Stress Analysis Report

Analyzed File:	X Axis Idler Pulley Bracket.ipt
Autodesk Inventor Version:	2023.2 (Build 272271000, 271)
Creation Date:	1/12/2023, 2:28 PM
Study Author:	elimb
Summary:	

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belt pull

General objective and settings:

Design Objective	Single Point
Study Type	Static Analysis
Last Modification Date	12/7/2022, 1:39 PM
Model State	[Primary]
Detect and Eliminate Rigid Body Modes	No

iProperties

Summary

Author	elimb

Project

Part Number	X Axis Idler Pulley Bracket
Designer	elimb
Estimated Cost	$0.00
Creation Date	12/7/2022

Status

Design State	WorkInProgress

Physical

Material	Thermoplastic Resin
Density	0.0462429 lbmass/in^3
Mass	0.0681137 lbmass
Area	15.8057 in^2
Volume	1.47295 in^3
Center of Gravity	x=0.00225208 in y=0.559541 in z=0 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	Yes

Material(s)

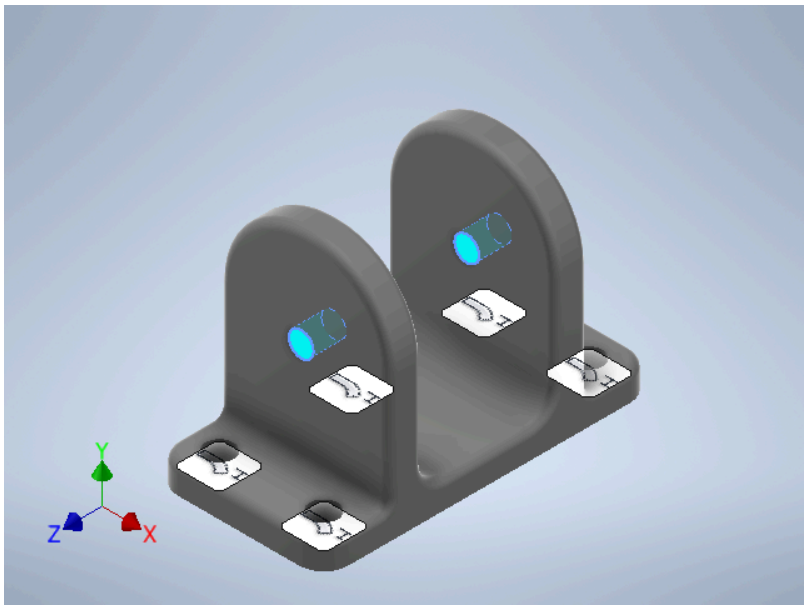
Name	Thermoplastic Resin	
General	Mass Density	0.0462429 lbmass/in^3
	Yield Strength	8296.16 psi
	Ultimate Tensile Strength	16534.3 psi
Stress	Young's Modulus	478.625 ksi
	Poisson's Ratio	0.36 ul
	Shear Modulus	175.965 ksi
Part Name(s)	X Axis Idler Pulley Bracket.ipt	

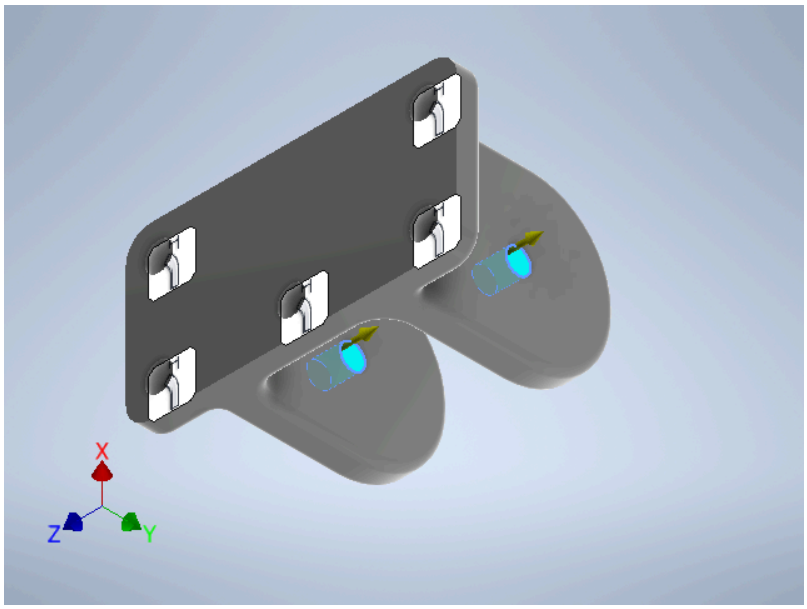
Operating conditions

Bearing Load:1

Load Type	Bearing Load
Magnitude	30.000 lbforce
Vector X	30.000 lbforce
Vector Y	0.000 lbforce
Vector Z	-0.000 lbforce

Selected Face(s)

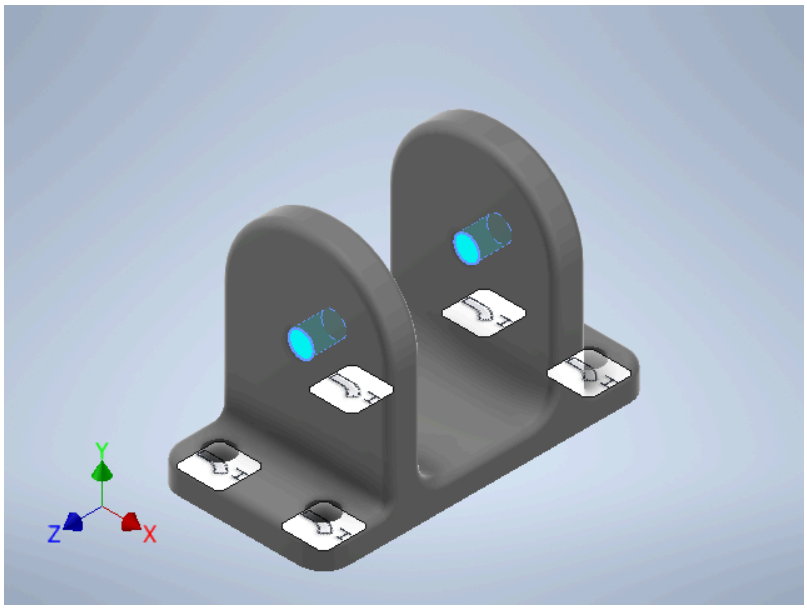


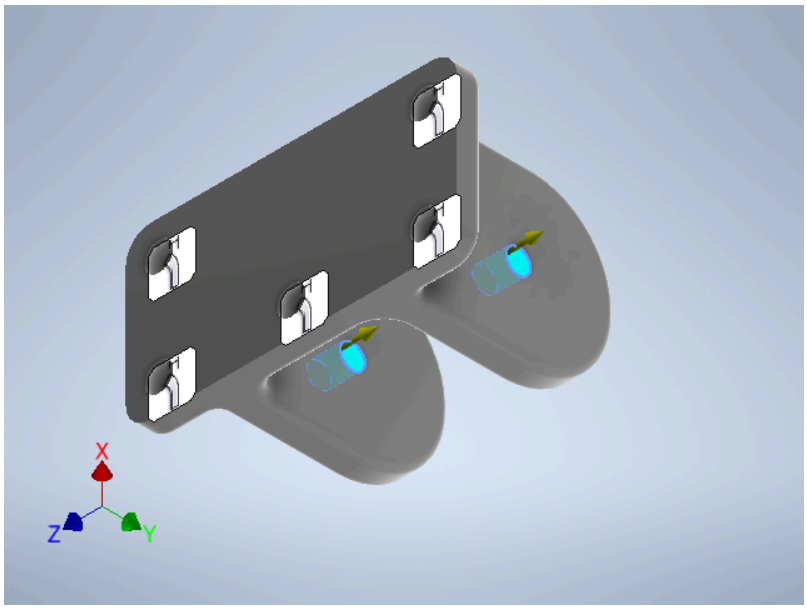


Bearing Load:2

Load Type	Bearing Load
Magnitude	10.000 lbforce
Vector X	-0.000 lbforce
Vector Y	0.000 lbforce
Vector Z	-10.000 lbforce

Selected Face(s)

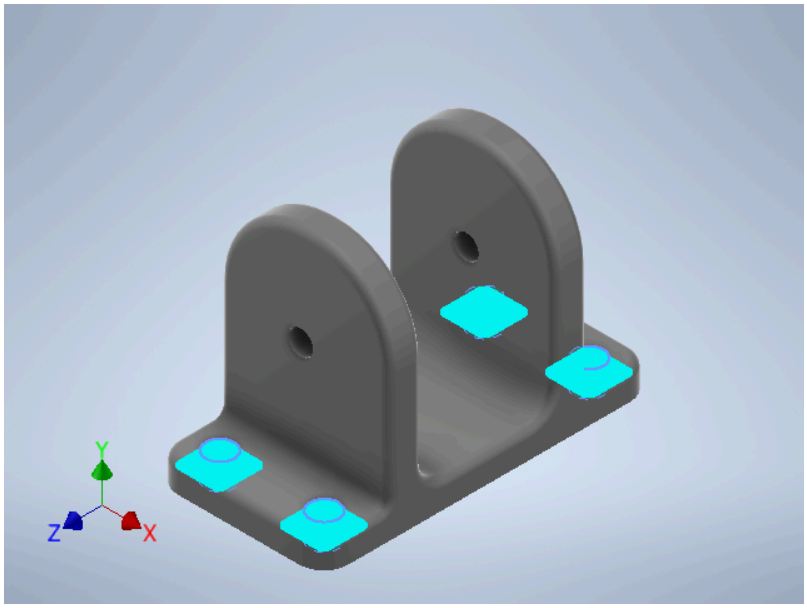


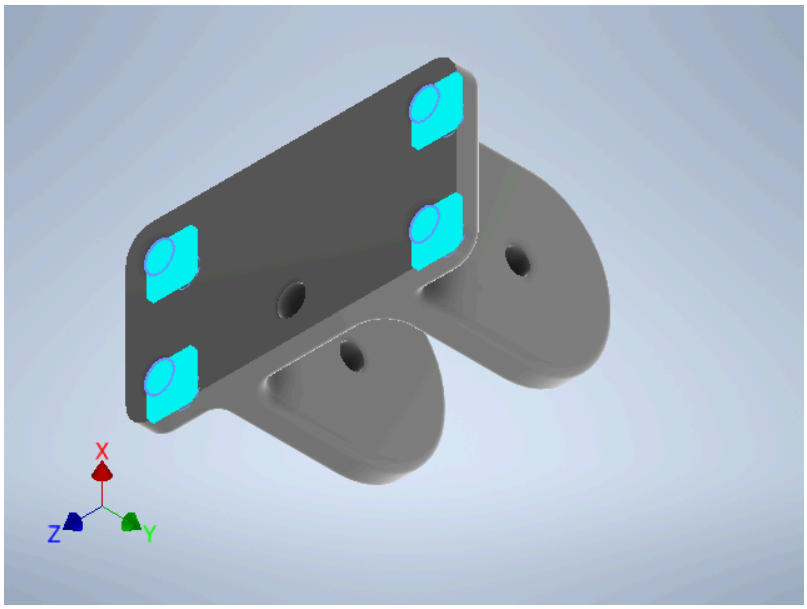


Fixed Constraint:1

Constraint Type	Fixed Constraint

Selected Face(s)

