

Description

Frequency Analysis of of thin brackets with ribs and beam assembly with a normal load acting on the beam.

Simulation of Assem3

Date: 09 September 2024  
Designer: Solidworks  
Study name: Frequency ThinBracketsWithRibs  
Analysis type: Frequency

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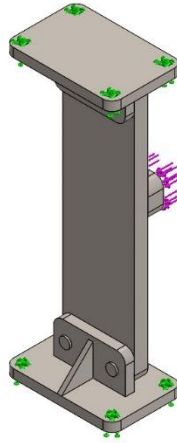
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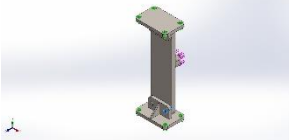
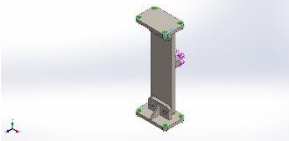
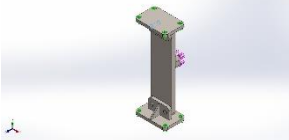

Conclusion..... **Error! Bookmark not defined.**



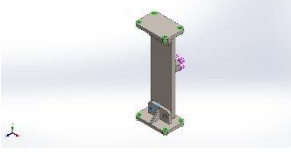
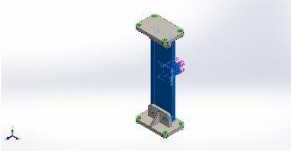
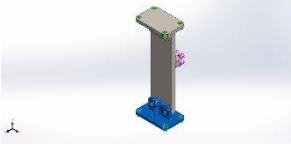


Model name: Assem3  
Current Configuration: Default

### Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude3 	Solid Body	Mass:0.015729 7 kg Volume:2.0428 2e-06 m <sup>3</sup> Density:7,700 kg/m <sup>3</sup> Weight:0.1541 51 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis \Part2.SLDPRT Sep 4 20:57:32 2024
Boss-Extrude3 	Solid Body	Mass:0.015729 7 kg Volume:2.0428 2e-06 m <sup>3</sup> Density:7,700 kg/m <sup>3</sup> Weight:0.1541 51 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis \Part2.SLDPRT Sep 4 20:57:32 2024
Boss-Extrude3 	Solid Body	Mass:0.015729 7 kg Volume:2.0428 2e-06 m <sup>3</sup> Density:7,700 kg/m <sup>3</sup> Weight:0.1541 51 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis \Part2.SLDPRT Sep 4 20:57:32 2024
Boss-Extrude3 	Solid Body	Mass:0.015729 7 kg Volume:2.0428 2e-06 m <sup>3</sup>	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis \Part2.SLDPRT Sep 4 20:57:32 2024



		Density:7,700 kg/m <sup>3</sup> Weight:0.1541 51 N	
Fillet12 	Solid Body	Mass:3.01994 kg Volume:0.0003 922 m <sup>3</sup> Density:7,700 kg/m <sup>3</sup> Weight:29.595 4 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis \Part3.SLDPRT Sep 4 20:40:21 2024
Chamfer10 	Solid Body	Mass:0.969875 kg Volume:0.0001 25958 m <sup>3</sup> Density:7,700 kg/m <sup>3</sup> Weight:9.5047 8 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis \Part5withRib.SLDPRT Sep 9 09:54:01 2024
Body-Move/Copy4	Solid Body	Mass:0.969875 kg Volume:0.0001 25958 m <sup>3</sup> Density:7,700 kg/m <sup>3</sup> Weight:9.5047 8 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis \Part5withRib.SLDPRT Sep 9 09:54:01 2024



