Stress Analysis Report

Analyzed File:	PE-SANIFOS-280-TANK-V2.ipt
Autodesk Inventor Version:	2012 (Build 160160000, 160)
Creation Date:	24/08/2021, 2:20 PM
Simulation Author:	PE
Summary:	

Project Info (iProperties)

Summary

Title	SANIFOS 280
Subject	FEA TESTING TO AS/NZS 1546.1:2008
Author	PE
Manager	Daryl Perusic
Company	Perusic Engineering

Project

Part Number	PE-SANIFOS-280-TANK-V2
Designer	PE
Cost	$0.00
Date Created	24/07/2021

Status

Design Status	WorkInProgress

Physical

Material	LLDPE Linear Low Density Polyethylene
Density	0.936 g/cm^3
Mass	6.69195 kg
Area	2844900 mm^2
Volume	7149520 mm^3
Center of Gravity	x=187.712 mm y=7.80388 mm z=525.708 mm

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

⊟ Simulation: LATERAL LOADS AS/NZS 1546.1:2008 APPENDIX H

General objective and settings:

Design Objective	Single Point
Simulation Type	Static Analysis
Last Modification Date	24/08/2021, 11:09 AM
Detect and Eliminate Rigid Body Modes	No

Advanced settings:

Avg. Element Size (fraction of model diameter)	0.2
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)

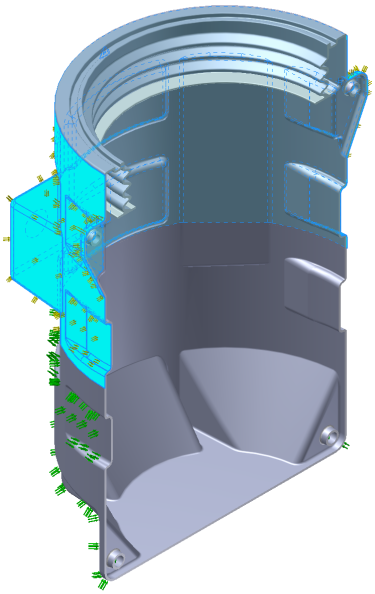
Name	LLDPE Linear Low Density Polyethylene	
General	Mass Density	0.936 g/cm^3
	Yield Strength	20 MPa
	Ultimate Tensile Strength	32 MPa
Stress	Young's Modulus	0.2 GPa
	Poisson's Ratio	0.41 ul
	Shear Modulus	0.070922 GPa
Stress Thermal	Expansion Coefficient	0.00018 ul/c
	Thermal Conductivity	0.225 W/(m K)
	Specific Heat	3182 J/(kg c)
Part Name(s)	PE-SANIFOS-280-TANK-V2.ipt	

⊟ Operating conditions

⊟ Pressure: 0.5m 5.5kPa

Load Type	Pressure
Magnitude	0.798 psi

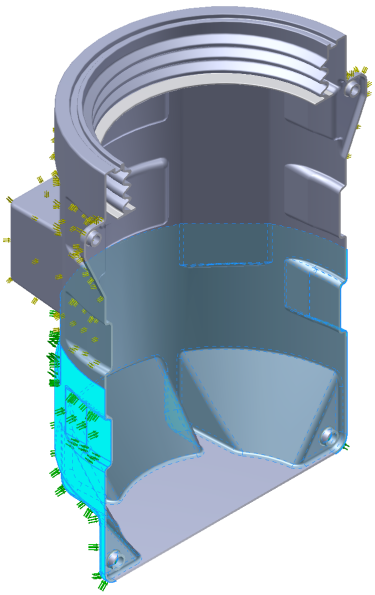
⊟ Selected Face(s)



⊟ Pressure: 1.0m 11.0 kPa

Load Type	Pressure
Magnitude	0.011 MPa

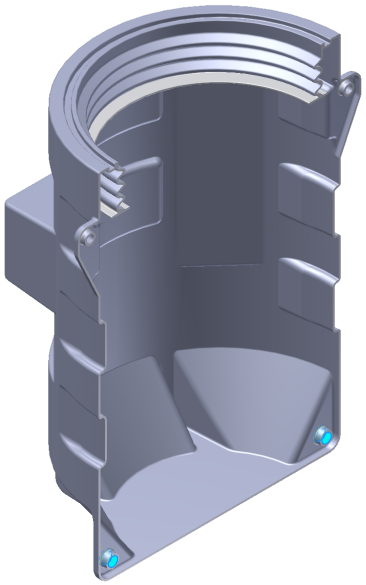
⊟ Selected Face(s)



