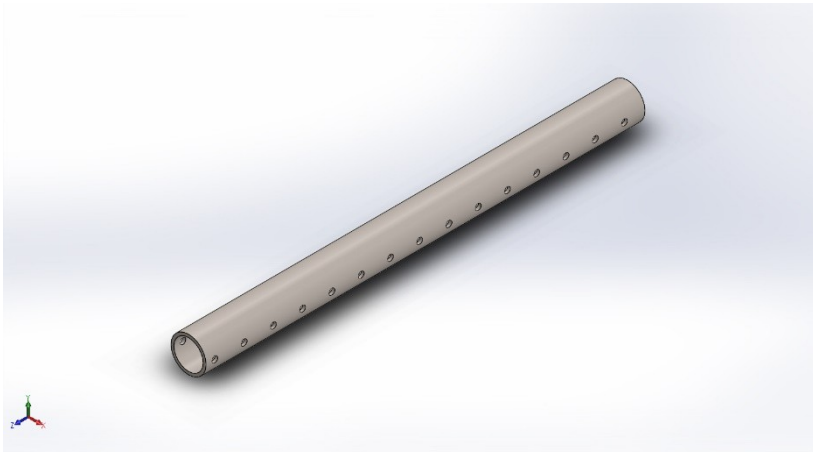


Simulation of Part1

Date: 17 April 2021
Designer: Solidworks
Study name: Static 1
Analysis type: Static

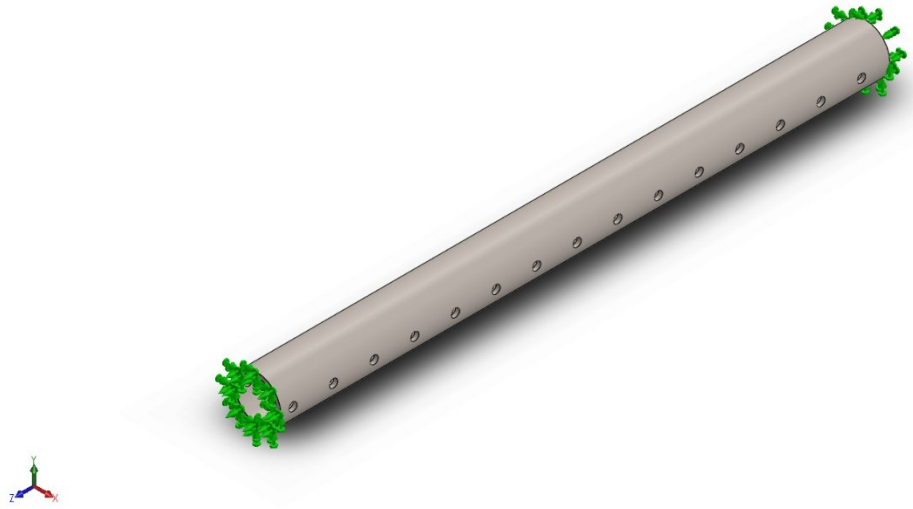
Table of Contents

Description

No Data

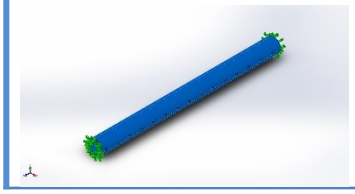
Assumptions

Model Information



Model name: Part1
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude1 	Solid Body	Mass:0.313482 kg Volume:4.0712e-05 m^3 Density:7,700 kg/m^3 Weight:3.07213 N	C:\Users\Mohamed Akheel.M\Downloads\New folder (2)\Part1.SLDPRT Apr 17 23:27:20 2021

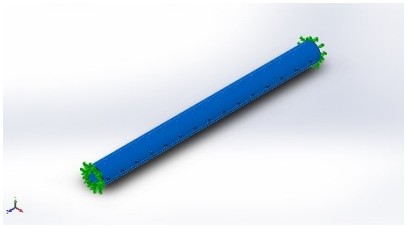
Study Properties

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	FFEPlus
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\Mohamed Akheel.M\Downloads\New folder (2))

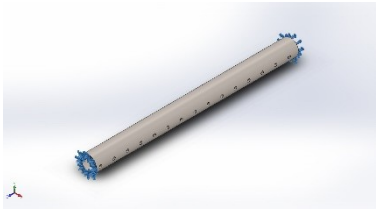
Units

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

Material Properties

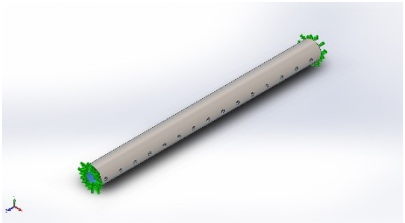
Model Reference	Properties	Components
	**Name:** Alloy Steel **Model type:** Linear Elastic Isotropic **Default failure criterion:** Max von Mises Stress **Yield strength:** 6.20422e+08 N/m^2 **Tensile strength:** 7.23826e+08 N/m^2 **Elastic modulus:** 2.1e+11 N/m^2 **Poisson's ratio:** 0.28 **Mass density:** 7,700 kg/m^3 **Shear modulus:** 7.9e+10 N/m^2 **Thermal expansion coefficient:** 1.3e-05 /Kelvin	SolidBody 1(Cut-Extrude1)(Part1)
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)	-1.04588e-06	3.77402e-07	2.01557e-07	1.13001e-06
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details
Pressure-1		**Entities:** 1 face(s) **Type:** Normal to selected face **Value:** 3 **Units:** N/m^2 **Phase Angle:** 0 **Units:** deg

Connector Definitions
No Data

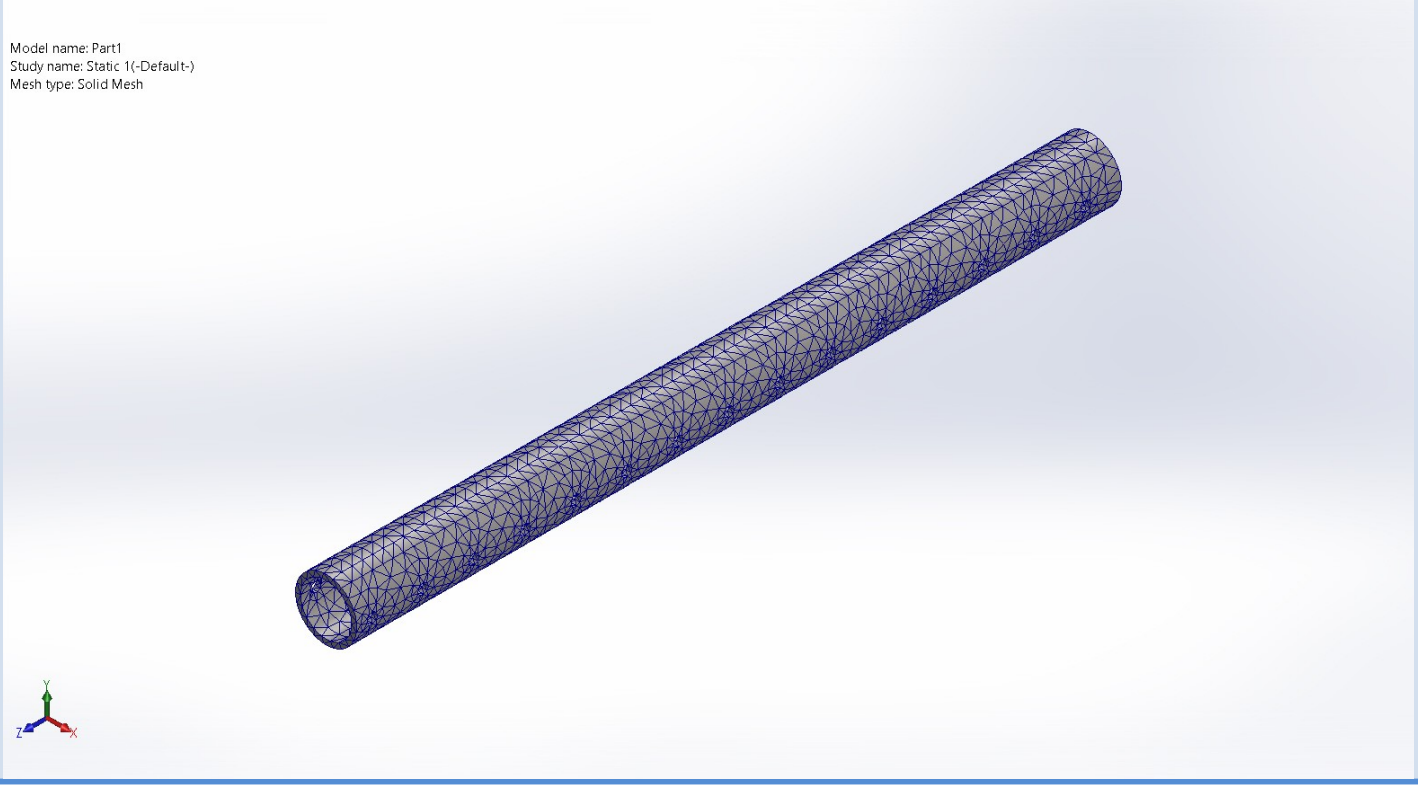
Contact Information
No Data

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	4.0865 mm
Tolerance	0.204325 mm
Mesh Quality	High

Mesh information - Details

Total Nodes	18960
Total Elements	9121
Maximum Aspect Ratio	9.1744
% of elements with Aspect Ratio < 3	92.4
% of elements with Aspect Ratio > 10	0
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:01
Computer name:	



Sensor Details

No Data

Resultant Forces

Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	-1.04588e-06	3.77402e-07	2.01557e-07	1.13001e-06

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	3.42241e-07	4.04057e-07	3.5586e-07	6.37987e-07

