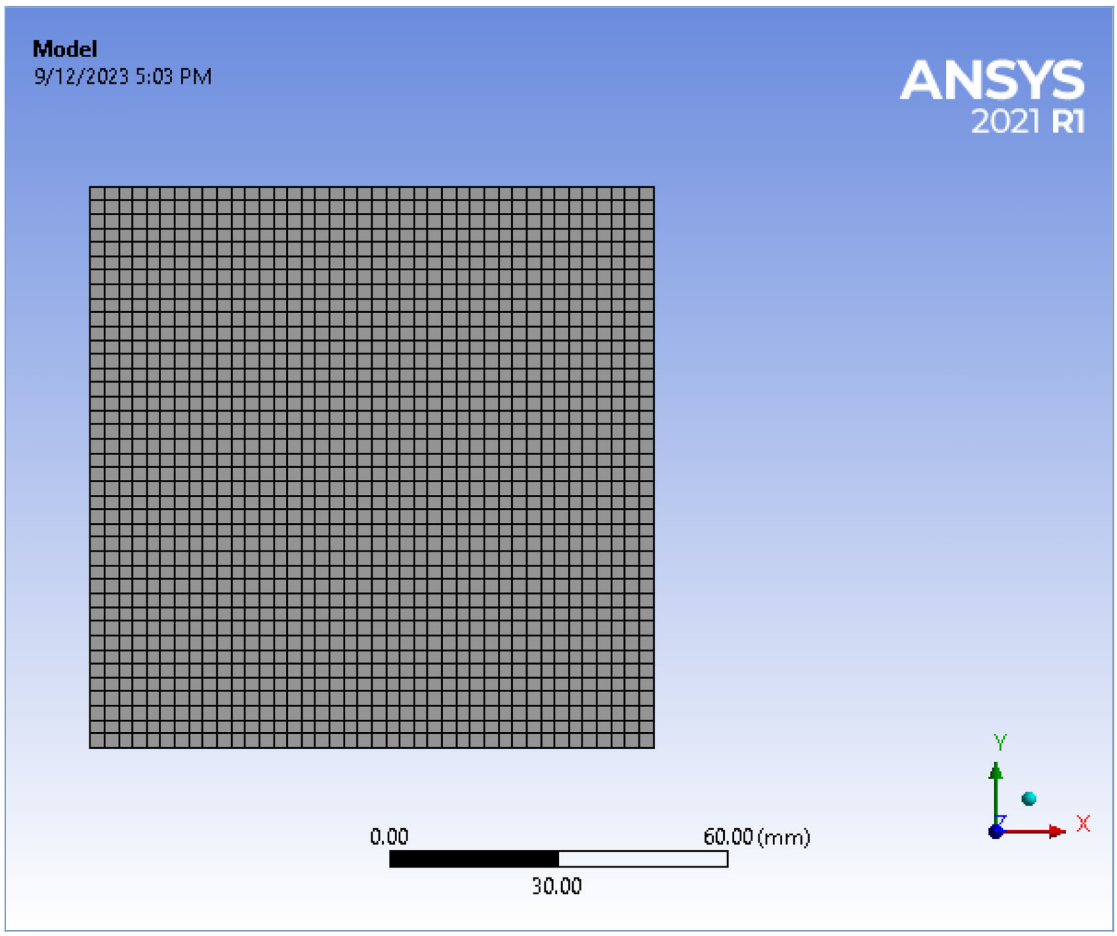
Project*

First Saved	Thursday, August 24, 2023
Last Saved	Tuesday, September 12, 2023
Product Version	2021 R1
Save Project Before Solution	No
Save Project After Solution	No



Contents

Units

TABLE 1

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

Model (B2)

