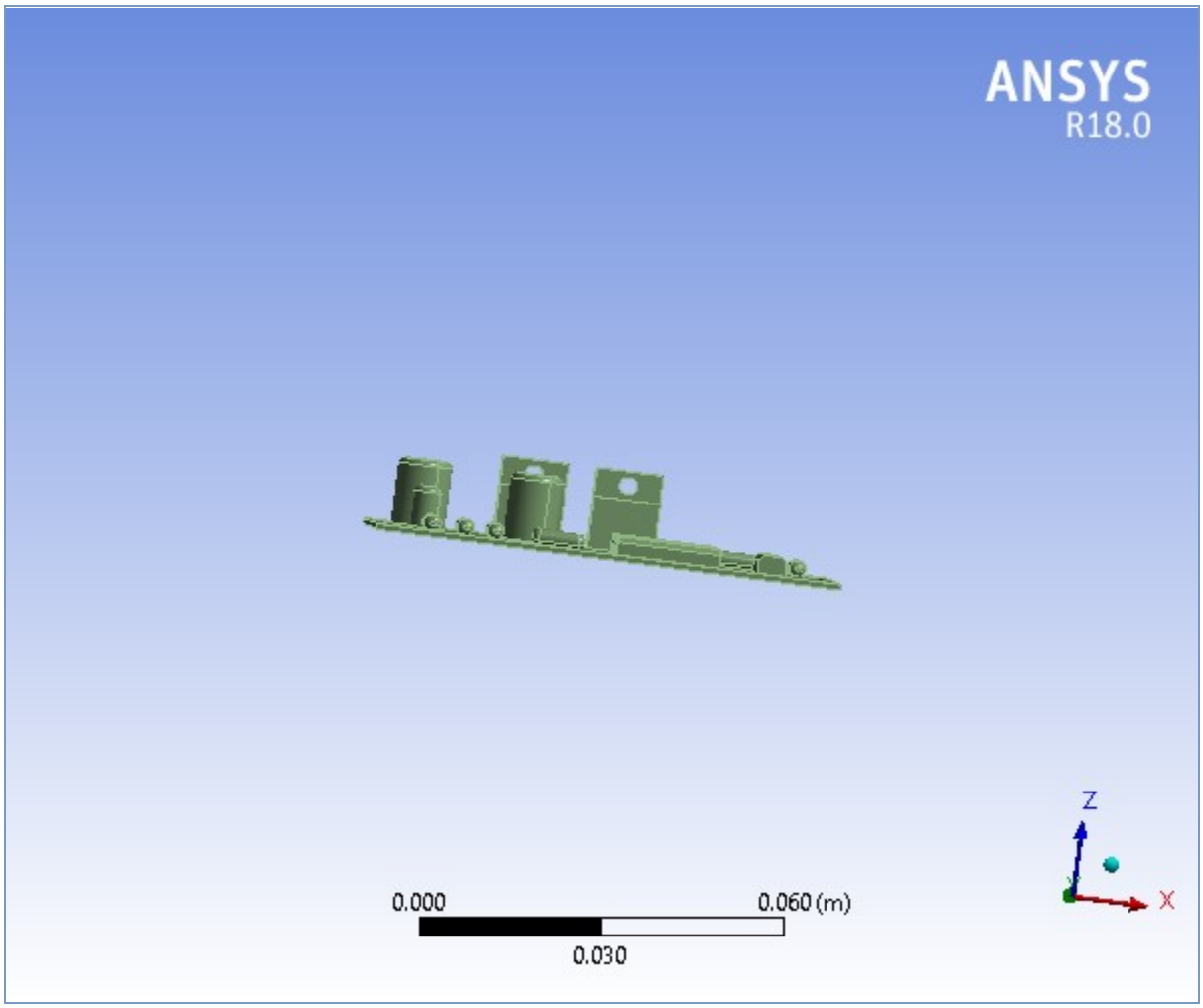
Project

First Saved	Tuesday, April 24, 2018
Last Saved	Wednesday, April 25, 2018
Product Version	18.0 Release
Save Project Before Solution	No
Save Project After Solution	No



Contents

Report Not Finalized

Not all objects described below are in a finalized state. As a result, data may be incomplete, obsolete or in error. View first state problem. To finalize this report, edit objects as needed and solve the analyses.

