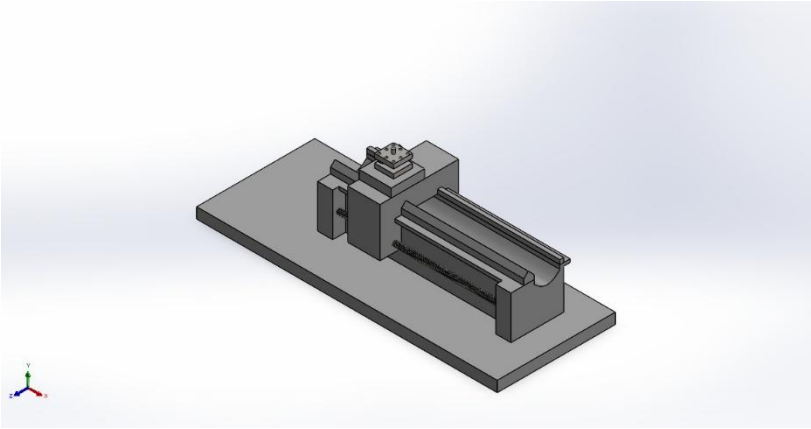

Simulation of Lathe Machine Assembly

Date: 13 April 2025
Designer: Solidworks
Study name: Buckling 1
Analysis type: Buckling

Table of Contents

Description 1
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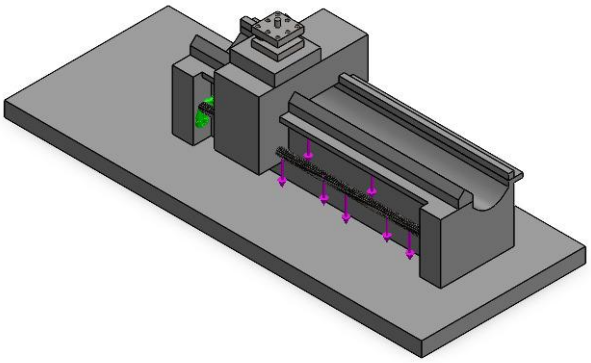
Conclusion 13

Description

No Data

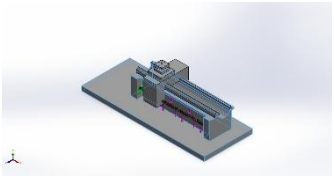
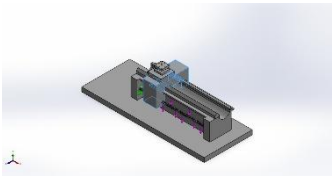
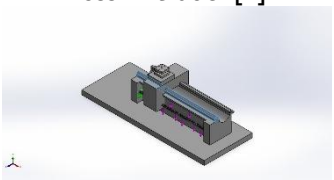
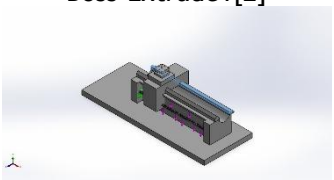
Assumptions

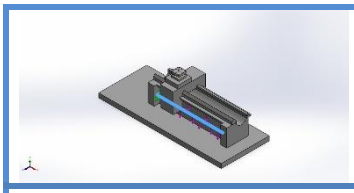
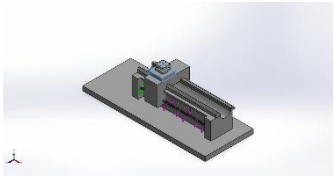
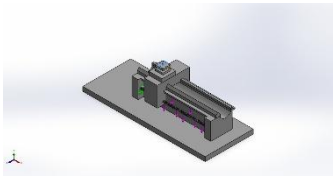
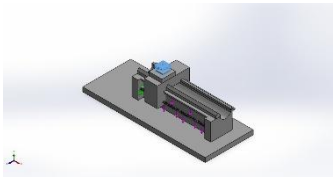
Model Information