TABLE 2
Model (B2) > Import Summary

Object Name	*Import Summary*
State	No State

Geometry

TABLE 3
Model (B2) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	

Source	C:\Users\MonsteR\Documents\Ansys\Example4-3\Example4-3_files\dp0 \global\MECH\SYS\AssembledModel\SYS.pmdb
Type	ACP
Length Unit	Meters
Element Control	Program Controlled
Display Style	Part Color
Bounding Box	
Length X	100. mm
Length Y	100. mm
Length Z	1.524 mm
Properties	
Volume	15240 mm³
Mass	2.2708e-002 kg
Statistics	
Bodies	1
Active Bodies	1
Nodes	6724
Elements	4800
Mesh Metric	None
Update Options	
Assign Default Material	No
Advanced Geometry Options	
Analysis Type	3-D

TABLE 4
Model (B2) > Geometry > Parts

Object Name	*SolidModel.1*
State	Meshed
Graphics Properties	
Visible	Yes
Transparency	1
Definition	
Suppressed	No
Stiffness Behavior	Flexible
Coordinate System	Default Coordinate System
Reference Temperature	By Environment
Treatment	None
Material	
Assignment	Composite Material
Nonlinear Effects	Yes
Thermal Strain Effects	Yes
Bounding Box	
Length X	100. mm
Length Y	100. mm
Length Z	1.524 mm
Properties	
Volume	15240 mm³
Centroid X	50. mm
Centroid Y	50. mm
Centroid Z	0.762 mm
Statistics	
Nodes	6724
Elements	4800
Mesh Metric	None
Transfer Properties	
Source	A5::ACP (Pre)

TABLE 5
Model (B2) > Materials

Object Name	*Materials*
State	Fully Defined
Statistics	
Materials	1
Material Assignments	0

Coordinate Systems

TABLE 6
Model (B2) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*
State	Fully Defined
Definition	
Type	Cartesian
Coordinate System ID	0.
Origin	
Origin X	0. mm
Origin Y	0. mm
Origin Z	0. mm
Directional Vectors	
X Axis Data	[1. 0. 0.]
Y Axis Data	[0. 1. 0.]
Z Axis Data	[0. 0. 1.]

Connections

TABLE 7
Model (B2) > Connections

Object Name	*Connections*
State	Fully Defined
Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes

Mesh

TABLE 8
Model (B2) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Use Geometry Setting
Quality	
Check Mesh Quality	Yes, Errors
Error Limits	Aggressive Mechanical
Mesh Metric	None
Statistics	
Nodes	6724
Elements	4800
Model Assembly	
Read Only	Yes

TABLE 9
Model (B2) > Imported Plies

Object Name	*Imported Plies*
State	Solved
Definition	
Type	Imported Plies
Suppressed	No
Material	
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 10
Model (B2) > 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))*
State	Fully Defined		
Definition			
Name in Source	P1L1__ModelingPly.1	P1L2__ModelingPly.1	P1L3__ModelingPly.1
ID in Source	P1L1__ModelingPly.1	P1L2__ModelingPly.1	P1L3__ModelingPly.1
Material	Epoxy Carbon UD (230 GPa) Prepreg		
Thickness	0.127 mm	1.27 mm	0.127 mm
Angle	0. °	90. °	0. °
Number of Elements	1600.		
Transfer Properties			
Source	A5::ACP (Pre)		

Named Selections

TABLE 11
Model (B2) > Named Selections > Named Selections

Object Name	*center*	*edges*	*X-hold*	*SOLIDMODEL.1_ALL_ELEMENTS_BOT (ACP (Pre))*	*SOLIDMODEL.1_ALL_ELEMENTS_TOP (ACP (Pre))*
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Geometry	4 Nodes	640 Nodes	8 Nodes	1 Face	
Definition					
Send to Solver	Yes				
Visible	Yes				
Program Controlled Inflation	Exclude				
Protected				Program Controlled	
Statistics					

Type	Manual			Imported
Total Selection	4 Nodes	640 Nodes	8 Nodes	1 Face
Suppressed	0			
Used by Mesh Worksheet	No			
Surface Area				10000 mm²
Transfer Properties				
Source				A5::ACP (Pre)

