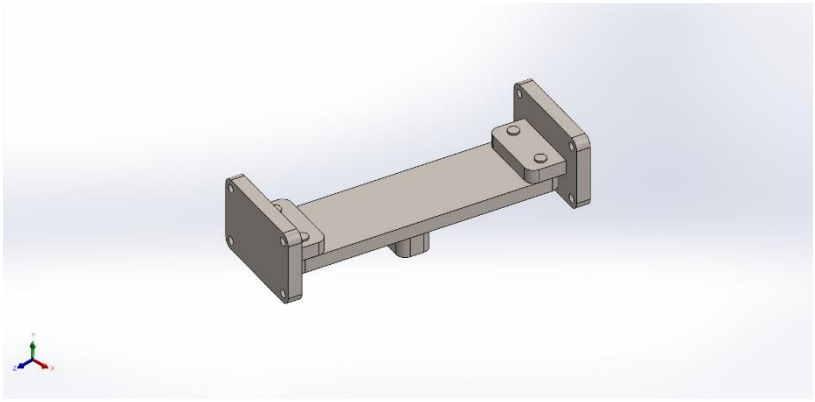

Simulation of Assem2

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

Table of Contents

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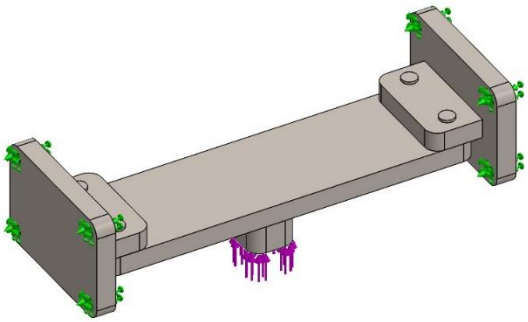
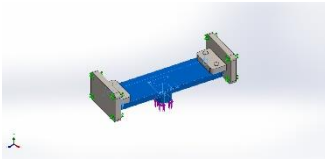
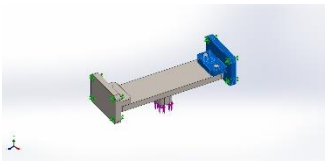
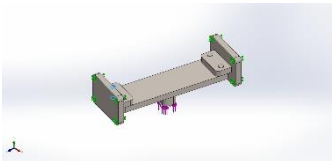
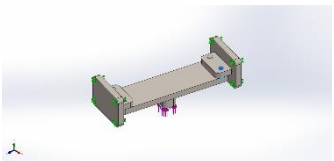
Description

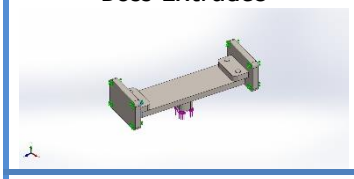
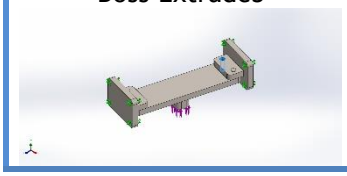
Frequency analysis of thick brackets holding a beam with normal vertical load applied on it.



Model name: Assem2
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Fillet12 	Solid Body	**Mass:3.01994 kg** **Volume:0.0003922 m^3** **Density:7,700 kg/m^3** **Weight:29.5954 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part3.SLDPRT** Sep 4 20:40:21 2024
Cut-Extrude3 	Solid Body	**Mass:1.41944 kg** **Volume:0.000184343 m^3** **Density:7,700 kg/m^3** **Weight:13.9105 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part4.SLDPRT** Sep 7 10:22:46 2024
Body-Move/Copy3	Solid Body	Mass:1.41944 kg Volume:0.000184343 m^3 Density:7,700 kg/m^3 Weight:13.9105 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part4.SLDPRT Sep 7 10:22:46 2024
Boss-Extrude3 	Solid Body	Mass:0.018179 kg Volume:2.36091e-06 m^3 Density:7,700 kg/m^3 Weight:0.178154 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\pin2.SLDPRT Sep 8 20:00:56 2024
Boss-Extrude3 	Solid Body	Mass:0.018179 kg Volume:2.36091e-06 m^3 Density:7,700 kg/m^3 Weight:0.178154 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\pin2.SLDPRT Sep 8 20:00:56 2024