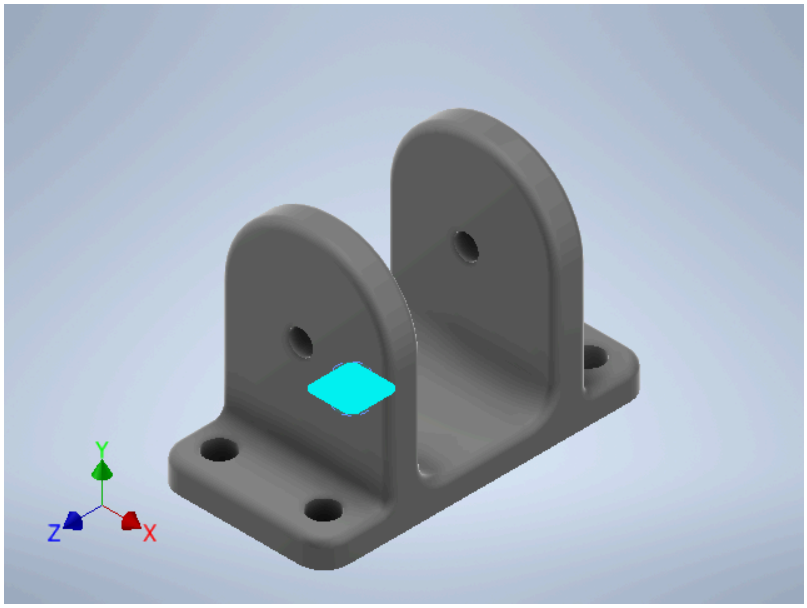


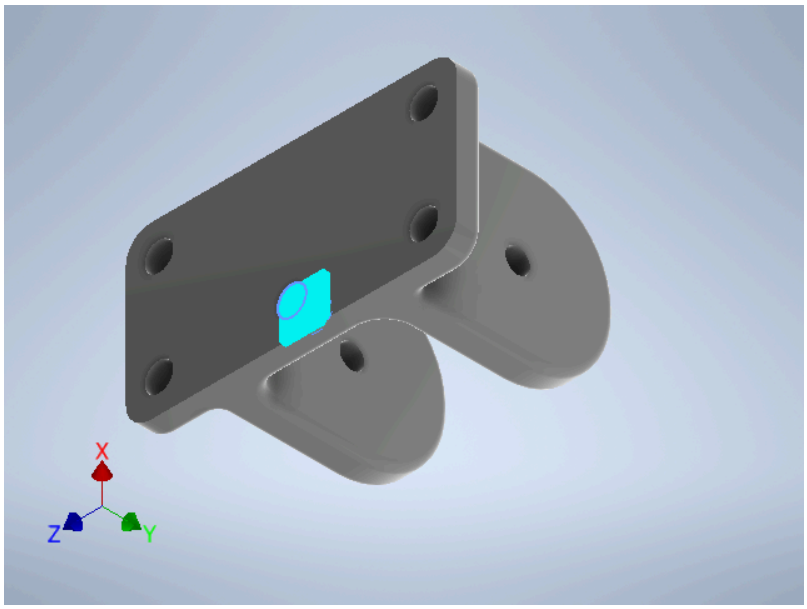


Fixed Constraint:2

Constraint Type	Fixed Constraint

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	25.7128 lbforce	-24.3591 lbforce	2.01835 lbforce ft	0.817466 lbforce ft
		4.36516 lbforce		-0.0745834 lbforce ft
		6.98045 lbforce		1.84389 lbforce ft
Fixed Constraint:2	7.74894 lbforce	-5.64544 lbforce	0.188123 lbforce ft	-0.102571 lbforce ft
		-4.36576 lbforce		0.000716951 lbforce ft
		3.01915 lbforce		0.157699 lbforce ft

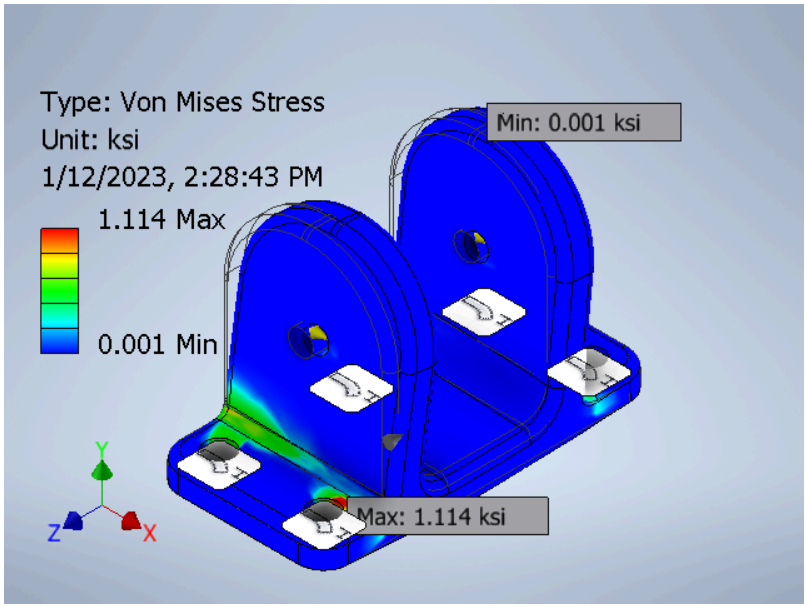
Result Summary

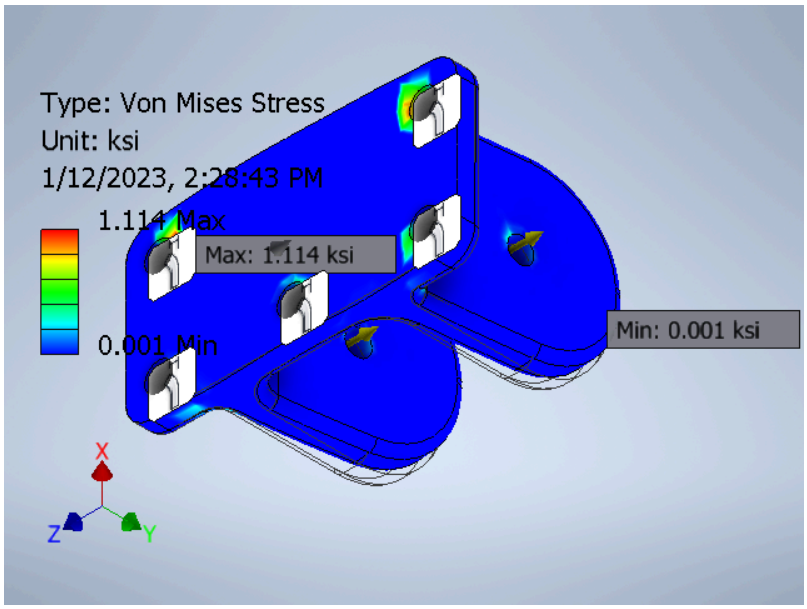
Name	Minimum	Maximum
Volume	1.47295 in^3	
Mass	0.0681137 lbmass	
Von Mises Stress	0.00112457 ksi	1.11412 ksi
1st Principal Stress	-0.317351 ksi	1.47899 ksi
3rd Principal Stress	-1.47774 ksi	0.346777 ksi
Displacement	0 in	0.00415357 in
Safety Factor	7.4464 ul	15 ul
Stress XX	-0.700916 ksi	0.814397 ksi
Stress XY	-0.216121 ksi	0.262723 ksi
Stress XZ	-0.350873 ksi	0.32899 ksi
Stress YY	-0.808461 ksi	0.839825 ksi
Stress YZ	-0.46166 ksi	0.298973 ksi
Stress ZZ	-1.36659 ksi	1.22621 ksi
X Displacement	-0.00011867 in	0.00205821 in
Y Displacement	-0.00124654 in	0.000825631 in
Z Displacement	-0.00361628 in	0.000209962 in
Equivalent Strain	0.00000216601 ul	0.00215349 ul
1st Principal Strain	0.00000183409 ul	0.00241818 ul
3rd Principal Strain	-0.0023836 ul	-0.00000144515 ul

Strain XX	-0.000862189 ul	0.000961062 ul
Strain XY	-0.000614103 ul	0.00074652 ul
Strain XZ	-0.000996997 ul	0.000934817 ul
Strain YY	-0.00154075 ul	0.00159918 ul
Strain YZ	-0.0013118 ul	0.000849525 ul
Strain ZZ	-0.00206778 ul	0.00194759 ul

