Isaac Wax

Assembly {reference}

Simulation of JAW[1]

Date: Friday, December 31, 2021
Designer: Solidworks, Setup by Isaac Wax
Study name: Static 1
Analysis type: Static

Table of Contents

Description

Static optimization simulation for claw in horizontal fixture on ROV.
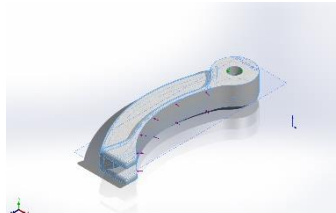
Assumptions

Model Information
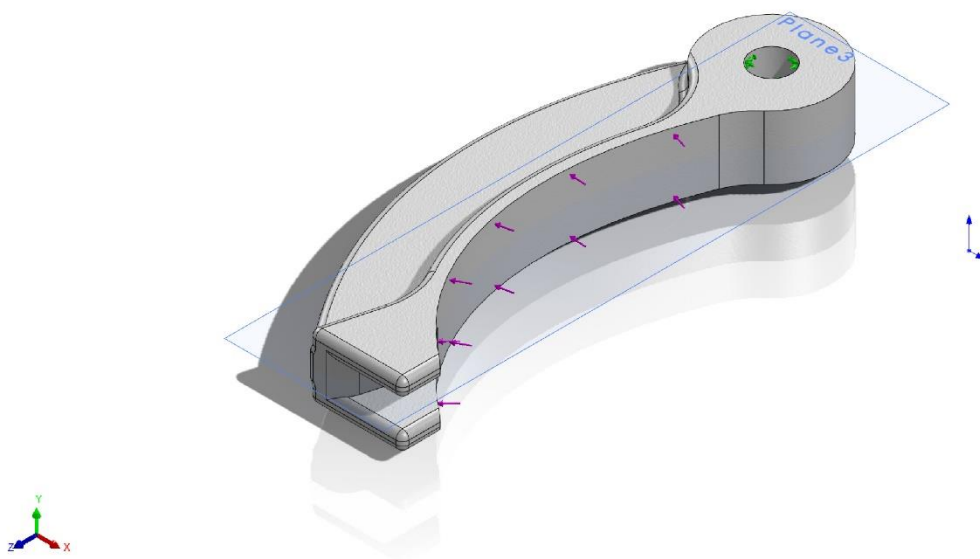
Model name: JAW[1]
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Fillet15	Solid Body	Mass:0.00774607 kg Volume:7.04181e-06 m^3 Density:1,100.01 kg/m^3 Weight:0.0759115 N	G:\My Drive\ROV--2022\MECHAICAL\Claw\Claw 2.3\JAW[1].SLDPRT Dec 31 10:55:03 2021

Study Properties

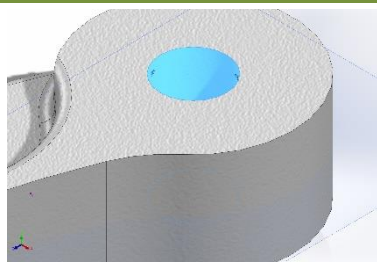|	
Study name	Static 1
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	Automatic
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (G:\My Drive\ROV--2022\MECHAICAL\Claw\Claw 2.3)

Units

Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

Material Properties

Model Reference	Properties	Components
	Name: Epoxy, Unfilled **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Tensile strength:** 2.8e+07 N/m^2 **Compressive strength:** 1.04e+08 N/m^2 **Elastic modulus:** 2.415e+09 N/m^2 **Poisson's ratio:** 0.35 **Mass density:** 1,100 kg/m^3	SolidBody 1(Fillet15)(JAW[1])
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 1 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	63.4159	-0.00435513	-9.65982	64.1474
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 7 kgf

Contact Information

The goal is only to look at that jaw component and not at the gears, so it is constrained rigidly throughout the 6 mm pin-hole

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Standard mesh
Automatic Transition:	Off
Include Mesh Auto Loops:	Off
Jacobian points for High quality mesh	16 Points
Element Size	1.91745 mm
Tolerance	0.0958726 mm
Mesh Quality	High

Mesh information - Details

Total Nodes	15020
Total Elements	9076
Maximum Aspect Ratio	6.9571
% of elements with Aspect Ratio < 3	98.9
Percentage of elements with Aspect Ratio > 10	0
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:02
Computer name:	

Sensor Details

No Data

Resultant Forces

Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	63.4159	-0.00435513	-9.65982	64.1474

Reaction Moments

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	0

Free body forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	-0.00134599	-0.0239432	0.0137557	0.0276461

Free body moments

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-33

Beams
No Data

Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	5.406e+02N/m^2 Node: 6010	1.041e+07N/m^2 Node: 881

Model name: JAW[1]
Study name: Static 1(-Default-)
Plot type: Static nodal stress Stress1
Deformation scale: 8.71994

von Mises (N/m^2)

1.041e+07
9.373e+06
8.331e+06
7.290e+06
6.249e+06
5.207e+06
4.166e+06
3.125e+06
2.083e+06
1.042e+06
5.406e+02

SOLIDWORKS Educational Product. For Instructional Use Only.

