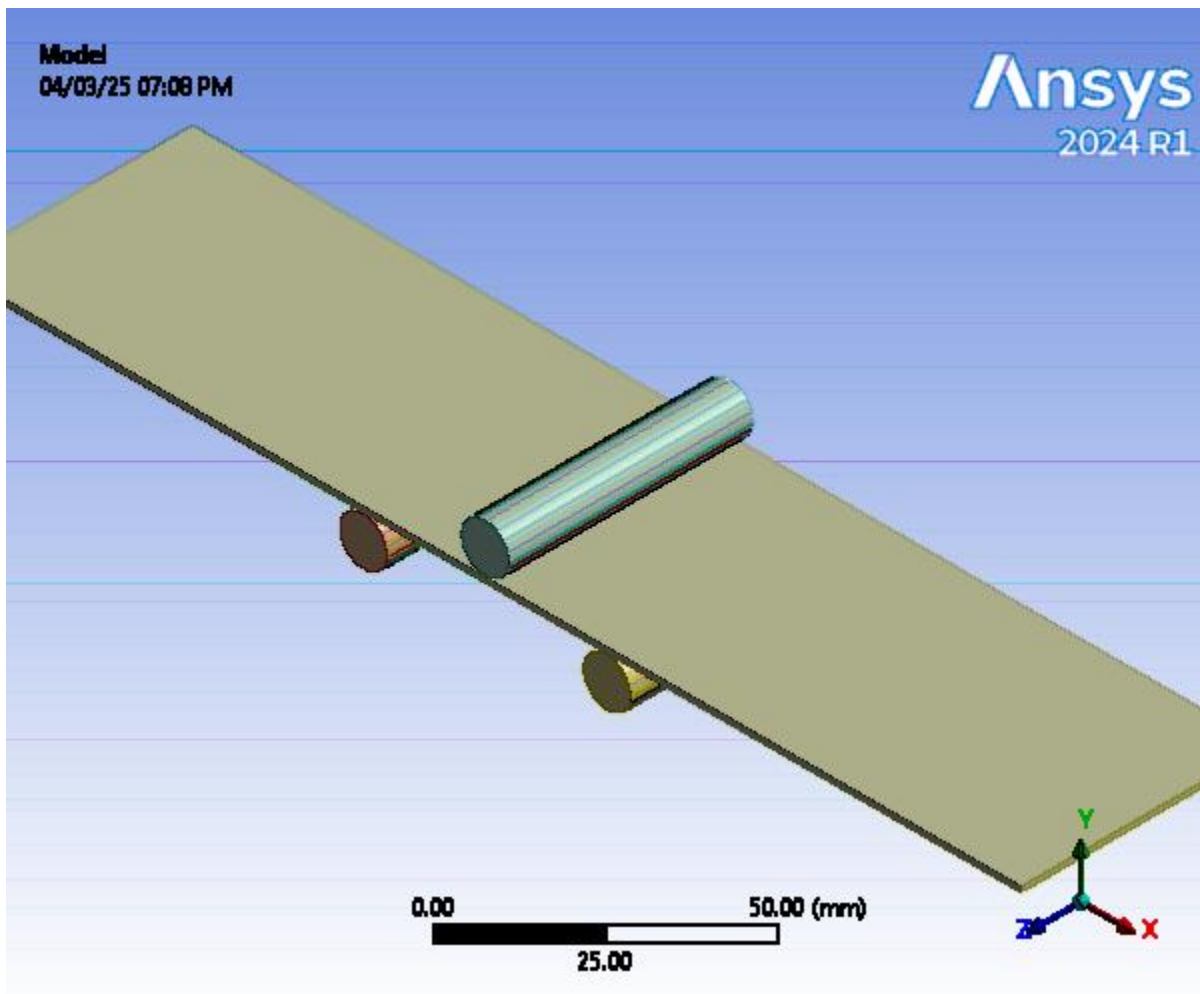




## Project

First Saved	05/Nov/2024
Last Saved	03/Mar/2025
Product Version	2024 R1
Save Project Before Solution	No
Save Project After Solution	No



# Contents

- [Units](#)
- [Model \(C2\)](#)
  - [Import Summary](#)
  - [Geometry Imports](#)
    - [Geometry Import \(B3\)](#)
  - [Geometry](#)
    - [Supports](#)
      - [Parts](#)
    - [ACP \(Pre\)](#)
      - [SolidModel.1](#)
  - [Materials](#)
  - [Coordinate Systems](#)
    - [Supports](#)
  - [Connections](#)
    - [Contacts](#)
      - [Contact Regions](#)
  - [Mesh](#)
  - [Imported Plies](#)
    - [ACP \(Pre\)](#)
      - [SolidModel.1.h5\(ACP \(Pre\)\)](#)
        - [ModelingGroup.1\(ACP \(Pre\)\)](#)
          - [ModelingPly.1\(ACP \(Pre\)\)](#)
            - [P1\\_\\_ModelingPly.1\(ACP \(Pre\)\)](#)
              - [P1L1\\_\\_ModelingPly.1\(ACP \(Pre\)\)](#)
  - [Named Selections](#)
    - [ACP \(Pre\)](#)
  - [Static Structural \(C3\)](#)
    - [Analysis Settings](#)
    - [Loads](#)
    - [Solution \(C4\)](#)
      - [Solution Information](#)
      - [Results](#)
- [Material Data](#)
  - [Structural Steel 2](#)
  - [UD\\_CFRP Tape \(90\)](#)

## Units

TABLE 1

Unit System	Metric (mm, t, N, s, mV, mA) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

## Model (C2)

**TABLE 2**  
**Model (C2) > Import Summary**

Object Name	<i>Import Summary</i>
State	No State

**TABLE 3**  
**Model (C2) > Geometry Imports**

Object Name	<i>Geometry Imports</i>
State	Solved

**TABLE 4**  
**Model (C2) > Geometry Imports > Geometry Import (B3)**

Object Name	<i>Geometry Import (B3)</i>
State	Solved
<b>Definition</b>	
Source	C:\Users\Mr. P\Documents\Simulation Files\Flexural Test Simulation\4 Layer Flexural Test\4 Layer Specimen_files\dp0\global\MECH\SYS-2\AssembledModel\SYS-2.pmdb
Type	Model Assembly
<b>Basic Geometry Options</b>	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	No
Parameters	Independent
Parameter Key	ANS;DS
Attributes	No
Named Selections	No
Material Properties	No
<b>Advanced Geometry Options</b>	
Use Associativity	Yes
Coordinate Systems	No
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	Yes
Compare Parts On Update	No
Analysis Type	3-D
Mixed Import Resolution	None
Import Facet Quality	Source
Clean Bodies On Import	No
Stitch Surfaces On Import	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

## Geometry

**TABLE 5**  
**Model (C2) > Geometry**

Object Name	Geometry
State	Fully Defined
<b>Definition</b>	
Source	C:\Users\Mr. P\Documents\Simulation Files\Flexural Test Simulation\4 Layer Flexural Test\4 Layer Specimen_files\dp0\global\MECH\SYS-2\AssembledModel\SYS-2.pmdb
Type	Model Assembly
Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
<b>Bounding Box</b>	
Length X	220. mm
Length Y	21.311 mm
Length Z	50. mm
<b>Properties</b>	
Volume	26202 mm <sup>3</sup>
Mass	1.1396e-004 t
<b>Statistics</b>	
Bodies	4
Active Bodies	4
Nodes	33950
Elements	6784
Mesh Metric	None
<b>Update Options</b>	
Assign Default Material	No
<b>Advanced Geometry Options</b>	
Analysis Type	3-D

## Supports

**TABLE 6**  
**Model (C2) > Geometry > Supports > Parts**

Object Name	SYS-1\Solid(Supports)	SYS-1\Solid(Supports)	SYS-1\Solid(Supports)
State	Meshed		
Graphics Properties			
Visible	Yes		
Transparency	1		
Definition			
Suppressed	No		
Stiffness Behavior	Flexible		
Coordinate System	Global Coordinate System(Supports)		
Reference Temperature	By Environment		
Treatment	None		
Material			

Assignment	Structural Steel 2		
Nonlinear Effects	Yes		
Thermal Strain Effects	Yes		
Bounding Box			
Length X	10. mm		
Length Y	10. mm		
Length Z	50. mm		
Properties			
Volume	3926.3 mm³	3927. mm³	3926.3 mm³
Mass	3.0821e-005 t	3.0827e-005 t	3.0821e-005 t
Centroid X	-25. mm	1.3911e-004 mm	25. mm
Centroid Y	-5.0009 mm	6.311 mm	-5.0009 mm
Centroid Z	7.7119e-017 mm	-4.5829e-016 mm	2.5383e-015 mm
Moment of Inertia Ip1	6.5864e-003 t·mm²	6.5866e-003 t·mm²	6.5864e-003 t·mm²
Moment of Inertia Ip2	6.5865e-003 t·mm²	6.5867e-003 t·mm²	6.5865e-003 t·mm²
Moment of Inertia Ip3	3.8212e-004 t·mm²	3.8214e-004 t·mm²	3.8212e-004 t·mm²
Statistics			
Nodes	2944	3110	3048
Elements	580	620	
Mesh Metric	None		
Transfer Properties			
Source	D4::Supports		
Read Only	Yes		

## ACP (Pre)

**TABLE 7**  
**Model (C2) > Geometry > ACP (Pre) > Parts**

Object Name	<i>SolidModel.1</i>
State	Meshed
<b>Graphics Properties</b>	
Visible	Yes
Transparency	1
<b>Definition</b>	
Suppressed	No
Stiffness Behavior	Flexible
Coordinate System	Default Coordinate System
Reference Temperature	By Environment
Treatment	None
<b>Material</b>	
Assignment	Composite Material
Nonlinear Effects	Yes
Thermal Strain Effects	Yes
<b>Bounding Box</b>	
Length X	220. mm
Length Y	1.3111 mm
Length Z	50. mm
<b>Properties</b>	

Volume	14422 mm <sup>3</sup>
Centroid X	3.3385e-015 mm
Centroid Y	0.65556 mm
Centroid Z	5.9057e-016 mm
<b>Statistics</b>	
Nodes	24848
Elements	4964
Mesh Metric	None
<b>Transfer Properties</b>	
Source	B5::ACP (Pre)

