

Stainless Steel Top Plate Analysis Report



Analyzed File:	topPlate.ipt
Autodesk Inventor Version:	2020 (Build 240168000, 168)
Creation Date:	7/30/2021, 11:00 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 ³
Mass	1.39446 kg
Area	31562.6 mm ²
Volume	174308 mm ³
Center of Gravity	x=0 mm y=10.329 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	7/30/2021, 10:59 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

Material(s)

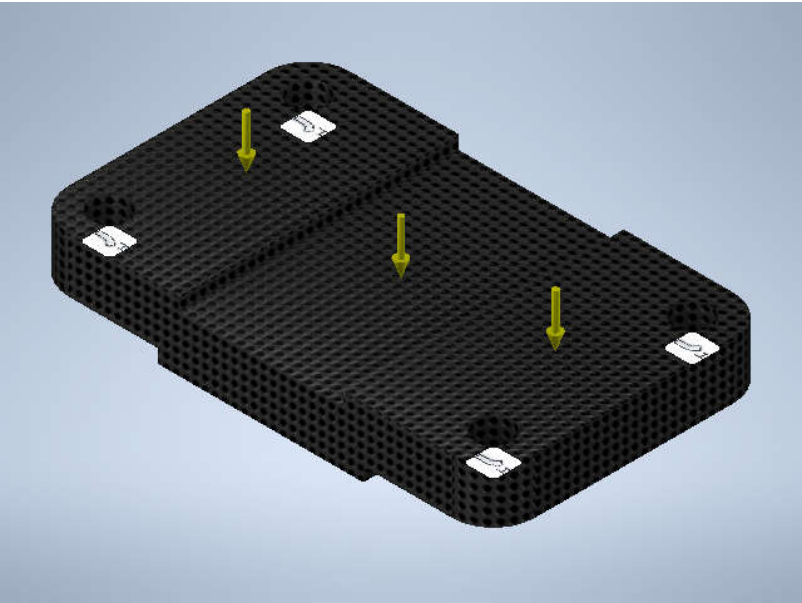
Name	Stainless Steel	
General	Mass Density	8 g/cm^3
	Yield Strength	250 MPa
	Ultimate Tensile Strength	540 MPa
Stress	Young's Modulus	193 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	74.2308 GPa
Part Name(s)	topPlate.ipt	

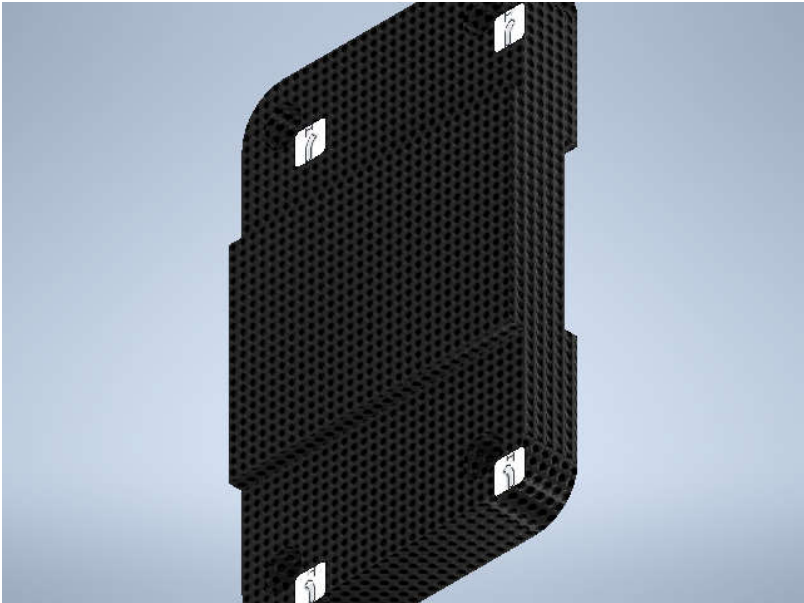
Operating conditions

Gravity

Load Type	Gravity
Magnitude	9810.000 mm/s^2
Vector X	0.000 mm/s^2
Vector Y	-9810.000 mm/s^2
Vector Z	0.000 mm/s^2

Selected Face(s)

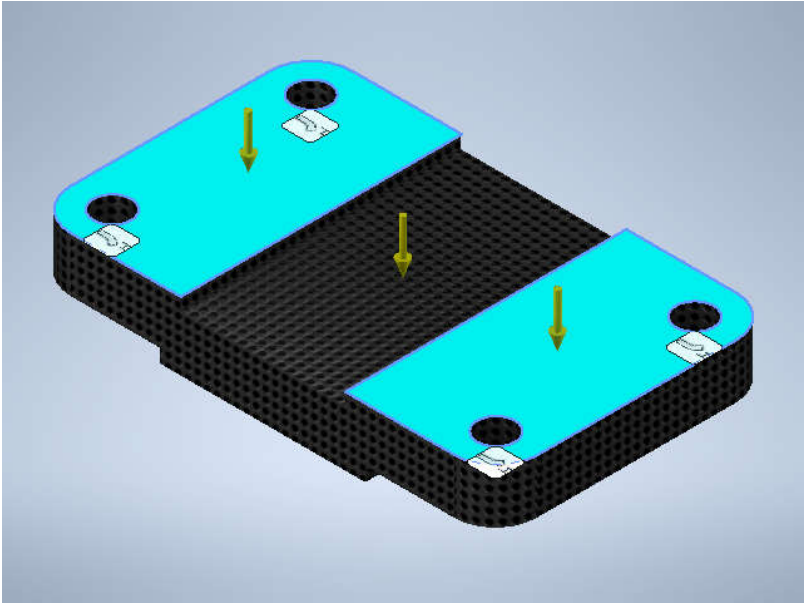


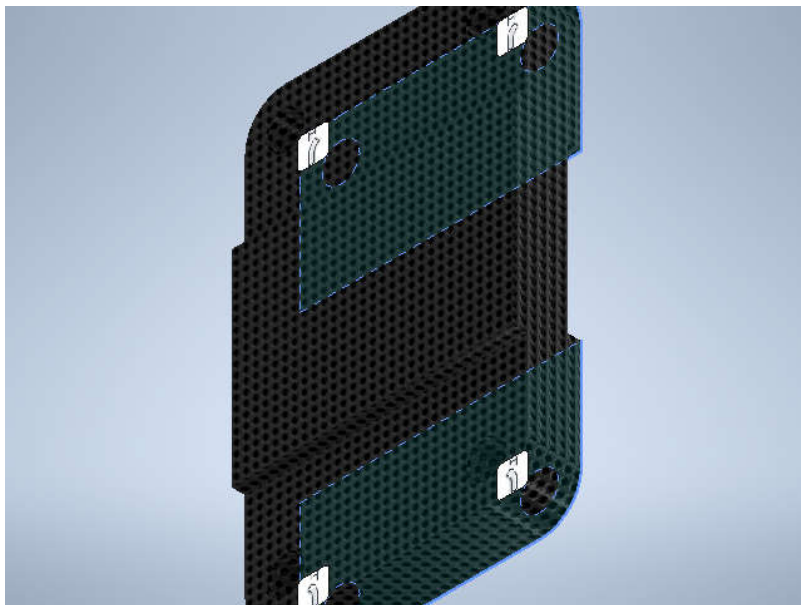


☐ **Force:1**

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)**

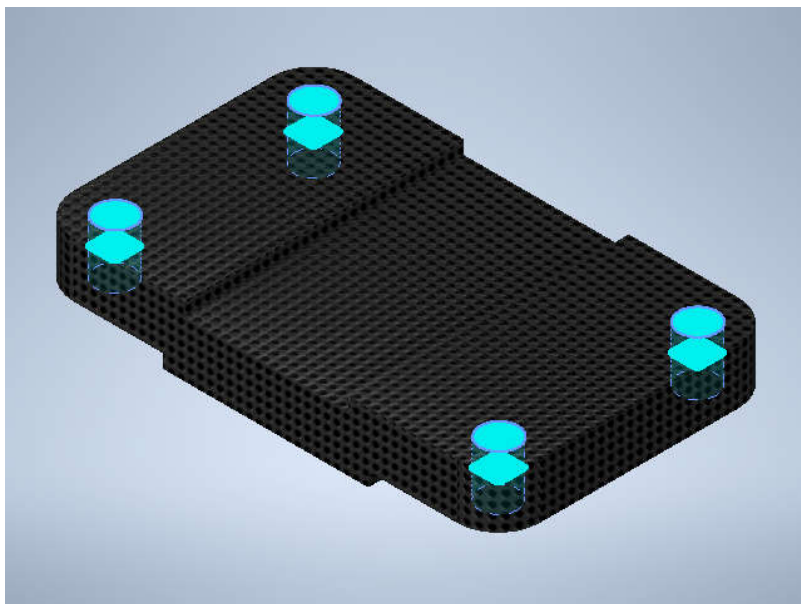


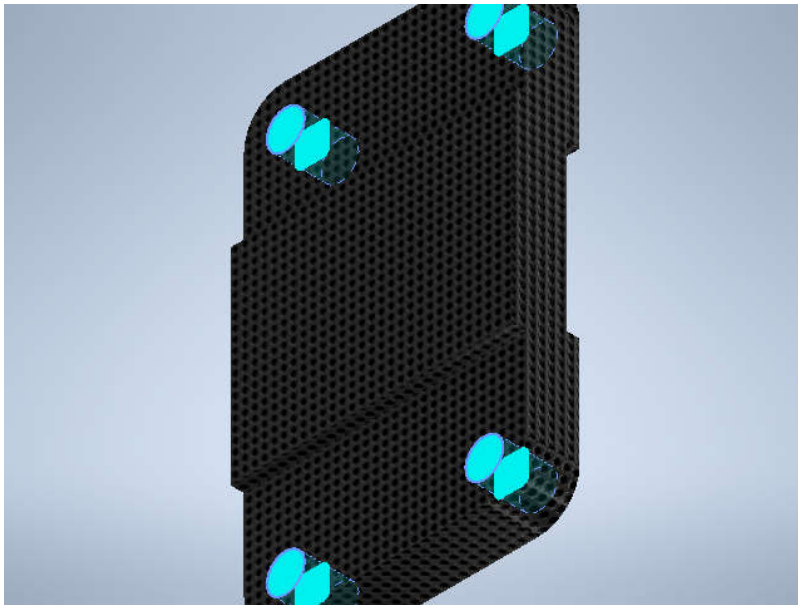


Fixed Constraint:1

Constraint Type	Fixed Constraint
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Selected Face(s)