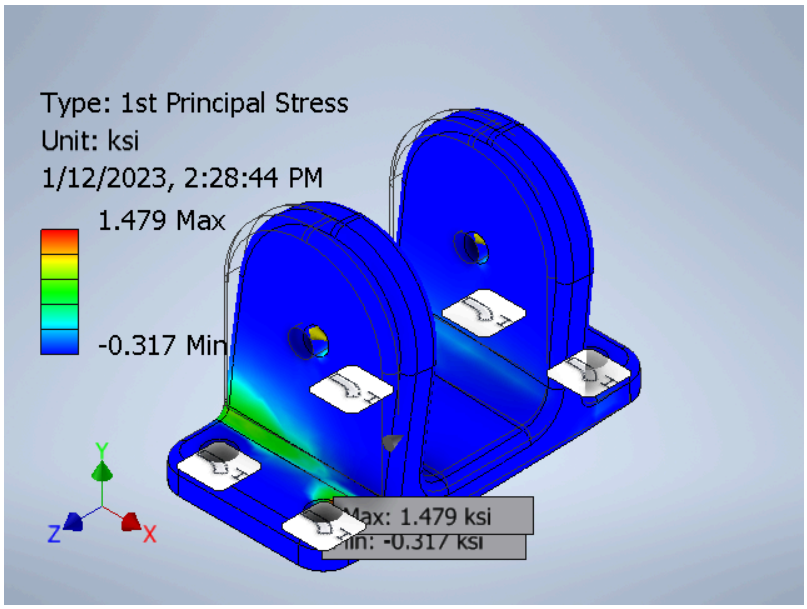
Figures

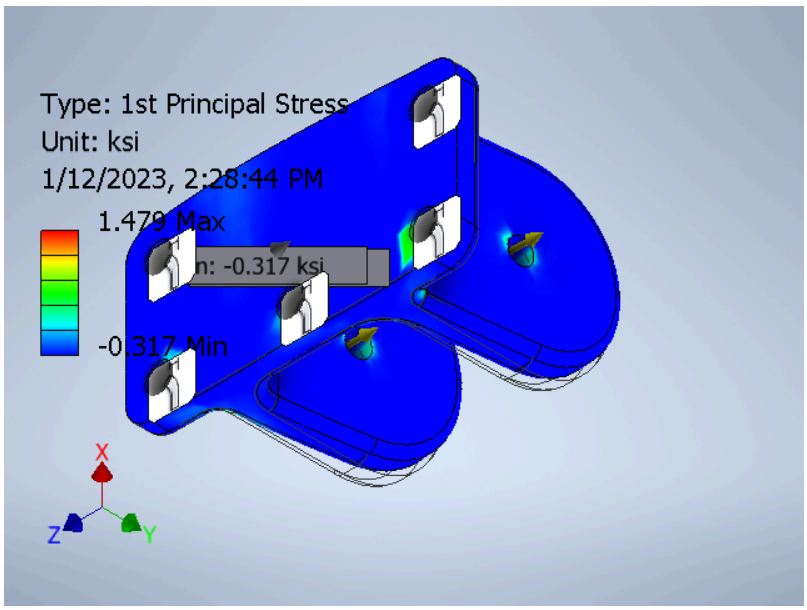
Von Mises Stress



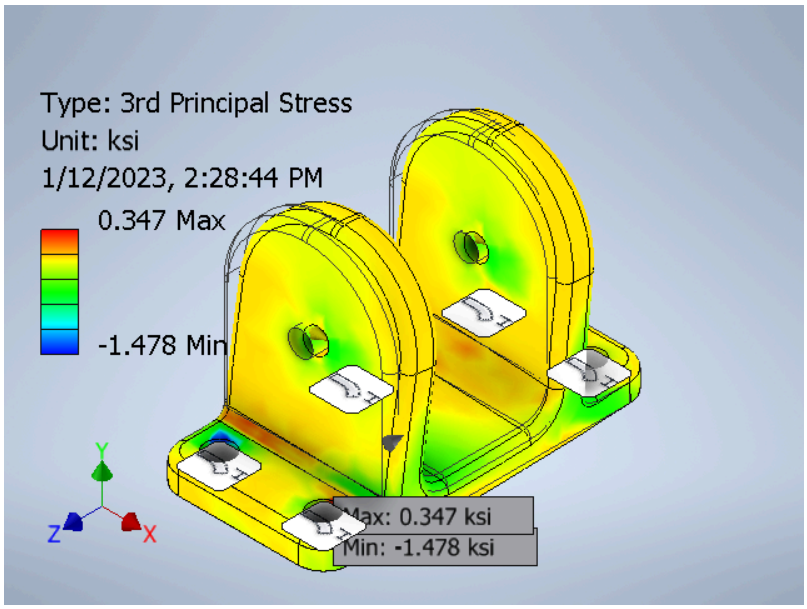


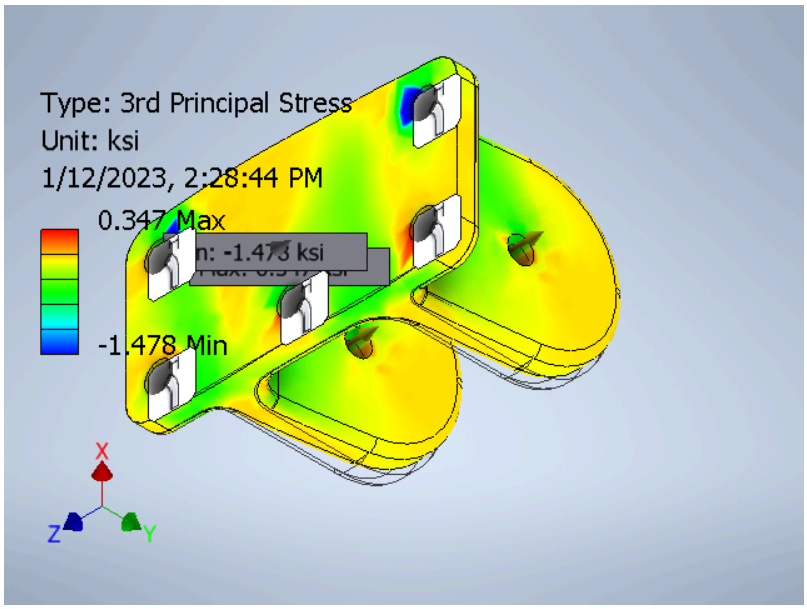
1st Principal Stress



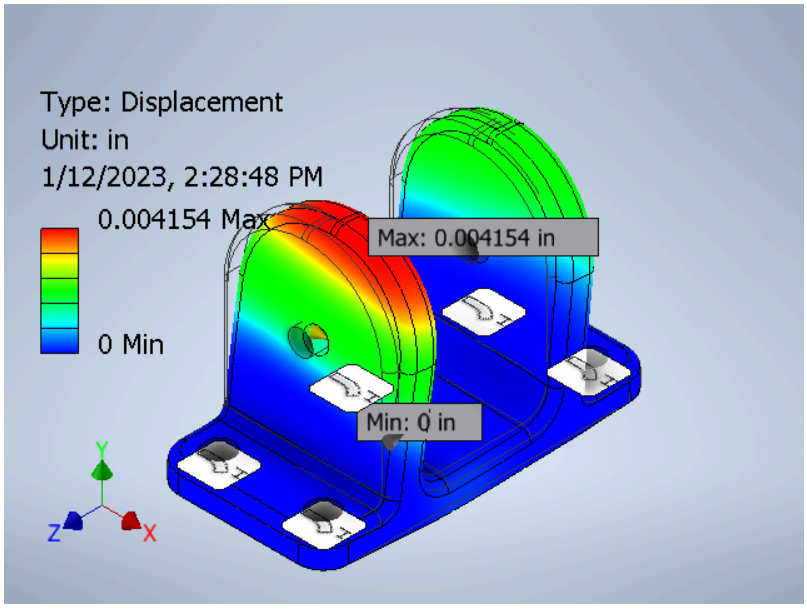


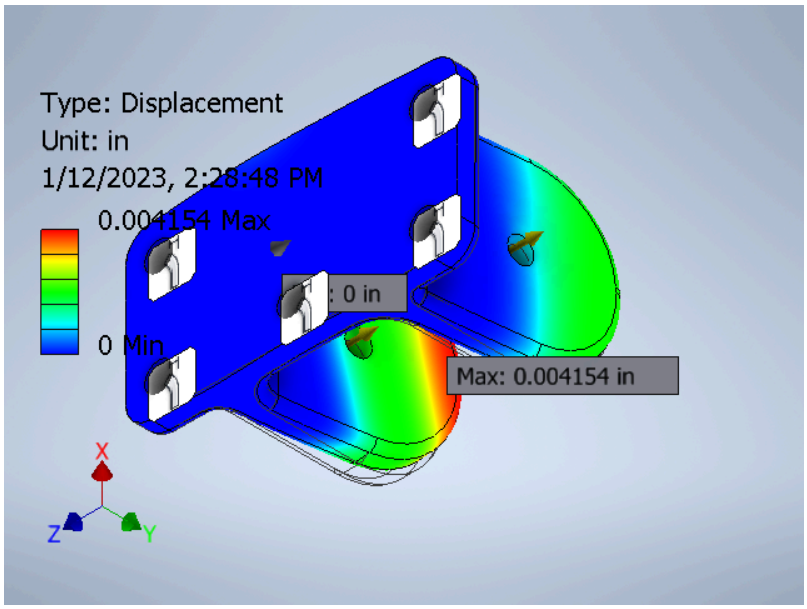
3rd Principal Stress



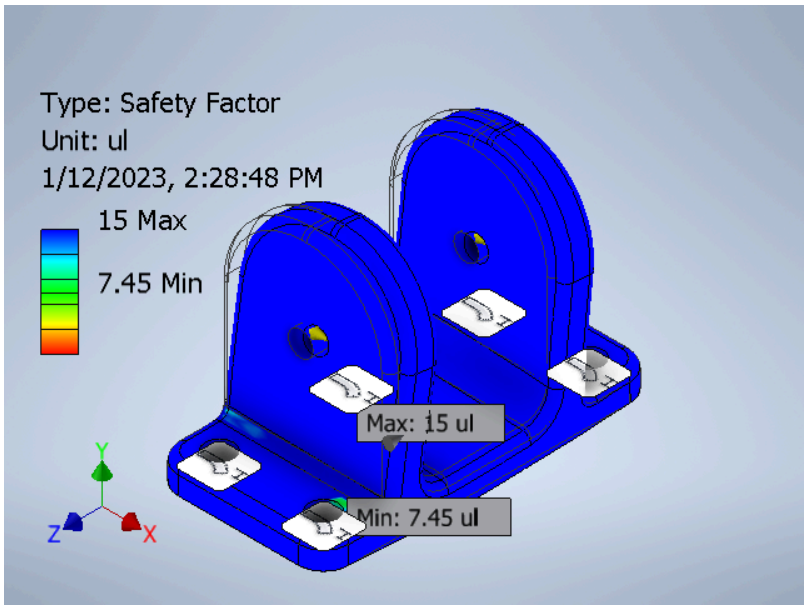


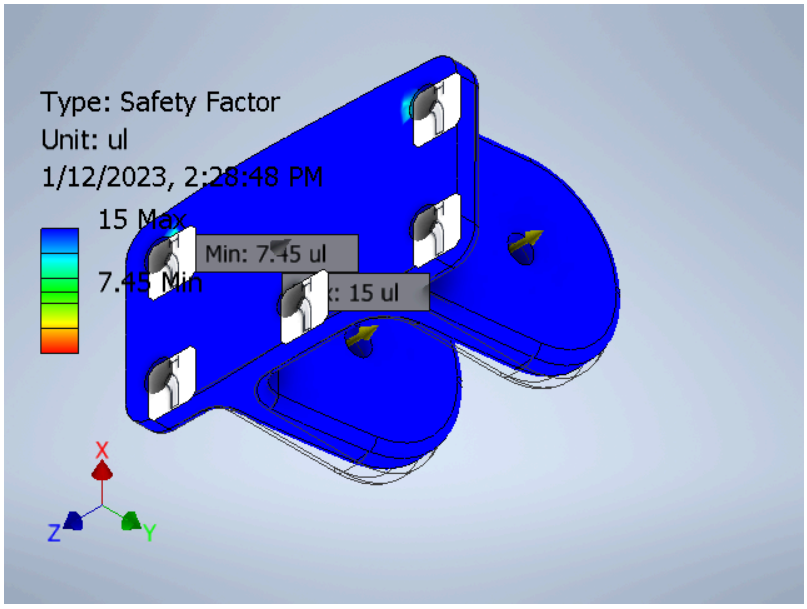
Displacement



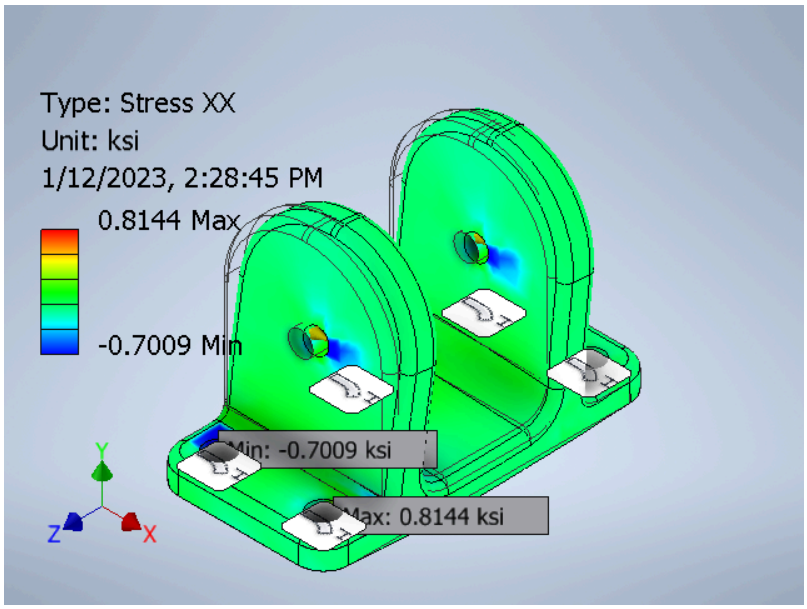


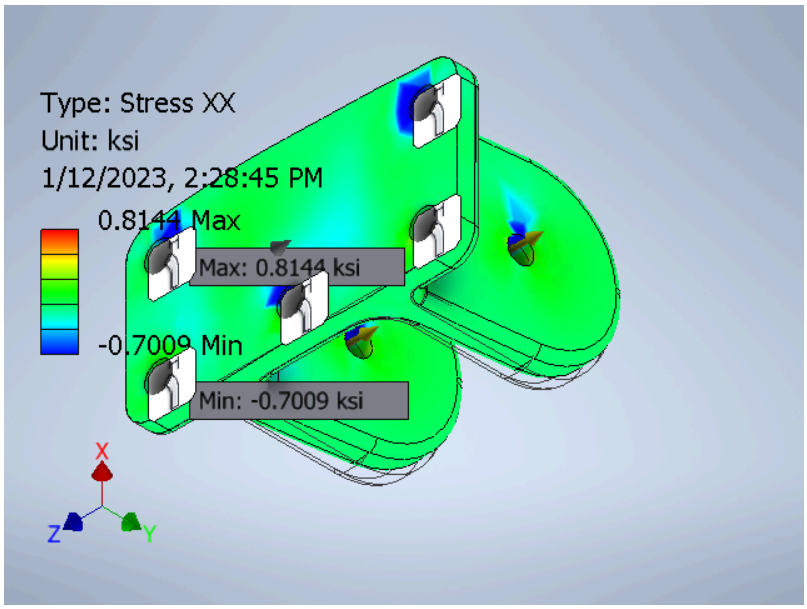
