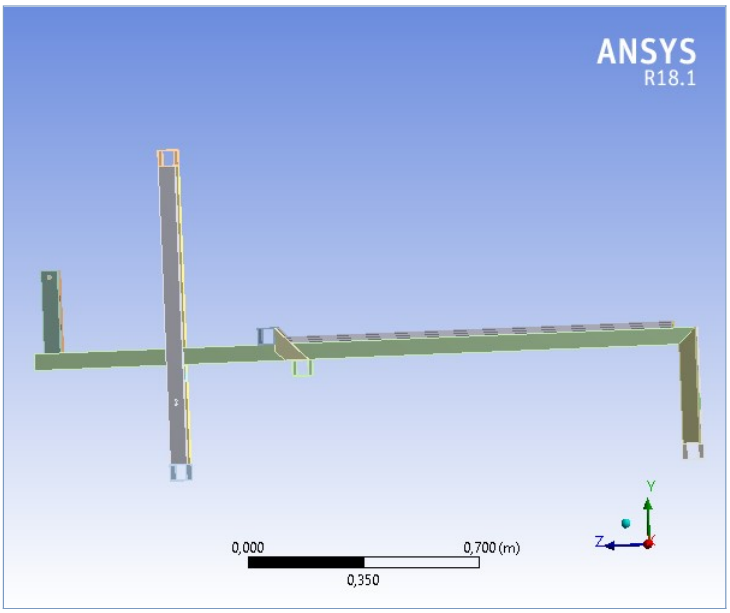
Project

First Saved	Sunday, May 13, 2018
Last Saved	Sunday, May 13, 2018
Product Version	18.1 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 (C4, D4)

Geometry

TABLE 2
Model (C4, D4) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\USUARIO\Desktop\PI2\Remo_Simplificado.STEP
Type	Step
Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	0,4 m
Length Y	1, m
Length Z	2, m
Properties	
Volume	4,0252e-003 m³
Mass	31,598 kg
Scale Factor Value	1,
Statistics	
Bodies	20
Active Bodies	20
Nodes	32260
Elements	8103
Mesh Metric	None
Basic Geometry Options	
Solid Bodies	Yes
Surface Bodies	Yes
Line Bodies	No
Parameters	Independent
Parameter Key	ANS;DS
Attributes	No
Named Selections	No
Material Properties	No
Advanced Geometry Options	
Use Associativity	Yes
Coordinate Systems	No
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\USUARIO\AppData\Local\Temp
Analysis Type	3-D
Mixed Import Resolution	None
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 3
Model (C4, D4) > Geometry > Parts

Object Name	*Part 1*	*Part 2*	*PI2_Suporte_Tela_V1*	*PI2_Suporte_Tela_V1*	*PI2_Meio*	*PI2_Apoio_Guia_Frontal*	*PI2_Apoio_Guia_Frontal*	*PI2_Apoio_Pe*	*PI2_Apoio_Pe*	*PI2_Baten*
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	0,4 m		0,3 m		0,2 m	5,e-002 m				0,3
Length Y	5,e-002 m					0,9 m		1,e-001 m		
Length Z	5,e-002 m							1,e-001 m		
Properties										
Volume	1,536e-004 m³		1,152e-004 m³		7,68e-005 m³	3,4535e-004 m³		3,5106e-005 m³		1,152e-
Mass	1,2058 kg		0,90432 kg		0,60288 kg	2,711 kg		0,27558 kg		0,904
Centroid X	-6,1858e-003 m					-0,13119 m	0,11881 m		-0,13119 m	
Centroid Y	-0,34683 m		-4,6826e-002 m	0,60317 m	-4,6826e-002 m	0,12837 m		1,6447e-002 m		5,3174e
Centroid Z	5,e-002 m	1,6 m	1,22 m	1,6 m				1,2567 m		1,32
Moment of Inertia Ip1	1,6541e-002 kg·m²		6,9572e-004 kg·m²		2,2415e-003 kg·m²	0,18403 kg·m²		4,0395e-004 kg·m²		6,9572e-0
Moment of Inertia Ip2	1,6541e-002 kg·m²		7,1303e-003 kg·m²		2,2415e-003 kg·m²	2,086e-003 kg·m²		1,925e-004 kg·m²		7,1303e-0
Moment of Inertia Ip3	9,2763e-004 kg·m²		7,1303e-003 kg·m²		4,6382e-004 kg·m²	0,18403 kg·m²		3,8444e-004 kg·m²		7,1303e-0
Statistics										
Nodes	936		976			1706		1132		97
Elements	216		128			800		150		12
Mesh Metric	None									