Static Structural (B3)

TABLE 12
Model (B2) > Analysis

Object Name	*Static Structural (B3)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
Options	
Environment Temperature	22. °C
Generate Input Only	No

TABLE 13
Model (B2) > Static Structural (B3) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Step Controls	
Number Of Steps	1.
Current Step Number	1.
Step End Time	1. s
Auto Time Stepping	Program Controlled
Solver Controls	
Solver Type	Program Controlled
Weak Springs	Off
Solver Pivot Checking	Program Controlled
Large Deflection	Off
Inertia Relief	Off
Quasi-Static Solution	Off
Rotordynamics Controls	
Coriolis Effect	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
Combine Restart Files	Program Controlled
Nonlinear Controls	
Newton-Raphson Option	Program Controlled
Force Convergence	Program Controlled
Moment Convergence	Program Controlled
Displacement Convergence	Program Controlled
Rotation Convergence	Program Controlled
Line Search	Program Controlled
Stabilization	Program Controlled
Advanced	

Inverse Option	No
Contact Split (DMP)	Off
Output Controls	
Stress	Yes
Surface Stress	No
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
Analysis Data Management	
Solver Files Directory	C:\Users\MonsteR\Documents\Ansys\Example4-3\Example4-3_files\dp0\SYS\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Contact Summary	Program Controlled
Delete Unneeded Files	Yes
Nonlinear Solution	No
Solver Units	Active System
Solver Unit System	nmm

BCs

TABLE 14
Model (B2) > Static Structural (B3) > BCs > Loads

Object Name	*center*	*x-hold*	*edges*
State	Fully Defined		
Scope			
Scoping Method	Named Selection		
Named Selection	center	X-hold	edges
Definition			
Type	Displacement		
Coordinate System	Nodal Coordinate System		
X Component	0. mm (ramped)	Free	
Y Component	0. mm (ramped)		Free
Z Component	0. mm (ramped)		
Suppressed	No		

