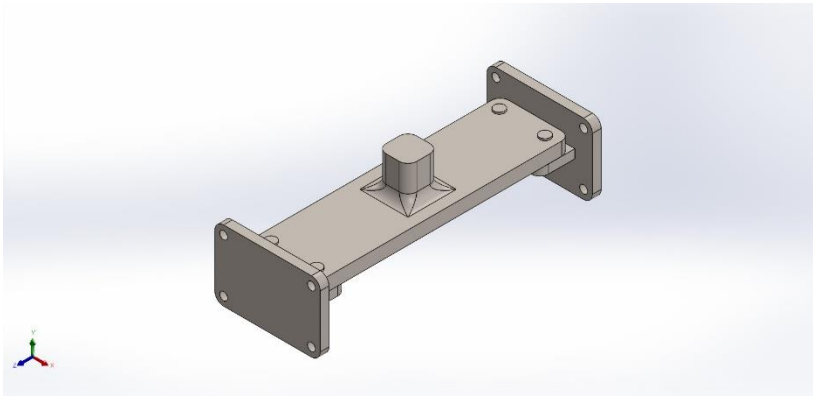


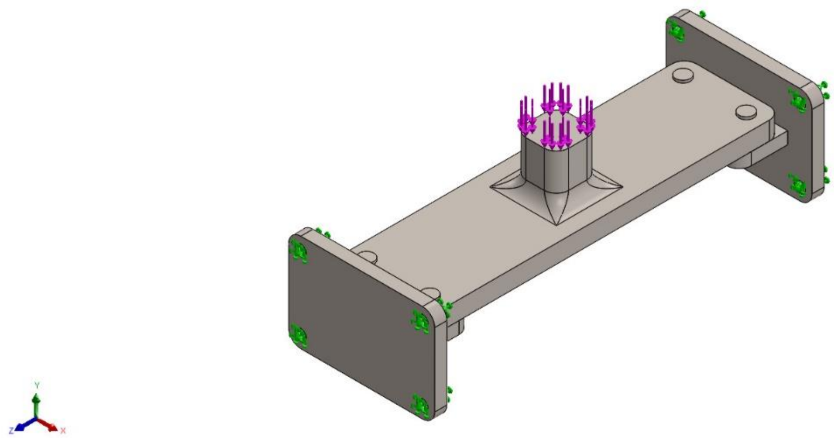
Simulation of Assem1

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

Table of Contents

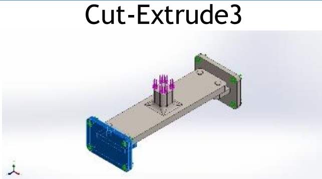
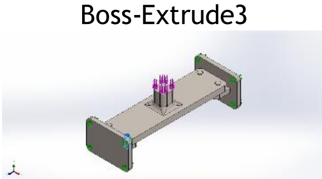
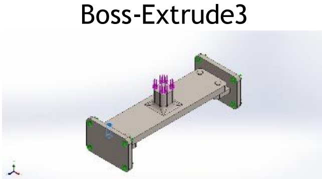
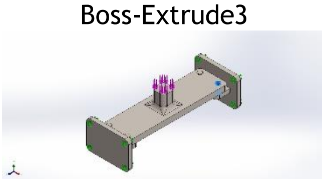
Description

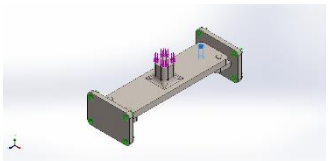
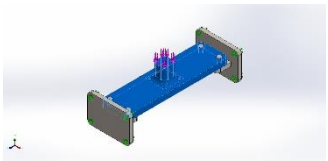
Frequency Analysis



