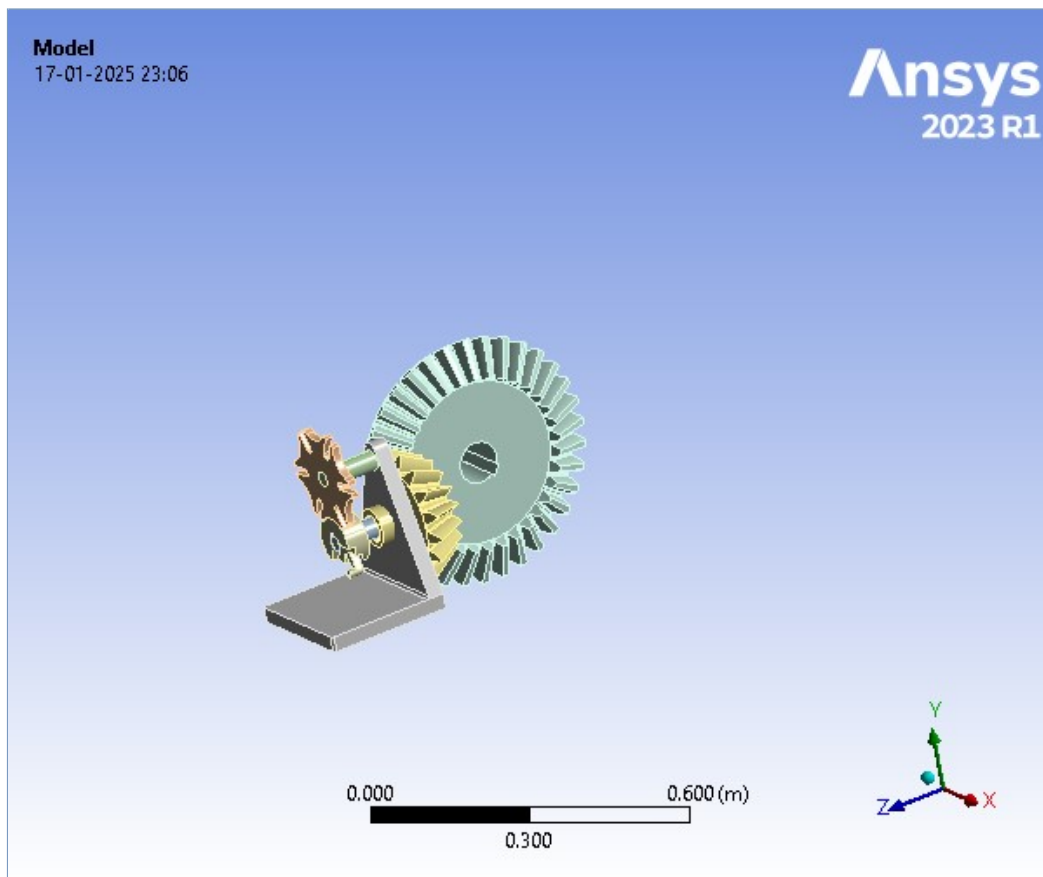




Project*

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Subject	Analysis on Geneva Mechanism using ANSYS
Prepared for	Solid Edge (PARSEC 5.0)
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Product Version	2023 R1
Save Project Before Solution	No
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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 (A4)

TABLE 2

Model (A4) > Geometry Imports

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

TABLE 3

Model (A4) > Geometry Imports > Geometry Import (A3)

Object Name	<i>Geometry Import (A3)</i>
State	Solved
Definition	
Source	C:\Users\Anushaa\SOLIDEDGE SOLIDWORKS SUBMISSION.IGS
Type	Iges
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
Analysis Type	3-D
Mixed Import Resolution	None
Import Facet Quality	Source
Clean Bodies On Import	No
Stitch Surfaces On Import	Program Tolerance
Stitch Tolerance	0.0000001
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

Geometry

TABLE 4
Model (A4) > Geometry

Object Name	Geometry
State	Fully Defined
Definition	
Source	C:\Users\Anushaa\SOLIDEDGE SOLIDWORKS SUBMISSION.IGS
Type	Iges
Length Unit	Millimeters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	0.48442 m
Length Y	0.68024 m
Length Z	0.83466 m
Properties	
Volume	1.7291e-002 m ³
Mass	135.73 kg
Scale Factor Value	1.
Statistics	
Bodies	8
Active Bodies	8
Nodes	89904
Elements	44190
Mesh Metric	None
Update Options	
Assign Default Material	No
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
Analysis Type	3-D