## Study Properties

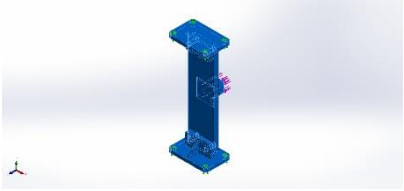
Study name	Frequency ThinBracketsWithRibs
Analysis type	Frequency
Mesh type	Solid Mesh
Number of frequencies	5
Decouple the mixed free body modes	Off
Solver type	FFEPlus
Soft Spring:	Off
Incompatible bonding options	Automatic
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Result folder	SOLIDWORKS document (C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis)

## Units

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

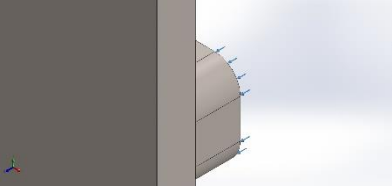


## Material Properties

Model Reference	Properties	Components
	<b>Name:</b> Alloy Steel <b>Model type:</b> Linear Elastic Isotropic <b>Default failure criterion:</b> Max von Mises Stress <b>Yield strength:</b> 6.20422e+08 N/m <sup>2</sup> <b>Tensile strength:</b> 7.23826e+08 N/m <sup>2</sup> <b>Mass density:</b> 7,700 kg/m <sup>3</sup> <b>Elastic modulus:</b> 2.1e+11 N/m <sup>2</sup> <b>Poisson's ratio:</b> 0.28 <b>Thermal expansion coefficient:</b> 1.3e-05 /Kelvin	SolidBody 1(Boss-Extrude3)(Part2-1), SolidBody 1(Boss-Extrude3)(Part2-2), SolidBody 1(Boss-Extrude3)(Part2-3), SolidBody 1(Boss-Extrude3)(Part2-4), SolidBody 1(Fillet12)(Part3-1), SolidBody 1(Chamfer10)(Part5withRib-1), SolidBody 2(Body-Move/Copy4)(Part5withRib-1)
Curve Data:N/A		

## Loads and Fixtures

Fixture name	Fixture Image	Fixture Details
Fixed-1		<b>Entities:</b> 8 face(s) <b>Type:</b> Fixed Geometry

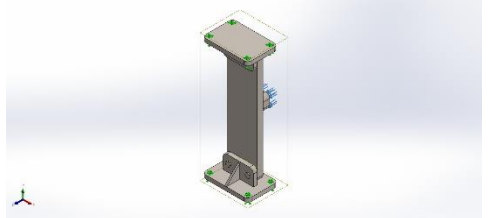
Load name	Load Image	Load Details
Force-1		<b>Entities:</b> 1 face(s) <b>Type:</b> Apply normal force <b>Value:</b> 100,000 N



# Connector Definitions

No Data

## Interaction Information

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

## Mesh information

Mesh type	Solid Mesh
Mesher Used:	Curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	8 mm
Minimum element size	2.66664 mm
Mesh Quality	High
Remesh failed parts independently	Off
Reuse mesh for identical parts in an assembly (Blended curvature-based mesher only)	Off

## Mesh information - Details

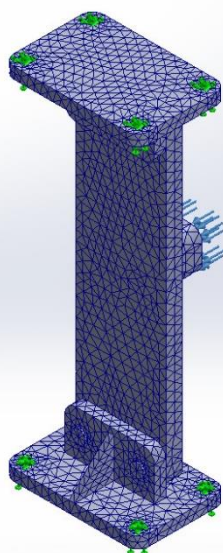
Total Nodes	41008
Total Elements	24080
Maximum Aspect Ratio	4.8614
% of elements with Aspect Ratio < 3	99
Percentage of elements with Aspect Ratio > 10	0
Percentage of distorted elements	0
Time to complete mesh(hh:mm:ss):	00:00:01
Computer name:	

## Mesh Quality Plots

Name	Type	Min	Max
Quality1	Mesh	-	-



Model name: Assem3  
Study name: Frequency ThinBracketsWithRibs(-Default-)  
Plot type: Mesh Quality1



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Assem3-Frequency ThinBracketsWithRibs-Quality-Quality1