Free body moments

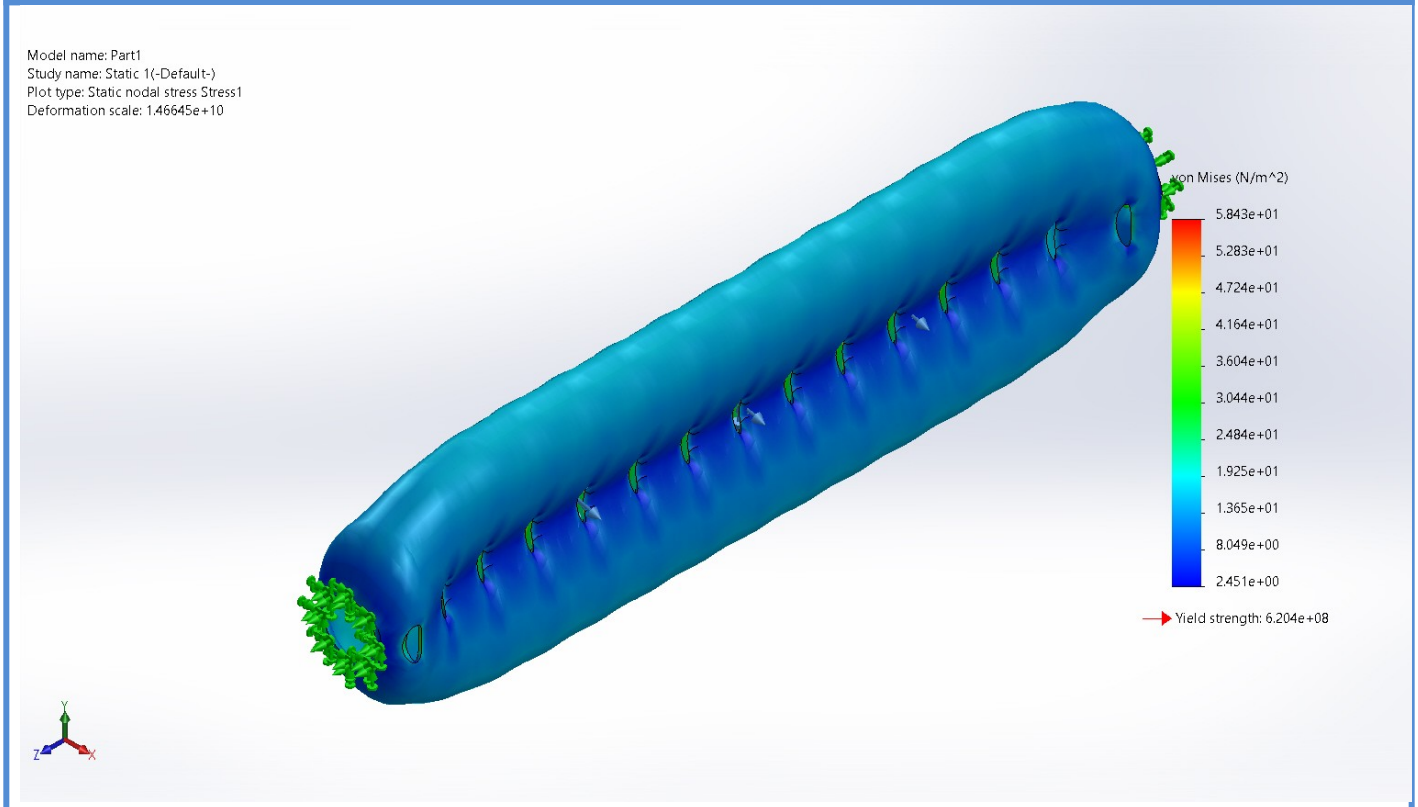
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-33

Beams

No Data

Study Results

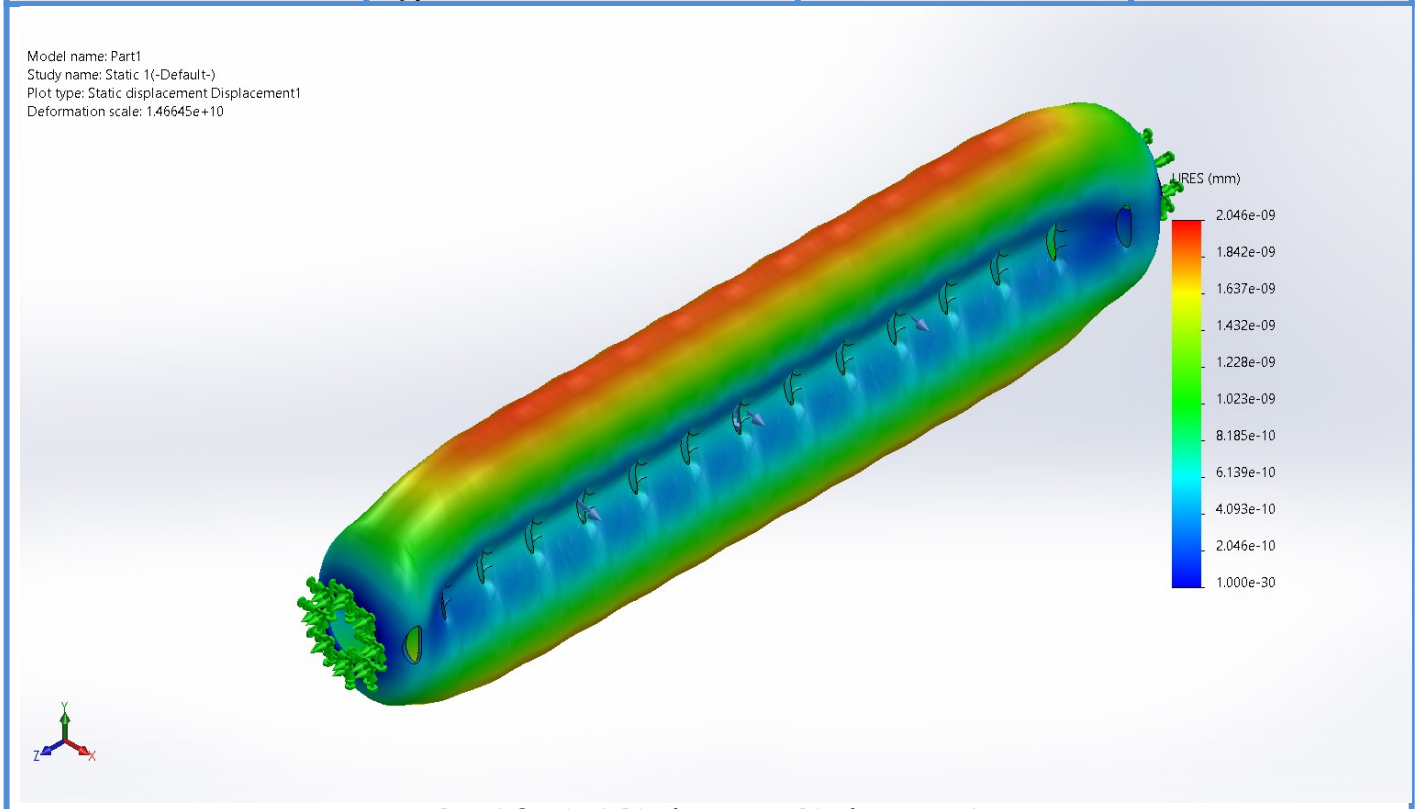
Name	Type	Min	Max
Stress1	VON: von Mises Stress	2.451e+00N/m^2 Node: 17698	5.843e+01N/m^2 Node: 16958



Part1-Static 1-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00mm Node: 451	2.046e-09mm Node: 14007

