



### Description

Study of Stress and strain distribution in a simple solid connecting rod for an IC Engine.

## Simulation of connectingRod

Date: 07 March 2024  
Designer: Solidworks  
Study name: Axial force  
Analysis type: Static

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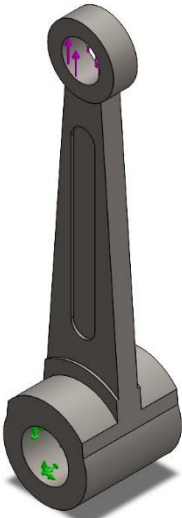
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Assumptions

Study is done only for axial forces and neglecting frictional forces and bending forces.

Model Information



Model name: connectingRod  
Current Configuration: Default

Solid Bodies		
Document Name and Reference	Treated As	Volumetric Properties
Scale2 	Solid Body	Mass:0.000408217 kg Volume:5.20021e-08 m^3 Density:7,850 kg/m^3 Weight:0.00400052 N

## Study Properties


Study name	Axial force
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	On
Compute free body forces	On
Friction	Off
Use Adaptive Method:	Off

## Units

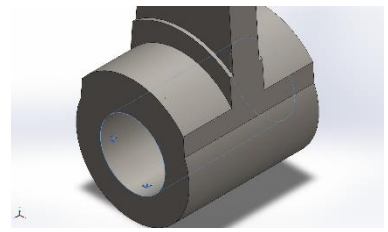
Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m <sup>2</sup>



## Material Properties

Model Reference	Properties	Components
	<b>Name:</b> AISI 4340 Steel, annealed <b>Model type:</b> Linear Elastic Isotropic <b>Default failure criterion:</b> Max von Mises Stress <b>Yield strength:</b> 4.7e+08 N/m <sup>2</sup> <b>Tensile strength:</b> 7.45e+08 N/m <sup>2</sup> <b>Elastic modulus:</b> 2.05e+11 N/m <sup>2</sup> <b>Poisson's ratio:</b> 0.285 <b>Mass density:</b> 7,850 kg/m <sup>3</sup> <b>Shear modulus:</b> 8e+10 N/m <sup>2</sup> <b>Thermal expansion coefficient:</b> 1.23e-05 /Kelvin	SolidBody 1(Scale2)(connectingRod)
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)	-0.000469208	-110,636	-3.8147e-05	110,636
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details
Force-1		<b>Entities:</b> 1 face(s) <b>Reference:</b> Edge< 1 > <b>Type:</b> Apply force <b>Values:</b> ---, ---, -,600,000 N



## Mesh information

Mesh type	Solid Mesh
Mesher Used:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	0.410811 mm
Minimum element size	0.373465 mm
Mesh Quality	High

## Mesh information - Details

Total Nodes	11966
Total Elements	7022
Maximum Aspect Ratio	6.2048
% of elements with Aspect Ratio < 3	94.3
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:	Amol Kamal

## Resultant Forces

### Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	-0.000469208	-110,636	-3.8147e-05	110,636