TABLE 4
Model (C4, D4) > Geometry > Parts

Object Name	*PI2_Apoio_Eixo_Transmissao*	*PI2_Apoio_Eixo_Transmissao*	*PI2_Perfil_V_Slot*	*PI2_Perfil_V_Slot*	*PI2_Perfil_50x50_2*	*PI2_Perfil_50x50_2*	*PI2_Perfil_50x50*	*PI*
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	5,e-002 m		2,e-002 m		5,e-002 m			
Length Y	0,25 m		2,e-002 m		0,35 m			
Length Z	5,e-002 m		1,2 m		5,e-002 m		2, m	
Properties								
Volume	9,5493e-005 m³		2,5025e-004 m³		1,248e-004 m³		7,584e-00	
Mass	0,74962 kg		1,9645 kg		0,97968 kg		5,9534	
Centroid X	-8,1186e-002 m	6,8814e-002 m	-8,1186e-002 m	6,8814e-002 m		-8,1186e-002 m		6
Centroid Y	0,15262 m		3,8174e-002 m		-0,15873 m		3,3691e-0	
Centroid Z	1,97 m		0,695 m		4,8816e-002 m		1,0374	
Moment of Inertia Ip1	4,1712e-003 kg·m²		0,23599 kg·m²		9,1868e-003 kg·m²		1,9386 kg	
Moment of Inertia Ip2	5,7746e-004 kg·m²		0,23599 kg·m²		7,4815e-004 kg·m²		1,9386 kg	
Moment of Inertia Ip3	4,169e-003 kg·m²		1,4239e-004 kg·m²		9,1923e-003 kg·m²		4,5793e-003	
Statistics								
Nodes	1564		4530		896		1303	
Elements	712		810		140		285	
Mesh Metric	None							

Coordinate Systems

TABLE 5

Model (C4, D4) > 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 6
Model (C4, D4) > Connections

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

TABLE 7
Model (C4, D4) > 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	0,
Tolerance Value	5,6789e-003 m
Use Range	No
Face/Face	Yes
Face Overlap Tolerance	Off
Cylindrical Faces	Include
Face/Edge	No
Edge/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Bodies
Statistics	
Connections	34
Active Connections	34

TABLE 8
Model (C4, D4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region*	*Contact Region 2*	*Contact Region 3*	*Contact Region 4*	*Contact Region 5*	*Contact Region 6*	*Contact Region 7*	*Contact Region 8*	*Contact Region 9*	*Contact Region 10*	*Contact Region 11*
State	Fully Defined										
Scope											
Scoping Method	Geometry Selection										
Contact	1 Face										
Target	1 Face										
Contact Bodies	Part 1		Part 2		PI2_Suporte_Tela_V1						PI2_Meio
Target Bodies	PI2_Perfil_50x50_2		PI2_Apoio_Guia_Frontal		PI2_Apoio_Pe		PI2_Perfil_50x50		PI2_Apoio_Guia_Frontal		
Definition											
Type	Bonded										
Scope Mode	Automatic										
Behavior	Program Controlled										
Trim Contact	Program Controlled										
Trim Tolerance	5,6789e-003 m										
Suppressed	No										
Advanced											
Formulation	Program Controlled										
Detection Method	Program Controlled										
Penetration Tolerance	Program Controlled										
Elastic Slip Tolerance	Program Controlled										
Normal Stiffness	Program Controlled										
Update Stiffness	Program Controlled										
Pinball Region	Program Controlled										
Geometric Modification											
Contact Geometry Correction	None										
Target Geometry Correction	None										

TABLE 9
Model (C4, D4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 12*	*Contact Region 13*	*Contact Region 14*	*Contact Region 15*	*Contact Region 16*	*Contact Region 17*	*Contact Region 18*	*Contact Region 19*	*Contact Region 20*	*Contact Region 21*	*Contac Regior 22*
State	Fully Defined										
Scope											
Scoping Method	Geometry Selection										
Contact	3 Faces		1 Face							2 Faces	