Units

TABLE 1

Unit System	Metric (m, kg, N, s, V, A) Degrees rad/s Celsius
Angle	Degrees
Rotational Velocity	rad/s
Temperature	Celsius

Model (B4)

Geometry

TABLE 2
Model (B4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\Mohammed Azharudeen\Desktop\fem_files\dp0\SYS-3\DM\SYS-3.scdoc
Type	SpaceClaim
Length Unit	Meters

Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	7.7e-002 m
Length Y	4.1e-002 m
Length Z	1.4229e-002 m
Properties	
Volume	6.2029e-006 m³
Mass	4.8693e-002 kg
Scale Factor Value	1.
Statistics	
Bodies	1
Active Bodies	1
Nodes	21194
Elements	11941
Mesh Metric	None
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	Yes
Parameters	Independent
Parameter Key	
Attributes	Yes
Attribute Key	
Named Selections	Yes
Named Selection Key	
Material Properties	Yes
Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	Yes
Coordinate System Key	
Reader Mode Saves Updated File	No
Use Instances	Yes
Smart CAD Update	Yes
Compare Parts On Update	No
Attach File Via Temp File	Yes
Temporary Directory	C:\Users\Mohammed Azharudeen\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (B4) > Geometry > Parts

Object Name	*Example - Circuit - Board\Solid*
State	Meshed
Graphics Properties	
Visible	Yes
Transparency	1
Definition	
Suppressed	No
Stiffness Behavior	Flexible

Coordinate System	Default Coordinate System
Reference Temperature	By Environment
Behavior	None
Material	
Assignment	Structural Steel
Nonlinear Effects	Yes
Thermal Strain Effects	Yes
Bounding Box	
Length X	7.7e-002 m
Length Y	4.1e-002 m
Length Z	1.4229e-002 m
Properties	
Volume	6.2029e-006 m³
Mass	4.8693e-002 kg
Centroid X	-6.4529e-003 m
Centroid Y	-2.626e-002 m
Centroid Z	1.1319 m
Moment of Inertia Ip1	5.877e-006 kg·m²
Moment of Inertia Ip2	2.0923e-005 kg·m²
Moment of Inertia Ip3	2.5914e-005 kg·m²
Statistics	
Nodes	21194
Elements	11941
Mesh Metric	None
CAD Attributes	
PartTolerance:	0.00000001
Color:143.175.143	

Coordinate Systems

TABLE 4
Model (B4) > Coordinate Systems > Coordinate System

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

Connections

TABLE 5
Model (B4) > Connections

Object Name	*Connections*
State	Fully Defined

Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes

TABLE 6
Model (B4) > Connections > Contacts

Object Name	*Contacts*
State	Fully Defined
Definition	
Connection Type	Contact
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Auto Detection	
Tolerance Type	Slider
Tolerance Slider	53.
Tolerance Value	4.8821e-005 m
Use Range	No
Face/Face	Yes
Cylindrical Faces	Include
Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Parts
Search Across	Bodies
Statistics	
Connections	0
Active Connections	0

Mesh

TABLE 7
Model (B4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Body Color
Defaults	
Physics Preference	Mechanical
Relevance	0
Element Midside Nodes	Program Controlled
Sizing	
Size Function	Curvature
Relevance Center	Coarse
Initial Size Seed	Active Assembly
Transition	Fast
Span Angle Center	Coarse
Curvature Normal Angle	Default (70.3950 °)
Min Size	Default (4.4056e-005 m)
Max Face Size	Default (4.4056e-003 m)
Max Tet Size	Default (8.8112e-003 m)

Growth Rate	Default (1.850)
Automatic Mesh Based Defeaturing	On
Defeature Size	Default (2.2028e-005 m)
Minimum Edge Length	9.2523e-004 m
Quality	
Check Mesh Quality	Yes, Errors
Error Limits	Standard Mechanical
Target Quality	Default (0.050000)
Smoothing	Medium
Mesh Metric	None
Inflation	
Use Automatic Inflation	None
Inflation Option	Smooth Transition
Transition Ratio	0.272
Maximum Layers	5
Growth Rate	1.2
Inflation Algorithm	Pre
View Advanced Options	No
Advanced	
Number of CPUs for Parallel Part Meshing	Program Controlled
Straight Sided Elements	No
Number of Retries	0
Rigid Body Behavior	Dimensionally Reduced
Mesh Morphing	Disabled
Triangle Surface Mesher	Program Controlled
Topology Checking	No
Pinch Tolerance	Default (3.965e-005 m)
Generate Pinch on Refresh	No
Statistics	
Nodes	21194
Elements	11941

