

Malleable Iron Top Plate Analysis Report



Analyzed File:	topPlate.ipt
Autodesk Inventor Version:	2020 (Build 240168000, 168)
Creation Date:	7/30/2021, 10:56 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	Iron, Malleable
Density	7.15 g/cm ³
Mass	1.2463 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, 10:55 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)

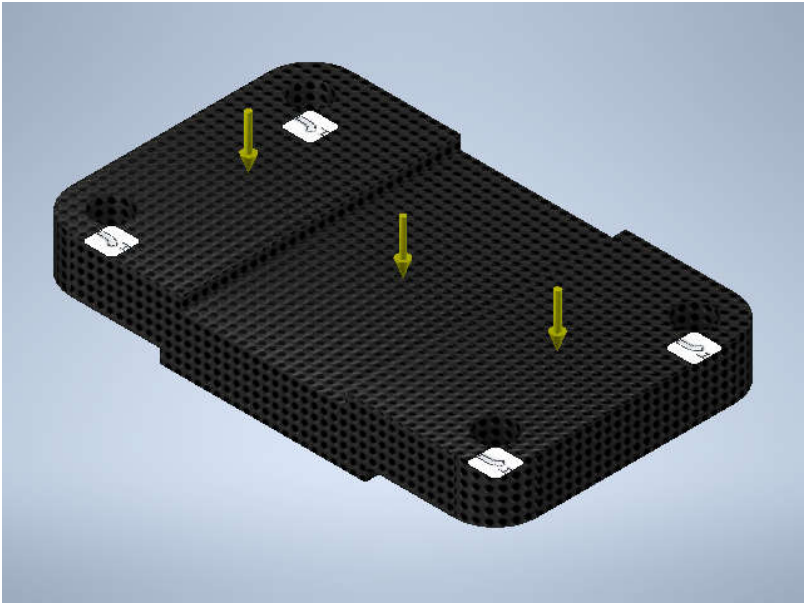
Name	Iron, Malleable	
General	Mass Density	7.15 g/cm^3
	Yield Strength	483 MPa
	Ultimate Tensile Strength	586 MPa
Stress	Young's Modulus	110 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	42.3077 GPa
Part Name(s)	topPlate.ipt	

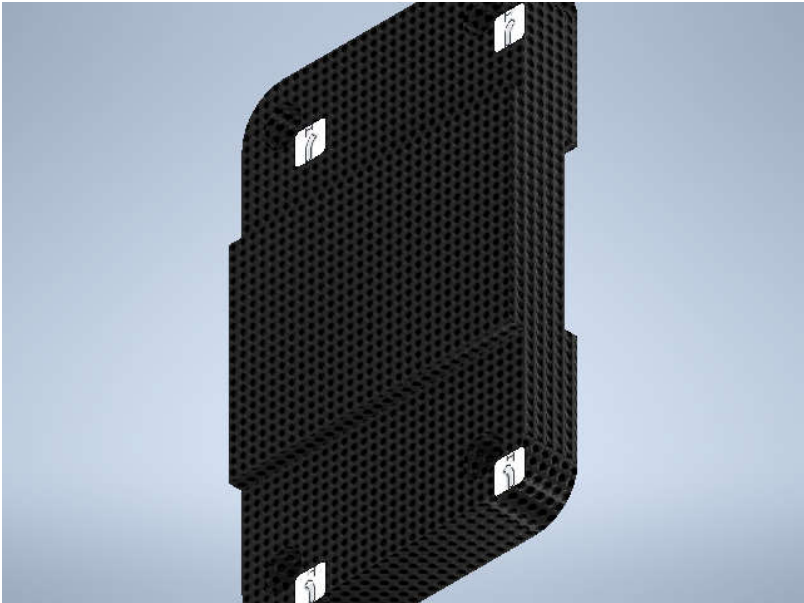
Operating conditions

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)

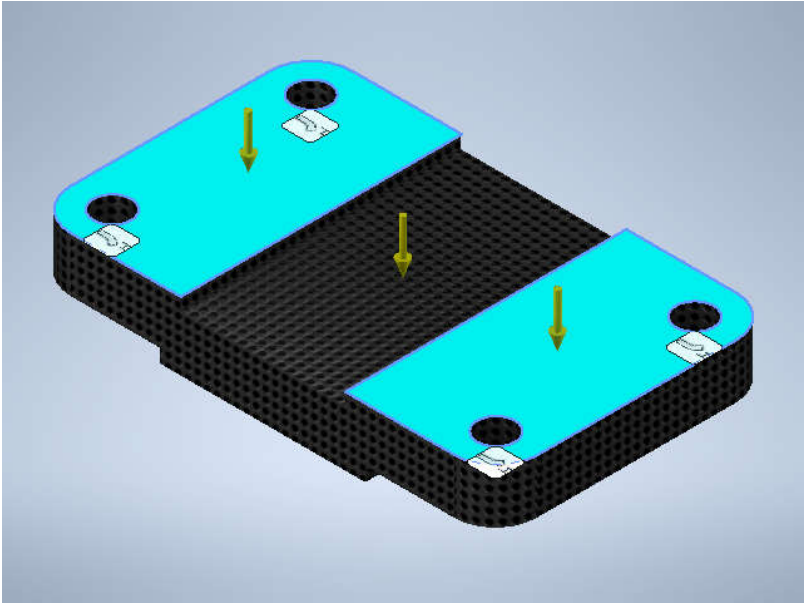


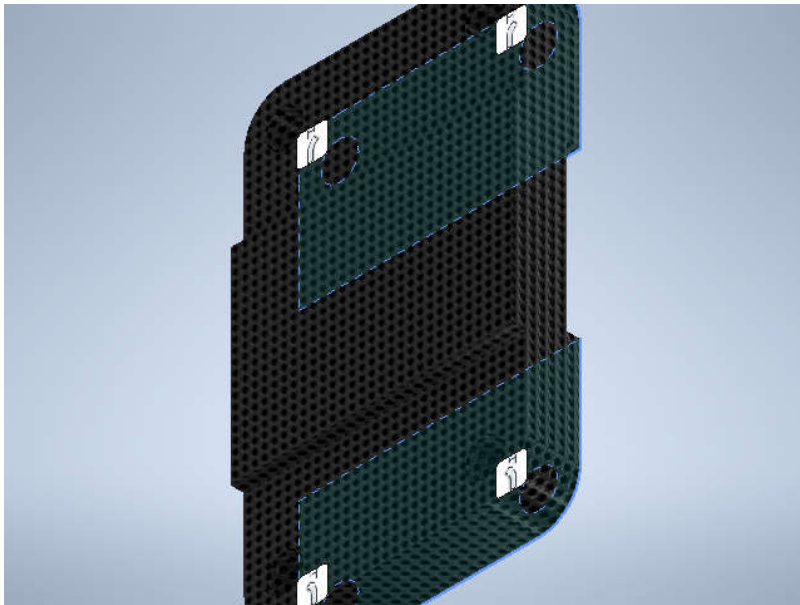


☒ **Force:1**

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)**

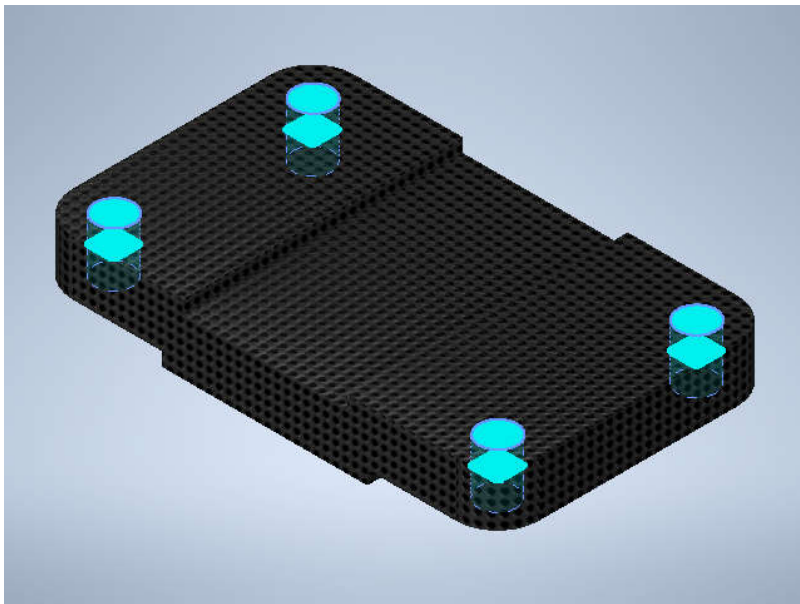


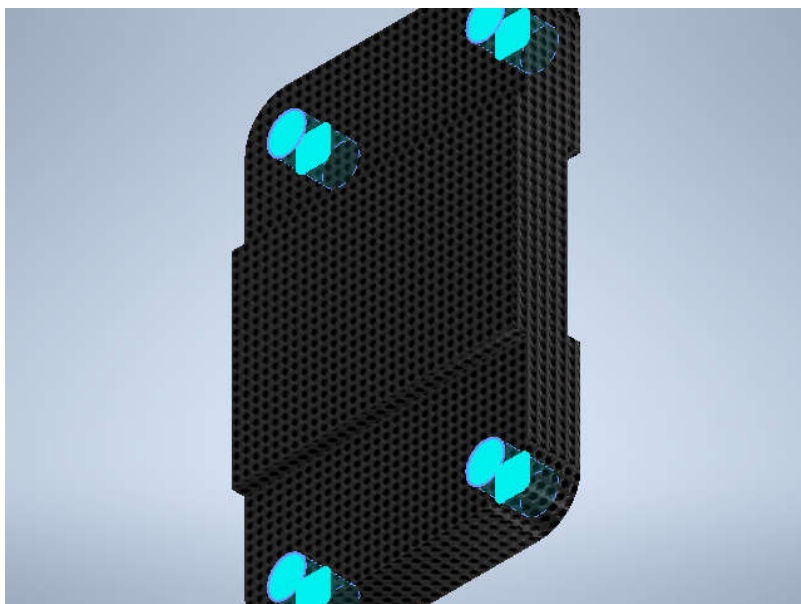


Fixed Constraint:1

Constraint Type	Fixed Constraint
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Selected Face(s)