Model name: Assem1
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Cut-Extrude3 	Solid Body	**Mass:0.946294 kg** **Volume:0.000122895 m^3** **Density:7,700 kg/m^3** **Weight:9.27368 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part1.SLDPRT** Sep 4 20:40:04 2024
Body-Move/Copy2	Solid Body	**Mass:0.946294 kg** **Volume:0.000122895 m^3** **Density:7,700 kg/m^3** **Weight:9.27368 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part1.SLDPRT** Sep 4 20:40:04 2024
Boss-Extrude3 	Solid Body	**Mass:0.0157297 kg** **Volume:2.04282e-06 m^3** **Density:7,700 kg/m^3** **Weight:0.154151 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part2.SLDPRT** Sep 4 20:57:32 2024
Boss-Extrude3 	Solid Body	**Mass:0.0157297 kg** **Volume:2.04282e-06 m^3** **Density:7,700 kg/m^3** **Weight:0.154151 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part2.SLDPRT** Sep 4 20:57:32 2024
Boss-Extrude3 	Solid Body	**Mass:0.0157297 kg** **Volume:2.04282e-06 m^3** **Density:7,700 kg/m^3** **Weight:0.154151 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part2.SLDPRT** Sep 4 20:57:32 2024

Boss-Extrude3 	Solid Body	**Mass:0.0157297 kg Volume:2.04282e-06 m^3 Density:7,700 kg/m^3 Weight:0.154151 N**	**C:\Users\user\Desktop\Solidworks_FEA\FEAfrequencyAnalysis\Part2.SLDPRT** Sep 4 20:57:32 2024
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

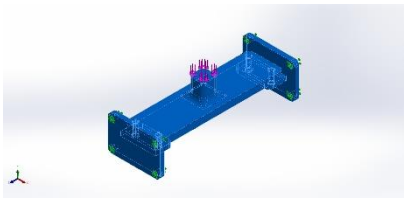
Study Properties

Study name	Frequency ThinBracket
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)

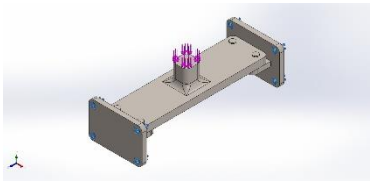
Units

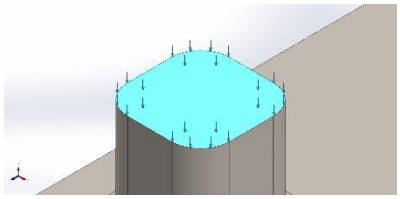
Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

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(Cut-Extrude3)(Part1-1), SolidBody 2(Body-Move/Copy2)(Part1-1), 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)(Part3-2)
Curve Data:N/A		

Loads and Fixtures

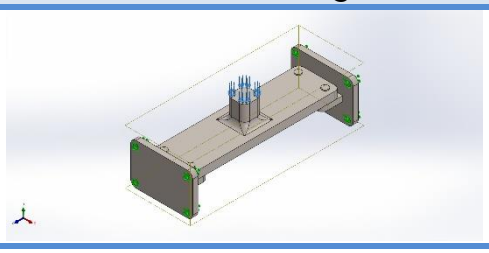
Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 8 face(s) **Type:** Fixed Geometry

