

Description
No Data

Simulation of Lab3_knuckle-joint_assembly

Date: 03 February 2025
Designer: Solidworks
Study name: Static 2
Analysis type: Static

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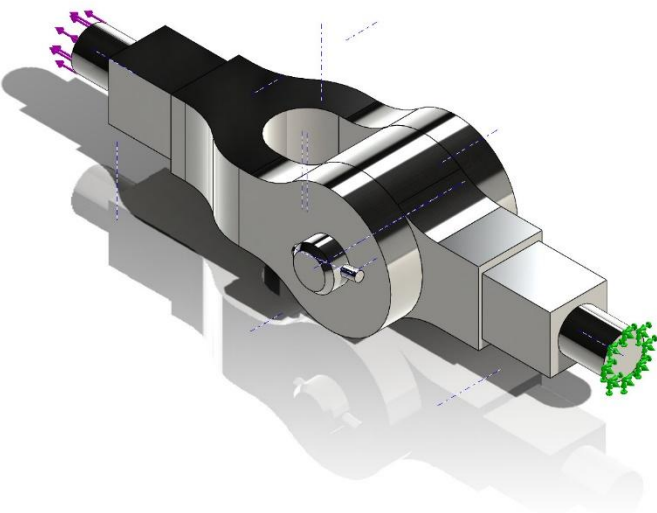
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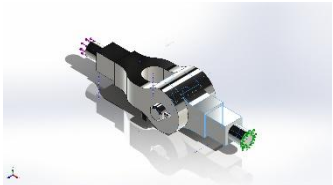
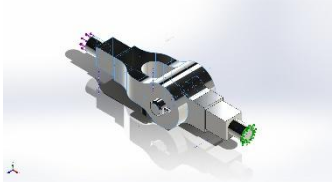
Assumptions

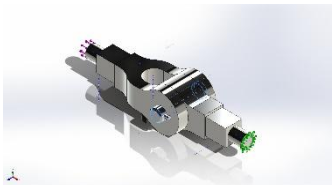
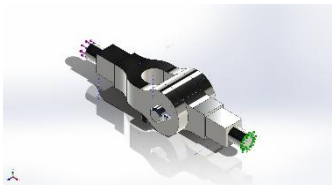
Model Information



Model name: Lab3_knuckle-joint_assembly
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
<div>Cut-Extrude3</div> 	Solid Body	Mass:0.82145 kg Volume:0.000105314 m^3 Density:7,800 kg/m^3 Weight:8.05021 N	C:\Users\pushk\Document s\DME-Lab\Lab3_eye.SLDPRT Feb 3 00:33:34 2025
<div>Boss-Extrude2</div> 	Solid Body	Mass:1.0853 kg Volume:0.000139142 m^3 Density:7,800 kg/m^3 Weight:10.636 N	C:\Users\pushk\Document s\DME-Lab\Lab3_fork.SLDPRT Feb 2 23:38:13 2025

<p>Cut-Extrude1</p> 	Solid Body	<p>Mass:0.136248 kg Volume:1.74677e-05 m³ Density:7,800 kg/m³ Weight:1.33523 N</p>	<p>C:\Users\pushk\Documents\DME-Lab\Lab3_pin.SLDPRT Feb 3 00:08:43 2025</p>
<p>Boss-Extrude1</p> 	Solid Body	<p>Mass:0.0027445 kg Volume:3.51858e-07 m³ Density:7,800 kg/m³ Weight:0.0268961 N</p>	<p>C:\Users\pushk\Documents\DME-Lab\Lab3_split-pin.SLDPRT Feb 3 00:10:39 2025</p>

Study Properties

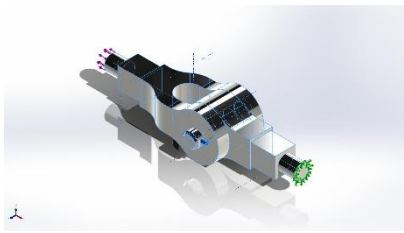
Study name	Static 2
Analysis type	Static
Mesh type	Solid Mesh
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Solver type	Automatic
Inplane Effect:	Off
Soft Spring:	Off
Inertial Relief:	Off
Incompatible bonding options	Automatic
Large displacement	Off
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off
Result folder	SOLIDWORKS document (C:\Users\pushk\Documents\DME-Lab)