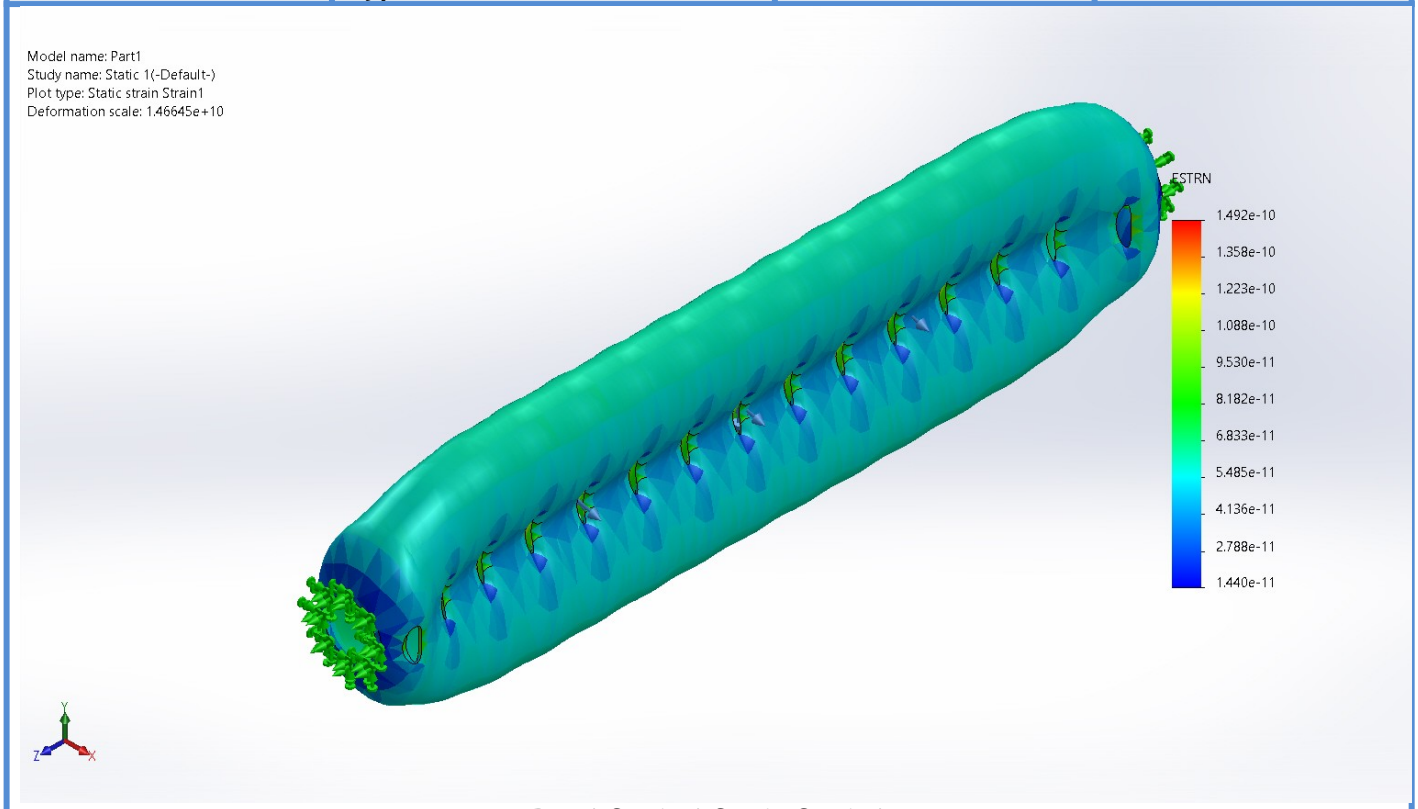
Name	Type	Min	Max



Part1-Static 1-Displacement-Displacement1

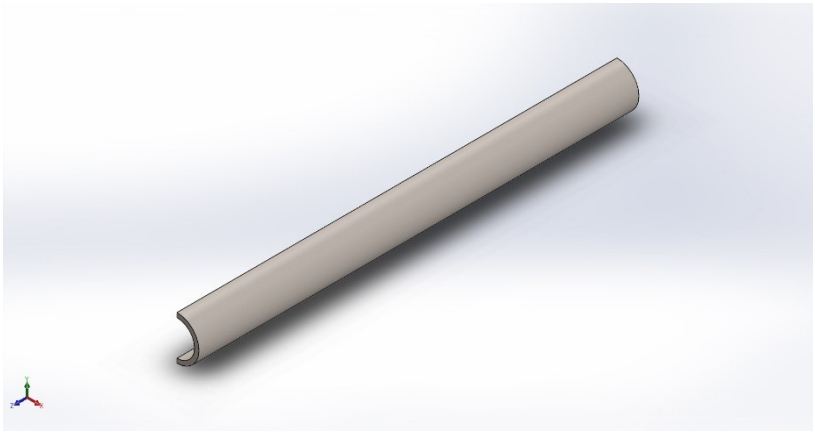
Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	1.440e-11 Element: 6000	1.492e-10 Element: 8867

Name	Type	Min	Max



Part1-Static 1-Strain-Strain1

Conclusion



Simulation of Slider

Date: 17 April 2021
Designer: Solidworks
Study name: Static 1
Analysis type: Static

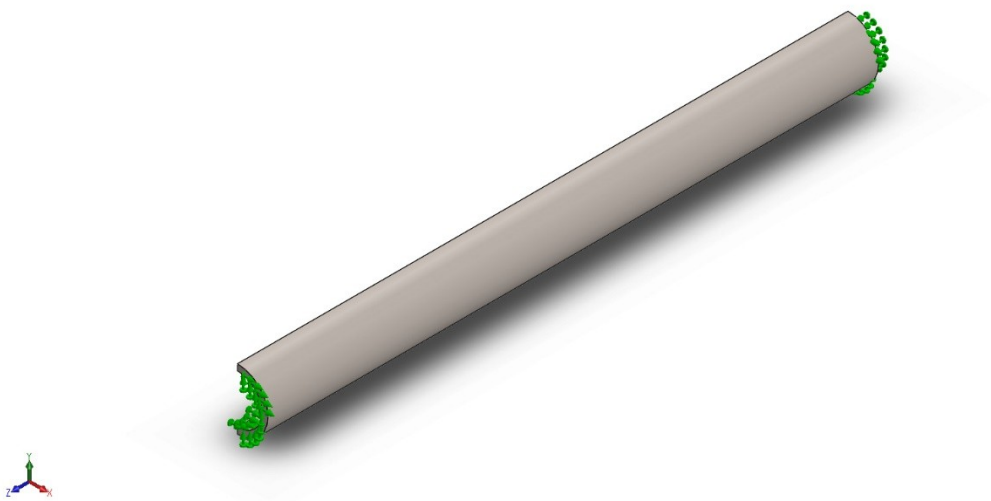
Table of Contents

Description

It slides to open or close the pores

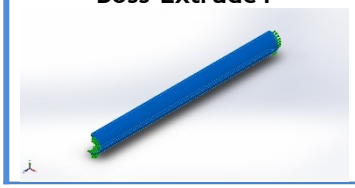
Assumptions

Model Information



Model name: Part2
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude1 	Solid Body	Mass:0.293912 kg Volume:3.81704e-05 m^3 Density:7,700 kg/m^3 Weight:2.88033 N	C:\Users\Mohamed Akheel.M\Downloads\New folder (2)\Part2.SLDPRT Apr 17 21:22:30 2021

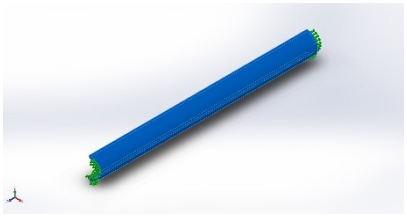
Study Properties

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	FFEPlus
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\Mohamed Akheel.M\Downloads\New folder (2))

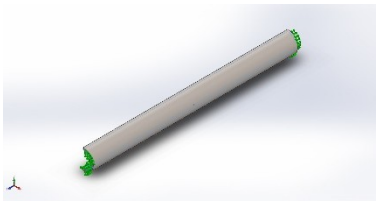
Units

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

Material Properties

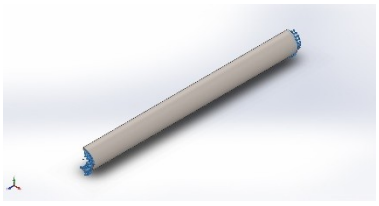
Model Reference	Properties	Components
	**Name:** Alloy Steel **Model type:** Linear Elastic Isotropic **Default failure criterion:** Max von Mises Stress **Yield strength:** 6.20422e+08 N/m^2 **Tensile strength:** 7.23826e+08 N/m^2 **Elastic modulus:** 2.1e+11 N/m^2 **Poisson's ratio:** 0.28 **Mass density:** 7,700 kg/m^3 **Shear modulus:** 7.9e+10 N/m^2 **Thermal expansion coefficient:** 1.3e-05 /Kelvin	SolidBody 1(Boss-Extrude1)(Part2)
Curve Data:N/A		

Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Roller/Slider-1		**Entities:** 1 face(s) **Type:** Roller/Slider

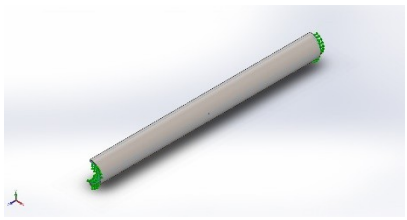
Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-1.33147	-1.83936e-05	5.71832e-05	1.33147
Reaction Moment(N.m)	0	0	0	0

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

Resultant Forces

Components	X	Y	Z	Resultant
Reaction force(N)	-1.27568	-1.83936e-05	-0.0230044	1.27588
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:** 2 N

Connector Definitions

No Data

Contact Information

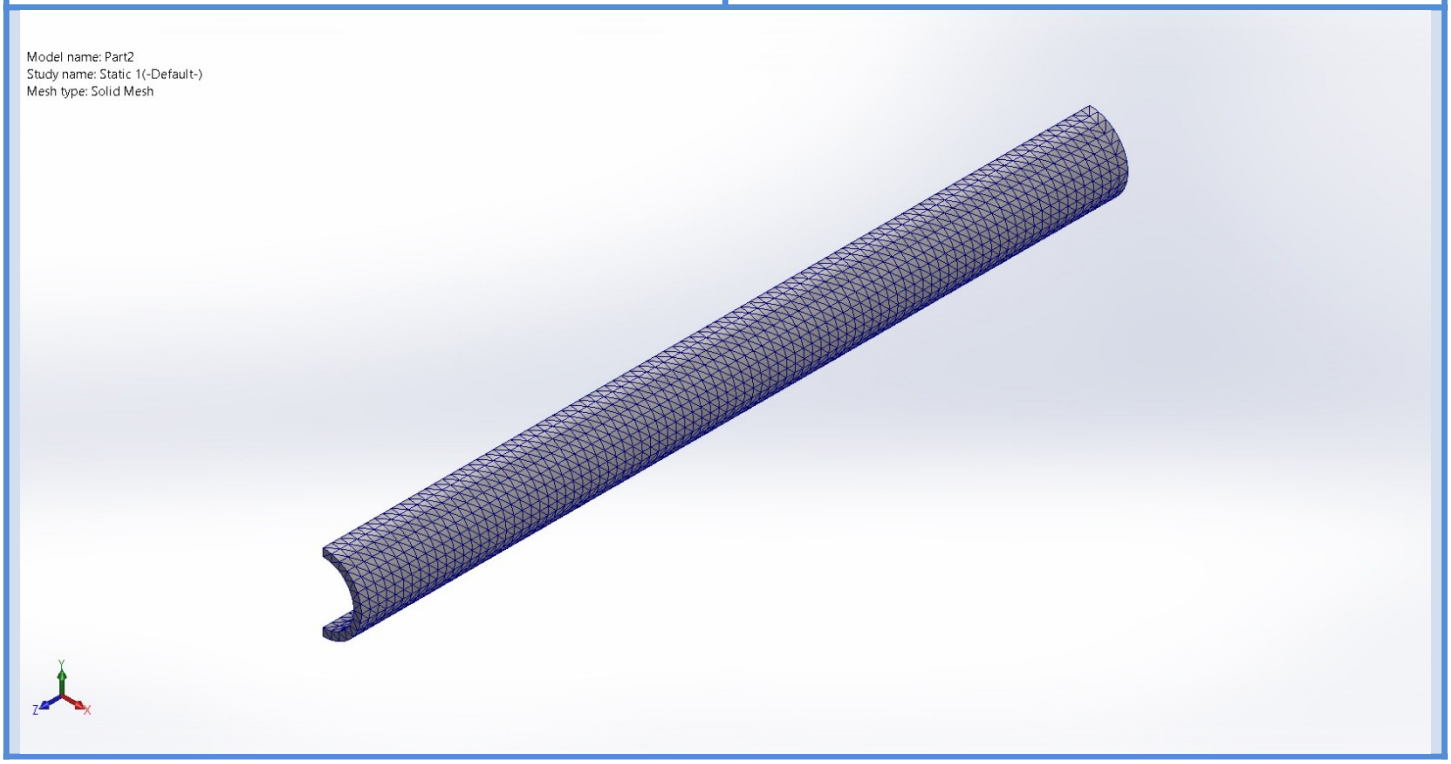
No Data

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	3.36813 mm
Tolerance	0.168407 mm
Mesh Quality	High