FIGURE 1  
Model (C2) > Geometry > Figure  
4 Layer Specimen

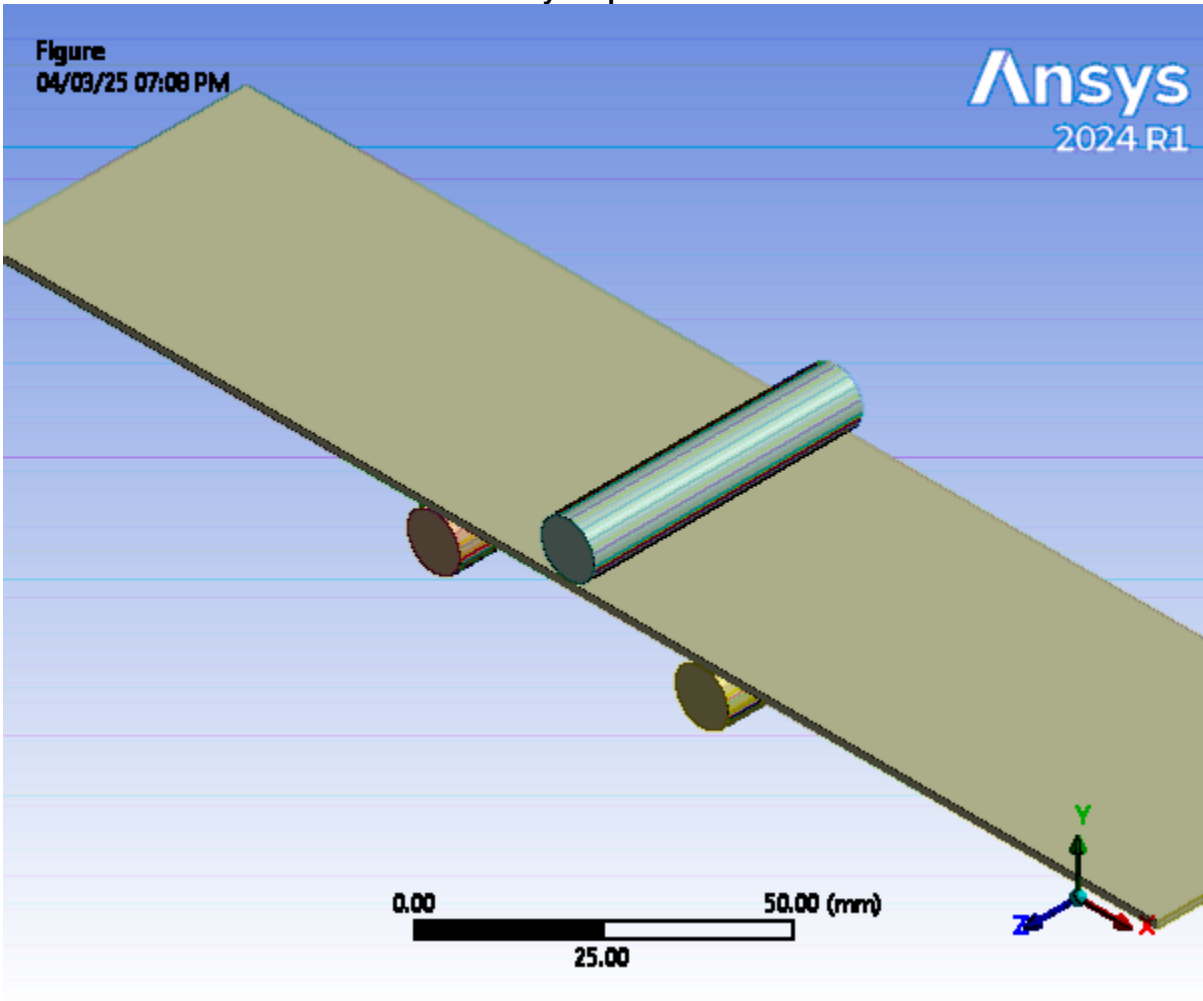


TABLE 8  
Model (C2) > Materials

Object Name	<i>Materials</i>
State	Fully Defined
<b>Statistics</b>	
Materials	4

Material Assignments	0
----------------------	---

## Coordinate Systems

### Supports

**TABLE 9**  
**Model (C2) > Coordinate Systems > Supports > Coordinate System**

Object Name	<i>Global Coordinate System(Supports)</i>
State	Fully Defined
<b>Definition</b>	
Type	Cartesian
Coordinate System	Program Controlled
APDL Name	
Suppressed	No
<b>Origin</b>	
Define By	Global Coordinates
Origin X	0. mm
Origin Y	0. mm
Origin Z	0. mm
Location	Defined
<b>Principal Axis</b>	
Axis	X
Define By	Fixed Vector
<b>Orientation About Principal Axis</b>	
Axis	Y
Define By	Fixed Vector
<b>Directional Vectors</b>	
X Axis Data	[ 1. 0. 0. ]
Y Axis Data	[ 0. 1. 0. ]
Z Axis Data	[ 0. 0. 1. ]
<b>Transfer Properties</b>	
Source	D4::Supports
Read Only	Yes
<b>Transformations</b>	
Base Configuration	Absolute
Transformed Configuration	[ 0. 0. 0. ]

**TABLE 10**  
**Model (C2) > Coordinate Systems > Coordinate System**

Object Name	<i>Global Coordinate System</i>
State	Fully Defined
<b>Definition</b>	
Type	Cartesian
Coordinate System ID	0.
<b>Origin</b>	
Origin X	0. mm
Origin Y	0. mm

Origin Z	0. mm
<b>Directional Vectors</b>	
X Axis Data	[ 1. 0. 0. ]
Y Axis Data	[ 0. 1. 0. ]
Z Axis Data	[ 0. 0. 1. ]
<b>Transfer Properties</b>	
Source	
Read Only	No

## Connections

**TABLE 11**  
**Model (C2) > Connections**

Object Name	<i>Connections</i>
State	Fully Defined
<b>Auto Detection</b>	
Generate Automatic Connection On Refresh	Yes
<b>Transparency</b>	
Enabled	Yes
<b>Statistics</b>	
Contacts	3
Active Contacts	3
Joints	0
Active Joints	0
Beams	0
Active Beams	0
Bearings	0
Active Bearings	0
Springs	0
Active Springs	0
Body Interactions	0
Active Body Interactions	0

**TABLE 12**  
**Model (C2) > Connections > Contacts**

Object Name	<i>Contacts</i>
State	Fully Defined
<b>Definition</b>	
Connection Type	Contact
<b>Scope</b>	
Scoping Method	Geometry Selection
Geometry	All Bodies
<b>Auto Detection</b>	
Tolerance Type	Slider
Tolerance Slider	0.
Tolerance Value	0.56654 mm
Use Range	No
Face/Face	Yes



Face-Face Angle Tolerance	75. °
Face Overlap Tolerance	Off
Cylindrical Faces	Include
Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Assemblies
<b>Statistics</b>	
Connections	3
Active Connections	3

**TABLE 13**  
**Model (C2) > Connections > Contacts > Contact Regions**

Object Name	Frictional - SYS-1\Solid(Supports) To SolidModel.1	Frictional - SYS-1\Solid(Supports) To SolidModel.1	Frictional - SYS-1\Solid(Supports) To SolidModel.1
State	Fully Defined		
Scope			
Scoping Method	Geometry Selection		
Contact	1 Face		
Target	1 Face		
Contact Bodies	SYS-1\Solid(Supports)		
Target Bodies	SolidModel.1		
Protected	No		
Definition			
Type	Frictional		
Friction Coefficient	0.2		
Scope Mode	Manual		
Behavior	Program Controlled		
Trim Contact	Program Controlled		
Contact APDL Name			
Target APDL Name			
Suppressed	No		
Display			
Element Normals	No		
Advanced			
Formulation	Program Controlled		
Small Sliding	Program Controlled		
Detection Method	Program Controlled		
Penetration Tolerance	Program Controlled		
Elastic Slip Tolerance	Program Controlled		
Normal Stiffness	Program Controlled		
Update Stiffness	Program Controlled		

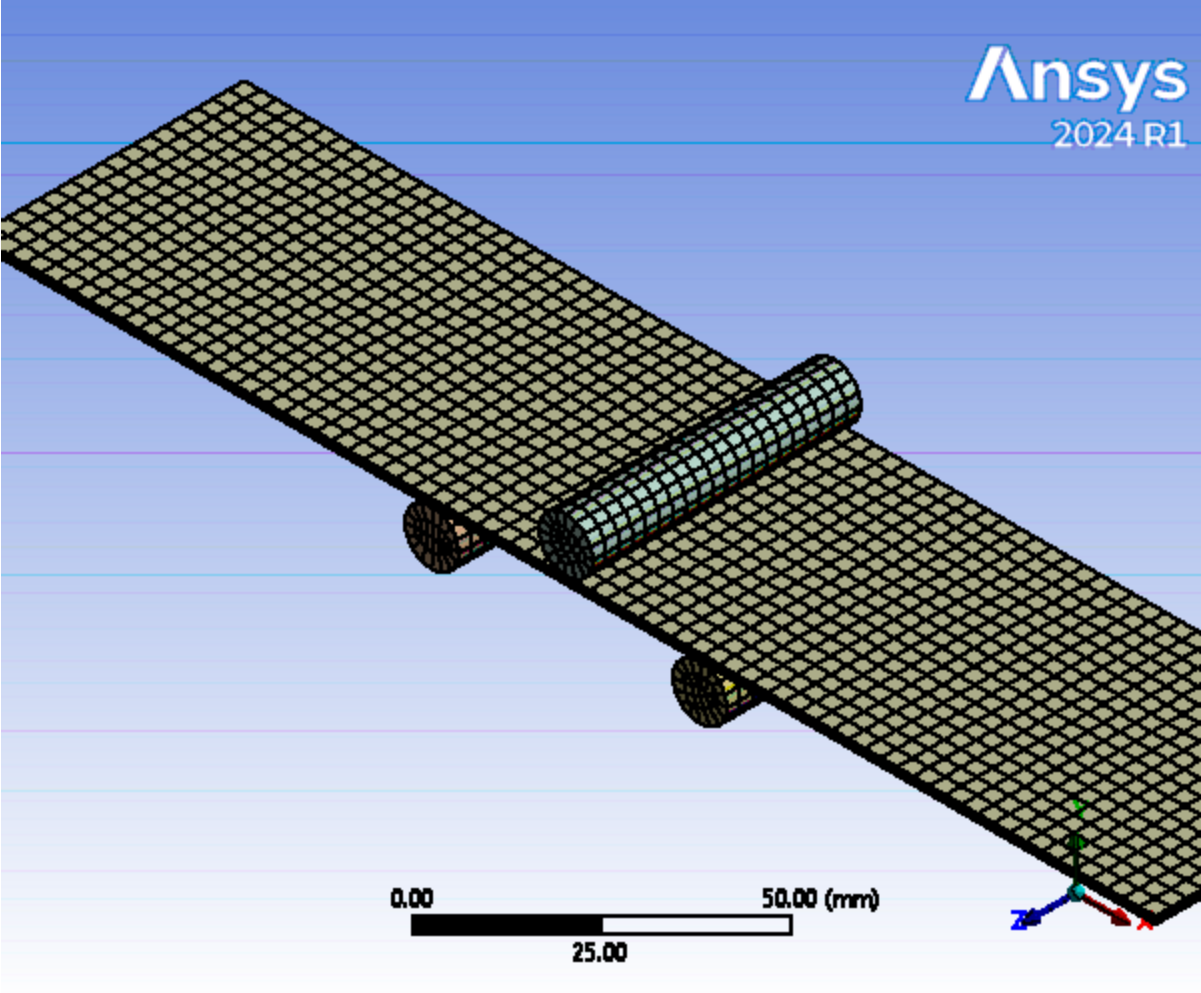
Stabilization Damping Factor	0.
Pinball Region	Program Controlled
Time Step Controls	None
<b>Geometric Modification</b>	
Interface Treatment	Adjust to Touch
Contact Geometry Correction	None
Target Geometry Correction	None

## Mesh

**TABLE 14**  
**Model (C2) > Mesh**

Object Name	<i>Mesh</i>
State	Solved
<b>Display</b>	
Display Style	Use Geometry Setting
<b>Quality</b>	
Check Mesh Quality	Yes, Errors
Error Limits	Aggressive Mechanical
Mesh Metric	None
<b>Statistics</b>	
Nodes	33950
Elements	6784
Show Detailed Statistics	No
<b>Model Assembly</b>	
Read Only	Yes

**FIGURE 2**  
**Model (C2) > Mesh > Figure**  
**Mesh Size**



**TABLE 15**  
**Model (C2) > Imported Plies**

Object Name	<i>Imported Plies</i>
State	Solved
<b>Definition</b>	
Type	Imported Plies
Suppressed	No
<b>Material</b>	
Nonlinear Effects	Yes
Thermal Strain Effects	Yes

*ACP (Pre)*

*SolidModel.1.h5(ACP (Pre))*

*ModelingGroup.1(ACP (Pre))*

*ModelingPly.1(ACP (Pre))*

## P1\_\_ModelingPly.1(ACP (Pre))

TABLE 16

Model (C2) > Imported Plies > ACP (Pre) > SolidModel.1.h5(ACP (Pre)) > ModelingGroup.1(ACP (Pre)) > ModelingPly.1(ACP (Pre)) > P1\_\_ModelingPly.1(ACP (Pre)) > P1L1\_\_ModelingPly.1(ACP (Pre))