Units

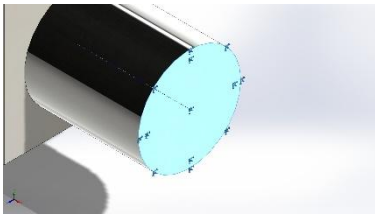
Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m ²

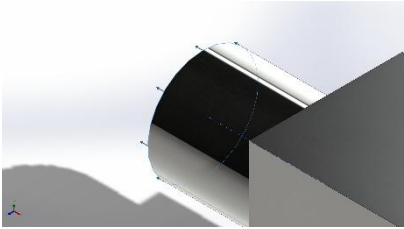
Material Properties

Model Reference	Properties	Components
	Name: Plain Carbon Steel Model type: Linear Elastic Isotropic Default failure criterion: Max von Mises Stress Yield strength: 2.20594e+08 N/m ² Tensile strength: 3.99826e+08 N/m ² Elastic modulus: 2.1e+11 N/m ² Poisson's ratio: 0.28 Mass density: 7,800 kg/m ³ Shear modulus: 7.9e+10 N/m ² Thermal expansion coefficient: 1.3e-05 /Kelvin	SolidBody 1(Cut-Extrude3)(Lab3_eye-1), SolidBody 1(Boss-Extrude2)(Lab3_fork-1), SolidBody 1(Cut-Extrude1)(Lab3_pin-1), SolidBody 1(Boss-Extrude1)(Lab3_split-pin-1)
Curve Data:N/A		



Loads and Fixtures

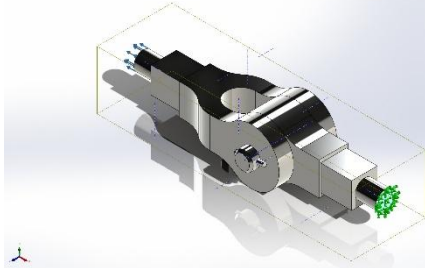
Fixture name	Fixture Image	Fixture Details		
Fixed-1		Entities: 1 face(s) Type: Fixed Geometry		
Resultant Forces				
Components	X	Y	Z	Resultant
Reaction force(N)	25,000	0.00012207	3.05176e-05	25,000
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details		
Force-1		Entities: 1 face(s) Type: Apply normal force Value: -25,000 N		

Connector Definitions

No Data

Interaction Information

Interaction	Interaction Image	Interaction Properties
Global Interaction		Type: Bonded Components: 1 component(s) Options: Independent mesh

Mesh information

Mesh type	Solid Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	12.8057 mm
Minimum element size	1.53073 mm
Mesh Quality	High
Remesh failed parts independently	Off

Mesh information - Details

Total Nodes	8721
Total Elements	4891
Maximum Aspect Ratio	9.0261
% of elements with Aspect Ratio < 3	95.4
Percentage of elements with Aspect Ratio > 10	0
Percentage of distorted elements	0
Time to complete mesh(hh:mm:ss):	00:00:03
Computer name:	PUSHKIN



Sensor Details

No Data

Resultant Forces

Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	25,000	0.00012207	3.05176e-05	25,000

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	0.00176215	-9.52482e-05	-0.000586361	0.00185959