Results

Reaction Force and Moment on Constraints

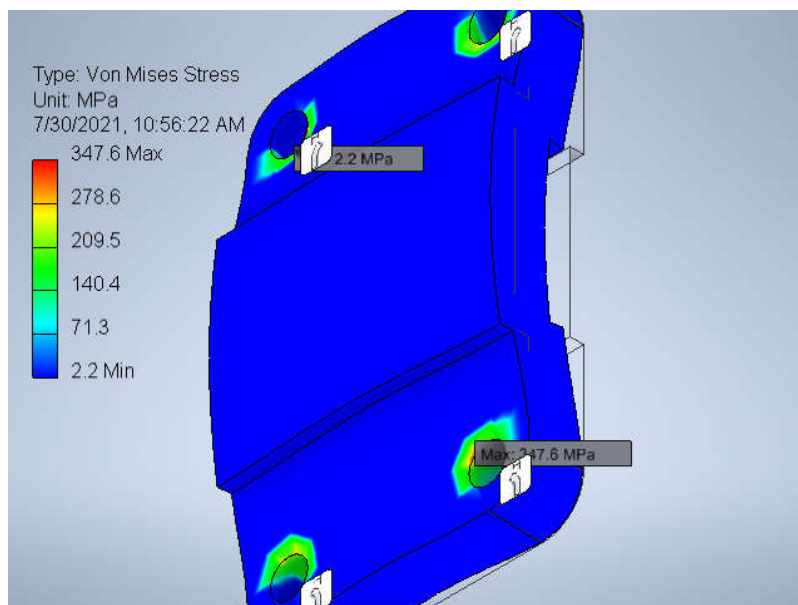
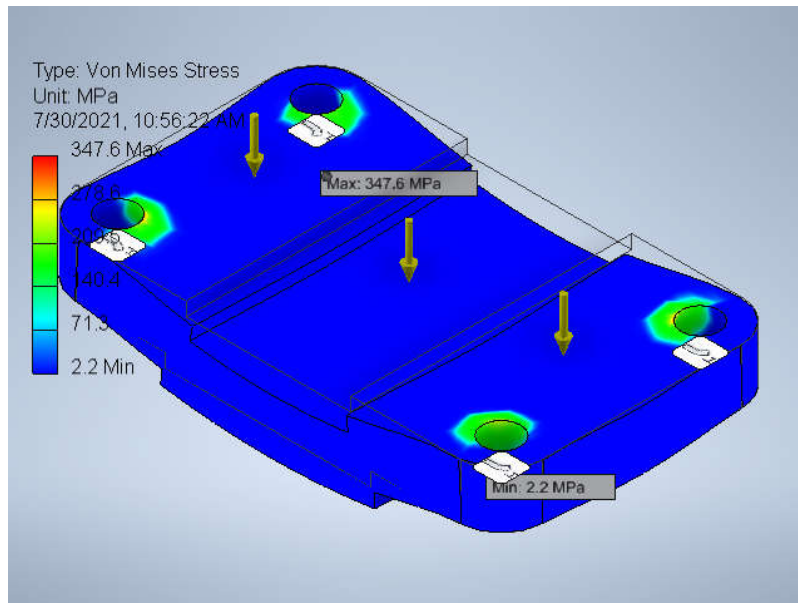
Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	100012 N	0 N	0 N m	0 N m
		100012 N		0 N m
		0 N		0 N m

Result Summary

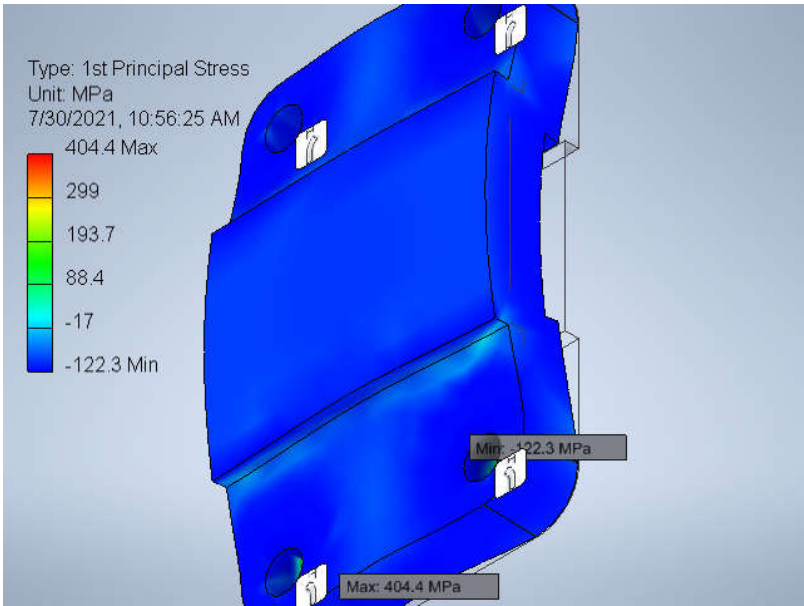
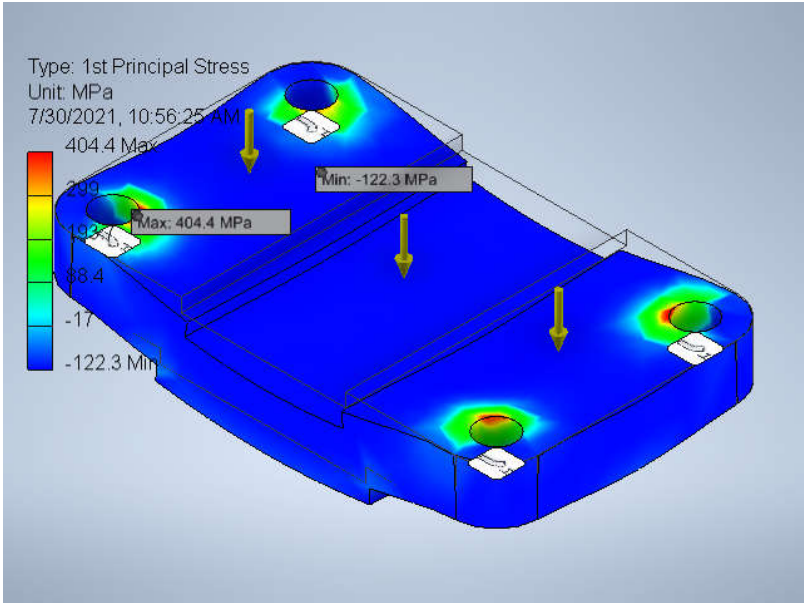
Name	Minimum	Maximum
Volume	174308 mm^3	
Mass	1.2463 kg	
Von Mises Stress	2.2174 MPa	347.644 MPa
1st Principal Stress	-122.337 MPa	404.383 MPa
3rd Principal Stress	-497.382 MPa	86.9175 MPa
Displacement	0 mm	0.0573436 mm
Safety Factor	1.38935 ul	15 ul
Stress XX	-419.205 MPa	315.153 MPa
Stress XY	-134.089 MPa	133.493 MPa
Stress XZ	-119.434 MPa	101.74 MPa
Stress YY	-185.916 MPa	147.75 MPa
Stress YZ	-94.6152 MPa	103.757 MPa
Stress ZZ	-284.528 MPa	221.01 MPa
X Displacement	-0.0121858 mm	0.0122341 mm
Y Displacement	-0.0573434 mm	0.000365963 mm
Z Displacement	-0.00470491 mm	0.00463012 mm
Equivalent Strain	0.000019268 ul	0.00306747 ul
1st Principal Strain	-0.0000126436 ul	0.00303294 ul
3rd Principal Strain	-0.00368097 ul	-0.0000127666 ul
Strain XX	-0.00276743 ul	0.0021561 ul
Strain XY	-0.00158469 ul	0.00157765 ul
Strain XZ	-0.00141149 ul	0.00120238 ul
Strain YY	-0.000725741 ul	0.000892287 ul
Strain YZ	-0.00111818 ul	0.00122622 ul
Strain ZZ	-0.0017985 ul	0.00149558 ul