Object Name	P1L1__ModelingPly.1(ACP (Pre))	P1L2__ModelingPly.1(ACP (Pre))	P1L3__ModelingPly.1(ACP (Pre))	P1L4__ModelingPly.1(ACP (Pre))
State	Fully Defined			
Definition				
Name in Source	P1L1__ModelingPly.1	P1L2__ModelingPly.1	P1L3__ModelingPly.1	P1L4__ModelingPly.1
ID in Source	P1L1__ModelingPly.1	P1L2__ModelingPly.1	P1L3__ModelingPly.1	P1L4__ModelingPly.1
Material	UD_CFRP Tape (90)			
Thickness	0.32778 mm			
Angle	0. °			
Number of Elements	1241.			
Transfer Properties				
Source	B5::ACP (Pre)			

## Named Selections

### ACP (Pre)

TABLE 17

Model (C2) > Named Selections > ACP (Pre) > Named Selections

Object Name	SOLIDMODEL.1_ALL_ELEMENTS_TOP(ACP (Pre))	SOLIDMODEL.1_ALL_ELEMENTS_BOT(ACP (Pre))	SOLIDMODEL.1_ALL_ELEMENTS (Pre))
State	Fully Defined		
	Scope		
Scoping Method	Geometry Selection		
Geometry	1 Face	4964 Elements	
	Definition		
Send to Solver	Yes		
Protected	Program Controlled		
Visible	Yes		
Program Controlled Inflation	Exclude		
Reserve During Solve			No
	Statistics		
Type	Imported		

Total Selection	1 Face	4964 Elements
Surface Area	11000 mm²	
Processed	0	
Used by Mesh Worksheet	No	
<b>Transfer Properties</b>		
Source	B5::ACP (Pre)	
Used Only		Yes

## Static Structural (C3)

**TABLE 18**  
**Model (C2) > Analysis**

Object Name	<i>Static Structural (C3)</i>
State	Solved
<b>Definition</b>	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
<b>Options</b>	
Environment Temperature	22. °C
Generate Input Only	No

**TABLE 19**  
**Model (C2) > Static Structural (C3) > Analysis Settings**

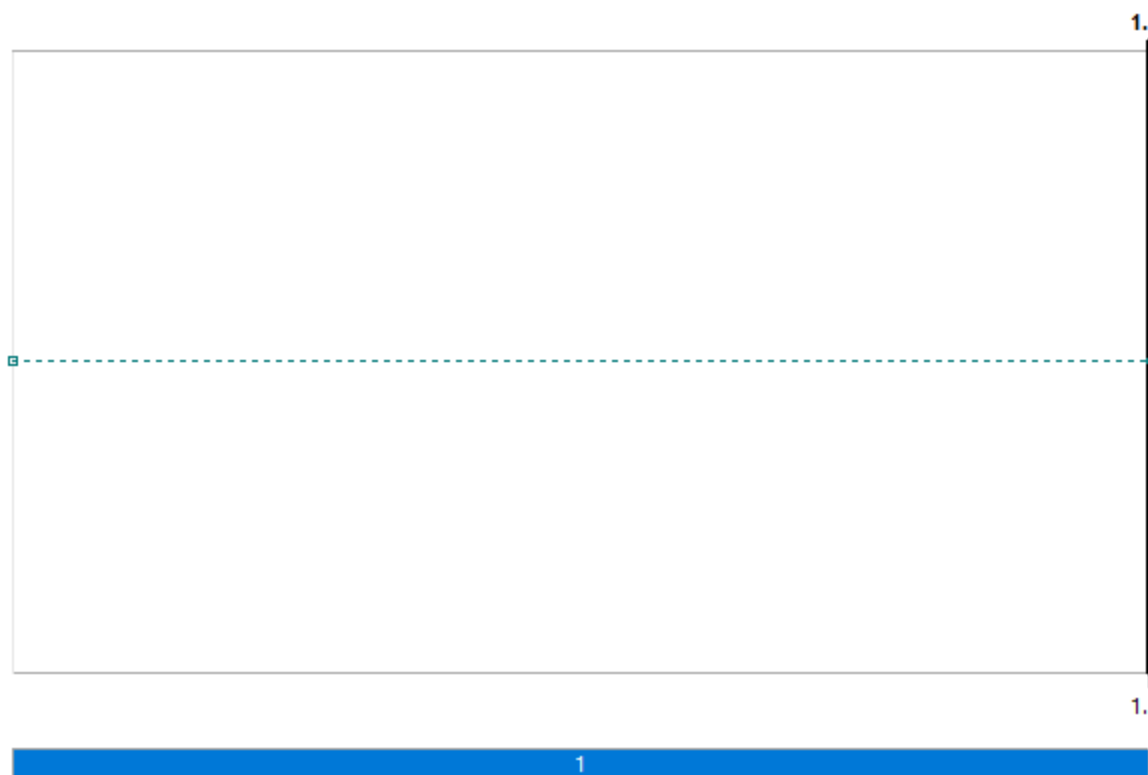
Object Name	<i>Analysis Settings</i>
State	Fully Defined
<b>Step Controls</b>	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	Program Controlled
<b>Solver Controls</b>	
Solver Type	Program Controlled
Weak Springs	Off
Solver Pivot Checking	Program Controlled
Large Deflection	Off
Inertia Relief	Off
Quasi-Static Solution	Off
<b>Rotordynamics Controls</b>	
Coriolis Effect	Off
<b>Restart Controls</b>	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No

Combine Restart Files	Program Controlled
<b>Nonlinear Controls</b>	
Newton-Raphson Option	Unsymmetric
Force Convergence	On
--Value	Calculated by solver
--Tolerance	0.5%
--Minimum Reference	1.e-002 N
Moment Convergence	Program Controlled
Displacement Convergence	Program Controlled
Rotation Convergence	Program Controlled
Line Search	Program Controlled
Stabilization	Program Controlled
<b>Advanced</b>	
Inverse Option	No
Contact Split (DMP)	Program Controlled
<b>Output Controls</b>	
Stress	Yes
Back Stress	No
Strain	Yes
Contact Data	Yes
Nonlinear Data	No
Nodal Forces	No
Volume and Energy	Yes
Euler Angles	Yes
General Miscellaneous	No
Contact Miscellaneous	No
Store Results At	All Time Points
Result File Compression	Program Controlled
<b>Analysis Data Management</b>	
Solver Files Directory	C:\Users\Mr. P\Documents\Simulation Files\Flexural Test Simulation\4 Layer Flexural Test\4 Layer Specimen_files\dp0\SYS-2\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Contact Summary	Program Controlled
Delete Unneeded Files	Yes
Nonlinear Solution	Yes
Solver Units	Active System
Solver Unit System	nmm

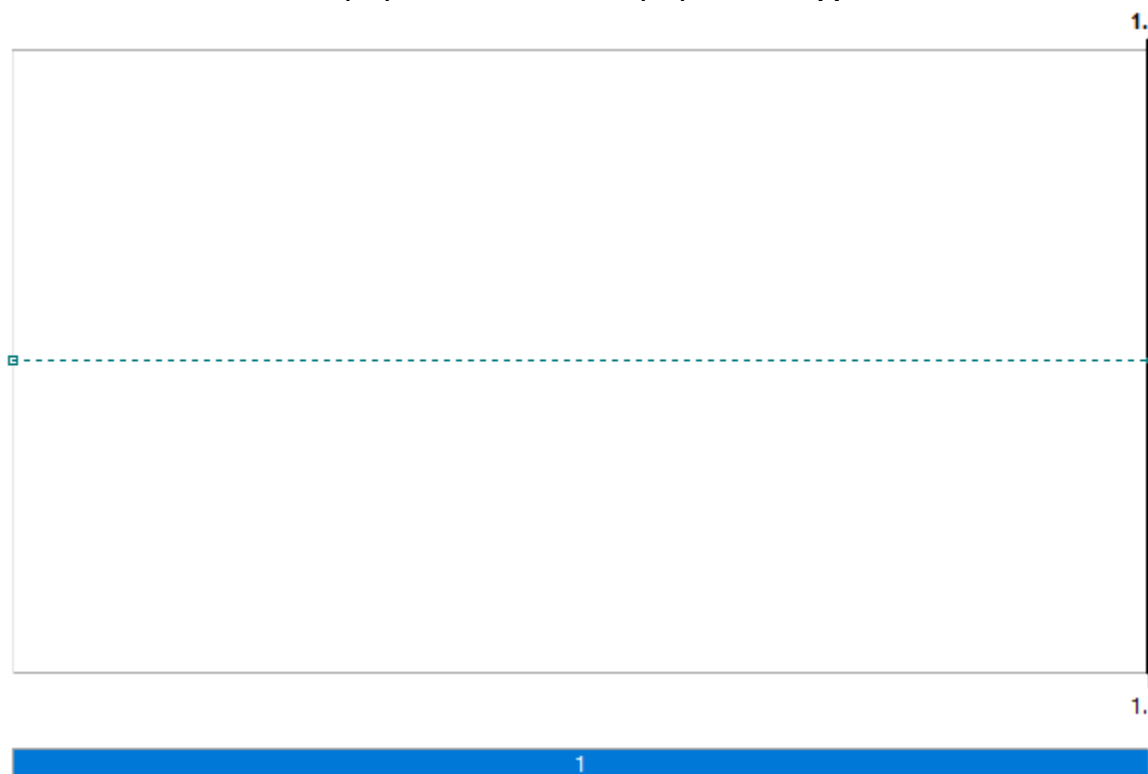
**TABLE 20**  
**Model (C2) > Static Structural (C3) > Loads**

Object Name	LHS Support		RHS Support		Applied Load	
State	Fully Defined					
Scope						
Scoping Method	Geometry Selection					
Geometry	1 Edge					
Coordinate System	Global Coordinate System					
X Coordinate	-25. mm		25. mm		-8.1103e-010 mm	
Y Coordinate	-10. mm				11.311 mm	
Z Coordinate	0. mm					
Location	Defined					
Definition						
Type	Remote Displacement					
X Component	0. mm (ramped)					
Y Component	0. mm (ramped)				-9.811 mm (ramped)	
Z Component	0. mm (ramped)					
Rotation X	0. ° (ramped)					
Rotation Y	0. ° (ramped)					
Rotation Z	0. ° (ramped)					
Suppressed	No					
Behavior	Deformable					
Rotation X		0. ° (ramped)				
Rotation Y		0. ° (ramped)				
Rotation Z		0. ° (ramped)				
Rotation X					0. ° (ramped)	
Rotation Y					0. ° (ramped)	
Rotation Z					0. ° (ramped)	
Advanced						
Pinball Region	All					

**FIGURE 3**  
**Model (C2) > Static Structural (C3) > LHS Support**



**FIGURE 4**  
**Model (C2) > Static Structural (C3) > RHS Support**





**FIGURE 5**  
**Model (C2) > Static Structural (C3) > Applied Load**



### ***Solution (C4)***

**TABLE 21**  
**Model (C2) > Static Structural (C3) > Solution**

Object Name	<i>Solution (C4)</i>
State	Solved
<b>Adaptive Mesh Refinement</b>	
Max Refinement Loops	1.
Refinement Depth	2.
<b>Information</b>	
Status	Done
MAPDL Elapsed Time	6 m 11 s
MAPDL Memory Used	2.125 GB
MAPDL Result File Size	9.75 MB
<b>Post Processing</b>	
Beam Section Results	No
On Demand Stress/Strain	No