Target	3 Faces	1 Face					3 Faces
Contact Bodies	PI2_Meio	PI2_Apoio_Guia_Frontal	PI2_Apoio_Pe				PI2_Batente_Banc
Target Bodies	PI2_Apoio_Guia_Frontal	PI2_Perfil_50x50	PI2_Batente_Banco	PI2_Perfil_50x50	PI2_Batente_Banco	PI2_Perfil_50x50	PI2_Perfil_V_Slo
Definition							
Type	Bonded						
Scope Mode	Automatic						
Behavior	Program Controlled						
Trim Contact	Program Controlled						
Trim Tolerance	5,6789e-003 m						
Suppressed	No						
Advanced							
Formulation	Program Controlled						
Detection Method	Program Controlled						
Penetration Tolerance	Program Controlled						
Elastic Slip Tolerance	Program Controlled						
Normal Stiffness	Program Controlled						
Update Stiffness	Program Controlled						
Pinball Region	Program Controlled						
Geometric Modification							
Contact Geometry Correction	None						
Target Geometry Correction	None						

TABLE 10
Model (C4, D4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 23*	*Contact Region 24*	*Contact Region 25*	*Contact Region 26*	*Contact Region 27*	*Contact Region 28*	*Contact Region 29*	*Contact Region 30*	*Contact Region 31*	*Contact Region 32*	*Contact Region 33*
State	Fully Defined										
Scope											
Scoping Method	Geometry Selection										
Contact	1 Face						3 Faces				1 Face
Target	1 Face								3 Faces		1 Face
Contact Bodies	PI2_Batente_Banco		PI2_Suporte_Sist_Retorno		PI2_Apoio_Eixo_Transmissao		PI2_Perfil_V_Slot		PI2_Perfil_50x50_2		PI2_Perfil_50x50
Target Bodies	PI2_Perfil_50x50		PI2_Perfil_50x50_2		PI2_Perfil_50x50						PI2_Perfil_50x50_3
Definition											
Type	Bonded										
Scope Mode	Automatic										
Behavior	Program Controlled										
Trim Contact	Program Controlled										
Trim Tolerance	5,6789e-003 m										
Suppressed	No										
Advanced											
Formulation	Program Controlled										
Detection Method	Program Controlled										
Penetration Tolerance	Program Controlled										
Elastic Slip Tolerance	Program Controlled										
Normal Stiffness	Program Controlled										
Update Stiffness	Program Controlled										
Pinball Region	Program Controlled										
Geometric Modification											
Contact Geometry Correction	None										
Target Geometry Correction	None										

TABLE 11
Model (C4, D4) > Connections > Contacts > Contact Regions

Object Name	*Contact Region 34*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Contact	1 Face
Target	1 Face
Contact Bodies	PI2_Perfil_50x50
Target Bodies	PI2_Perfil_50x50_3
Definition	
Type	Bonded
Scope Mode	Automatic
Behavior	Program Controlled
Trim Contact	Program Controlled
Trim Tolerance	5,6789e-003 m
Suppressed	No
Advanced	
Formulation	Program Controlled
Detection Method	Program Controlled
Penetration Tolerance	Program Controlled
Elastic Slip Tolerance	Program Controlled
Normal Stiffness	Program Controlled

Update Stiffness	Program Controlled
Pinball Region	Program Controlled
Geometric Modification	
Contact Geometry Correction	None
Target Geometry Correction	None

Mesh

TABLE 12
Model (C4, D4) > Mesh

Object Name	*Mesh*
State	Solved
Display	
Display Style	Body Color
Defaults	
Physics Preference	Mechanical
Relevance	0
Element Order	Program Controlled
Sizing	
Size Function	Adaptive
Relevance Center	Coarse
Element Size	Default
Initial Size Seed	Assembly
Transition	Fast
Span Angle Center	Coarse
Automatic Mesh Based Defeaturing	On
Defeature Size	Default
Minimum Edge Length	7,5e-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	Default (4)
Rigid Body Behavior	Dimensionally Reduced
Mesh Morphing	Disabled
Triangle Surface Mesher	Program Controlled
Topology Checking	No
Pinch Tolerance	Please Define
Generate Pinch on Refresh	No
Statistics	
Nodes	32260
Elements	8103