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

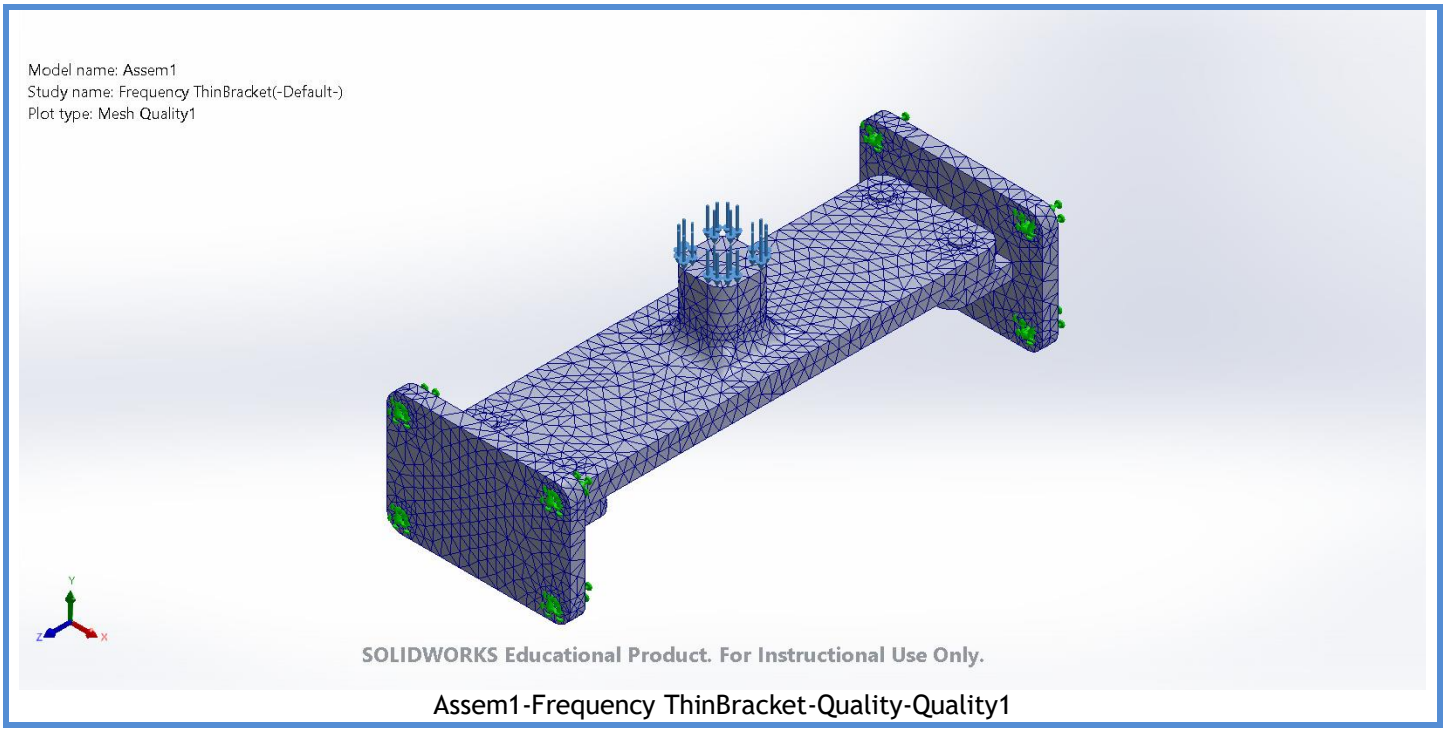
Mesh type	Solid Mesh
Mesher Used:	Curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	9 mm
Minimum element size	2.99997 mm
Mesh Quality	High
Remesh failed parts independently	Off
Reuse mesh for identical parts in an assembly (Blended curvature-based mesher only)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

Mesh information - Details

Total Nodes	37176
Total Elements	21681
Maximum Aspect Ratio	6.5458
% of elements with Aspect Ratio < 3	98.6
Percentage of elements with Aspect Ratio > 10	0
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:00:08
Computer name:	