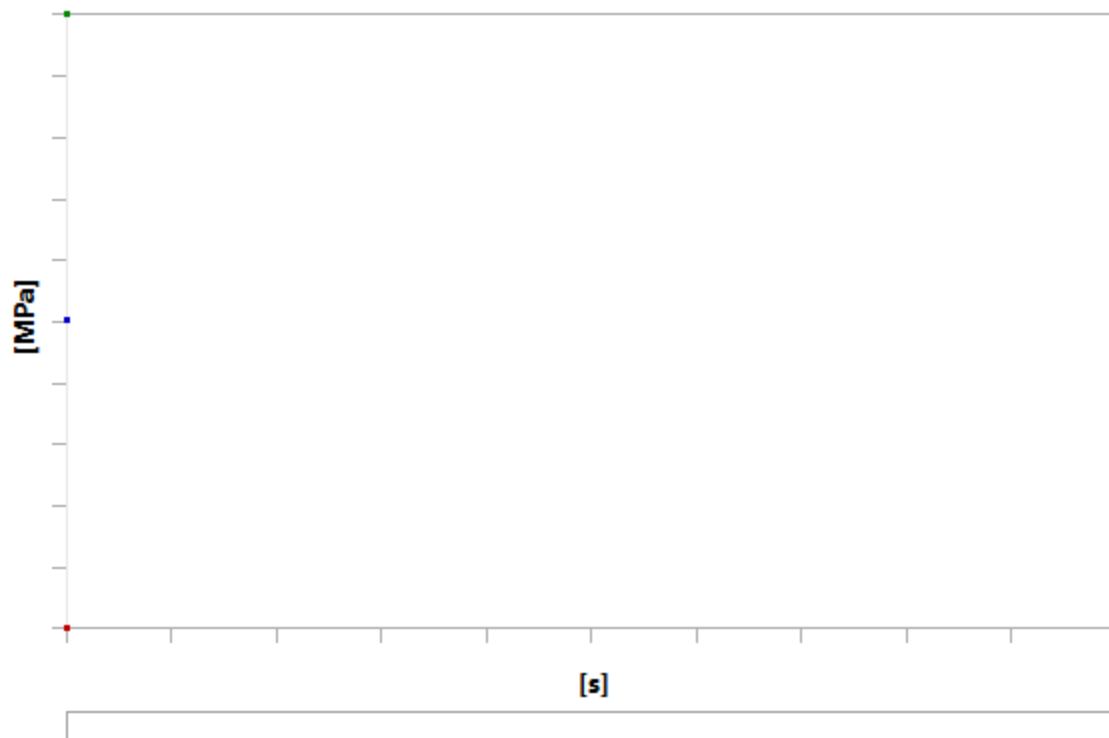
**TABLE 22**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Solution Information**

Object Name	<i>Solution Information</i>
State	Solved
<b>Solution Information</b>	



Display Option	Averaged							
Average Across Bodies	No							
Results								
Minimum	-2537.3 MPa	5.3517e-004 MPa	2.8727e-004 MPa	4.7913e-007 mm/mm	-16.711 MPa	-3.4877e-002 mm/mm	-0.40176 mm	4.7308e-005 mm
Maximum	2505.6 MPa	2509. MPa	1264.7 MPa	4.2599e-002 mm/mm	17.936 MPa	3.447e-002 mm/mm	0.40168 mm	52.027 mm
Average	-3.1731 MPa	113.72 MPa	57.601 MPa	2.6779e-003 mm/mm	4.1374e-002 MPa	-3.9976e-005 mm/mm	-5.3628e-005 mm	17.075 mm
Minimum Occurs On	SolidModel.1				SYS-1\Solid(Supports)	SolidModel.1		SYS-1\Solid(Supports)
Maximum Occurs On	SolidModel.1				SYS-1\Solid(Supports)	SolidModel.1		
Information								
Time	1. s							
Load Step	1							
Substep	1							
Iteration Number	10							

**FIGURE 6**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Normal Stress**



**TABLE 24**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Normal Stress**

Time [s]	Minimum [MPa]	Maximum [MPa]	Average [MPa]
1.	-2537.3	2505.6	-3.1731

**FIGURE 7**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Normal Stress > Figure 4 Layer normal stress**

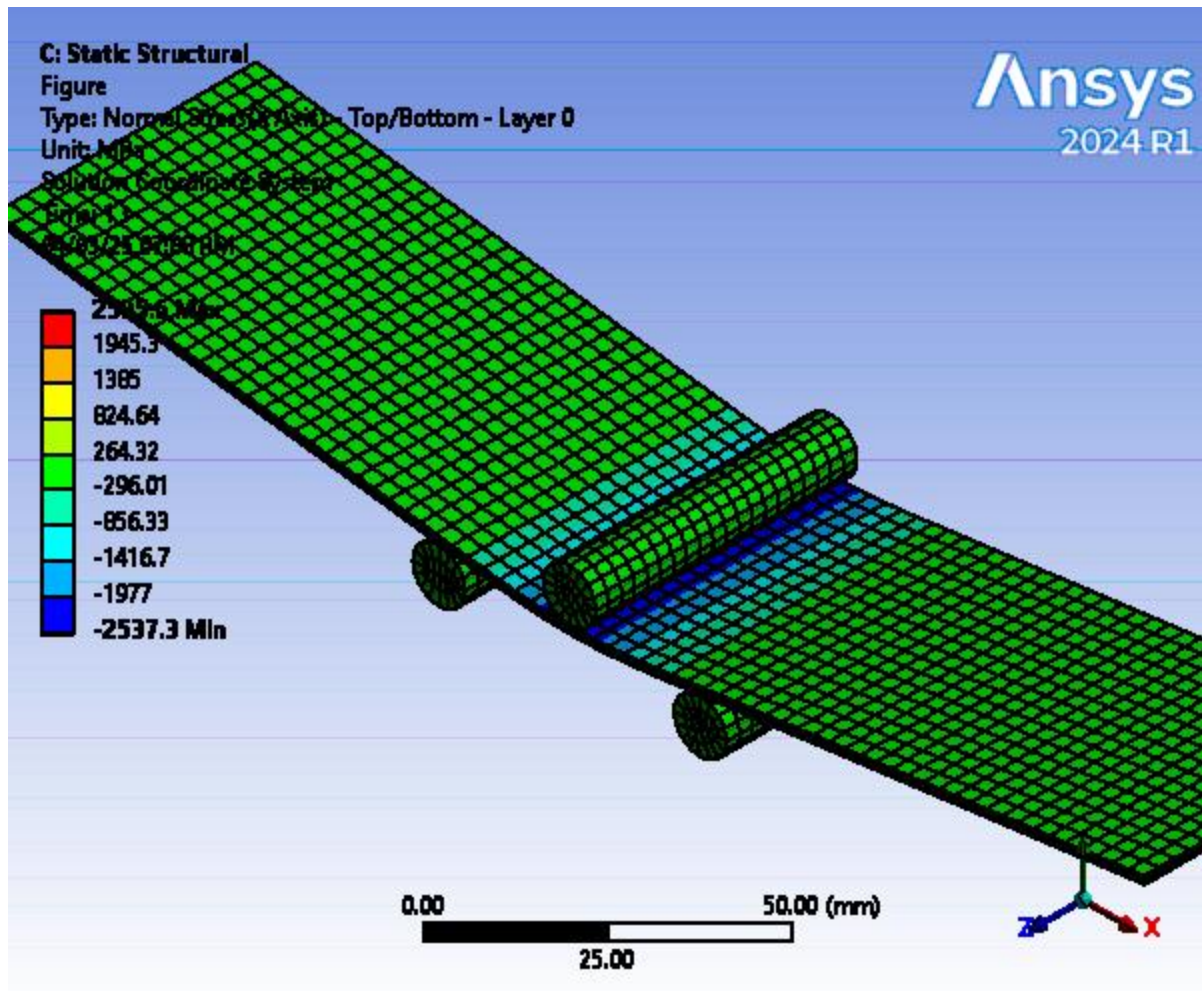
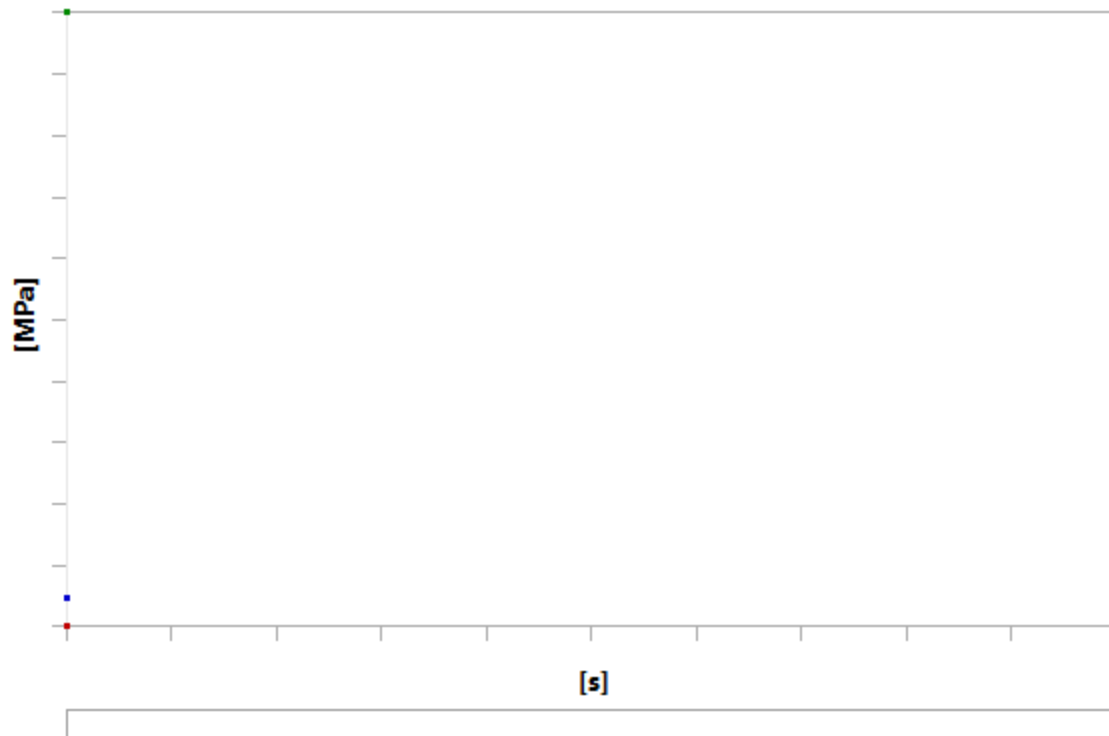


FIGURE 8  
Model (C2) > Static Structural (C3) > Solution (C4) > Equivalent Stress