Safety Factor





Stress XX

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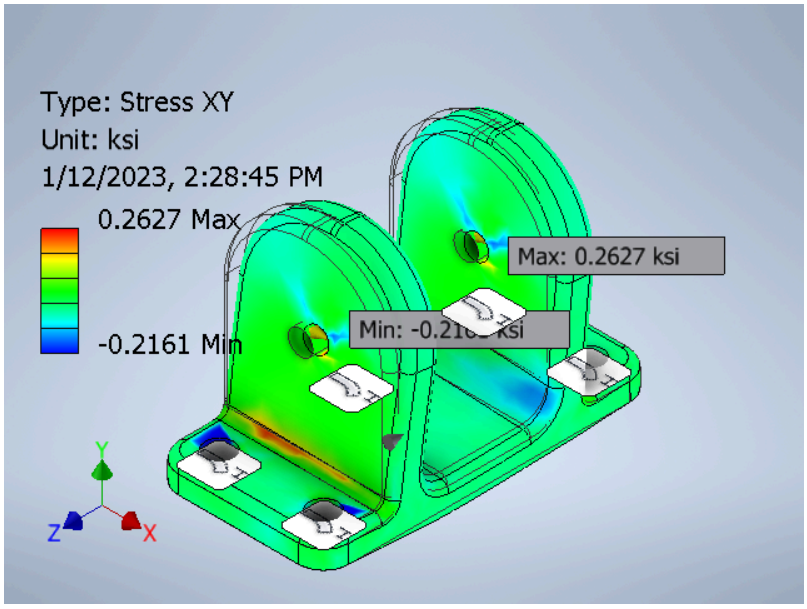
-0.7009 Min
Min: -0.7009 ksi
X
Z
Y

Stress XY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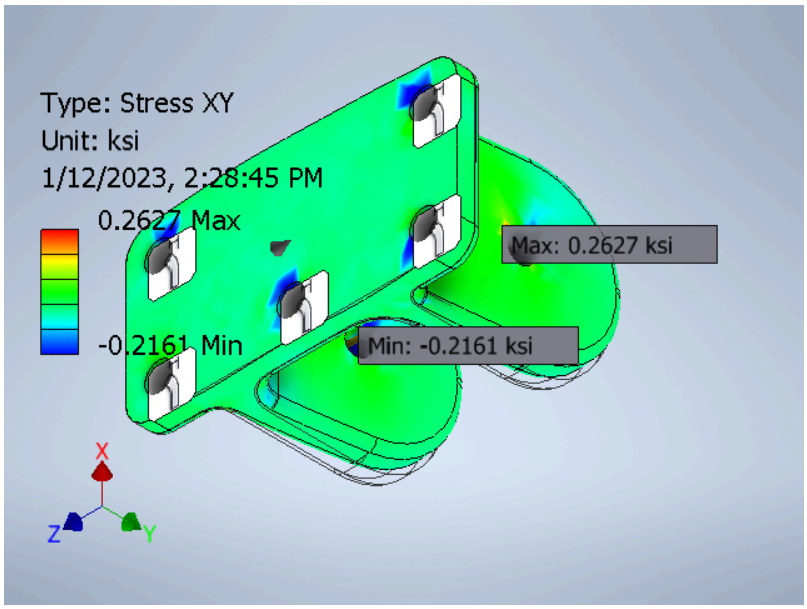
-0.2161 Min
Y
Z
X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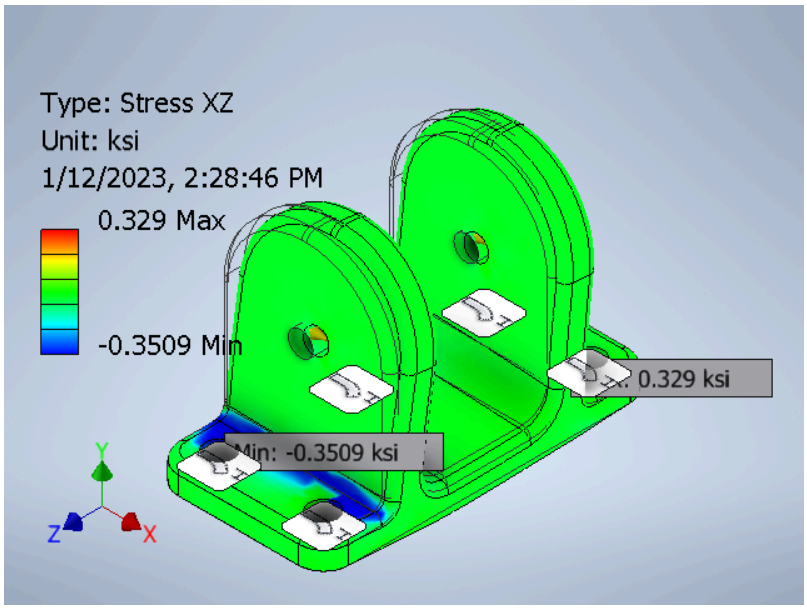
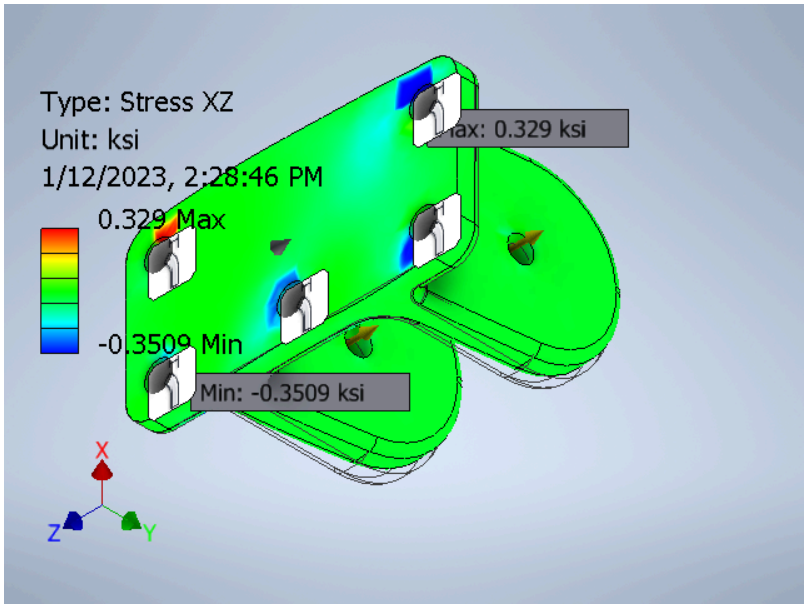
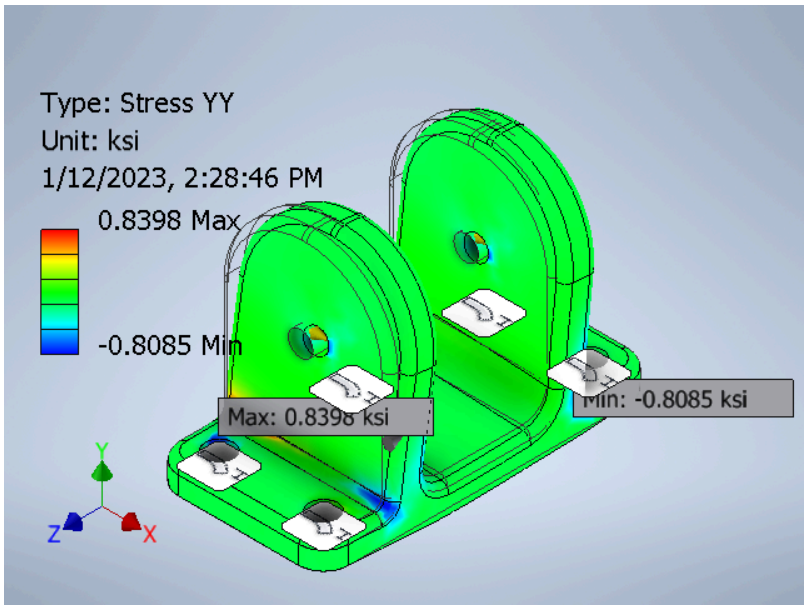
-0.2161 Min
Min: -0.2161 ksi
X
Z
Y