⊟ Fixed Constraint: PINS

Constraint Type	Fixed Constraint

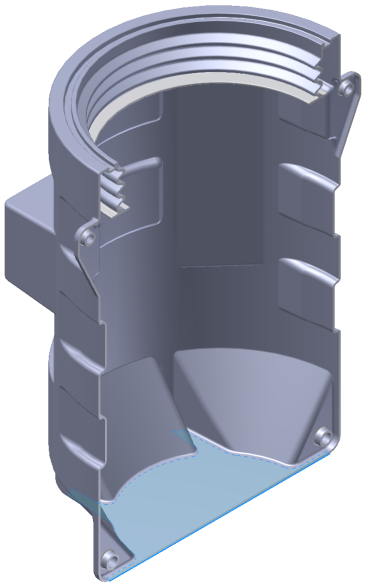
⊟ Selected Face(s)



⊟ Frictionless Constraint: BASE

Constraint Type	Frictionless Constraint

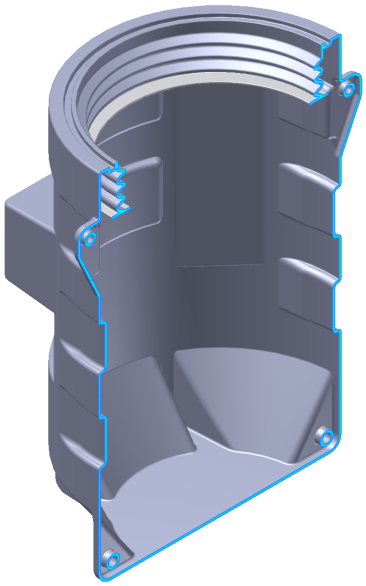
⊟ Selected Face(s)



⊟ Frictionless Constraint: HALF

Constraint Type	Frictionless Constraint

⊟ Selected Face(s)



Results

Reaction Force and Moment on Constraints

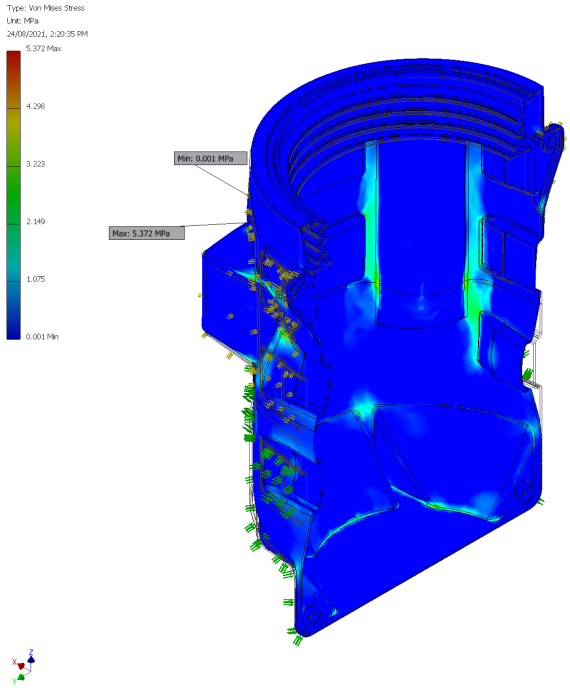
Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint: PINS	546.053 N	39.54 N	12.9251 N m	-12.3959 N m
		0 N		3.66039 N m
		-544.62 N		0 N m
Frictionless Constraint: BASE	456.554 N	66.6652 N	139.582 N m	12.657 N m
		0 N		139.006 N m
		-451.66 N		-0.578706 N m
Frictionless Constraint: HALF	4924.59 N	4924.58 N	303.846 N m	0 N m
		0 N		-303.787 N m
		-5.14395 N		5.96847 N m