Mesh information - Details

Total Nodes	17675
Total Elements	9280
Maximum Aspect Ratio	5.1573
% of elements with Aspect Ratio < 3	99.8
% of elements with Aspect Ratio > 10	0
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:00
Computer name:	



Sensor Details

No Data

Resultant Forces

Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	-1.33147	-1.83936e-05	5.71832e-05	1.33147

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	0.000100754	0.000112906	0.000108168	0.000186009

Free body moments

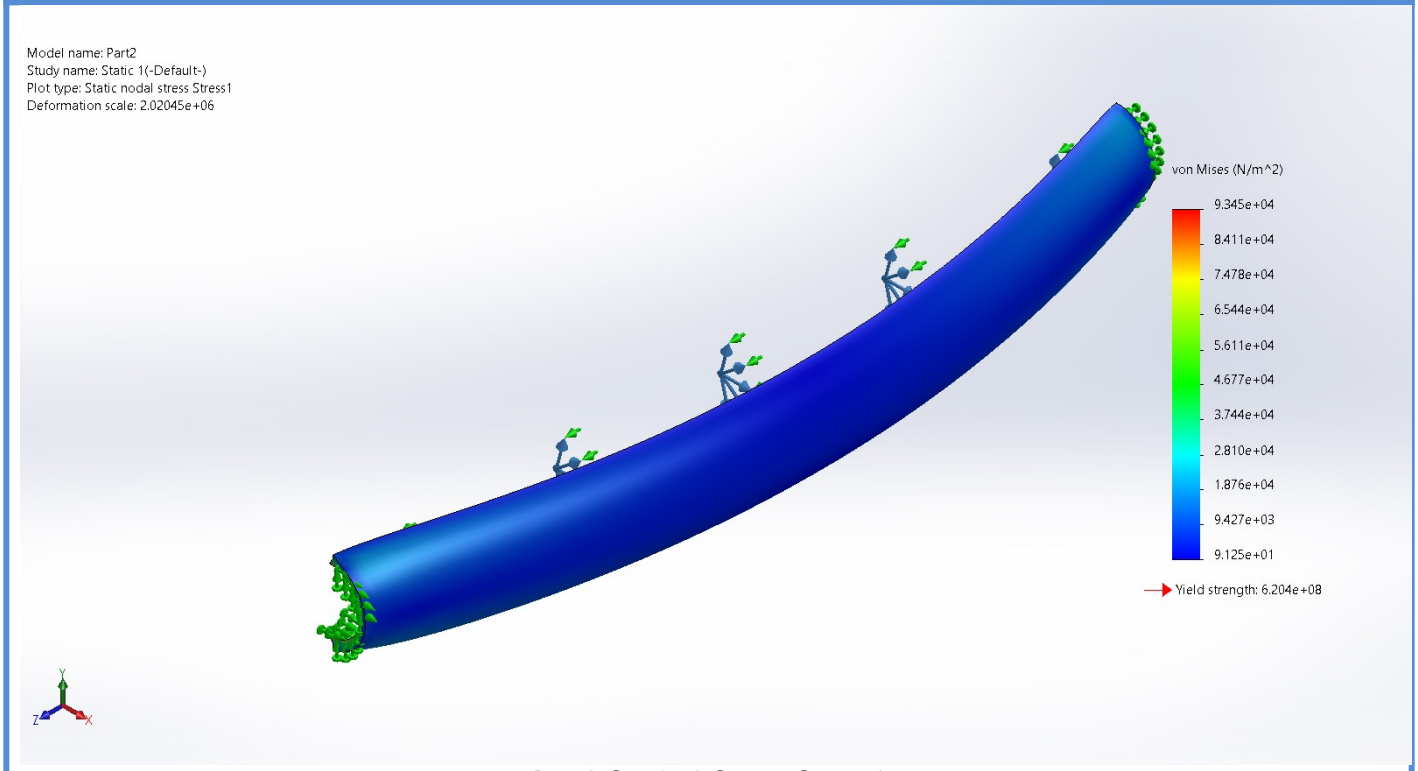
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-33

Beams

No Data

Study Results

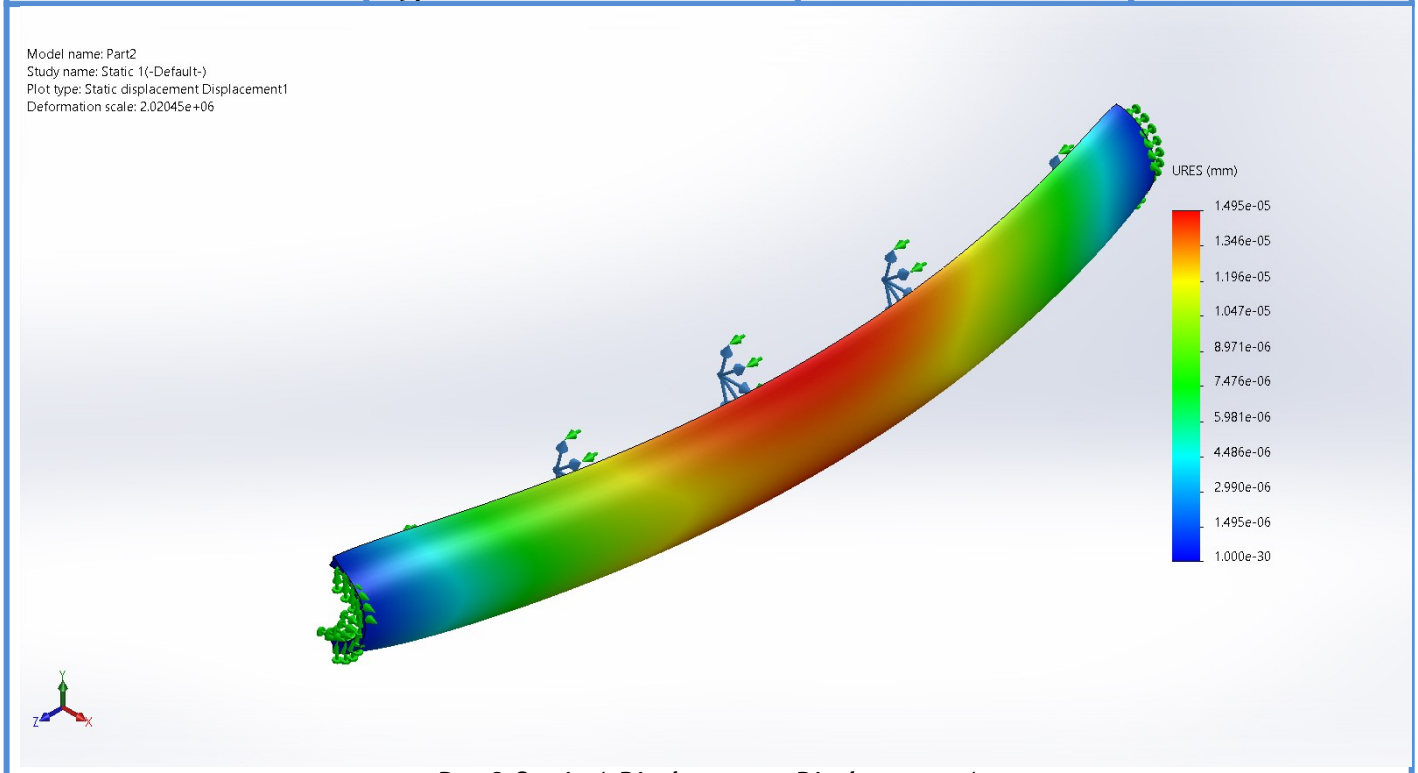
Name	Type	Min	Max
Stress1	VON: von Mises Stress	9.125e+01N/m^2 Node: 1474	9.345e+04N/m^2 Node: 1



Part2-Static 1-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00mm Node: 1	1.495e-05mm Node: 1417