Mesh Quality Plots

Name	Type	Min	Max
Quality1	Mesh	-	-



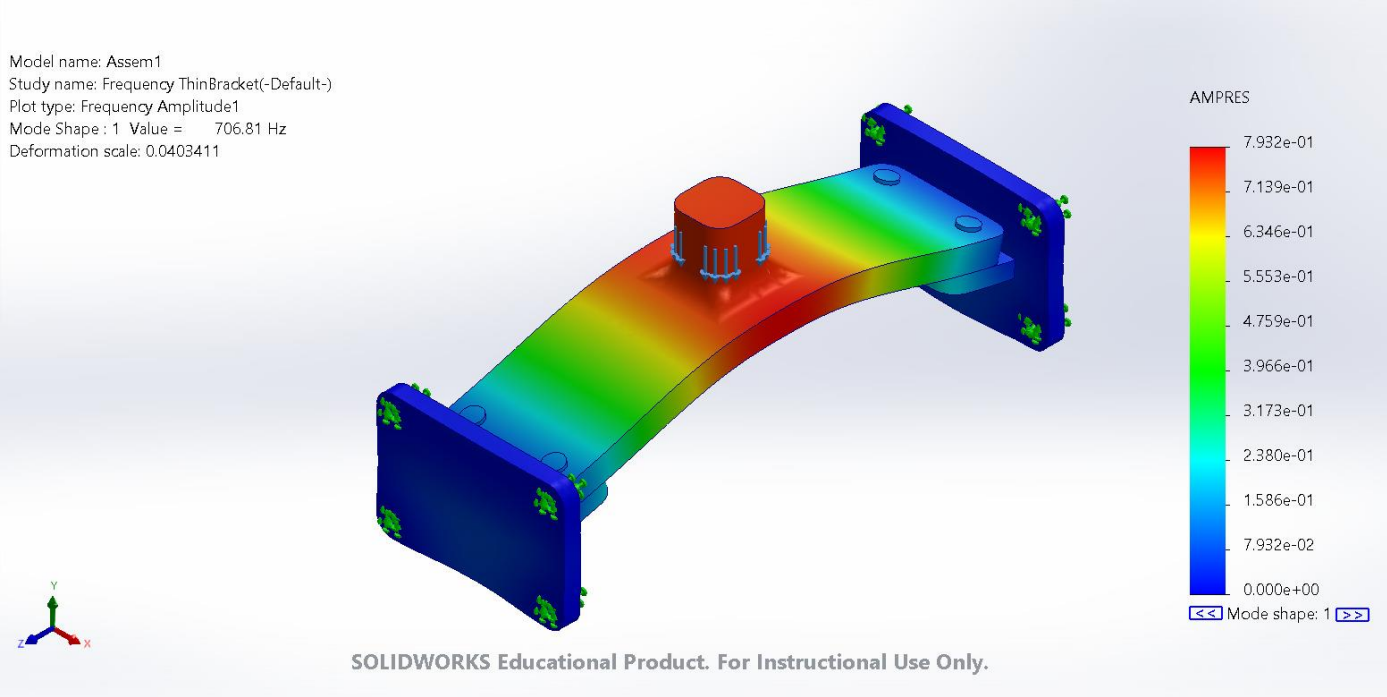
Assem1-Frequency ThinBracket-Quality-Quality1