Model name: Lathe Machine Assembly
Current Configuration: Default

Solid Bodies

Document Name and Reference	Treated As	Volumetric Properties	Document Path/Date Modified
Boss-Extrude6 	Solid Body	**Mass:505.076 kg** **Volume:0.0701495 m^3** **Density:7,200 kg/m^3** **Weight:4,949.75 N**	**E:\Semester VI\Design of Machine Elements\Project\Lathe Machine CAD Model\Lathe Machine\Bed.SLDPRT** Apr 12 00:05:46 2025
Boss-Extrude1 	Solid Body	**Mass:54.1029 kg** **Volume:0.00751429 m^3** **Density:7,200 kg/m^3** **Weight:530.208 N**	**E:\Semester VI\Design of Machine Elements\Project\Lathe Machine CAD Model\Lathe Machine\Carraige.SLDPRT** Apr 11 17:36:22 2025
Boss-Extrude1[1] 	Solid Body	**Mass:11.1227 kg** **Volume:0.00154482 m^3** **Density:7,200 kg/m^3** **Weight:109.002 N**	**E:\Semester VI\Design of Machine Elements\Project\Lathe Machine CAD Model\Lathe Machine\Guideways.SLDPRT** Apr 11 19:36:35 2025
Boss-Extrude1[2] 	Solid Body	**Mass:2.3328 kg** **Volume:0.000324 m^3** **Density:7,200 kg/m^3** **Weight:22.8614 N**	**E:\Semester VI\Design of Machine Elements\Project\Lathe Machine CAD Model\Lathe Machine\Guideways.SLDPRT** Apr 11 19:36:35 2025
Cut-Sweep1	Solid Body	**Mass:2.30949 kg** **Volume:0.000294203 m^3** **Density:7,850 kg/m^3**	**E:\Semester VI\Design of Machine Elements\Project\Lathe**

		**Weight:22.633 N**	**Machine CAD Model\Lathe Machine\Lead Screw.SLDPRT** Apr 12 01:03:39 2025
Boss-Extrude2 	Solid Body	**Mass:6.87394 kg** **Volume:0.000954713 m^3** **Density:7,200 kg/m^3** **Weight:67.3646 N**	**C:\Users\Yogesh\AppData\Local\Temp\swx10344\VC~~\Lathe Machine Assembly\Part4^Lathe Machine Assembly.SLDPRT** Apr 13 21:18:40 2025
Cut-Extrude5 	Solid Body	**Mass:0.305902 kg** **Volume:3.75339e-05 m^3** **Density:8,150 kg/m^3** **Weight:2.99784 N**	**E:\Semester VI\Design of Machine Elements\Project\Lathe Machine CAD Model\Lathe Machine\Single Point Cutting Tool.SLDPRT** Apr 11 16:19:35 2025
LPattern2 	Solid Body	**Mass:2.25731 kg** **Volume:0.000309221 m^3** **Density:7,300.01 kg/m^3** **Weight:22.1217 N**	**E:\Semester VI\Design of Machine Elements\Project\Lathe Machine CAD Model\Lathe Machine\Tool Post Head.SLDPRT** Apr 11 17:36:22 2025

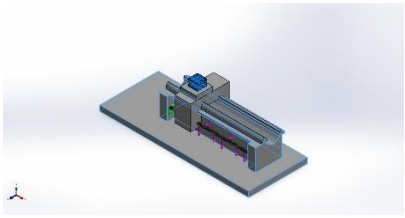
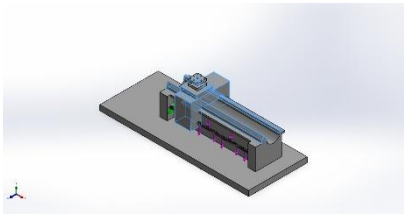
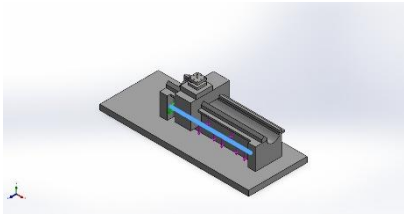
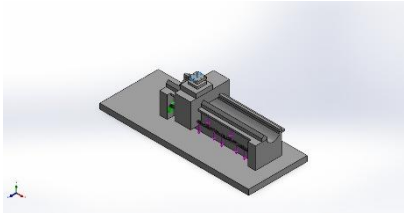
Study Properties