## Sensor Details

No Data



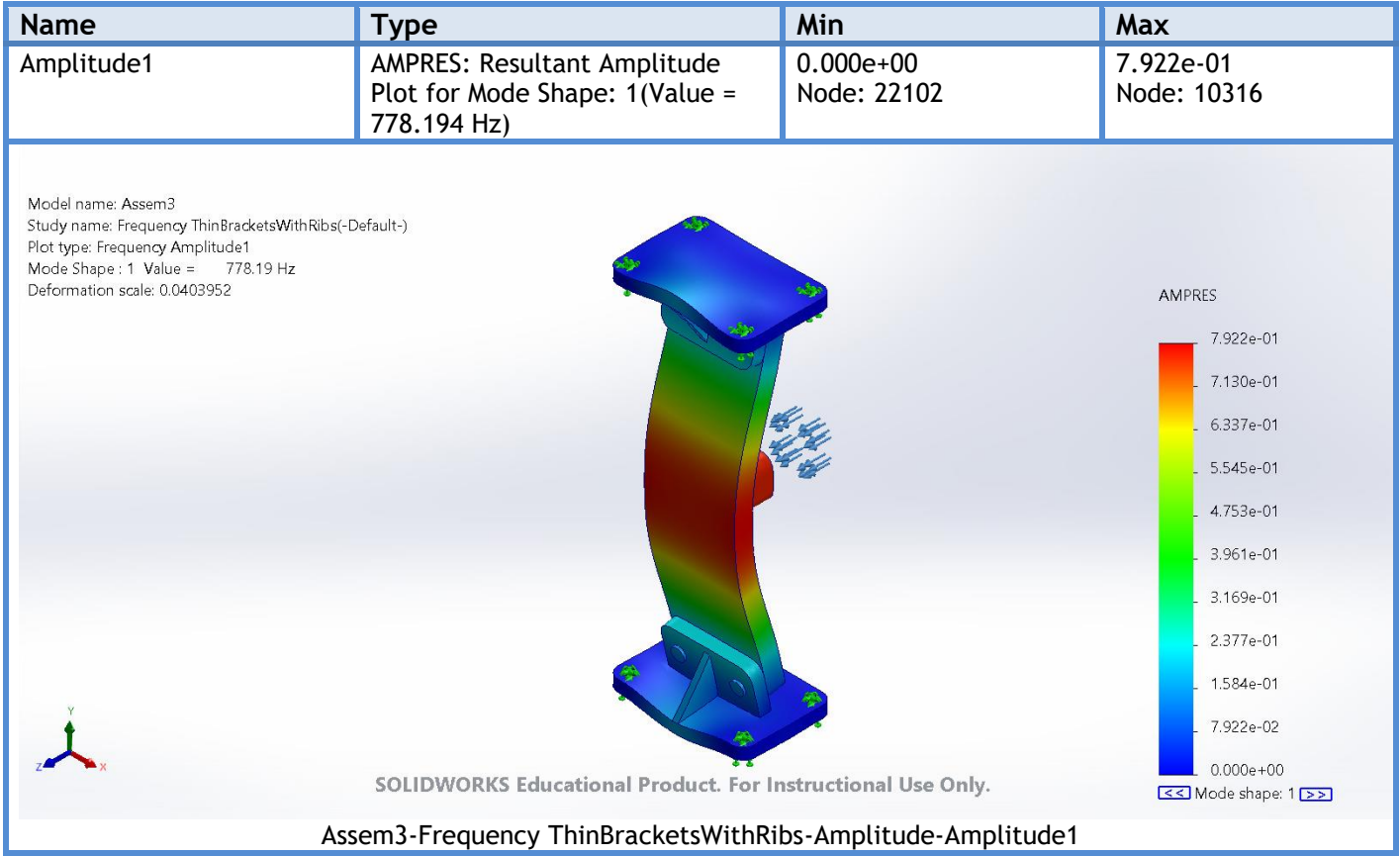
SOLIDWORKS

Analyzed with SOLIDWORKS Simulation

Simulation of Assem3



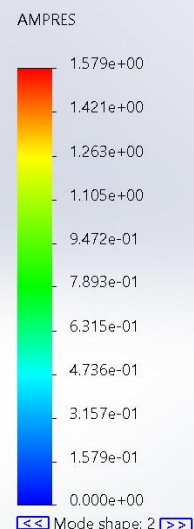
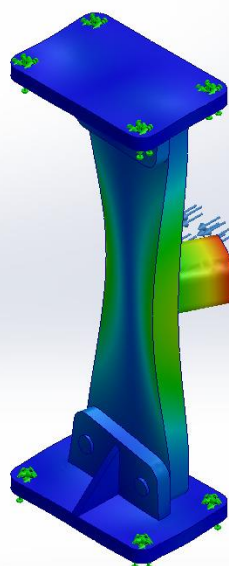
Study Results



Name	Type	Min	Max
Amplitude2	AMPRES: Resultant Amplitude Plot for Mode Shape: 2(Value = 1,698.42 Hz)	0.000e+00 Node: 22102	1.579e+00 Node: 3424



Model name: Assem3  
 Study name: Frequency ThinBracketsWithRibs(-Default-)  