**TABLE 25**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Equivalent Stress**

Time [s]	Minimum [MPa]	Maximum [MPa]	Average [MPa]
1.	5.3517e-004	2509.	113.72

**FIGURE 9**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Equivalent Stress > Figure 4 Layer Equivalent Stress**

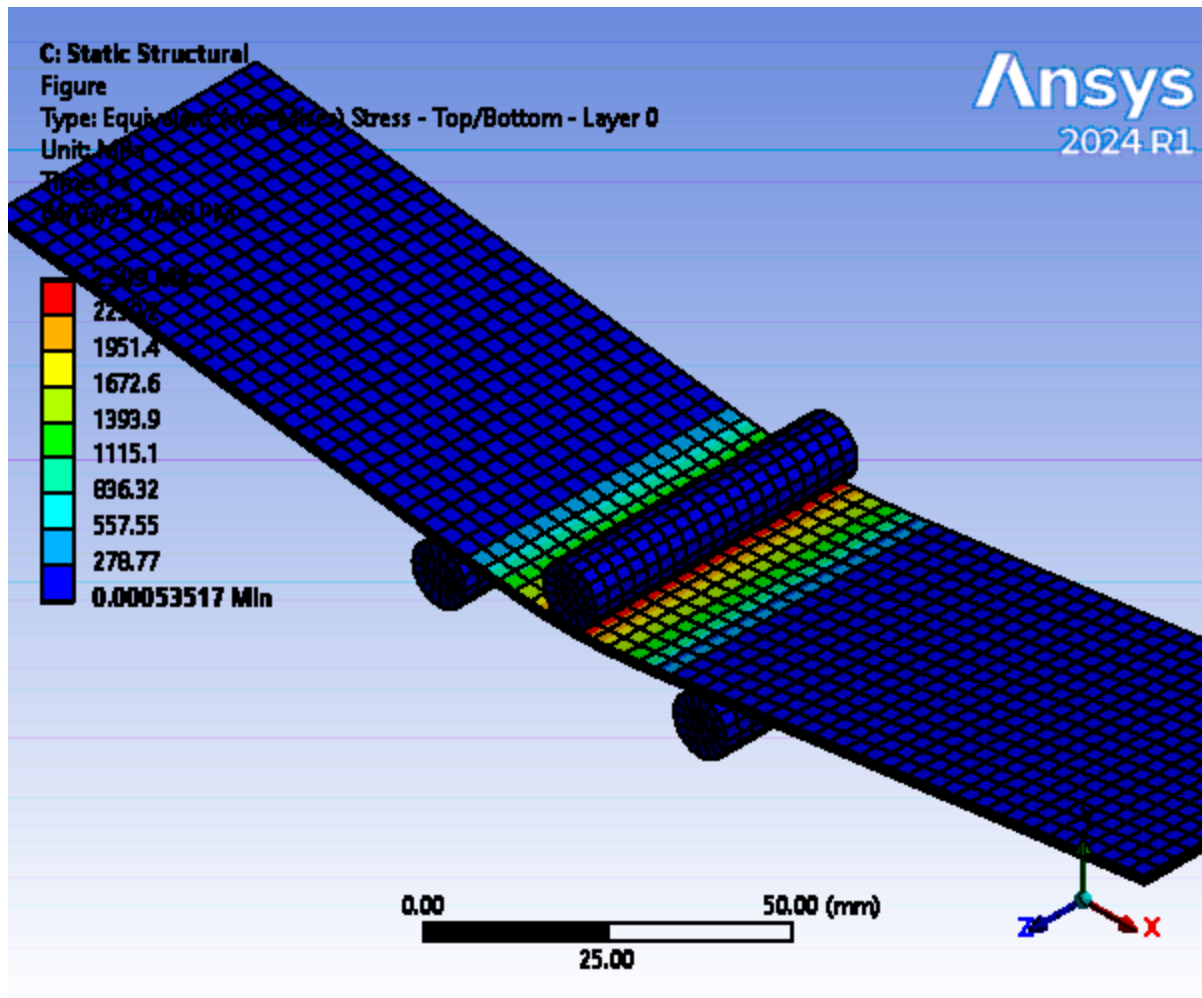
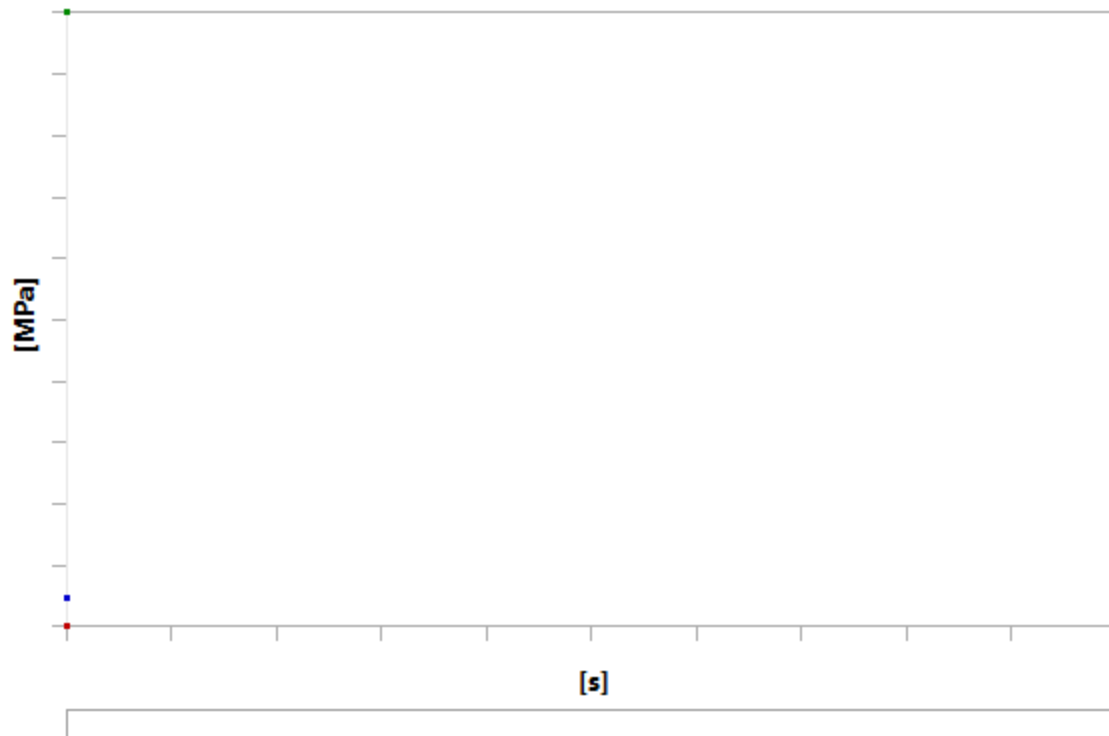


FIGURE 10  
Model (C2) > Static Structural (C3) > Solution (C4) > Maximum Shear Stress



**TABLE 26**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Maximum Shear Stress**

Time [s]	Minimum [MPa]	Maximum [MPa]	Average [MPa]
1.	2.8727e-004	1264.7	57.601

**FIGURE 11**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Maximum Shear Stress > Figure 4 Layer Maximum Shear**



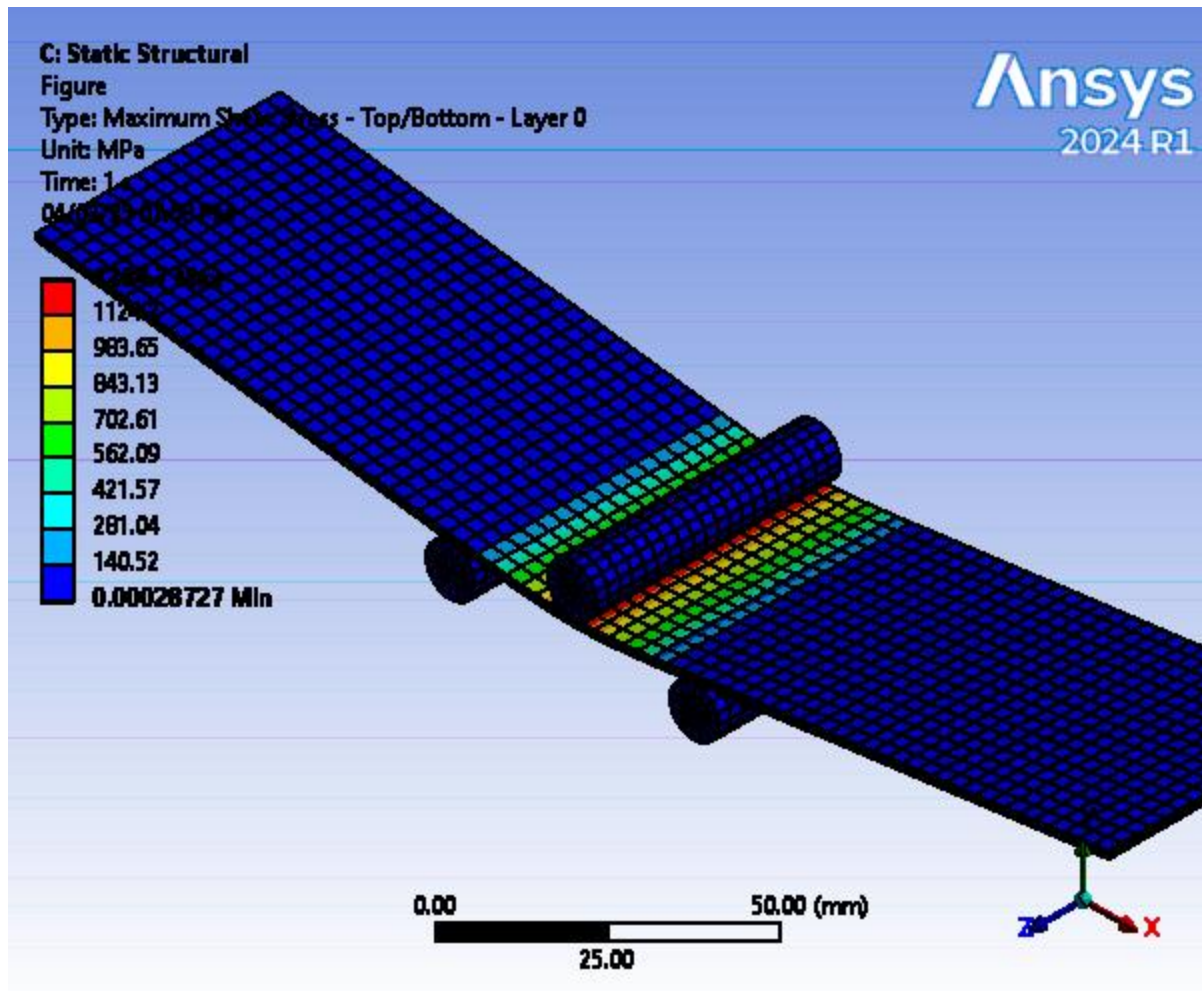
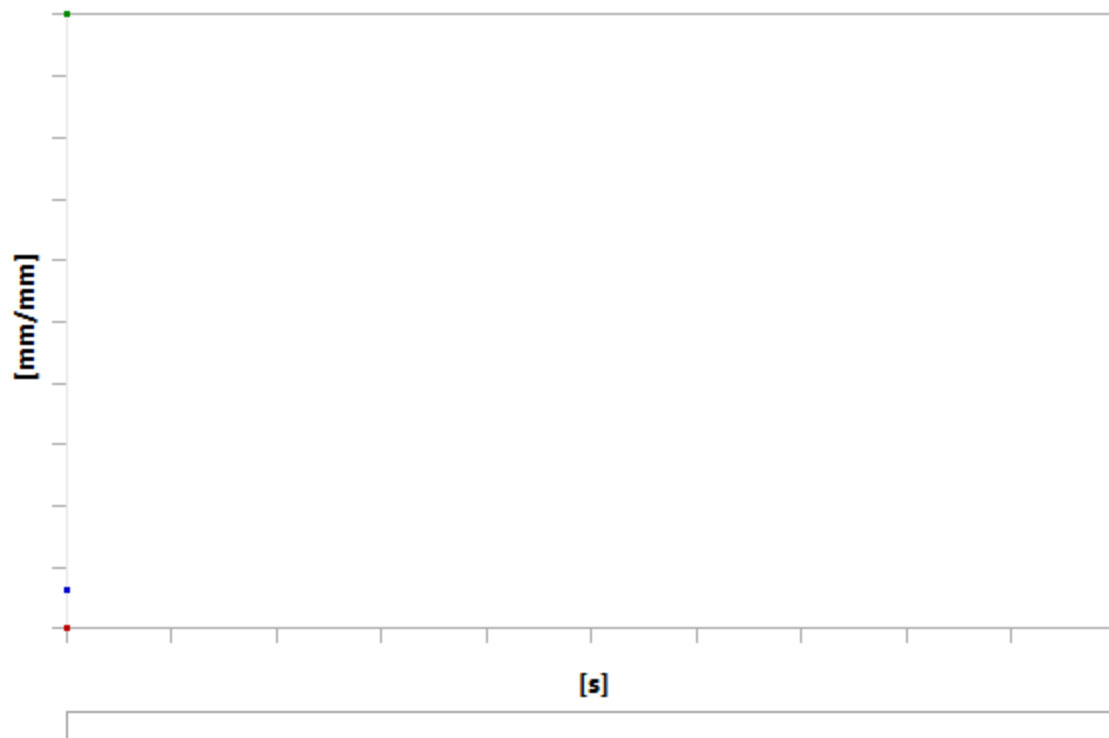