Sensor Details

No Data

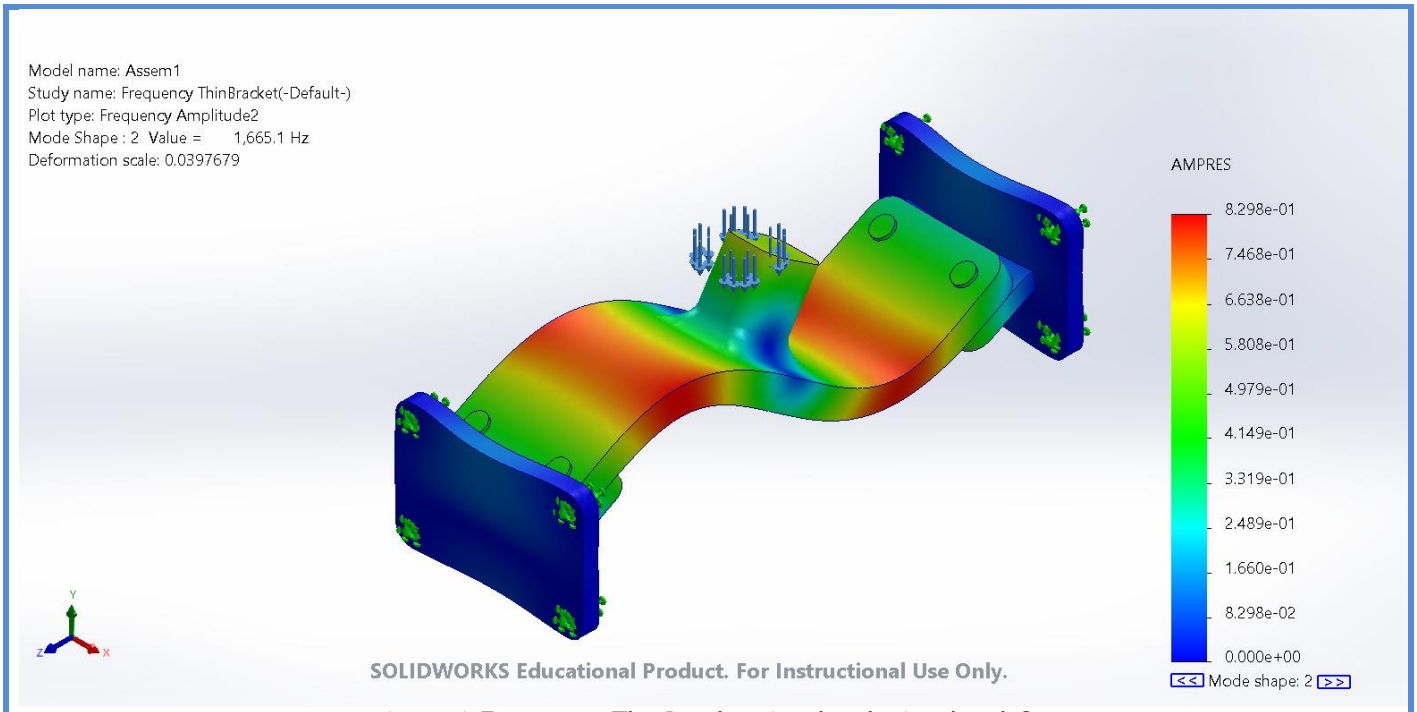
Study Results

Name	Type	Min	Max
Amplitude1	AMPRES: Resultant Amplitude Plot for Mode Shape: 1(Value = 706.815 Hz)	0.000e+00 Node: 131	7.932e-01 Node: 22007



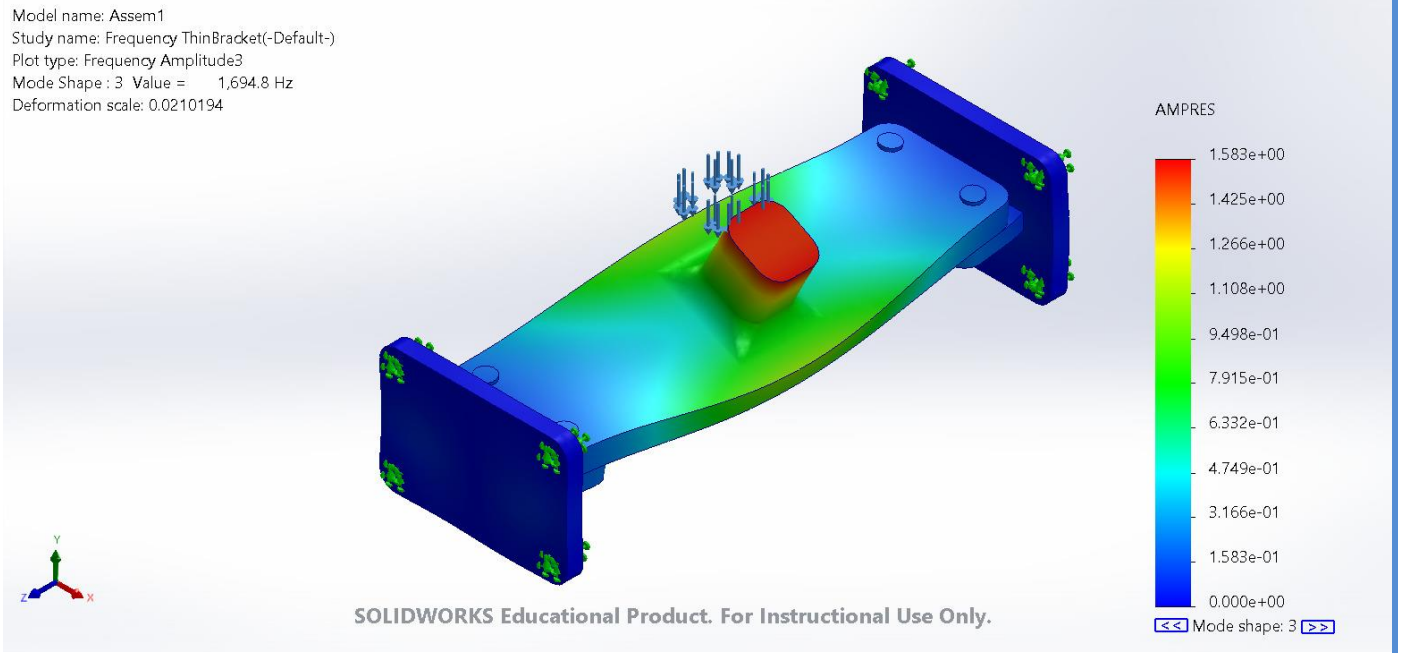
Assem1-Frequency ThinBracket-Amplitude-Amplitude1

