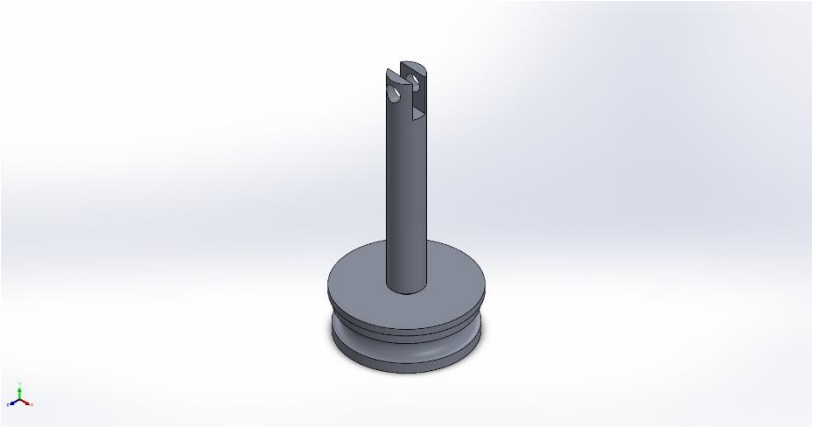


Simulation of Engine Piston

Date: Sunday, December 5, 2021
Designer: Lea Youssef Babi
Study name: Simulation
Analysis type: Static

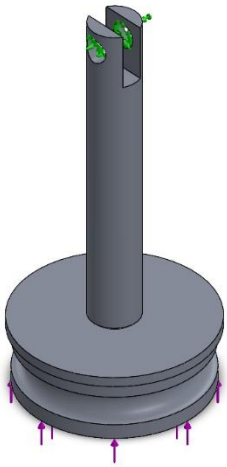
Table of Contents

Description

No Data

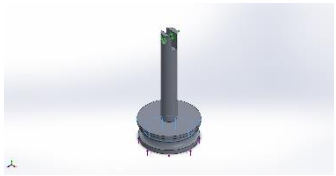
Assumptions

Model Information



Model name: Engine Piston
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Chamfer1 	Solid Body	**Mass:0.0017001 kg** **Volume:6.07177e-07 m^3** **Density:2,800 kg/m^3** **Weight:0.0166609 N**	**C:\Users\leaba\OneDrive\Desktop\University\5th semester\CAD\Project\Solidworks parts\piston rod.SLDPRT** Nov 20 19:32:48 2021
Revolve1 	Solid Body	**Mass:0.00372577 kg** **Volume:1.33063e-06 m^3** **Density:2,800 kg/m^3** **Weight:0.0365125 N**	**C:\Users\leaba\OneDrive\Desktop\University\5th semester\CAD\Project\Solidworks parts\piston.SLDPRT** Nov 20 00:09:34 2021

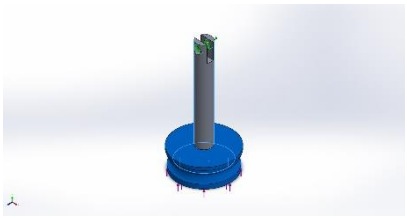
Study Properties

Study name	Simulation
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\leaba\OneDrive\Desktop\University\5th semester\CAD\Project\Simulation)