Mixed Import Resolution	None
Import Facet Quality	Source
Clean Bodies On Import	No
Stitch Surfaces On Import	Program Tolerance
Decompose Disjoint Geometry	Yes
Enclosure and Symmetry Processing	Yes

TABLE 5
Model (A4) > Geometry > Parts

Object Name	base	stift	stift2	wheel 1	straight bevel gear_iso_ISO - Straight bevel gear 14M 34GT 17PT 20PA 80FW --- 34O200H300MD80.0R1	straight bevel pinion_iso_ISO - Straight bevel pinion 14M17PT 34GT 20PA 80FW --- 17O75H300MD48.0R1	Pin	wheel 2
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	Structural Steel							
Nonlinear Effects	Yes							
Thermal Strain Effects	Yes							
Bounding Box								
Length X	0.25021 m	5.4519e-002 m	4.002e-002 m	0.2592 m	0.22559 m	0.36909 m	9.1562e-003 m	0.14732 m
Length Y	0.32001 m	5.4519e-002 m	4.002e-002 m	0.26407 m	0.68024 m	0.36928 m	9.9157e-003 m	0.15586 m
Length Z	0.25 m	0.14 m		1.5001e-002 m	0.68012 m	0.14208 m	4.5e-002 m	4.5001e-002 m
Properties								
Volume	3.039e-003 m³	1.332e-004 m³	1.5078e-004 m³	3.164e-004 m³	1.086e-002 m³	2.5073e-003 m³	2.16e-006 m³	2.8212e-004 m³
Mass	23.856 kg	1.0456 kg	1.1836 kg	2.4838 kg	85.251 kg	19.682 kg	1.6956e-002 kg	2.2147 kg
Centroid X	0.25986 m	0.25996 m	0.25967 m	0.25968 m	0.10099 m	0.25987 m	0.25254 m	0.25826 m
Centroid Y	6.0138e-002 m	0.15334 m	0.28343 m	0.28346 m	0.15349 m	0.1535 m	0.16649 m	0.15634 m
Centroid Z	8.285e-002 m	6.7587e-002 m	7.2589e-002 m	0.1325 m	-0.24452 m	-3.0012e-002 m	0.1175 m	0.11574 m
Moment of Inertia Ip1	0.27284 kg·m²	1.4377e-003 kg·m²	1.6953e-003 kg·m²	4.9863e-003 kg·m²	1.5758 kg·m²	0.11377 kg·m²	2.9518e-006 kg·m²	1.9247e-003 kg·m²
Moment of Inertia Ip2	0.31167 kg·m²	1.725e-004 kg·m²	2.1433e-004 kg·m²	9.8847e-003 kg·m²	1.0682 kg·m²	6.9187e-002 kg·m²	1.413e-007 kg·m²	3.1243e-003 kg·m²
Moment of Inertia Ip3	0.16444 kg·m²	1.4391e-003 kg·m²	1.6953e-003 kg·m²	4.9915e-003 kg·m²	1.0675 kg·m²	6.9162e-002 kg·m²	2.9122e-006 kg·m²	1.883e-003 kg·m²
Statistics								
Nodes	3935	4164	5113	6635	42219	24425	261	3152
Elements	1983	2289	2856	870	21811	12716	32	1633

Mesh Metric

None

TABLE 6
Model (A4) > Materials

Object Name	<i>Materials</i>
State	Fully Defined
Statistics	
Materials	1
Material Assignments	0

Coordinate Systems

TABLE 7
Model (A4) > Coordinate Systems > Coordinate System

Object Name	<i>Global Coordinate System</i>
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 8
Model (A4) > Connections

Object Name	<i>Connections</i>
State	Fully Defined
Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes
Statistics	
Contacts	9
Active Contacts	9
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 9
Model (A4) > Connections > Contacts

Object Name	<i>Contacts</i>
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	2.9517e-003 m
Use Range	No
Face/Face	Yes
Face-Face Angle Tolerance	75. °
Face Overlap Tolerance	Off
Cylindrical Faces	Include
Face/Edge	No
Priority	Include All
Group By	Bodies
Search Across	Bodies
Statistics	
Connections	9
Active Connections	9