Boss-Extrude3 	Solid Body	Mass:0.018179 kg Volume:2.36091e-06 m^3 Density:7,700 kg/m^3 Weight:0.178154 N	C:\Users\user\Desktop\Solidworks_FEA\FEAfrequency Analysis\pin2.SLDPRT Sep 8 20:00:56 2024
Boss-Extrude3 	Solid Body	**Mass:0.018179 kg** **Volume:2.36091e-06 m^3** **Density:7,700 kg/m^3** **Weight:0.178154 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\pin2.SLDPRT** Sep 8 20:00:56 2024

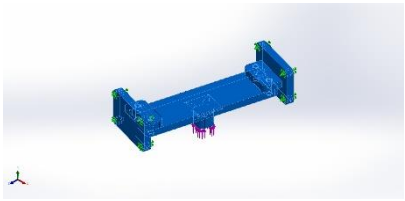
Study Properties

Study name	Frequency ThickBracket
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)

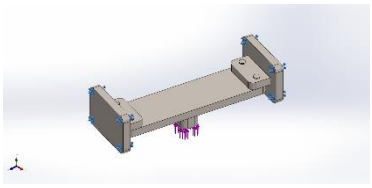
Units

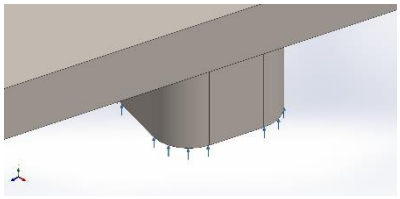
Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

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 **Mass density:** 7,700 kg/m^3 **Elastic modulus:** 2.1e+11 N/m^2 **Poisson's ratio:** 0.28 **Thermal expansion coefficient:** 1.3e-05 /Kelvin	SolidBody 1(Fillet12)(Part3-3), SolidBody 1(Cut-Extrude3)(Part4-1), SolidBody 2(Body-Move/Copy3)(Part4-1), SolidBody 1(Boss-Extrude3)(pin2-5), SolidBody 1(Boss-Extrude3)(pin2-6), SolidBody 1(Boss-Extrude3)(pin2-7), SolidBody 1(Boss-Extrude3)(pin2-8)
Curve Data:N/A		

Loads and Fixtures

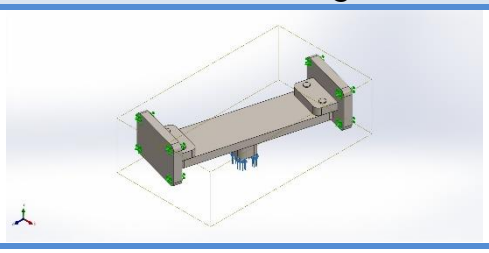
Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 8 face(s) **Type:** Fixed Geometry

Load name	Load Image	Load Details
Force-1		**Entities:** 1 face(s) **Type:** Apply normal force **Value:** 100,000 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