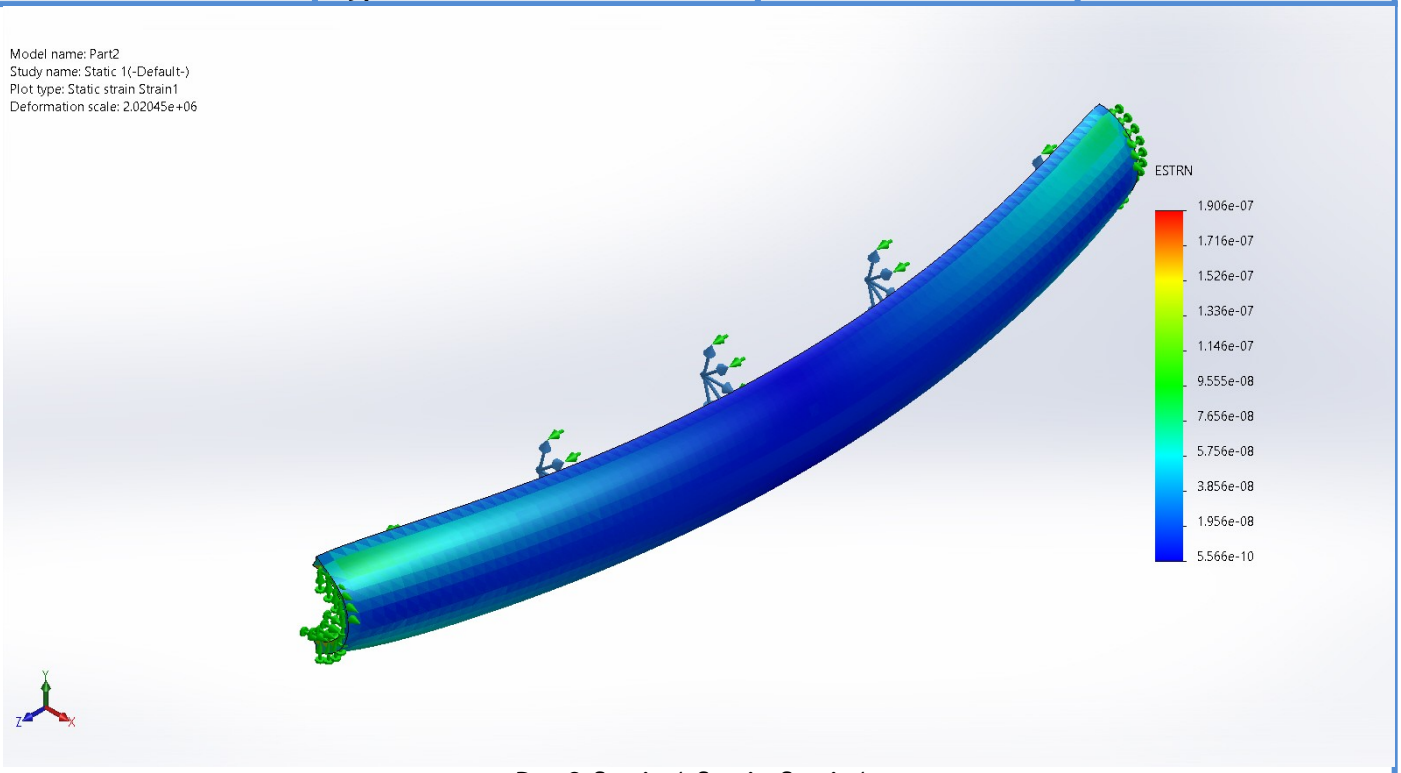
Name	Type	Min	Max



Part2-Static 1-Displacement-Displacement1

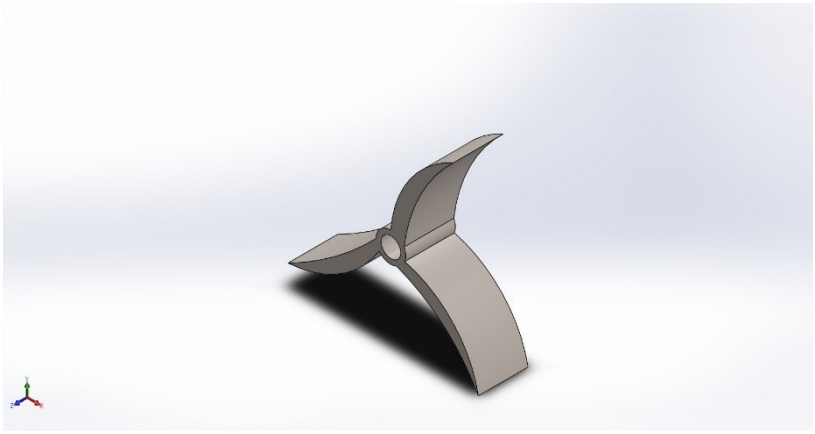
Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	5.566e-10 Element: 2253	1.906e-07 Element: 7230

Name	Type	Min	Max



Part2-Static 1-Strain-Strain1

Conclusion



Simulation of Blade

Date: 17 April 2021
Designer: Solidworks
Study name: Static 1
Analysis type: Static

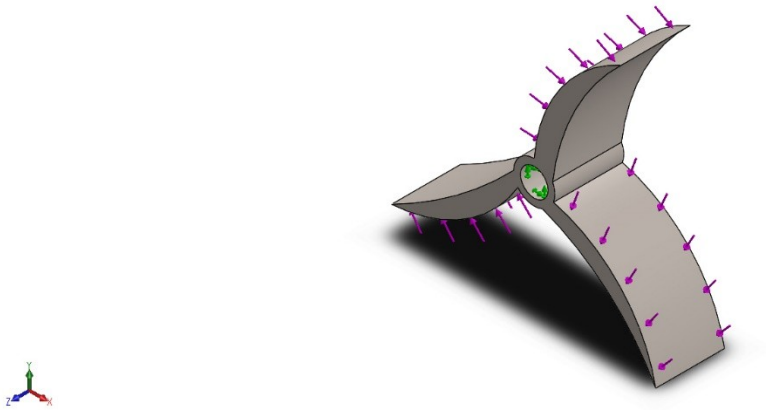
Table of Contents

Description

Converts hydraulic energy to mechanical energy

Assumptions

Model Information



Model name: Part4
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude2 	Solid Body	Mass:0.0117917 kg Volume:1.53139e-06 m^3 Density:7,700 kg/m^3 Weight:0.115558 N	C:\Users\Mohamed Akheel.M\Downloads\New folder (2)\Part4.SLDPRT Apr 17 21:22:29 2021

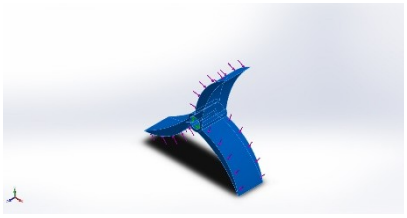
Study Properties

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	FFEPlus
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\Mohamed Akheel.M\Downloads\New folder (2))

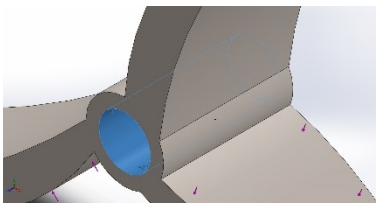
Units

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

Material Properties

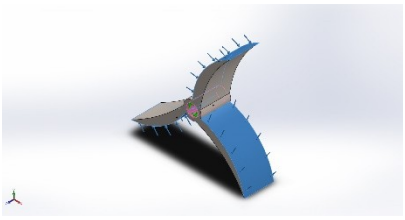
Model Reference	Properties	Components
	**Name:** Alloy Steel **Model type:** Linear Elastic Isotropic **Default failure criterion:** Max von Mises Stress **Yield strength:** 6.20422e+08 N/m^2 **Tensile strength:** 7.23826e+08 N/m^2 **Elastic modulus:** 2.1e+11 N/m^2 **Poisson's ratio:** 0.28 **Mass density:** 7,700 kg/m^3 **Shear modulus:** 7.9e+10 N/m^2 **Thermal expansion coefficient:** 1.3e-05 /Kelvin	SolidBody 1(Boss-Extrude2)(Part4)
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)	22.6446	46.9933	0.0060029	52.1646
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details
Torque-1		**Entities:** 3 face(s) **Reference:** Face< 1 > **Type:** Apply torque **Value:** 5 N.m

Connector Definitions
No Data

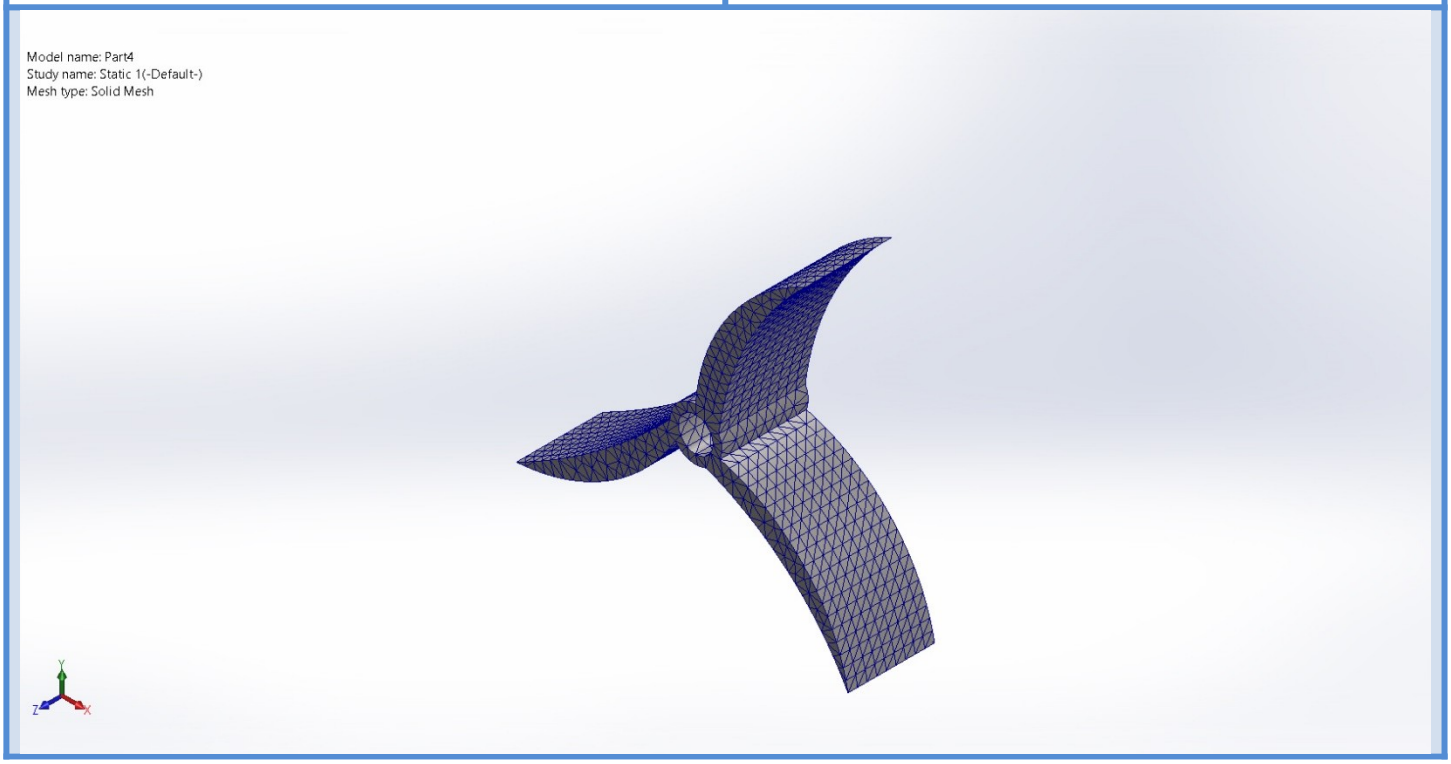
Contact Information
No Data

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	1.15316 mm
Tolerance	0.0576579 mm
Mesh Quality	High

Mesh information - Details

Total Nodes	13806
Total Elements	7994
Maximum Aspect Ratio	6.7197
% of elements with Aspect Ratio < 3	97.4
% of elements with Aspect Ratio > 10	0
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:01
Computer name:	



Sensor Details

No Data

Resultant Forces

Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	22.6446	46.9933	0.0060029	52.1646

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	-0.120886	-0.0770569	0.119092	0.186371