Named Selections

Modal (B5)

TABLE 8
Model (B4) > Analysis

Object Name	*Modal (B5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Modal
Solver Target	Mechanical APDL
Options	
Environment Temperature	30. °C
Generate Input Only	No

TABLE 9
Model (B4) > Modal (B5) > Initial Condition

Object Name	*Pre-Stress (None)*
State	Fully Defined

Definition	
Pre-Stress Environment	None

TABLE 10
Model (B4) > Modal (B5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Options	
Max Modes to Find	4
Limit Search to Range	No
Solver Controls	
Damped	No
Solver Type	Program Controlled
Rotordynamics Controls	
Coriolis Effect	Off
Campbell Diagram	Off
Output Controls	
Stress	No
Strain	No
Nodal Forces	No
Calculate Reactions	No
General Miscellaneous	No
Analysis Data Management	
Solver Files Directory	C:\Users\Mohammed Azharudeen\Desktop\fem_files\dp0\SYS-3\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Delete Unneeded Files	Yes
Solver Units	Active System
Solver Unit System	mks

TABLE 11
Model (B4) > Modal (B5) > Loads

Object Name	*Fixed Support*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	4 Faces
Definition	
Type	Fixed Support
Suppressed	No

Solution (B6)

TABLE 12
Model (B4) > Modal (B5) > Solution

Object Name	*Solution (B6)*
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	

Status	Done
MAPDL Elapsed Time	7. s
MAPDL Memory Used	462. MB
MAPDL Result File Size	6.25 MB
Post Processing	
Beam Section Results	No

The following bar chart indicates the frequency at each calculated mode.

FIGURE 1
Model (B4) > Modal (B5) > Solution (B6)