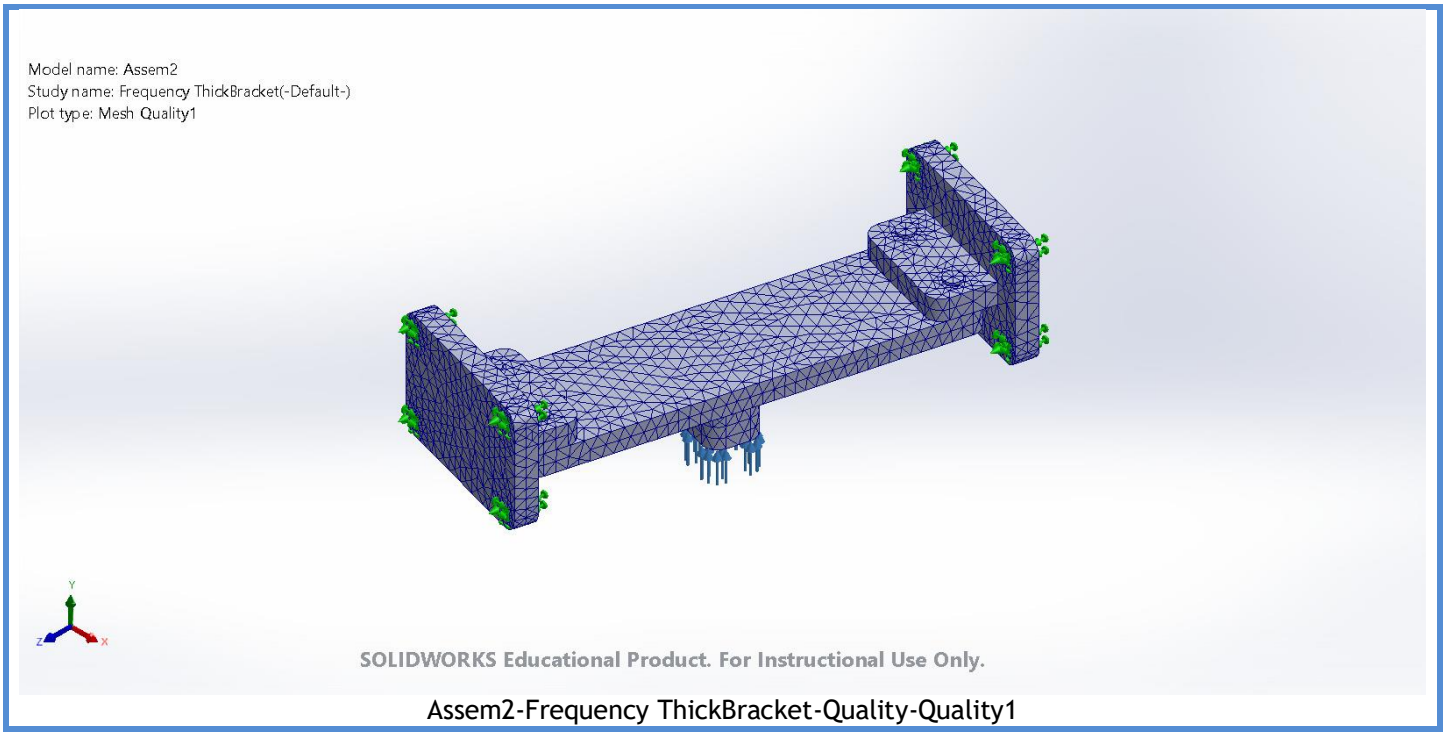
Mesh type	Solid Mesh
Mesher Used:	Curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	9 mm
Minimum element size	2.99997 mm
Mesh Quality	High
Remesh failed parts independently	Off
Reuse mesh for identical parts in an assembly (Blended curvature-based mesher only)	Off

Mesh information - Details

Total Nodes	41662
Total Elements	24844
Maximum Aspect Ratio	4.3464
% of elements with Aspect Ratio < 3	99.1
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:	