Name	Type	Min	Max
Amplitude2	AMPRES: Resultant Amplitude Plot for Mode Shape: 2(Value = 1,665.11 Hz)	0.000e+00 Node: 131	8.298e-01 Node: 26805



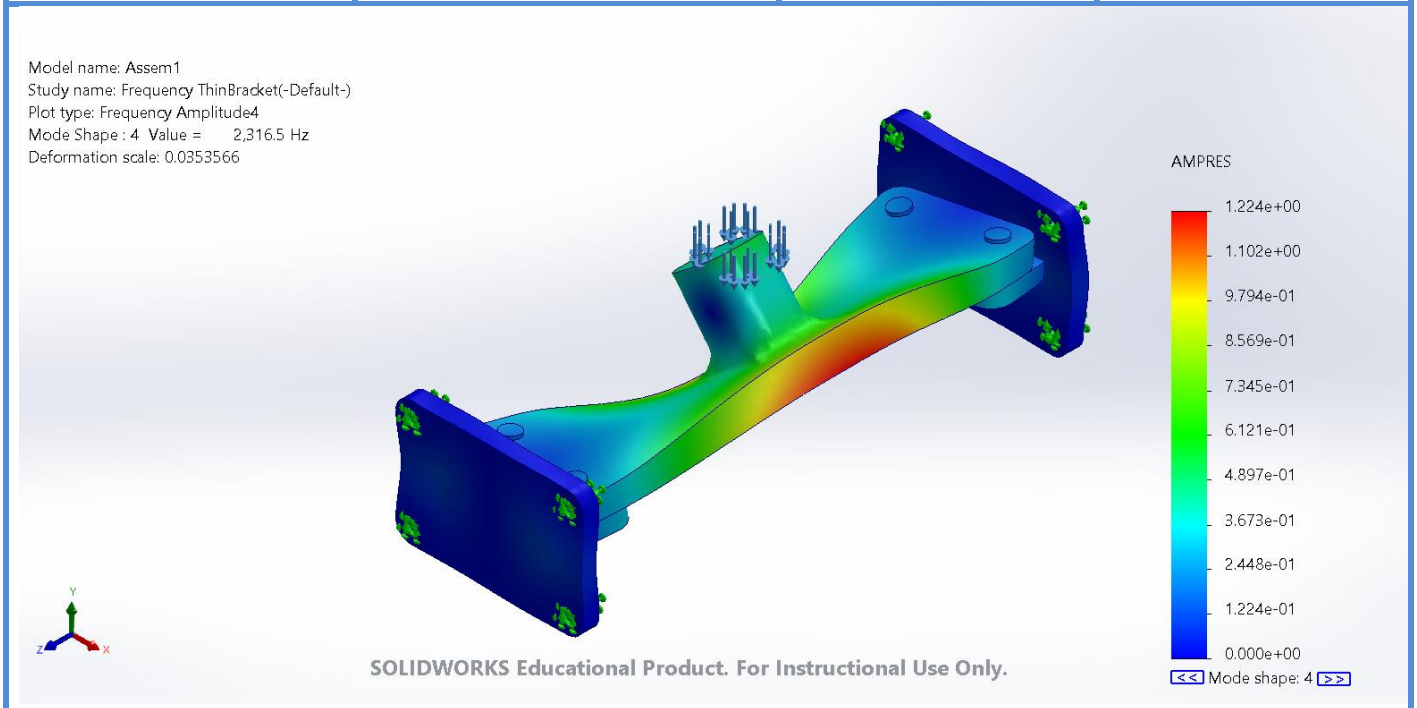
Assem1-Frequency ThinBracket-Amplitude-Amplitude2

Name	Type	Min	Max
Amplitude3	AMPRES: Resultant Amplitude Plot for Mode Shape: 3(Value = 1,694.83 Hz)	0.000e+00 Node: 131	1.583e+00 Node: 20738