Free body moments

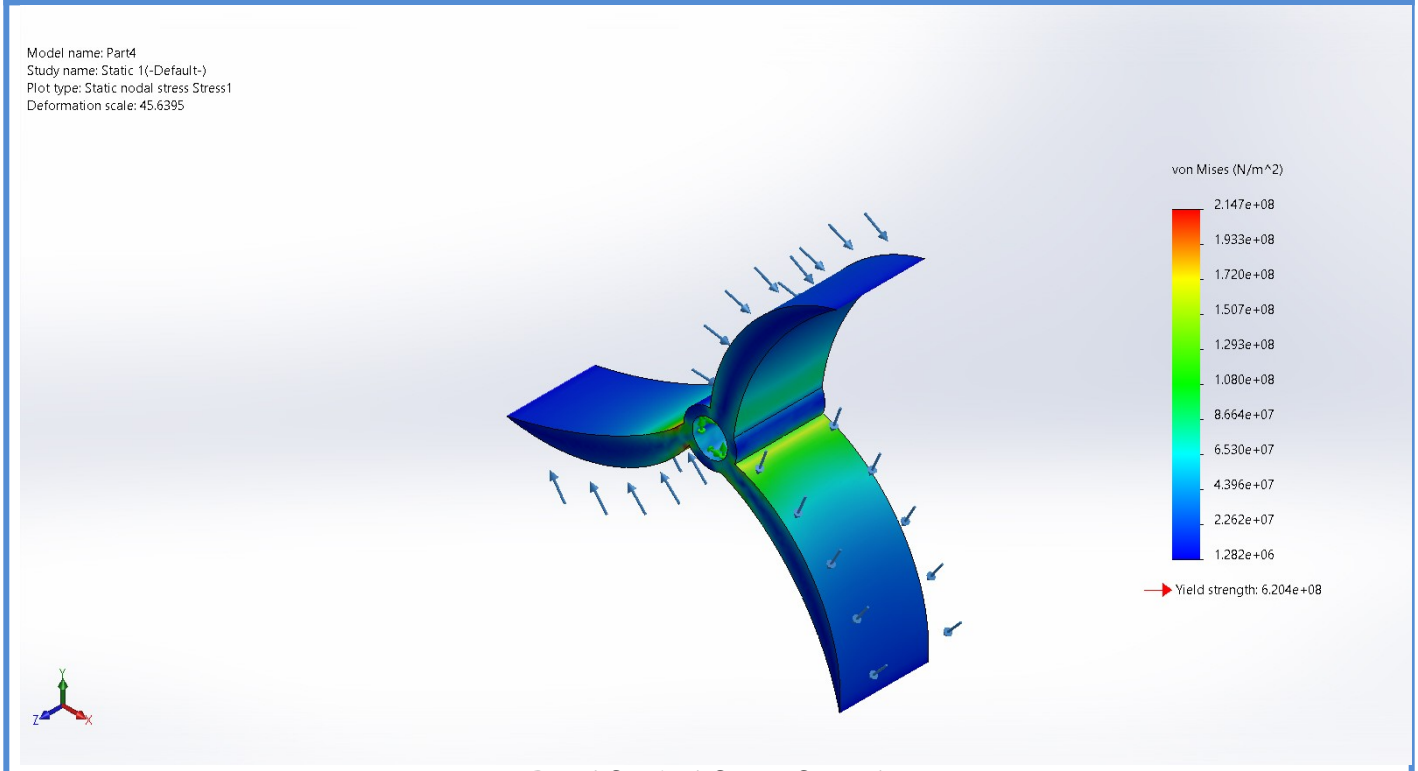
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-33

Beams

No Data

Study Results

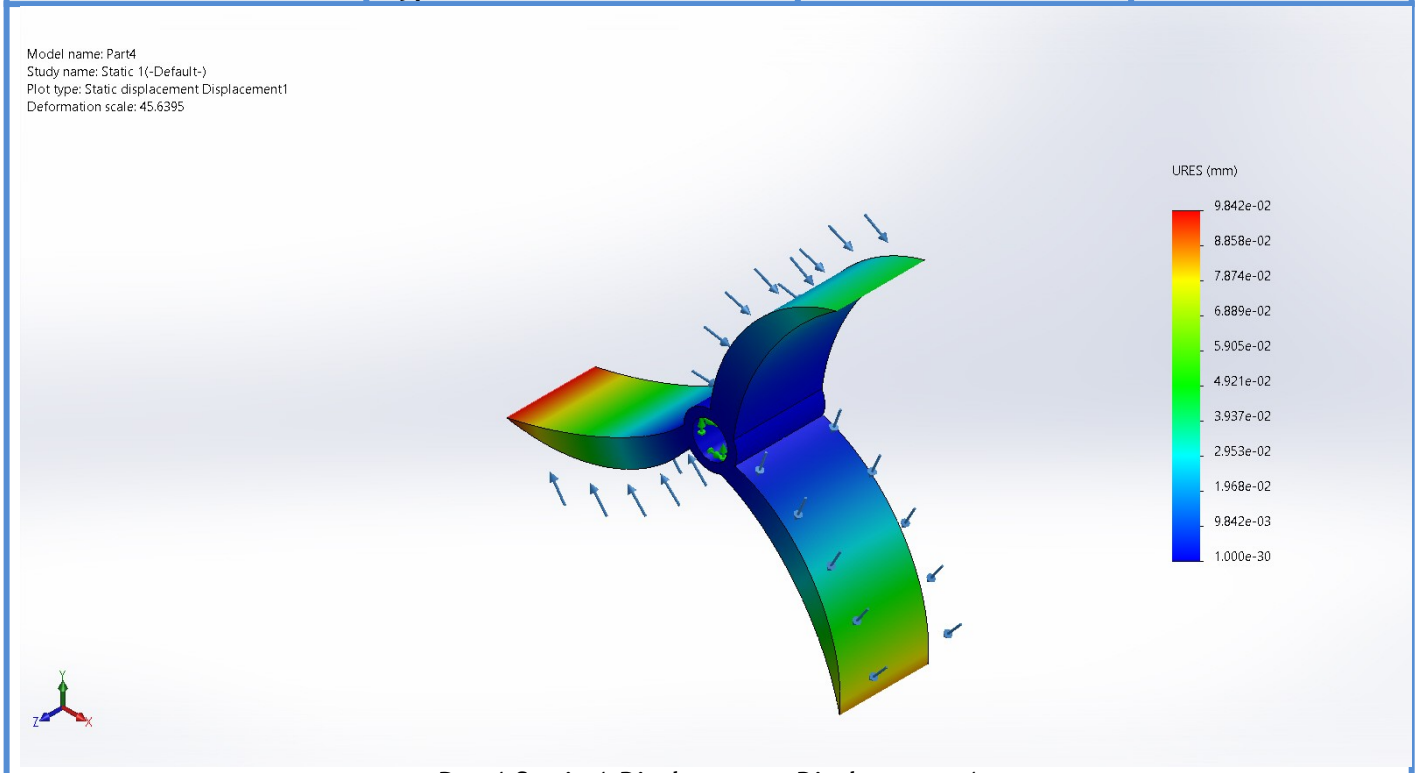
Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.282e+06N/m^2 Node: 11879	2.147e+08N/m^2 Node: 12799



Part4-Static 1-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00mm Node: 1	9.842e-02mm Node: 6429

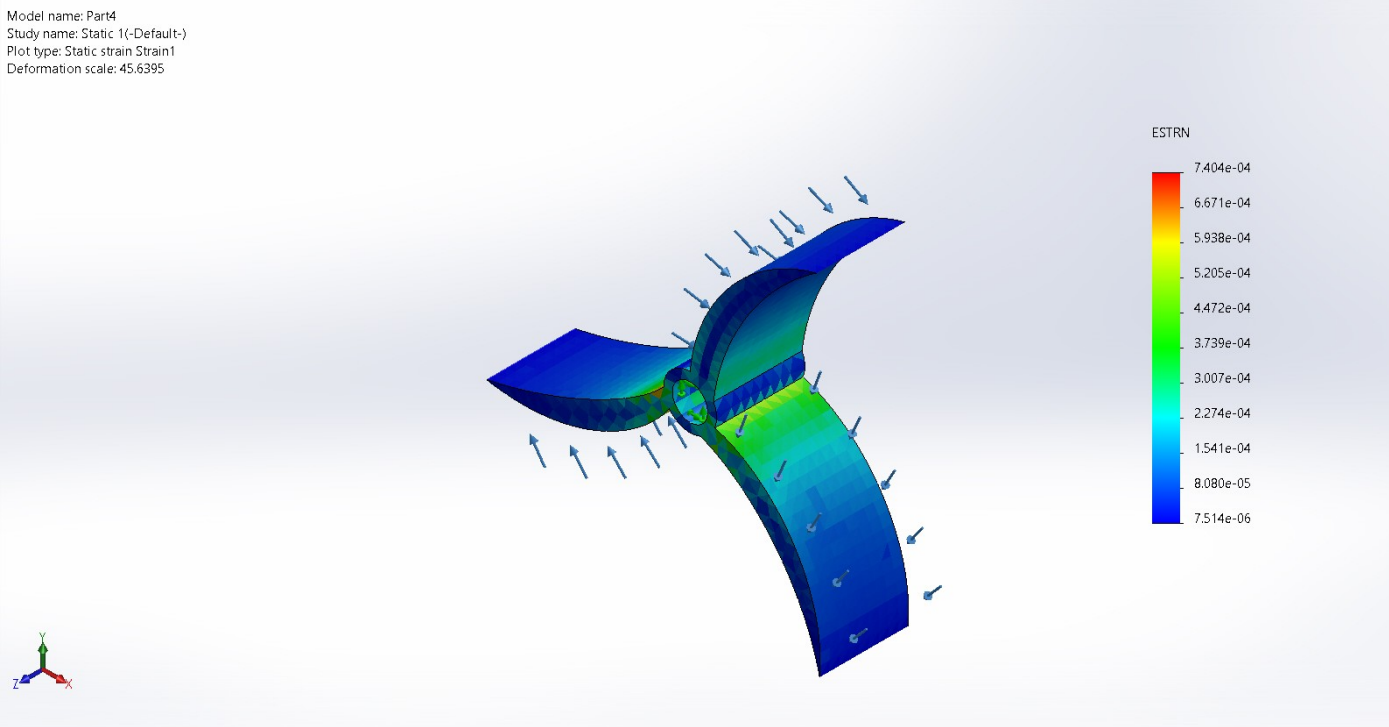
Name	Type	Min	Max



Part4-Static 1-Displacement-Displacement1

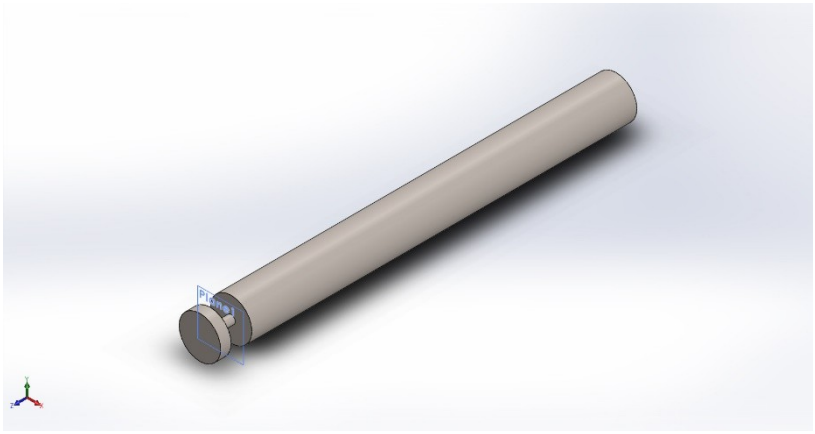
Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	7.514e-06 Element: 697	7.404e-04 Element: 2225

