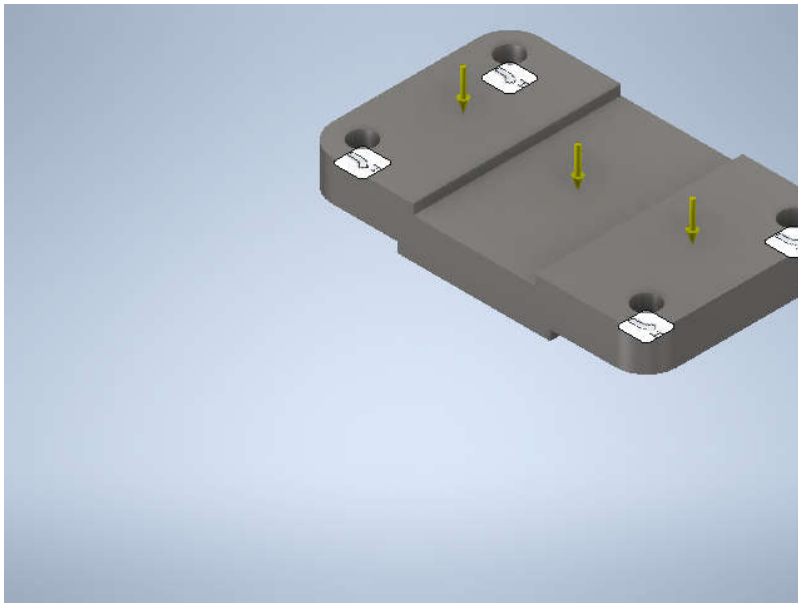
Name	Stainless Steel	
General	Mass Density	8 g/cm <sup>3</sup>
	Yield Strength	250 MPa
	Ultimate Tensile Strength	540 MPa
Stress	Young's Modulus	193 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	74.2308 GPa
Part Name(s)	topPlate.ipt	