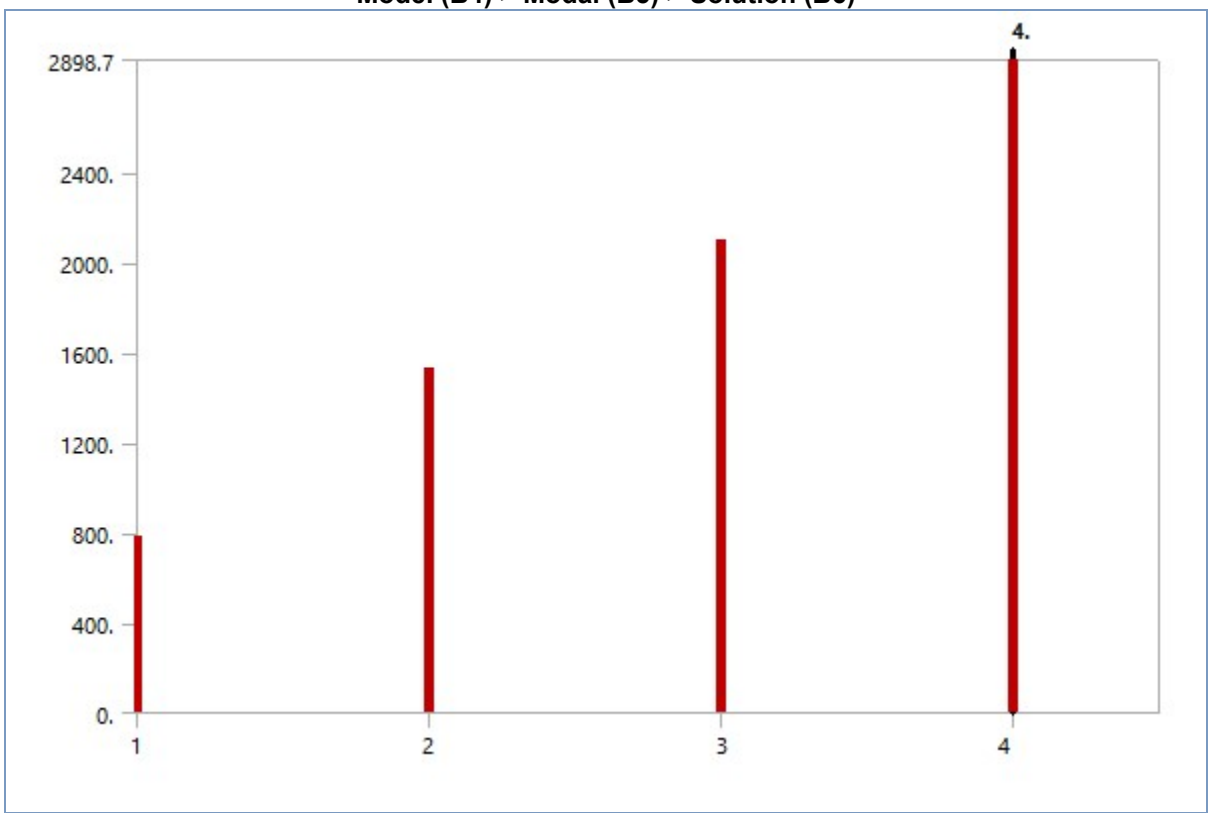


TABLE 13
Model (B4) > Modal (B5) > Solution (B6)

Mode	Frequency [Hz]
1.	785.44
2.	1532.7
3.	2094.5
4.	2898.7

TABLE 14
Model (B4) > Modal (B5) > Solution (B6) > 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 15
Model (B4) > Modal (B5) > Solution (B6) > Results

Object Name	*Total Deformation*	*Total Deformation 2*	*Total Deformation 3*	*Total Deformation 4*
State	Solved			
Scope				
Scoping Method	Geometry Selection			
Geometry	All Bodies			
Definition				
Type	Total Deformation			
Mode	1.	2.	3.	4.
Identifier				
Suppressed	No			
Results				
Minimum	0. m			
Maximum	7.216 m	12.973 m	9.276 m	15.333 m
Minimum Occurs On	Example - Circuit - Board\Solid			
Maximum Occurs On	Example - Circuit - Board\Solid			
Information				
Frequency	785.44 Hz	1532.7 Hz	2094.5 Hz	2898.7 Hz

TABLE 16
Model (B4) > Modal (B5) > Solution (B6) > Total Deformation

Mode	Frequency [Hz]
1.	785.44
2.	1532.7
3.	2094.5
4.	2898.7

TABLE 17
Model (B4) > Modal (B5) > Solution (B6) > Total Deformation 2

Mode	Frequency [Hz]
1.	785.44
2.	1532.7
3.	2094.5
4.	2898.7

TABLE 18
Model (B4) > Modal (B5) > Solution (B6) > Total Deformation 3

Mode	Frequency [Hz]
1.	785.44
2.	1532.7
3.	2094.5
4.	2898.7

TABLE 19
Model (B4) > Modal (B5) > Solution (B6) > Total Deformation 4

Mode	Frequency [Hz]
1.	785.44
2.	1532.7
3.	2094.5
4.	2898.7

Material Data

Structural Steel

TABLE 20
Structural Steel > Constants

Density	7850 kg m^-3
Coefficient of Thermal Expansion	1.2e-005 C^-1
Specific Heat	434 J kg^-1 C^-1
Thermal Conductivity	60.5 W m^-1 C^-1
Resistivity	1.7e-007 ohm m

TABLE 21
Structural Steel > Color

Red	Green	Blue
132	139	179

TABLE 22
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength Pa
0

TABLE 23
Structural Steel > Compressive Yield Strength

Compressive Yield Strength Pa
2.5e+008

TABLE 24
Structural Steel > Tensile Yield Strength

Tensile Yield Strength Pa
2.5e+008

TABLE 25
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
4.6e+008

TABLE 26
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 27
Structural Steel > Alternating Stress Mean Stress

Alternating Stress Pa	Cycles	Mean Stress Pa

3.999e+009	10	0
2.827e+009	20	0
1.896e+009	50	0
1.413e+009	100	0
1.069e+009	200	0
4.41e+008	2000	0
2.62e+008	10000	0
2.14e+008	20000	0
1.38e+008	1.e+005	0
1.14e+008	2.e+005	0
8.62e+007	1.e+006	0

TABLE 28
Structural Steel > Strain-Life Parameters

Strength Coefficient Pa	Strength Exponent	Ductility Coefficient	Ductility Exponent	Cyclic Strength Coefficient Pa	Cyclic Strain Hardening Exponent
9.2e+008	-0.106	0.213	-0.47	1.e+009	0.2

TABLE 29
Structural Steel > Isotropic Elasticity

Temperature C	Young's Modulus Pa	Poisson's Ratio	Bulk Modulus Pa	Shear Modulus Pa
	2.e+011	0.3	1.6667e+011	7.6923e+010

TABLE 30
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000