Figures

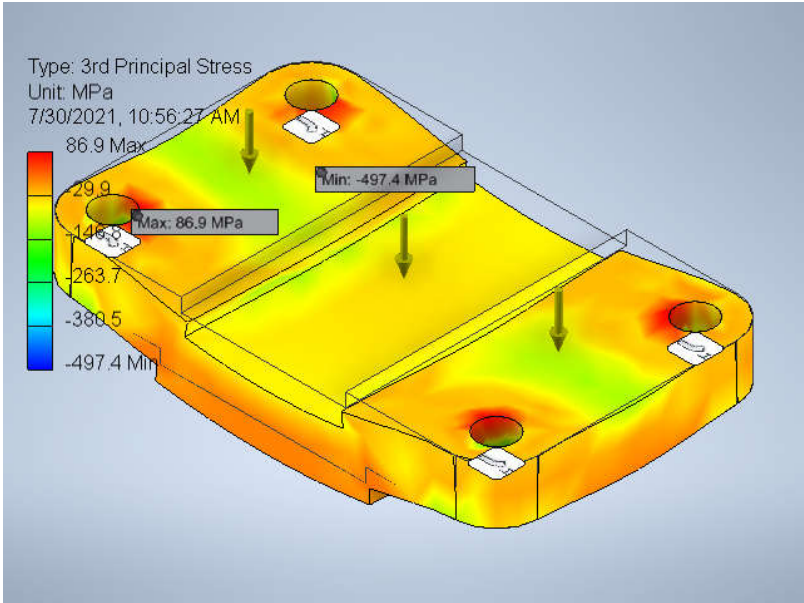
Von Mises Stress

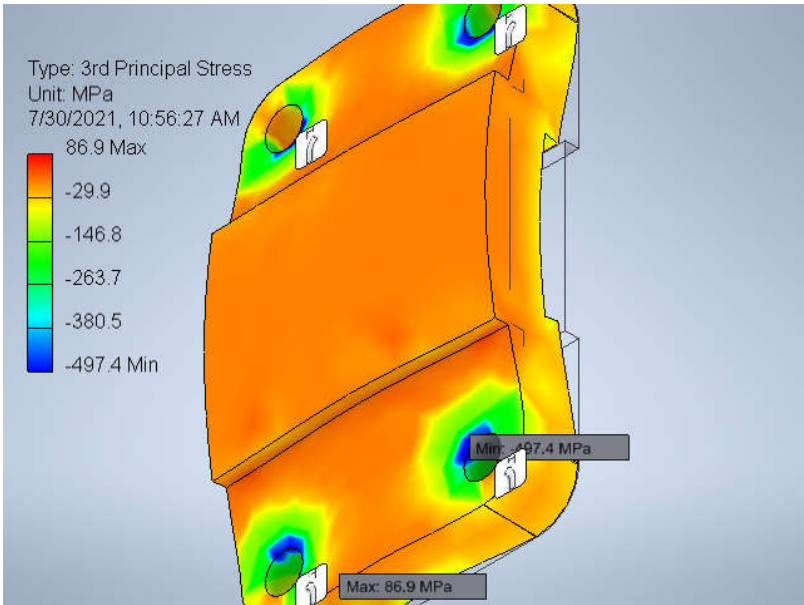


1st Principal Stress

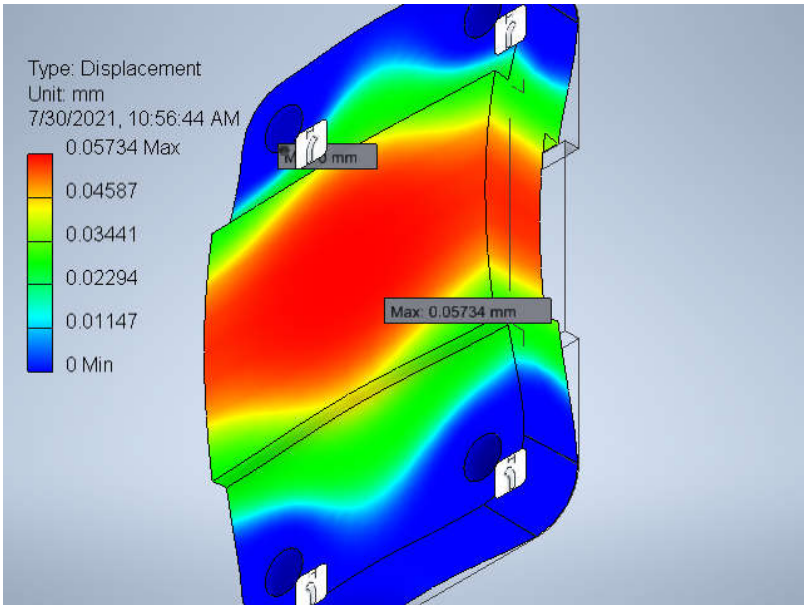
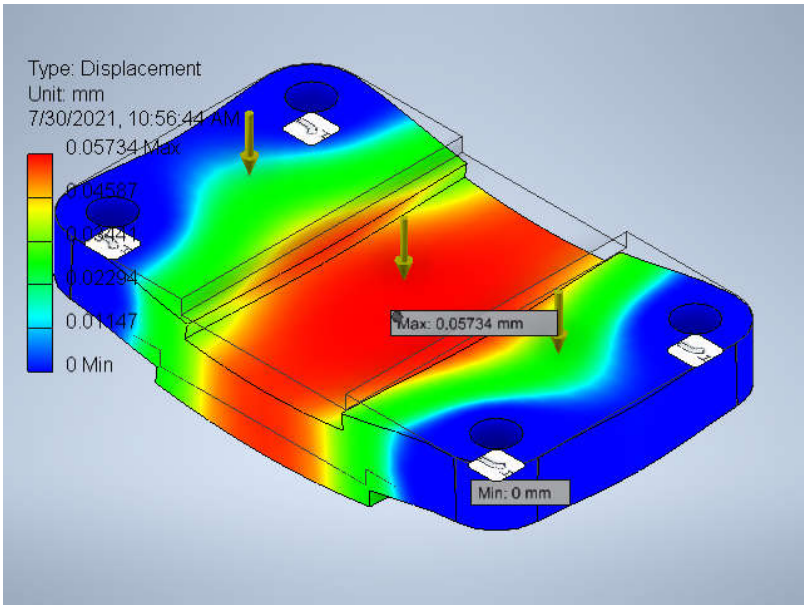


3rd Principal Stress

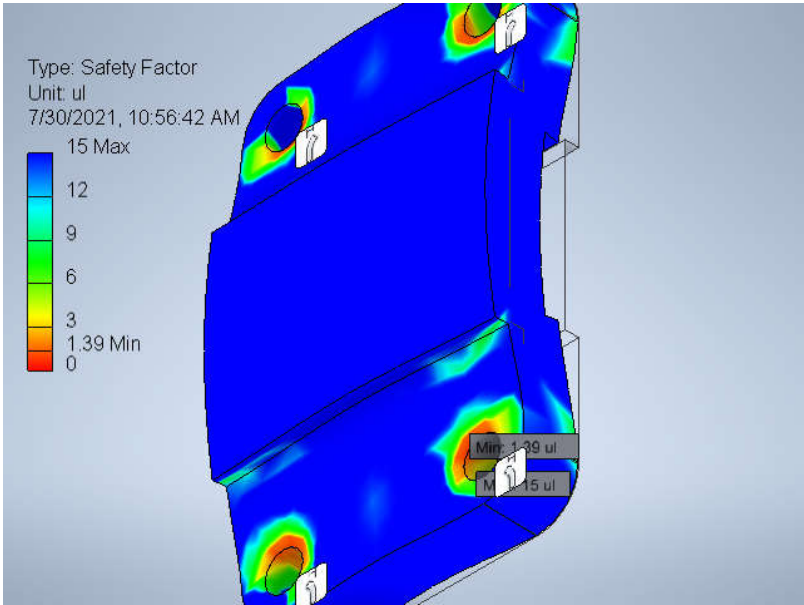
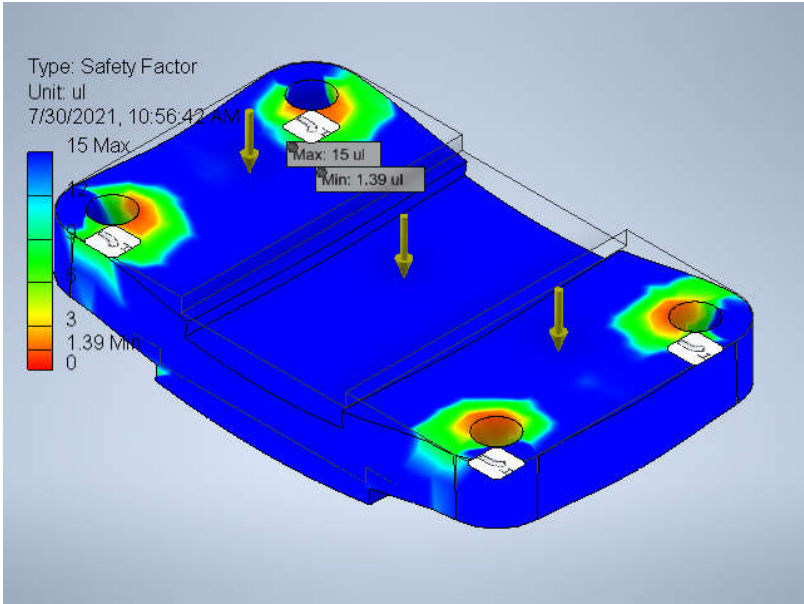