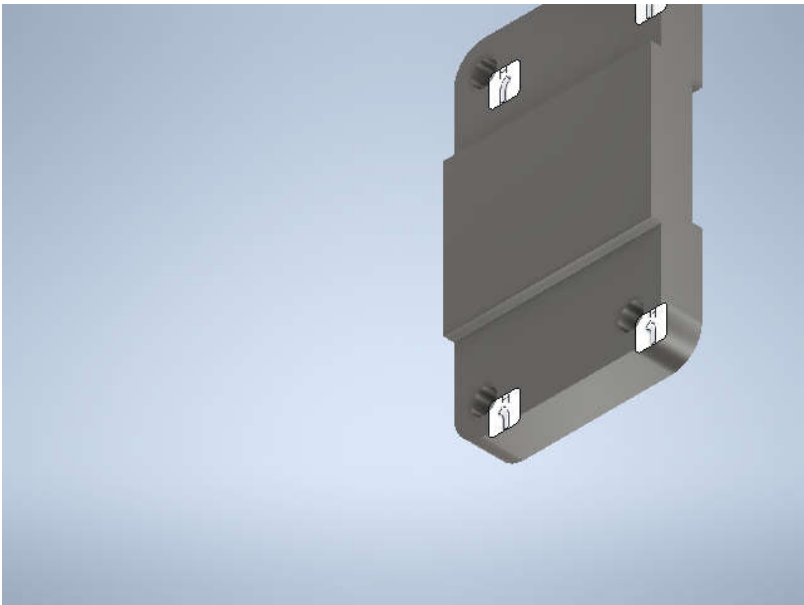
## Operating conditions

### 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)

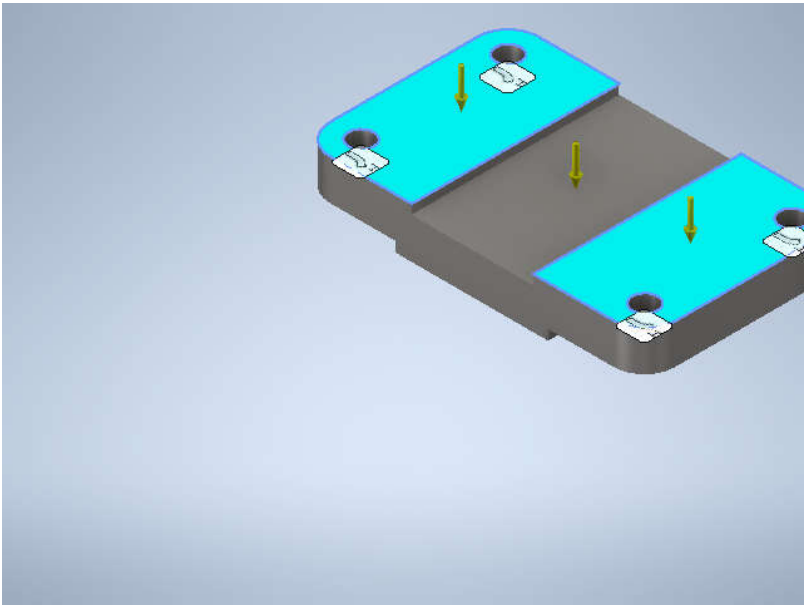


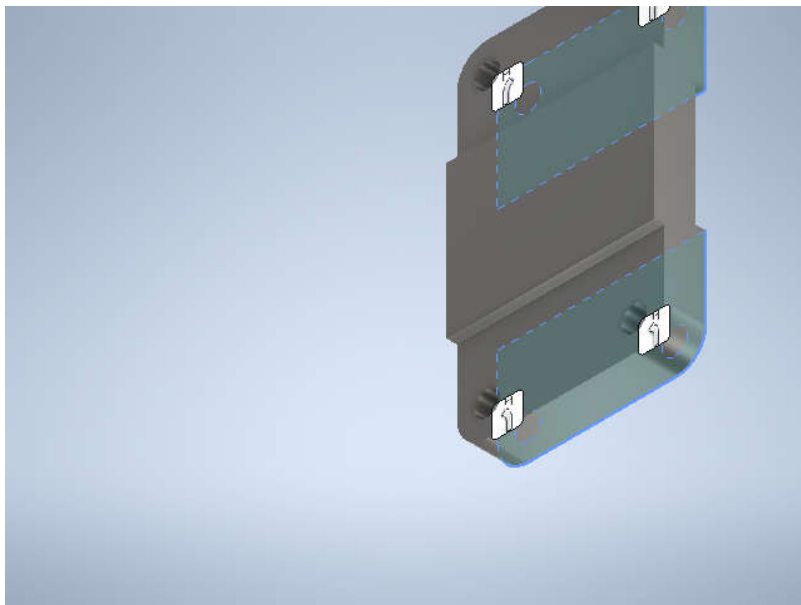


☐ **Force:1**

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)**

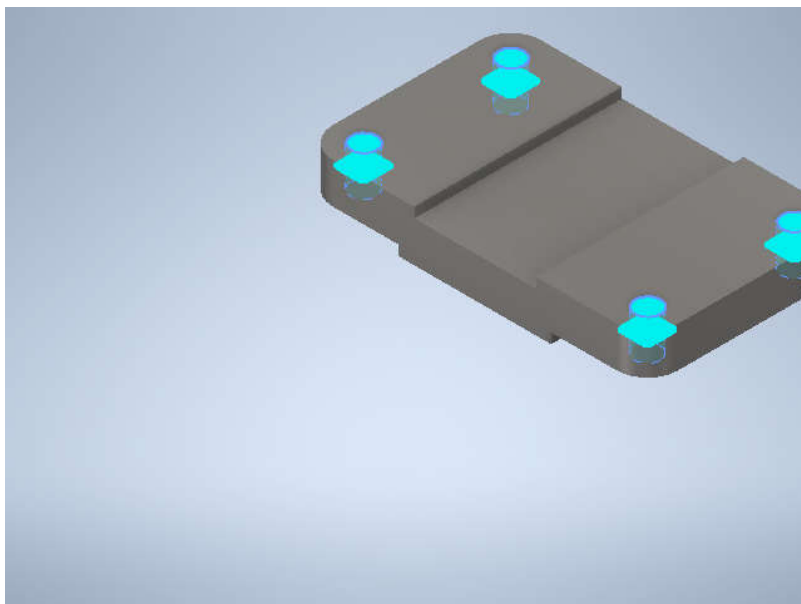


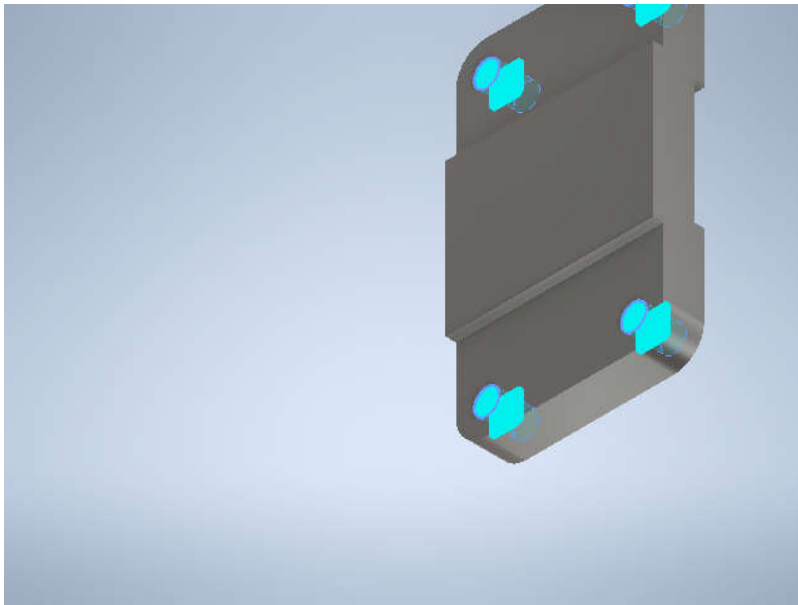


#### Fixed Constraint:1

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





## Results

### Reaction Force and Moment on Constraints

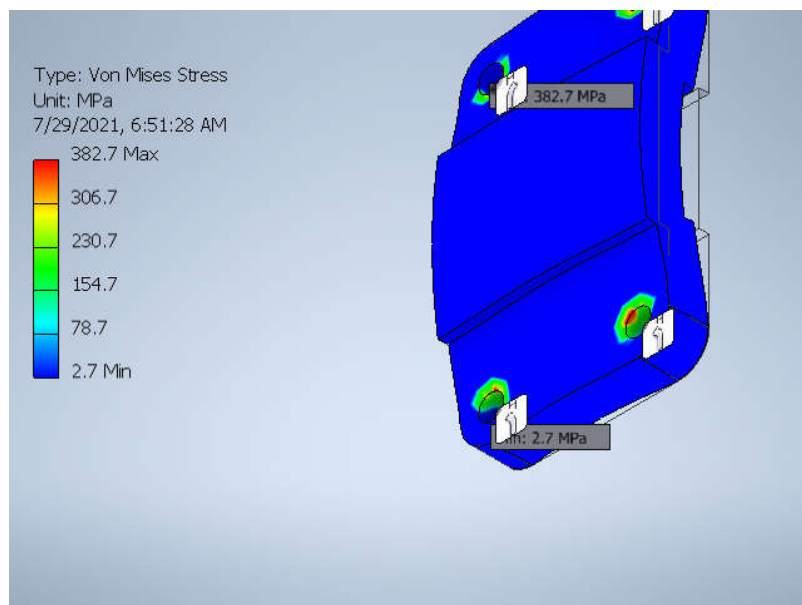
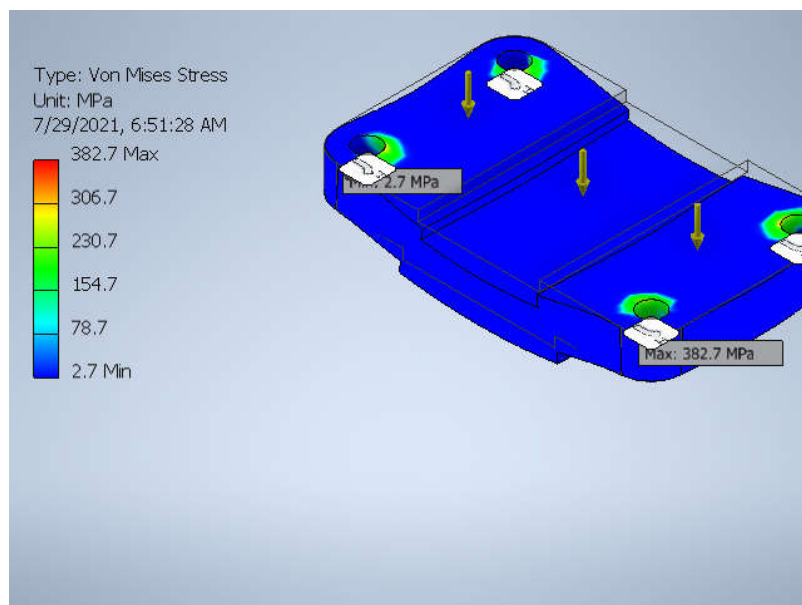
Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint: 1	100014 N	0 N	0 N m	0 N m
		100014 N		0 N m
		0 N		0 N m

### Result Summary

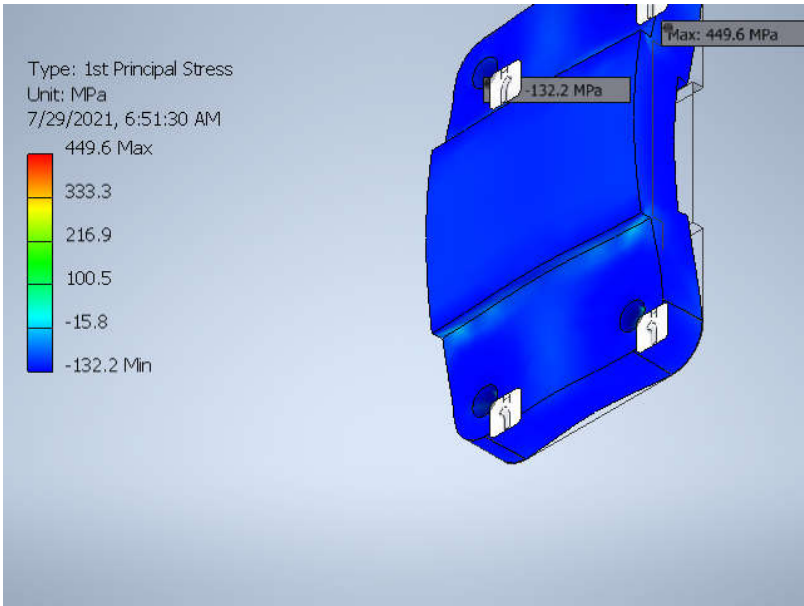
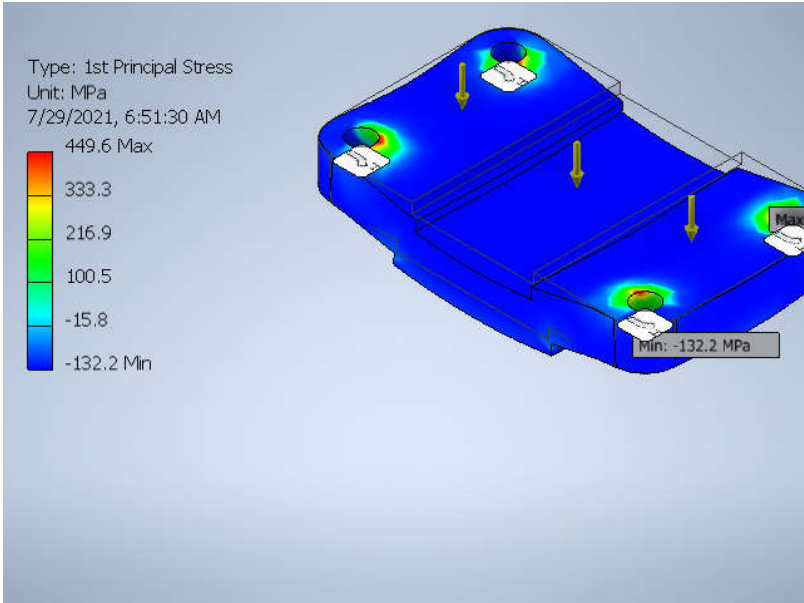
Name	Minimum	Maximum
Volume	175364 mm <sup>3</sup>	
Mass	1.40291 kg	
Von Mises Stress	2.71267 MPa	382.655 MPa
1st Principal Stress	-132.168 MPa	449.62 MPa
3rd Principal Stress	-545.386 MPa	98.7437 MPa
Displacement	0 mm	0.0347143 mm
Safety Factor	0.653331 ul	15 ul
Stress XX	-457.745 MPa	351.125 MPa
Stress XY	-147.176 MPa	148.139 MPa
Stress XZ	-131.429 MPa	122.826 MPa
Stress YY	-203.266 MPa	164.913 MPa
Stress YZ	-113.872 MPa	104.618 MPa
Stress ZZ	-312.061 MPa	232.598 MPa
X Displacement	-0.00730153 mm	0.00732624 mm
Y Displacement	-0.0347142 mm	0.000306306 mm
Z Displacement	-0.00283307 mm	0.00284397 mm
Equivalent Strain	0.0000123432 ul	0.00192176 ul
1st Principal Strain	-0.0000000670111 ul	0.00191772 ul
3rd Principal Strain	-0.00230443 ul	-0.00000669802 ul
Strain XX	-0.0017141 ul	0.00142398 ul
Strain XY	-0.000991342 ul	0.00099783 ul
Strain XZ	-0.000885275 ul	0.000827326 ul
Strain YY	-0.000457162 ul	0.000631634 ul
Strain YZ	-0.000767017 ul	0.000704683 ul
Strain ZZ	-0.0012121 ul	0.000955014 ul