Results

Reaction Force and Moment on Constraints

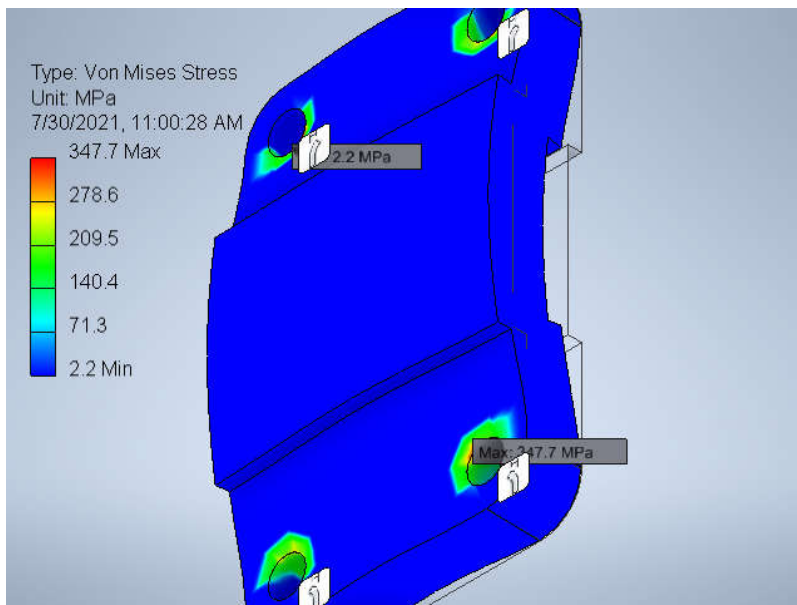
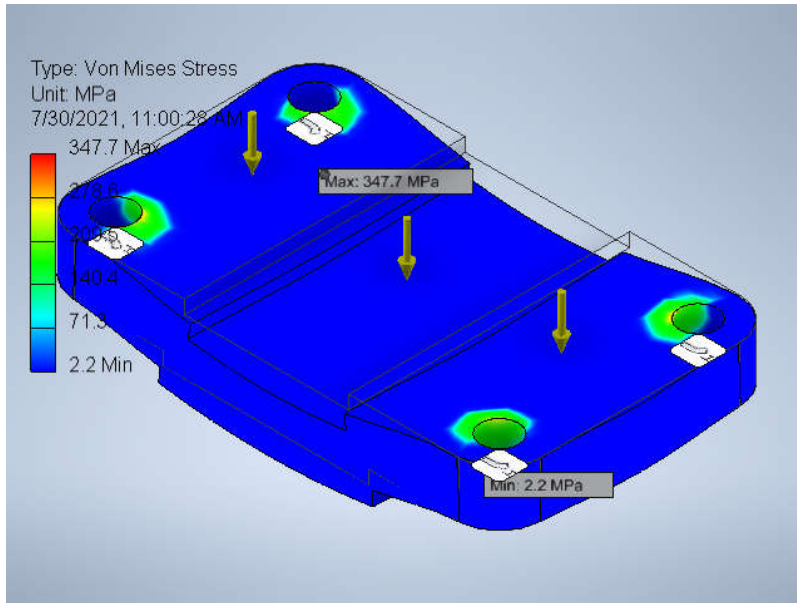
Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	100014 N	0 N	0 N m	0 N m
		100014 N		0 N m
		0 N		0 N m

Result Summary

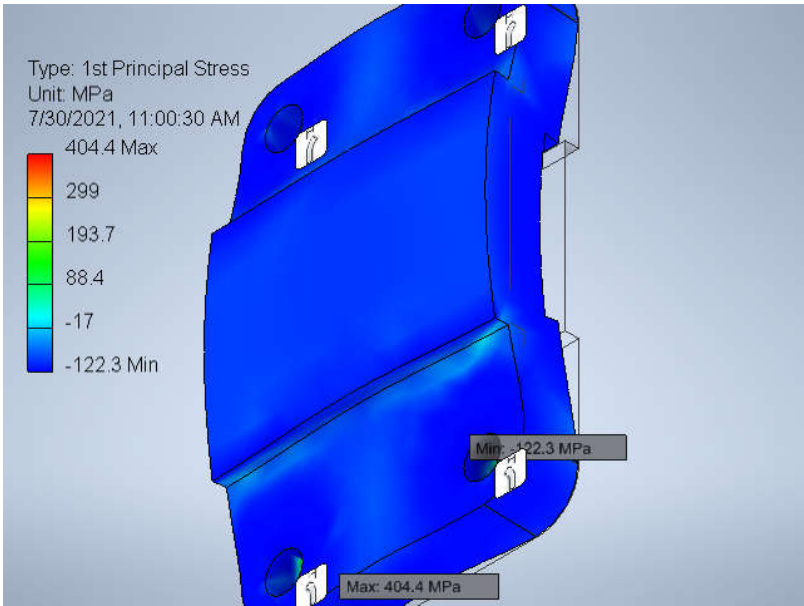
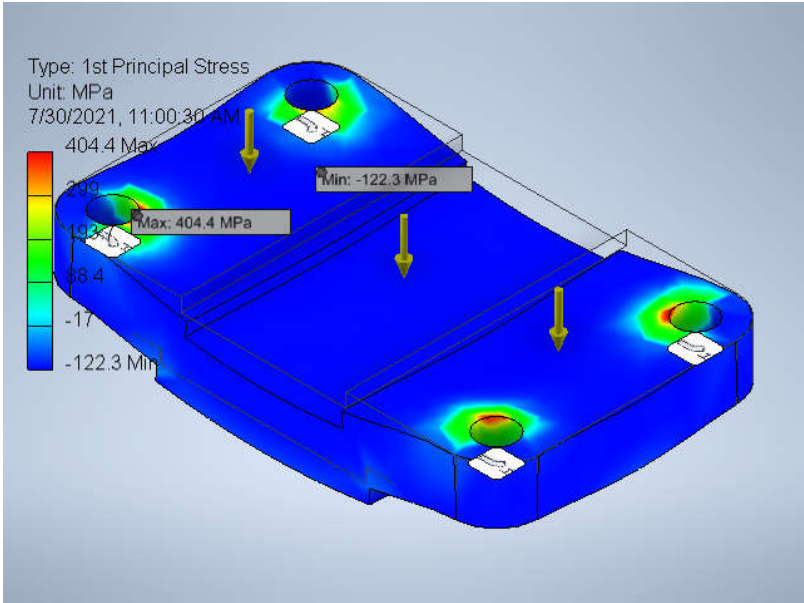
Name	Minimum	Maximum
Volume	174308 mm^3	
Mass	1.39446 kg	
Von Mises Stress	2.21752 MPa	347.651 MPa
1st Principal Stress	-122.34 MPa	404.392 MPa
3rd Principal Stress	-497.393 MPa	86.92 MPa
Displacement	0 mm	0.0326839 mm
Safety Factor	0.719112 ul	15 ul
Stress XX	-419.215 MPa	315.16 MPa
Stress XY	-134.092 MPa	133.496 MPa
Stress XZ	-119.437 MPa	101.742 MPa
Stress YY	-185.92 MPa	147.754 MPa
Stress YZ	-94.6166 MPa	103.759 MPa
Stress ZZ	-284.533 MPa	221.013 MPa
X Displacement	-0.00694551 mm	0.00697304 mm
Y Displacement	-0.0326838 mm	0.000208588 mm
Z Displacement	-0.00268159 mm	0.00263896 mm
Equivalent Strain	0.0000109822 ul	0.00174834 ul
1st Principal Strain	-0.00000720612 ul	0.00172866 ul
3rd Principal Strain	-0.00209801 ul	-0.00000727713 ul
Strain XX	-0.00157733 ul	0.00122889 ul
Strain XY	-0.00090321 ul	0.000899197 ul
Strain XZ	-0.000804495 ul	0.000685311 ul
Strain YY	-0.000413642 ul	0.000508568 ul
Strain YZ	-0.000637314 ul	0.000698895 ul
Strain ZZ	-0.00102507 ul	0.000852414 ul