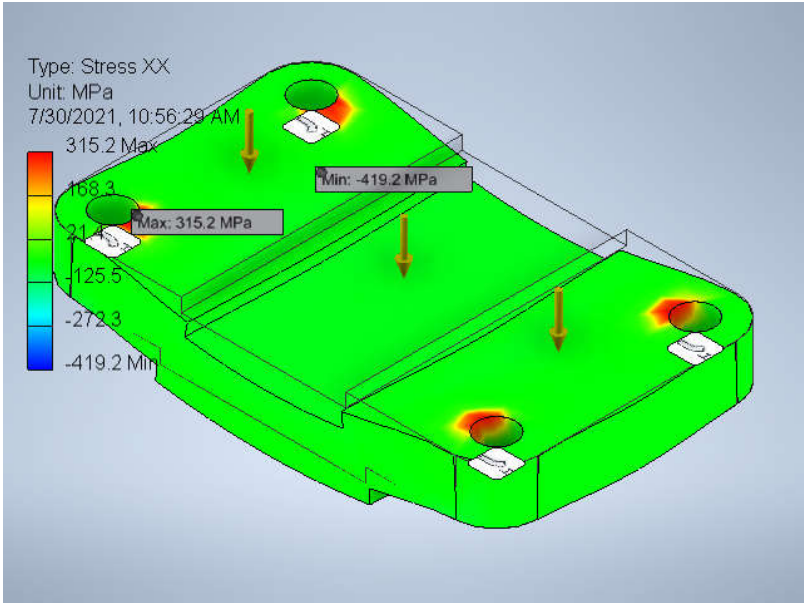
Displacement

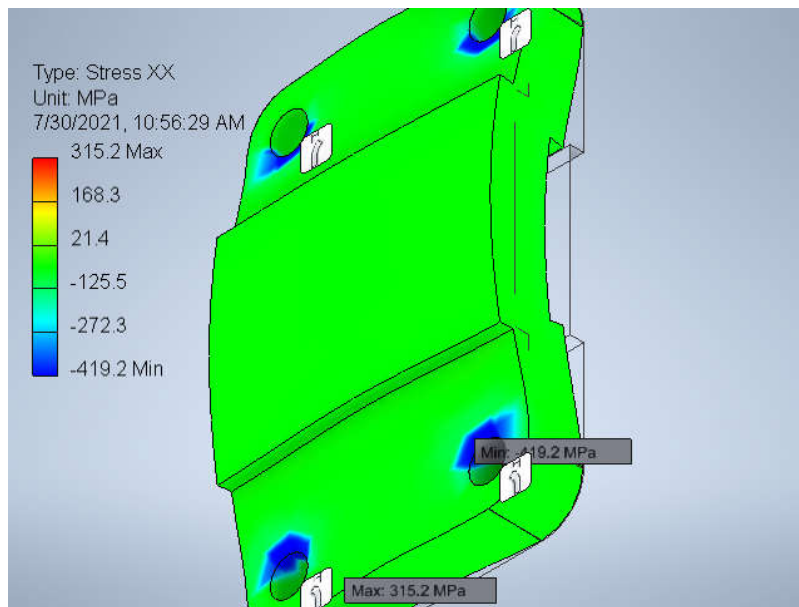


Safety Factor

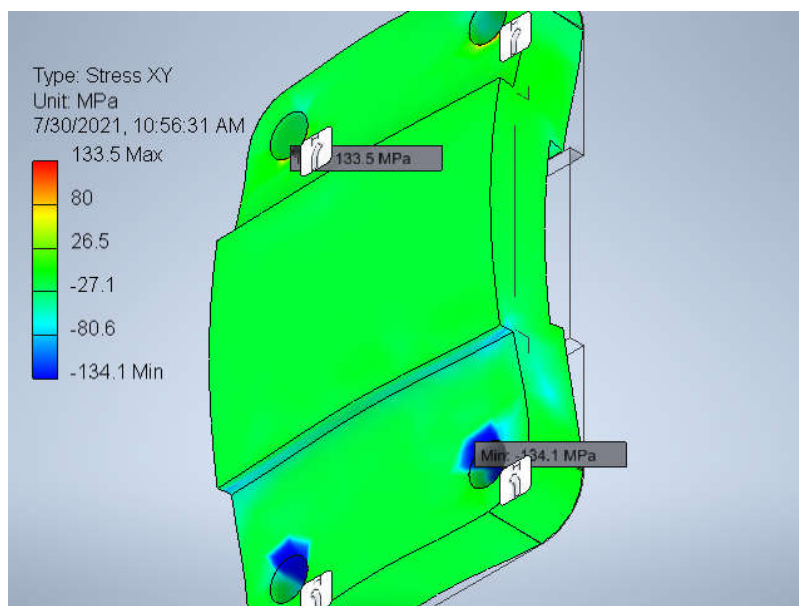
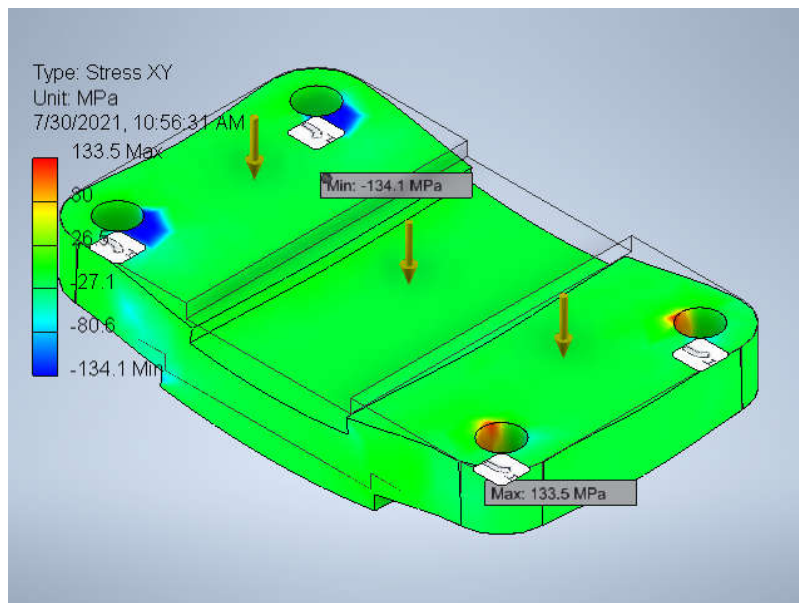


Stress XX

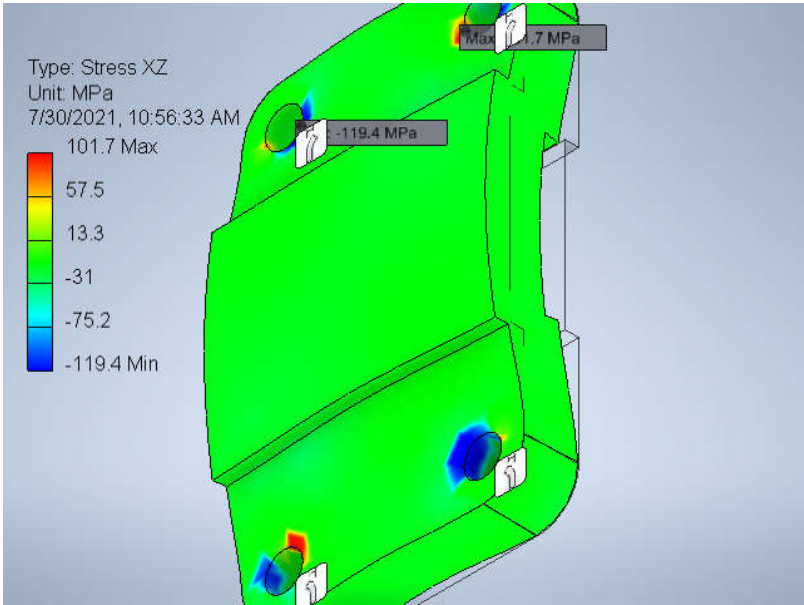
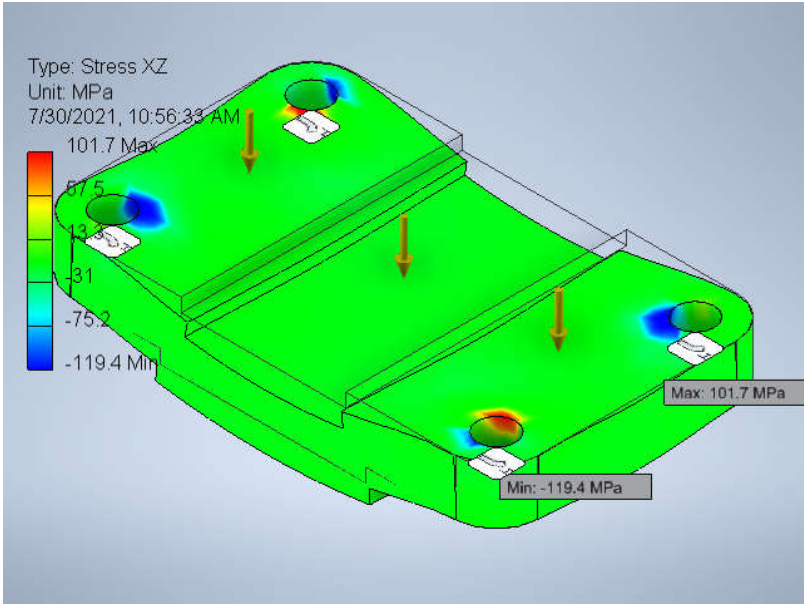