TABLE 10
Model (A4) > 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	
State	Fully Defined									
Scope										
Scoping Method	Geometry Selection									
Contact	3 Faces		1 Face	4 Faces	2 Faces	3 Faces	1 Face		3 Faces	
Target	3 Faces		1 Face	4 Faces		3 Faces	1 Face	2 Faces		3 Faces
Contact Bodies	base			stift		stift2	wheel 1	straight bevel gear_iso_ISO - Straight bevel gear 14M 34GT 17PT 20PA 80FW --- 34O200H300MD80.0R1		Pin
Target Bodies	stift	stift2	straight bevel pinion_iso_ISO - Straight bevel pinion 14M17PT 34GT 20PA 80FW --- 17O75H300MD48.0R1	Pin	wheel 2	wheel 1	wheel 2	straight bevel pinion_iso_ISO - Straight bevel pinion 14M17PT 34GT 20PA 80FW --- 17O75H300MD48.0R1		wheel 2
Protected	No									
Definition										
Type	Bonded									
Scope Mode	Automatic									
Behavior	Program Controlled									
Trim Contact	Program Controlled									
Trim Tolerance	2.9517e-003 m									
Suppressed	No									
Display										
Element Normals	No									
Advanced										
Formulation	Program Controlled									
Small Sliding	Program Controlled									
Detection Method	Program Controlled									
Penetration Tolerance	Program Controlled									
Elastic Slip	Program Controlled									

Tolerance	
Normal Stiffness	Program Controlled
Update Stiffness	Program Controlled
Pinball Region	Program Controlled

Mesh

TABLE 11
Model (A4) > Mesh

Object Name	Mesh
State	Solved
Display	
Display Style	Use Geometry Setting
Defaults	
Physics Preference	Mechanical
Element Order	Program Controlled
Element Size	Default
Sizing	
Use Adaptive Sizing	Yes
Resolution	Default (2)
Mesh Defeaturing	Yes
Defeature Size	Default
Transition	Fast
Span Angle Center	Coarse
Initial Size Seed	Assembly
Bounding Box Diagonal	1.1807 m
Average Surface Area	2.7825e-003 m ²
Minimum Edge Length	3.1698e-004 m
Quality	
Check Mesh Quality	Mesh Quality Worksheet
Error Limits	Aggressive Mechanical
Target Element Quality	5.e-002
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
Rigid Body Behavior	Dimensionally Reduced
Triangle Surface Mesher	Program Controlled
Topology Checking	Yes
Pinch Tolerance	Please Define
Generate Pinch on Refresh	No
Statistics	
Nodes	89904
Elements	44190
Show Detailed Statistics	No

Static Structural (A5)

TABLE 12
Model (A4) > Analysis

Object Name	<i>Static Structural (A5)</i>
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 (A4) > Static Structural (A5) > Analysis Settings

Object Name	<i>Analysis Settings</i>
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	Direct
Weak Springs	Off
Solver Pivot Checking	Program Controlled
Inertia Relief	Off
Quasi-Static Solution	Off
Restart Controls	
Generate Restart Points	Program Controlled
Retain Files After Full Solve	No
Combine Restart Files	Program Controlled
Nonlinear Controls	
Force Convergence	Program Controlled
Moment Convergence	Program Controlled
Displacement Convergence	Program Controlled
Rotation Convergence	Program Controlled
Line Search	Program Controlled
Advanced	
Inverse Option	No
Contact Split (DMP)	Off
Output Controls	
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	Yes
Contact Miscellaneous	Yes
Store Results At	All Time Points
Result File Compression	Program Controlled
Analysis Data Management	
Solver Files Directory	C:\Users\Anushaa\AppData\Local\Temp\WB_Anushaa_4620_7\wbnew_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	mks

TABLE 14
Model (A4) > Static Structural (A5) > Accelerations

Object Name	<i>Standard Earth Gravity</i>
State	Fully Defined
Scope	
Geometry	All Bodies
Definition	
Coordinate System	Global Coordinate System
X Component	0. m/s ² (ramped)
Y Component	0. m/s ² (ramped)
Z Component	-9.8066 m/s ² (ramped)
Suppressed	No
Direction	-Z Direction