Free body moments

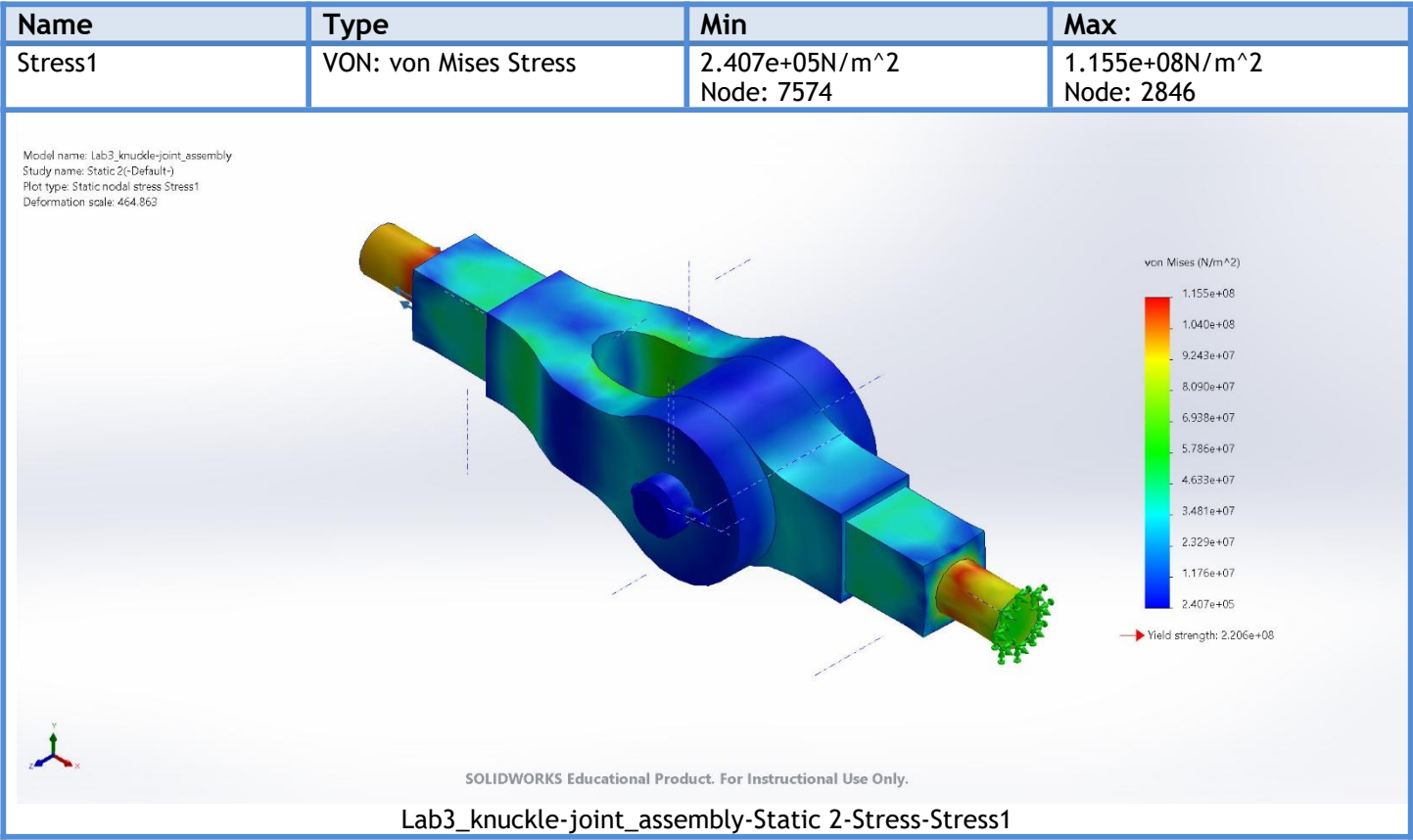
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-33

Beams

No Data

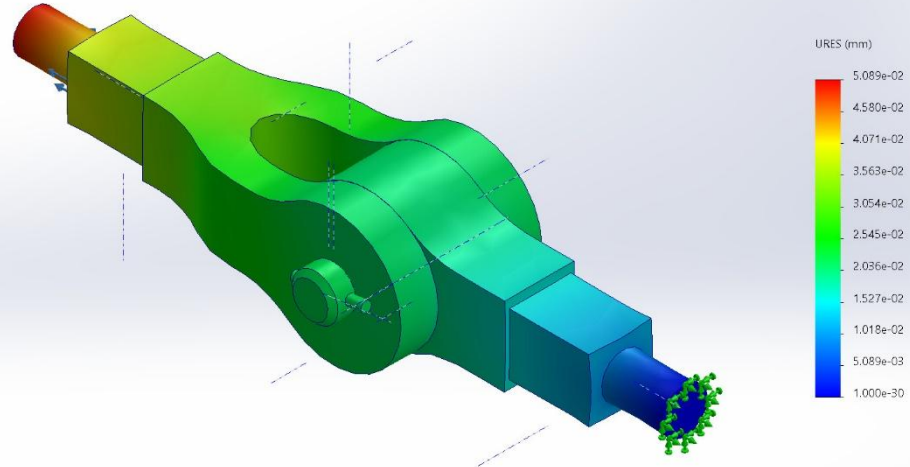


Study Results



Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00mm Node: 7	5.089e-02mm Node: 3703

Model name: Lab3_knuckle-joint_assembly
 Study name: Static 2(-Default-)
 Plot type: Static displacement: Displacement1
 Deformation scale: 464.863