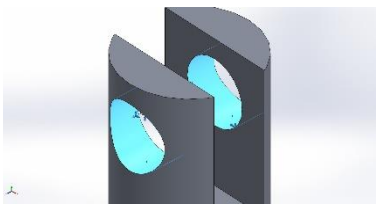
Units

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

Material Properties

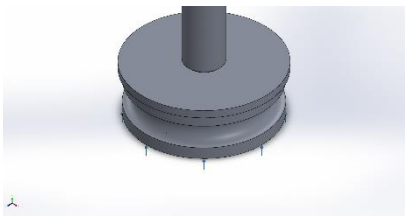
Model Reference	Properties	Components
	**Name:** 201.0-T43 Insulated Mold Casting (SS) **Model type:** Linear Elastic Isotropic **Default failure criterion:** Max von Mises Stress **Yield strength:** 2.25e+08 N/m^2 **Tensile strength:** 2.73e+08 N/m^2 **Elastic modulus:** 7.1e+10 N/m^2 **Poisson's ratio:** 0.33 **Mass density:** 2,800 kg/m^3 **Shear modulus:** 2.3e+10 N/m^2 **Thermal expansion coefficient:** 1.9e-05 /Kelvin	SolidBody 1(Chamfer1)(piston rod-2), SolidBody 1(Revolve1)(piston-1)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 2 face(s) **Type:** Fixed Geometry

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-0.00258747	-44.4838	-0.000207447	44.4838
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:** 44.48 N

Connector Definitions

No Data

Contact Information

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

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	1.24727 mm
Tolerance	0.0623633 mm
Mesh Quality	High
Remesh failed parts independently	Off

Mesh information - Details

Total Nodes	13323
Total Elements	7892
Maximum Aspect Ratio	9.955
% of elements with Aspect Ratio < 3	97.3
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	-0.00258747	-44.4838	-0.000207447	44.4838

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	0.00472906	0.00596881	0.000365825	0.00762395

Free body moments

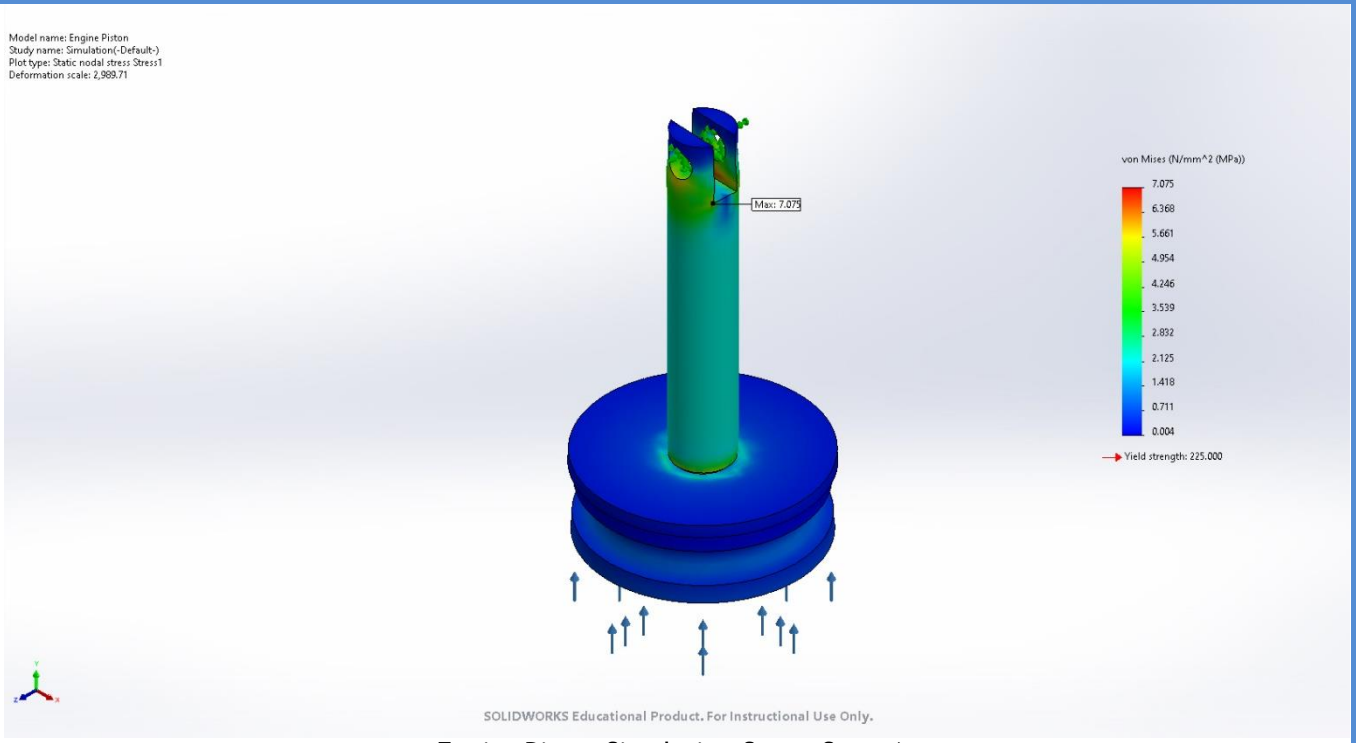
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-33