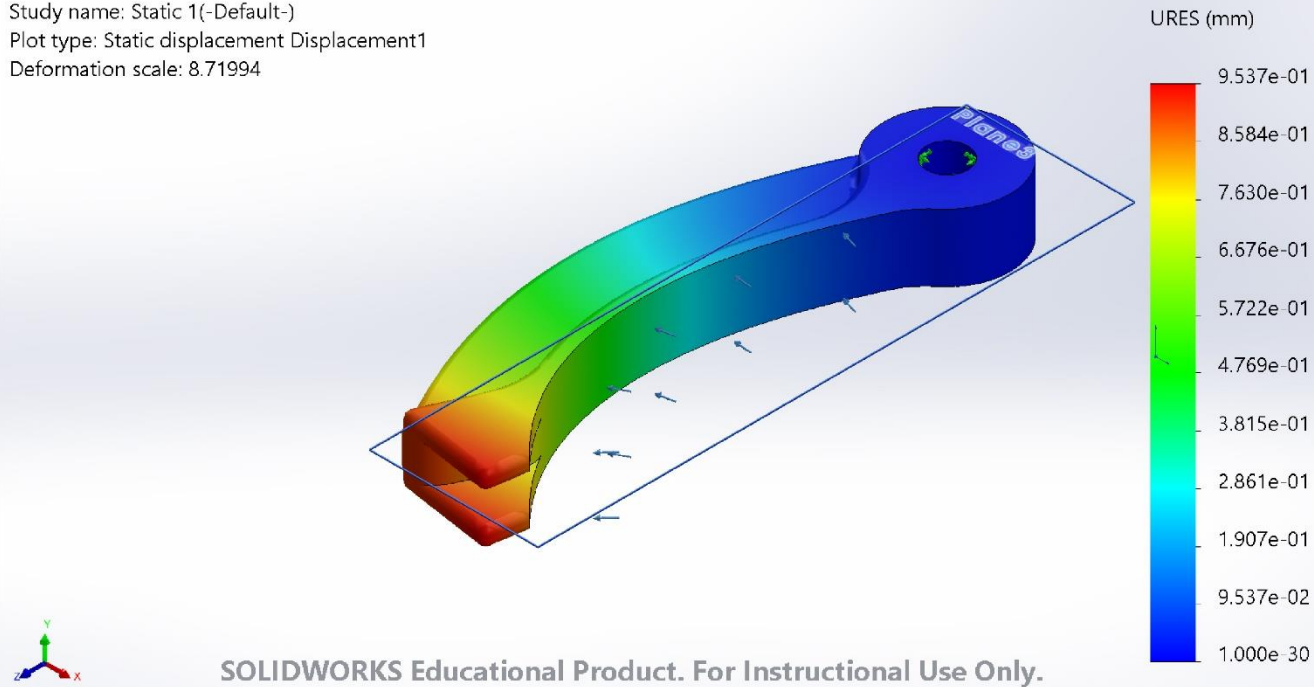JAW[1]-Static 1-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00mm Node: 1	9.537e-01mm Node: 11920