FIGURE 1
Model (A4) > Static Structural (A5) > Standard Earth Gravity

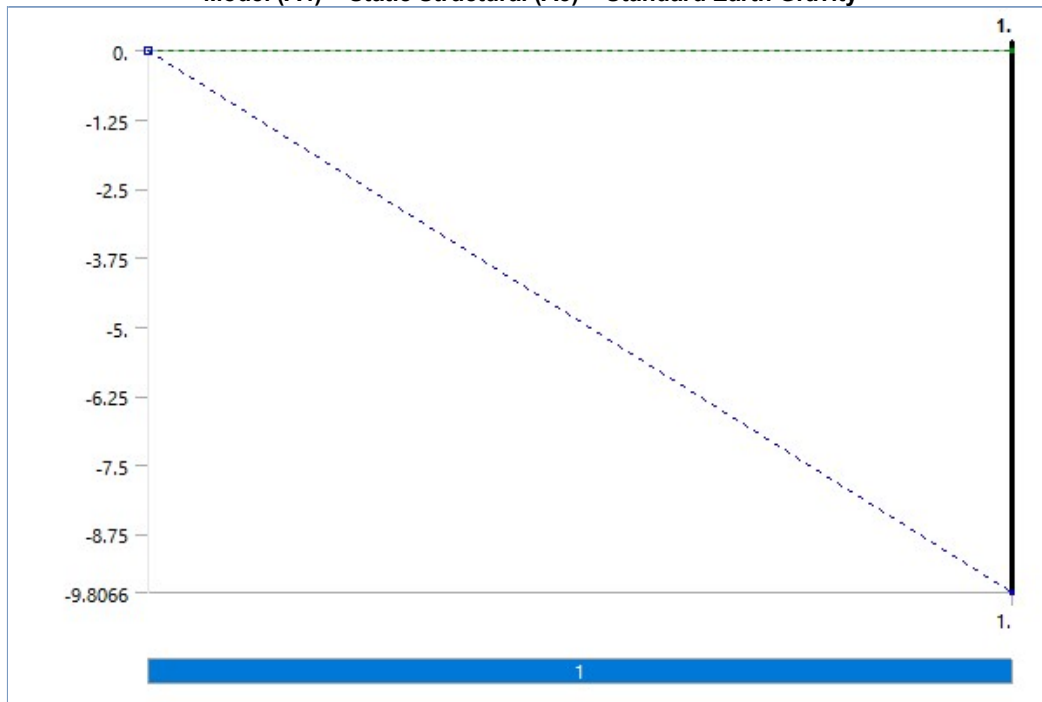


TABLE 15
Model (A4) > Static Structural (A5) > Loads

Object Name	Moment	Force	Pressure	Fixed Support	Fixed Support 2
State	Fully Defined				
Scope					
Scoping Method	Geometry Selection				
Geometry	1 Face	34 Edges	1 Face	1 Edge	
Definition					
Type	Moment	Force	Pressure	Fixed Support	
Define By	Vector		Normal To		
Magnitude	10. N·m (ramped)	50. N (ramped)	10. Pa (ramped)		
Direction	Defined				
Suppressed	No				
Behavior	Deformable				
Applied By		Surface Effect			
Loaded Area			Deformed		
Advanced					