FIGURE 12  
Model (C2) > Static Structural (C3) > Solution (C4) > Equivalent Elastic Strain



**TABLE 27**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Equivalent Elastic Strain**

Time [s]	Minimum [mm/mm]	Maximum [mm/mm]	Average [mm/mm]
1.	4.7913e-007	4.2599e-002	2.6779e-003

**FIGURE 13**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Equivalent Elastic Strain > Figure 4 Layer equivalent strain**

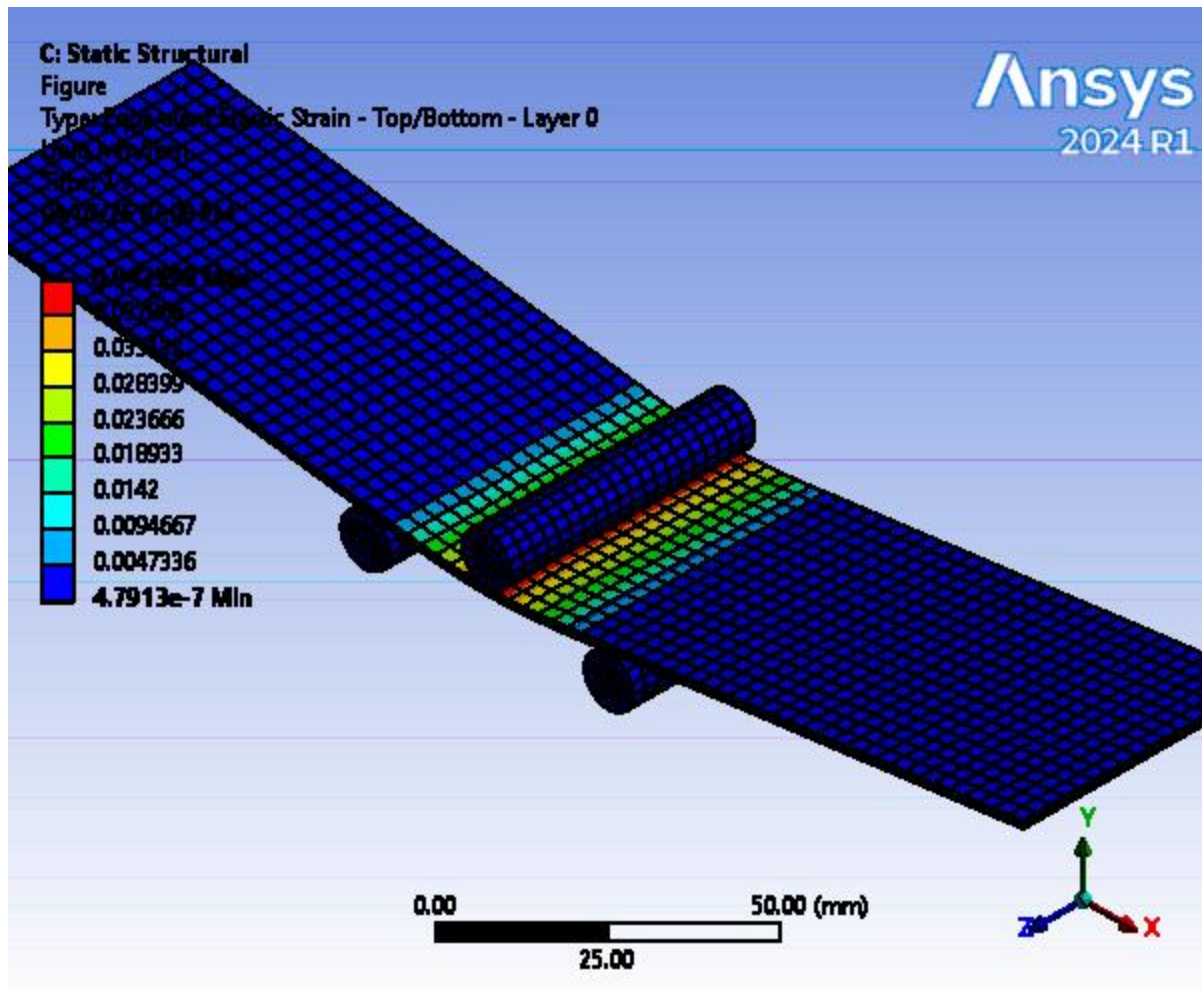
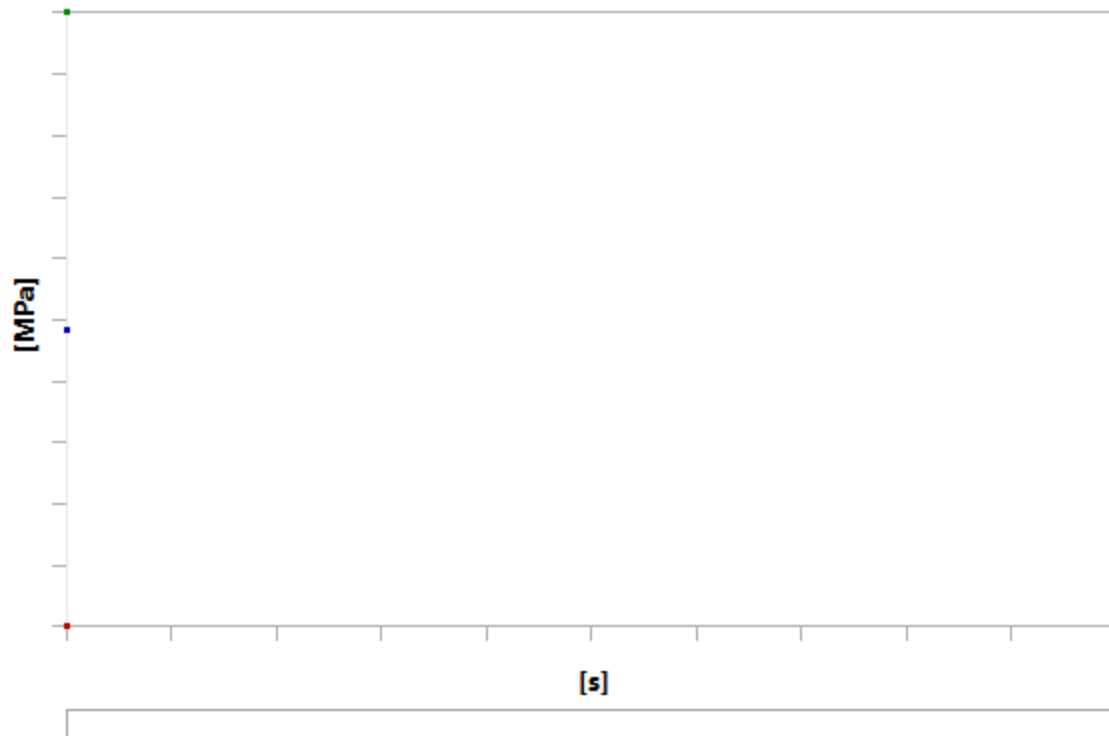


FIGURE 14  
Model (C2) > Static Structural (C3) > Solution (C4) > Shear Stress



**TABLE 28**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Shear Stress**

Time [s]	Minimum [MPa]	Maximum [MPa]	Average [MPa]
1.	-16.711	17.936	4.1374e-002

**FIGURE 15**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Shear Stress > Figure**  
**4 Layer Shar Stress**

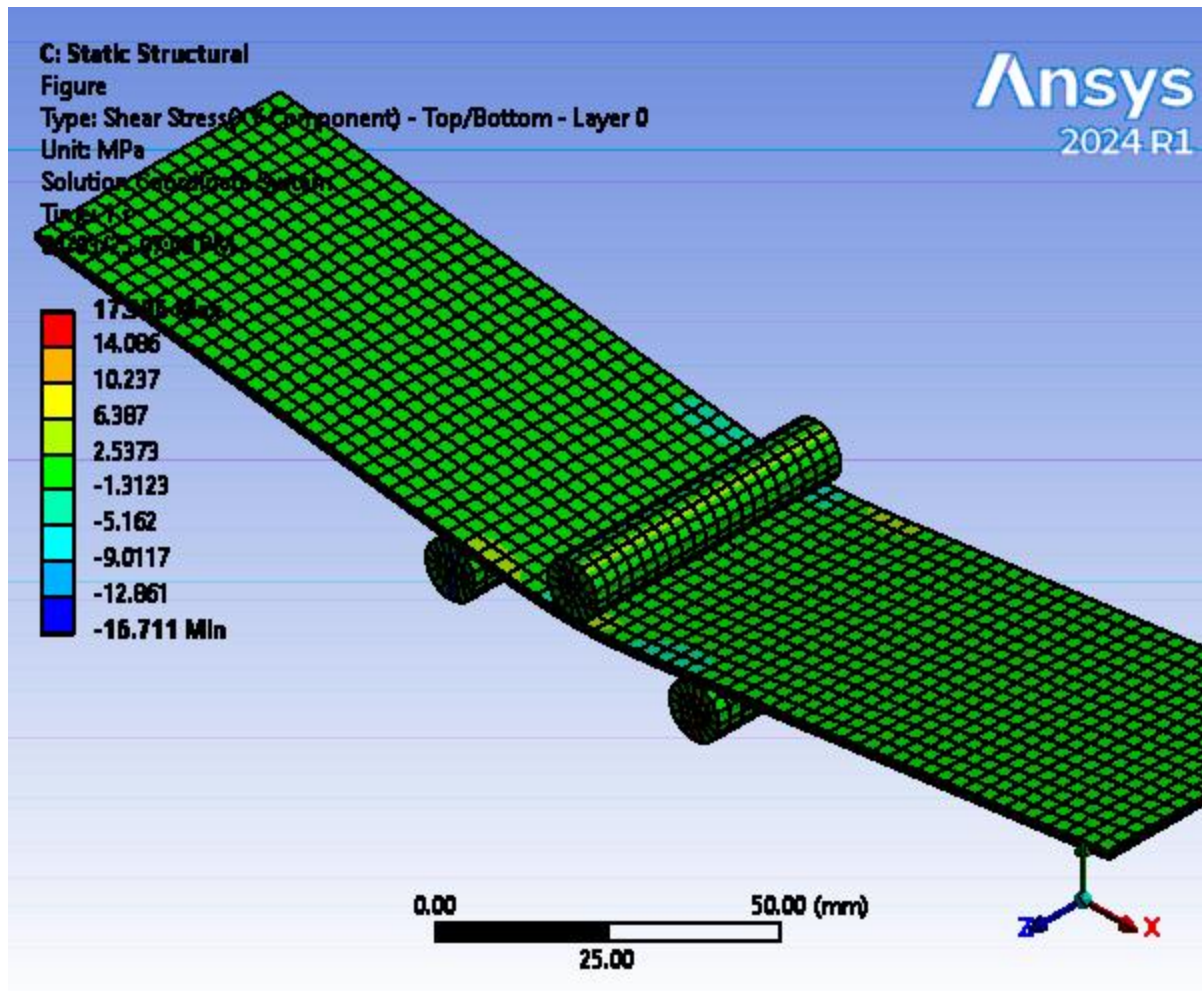
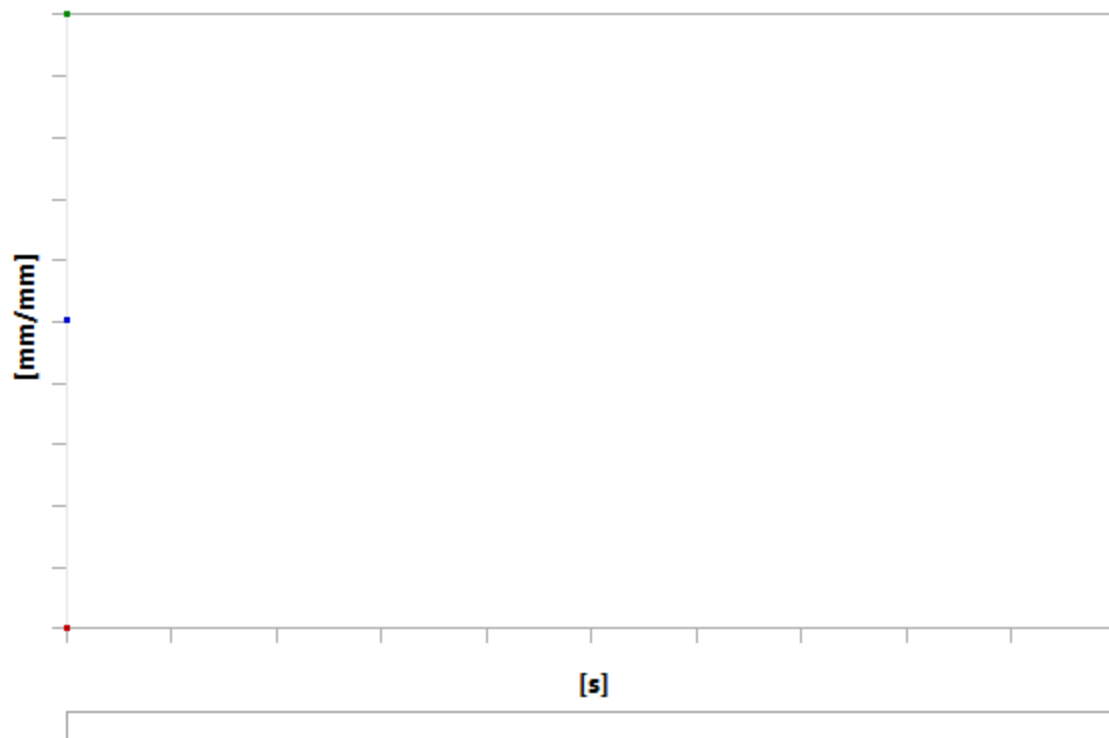