Mesh Quality Plots

Name	Type	Min	Max
Quality1	Mesh	-	-



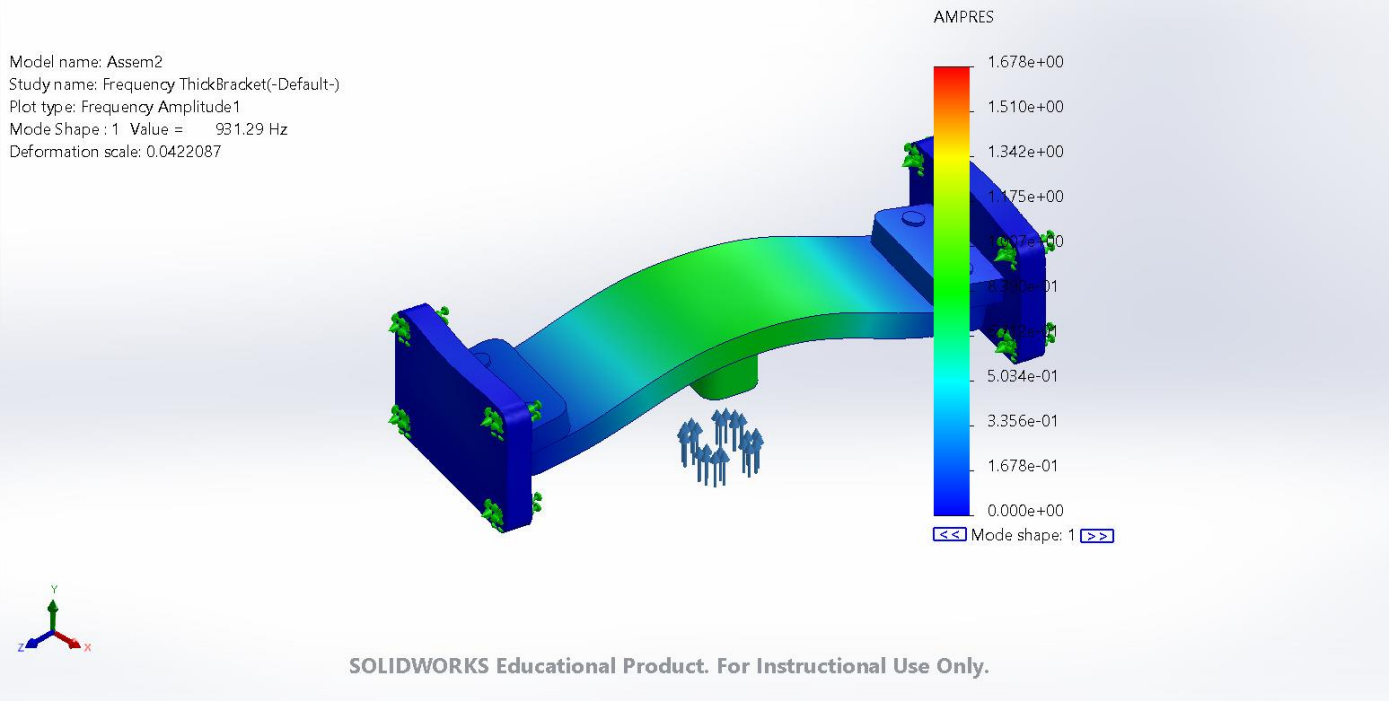
Assem2-Frequency ThickBracket-Quality-Quality1