Pinball Region |

All |

FIGURE 2
Model (A4) > Static Structural (A5) > Moment

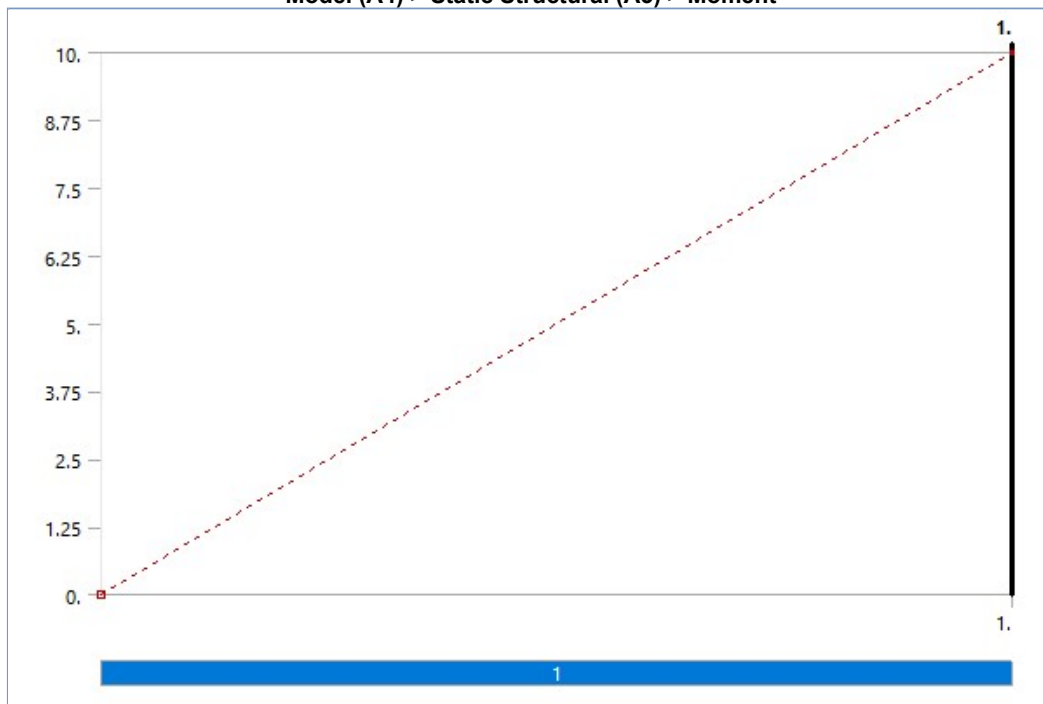


FIGURE 3
Model (A4) > Static Structural (A5) > Force

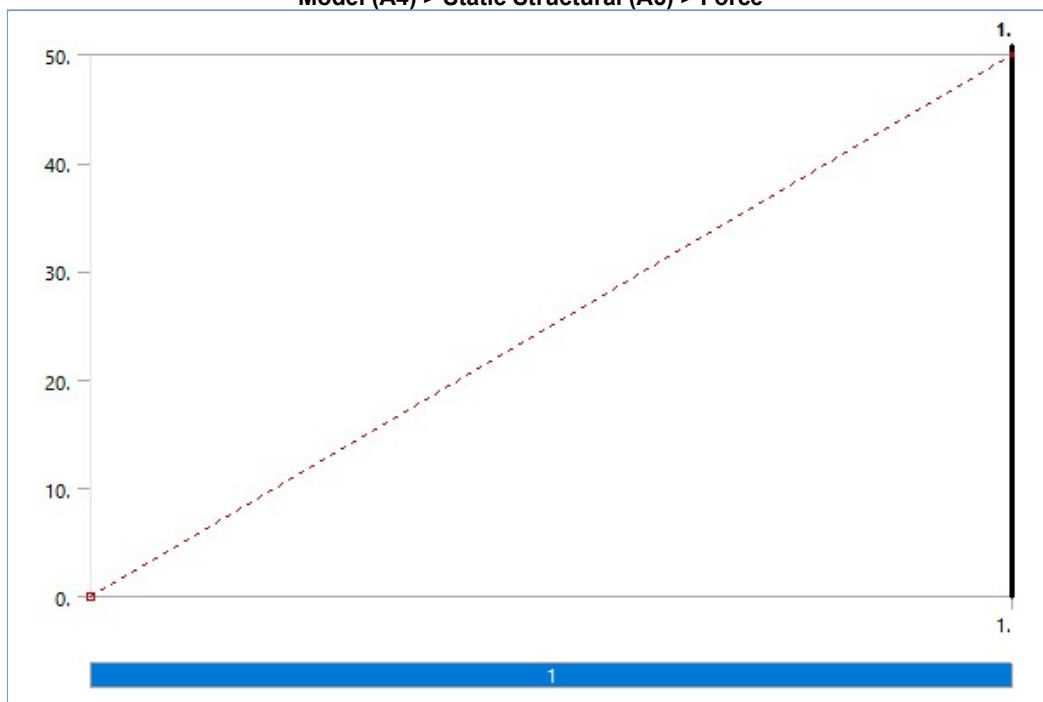
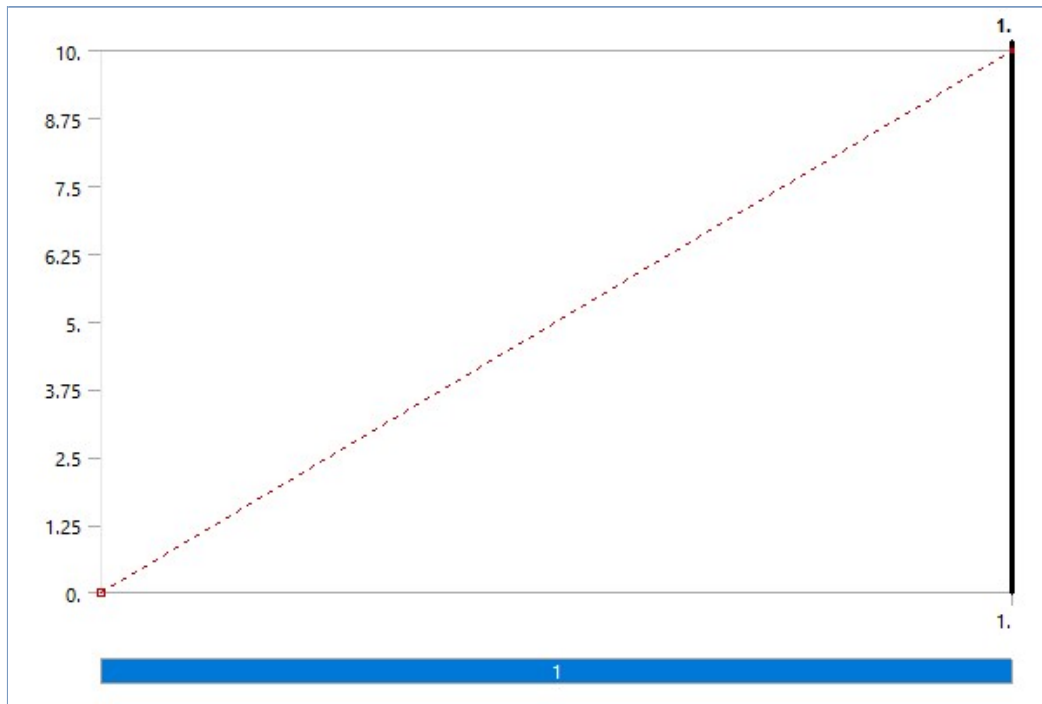