Result Summary

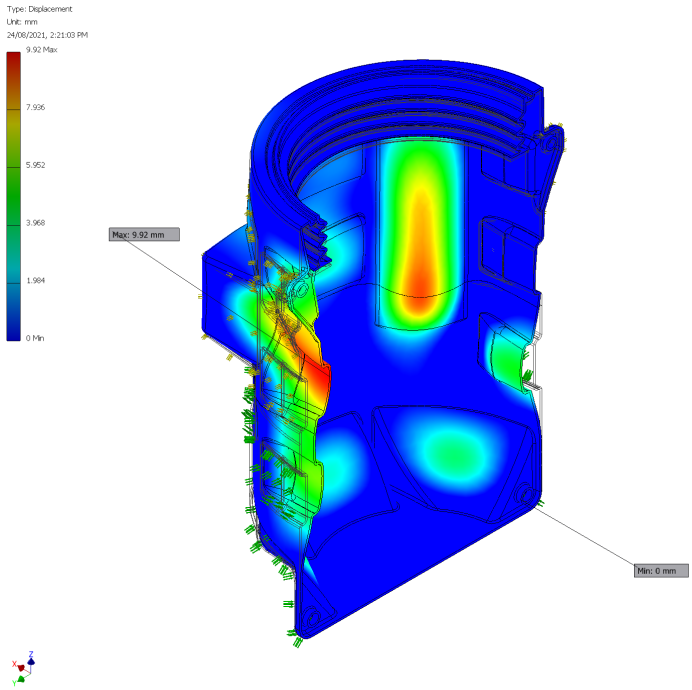
Name	Minimum	Maximum
Volume	7146340 mm^3	
Mass	6.68897 kg	
Von Mises Stress	0.000502801 MPa	5.3718 MPa
Displacement	0 mm	9.92027 mm
Safety Factor	3.72315 ul	15 ul
Equivalent Strain	0.00000239787 ul	0.0256072 ul

Figures

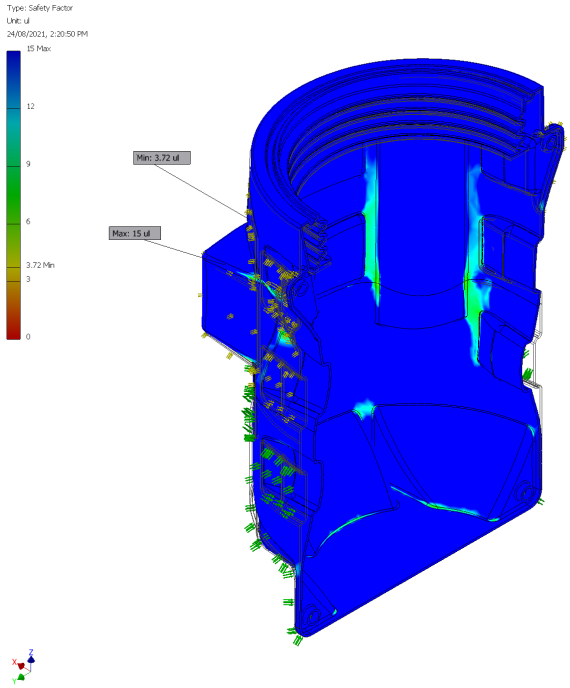
Von Mises Stress



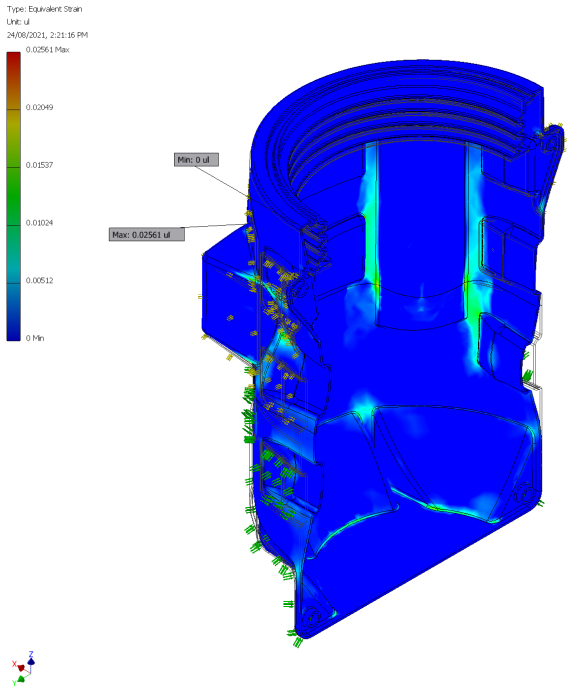
⊟ Displacement



⊟ Safety Factor



Equivalent Strain



Simulation: HYDROSTATIC UPLIFT LOADS AS/NZS:1546.1:2008

General objective and settings:

Design Objective	Single Point
Simulation Type	Static Analysis
Last Modification Date	24/08/2021, 11:05 AM
Detect and Eliminate Rigid Body Modes	No

Advanced settings:

Avg. Element Size (fraction of model diameter)	0.2
Min. Element Size (fraction of avg. size)	0.1

Grading Factor	1.5
Max. Turn Angle	60 deg
Create Curved Mesh Elements	Yes

Material(s)

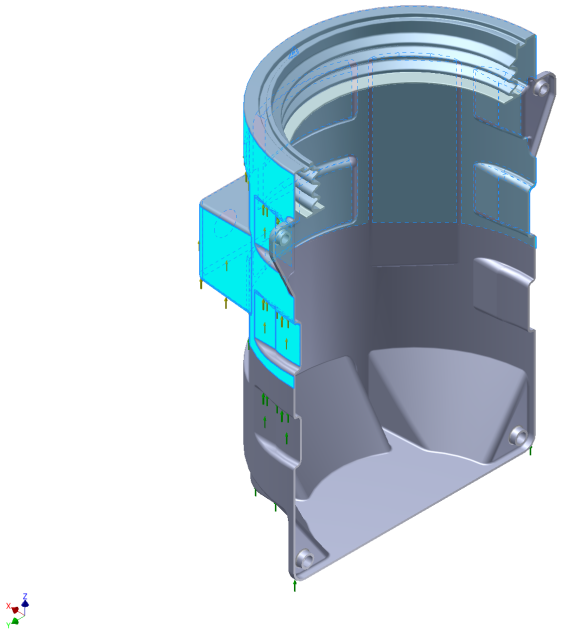
Name	LLDPE Linear Low Density Polyethylene	
General	Mass Density	0.936 g/cm^3
	Yield Strength	20 MPa
	Ultimate Tensile Strength	32 MPa
Stress	Young's Modulus	0.2 GPa
	Poisson's Ratio	0.41 ul
	Shear Modulus	0.070922 GPa
Stress Thermal	Expansion Coefficient	0.00018 ul/c
	Thermal Conductivity	0.225 W/(m K)
	Specific Heat	3182 J/(kg c)
Part Name(s)	PE-SANIFOS-280-TANK-V2.ipt	

Operating conditions

Force: 0.5m 4.905 kPa

Load Type	Force
Magnitude	809.325 N
Vector X	0.000 N
Vector Y	0.000 N
Vector Z	809.325 N

Selected Face(s)

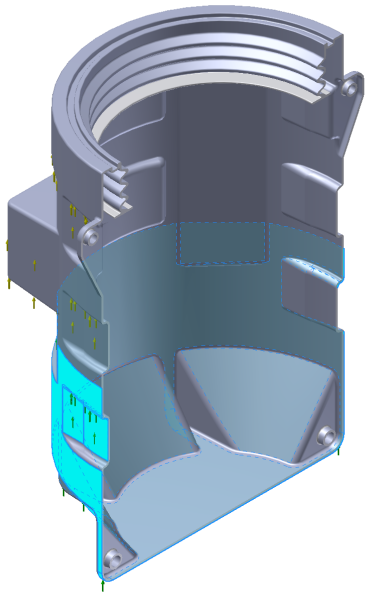


Force: 1.0m 9.81 kPa

Load Type	Force
Magnitude	1618.650 N

Vector X	0.000 N
Vector Y	0.000 N
Vector Z	1618.650 N

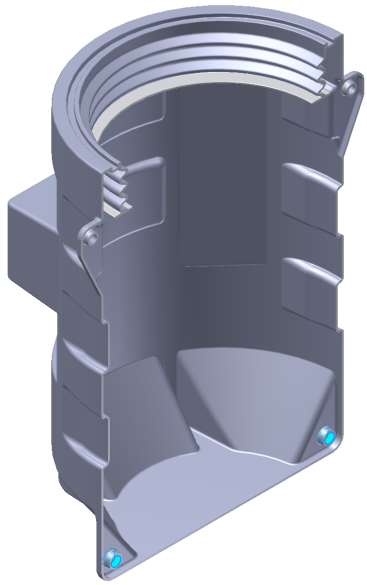
Selected Face(s)



Fixed Constraint: PINS

Constraint Type	Fixed Constraint

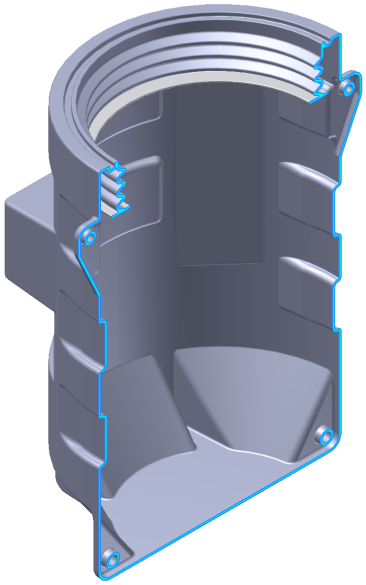
Selected Face(s)