FIGURE 1
Model (B2) > Static Structural (B3) > BCs > center

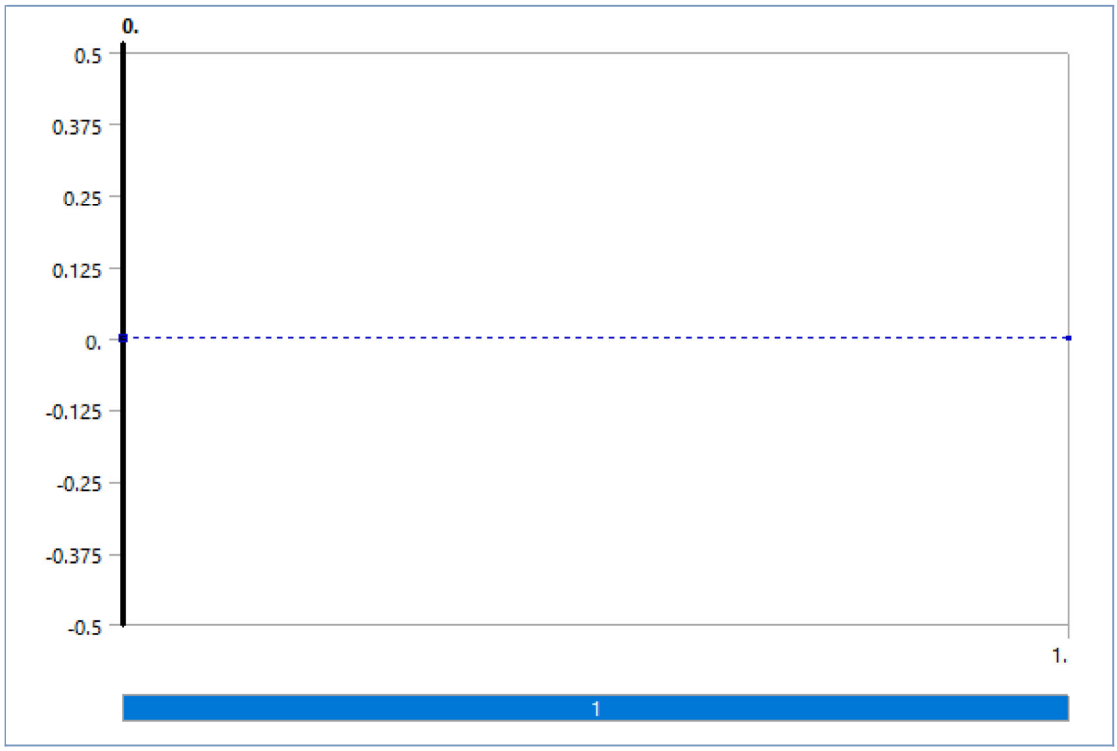


FIGURE 2
Model (B2) > Static Structural (B3) > BCs > x-hold

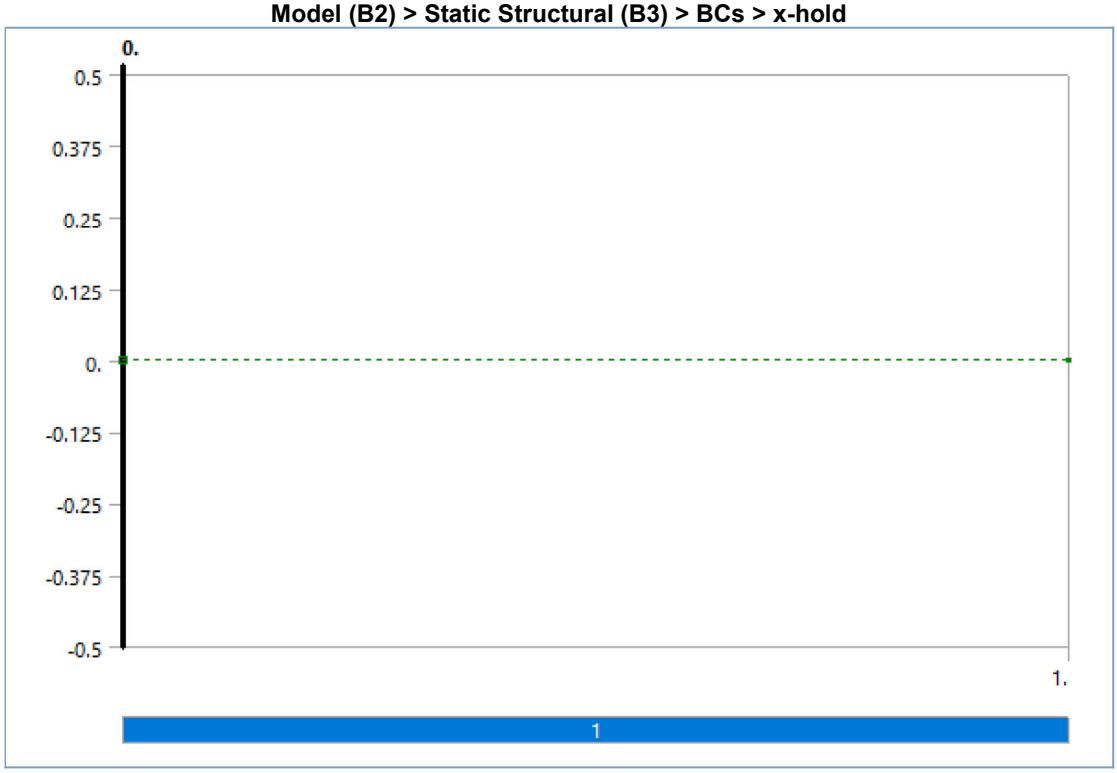


FIGURE 3
Model (B2) > Static Structural (B3) > BCs > edges

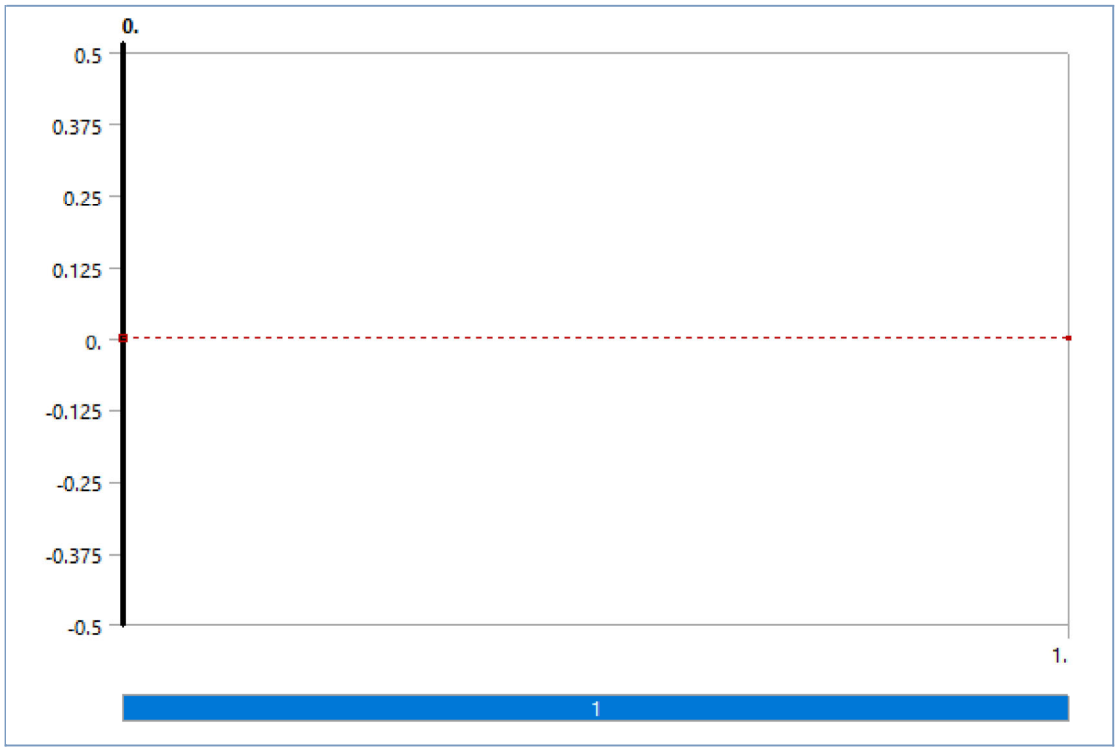


TABLE 15
Model (B2) > Static Structural (B3) > Loads

Object Name	*Force*	*Force 2*
State	Fully Defined	
Scope		
Scoping Method	Geometry Selection	
Geometry	1 Face	
Definition		
Type	Force	
Define By	Vector	
Applied By	Surface Effect	
Magnitude	10000 N (ramped)	-10000 N (ramped)
Direction	Defined	
Suppressed	No	