Figures

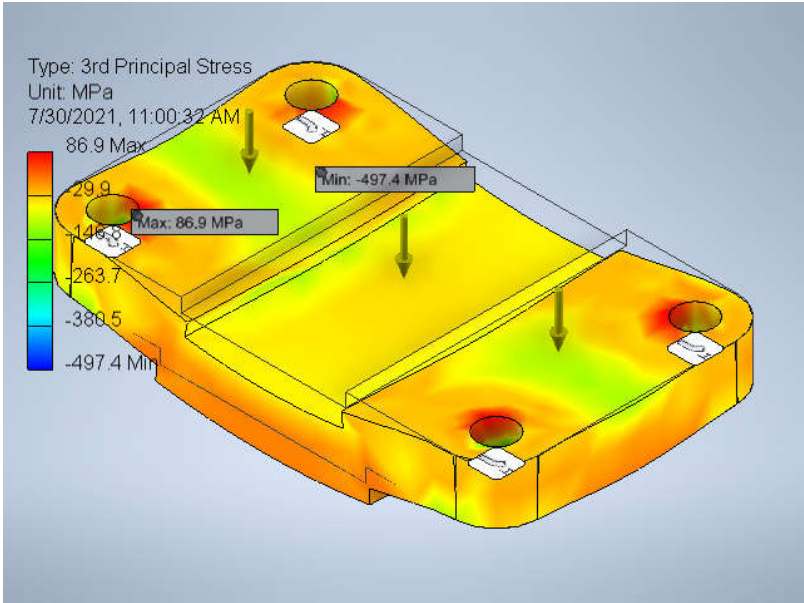
Von Mises Stress

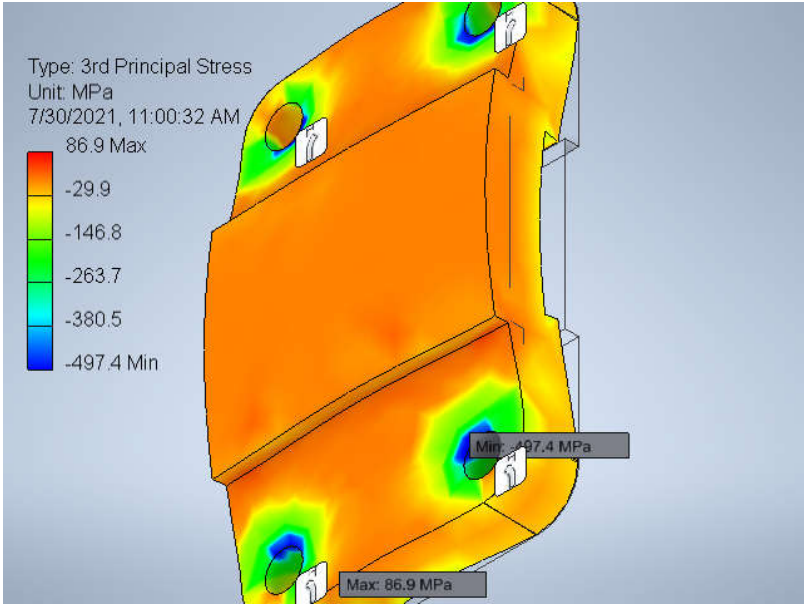


1st Principal Stress

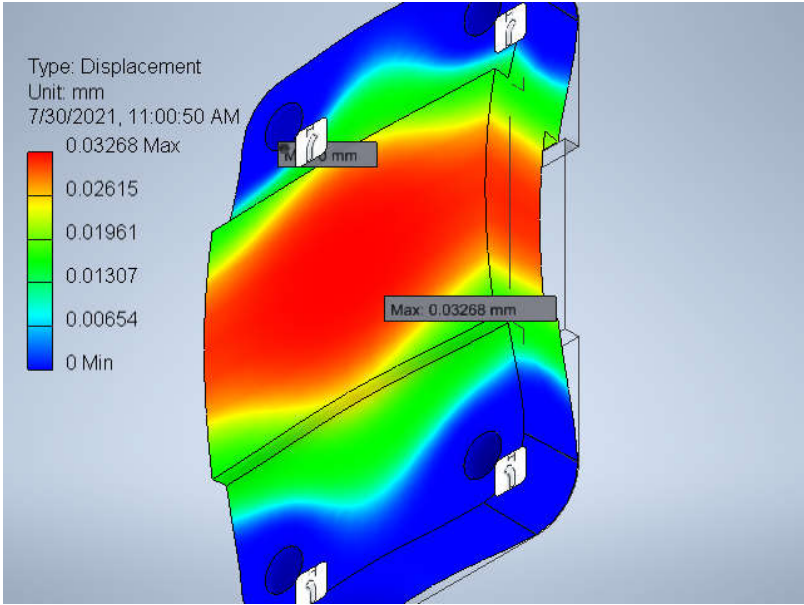
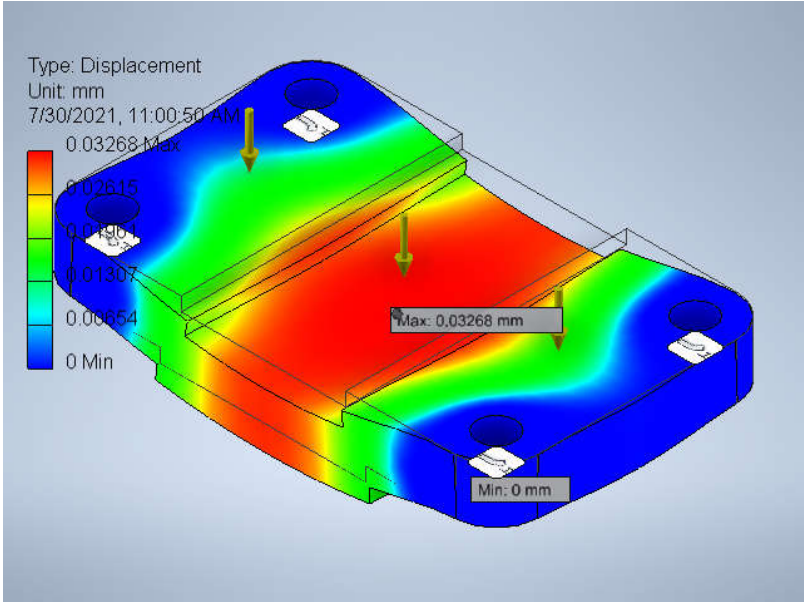


3rd Principal Stress

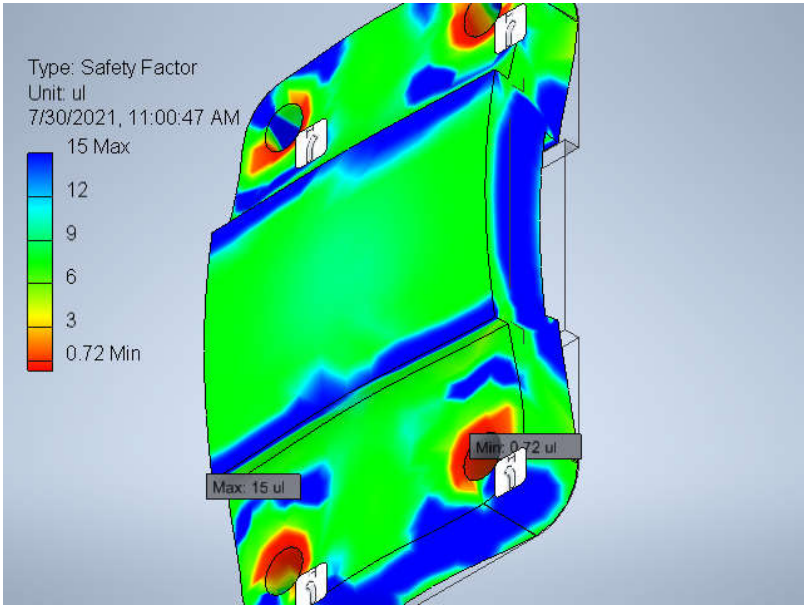
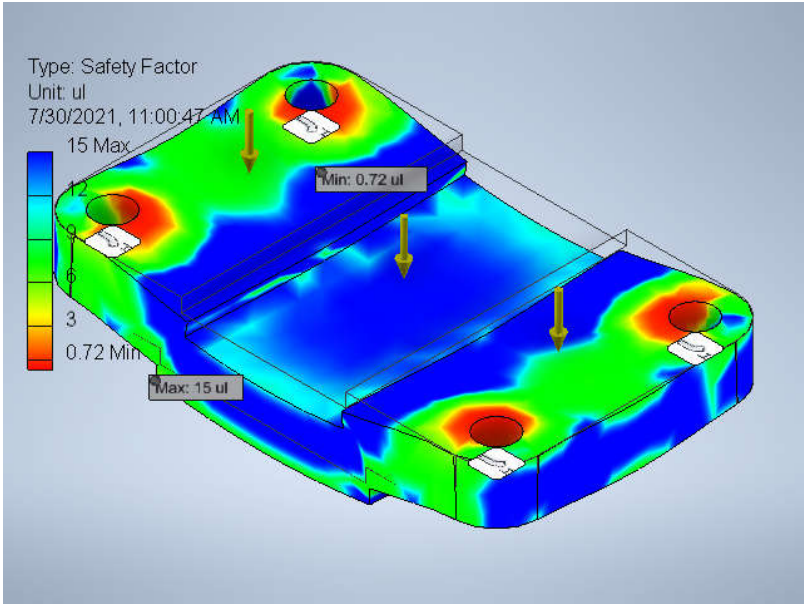