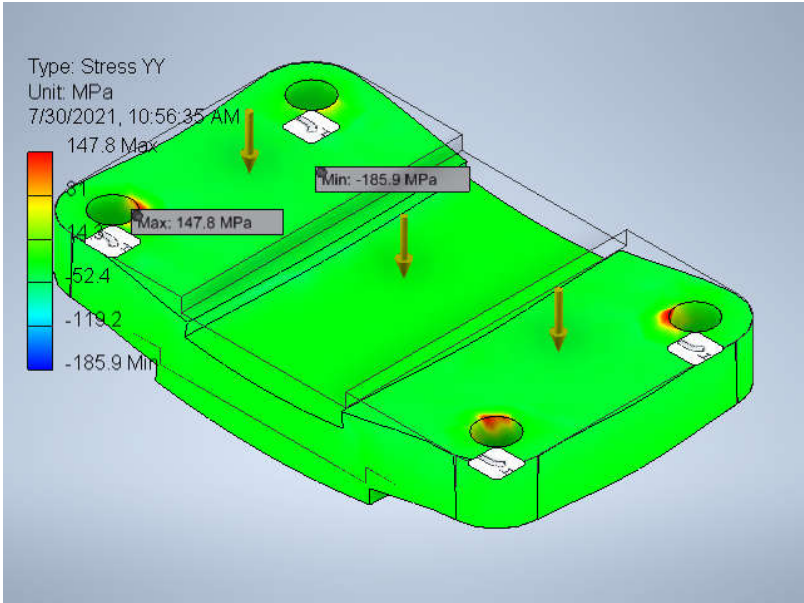
Stress XY

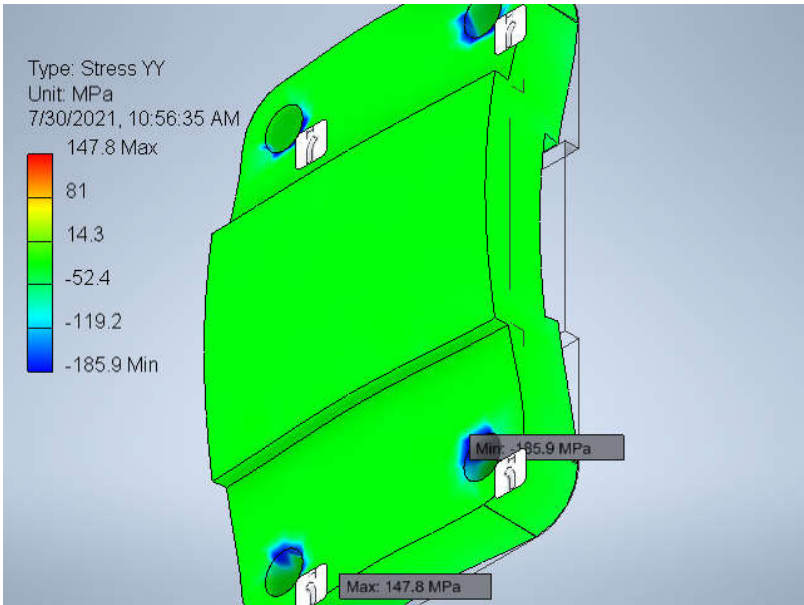


Stress XZ

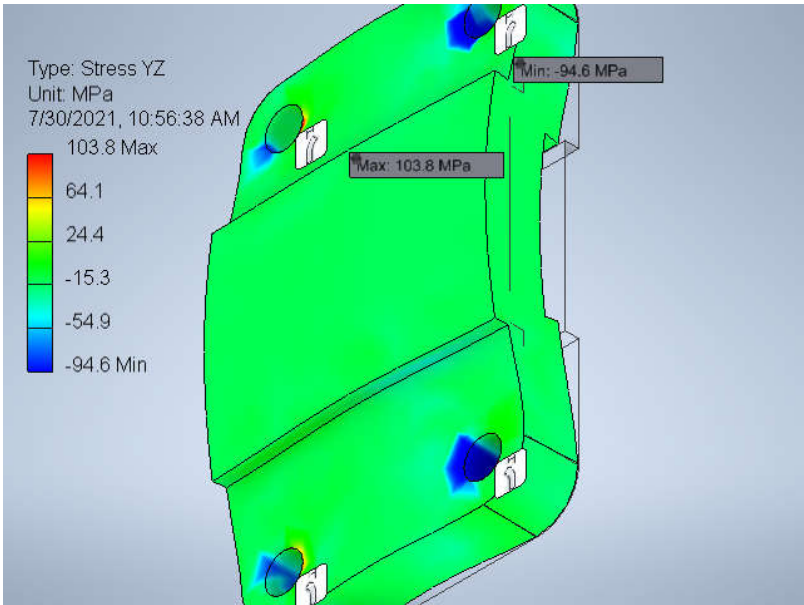
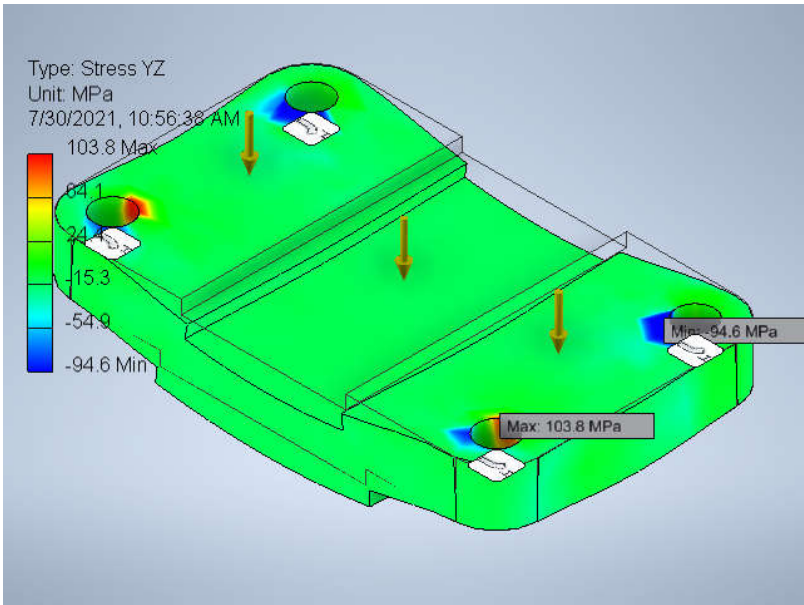


Stress YY

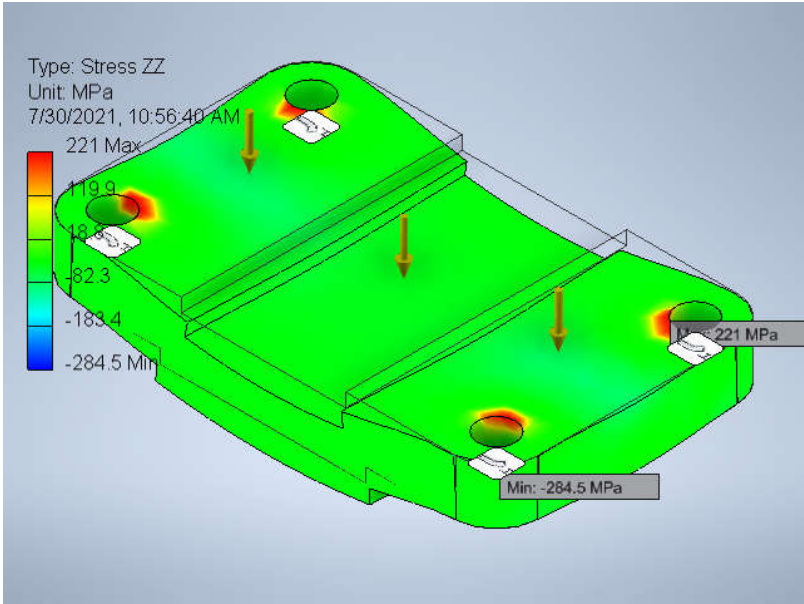




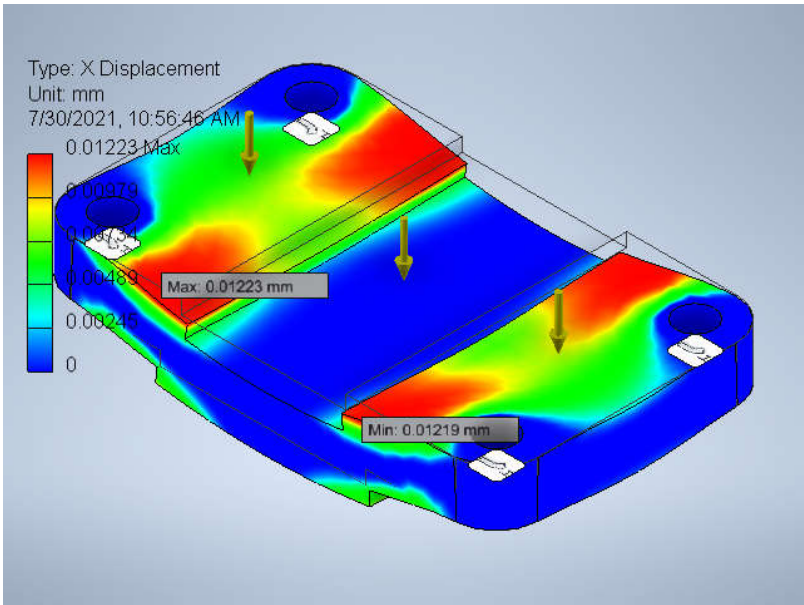
Stress YZ

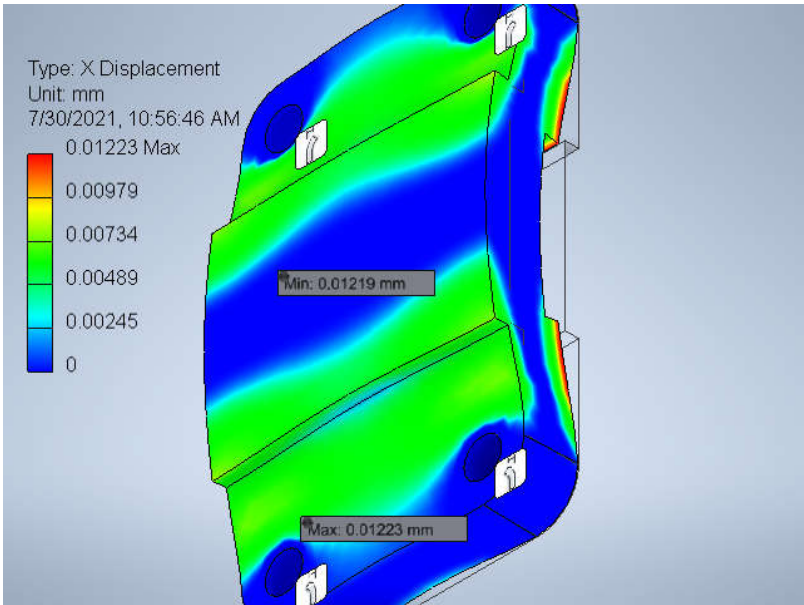


☐ Stress ZZ

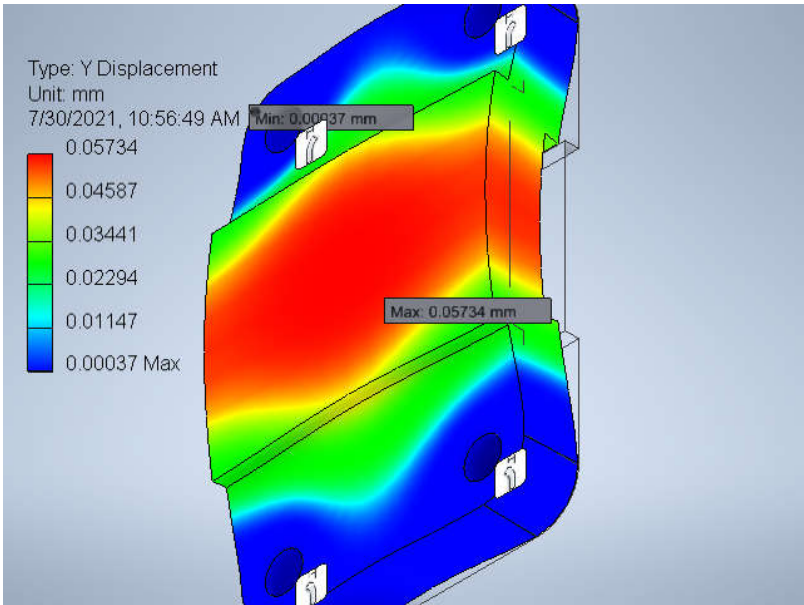
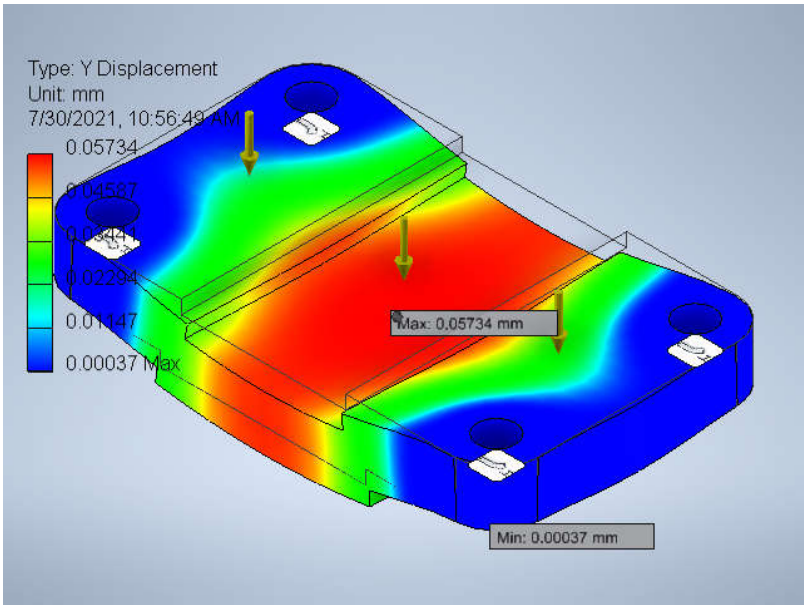