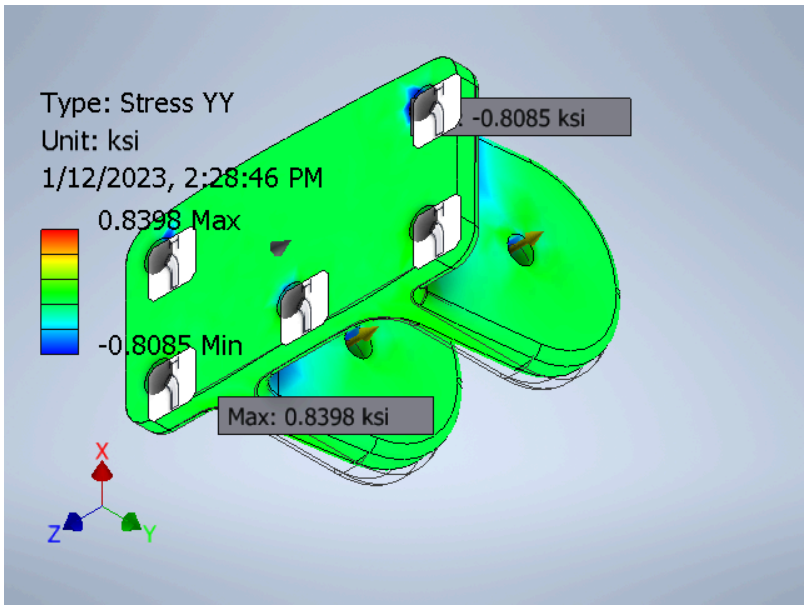
Stress XZ





Stress YY

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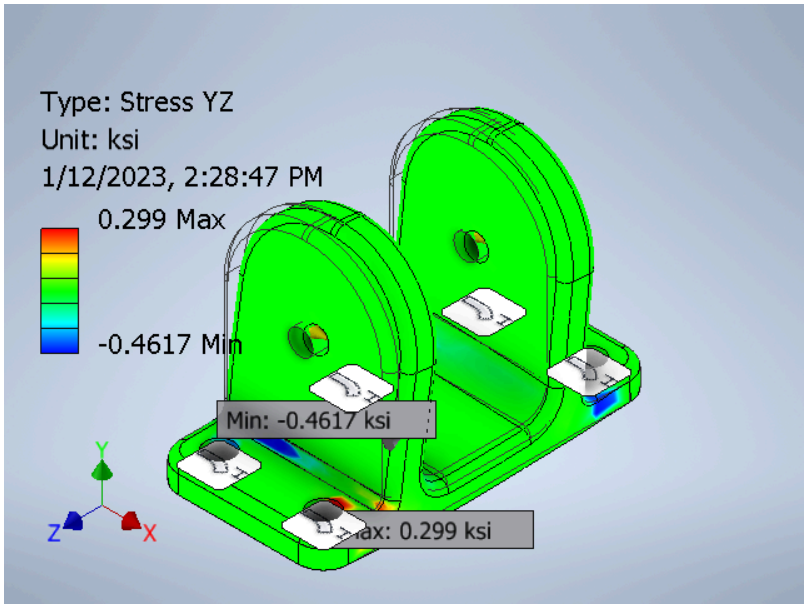
-0.8085 ksi
Max: 0.8398 ksi
X
Z
Y

Stress YZ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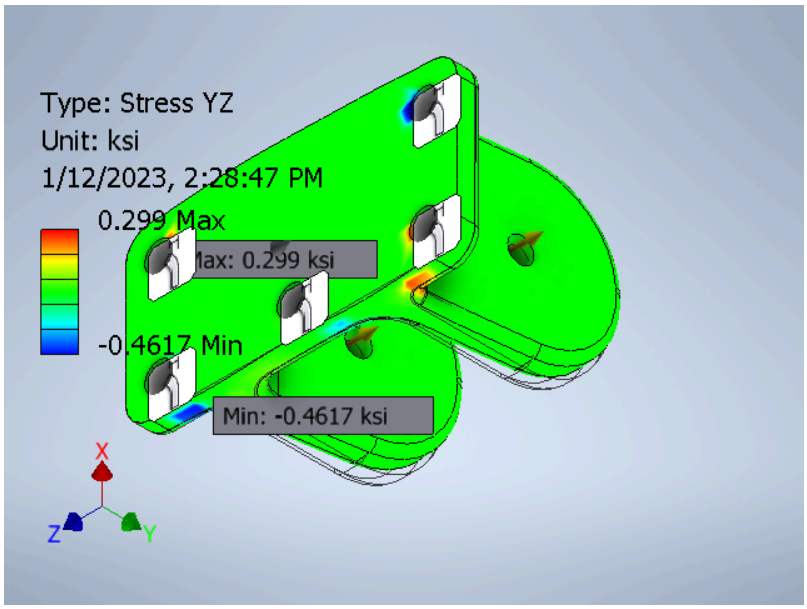
Y
Z
X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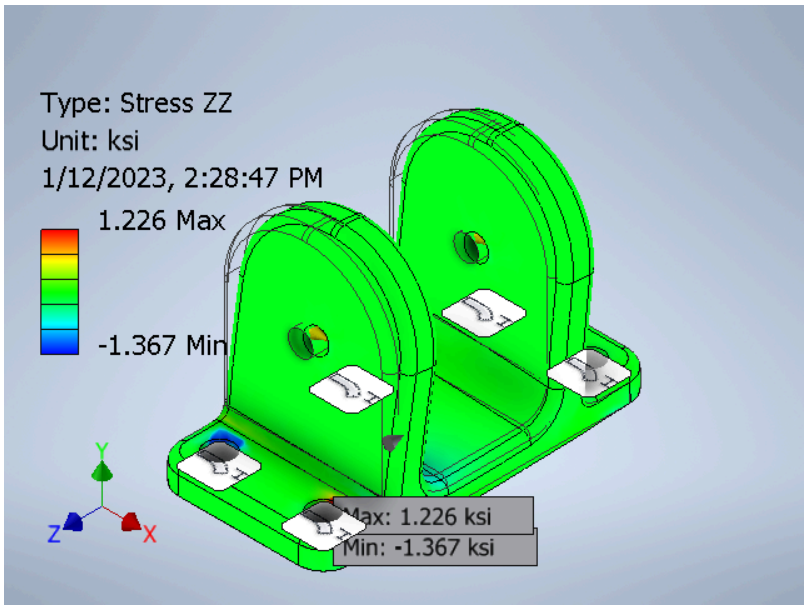
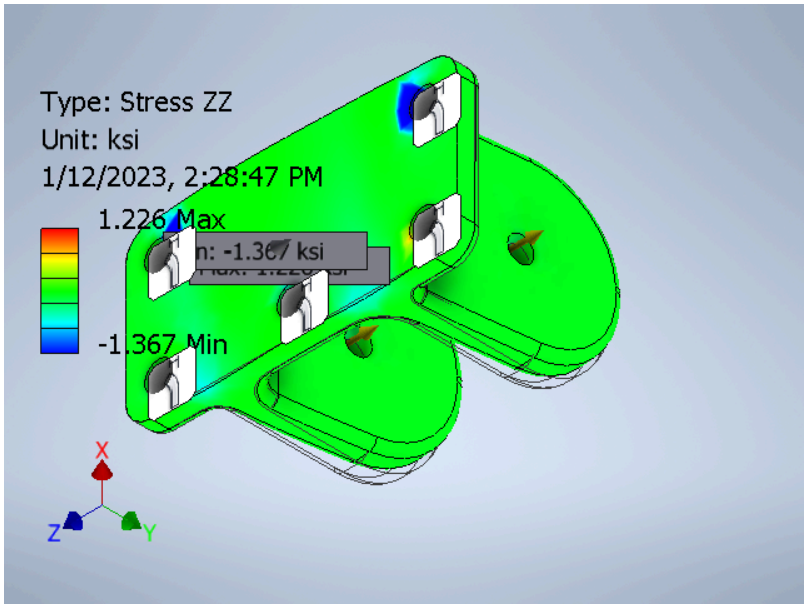
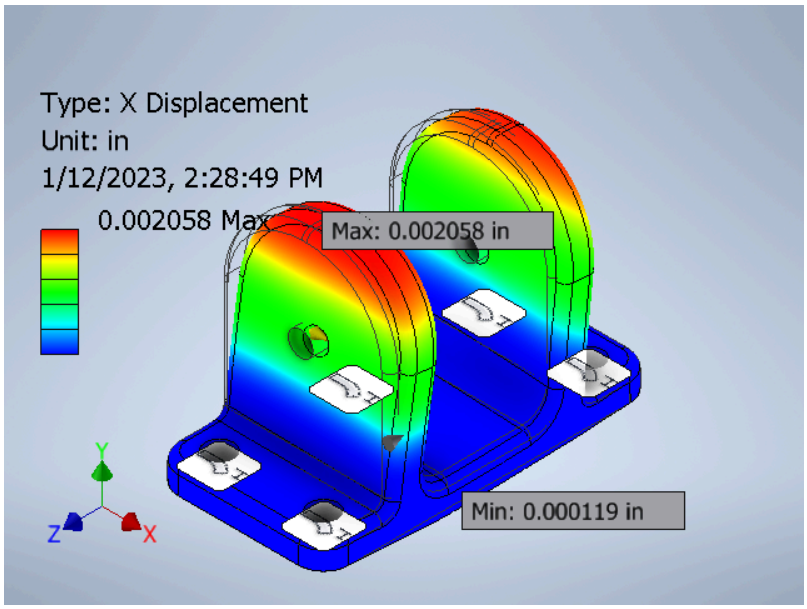
X
Z
Y