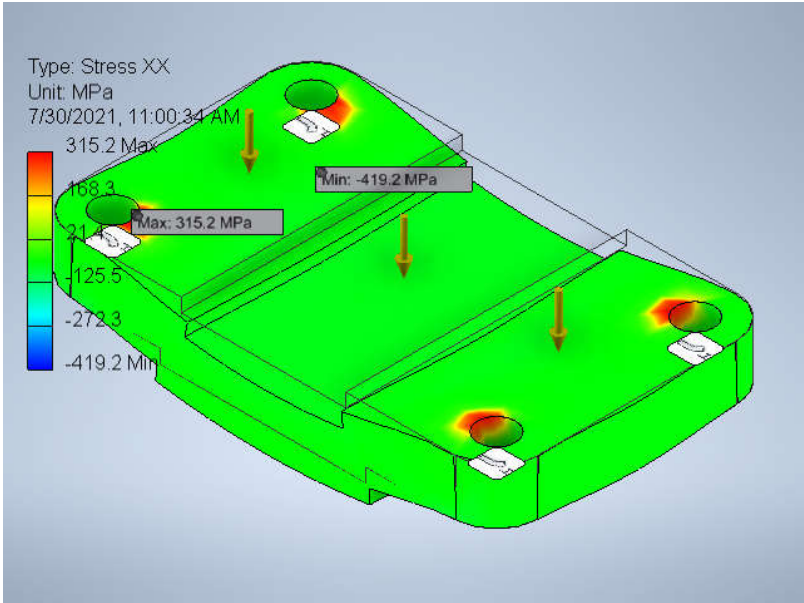
Displacement

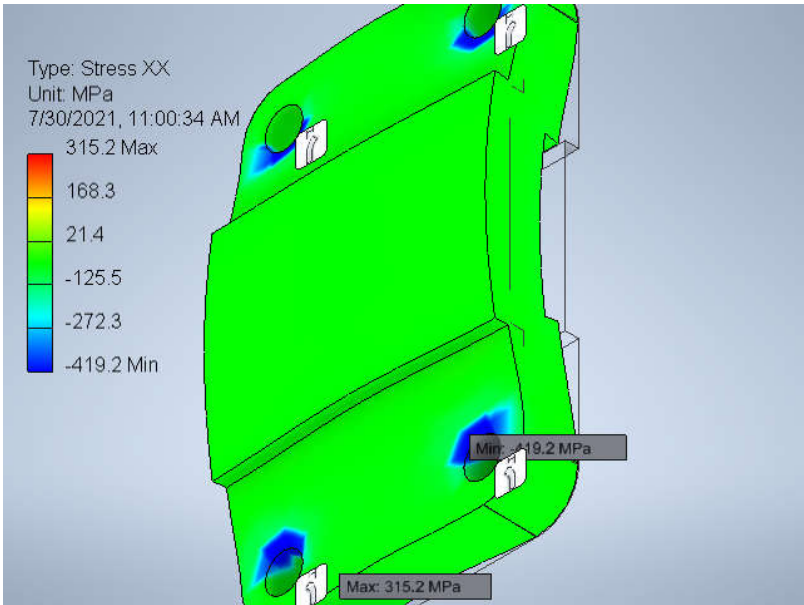


Safety Factor

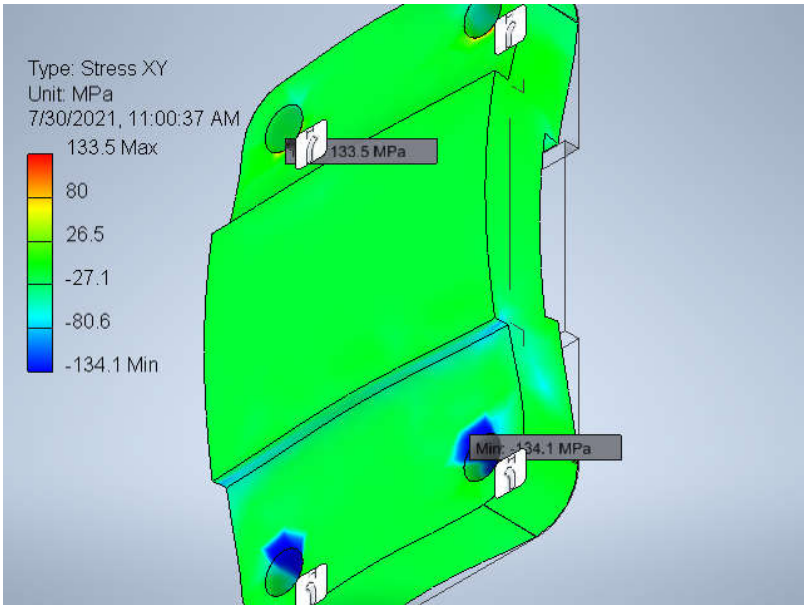
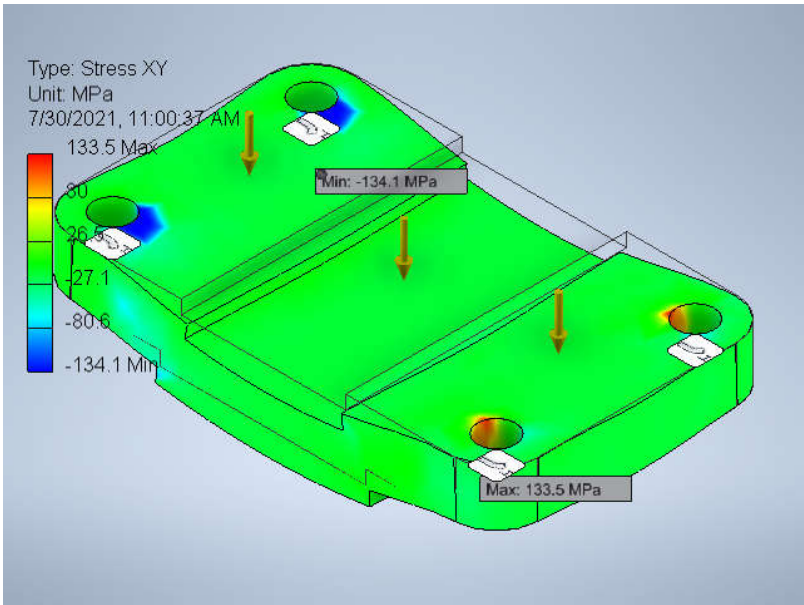


Stress XX

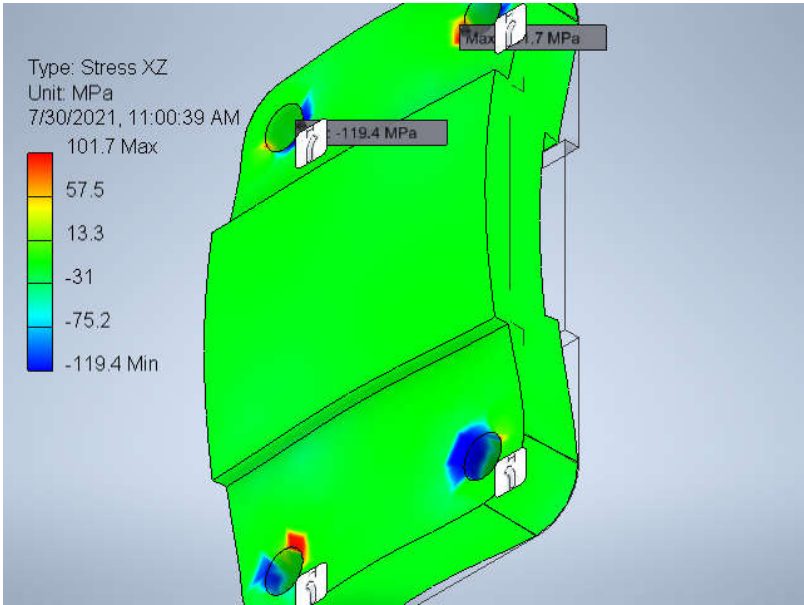
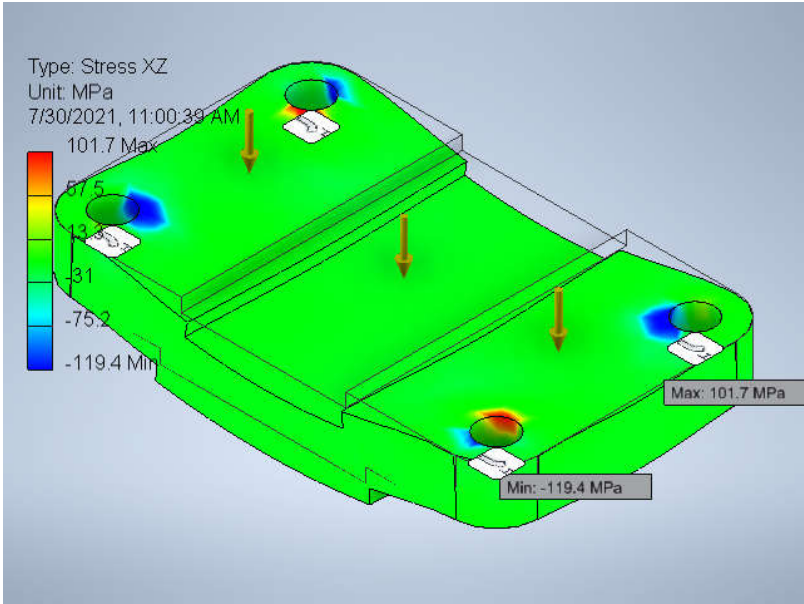