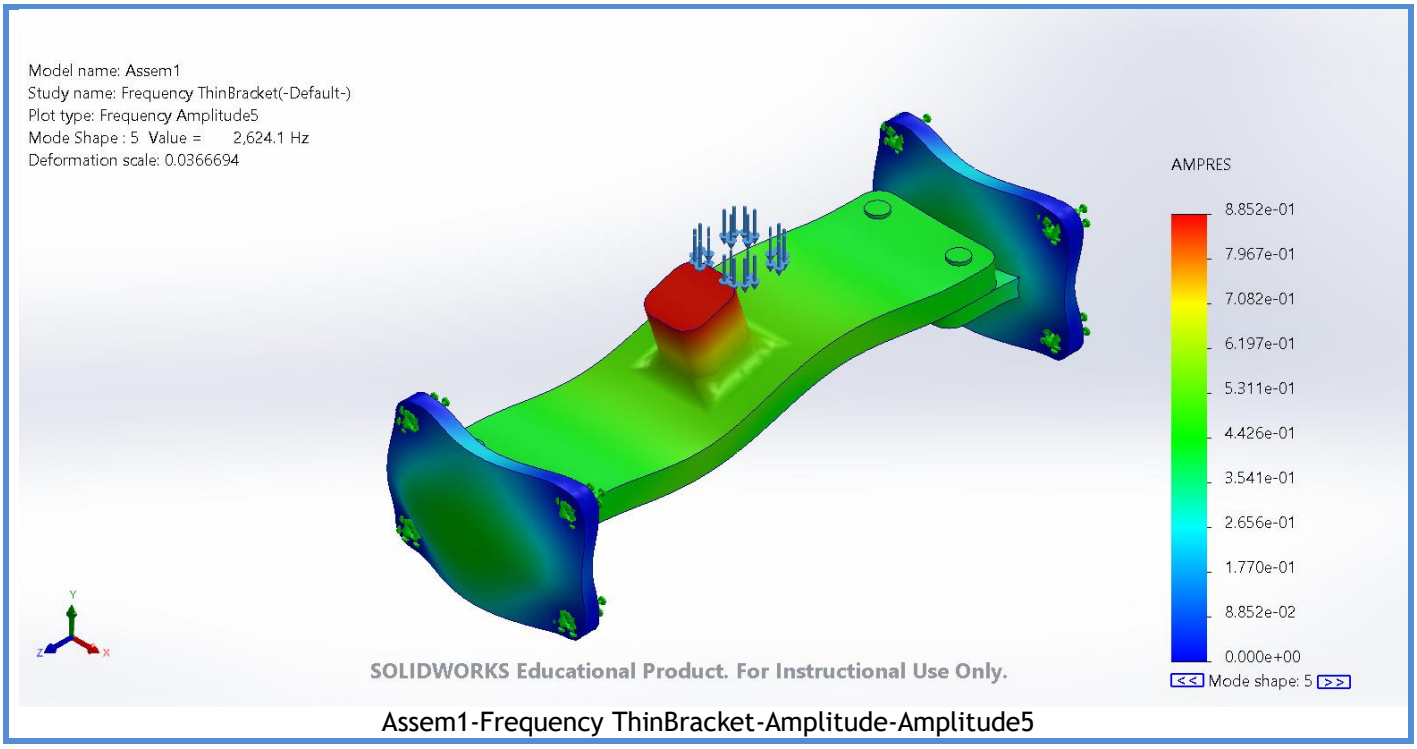
Assem1-Frequency ThinBracket-Amplitude-Amplitude3

Name	Type	Min	Max
Amplitude4	AMPRES: Resultant Amplitude Plot for Mode Shape: 4(Value = 2,316.52 Hz)	0.000e+00 Node: 131	1.224e+00 Node: 20933



Assem1-Frequency ThinBracket-Amplitude-Amplitude4

Name	Type	Min	Max
Amplitude5	AMPRES: Resultant Amplitude Plot for Mode Shape: 5(Value = 2,624.06 Hz)	0.000e+00 Node: 131	8.852e-01 Node: 21124