Model name: JAW[1]
Study name: Static 1(-Default-)
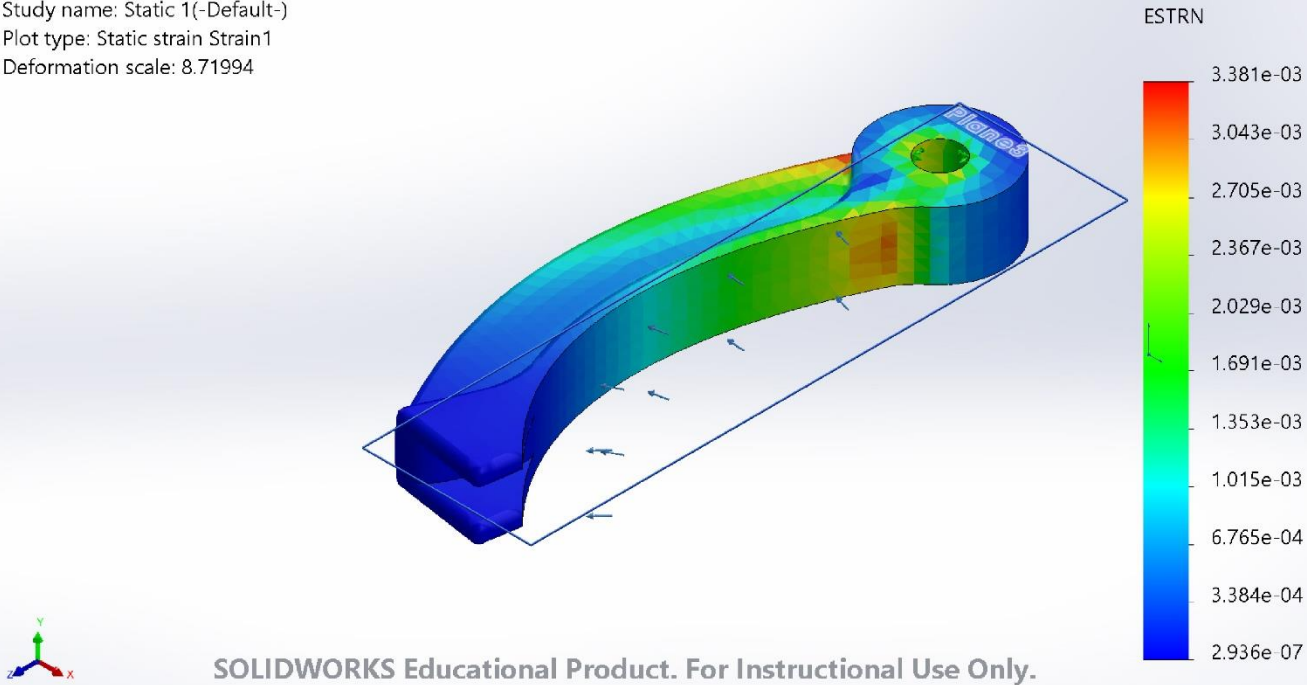Plot type: Static displacement Displacement1
Deformation scale: 8.71994

URES (mm)

9.537e-01
8.584e-01
7.630e-01
6.676e-01
5.722e-01
4.769e-01
3.815e-01
2.861e-01
1.907e-01
9.537e-02
1.000e-30

JAW[1]-Static 1-Displacement-Displacement1

| Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	2.936e-07 Element: 2505	3.381e-03 Element: 6683

Model name: JAW[1]
Study name: Static 1(-Default-)
Plot type: Static strain Strain1
Deformation scale: 8.71994

ESTRN

3.381e-03
3.043e-03
2.705e-03
2.367e-03
2.029e-03
1.691e-03
1.353e-03
1.015e-03
6.765e-04
3.384e-04
2.936e-07

JAW[1]-Static 1-Strain-Strain1

Name	Type
Displacement1{1}	Deformed shape

Model name: JAW[1]
Study name: Static 1(-Default-)
Plot type: Deformed shape Displacement1{1}
Deformation scale: 8.71994
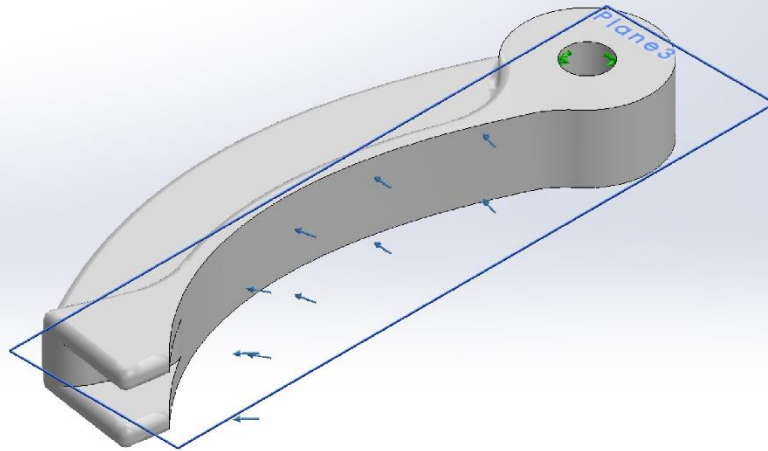
SOLIDWORKS Educational Product. For Instructional Use Only.

JAW[1]-Static 1-Displacement-Displacement1{1}

Conclusion

This part seems adequate at 7Kgf in the horizontal mounting position, but may want to add more aggressive filets to the high stress areas.