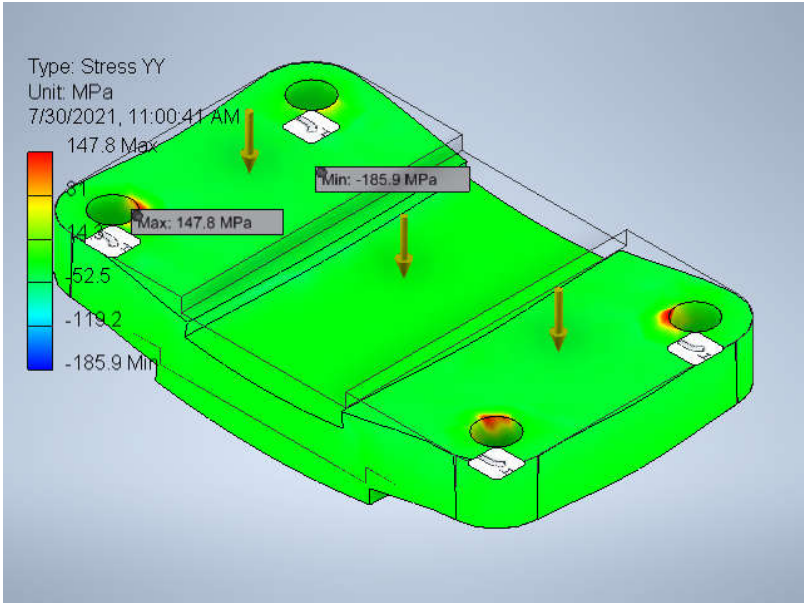
☐ Stress XY

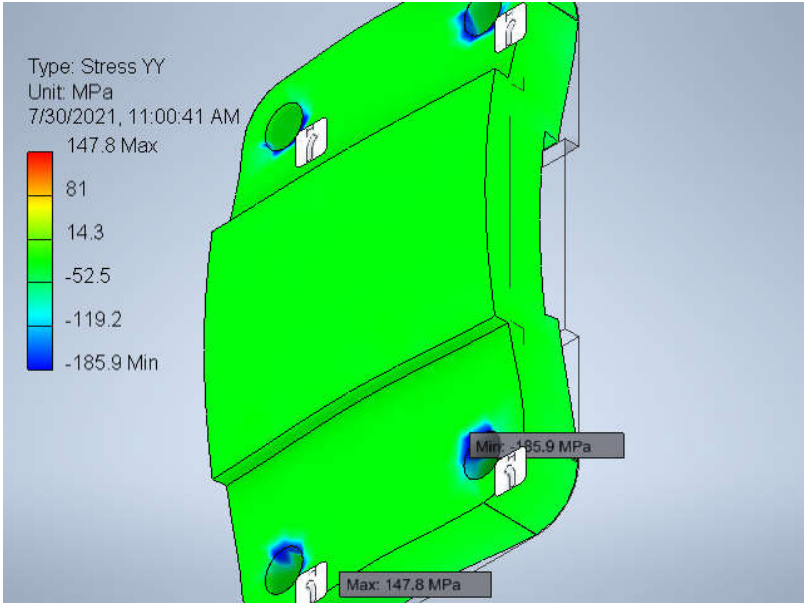


☐ Stress XZ

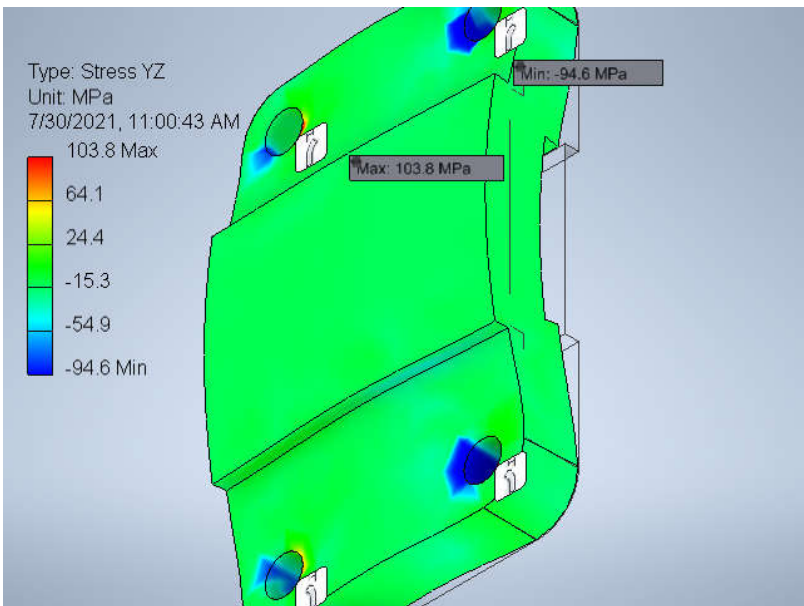
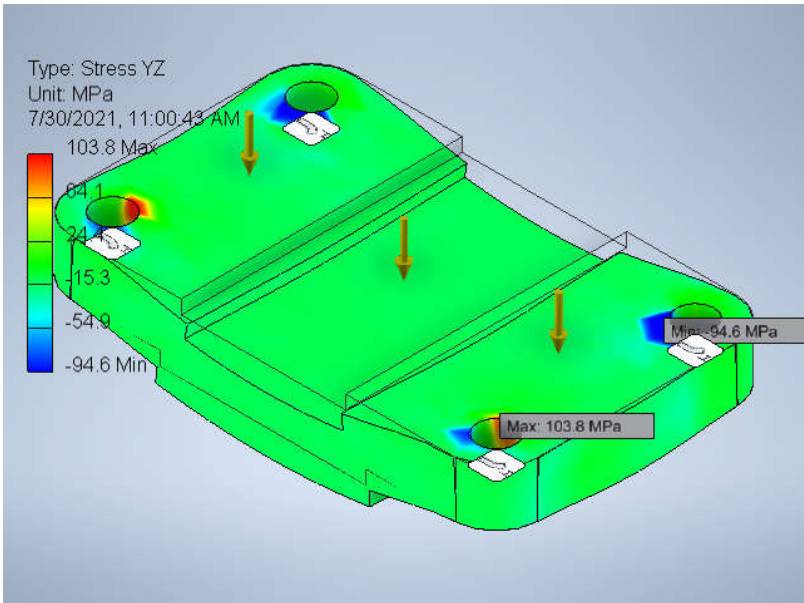


☐ Stress YY

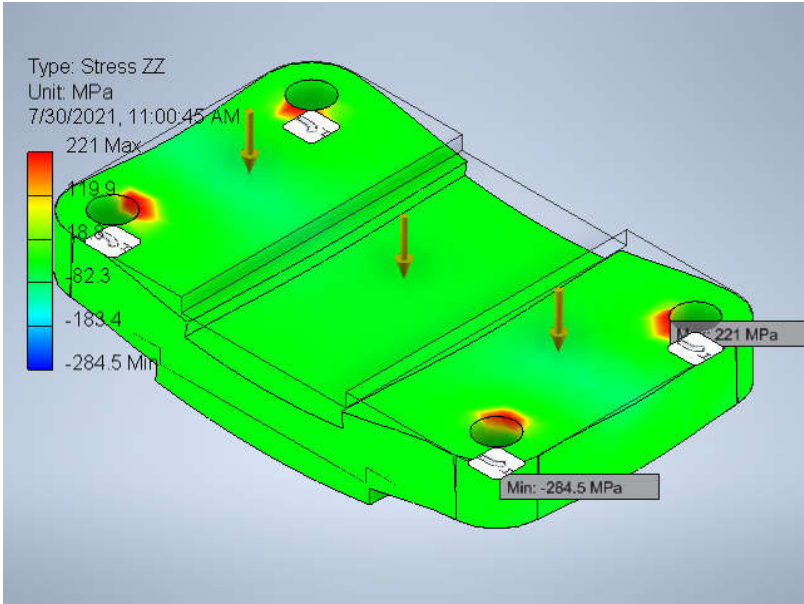




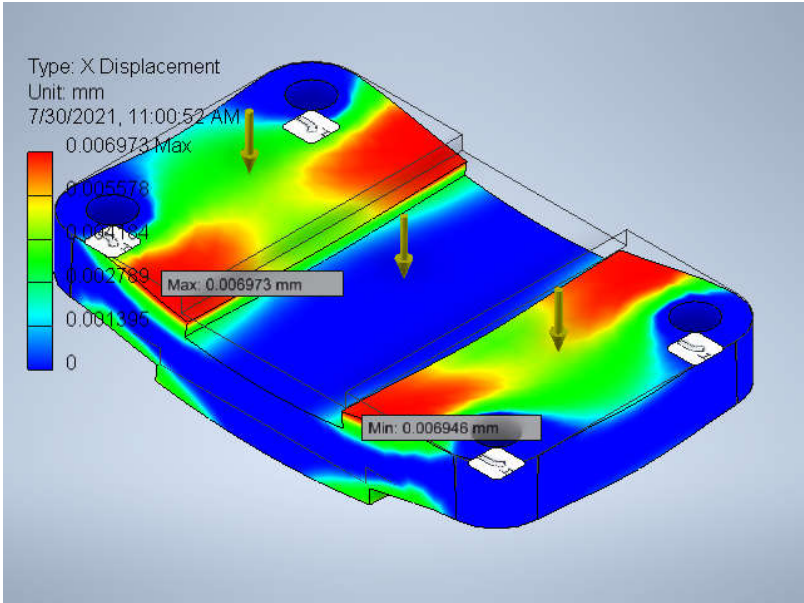
Stress YZ

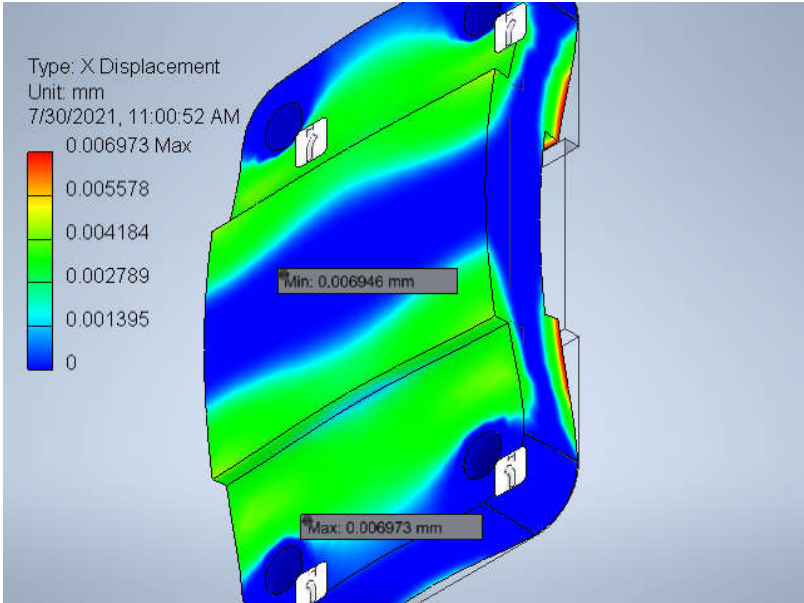


Stress ZZ

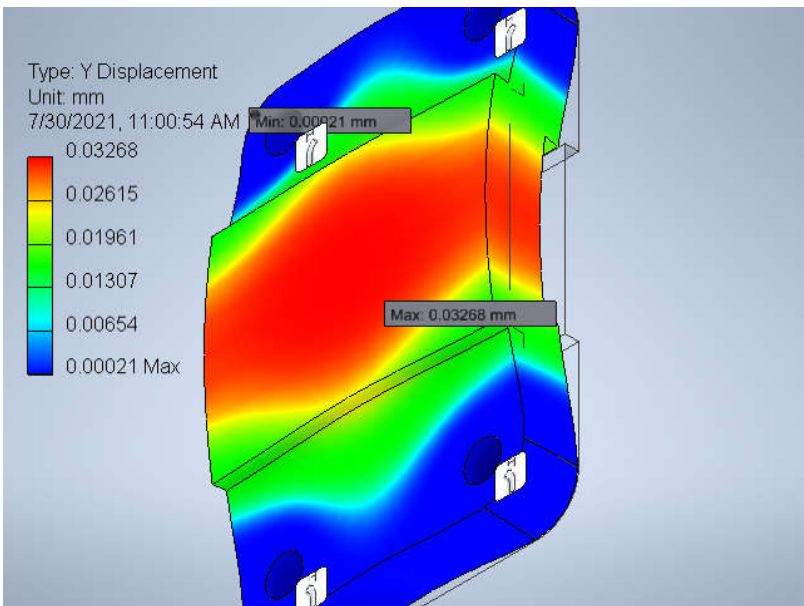
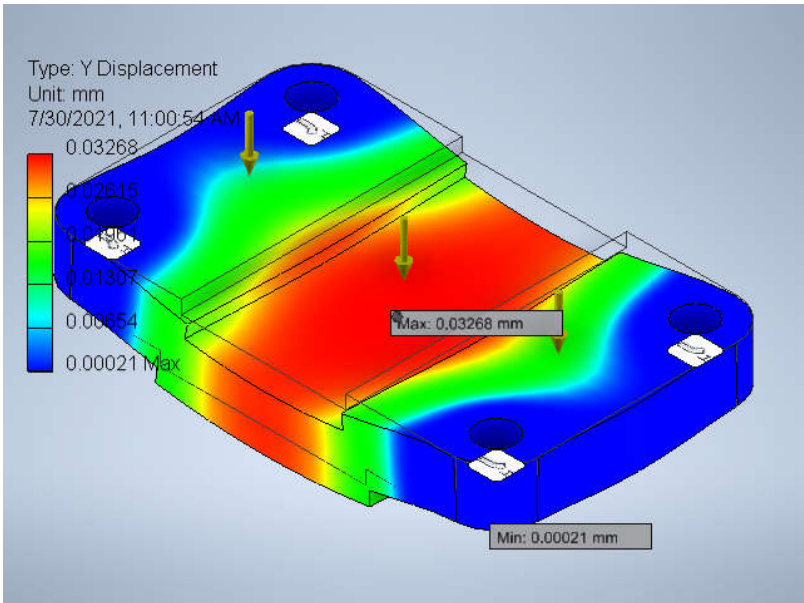