☐ X Displacement

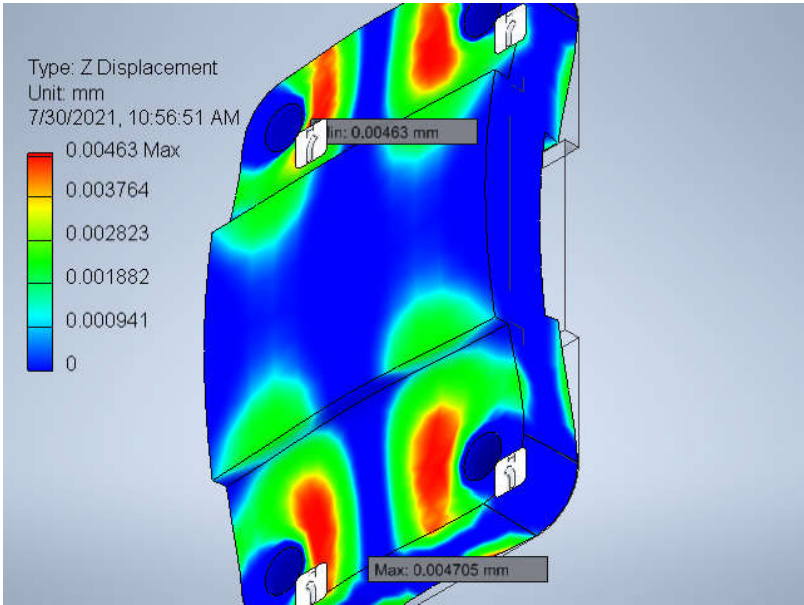
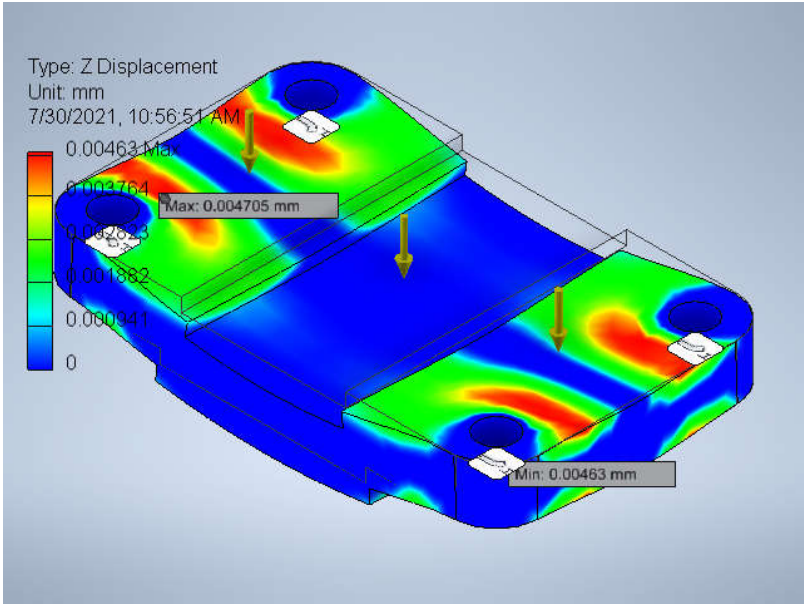




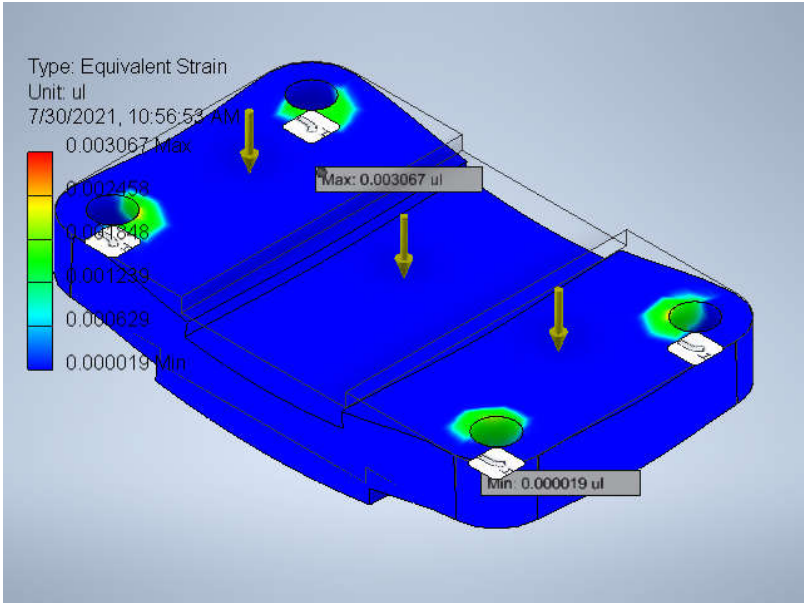
Y Displacement

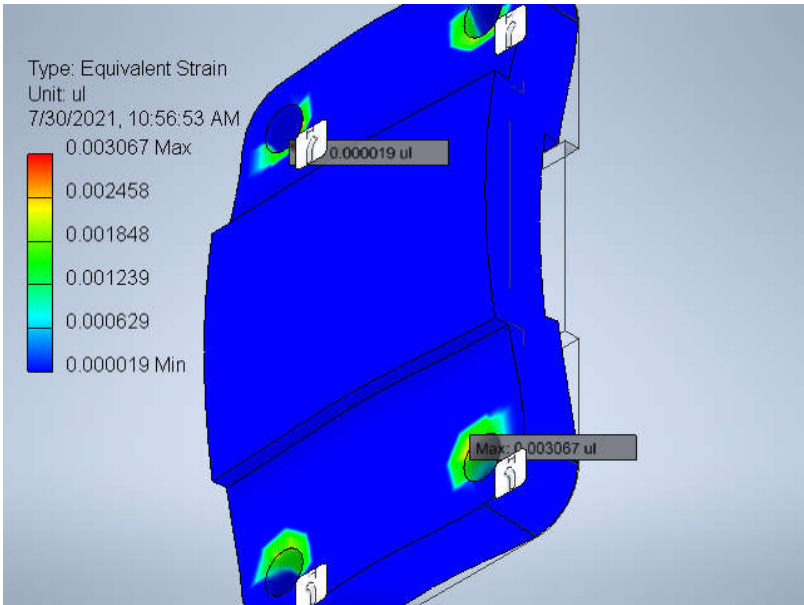


Z Displacement

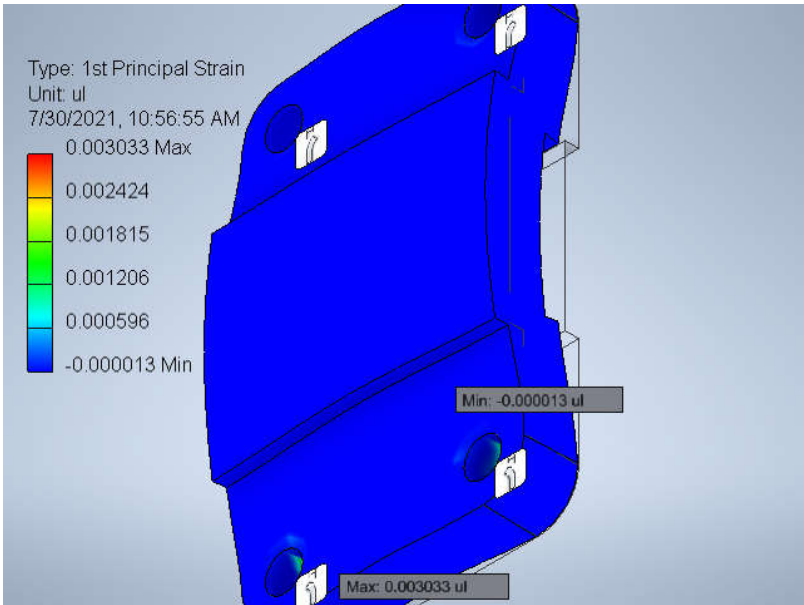
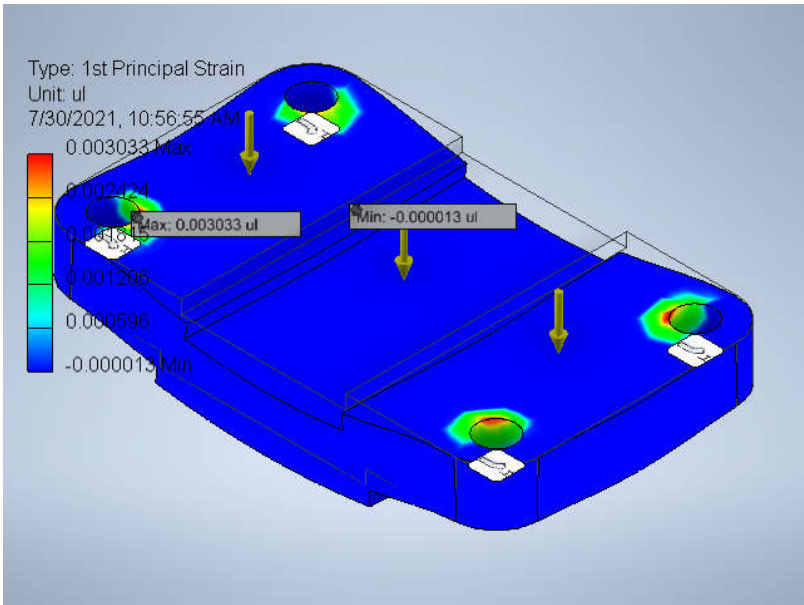