FIGURE 4
Model (B2) > Static Structural (B3) > Force

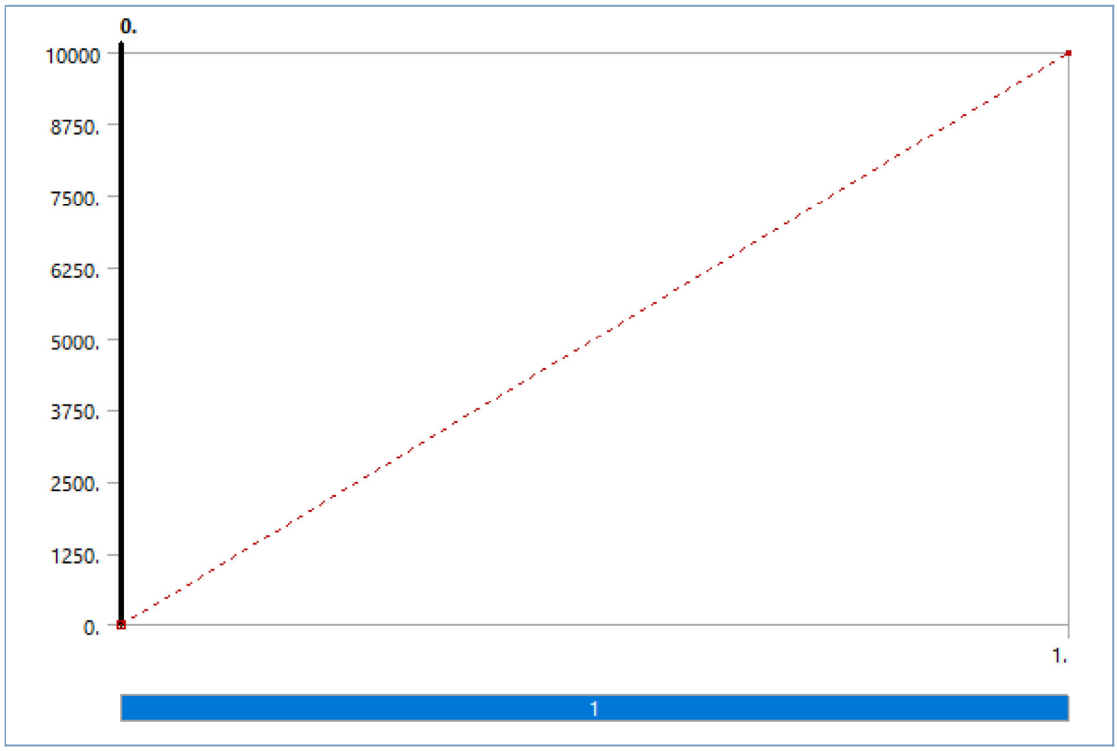
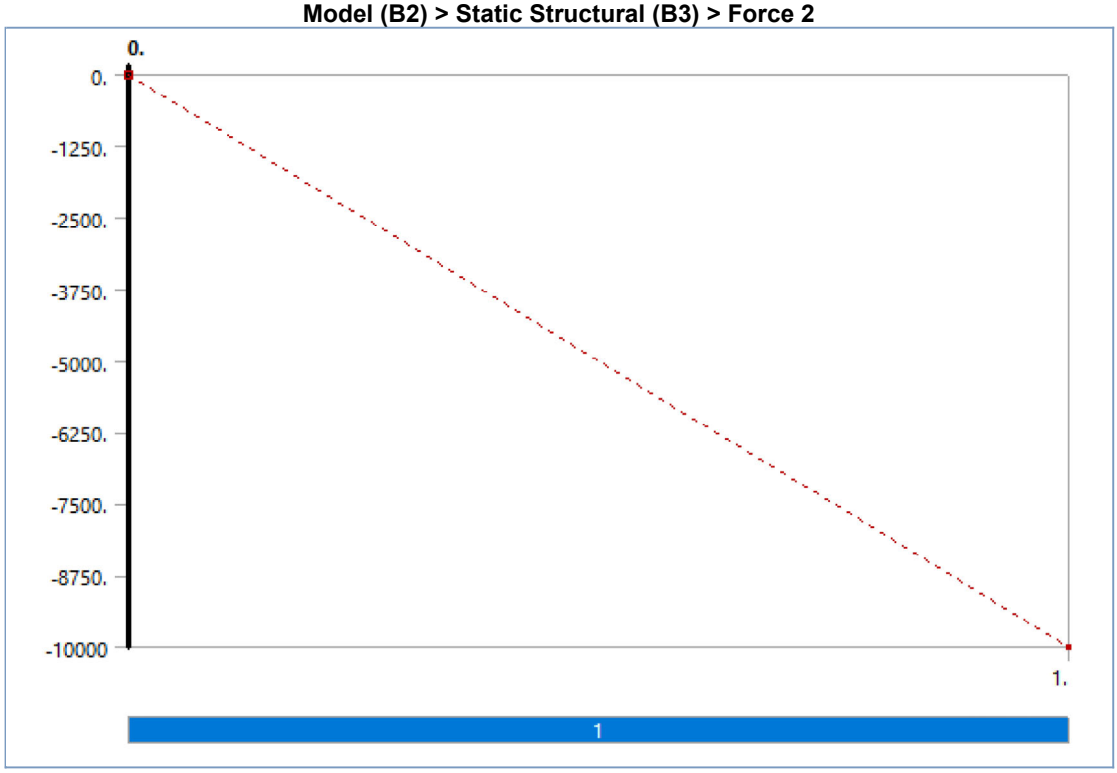