Static Structural (C5)

TABLE 13
Model (C4, D4) > Analysis

Object Name	*Static Structural (C5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Static Structural
Solver Target	Mechanical APDL
Options	
Environment Temperature	22, °C
Generate Input Only	No

TABLE 14
Model (C4, D4) > Static Structural (C5) > 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
Rotordynamics Controls	
Coriolis Effect	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
Combined 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	Off
Output Controls	
Stress	Yes
Strain	Yes
Nodal Forces	No
Contact Miscellaneous	No
General Miscellaneous	No
Store Results At	All Time Points
Analysis Data Management	
Solver Files Directory	C:\Users\USUARIO\AppData\Local\Temp\WB_MTEC-INFO_USUARIO_10736_2\unsaved_project_files\dp0\SYS-2\MECH\
Future Analysis	None
Scratch Solver Files Directory	
Save MAPDL db	No
Delete Unneeded Files	Yes
Nonlinear Solution	No
Solver Units	Active System
Solver Unit System	mks

TABLE 15
Model (C4, D4) > Static Structural (C5) > Loads

Object Name	*Displacement*	*Force*
State	Fully Defined	
Scope		
Scoping Method	Geometry Selection	
Geometry	2 Faces	
Definition		
Type	Displacement	Force
Define By	Components	Vector
Coordinate System	Global Coordinate System	
X Component	0, m (ramped)	
Y Component	0, m (ramped)	
Z Component	0, m (ramped)	
Suppressed	No	
Magnitude		1500, N (ramped)
Direction		Defined

FIGURE 1
Model (C4, D4) > Static Structural (C5) > Displacement

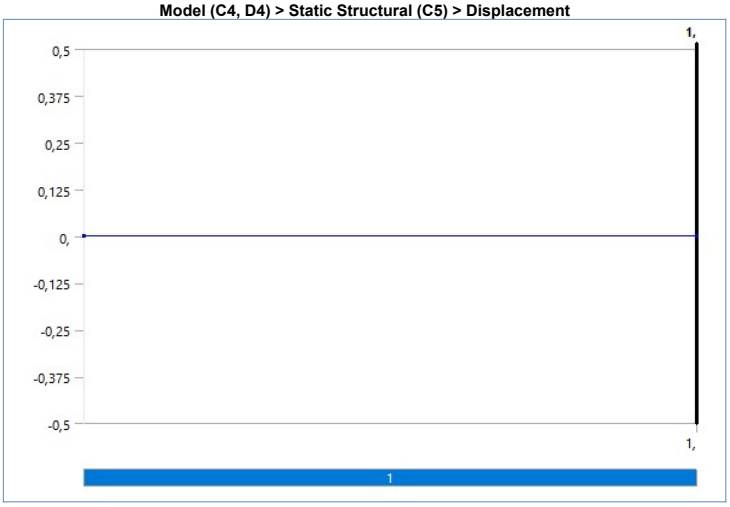
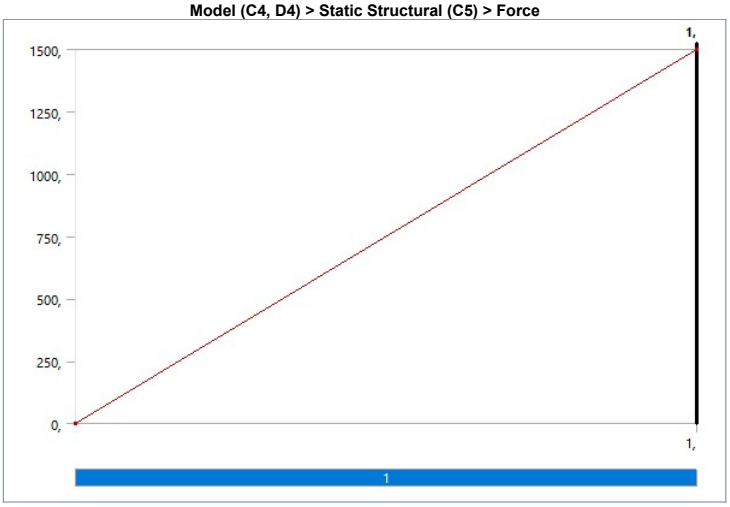