## Figures

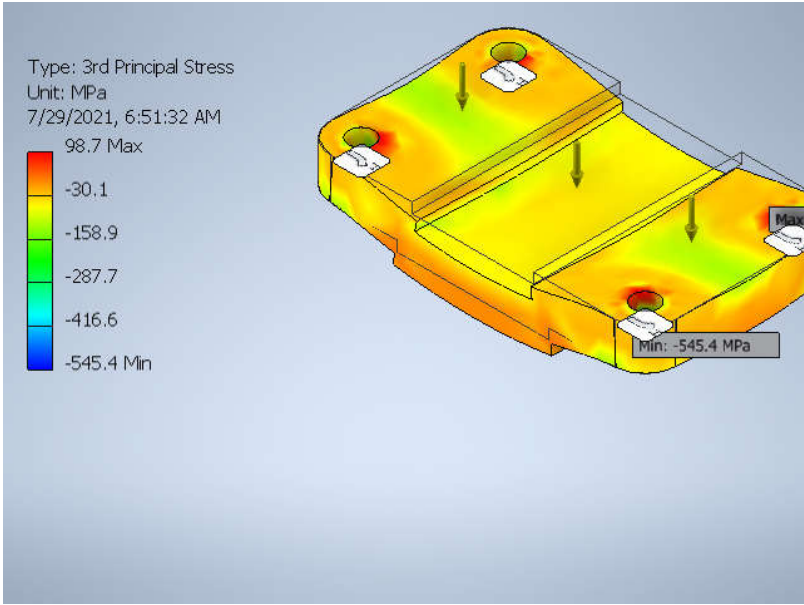
### Von Mises Stress

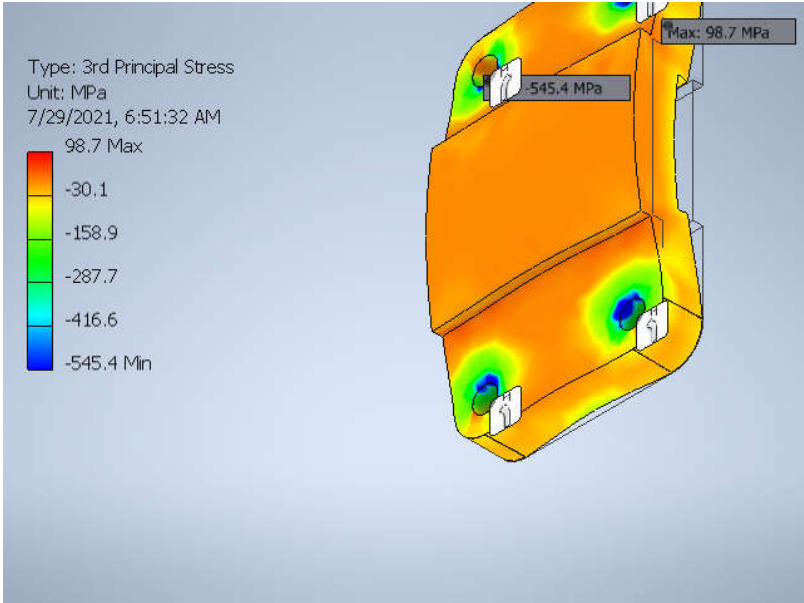


### 1st Principal Stress

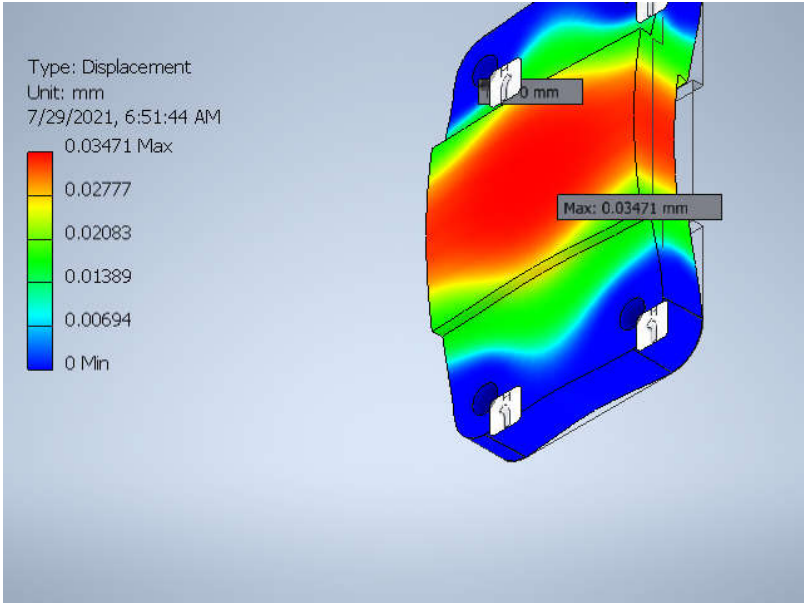
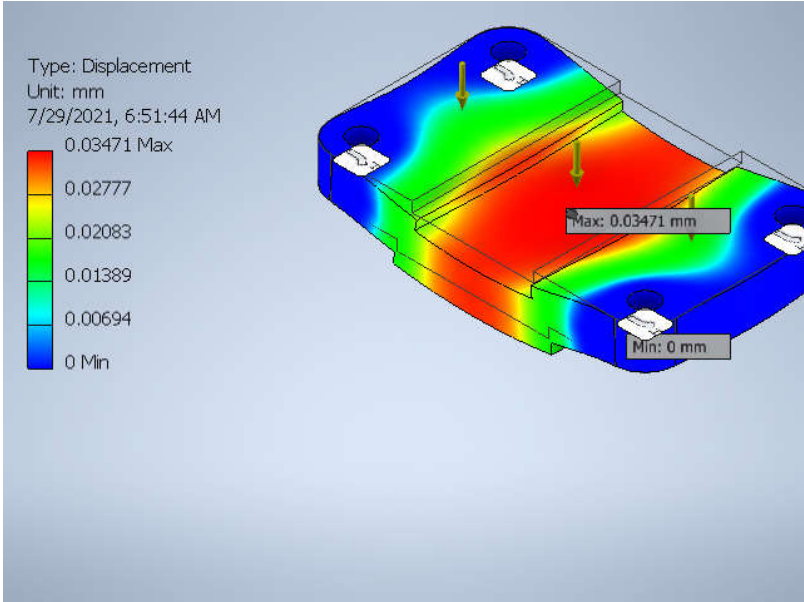


3rd Principal Stress



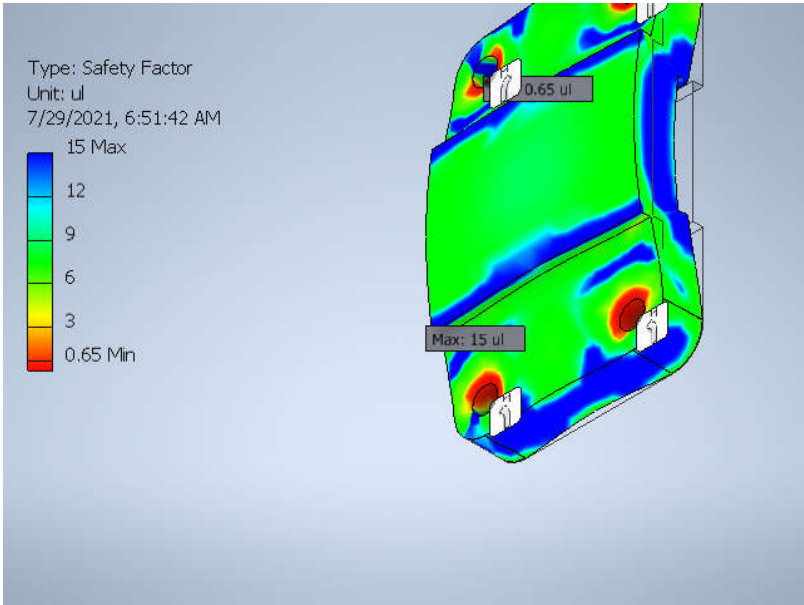
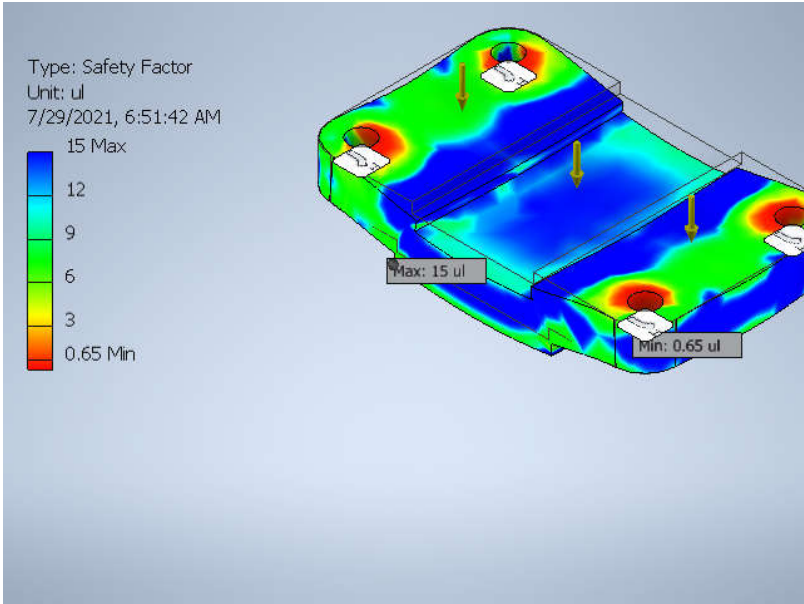