FIGURE 5
Model (B2) > Static Structural (B3) > Force 2



Solution (B4)

TABLE 16
Model (B2) > Static Structural (B3) > Solution

Object Name	*Solution (B4)*
State	Solved

Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	3. s
MAPDL Memory Used	95. MB
MAPDL Result File Size	4.1875 MB
Post Processing	
Beam Section Results	No
On Demand Stress/Strain	No

TABLE 17
Model (B2) > Static Structural (B3) > Solution (B4) > Solution Information

Object Name	*Solution Information*
State	Solved
Solution Information	
Solution Output	Solver Output
Newton-Raphson Residuals	0
Identify Element Violations	0
Update Interval	2.5 s
Display Points	All
FE Connection Visibility	
Activate Visibility	Yes
Display	All FE Connectors
Draw Connections Attached To	All Nodes
Line Color	Connection Type
Visible on Results	No
Line Thickness	Single
Display Type	Lines

TABLE 18
Model (B2) > Static Structural (B3) > Solution (B4) > Results

Object Name	*Total Deformation*
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Total Deformation
By	Time
Display Time	Last
Calculate Time History	Yes
Identifier	
Suppressed	No
Results	
Minimum	0. mm
Maximum	3.3278e-002 mm
Average	1.7981e-002 mm
Minimum Occurs On	SolidModel.1
Maximum Occurs On	SolidModel.1
Information	
Time	1. s
Load Step	1
Substep	1
Iteration Number	1