X Displacement

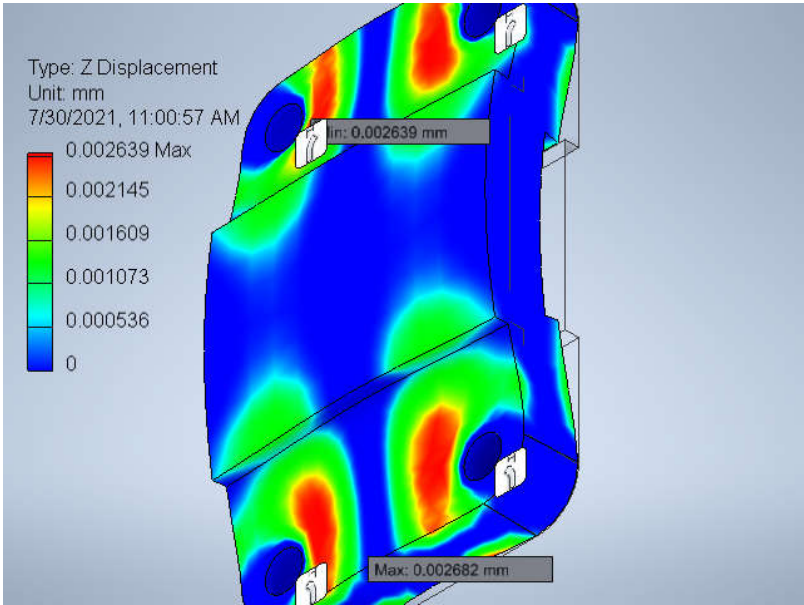
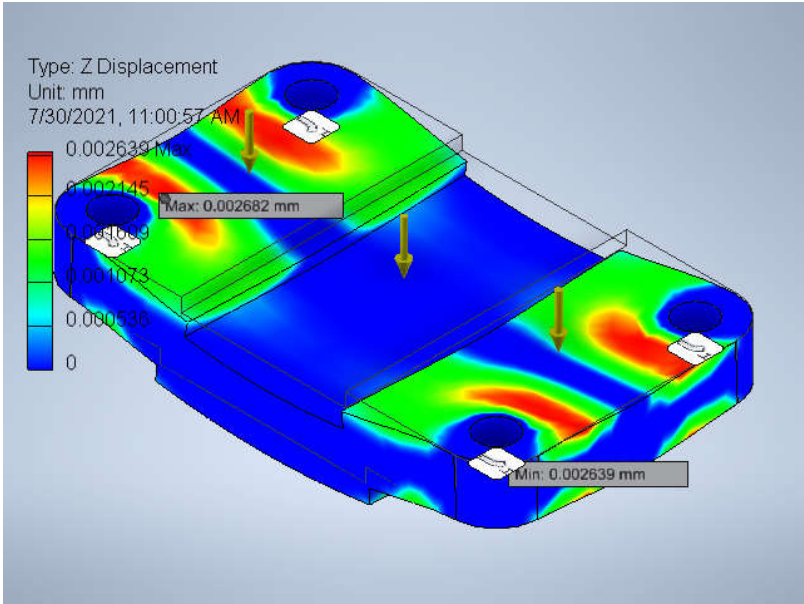




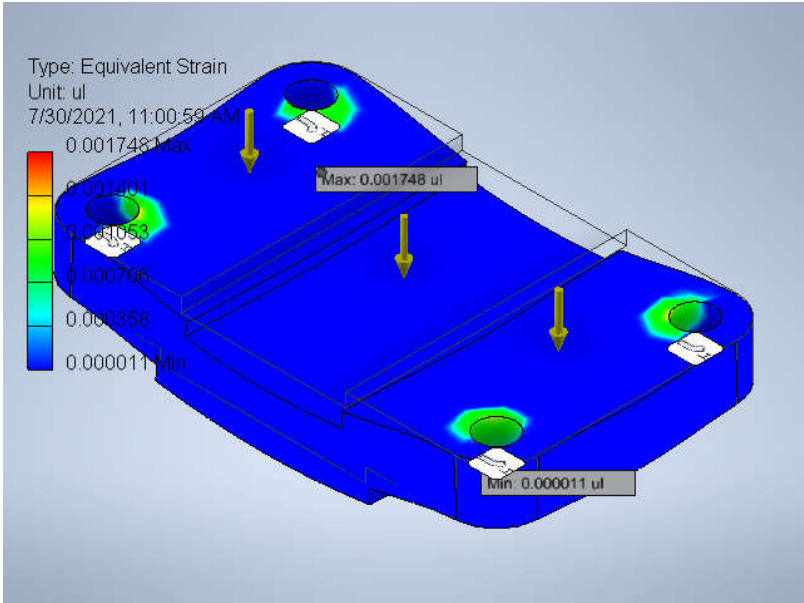
Y Displacement

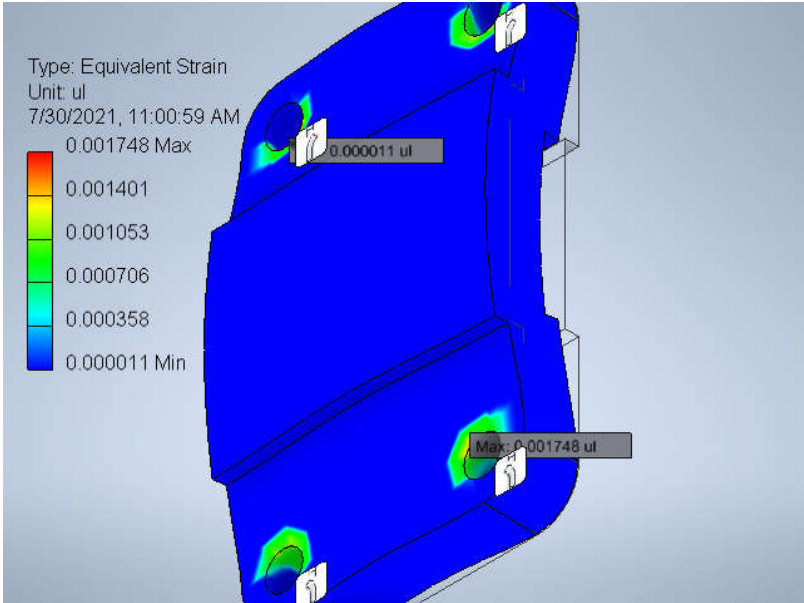


Z Displacement

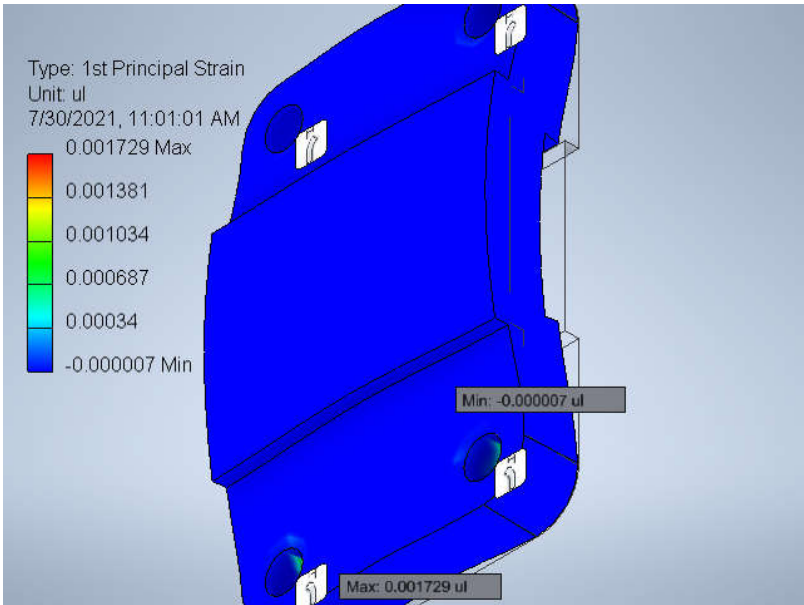
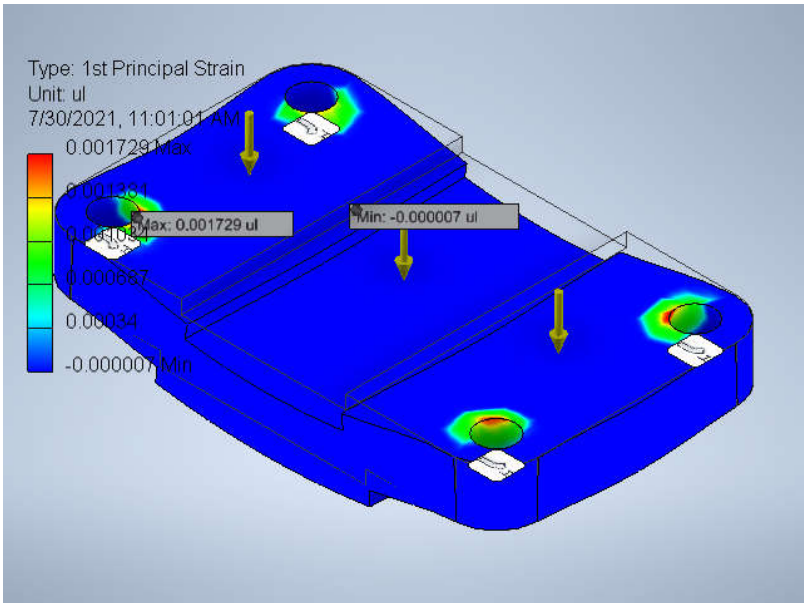