Displacement

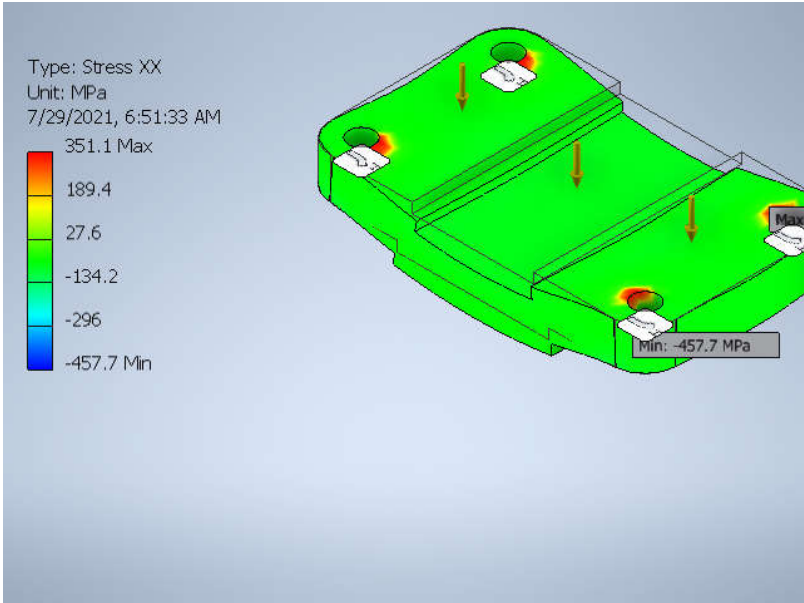


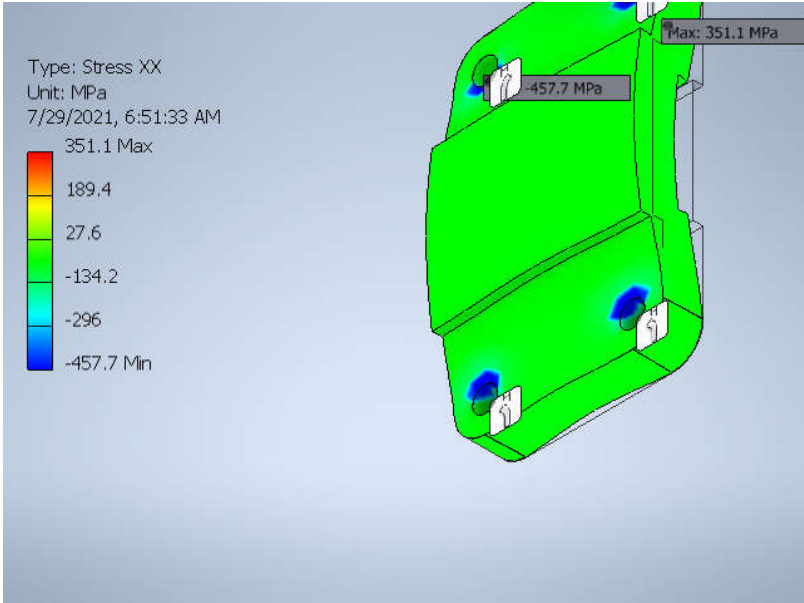


**Safety Factor**

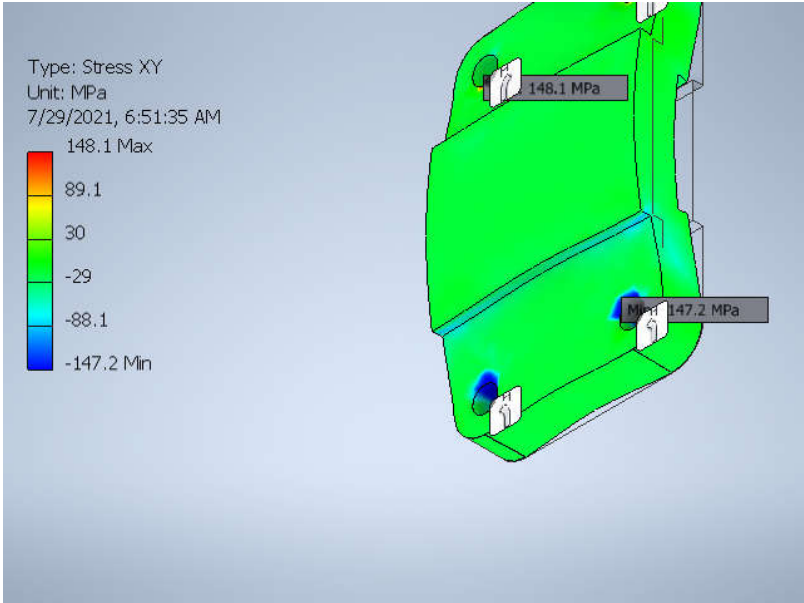
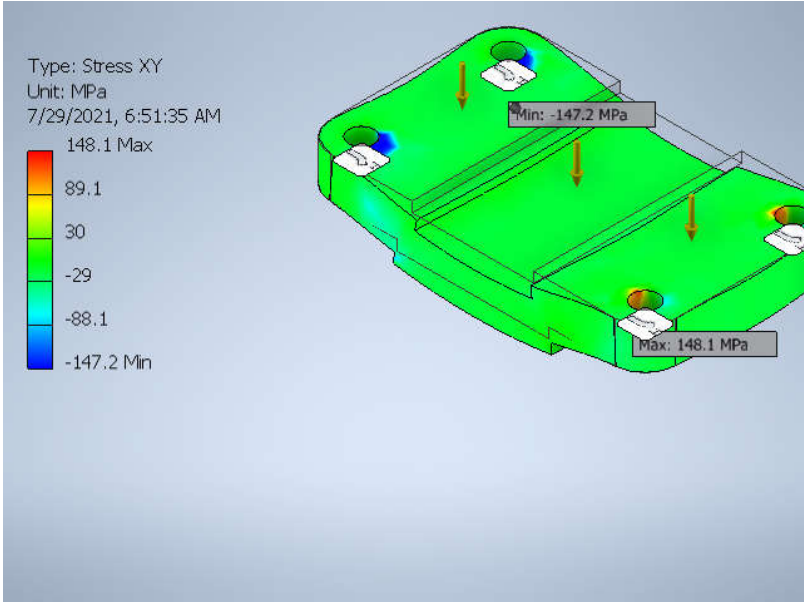


**Stress XX**

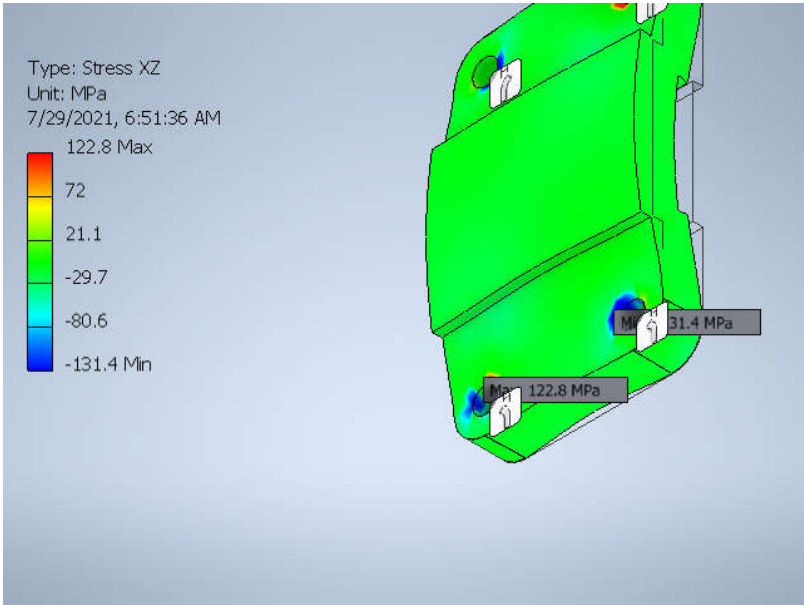
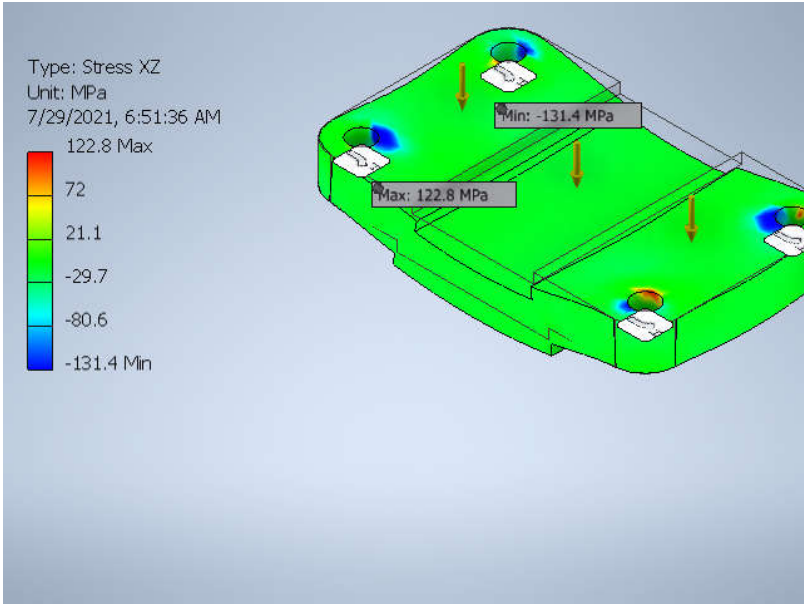




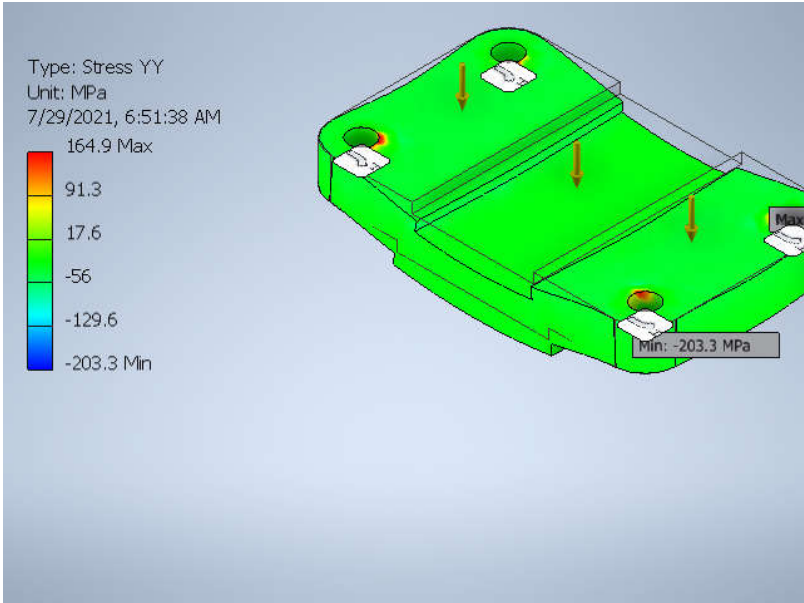
☐ Stress XY

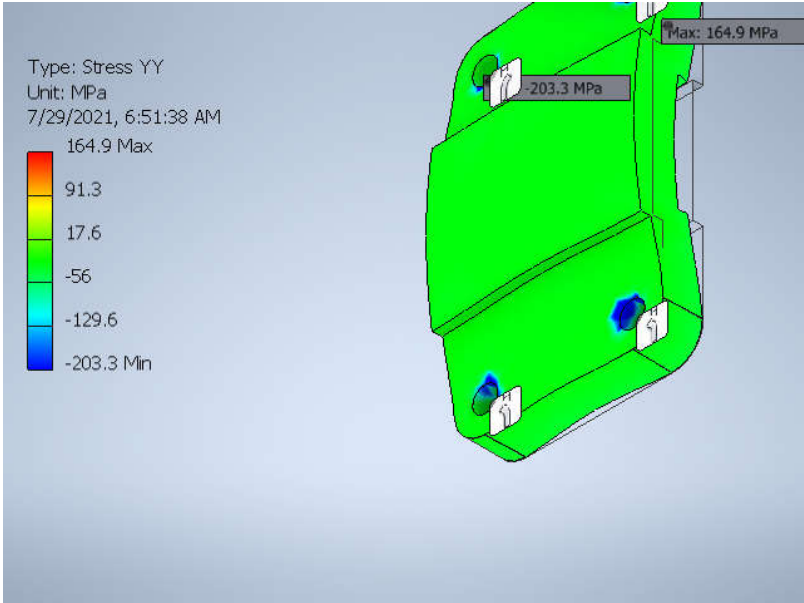


**Stress XZ**

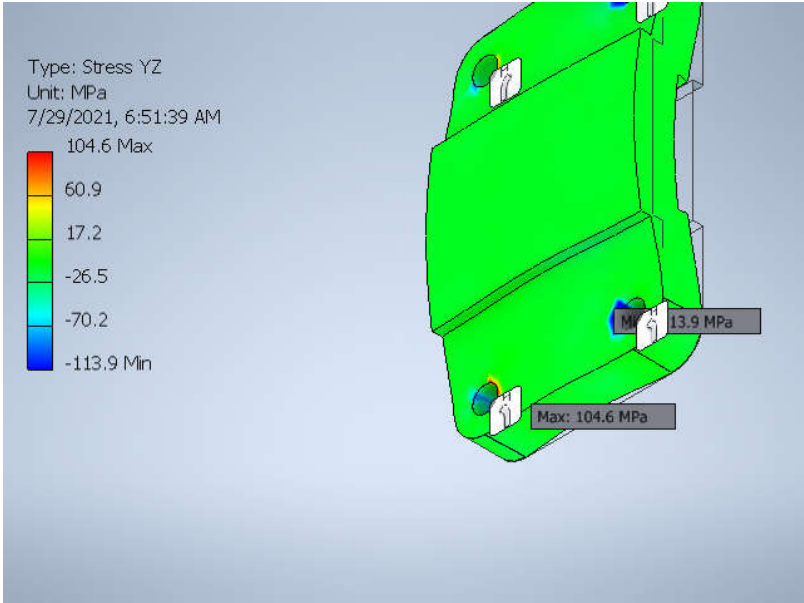
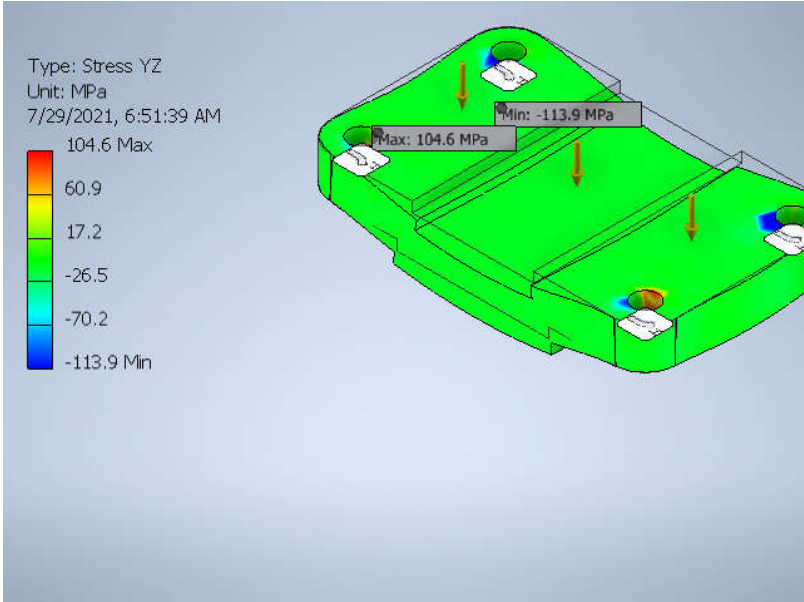