Assem1-Frequency ThinBracket-Amplitude-Amplitude5

Mode List

Frequency Number	Rad/sec	Hertz	Seconds
1	4,441	706.81	0.0014148
2	10,462	1,665.1	0.00060056
3	10,649	1,694.8	0.00059003
4	14,555	2,316.5	0.00043168
5	16,487	2,624.1	0.00038109

Mass Participation (Normalized)

Mode Number	Frequency(Hertz)	X direction	Y direction	Z direction
1	706.81	4.796e-06	0.53123	5.7803e-08
2	1,665.1	3.2888e-05	2.5212e-09	0.054199
3	1,694.8	0.25242	5.6284e-05	1.1923e-05
4	2,316.5	0.32115	2.1101e-05	5.1132e-06
5	2,624.1	3.3099e-06	3.9034e-10	0.82723
		Sum X = 0.57361	Sum Y = 0.53131	Sum Z = 0.88144

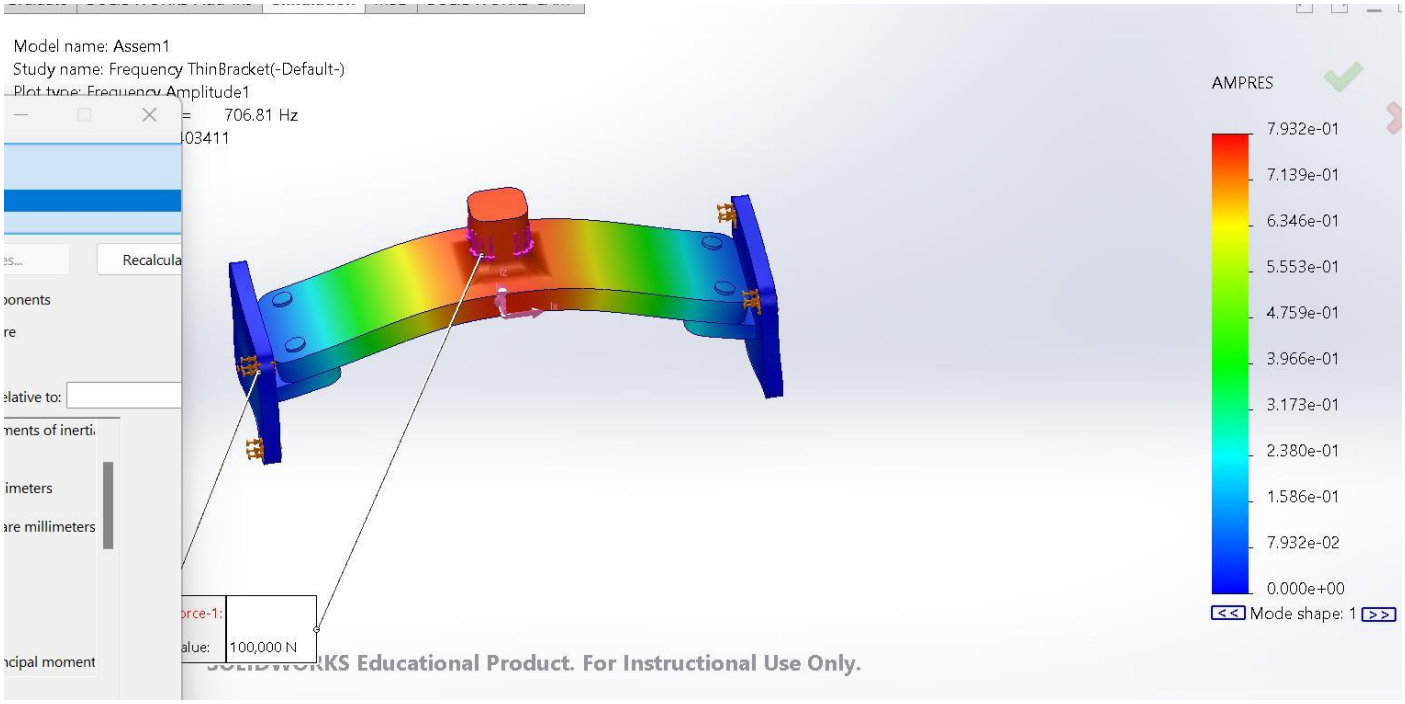


Image-1

Conclusion