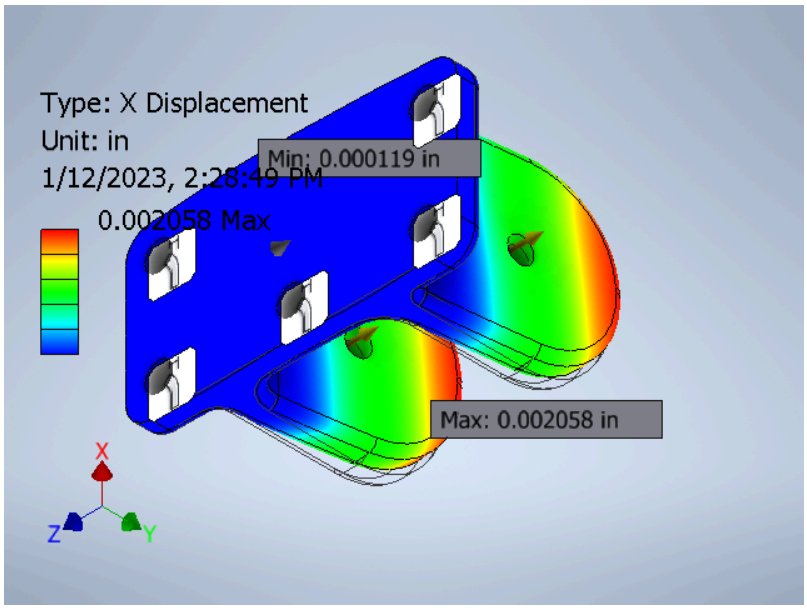
Stress ZZ



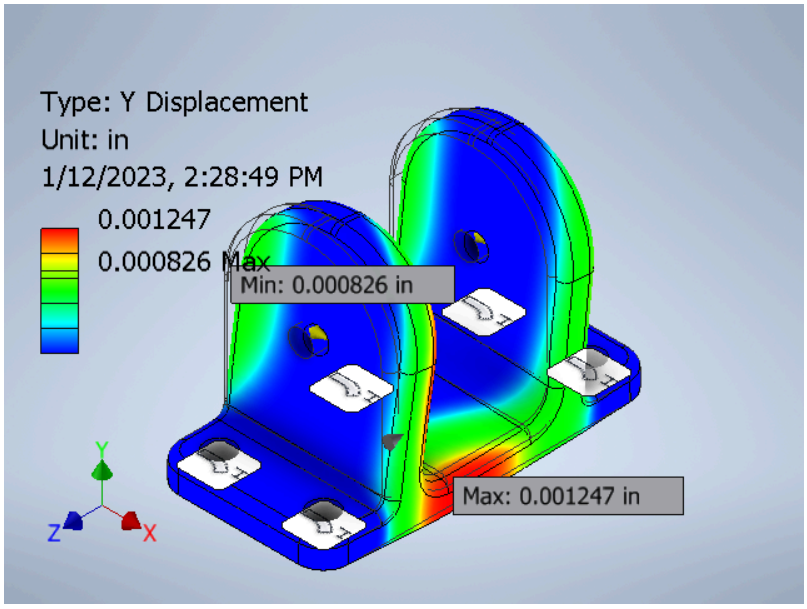


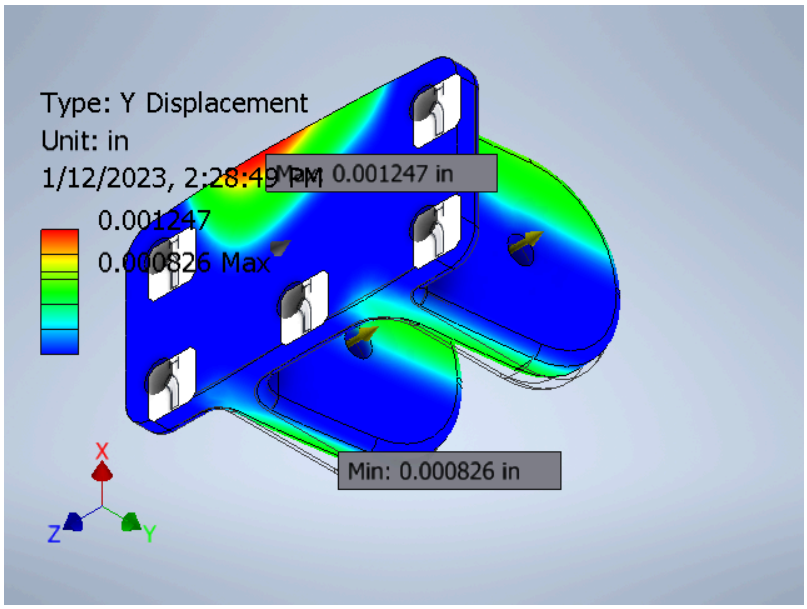
X Displacement



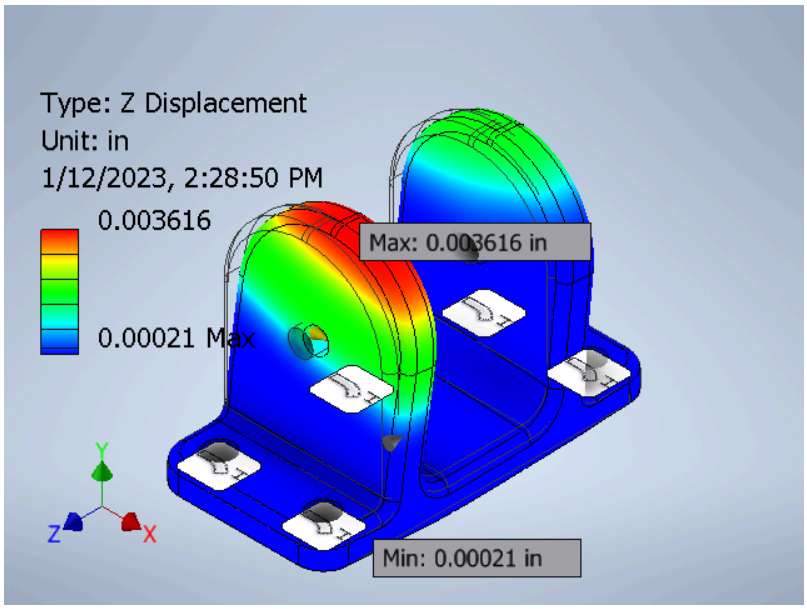


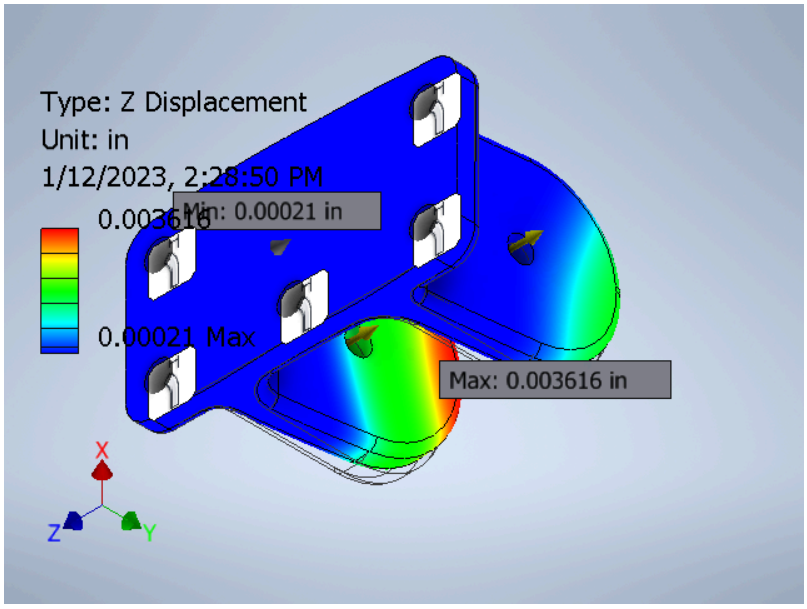
Y Displacement



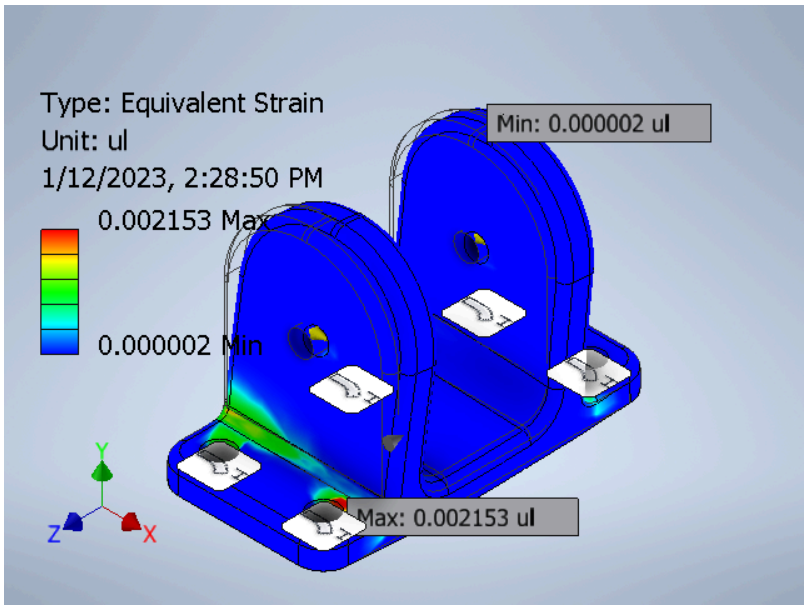


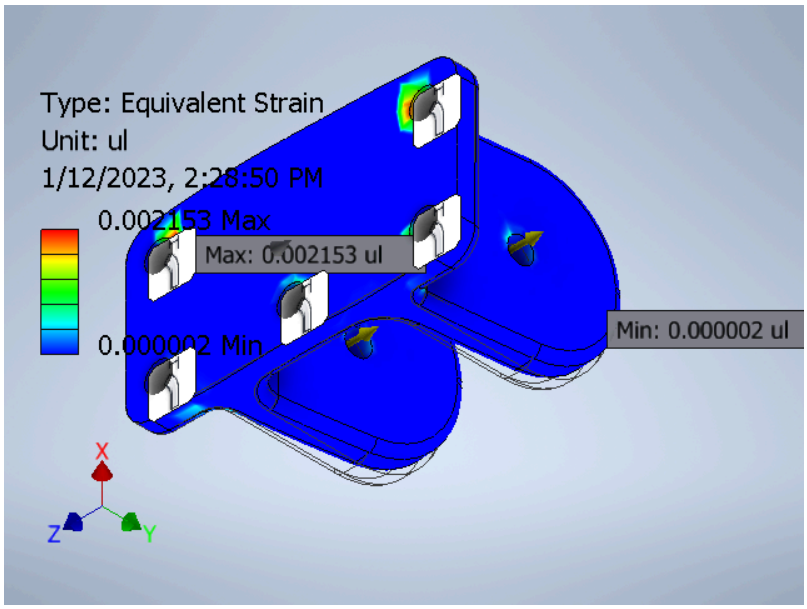
Z Displacement



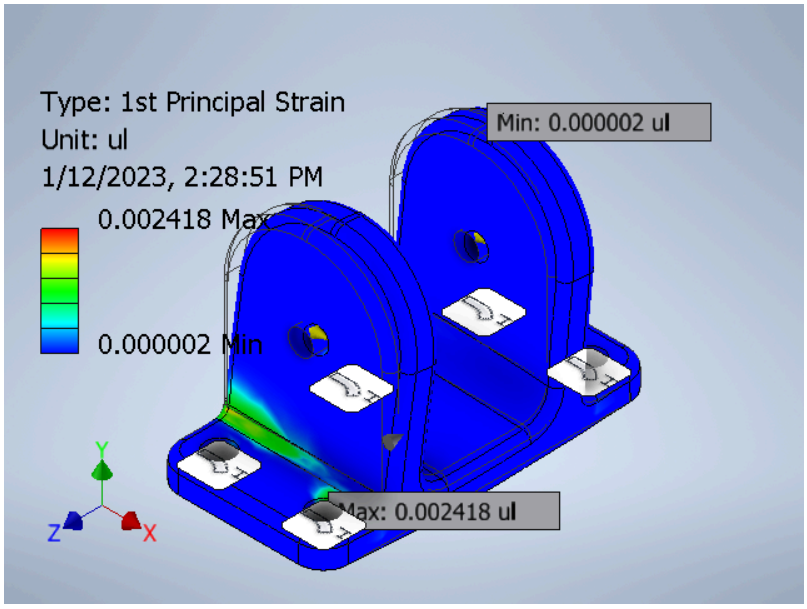


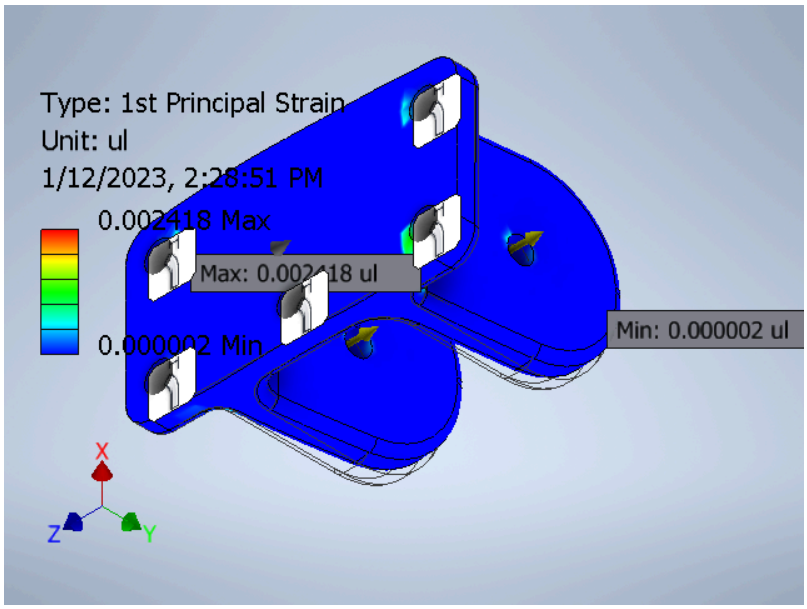
Equivalent Strain



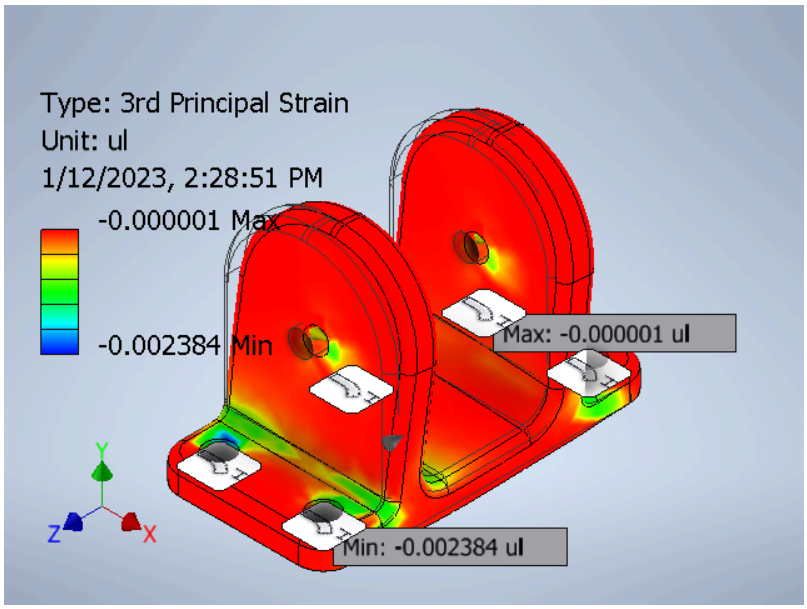


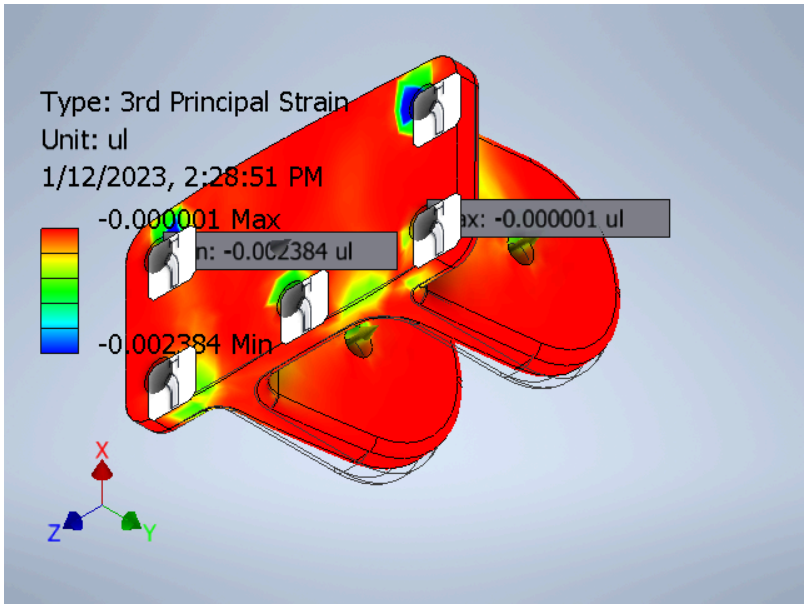
1st Principal Strain



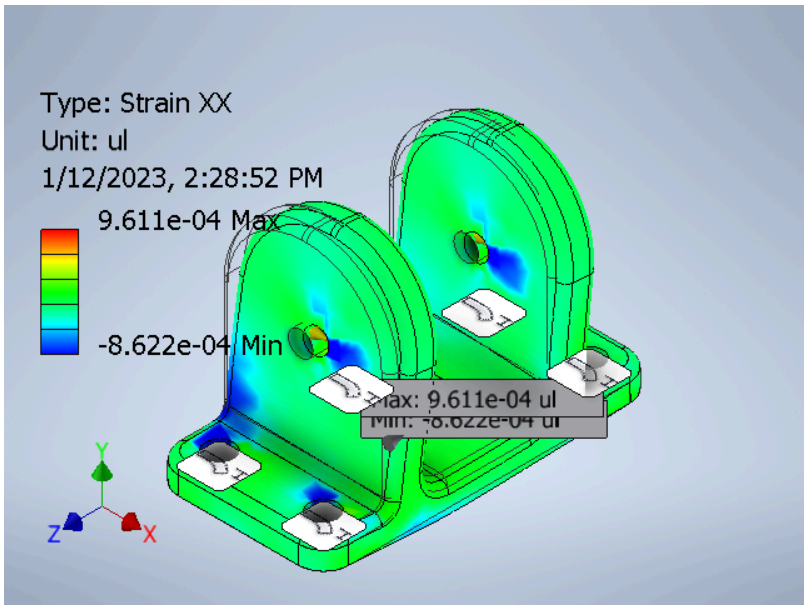


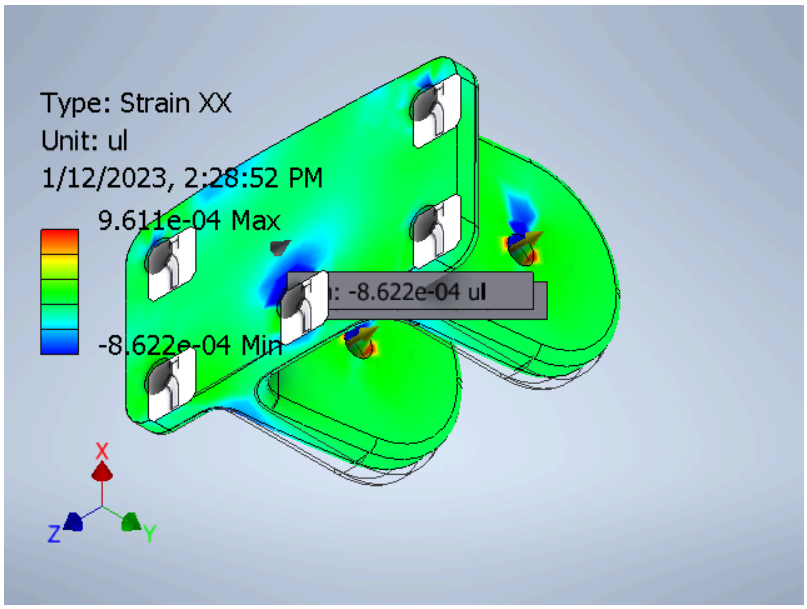
3rd Principal Strain