 Plot type: Frequency Amplitude2  
 Mode Shape : 2 Value = 1,698.4 Hz  
 Deformation scale: 0.0210782

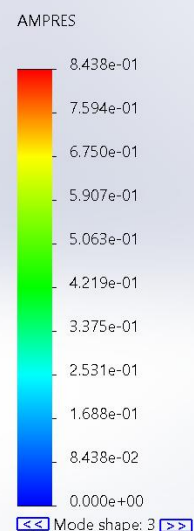
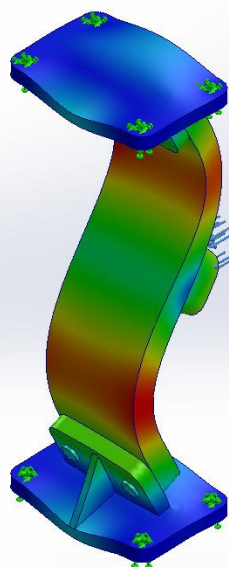


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Assem3-Frequency ThinBracketsWithRibs-Amplitude-Amplitude2

Name	Type	Min	Max
Amplitude3	AMPRES: Resultant Amplitude Plot for Mode Shape: 3(Value = 1,741.12 Hz)	0.000e+00 Node: 22102	8.438e-01 Node: 10021