Frictionless Constraint: HALF

Constraint Type	Frictionless Constraint

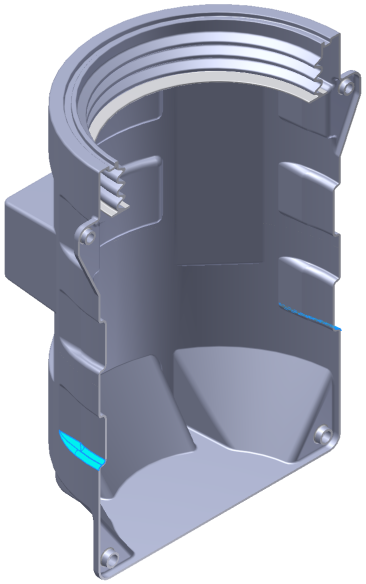
Selected Face(s)



Frictionless Constraint: CONCRETE

Constraint Type	Frictionless 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: PINS	509.699 N	-49.2875 N	2.41726 N m	0.924365 N m
		25.7072 N		1.96435 N m

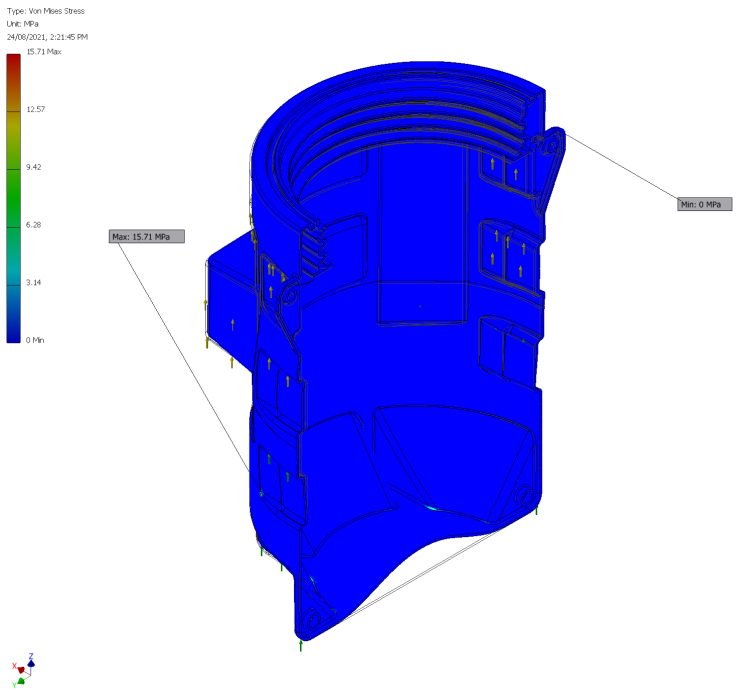
		-506.659 N		1.06302 N m
Frictionless Constraint: HALF	443.451 N	-443.427 N	340.595 N m	-1.00775 N m
		-4.61524 N		340.274 N m
		0 N		14.7411 N m
Frictionless Constraint: CONCRETE	1983.57 N	493.117 N	86.6071 N m	-30.441 N m
		-20.3541 N		79.6571 N m
		-1921.19 N		-15.1289 N m