Sensor Details

No Data

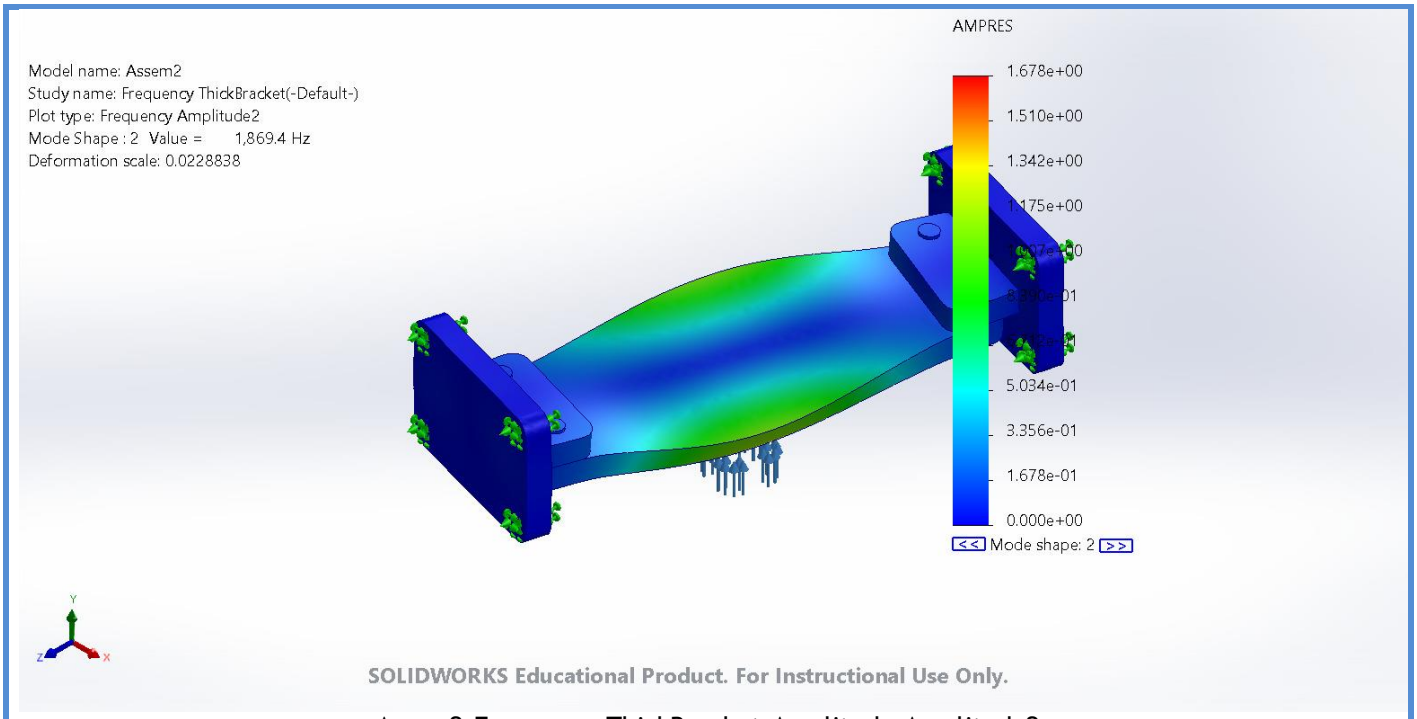
Study Results

Name	Type	Min	Max
Amplitude1	AMPRES: Resultant Amplitude Plot for Mode Shape: 1(Value = 931.29 Hz)	0.000e+00 Node: 16821	8.292e-01 Node: 6320



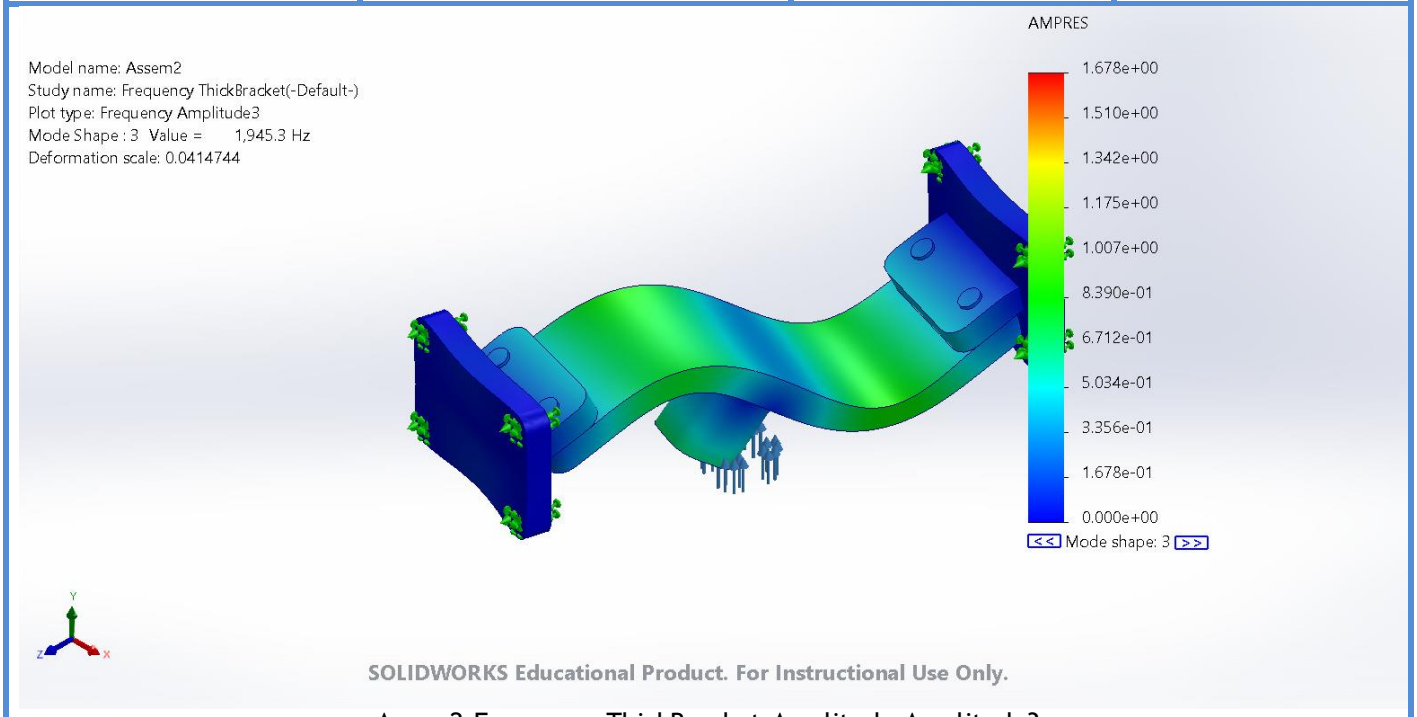
Assem2-Frequency ThickBracket-Amplitude-Amplitude1