Name	Type	Min	Max



Part4-Static 1-Strain-Strain1

Conclusion



Simulation of Connecting shaft

Date: 17 April 2021
Designer: Solidworks
Study name: Static 1
Analysis type: Static

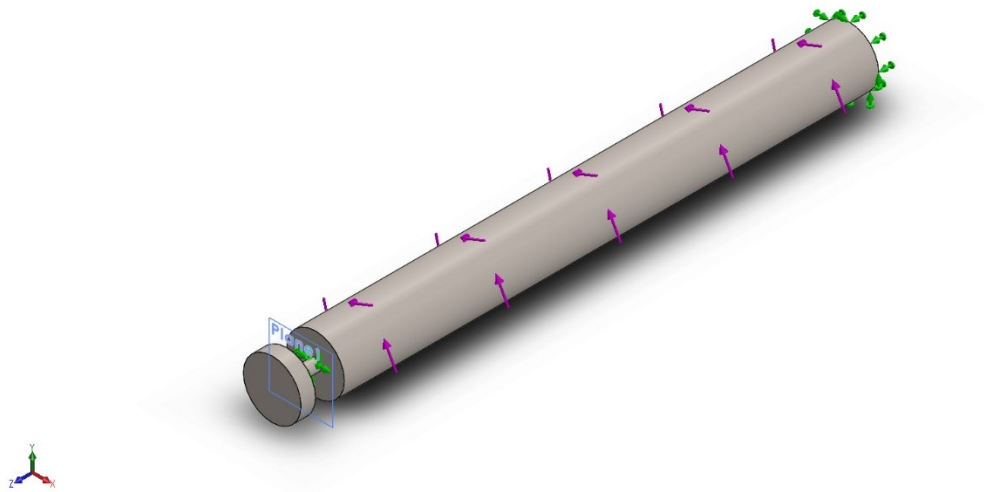
Table of Contents

Description

Transfers motion from blades to generator

Assumptions

Model Information



Model name: Part6
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude1 	Solid Body	Mass:0.460583 kg Volume:5.98159e-05 m^3 Density:7,700 kg/m^3 Weight:4.51371 N	C:\Users\Mohamed Akheel.M\Downloads\New folder (2)\Part6.SLDPRT Apr 17 21:22:29 2021

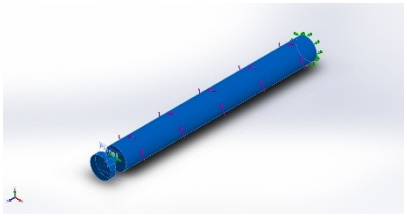
Study Properties

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	FFEPlus
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\Mohamed Akheel.M\Downloads\New folder (2))

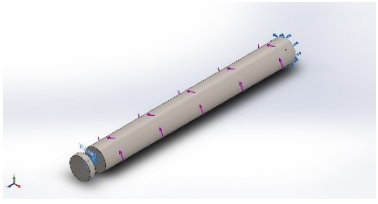
Units

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

Material Properties

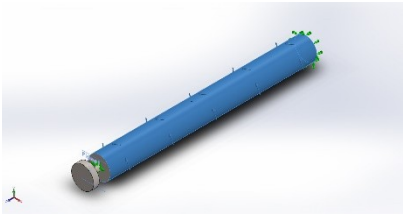
Model Reference	Properties	Components
	**Name:** Alloy Steel **Model type:** Linear Elastic Isotropic **Default failure criterion:** Max von Mises Stress **Yield strength:** 6.20422e+08 N/m^2 **Tensile strength:** 7.23826e+08 N/m^2 **Elastic modulus:** 2.1e+11 N/m^2 **Poisson's ratio:** 0.28 **Mass density:** 7,700 kg/m^3 **Shear modulus:** 7.9e+10 N/m^2 **Thermal expansion coefficient:** 1.3e-05 /Kelvin	SolidBody 1(Cut-Extrude1)(Part6)
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)	-0.00349998	-0.00134659	-0.00334787	0.00502707
Reaction Moment(N.m)	0	0	0	0

Load name	Load Image	Load Details
Torque-1		**Entities:** 1 face(s) **Type:** Apply torque **Value:** 5 N.m

Connector Definitions
No Data

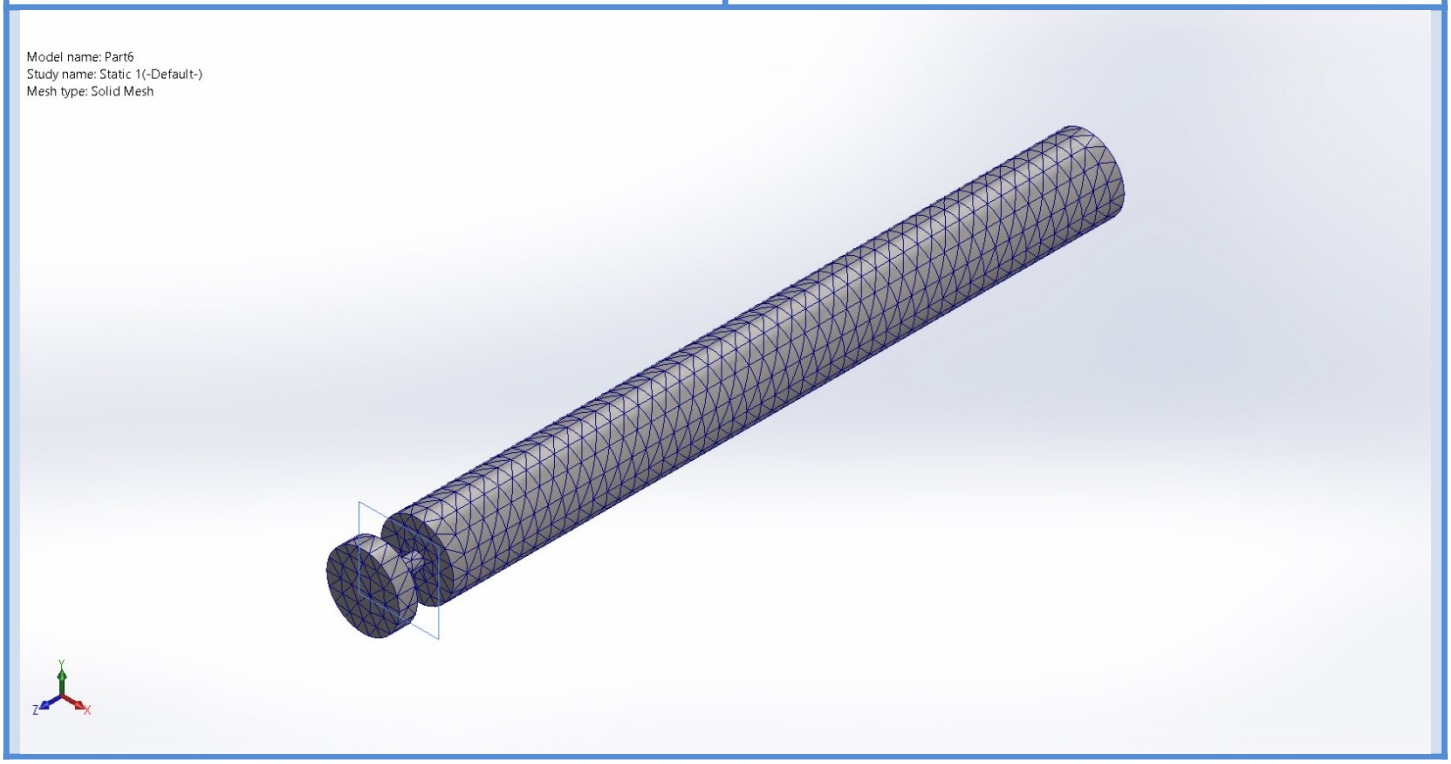
Contact Information
No Data

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	3.91213 mm
Tolerance	0.195606 mm
Mesh Quality	High

Mesh information - Details

Total Nodes	10622
Total Elements	6554
Maximum Aspect Ratio	4.2174
% of elements with Aspect Ratio < 3	99.9
% of elements with Aspect Ratio > 10	0
% of distorted elements(Jacobian)	0
Time to complete mesh(hh;mm;ss):	00:00:01
Computer name:	



Sensor Details

No Data

Resultant Forces

Reaction forces

Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N	-0.00349998	-0.00134659	-0.00334787	0.00502707

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	0.0183278	-0.00575454	0.0149823	0.0243617