Strain XX

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1/12/2023, 2:28:52 PM
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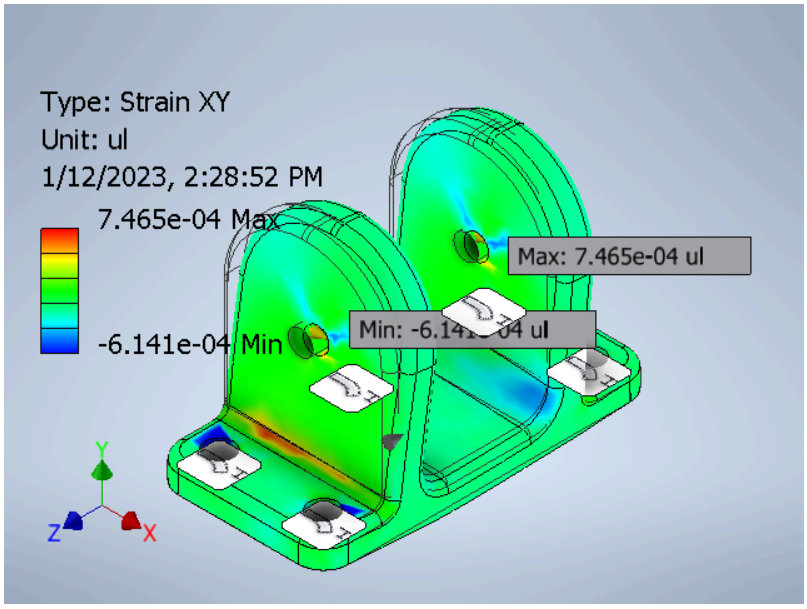
-8.622e-04 Min
-8.622e-04 ul
X
Z
Y

Strain XY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1/12/2023, 2:28:52 PM
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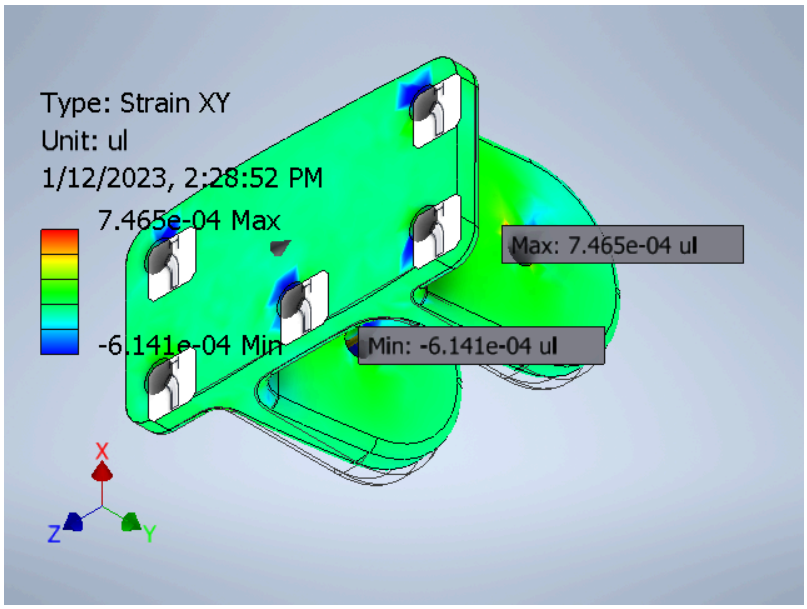
-6.141e-04 Min
Max: 7.465e-04 ul
Y
Z
X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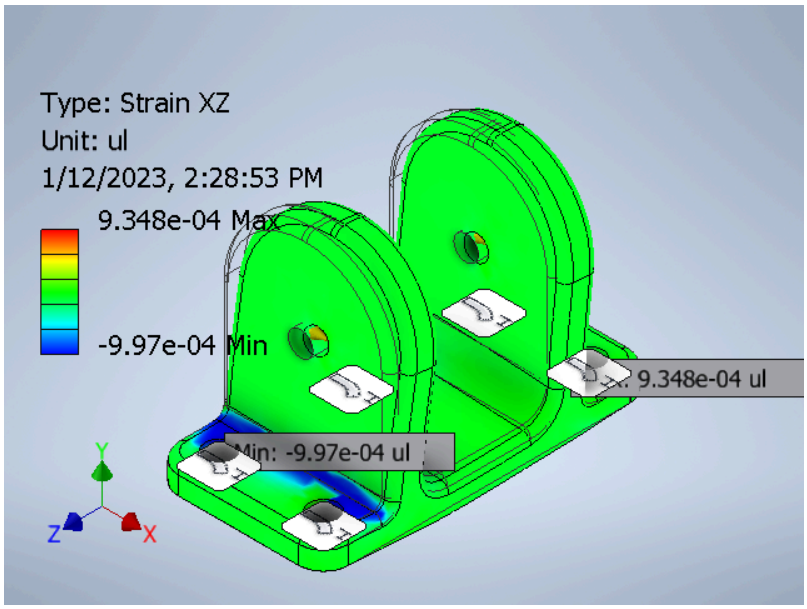
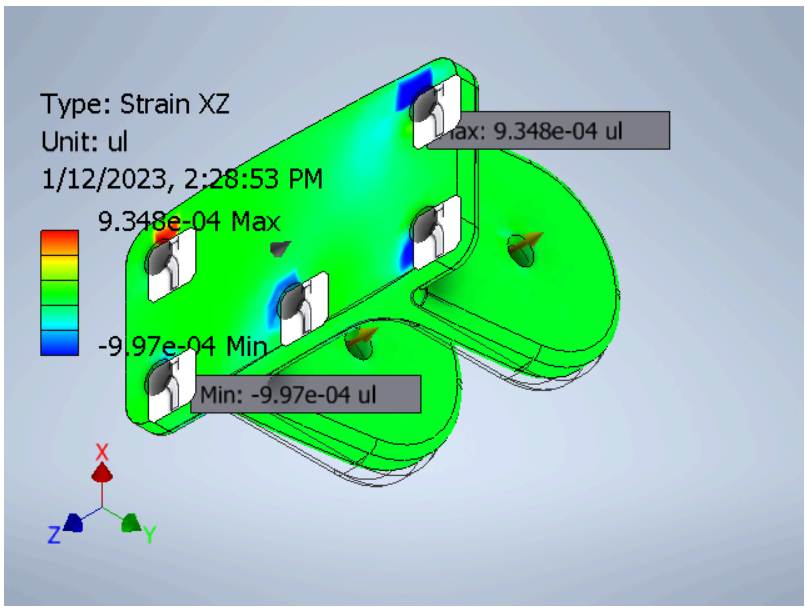
1/12/2023, 2:28:52 PM
7.465e-04 Max
-6.141e-04 Min
Max: 7.465e-04 ul
Min: -6.141e-04 ul
X
Z
Y