Name	Type	Min	Max
Amplitude2	AMPRES: Resultant Amplitude Plot for Mode Shape: 2(Value = 1,869.38 Hz)	0.000e+00 Node: 16821	1.678e+00 Node: 6



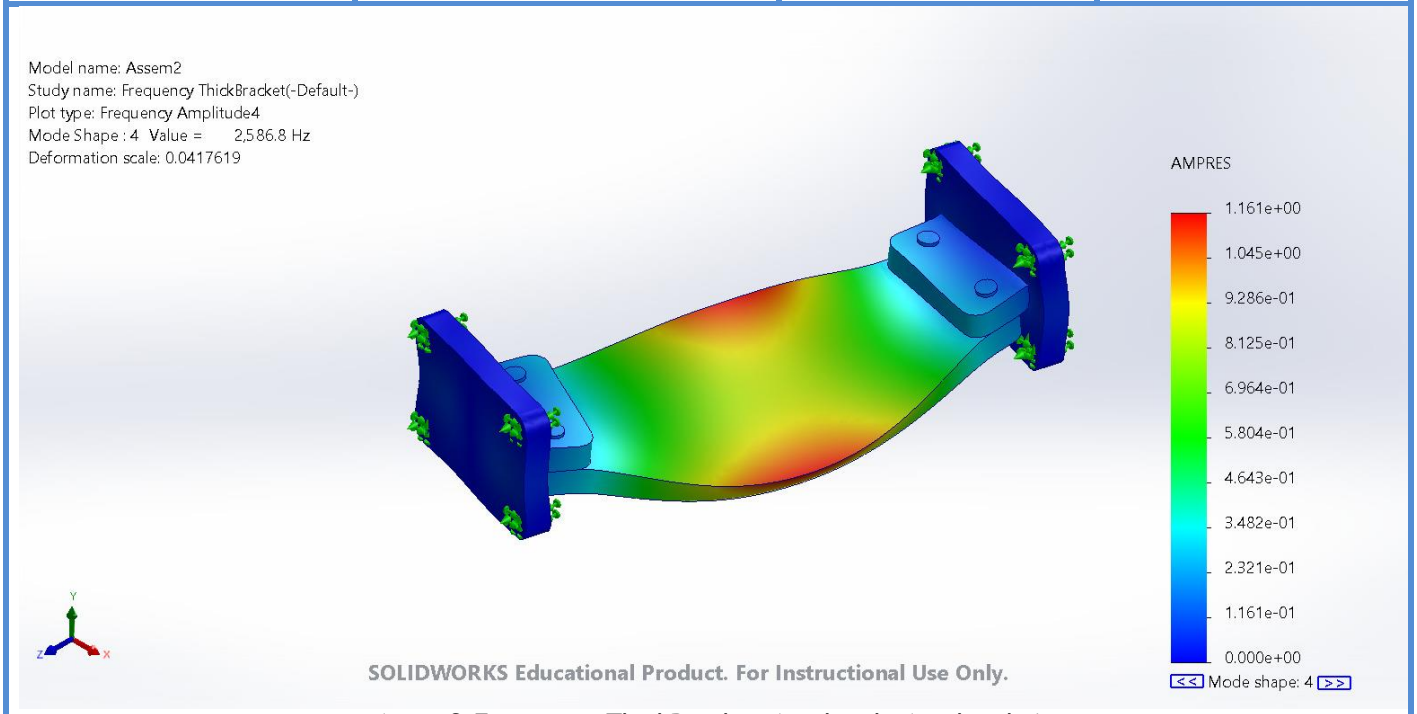
Assem2-Frequency ThickBracket-Amplitude-Amplitude2