FIGURE 2
Model (C4, D4) > Static Structural (C5) > Force



Solution (C6)

TABLE 16
Model (C4, D4) > Static Structural (C5) > Solution

Object Name	*Solution (C6)*
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1,
Refinement Depth	2,
Information	
Status	Done
MAPDL Elapsed Time	1 m 24 s
MAPDL Memory Used	532, MB
MAPDL Result File Size	10,438 MB
Post Processing	
Beam Section Results	No

TABLE 17
Model (C4, D4) > Static Structural (C5) > Solution (C6) > 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 (C4, D4) > Static Structural (C5) > Solution (C6) > Results

Object Name	*Total Deformation*	*Equivalent Stress*
State	Solved	
Scope		
Scoping Method	Geometry Selection	
Geometry	All Bodies	
Definition		
Type	Total Deformation	Equivalent (von-Mises) Stress
By	Time	
Display Time	Last	
Calculate Time History	Yes	
Identifier		
Suppressed	No	
Results		
Minimum	0, m	100,57 Pa
Maximum	1,8657e-004 m	1,8144e+007 Pa
Minimum Occurs On	Part 1	PI2_Apoio_Eixo_Transmissao
Maximum Occurs On	PI2_Perfil_V_Slot	PI2_Perfil_50x50_2
Information		
Time	1, s	
Load Step	1	
Substep	1	
Iteration Number	1	
Integration Point Results		
Display Option		Averaged
Average Across Bodies		No

FIGURE 3
Model (C4, D4) > Static Structural (C5) > Solution (C6) > Total Deformation

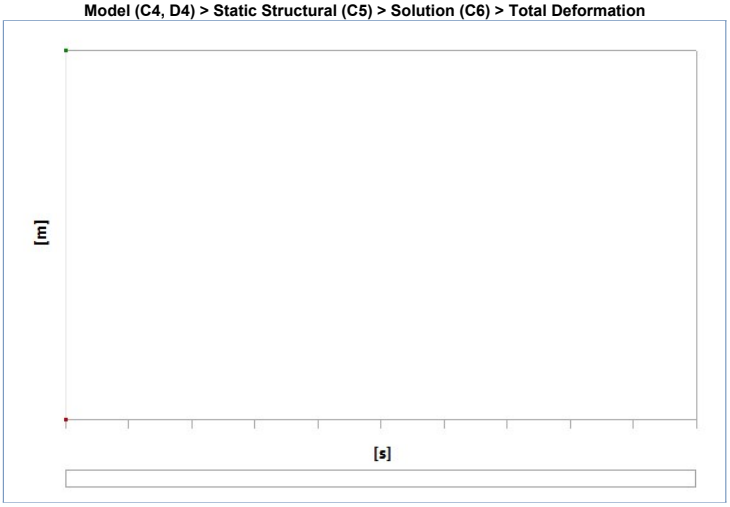


TABLE 19
Model (C4, D4) > Static Structural (C5) > Solution (C6) > Total Deformation

Time [s]	Minimum [m]	Maximum [m]
1,	0,	1,8657e-004

FIGURE 4
Model (C4, D4) > Static Structural (C5) > Solution (C6) > Equivalent Stress

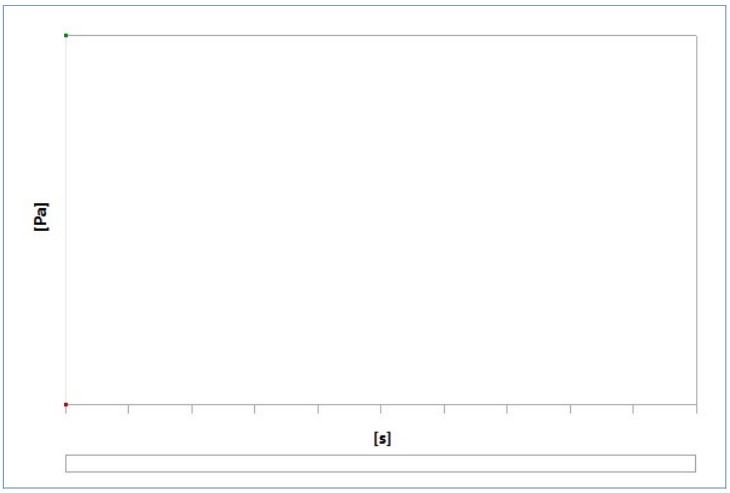


TABLE 20
Model (C4, D4) > Static Structural (C5) > Solution (C6) > Equivalent Stress