**Stress YY**

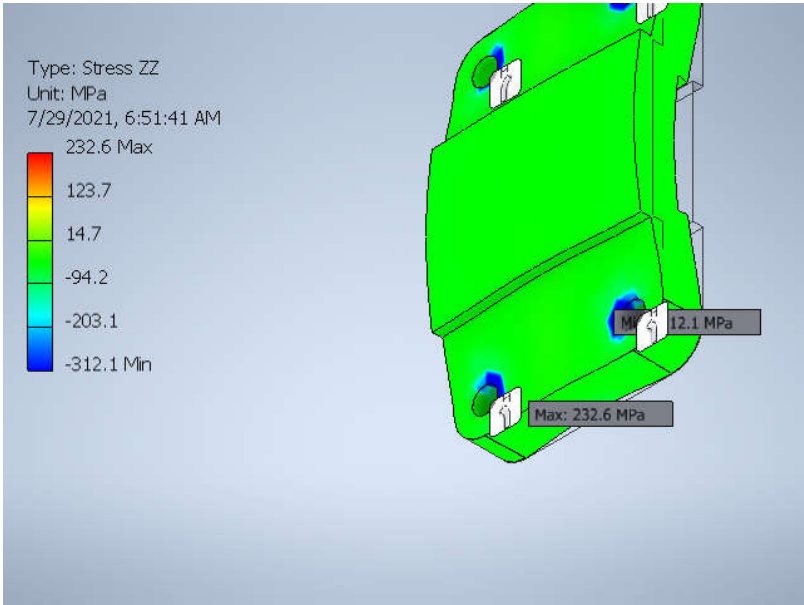
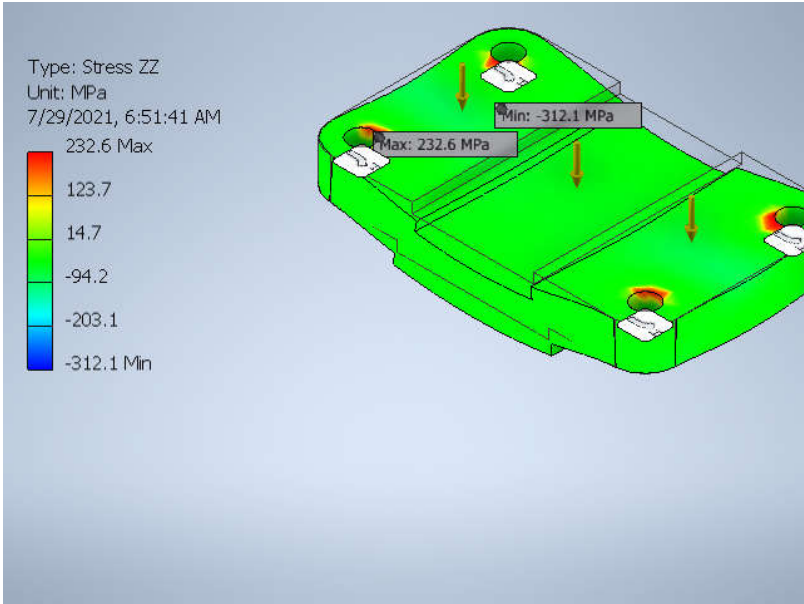




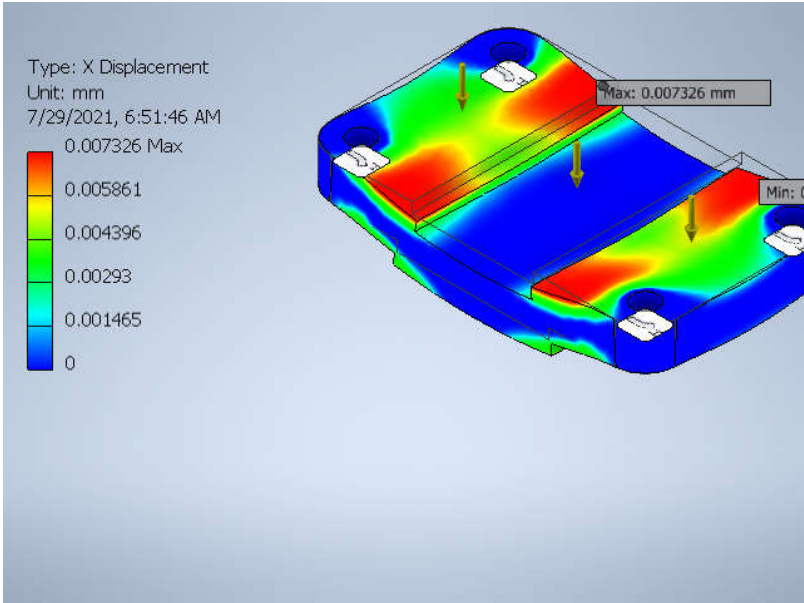
Stress YZ



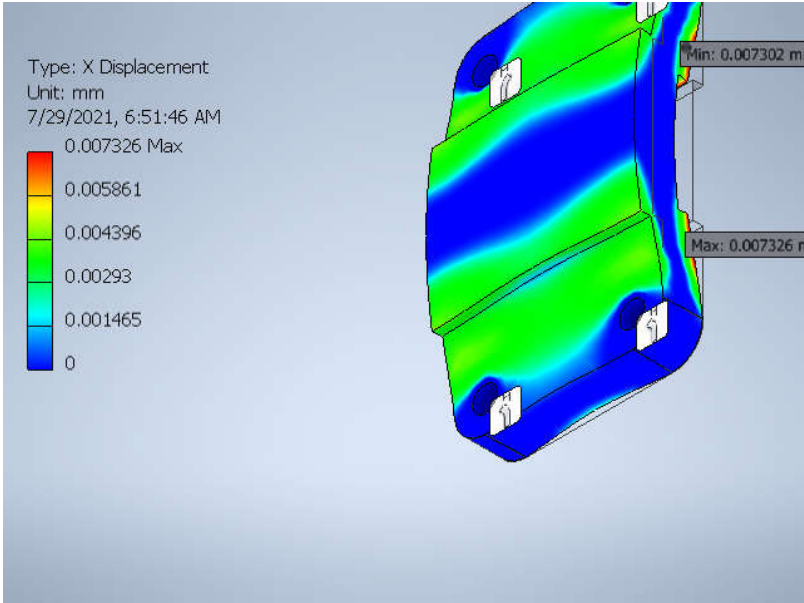
**Stress ZZ**



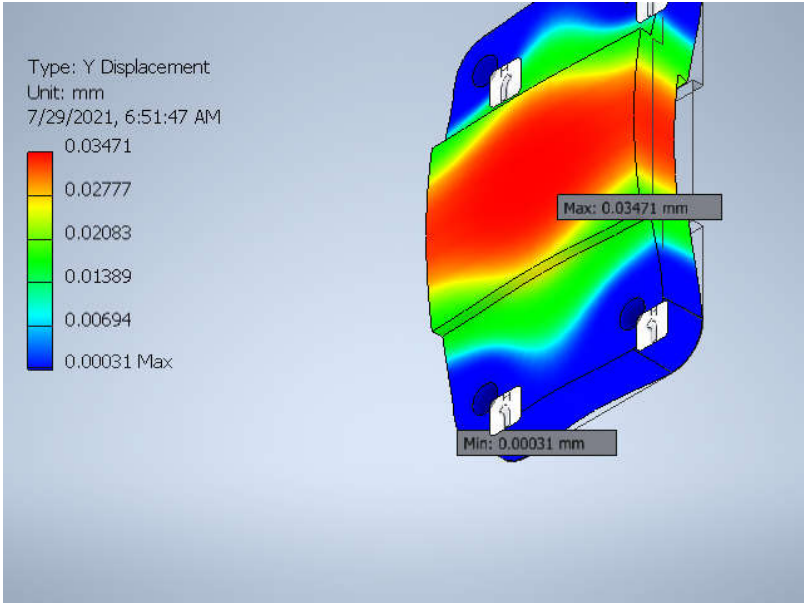
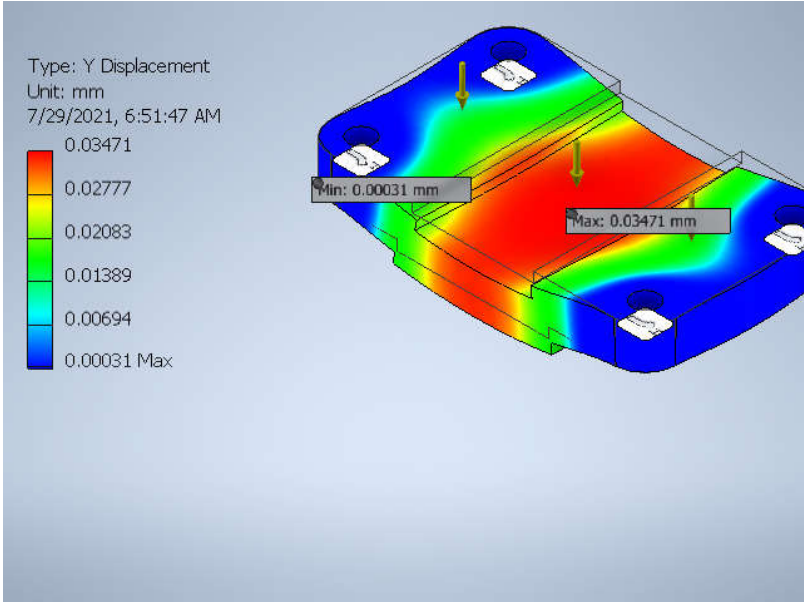
**X Displacement**