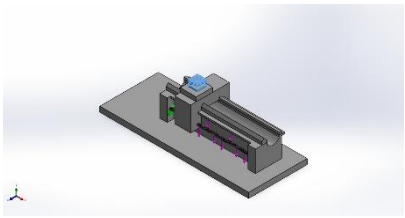
Study name	Buckling 1
Analysis type	Buckling
Mesh type	Solid Mesh
Number of modes	1
Solver type	FFEPlus
Incompatible bonding options	Automatic
Thermal Effect:	On
Thermal option	Include temperature loads
Zero strain temperature	298 Kelvin
Include fluid pressure effects from SOLIDWORKS Flow Simulation	Off
Soft Spring:	Off
Result folder	SOLIDWORKS document (E:\Semester VI\Design of Machine Elements\Project\Lathe Machine CAD Model\Lathe Machine)

Units

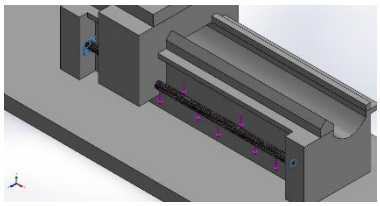
Unit system:	SI (MKS)
Length/Displacement	mm
Temperature	Kelvin
Angular velocity	Rad/sec
Pressure/Stress	N/m^2

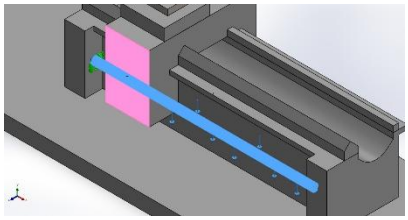
Material Properties

Model Reference	Properties	Components
	**Name:** Default (3) **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.2e+08 N/m^2 **Tensile strength:** 2e+08 N/m^2 **Mass density:** 7,200 kg/m^3 **Elastic modulus:** 1.1e+11 N/m^2 **Poisson's ratio:** 0.28 **Thermal expansion coefficient:** 1.1e-05 /Kelvin	SolidBody 1(Boss-Extrude6)(Bed-2)
Curve Data:N/A		
	**Name:** FG260 **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 2.2e+08 N/m^2 **Tensile strength:** 1.8e+08 N/m^2 **Mass density:** 7,200 kg/m^3 **Elastic modulus:** 1.1e+11 N/m^2 **Poisson's ratio:** 0.28 **Thermal expansion coefficient:** 1.1e-05 /Kelvin	SolidBody 1(Boss-Extrude1)(Carraige-2), SolidBody 1(Boss-Extrude1[1])(Guideways-3), SolidBody 2(Boss-Extrude1[2])(Guideways-3), SolidBody 1(Boss-Extrude2)(Part4^Lathe Machine Assembly-1)
Curve Data:N/A		
	**Name:** AISI 1045 Steel, cold drawn **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 5.3e+08 N/m^2 **Tensile strength:** 6.25e+08 N/m^2 **Mass density:** 7,850 kg/m^3 **Elastic modulus:** 2.05e+11 N/m^2 **Poisson's ratio:** 0.29 **Thermal expansion coefficient:** 1.15e-05 /Kelvin	SolidBody 1(Cut-Sweep1)(Lead Screw-1)
Curve Data:N/A		
	**Name:** HSS **Model type:** Linear Elastic Isotropic **Default failure criterion:** Unknown **Yield strength:** 9e+08 N/m^2 **Tensile strength:** 1.1e+09 N/m^2 **Mass density:** 8,150 kg/m^3 **Elastic modulus:** 2.1e+11 N/m^2 **Poisson's ratio:** 0.3	SolidBody 1(Cut-Extrude5)(Single Point Cutting Tool-3)

	Thermal expansion coefficient:	1.15e-05 /Kelvin	
Curve Data:N/A			
	**Name:** **Model type:** **Default failure criterion:** **Yield strength:** **Tensile strength:** **Mass density:** **Elastic modulus:** **Poisson's ratio:** **Thermal expansion coefficient:**	Cast Alloy Steel Linear Elastic Isotropic Unknown 2.41275e+08 N/m^2 4.48082e+08 N/m^2 7,300 kg/m^3 1.9e+11 N/m^2 0.26 1.5e-05 /Kelvin	SolidBody 1(LPattern2)(Tool Post Head-2)
Curve Data:N/A			