Time [s]	Minimum [Pa]	Maximum [Pa]
1,	100,57	1,8144e+007

Modal (D5)

TABLE 21
Model (C4, D4) > Analysis

Object Name	*Modal (D5)*
State	Solved
Definition	
Physics Type	Structural
Analysis Type	Modal
Solver Target	Mechanical APDL
Options	
Environment Temperature	22, °C
Generate Input Only	No

TABLE 22
Model (C4, D4) > Modal (D5) > Initial Condition

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

TABLE 23
Model (C4, D4) > Modal (D5) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Options	
Max Modes to Find	10
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\USUARIO\AppData\Local\Temp\WB_MTEC-INFO_USUARIO_10736_2\unsaved_project_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

Solution (D6)

TABLE 24
Model (C4, D4) > Modal (D5) > Solution

Object Name	*Solution (D6)*
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1,
Refinement Depth	2,
Information	
Status	Done
MAPDL Elapsed Time	1 m 0 s
MAPDL Memory Used	837, MB
MAPDL Result File Size	12,875 MB
Post Processing	
Beam Section Results	No

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

FIGURE 5
Model (C4, D4) > Modal (D5) > Solution (D6)

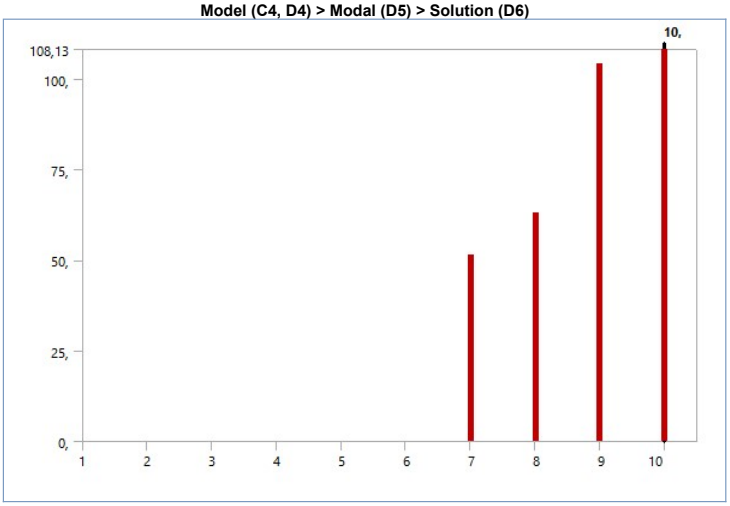


TABLE 25
Model (C4, D4) > Modal (D5) > Solution (D6)

Mode	Frequency [Hz]
1,	0,
2,	
3,	
4,	6,8058e-003
5,	1,1143e-002
6,	1,2293e-002
7,	51,501
8,	63,171
9,	104,2
10,	108,13

TABLE 26
Model (C4, D4) > Modal (D5) > Solution (D6) > 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

Material Data

Structural Steel

TABLE 27
Structural Steel > Constants

Density	7850, kg m^-3
Isotropic Secant Coefficient of Thermal Expansion	1,2e-005 C^-1
Specific Heat	434, J kg^-1 C^-1
Isotropic Thermal Conductivity	60,5 W m^-1 C^-1
Isotropic Resistivity	1,7e-007 ohm m

TABLE 28
Structural Steel > Appearance

Red	Green	Blue
132,	139,	179,

TABLE 29
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength Pa
0,

TABLE 30
Structural Steel > Compressive Yield Strength

Compressive Yield Strength Pa
2,5e+008

TABLE 31
Structural Steel > Tensile Yield Strength

Tensile Yield Strength Pa
2,5e+008

TABLE 32

Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
4,6e+008

TABLE 33
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22,

TABLE 34
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 35
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 36
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 37
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000