FIGURE 16  
Model (C2) > Static Structural (C3) > Solution (C4) > Normal Elastic Strain



**TABLE 29**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Normal Elastic Strain**

Time [s]	Minimum [mm/mm]	Maximum [mm/mm]	Average [mm/mm]
1.	-3.4877e-002	3.447e-002	-3.9976e-005

**FIGURE 17**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Normal Elastic Strain > Figure 4 Layer Normal Strain**

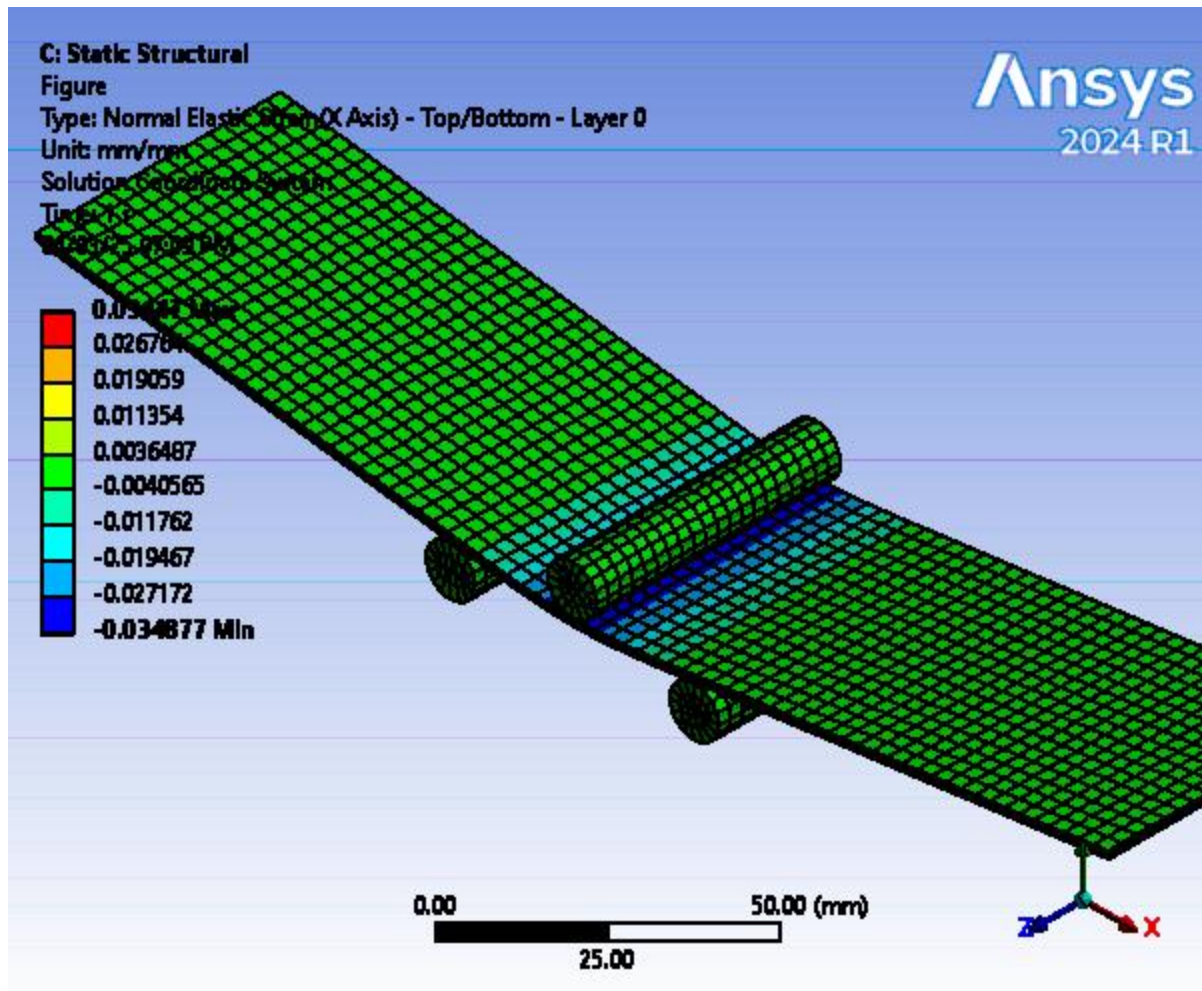
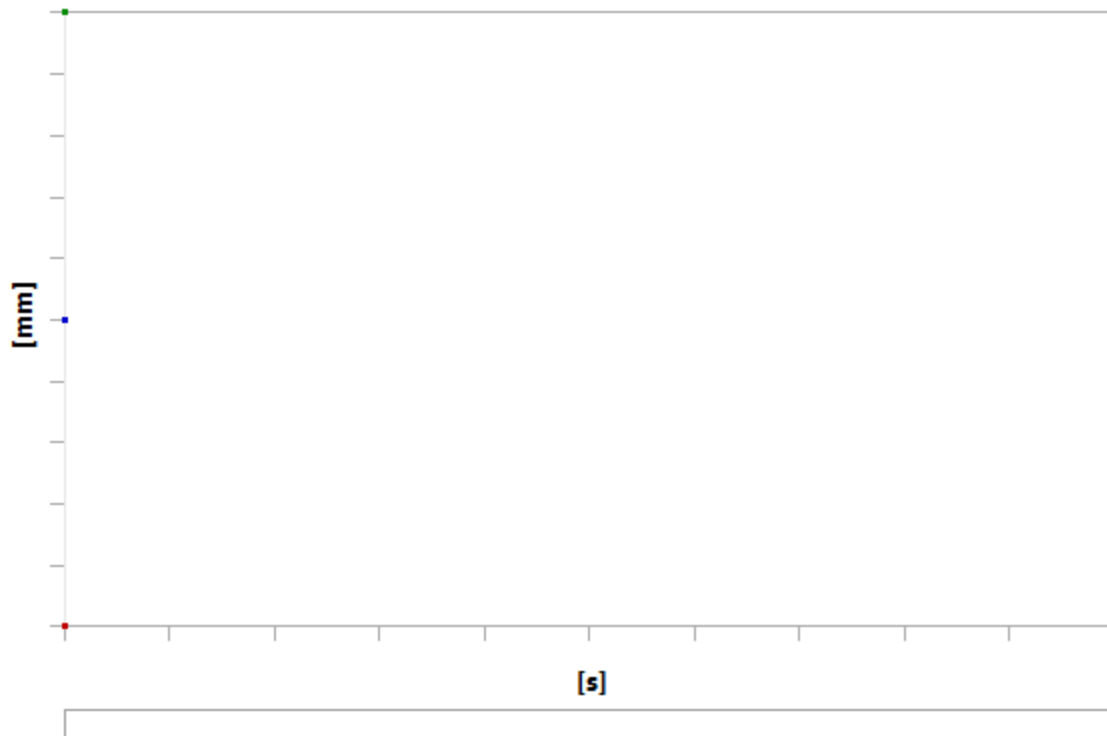


FIGURE 18  
Model (C2) > Static Structural (C3) > Solution (C4) > Directional Deformation



**TABLE 30**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Directional Deformation**

Time [s]	Minimum [mm]	Maximum [mm]	Average [mm]
1.	-0.40176	0.40168	-5.3628e-005

**FIGURE 19**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Directional Deformation > Figure 4 Layer directional deformation**