Equivalent Strain

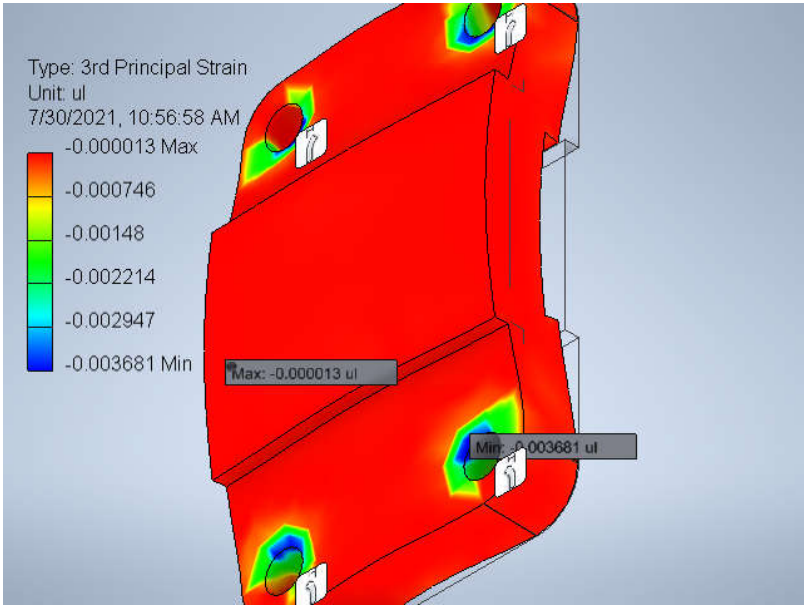
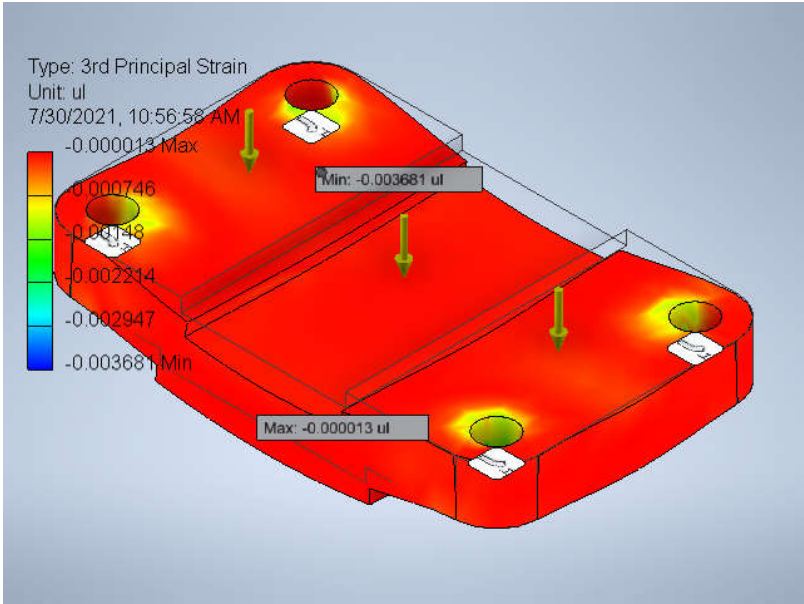




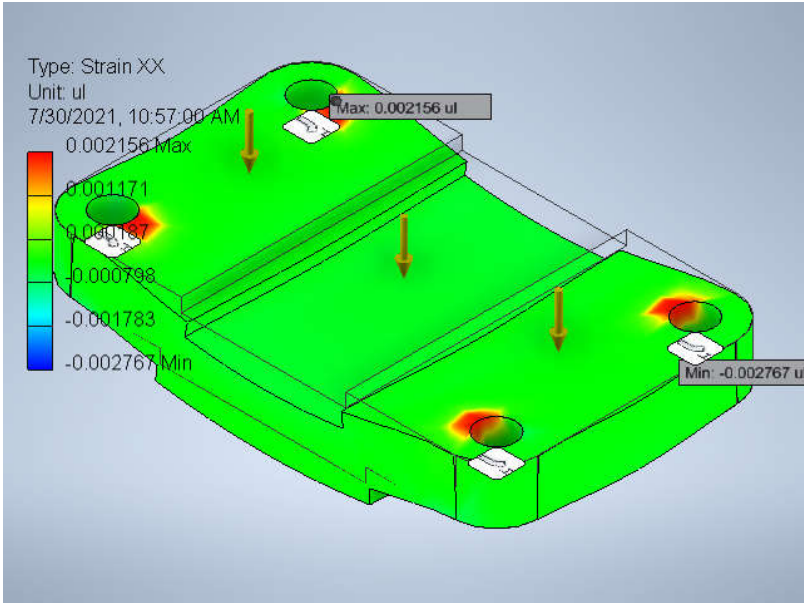
1st Principal Strain

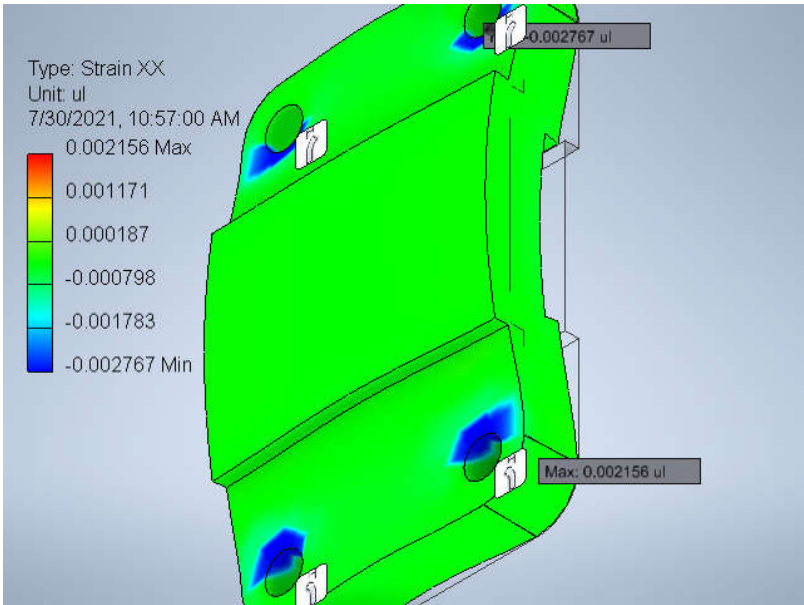


3d Principal Strain

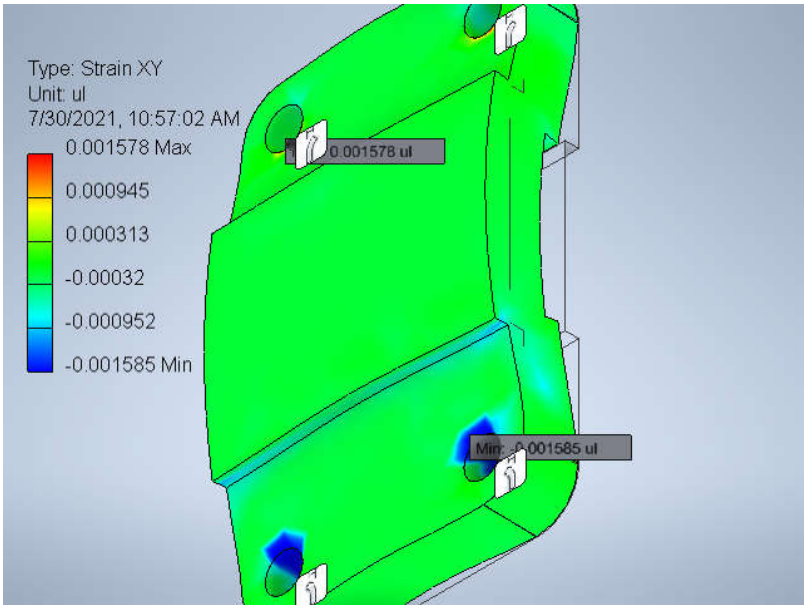
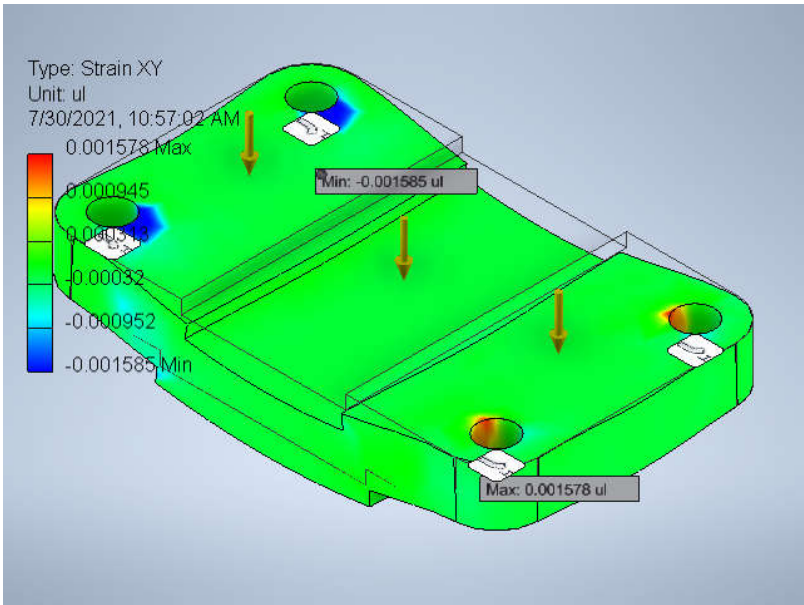


Strain XX

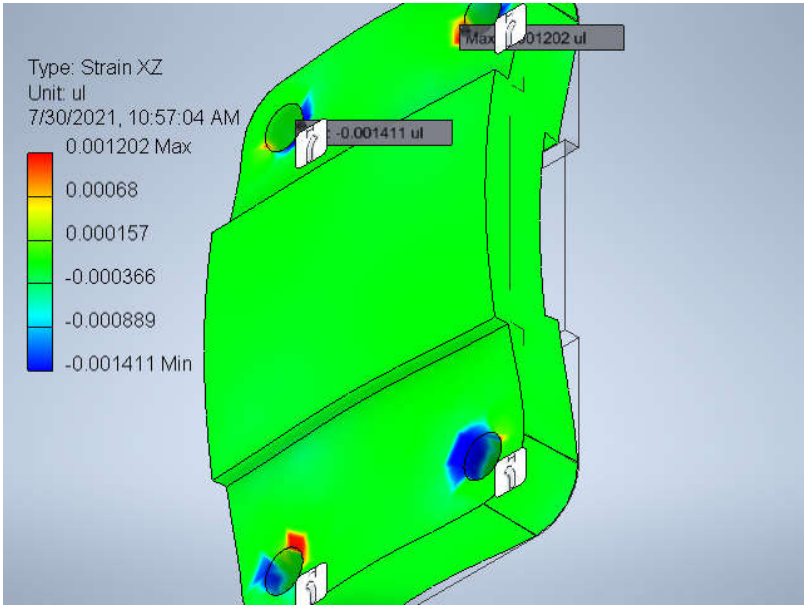
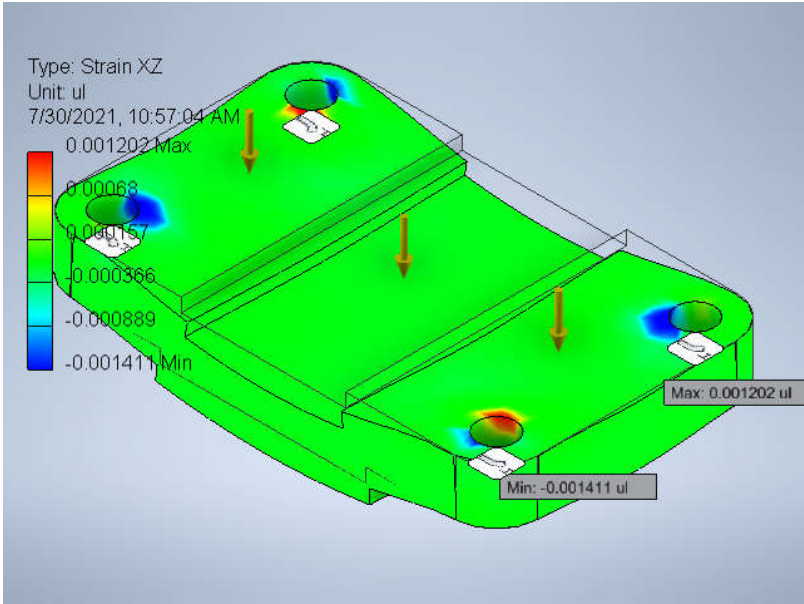