Free body moments

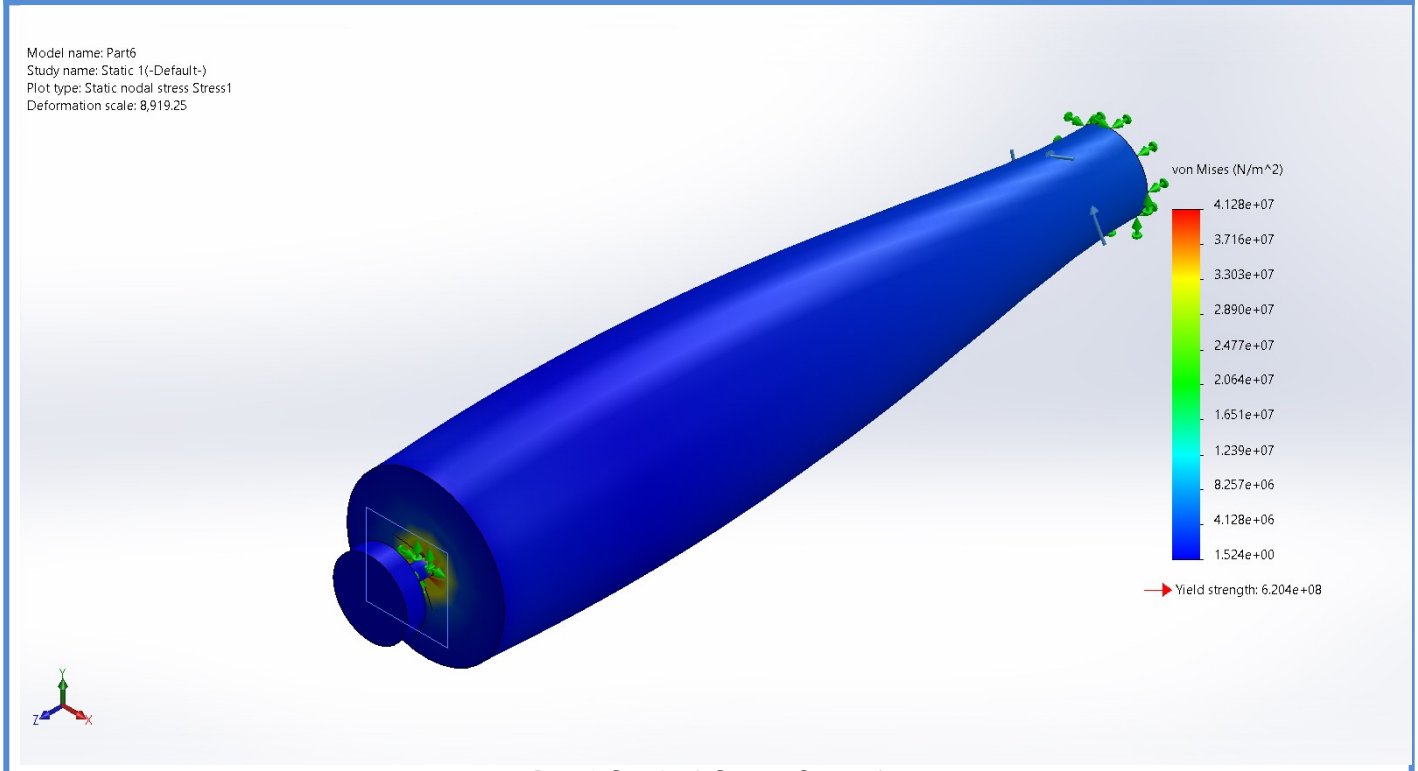
Selection set	Units	Sum X	Sum Y	Sum Z	Resultant
Entire Model	N.m	0	0	0	1e-33

Beams

No Data

Study Results

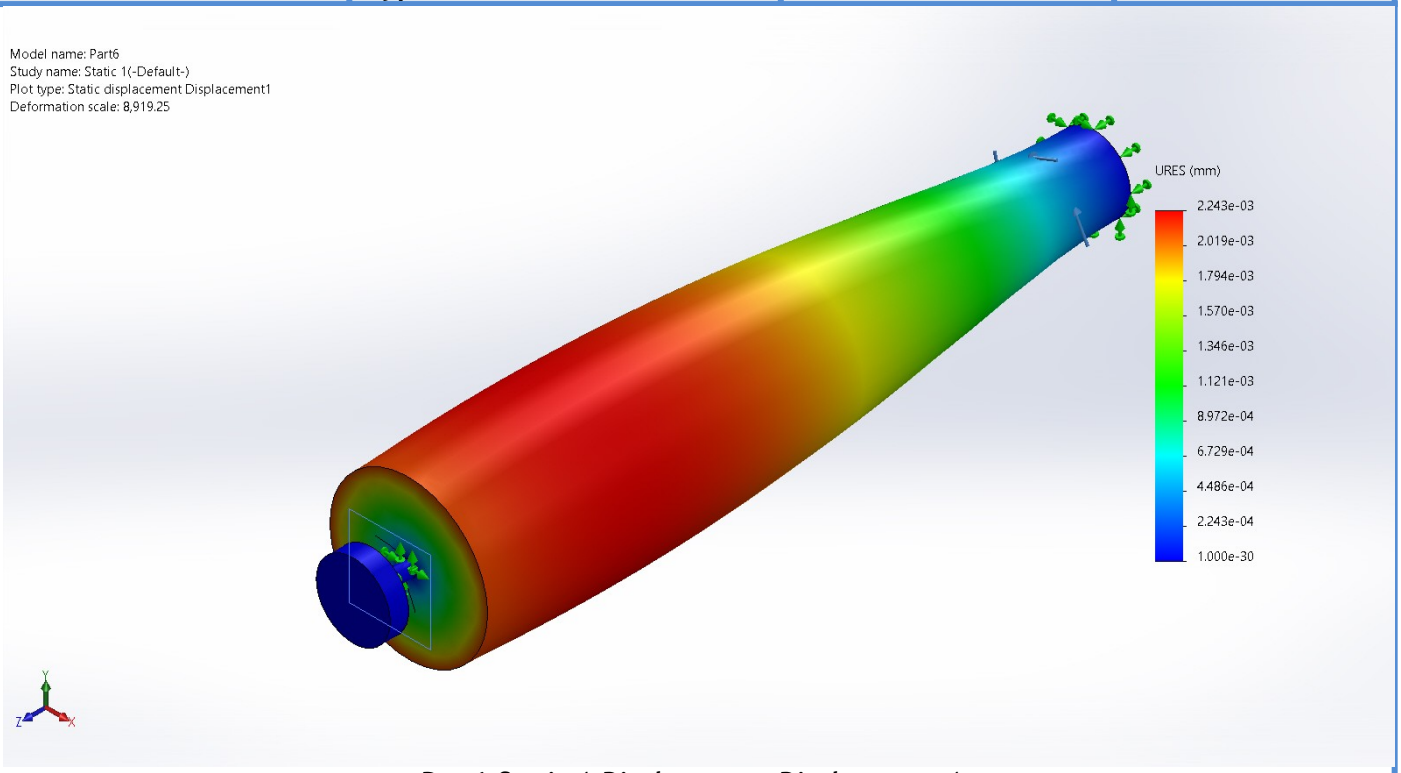
Name	Type	Min	Max
Stress1	VON: von Mises Stress	1.524e+00N/m^2 Node: 10510	4.128e+07N/m^2 Node: 815



Part6-Static 1-Stress-Stress1

Name	Type	Min	Max
Displacement1	URES: Resultant Displacement	0.000e+00mm Node: 30	2.243e-03mm Node: 469

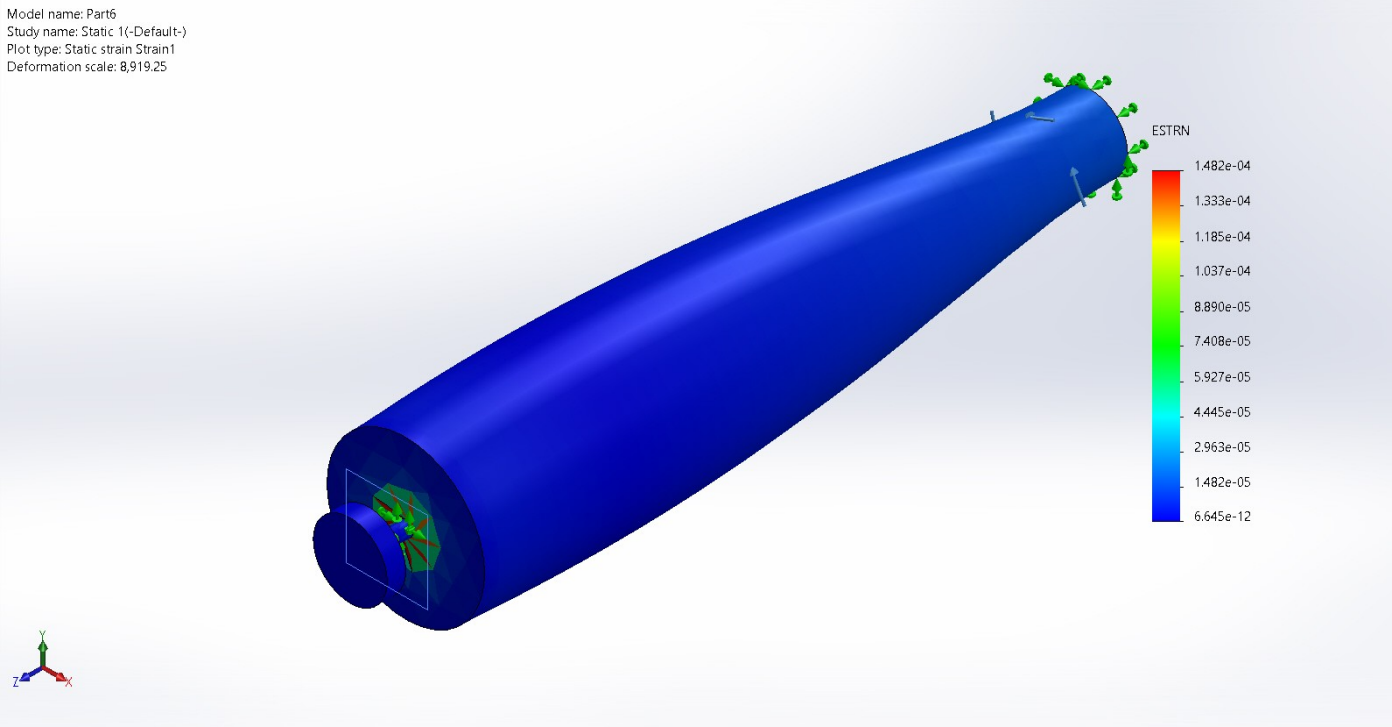
Name	Type	Min	Max



Part6-Static 1-Displacement-Displacement1

Name	Type	Min	Max
Strain1	ESTRN: Equivalent Strain	6.645e-12 Element: 2572	1.482e-04 Element: 2017

Name	Type	Min	Max



Part6-Static 1-Strain-Strain1

Conclusion