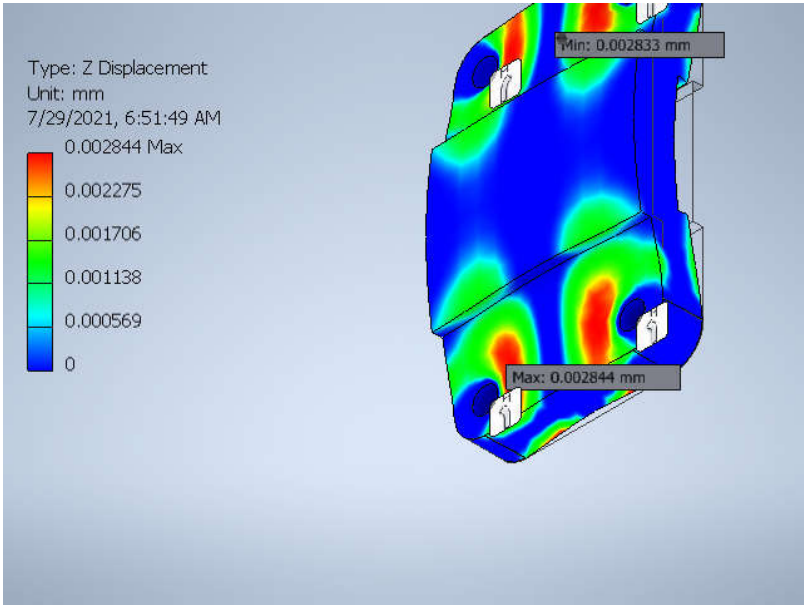
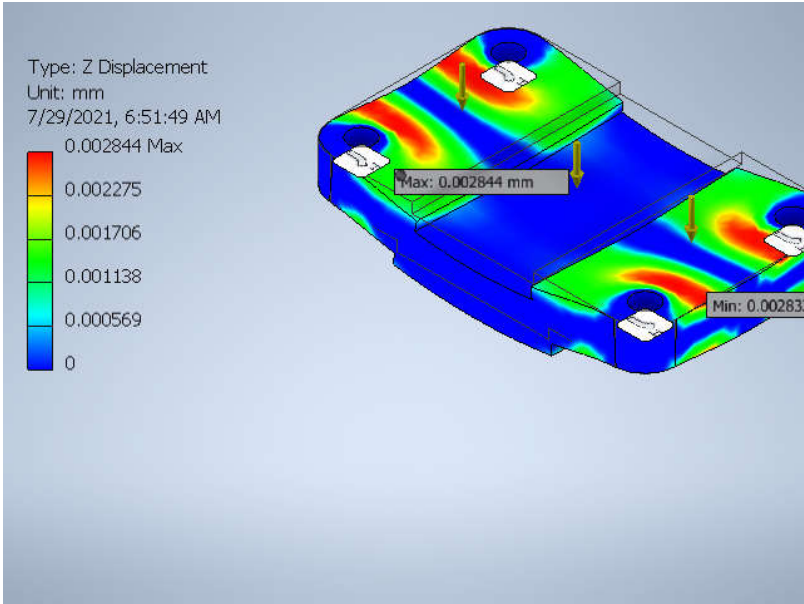




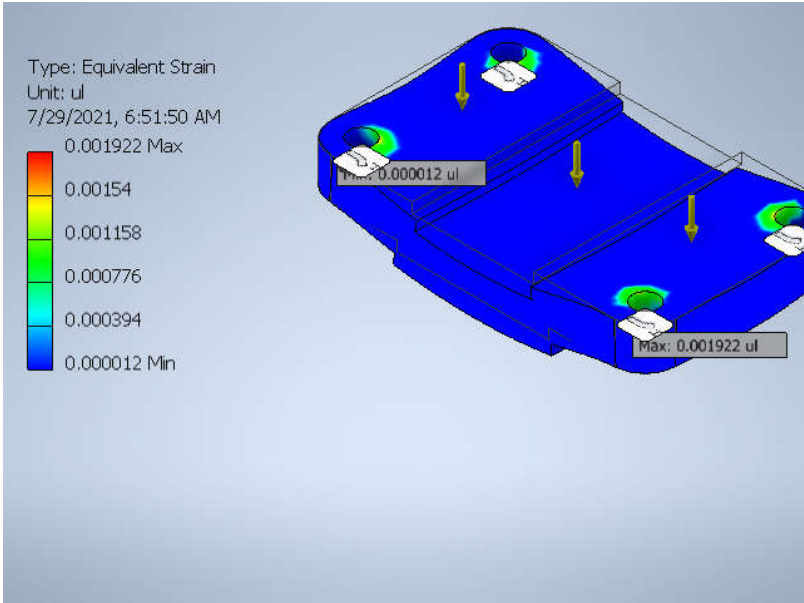
**Y Displacement**

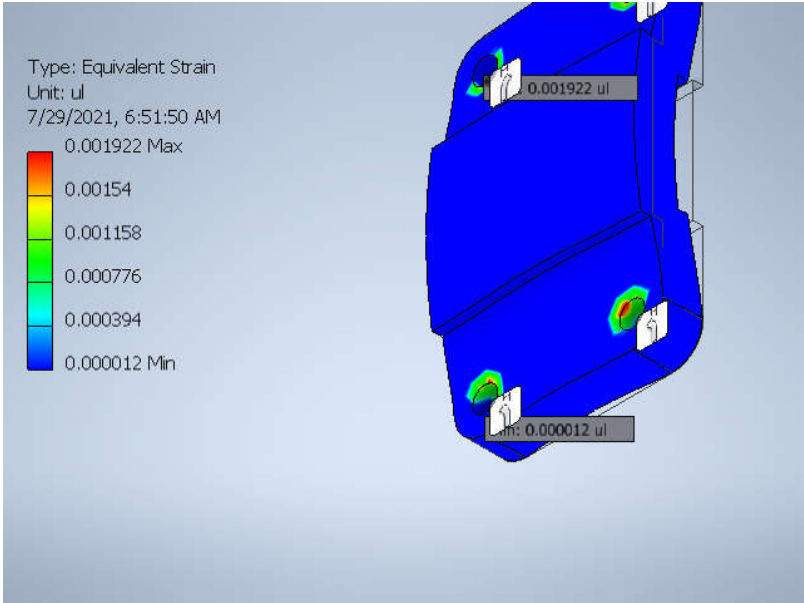


**Z Displacement**

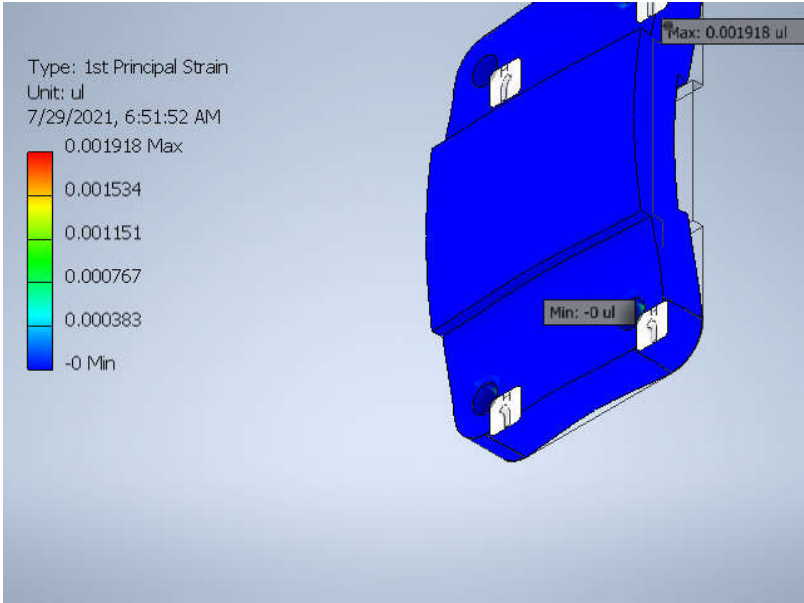
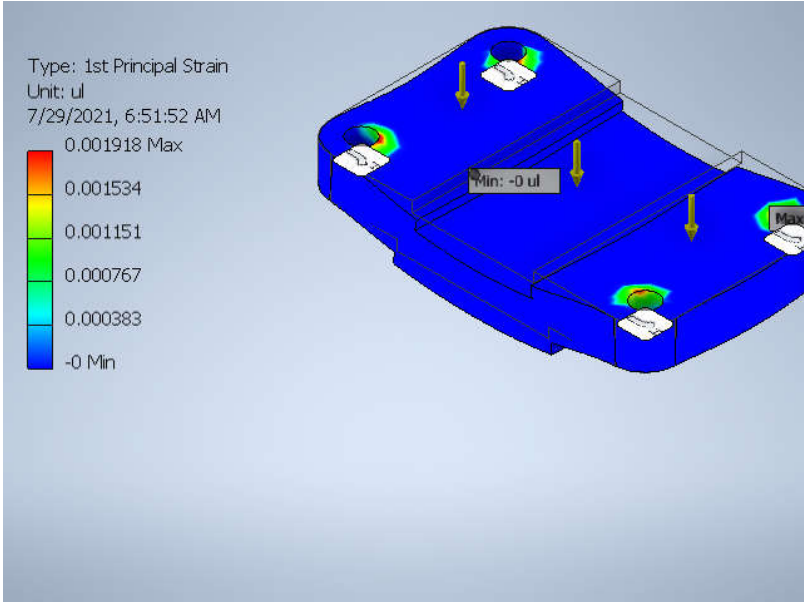