Name	Type	Min	Max
Amplitude3	AMPRES: Resultant Amplitude Plot for Mode Shape: 3(Value = 1,945.26 Hz)	0.000e+00 Node: 16821	8.656e-01 Node: 6133



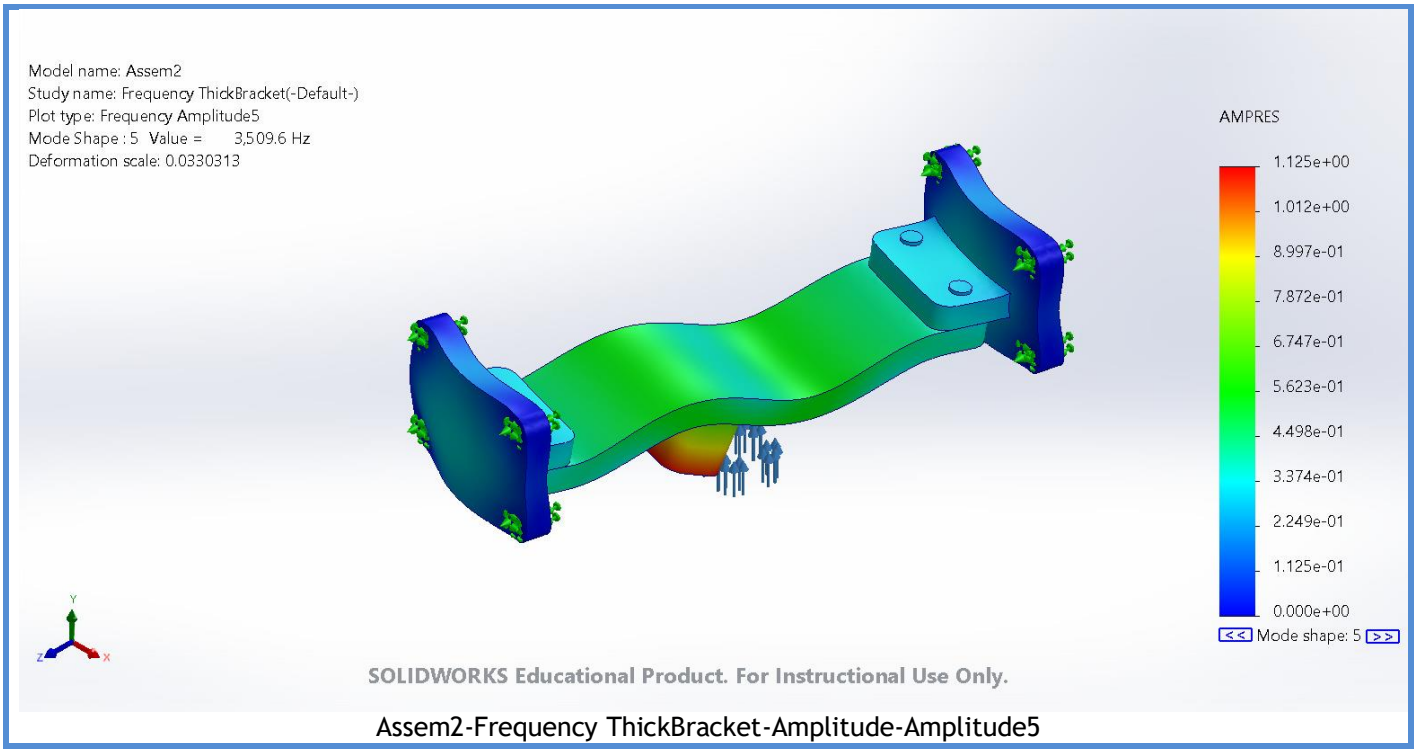
Assem2-Frequency ThickBracket-Amplitude-Amplitude3

Name	Type	Min	Max
Amplitude4	AMPRES: Resultant Amplitude Plot for Mode Shape: 4(Value = 2,586.79 Hz)	0.000e+00 Node: 16821	1.161e+00 Node: 168



Assem2-Frequency ThickBracket-Amplitude-Amplitude4

Name	Type	Min	Max
Amplitude5	AMPRES: Resultant Amplitude Plot for Mode Shape: 5(Value = 3,509.56 Hz)	0.000e+00 Node: 16821	1.125e+00 Node: 413