Result Summary

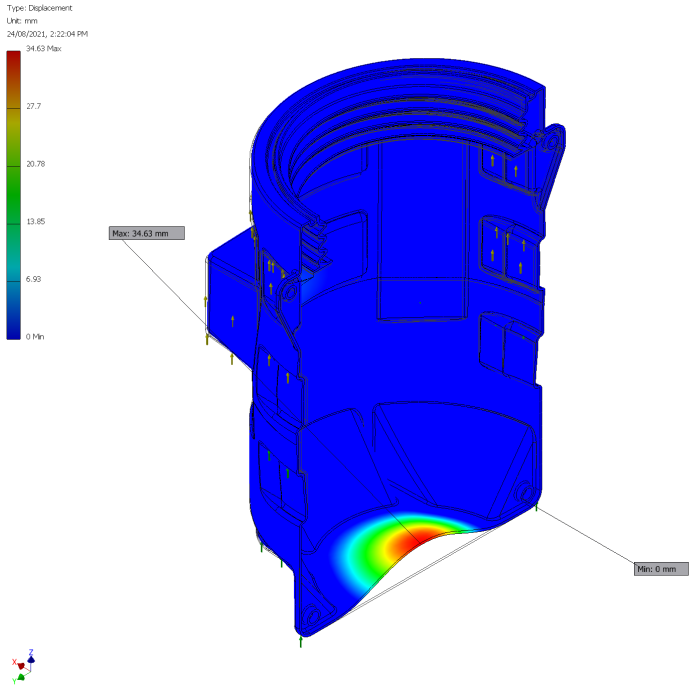
Name	Minimum	Maximum
Volume	7146340 mm^3	
Mass	6.68897 kg	
Von Mises Stress	0.00248222 MPa	15.7067 MPa
Displacement	0 mm	34.627 mm
Safety Factor	1.27335 ul	15 ul
Equivalent Strain	0.0000123844 ul	0.0774445 ul

Figures

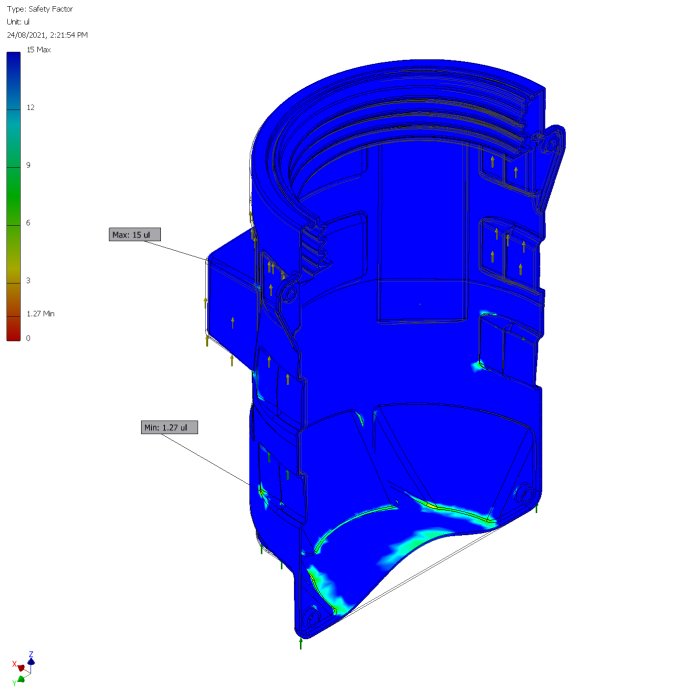
Von Mises Stress



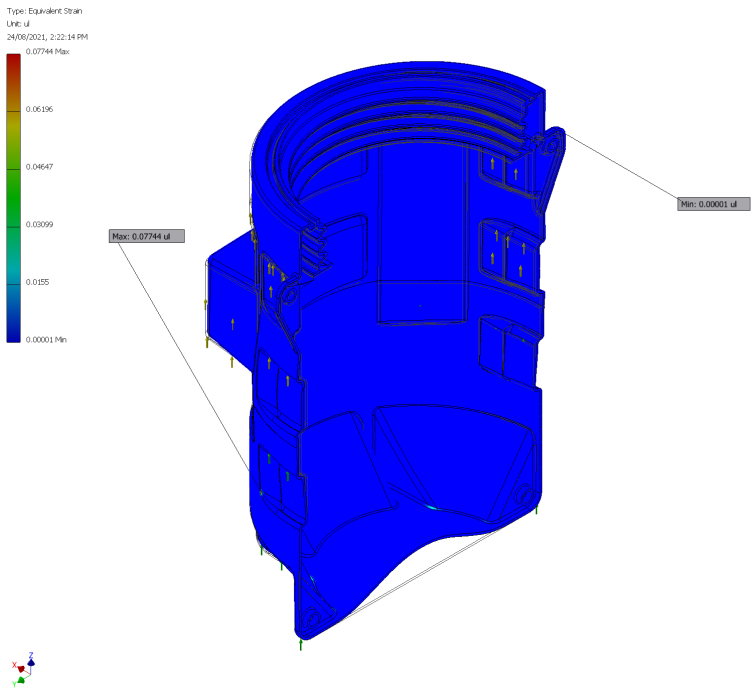
Displacement



⊟ Safety Factor



⊟ Equivalent Strain



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