Beams

No Data

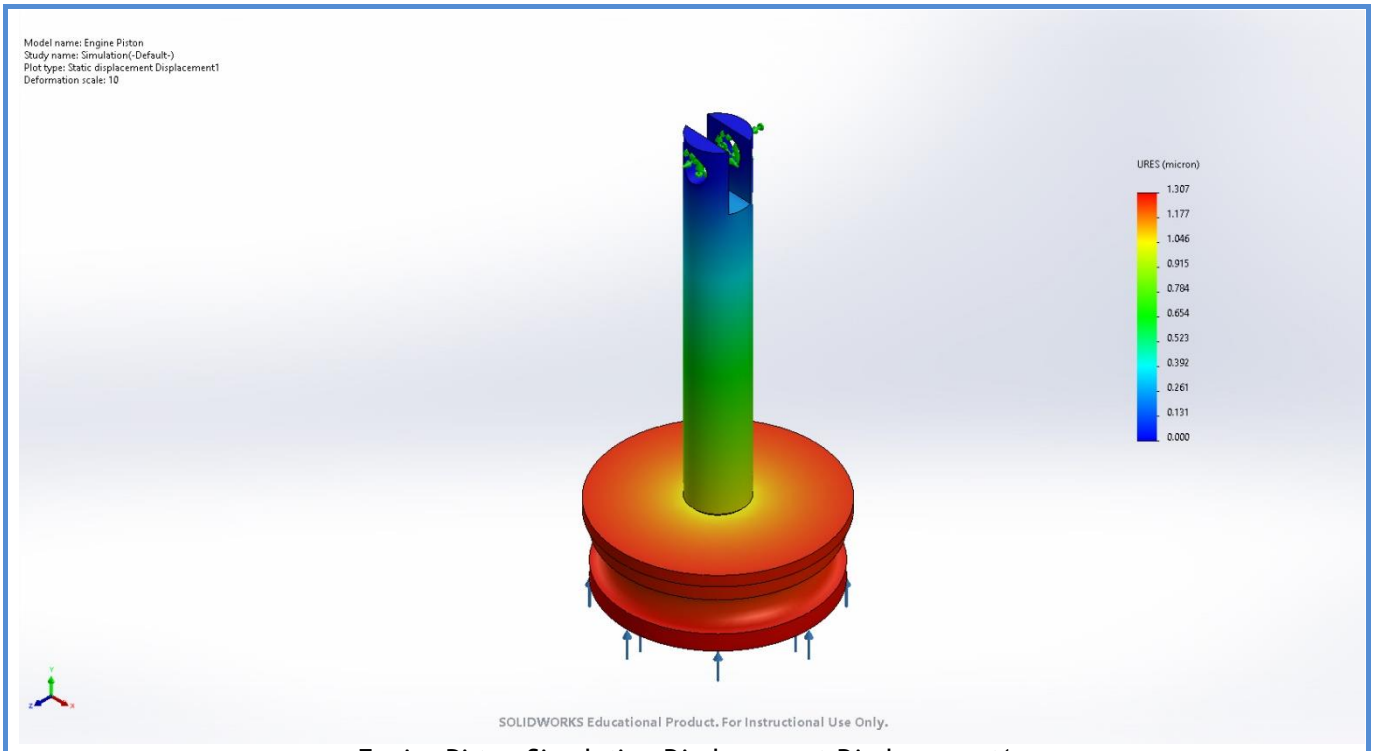
Study Results

Name	Type	Min	Max
Stress1	VON: von Mises Stress	0.004N/mm^2 (MPa) Node: 5664	7.075N/mm^2 (MPa) Node: 3489