Loads and Fixtures

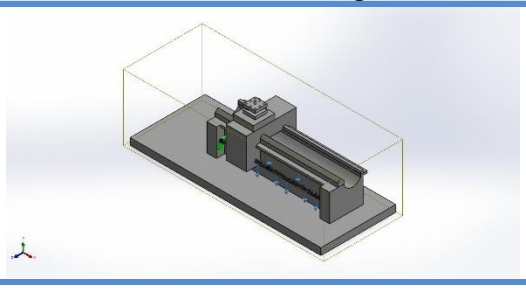
Fixture name	Fixture Image	Fixture Details
Fixed-1		**Entities:** 2 face(s) **Type:** Fixed Geometry

Load name	Load Image	Load Details
Force-1		**Entities:** 1 edge(s) **Reference:** Face< 1 > **Type:** Apply force **Values:** ---, 4,300, --- 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:	Blended curvature-based mesh
Jacobian points for High quality mesh	16 Points
Maximum element size	86.5199 mm
Minimum element size	4.326 mm
Mesh Quality	High
Remesh failed parts independently	Off

Mesh information - Details

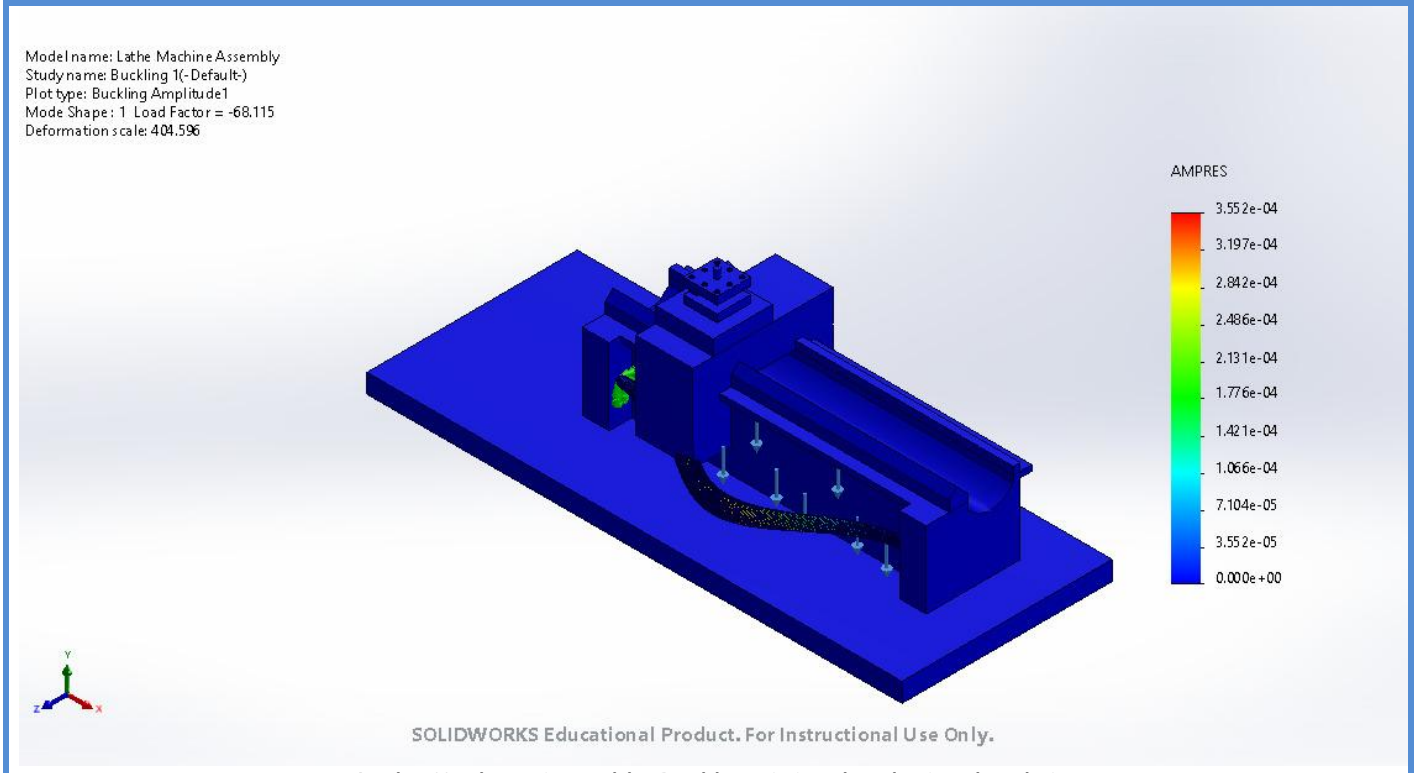
Total Nodes	244213
Total Elements	150583
Maximum Aspect Ratio	51.217
% of elements with Aspect Ratio < 3	53.2
Percentage of elements with Aspect Ratio > 10	10.3
Percentage of distorted elements	0
Time to complete mesh(hh;mm;ss):	00:06:04
Computer name:	YOGESH