Assem2-Frequency ThickBracket-Amplitude-Amplitude5

Mode List

Frequency Number	Rad/sec	Hertz	Seconds
1	5,851.5	931.29	0.0010738
2	11,746	1,869.4	0.00053494
3	12,222	1,945.3	0.00051407
4	16,253	2,586.8	0.00038658
5	22,051	3,509.6	0.00028494

Mass Participation (Normalized)

Mode Number	Frequency(Hertz)	X direction	Y direction	Z direction
1	931.29	3.4852e-06	0.42756	1.9724e-07
2	1,869.4	0.13847	4.4569e-05	0.0076563
3	1,945.3	0.00042425	1.9165e-08	0.038244
4	2,586.8	0.31841	8.4198e-06	0.023599
5	3,509.6	0.050056	1.2632e-07	0.66551
		Sum X = 0.50736	Sum Y = 0.42761	Sum Z = 0.73501

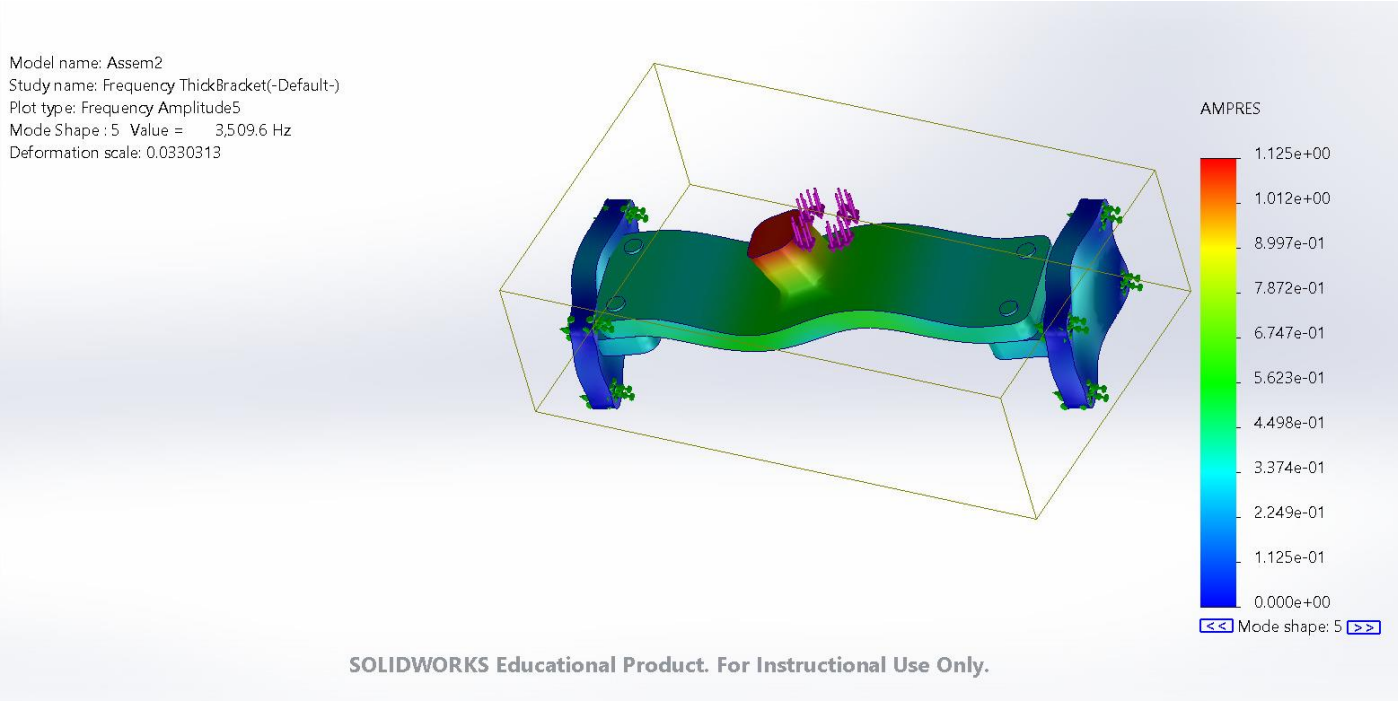


Image-1

Conclusion