Equivalent Strain

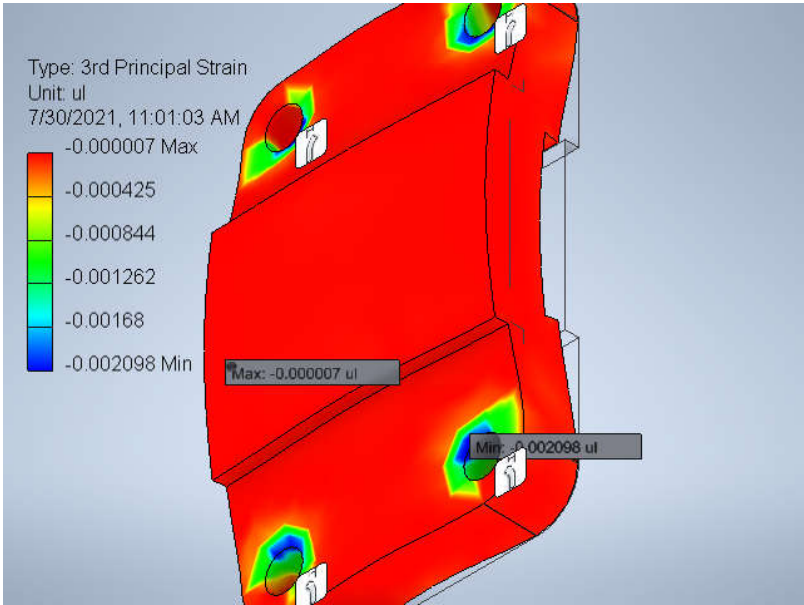
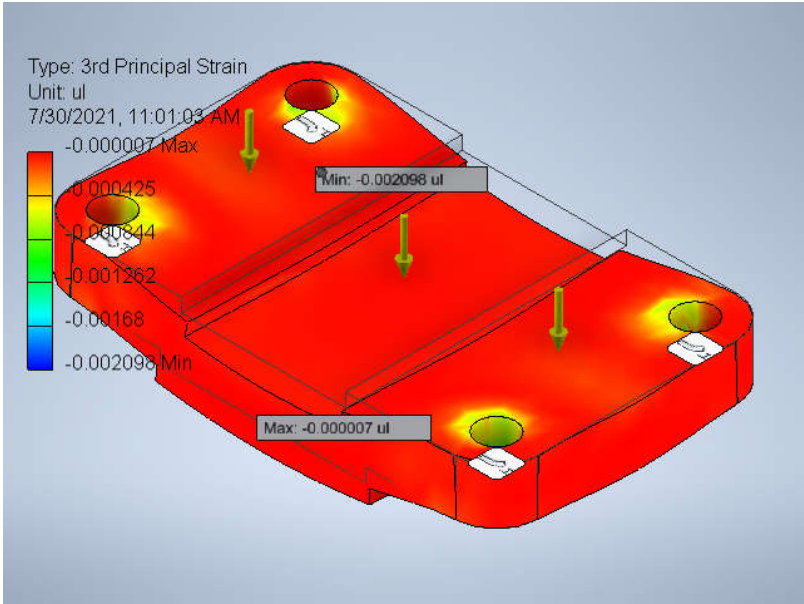




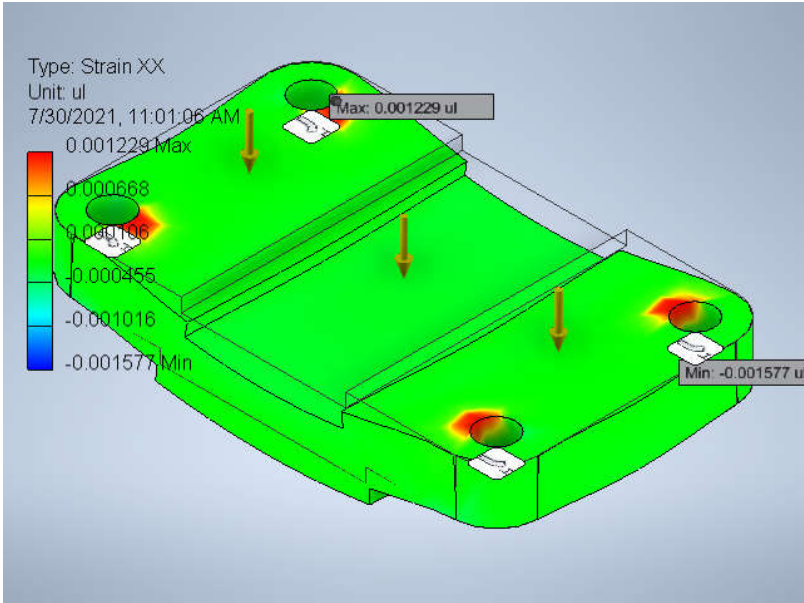
1st Principal Strain

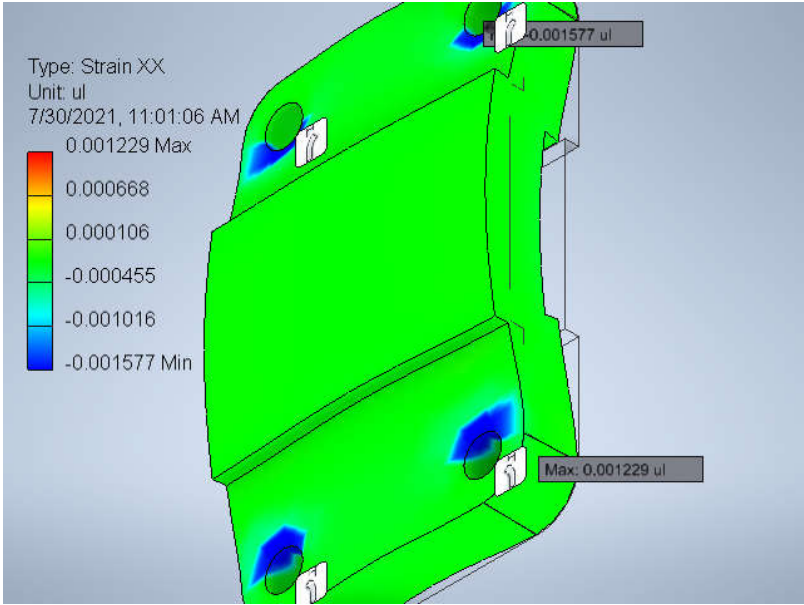


3rd Principal Strain

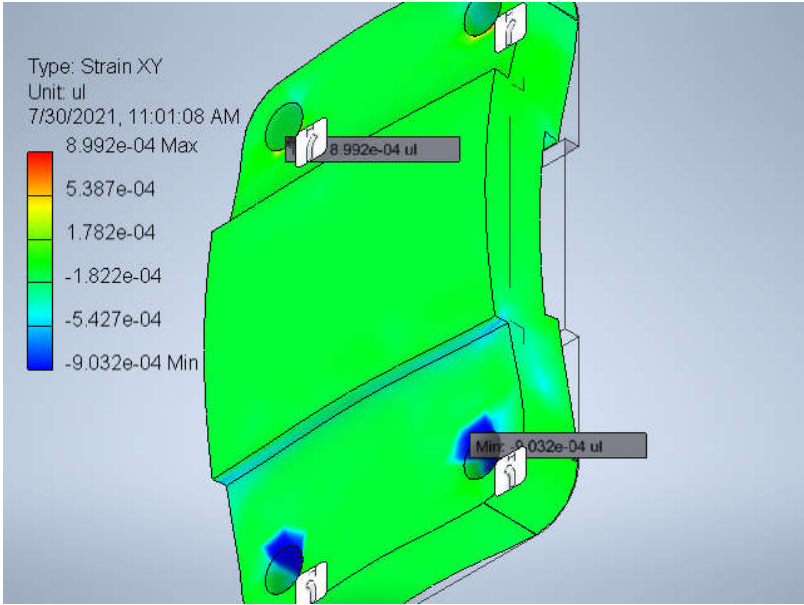
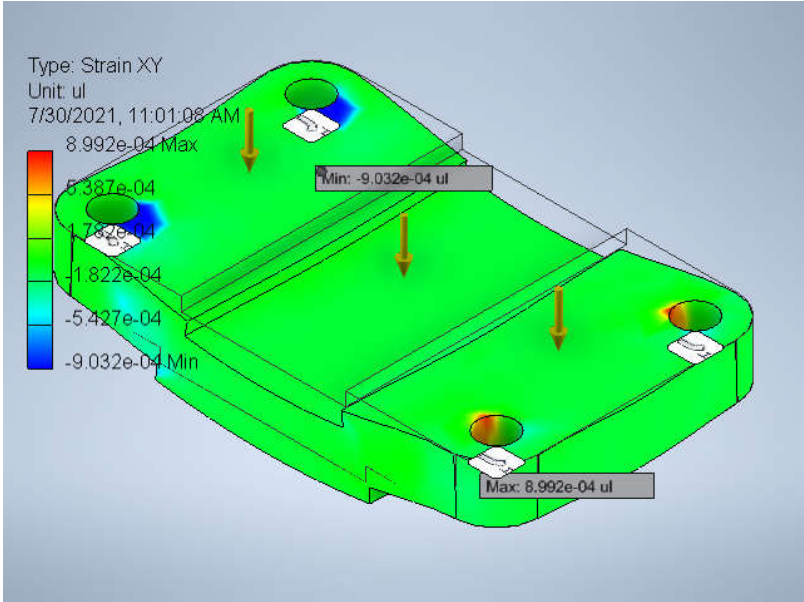


Strain XX

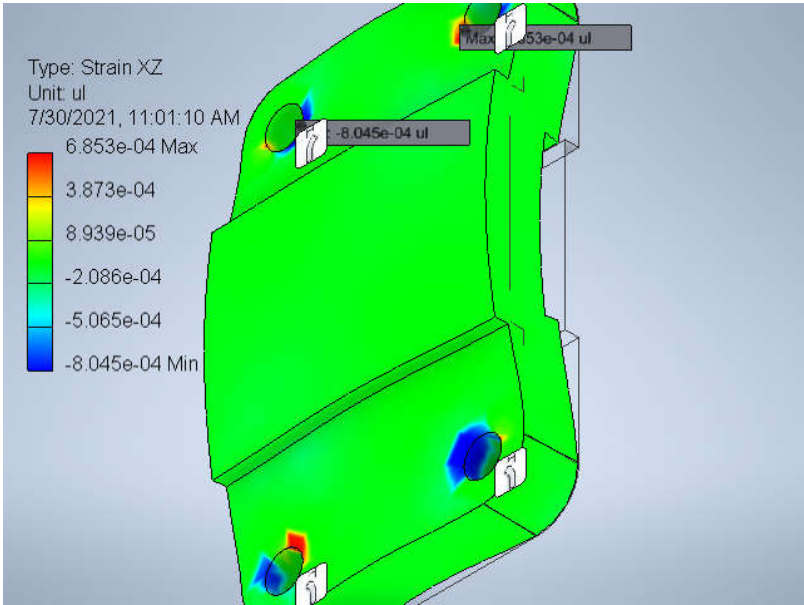
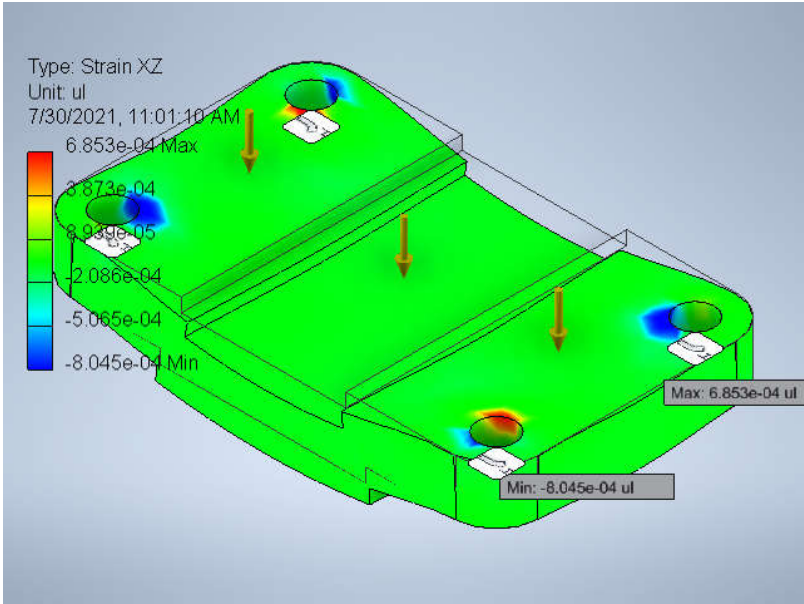