FIGURE 6
Model (B2) > Static Structural (B3) > Solution (B4) > Total Deformation

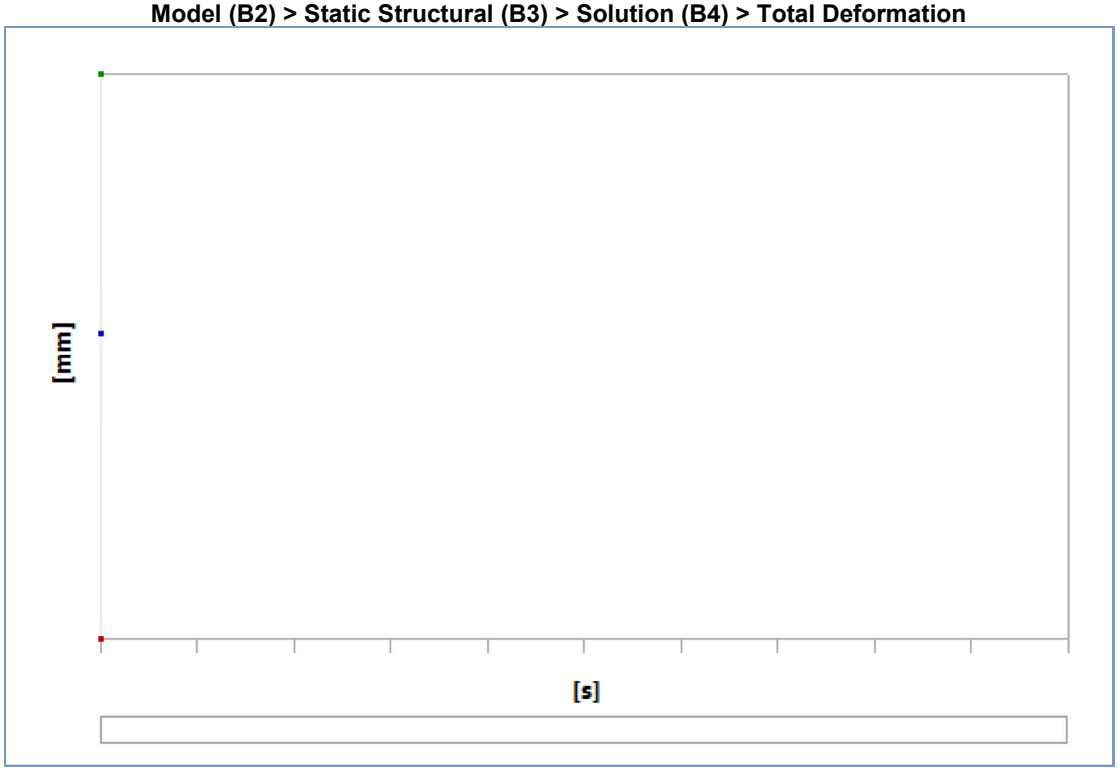


TABLE 19
Model (B2) > Static Structural (B3) > Solution (B4) > Total Deformation

Time [s]	Minimum [mm]	Maximum [mm]	Average [mm]
1.	0.	3.3278e-002	1.7981e-002

Material Data

Epoxy Carbon UD (230 GPa) Prepreg

TABLE 20
Epoxy Carbon UD (230 GPa) Prepreg > Density

Density kg mm^-3
1.49e-006

TABLE 21
Epoxy Carbon UD (230 GPa) Prepreg > 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
53780	1.1793e+005	10300	0.25	0.6	0.27	8620	3000	7000

TABLE 22
Epoxy Carbon UD (230 GPa) Prepreg > Orthotropic Strain Limits

Tensile X direction	Tensile Y direction	Tensile Z direction	Compressive X direction	Compressive Y direction	Compressive Z direction	Shear XY	Shear YZ	Shear XZ
1.67e-002	3.2e-003	3.2e-003	-1.08e-002	-1.92e-002	-1.92e-002	1.2e-002	1.1e-002	1.2e-002

TABLE 23
Epoxy Carbon UD (230 GPa) Prepreg > 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
2231	29	29	-1082	-100	-100	60	32	60

TABLE 24
Epoxy Carbon UD (230 GPa) Prepreg > Orthotropic Secant Coefficient of Thermal Expansion

Coefficient of Thermal Expansion X direction C^-1	Coefficient of Thermal Expansion Y direction C^-1	Coefficient of Thermal Expansion Z direction C^-1
-4.7e-007	3.e-005	3.e-005

Zero-Thermal-Strain Reference Temperature C
20

TABLE 25
Epoxy Carbon UD (230 GPa) Prepreg > Puck Constants

Compressive Inclination XZ	Compressive Inclination YZ	Tensile Inclination XZ	Tensile Inclination YZ
0.3	0.25	0.35	0.25

TABLE 26
Epoxy Carbon UD (230 GPa) Prepreg > Additional Puck Constants

Interface Weakening Factor	Degradation Parameter s	Degradation Parameter M
0.8	0.5	0.5

TABLE 27
Epoxy Carbon UD (230 GPa) Prepreg > Tsai-Wu Constants

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

TABLE 28
Epoxy Carbon UD (230 GPa) Prepreg > Color

Red	Green	Blue
222	222	222