### Reaction Moments

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

### Free body forces

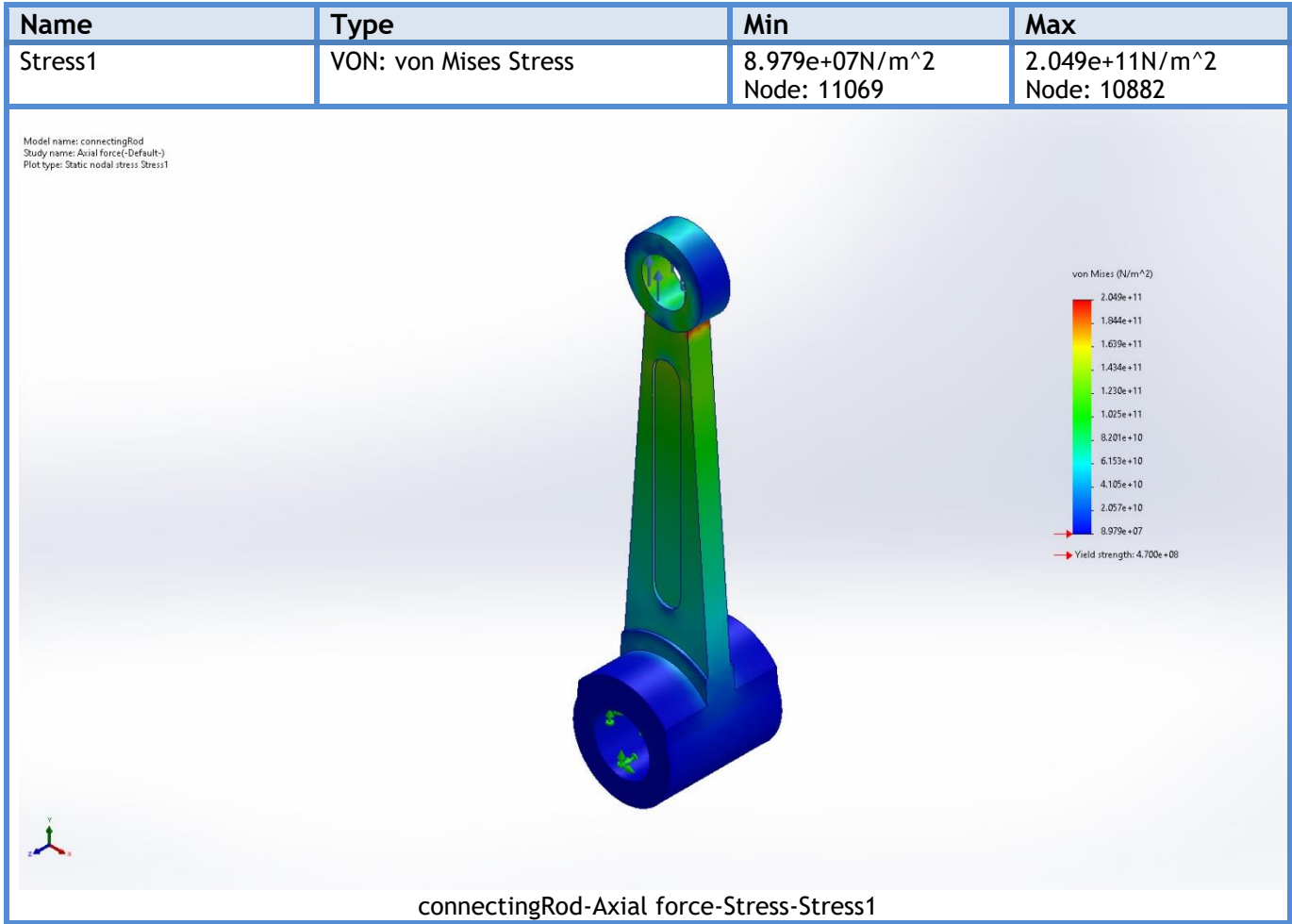
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	0	0	0	0

### Free body moments

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

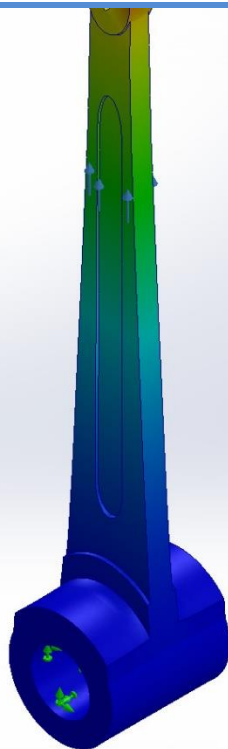
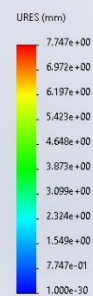


Study Results



Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00mm Node: 45	7.747e+00mm Node: 453

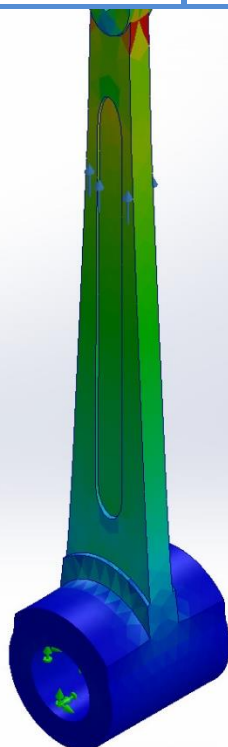
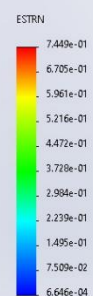
Model name: connectingRod  
Study name: Axial force(-Default-)  
Plot type: Static displacement Displacement1  
Deformation scale: 1



connectingRod-Axial force-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	6.646e-04 Element: 6282	7.449e-01 Element: 3276

Model name: connectingRod  
Study name: Axial force(-Default-)  
Plot type: Static strain Strain1  
Deformation scale: 1



connectingRod-Axial force-Strain-Strain1