Sensor Details

No Data

Study Results

Name	Type	Min	Max
Amplitude1	AMPRES: Resultant Amplitude Plot for Mode Shape: 1(Load Factor = -68.1146)	0.000e+00 Node: 3909	3.552e-04 Node: 4643



Lathe Machine Assembly-Buckling 1-Amplitude-Amplitude1

Mode List

Mode Number	Load Factor
1	-68.115

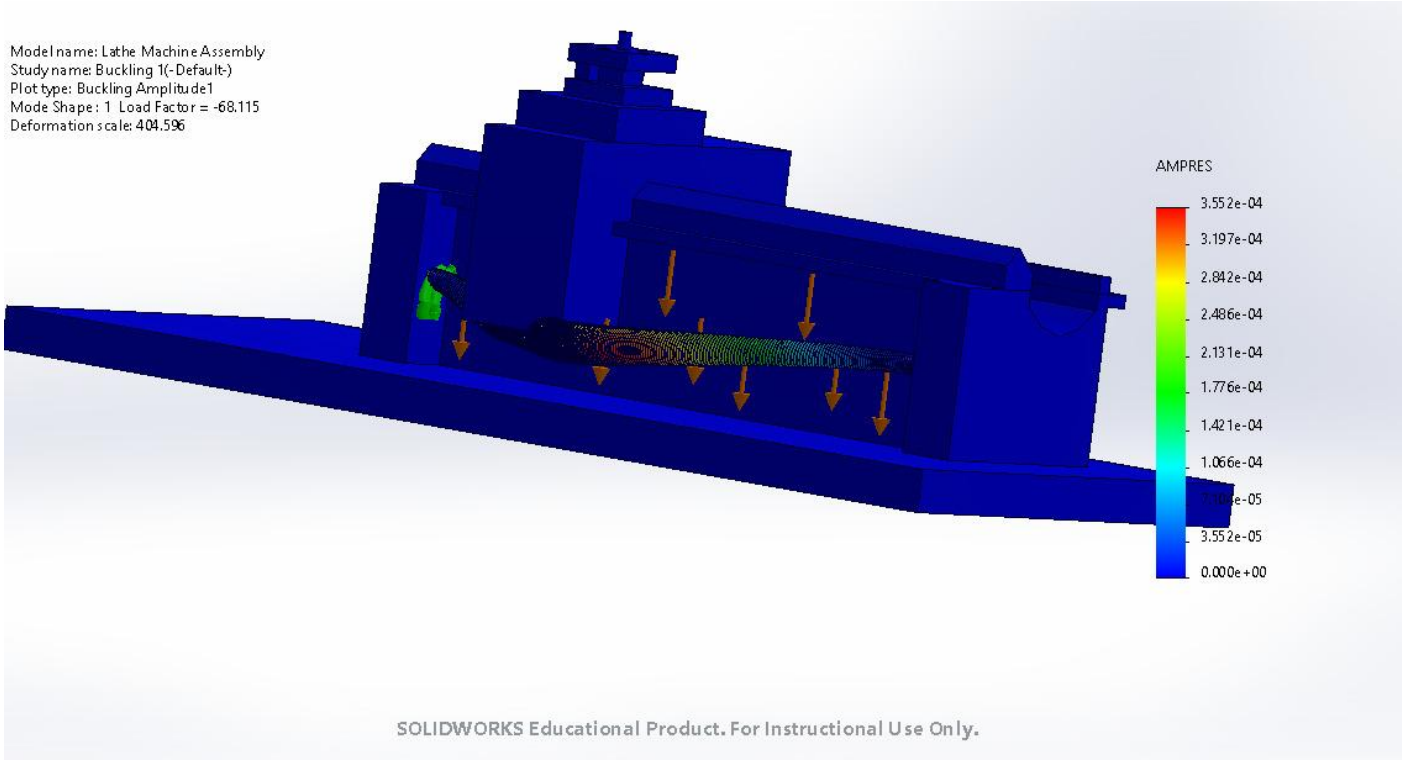


Image-1

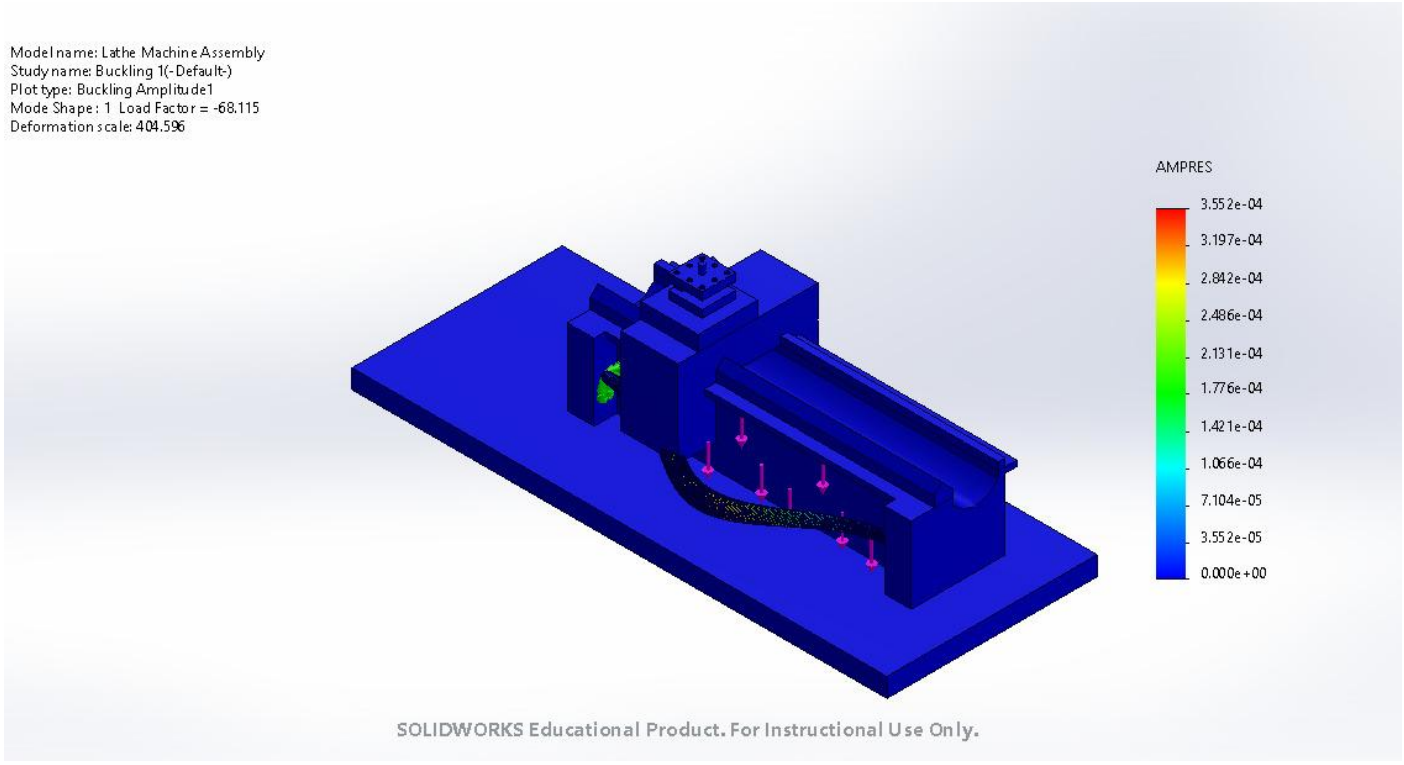


Image-2

Conclusion