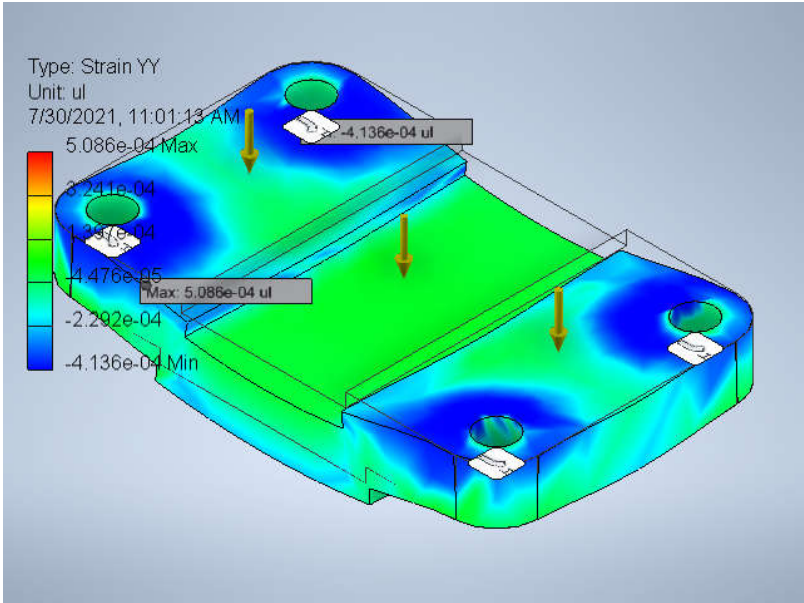
Strain XY

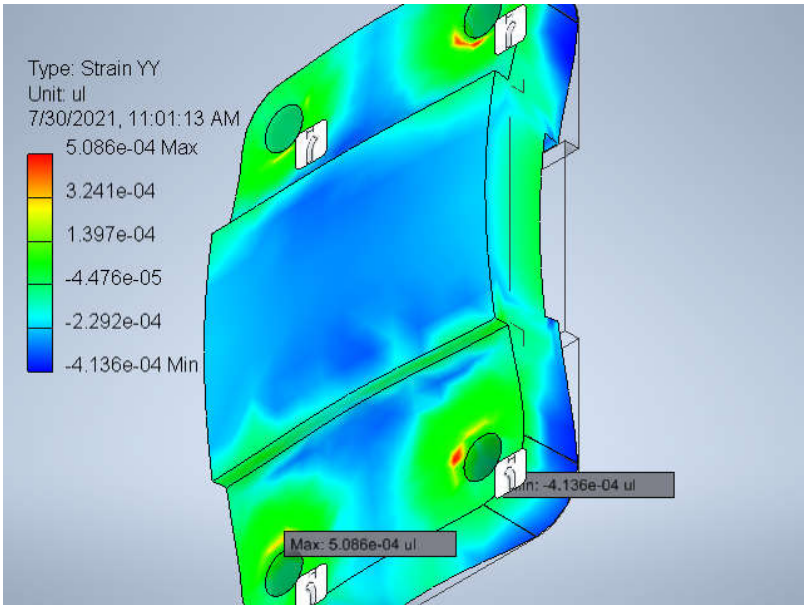


Strain XZ

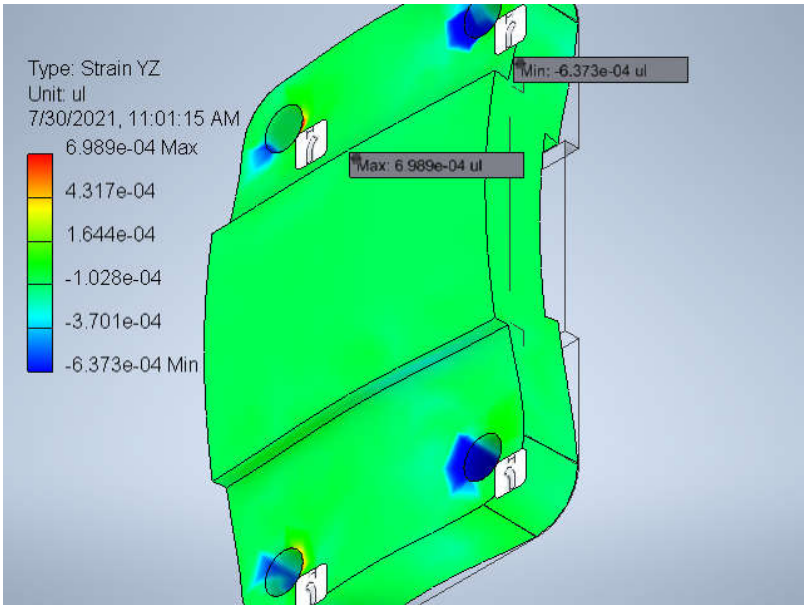
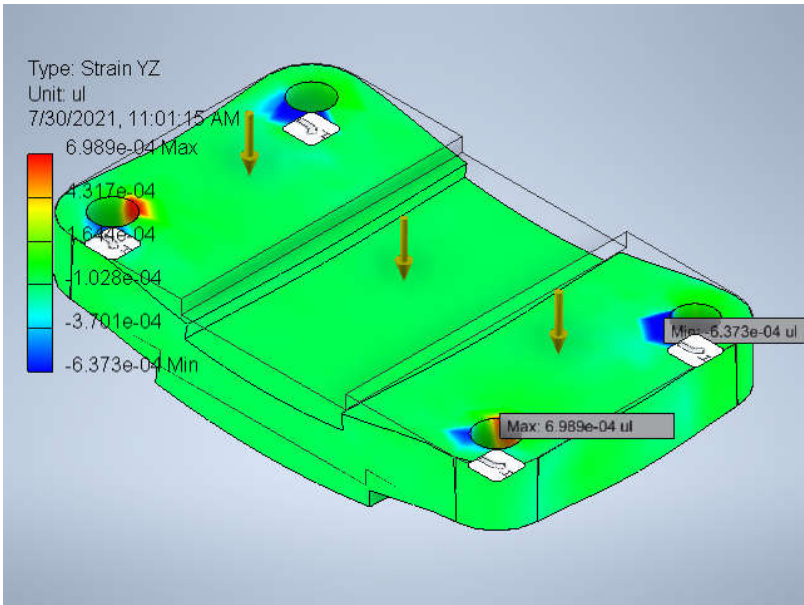


Strain YY

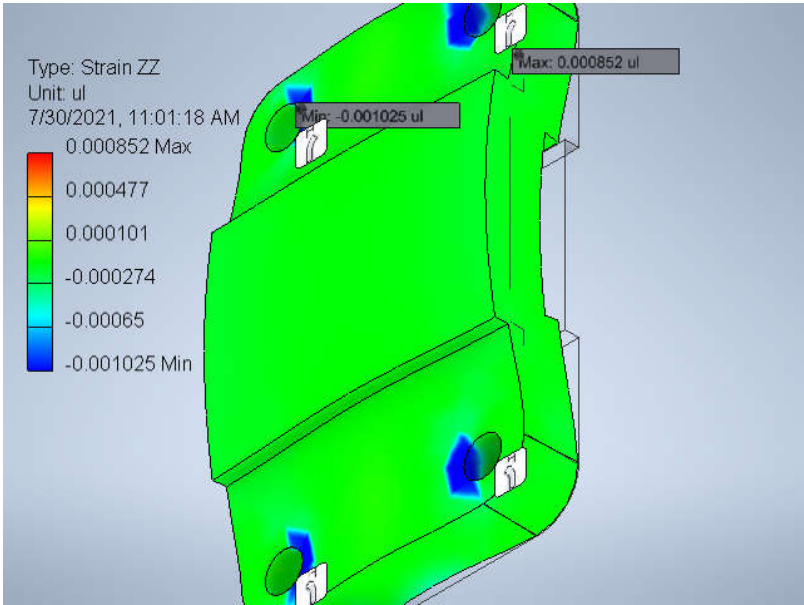
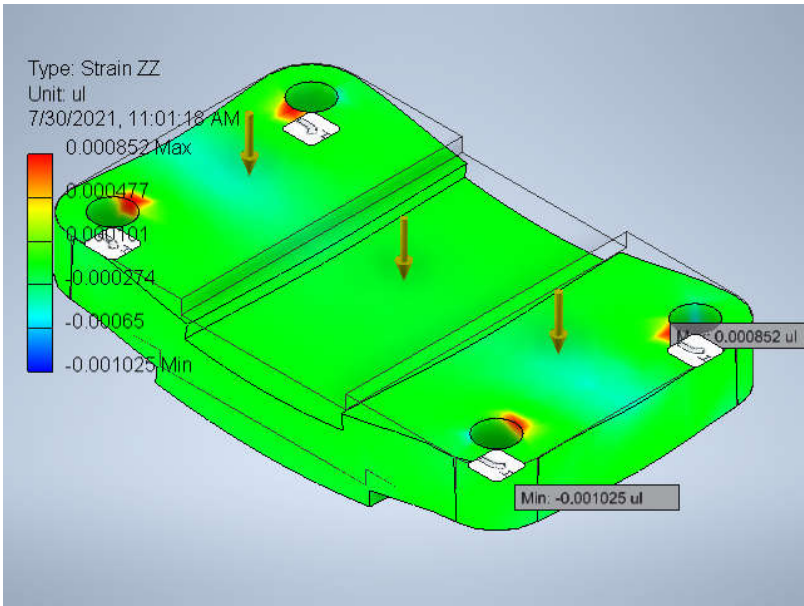




Strain YZ



Strain ZZ



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