**Equivalent Strain**



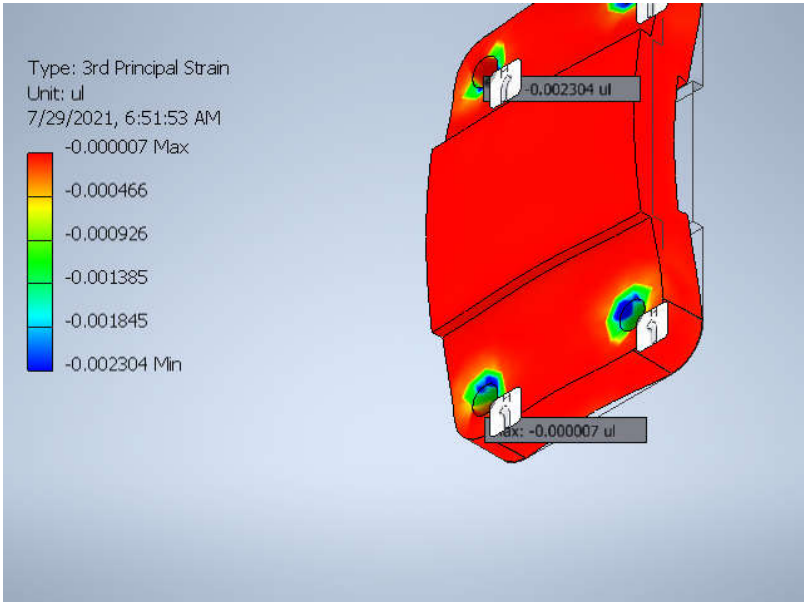
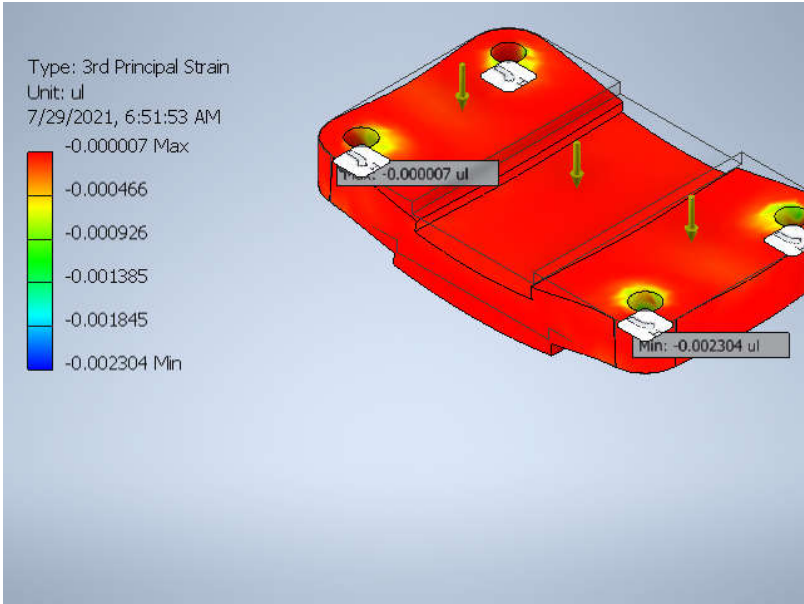


1st Principal Strain

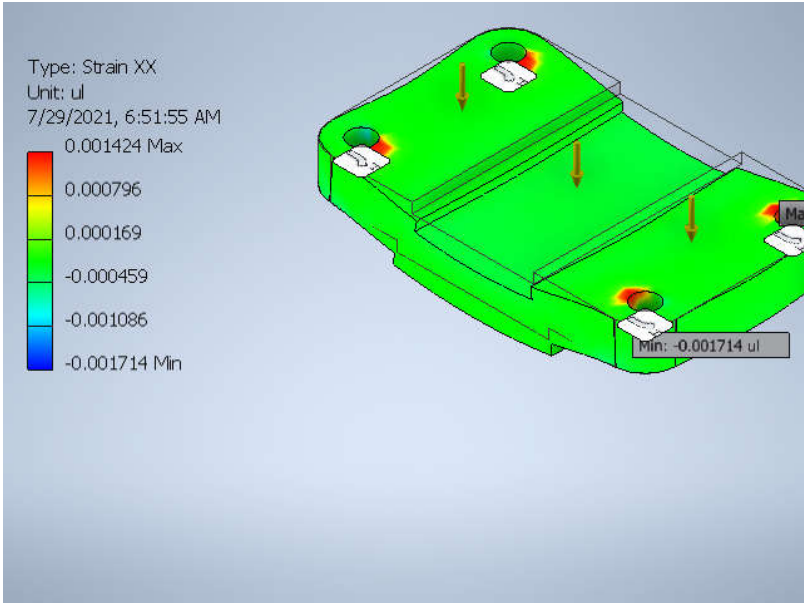


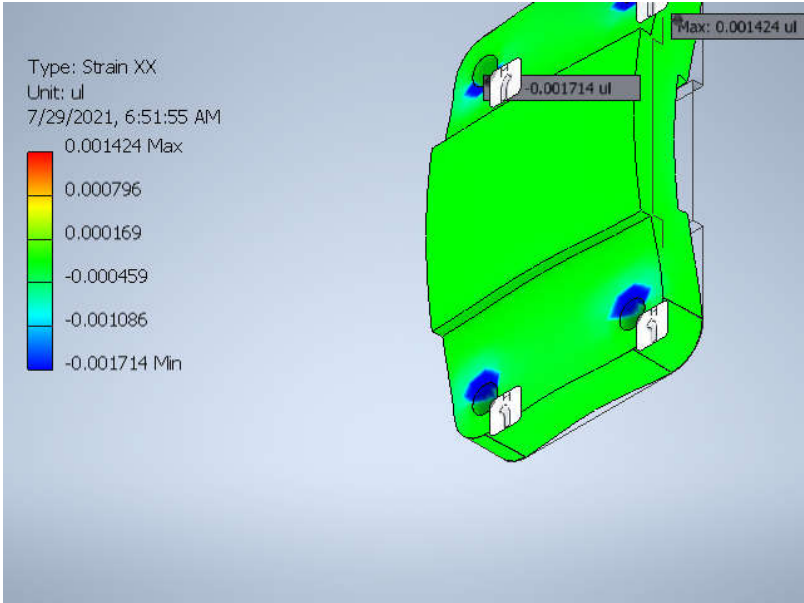


3rd Principal Strain

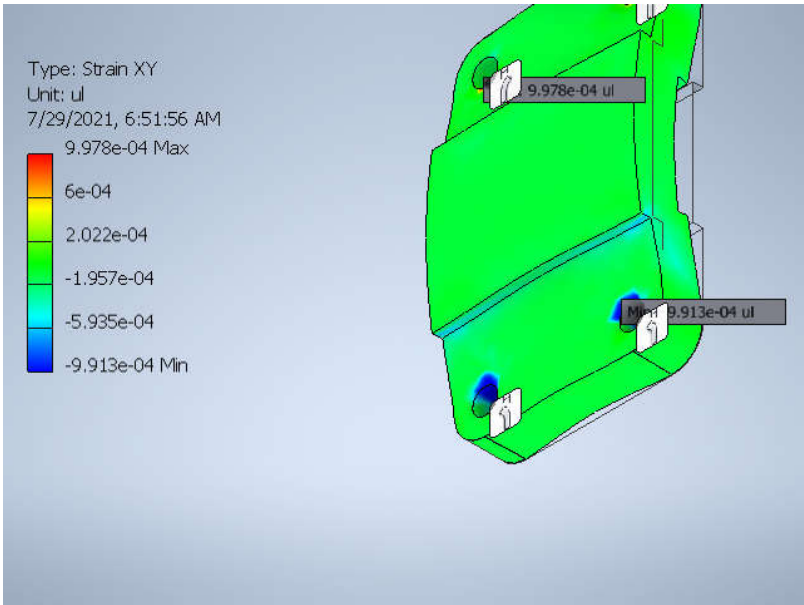
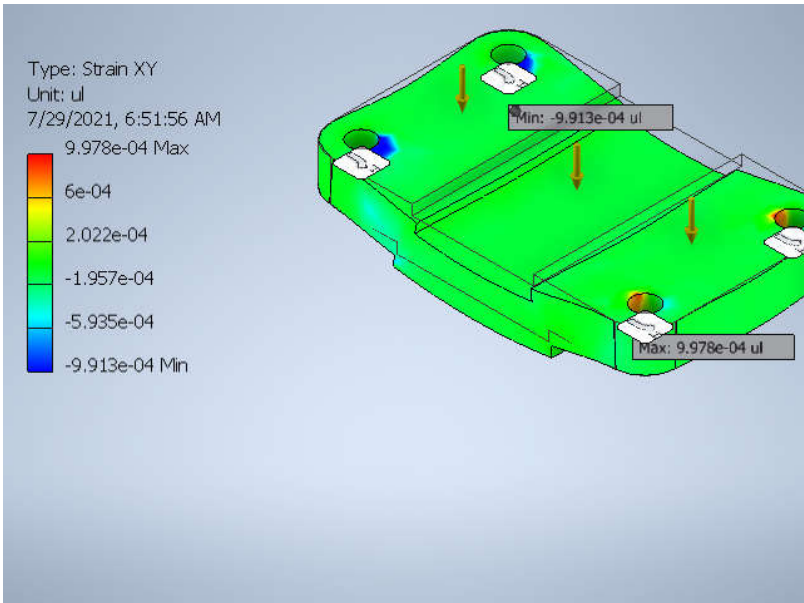


Strain XX

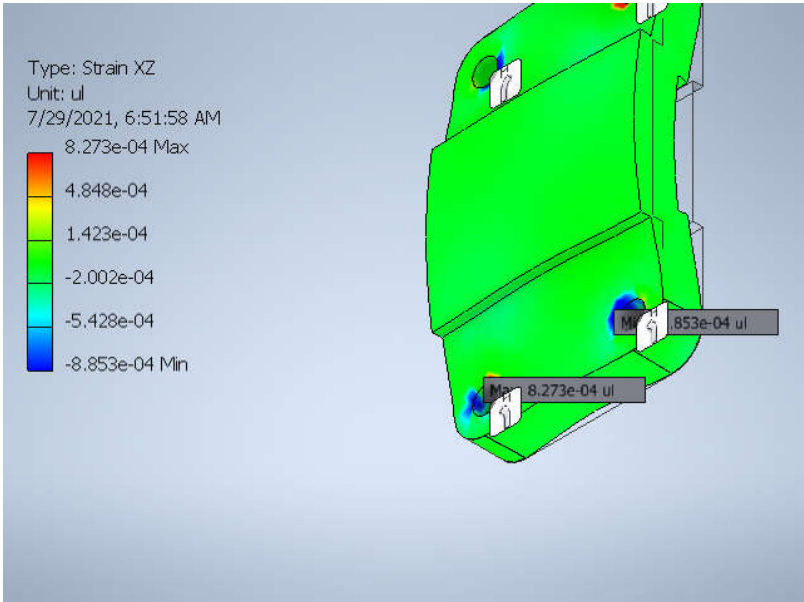
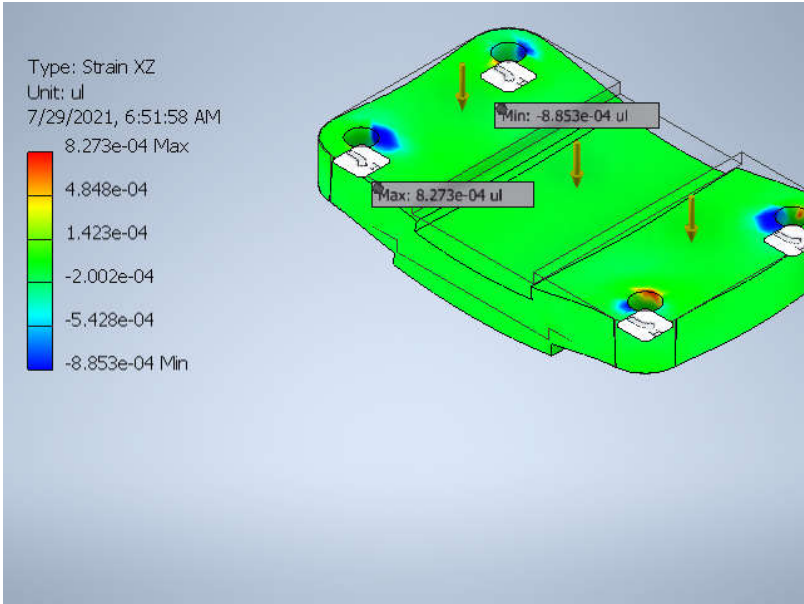