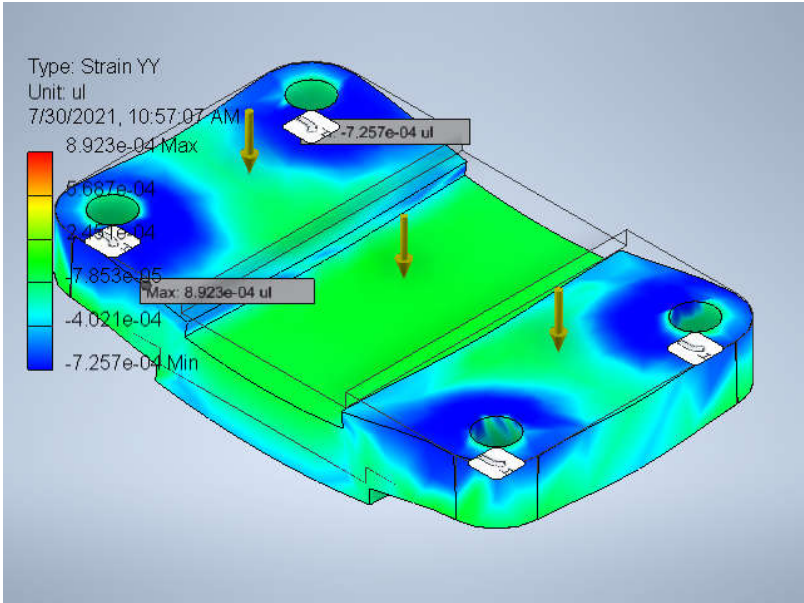
Strain XY

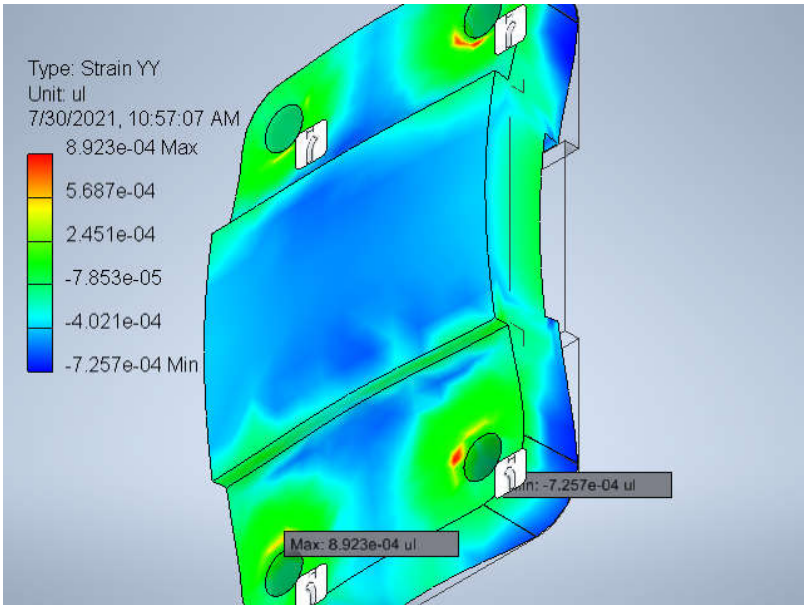


Strain XZ

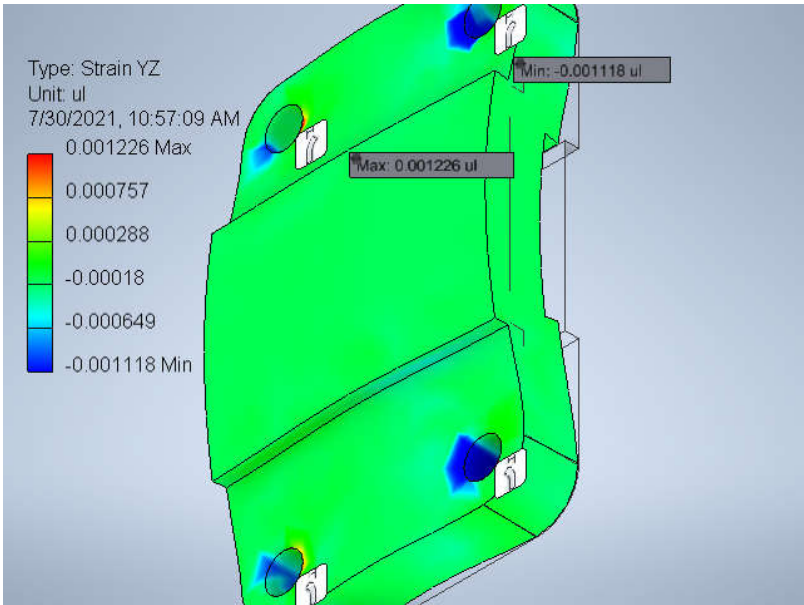
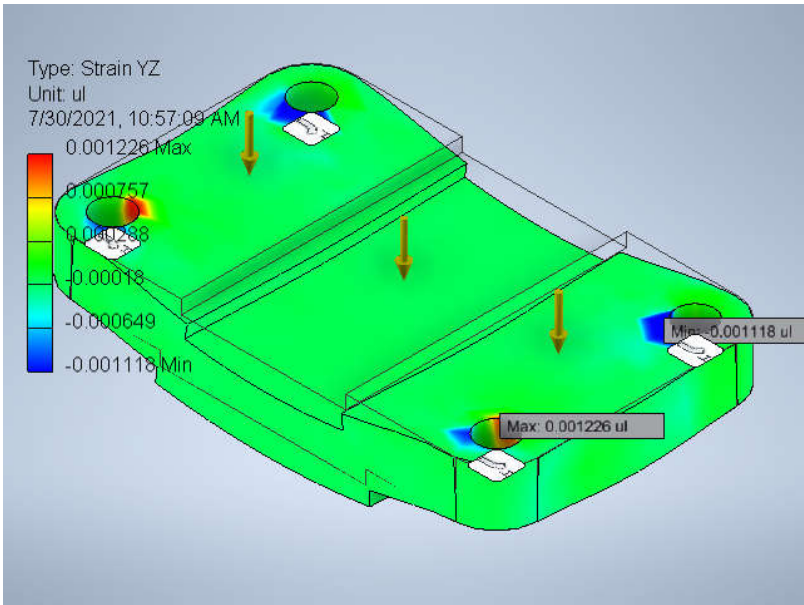


Strain YY

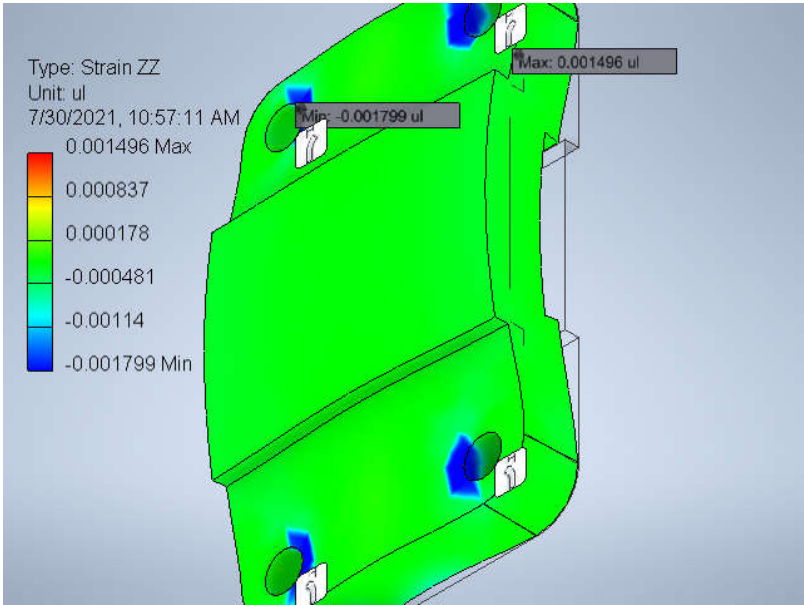
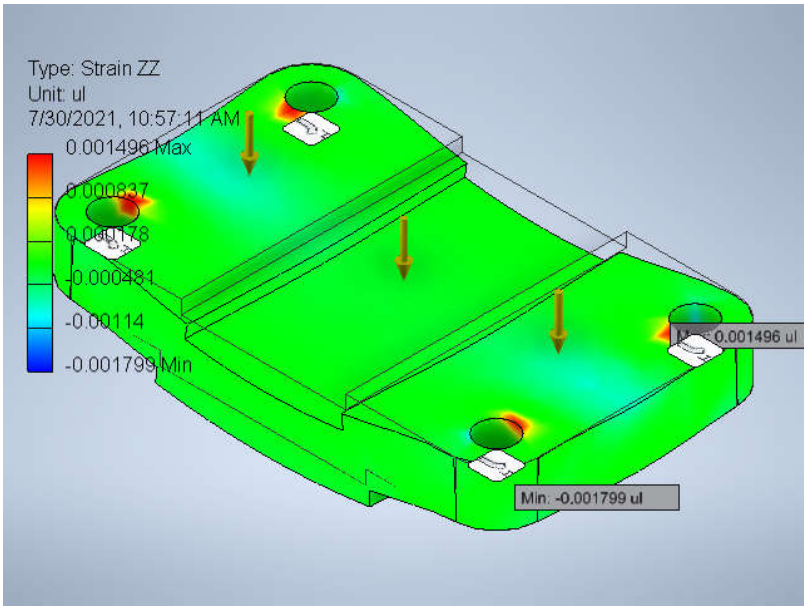




Strain YZ



Strain ZZ



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