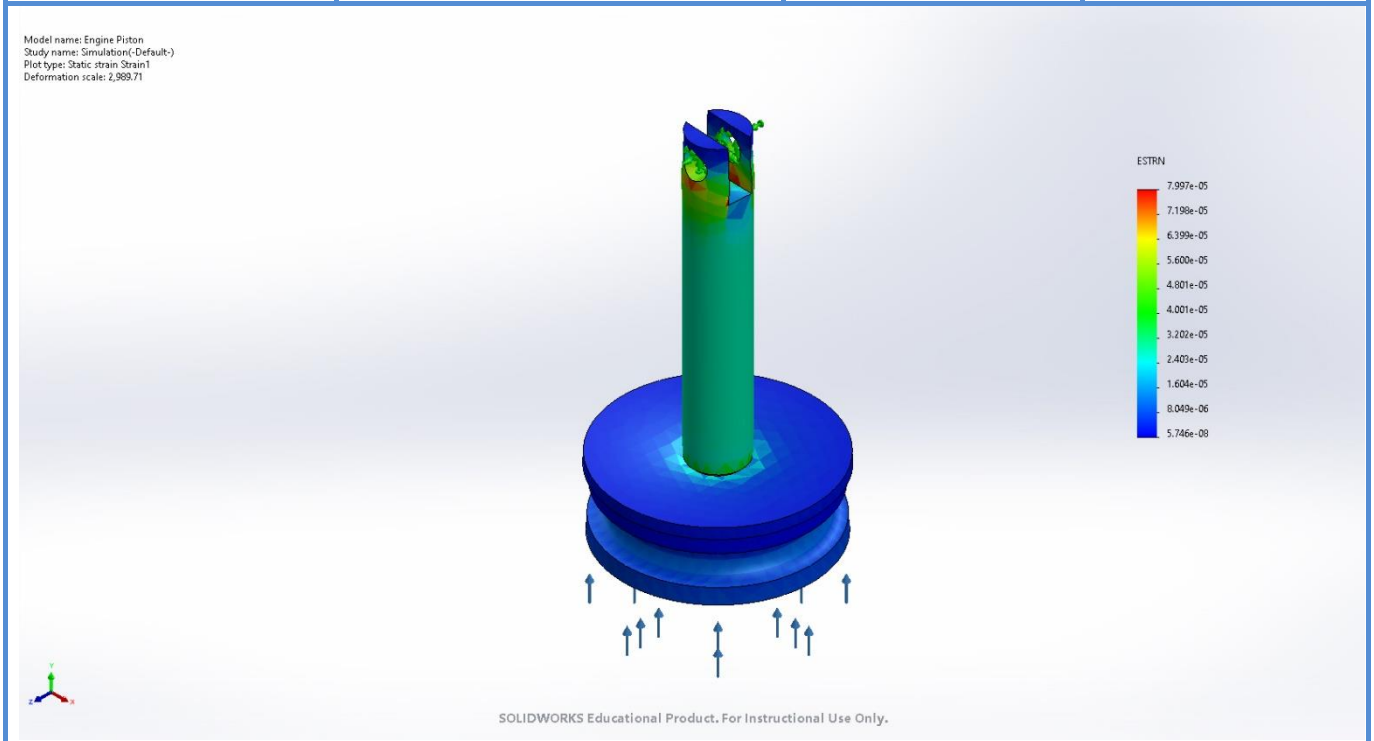
Engine Piston-Simulation-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000micron Node: 55	1.307micron Node: 4669