Strain XZ





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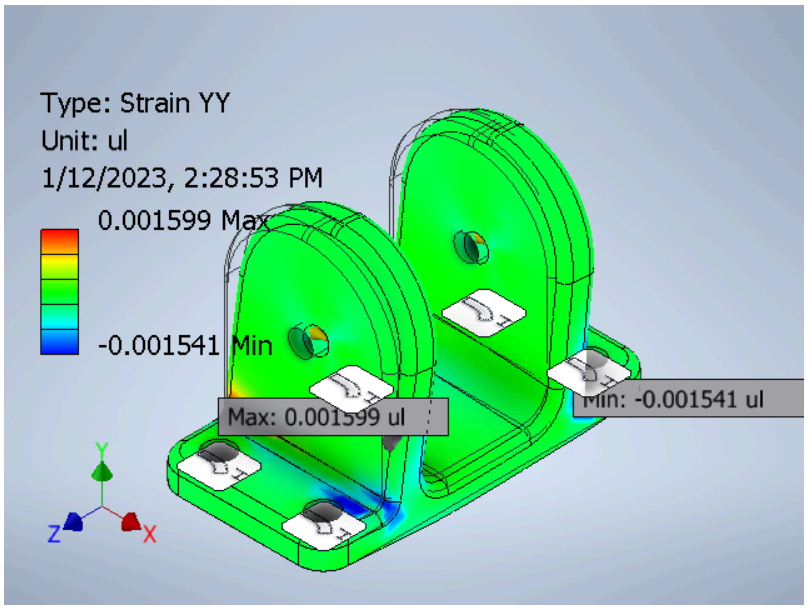

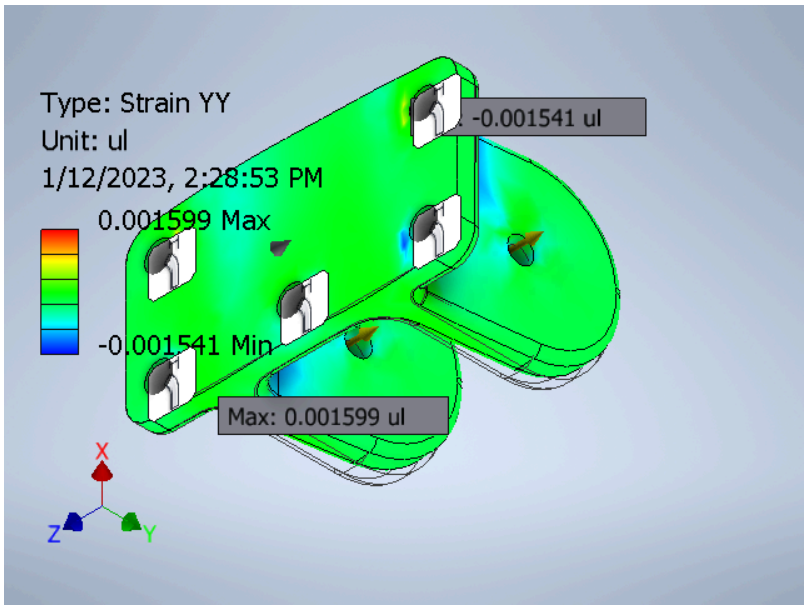
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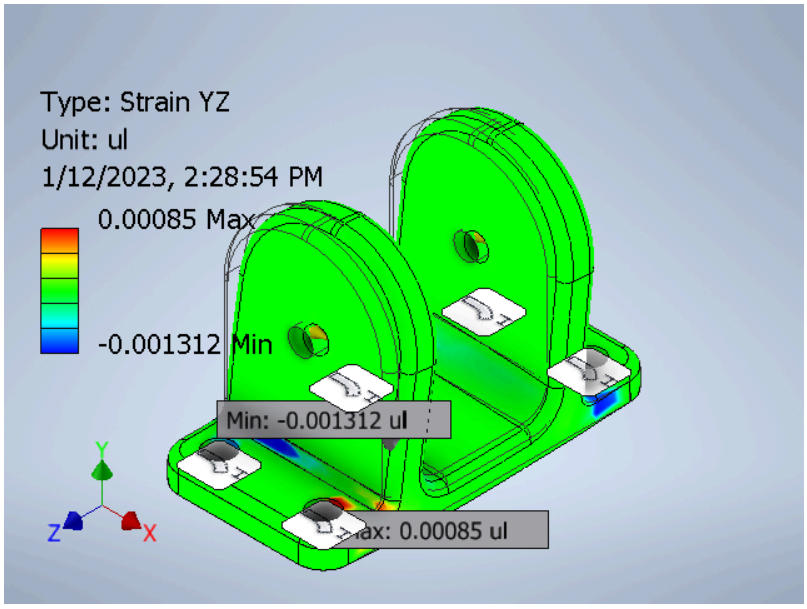
Z
Y

Strain YZ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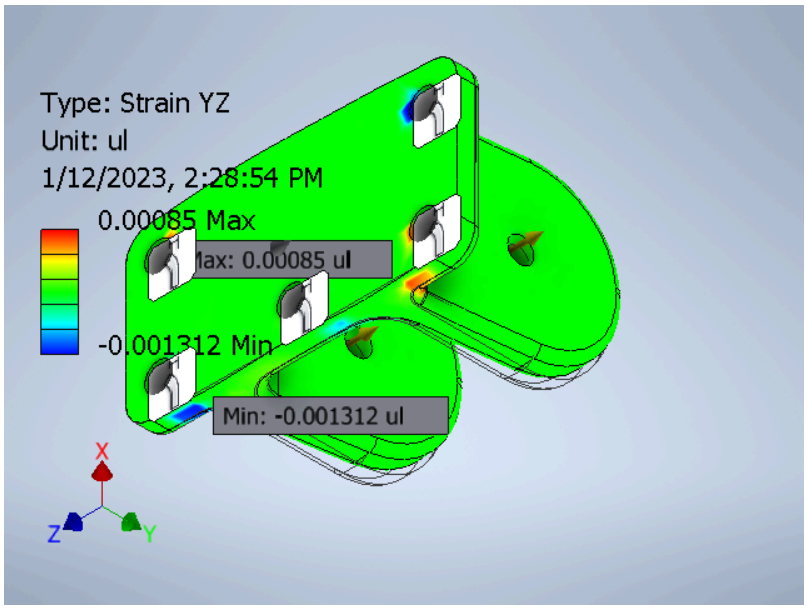
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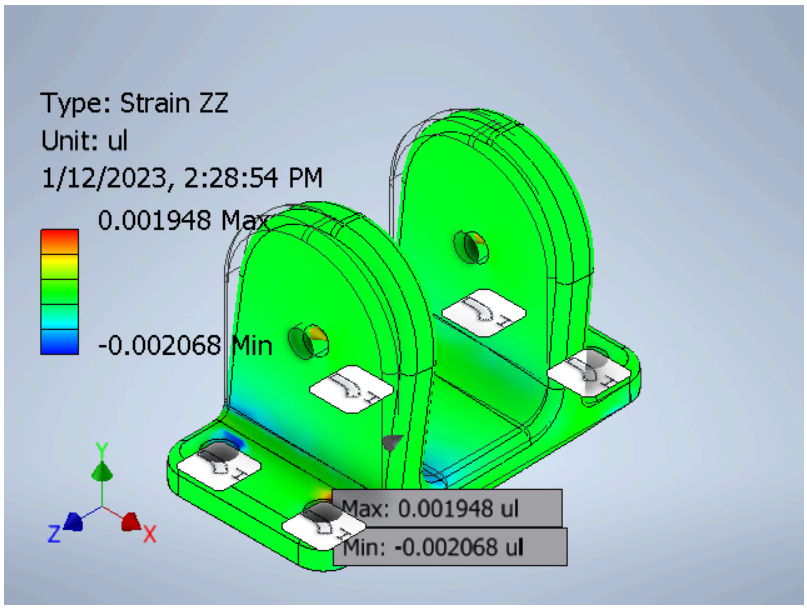
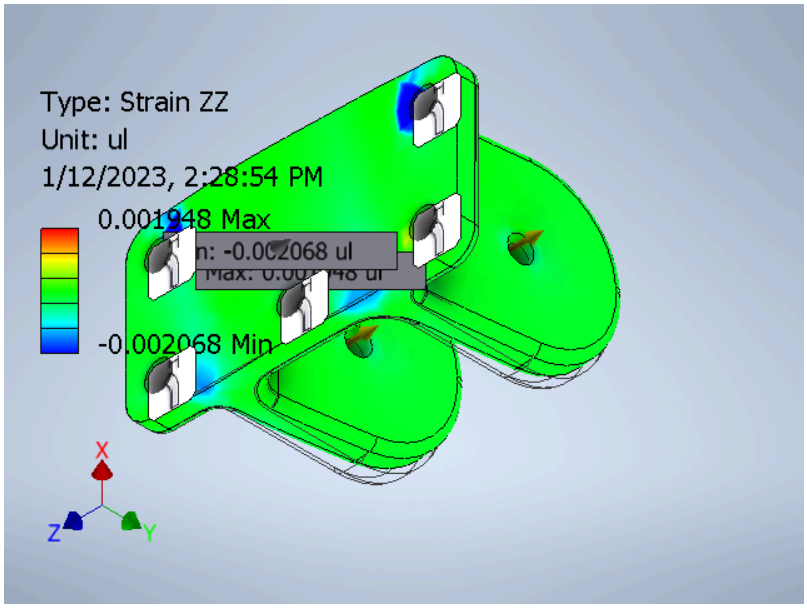
Strain ZZ





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