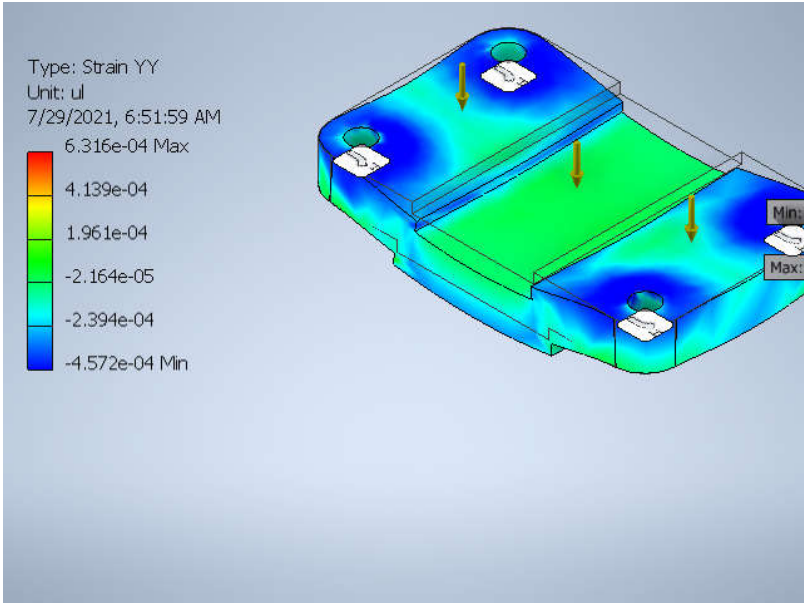
Strain XY

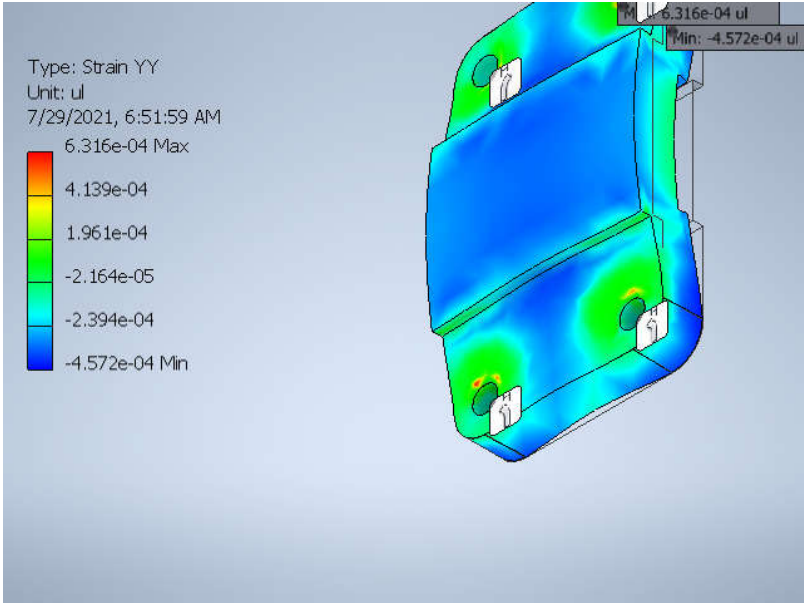


Strain XZ

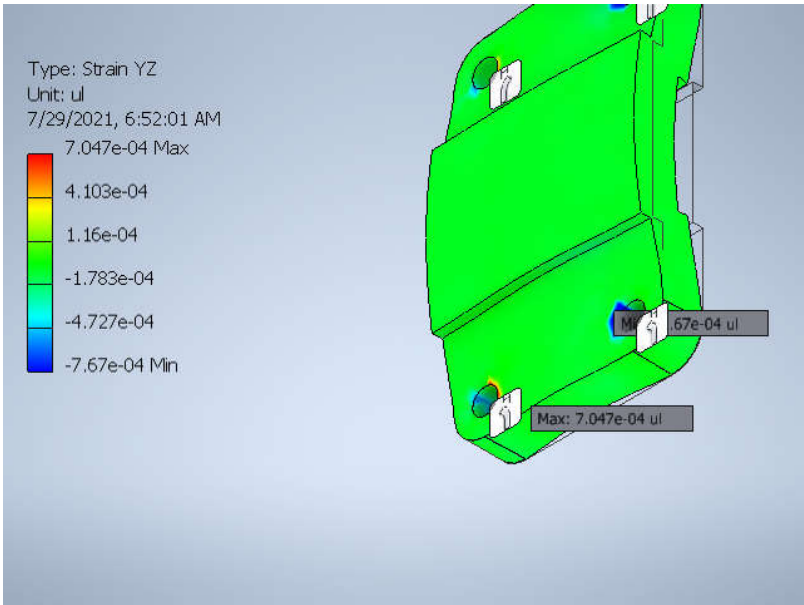
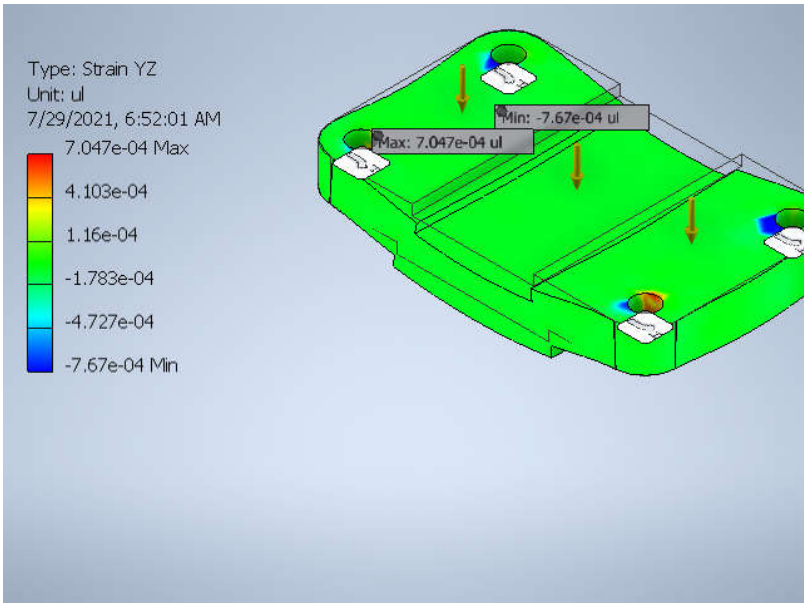


Strain YY

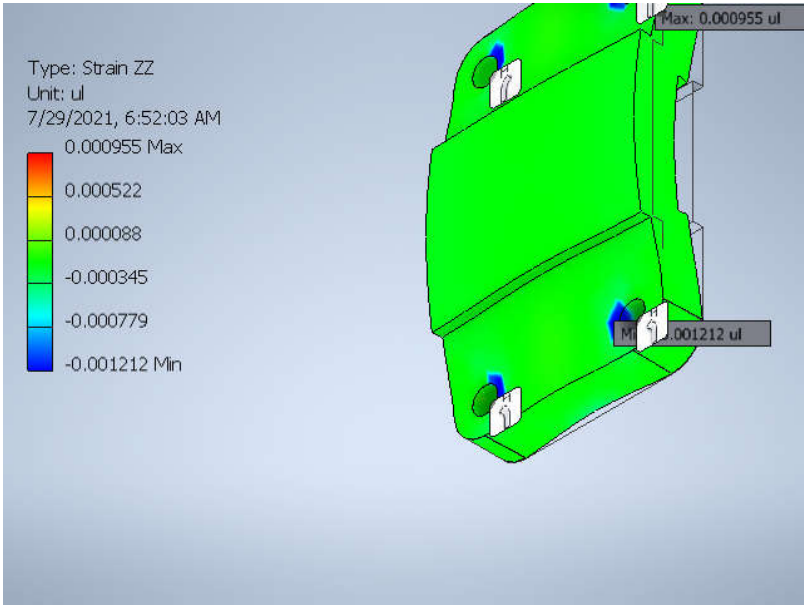
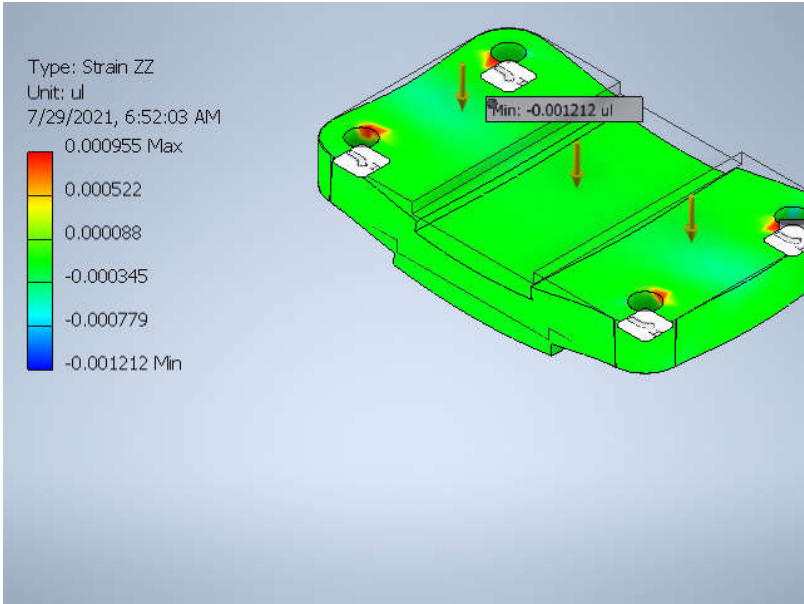




Strain YZ



Strain ZZ



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