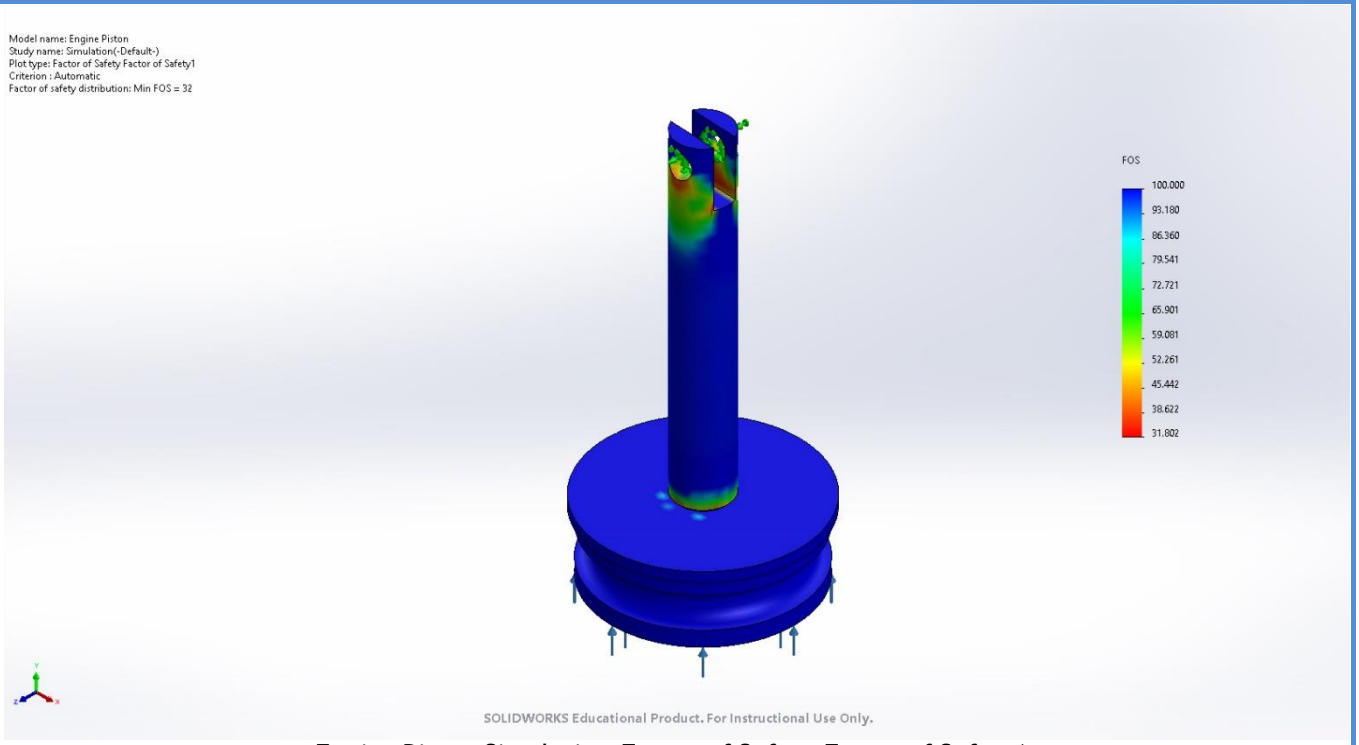
Engine Piston-Simulation-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	5.746e-08 Element: 4805	7.997e-05 Element: 1834



Engine Piston-Simulation-Strain-Strain1

Name	Type	Min	Max
Factor of Safety1	Automatic	31.802 Node: 3489	61,803.461 Node: 5664



Engine Piston-Simulation-Factor of Safety-Factor of Safety1

Conclusion