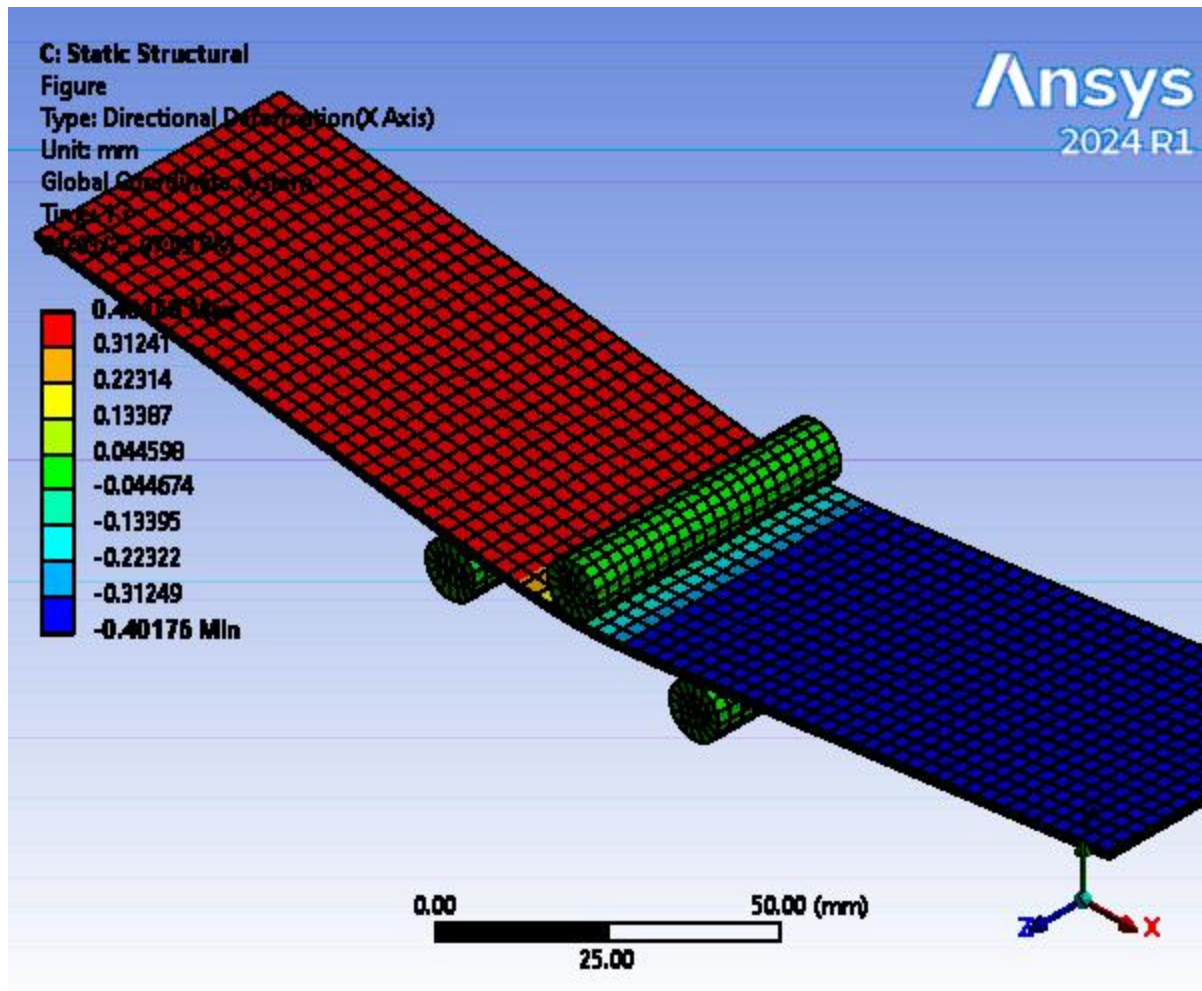
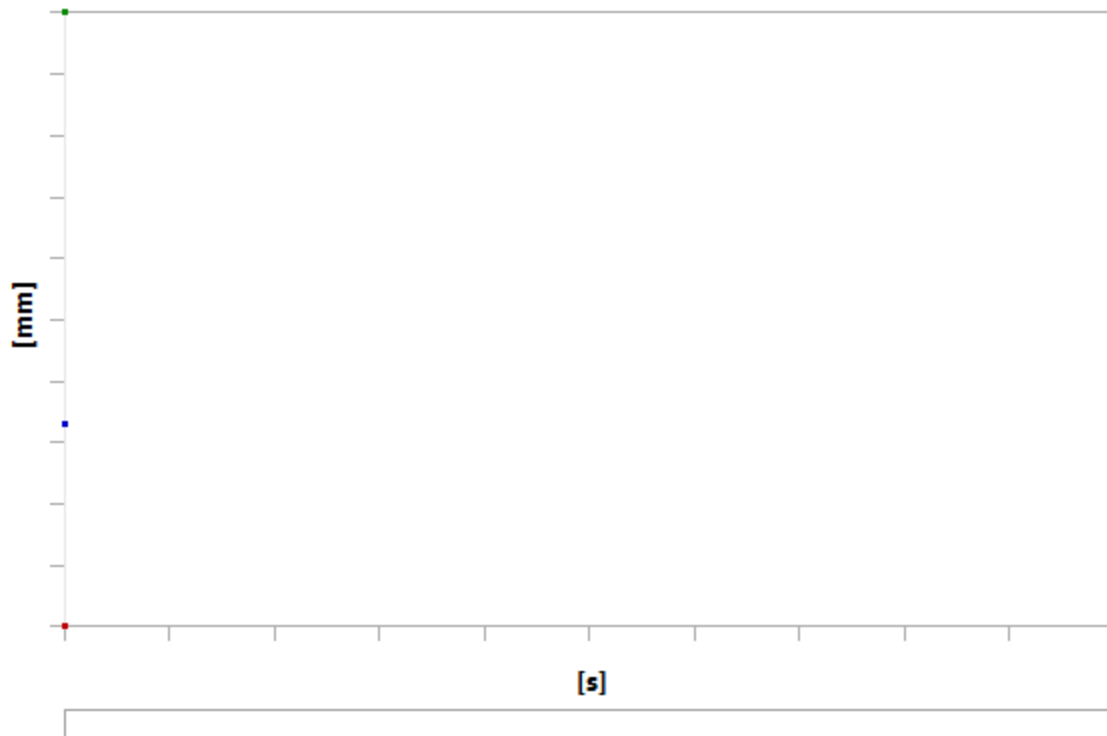


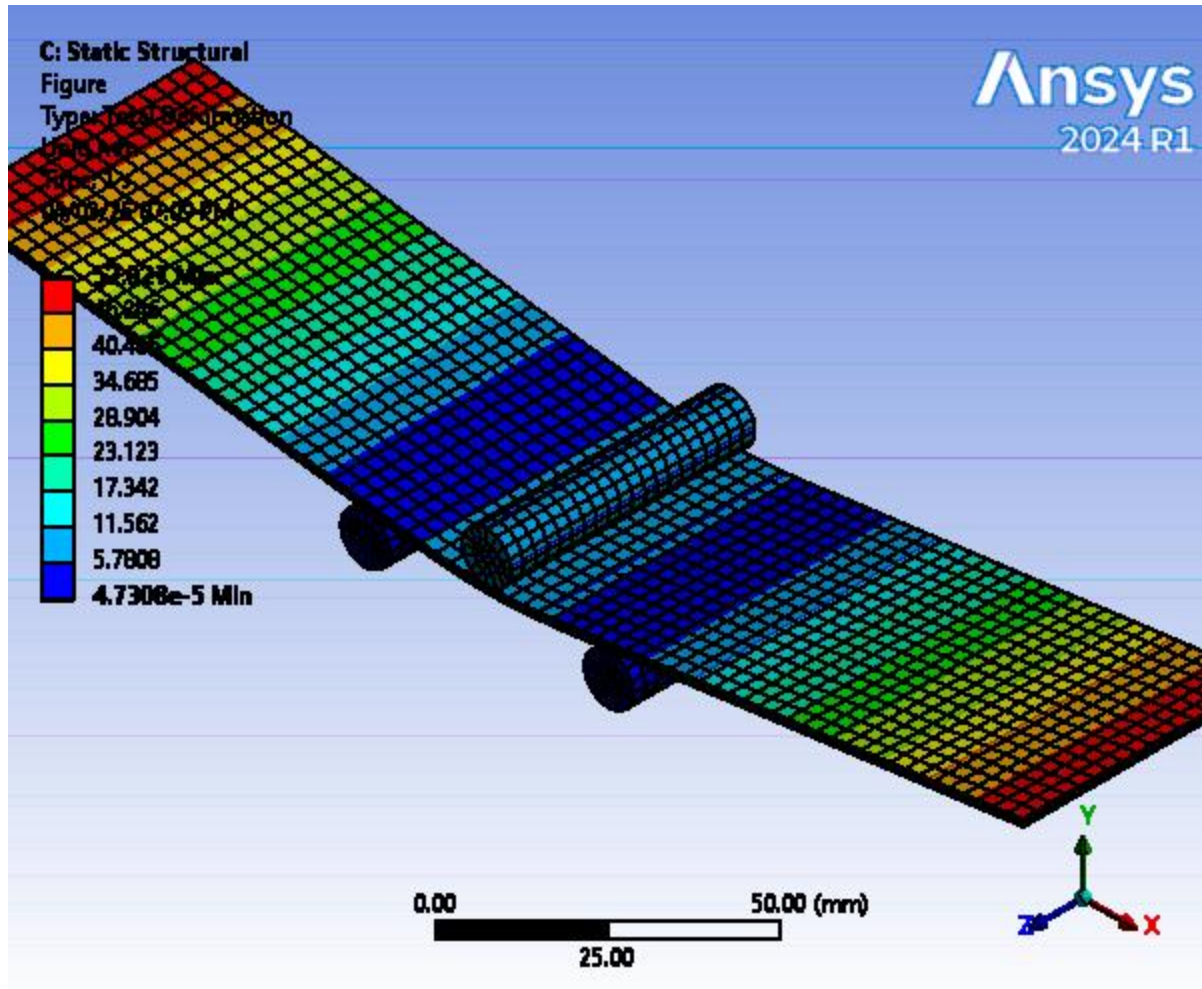
FIGURE 20  
Model (C2) > Static Structural (C3) > Solution (C4) > Total Deformation



**TABLE 31**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Total Deformation**

Time [s]	Minimum [mm]	Maximum [mm]	Average [mm]
1.	4.7308e-005	52.027	17.075

**FIGURE 21**  
**Model (C2) > Static Structural (C3) > Solution (C4) > Total Deformation > Figure**  
**4 Layer total Deformation**



## Material Data

### Structural Steel 2

**TABLE 32**  
Structural Steel 2 > Constants

Density	7.85e-009 tonne mm <sup>-3</sup>
Coefficient of Thermal Expansion	1.2e-005 C <sup>-1</sup>
Specific Heat	4.34e+008 mJ tonne <sup>-1</sup> C <sup>-1</sup>
Thermal Conductivity	6.05e-002 W mm <sup>-1</sup> C <sup>-1</sup>
Resistivity	1.7e-004 ohm mm

**TABLE 33**  
Structural Steel 2 > Color

Red	Green	Blue
132	139	179

**TABLE 34**  
Structural Steel 2 > Compressive Ultimate Strength

Compressive Ultimate Strength MPa
0

**TABLE 35**  
**Structural Steel 2 > Compressive Yield Strength**

Compressive Yield Strength MPa
250

**TABLE 36**  
**Structural Steel 2 > Tensile Yield Strength**

Tensile Yield Strength MPa
250

**TABLE 37**  
**Structural Steel 2 > Tensile Ultimate Strength**

Tensile Ultimate Strength MPa
460

**TABLE 38**  
**Structural Steel 2 > Isotropic Secant Coefficient of Thermal Expansion**

Zero-Thermal-Strain Reference Temperature C
22

**TABLE 39**  
**Structural Steel 2 > S-N Curve**

Alternating Stress MPa	Cycles	Mean Stress MPa
3999	10	0
2827	20	0
1896	50	0
1413	100	0
1069	200	0
441	2000	0
262	10000	0
214	20000	0
138	1.e+005	0
114	2.e+005	0
86.2	1.e+006	0

**TABLE 40**  
**Structural Steel 2 > Strain-Life Parameters**

Strength Coefficient MPa	Strength Exponent	Ductility Coefficient	Ductility Exponent	Cyclic Strength Coefficient MPa	Cyclic Strain Hardening Exponent
920	-0.106	0.213	-0.47	1000	0.2

**TABLE 41**  
**Structural Steel 2 > Isotropic Elasticity**

Young's Modulus MPa	Poisson's Ratio	Bulk Modulus MPa	Shear Modulus MPa	Temperature C
2.e+005	0.3	1.6667e+005	76923	

**TABLE 42**  
**Structural Steel 2 > Isotropic Relative Permeability**

Relative Permeability
10000

## **UD\_CFRP Tape (90)**

**TABLE 43**  
**UD\_CFRP Tape (90) > Constants**

Density	1.49e-009 tonne mm <sup>-3</sup>
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**TABLE 44**  
**UD\_CFRP Tape (90) > Color**

Red	Green	Blue
184	235	197

**TABLE 45**  
**UD\_CFRP Tape (90) > Orthotropic Elasticity**

Young's Modulus X direction MPa	Young's Modulus Y direction MPa	Young's Modulus Z direction MPa	Poisson's Ratio XY	Poisson's Ratio YZ	Poisson's Ratio XZ	Shear Modulus XY MPa	Shear Modulus YZ MPa	Shear Modulus XZ MPa	Temperature C
72322	5140	5140	0.26	0.4	0.26	2806	1853	2806	

**TABLE 46**  
**UD\_CFRP Tape (90) > Orthotropic Stress Limits**

Tensile X direction MPa	Tensile Y direction MPa	Tensile Z direction MPa	Compressive X direction MPa	Compressive Y direction MPa	Compressive Z direction MPa	Shear XY MPa	Shear YZ MPa	Shear XZ MPa	Temperature C
1253	16	16	-608	-56	-56	34	18	34	

**TABLE 47**  
**UD\_CFRP Tape (90) > Tsai-Wu Constants**

Temperature C	Coupling Coefficient XY	Coupling Coefficient YZ	Coupling Coefficient XZ
	-1	-1	-1