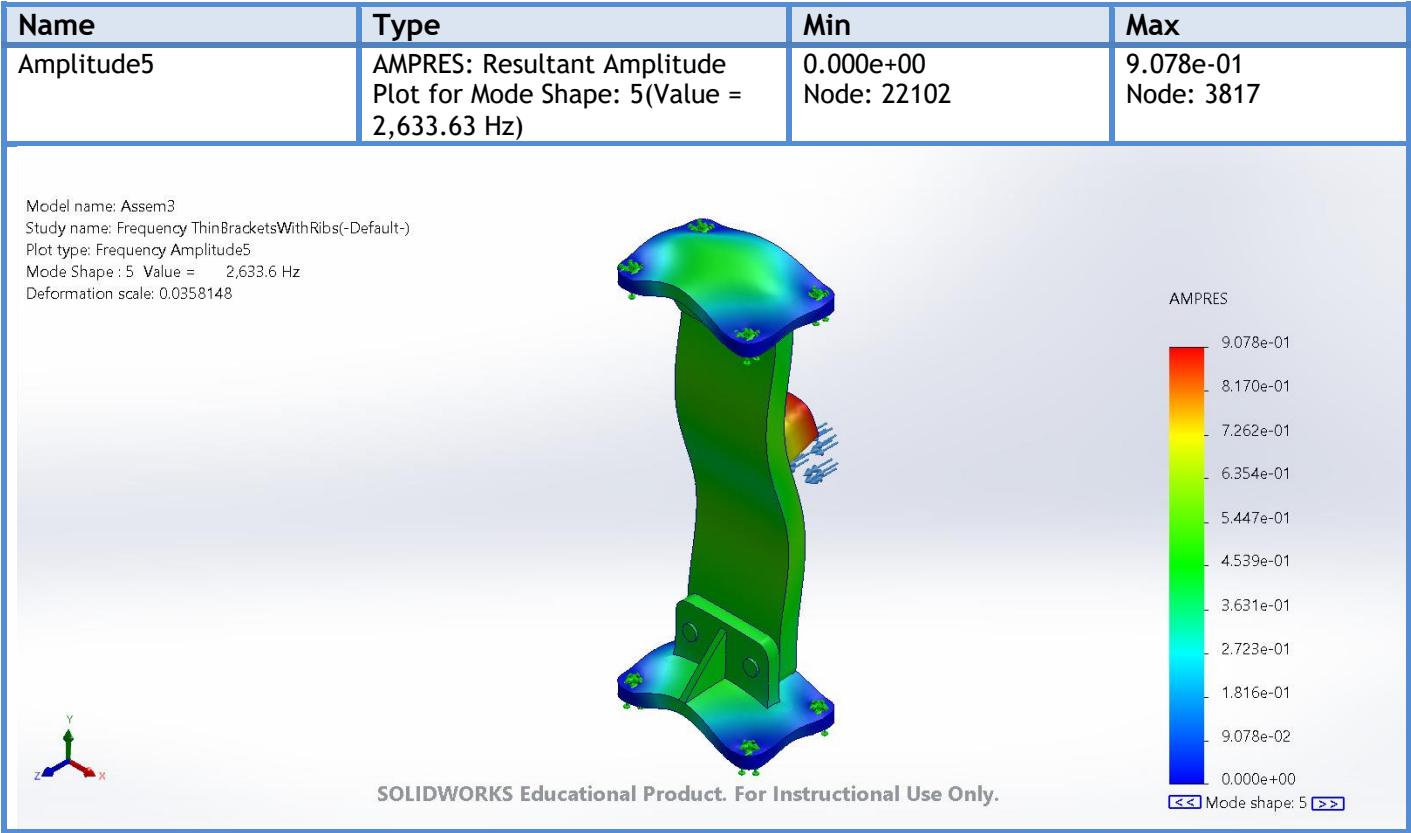
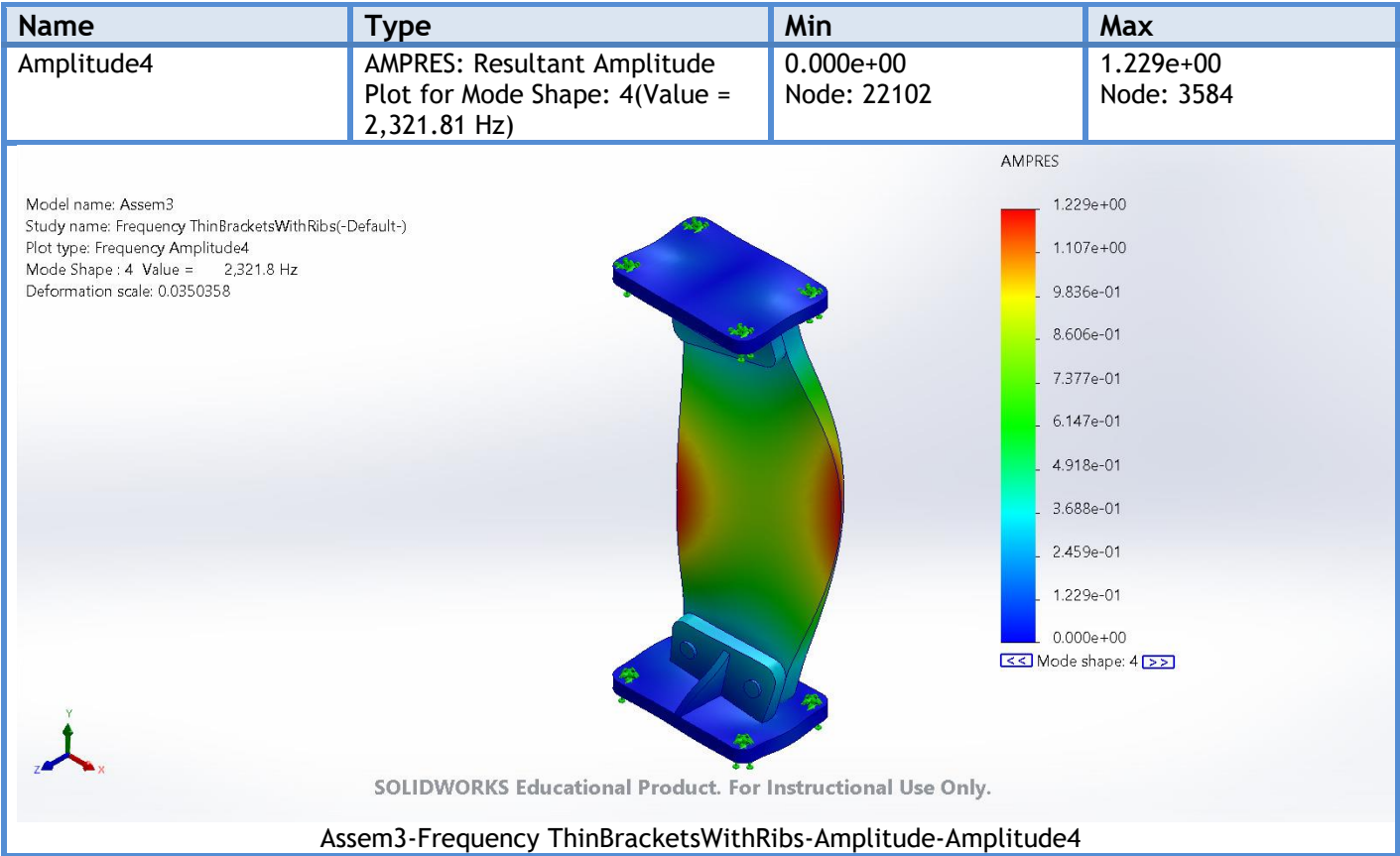
Model name: Assem3  
 Study name: Frequency ThinBracketsWithRibs(-Default-)  
 Plot type: Frequency Amplitude3  
 Mode Shape : 3 Value = 1,741.1 Hz  
 Deformation scale: 0.0392764



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Assem3-Frequency ThinBracketsWithRibs-Amplitude-Amplitude3





**Mode List**

Frequency Number	Rad/sec	Hertz	Seconds
1	4,889.5	778.19	0.001285
2	10,671	1,698.4	0.00058878
3	10,940	1,741.1	0.00057434
4	14,588	2,321.8	0.0004307
5	16,548	2,633.6	0.0003797

**Mass Participation (Normalized)**

Mode Number	Frequency(Hertz)	X direction	Y direction	Z direction
1	778.19	2.0048e-08	5.8728e-09	0.52052
2	1,698.4	0.25445	0.00015126	3.6757e-08
3	1,741.1	0.00070249	0.069055	1.0226e-09
4	2,321.8	0.31599	3.0489e-05	1.7887e-08
5	2,633.6	1.7823e-05	0.8145	3.0425e-12
		Sum X = 0.57116	Sum Y = 0.88373	Sum Z = 0.52052