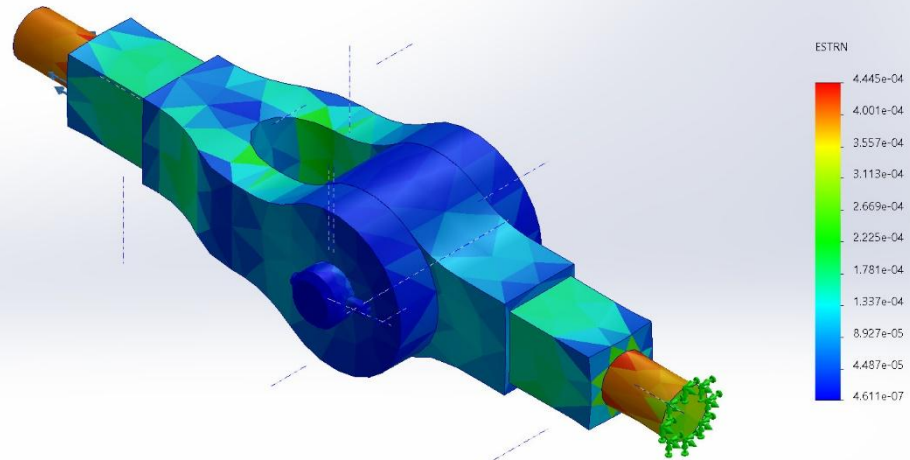


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Lab3_knuckle-joint_assembly-Static 2-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	4.611e-07 Element: 3728	4.445e-04 Element: 1928

Model name: Lab3_knuckle-joint_assembly
 Study name: Static 2(-Default-)
 Plot type: Static strain: Strain1
 Deformation scale: 464.863



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Lab3_knuckle-joint_assembly-Static 2-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Max Normal Stress	3.051e+00	2.792e+03

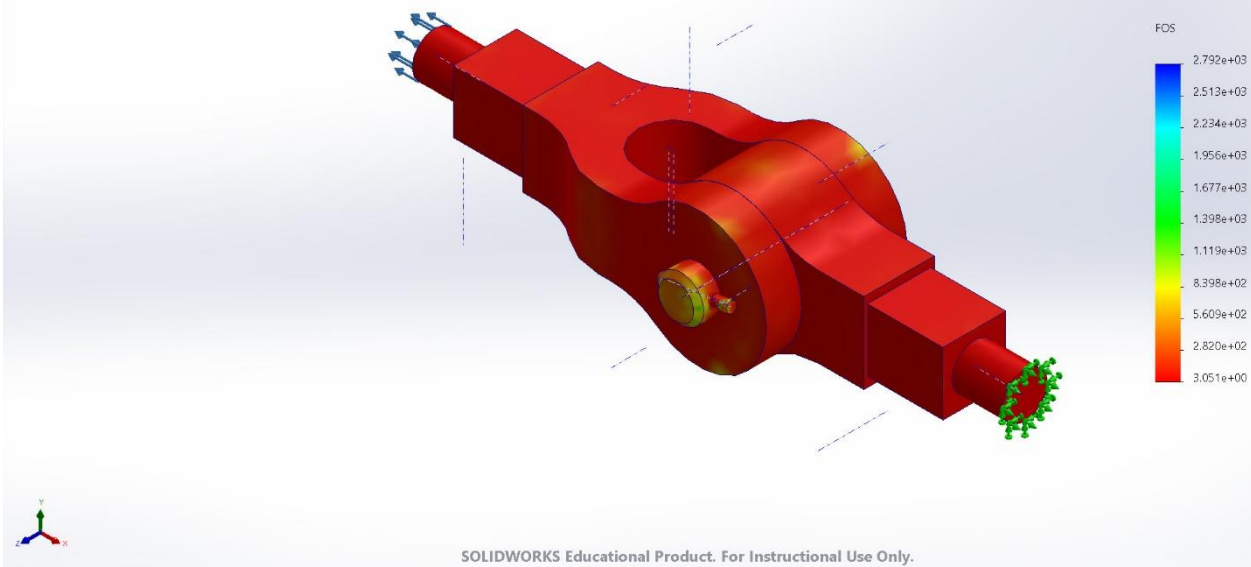


SOLIDWORKS

Analyzed with SOLIDWORKS Simulation

Simulation of Lab3_knuckle-joint_assembly

Model name: Lab3_knuckle-joint_assembly
 Study name: Static 2(-Default-)
 Plot type: Factor of Safety Factor of Safety1
 Criterion : Max Normal Stress
 Factor of safety distribution: Min FOS = 3.1



Lab3_knuckle-joint_assembly-Static 2-Factor of Safety-Factor of Safety1

Conclusion