FIGURE 4
Model (A4) > Static Structural (A5) > Pressure



Solution (A6)

TABLE 16
Model (A4) > Static Structural (A5) > Solution

Object Name	<i>Solution (A6)</i>
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	8. s
MAPDL Memory Used	1.3984 GB
MAPDL Result File Size	31.813 MB
Post Processing	
Beam Section Results	No
On Demand Stress/Strain	No

TABLE 17
Model (A4) > Static Structural (A5) > Solution (A6) > Solution Information

Object Name	<i>Solution Information</i>
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 (A4) > Static Structural (A5) > Solution (A6) > Results

Object Name	Directional Deformation		Equivalent Stress	Total Deformation
State	Solved			
Scope				
Scoping Method	Geometry Selection			
Geometry	All Bodies			
Definition				
Type	Directional Deformation	Equivalent (von-Mises) Stress		Total Deformation
Orientation	X Axis			
By	Time			
Display Time	Last			
Separate Data by Entity	No			
Coordinate System	Global Coordinate System			
Calculate Time History	Yes			
Identifier				
Suppressed	No			
Results				
Minimum	-5.3787e-005 m	5.8858 Pa		0. m
Maximum	7.9277e-005 m	3.3065e+007 Pa		7.9865e-005 m
Average	5.5825e-006 m	1.9606e+005 Pa		2.6338e-005 m
Minimum Occurs On	straight bevel gear_iso_ISO - Straight bevel gear 14M 34GT 17PT 20PA 80FW --- 34O200H300MD80.0R1	wheel 2		base
Maximum Occurs On	straight bevel gear_iso_ISO - Straight bevel gear 14M 34GT 17PT 20PA 80FW --- 34O200H300MD80.0R1	straight bevel pinion_iso_ISO - Straight bevel pinion 14M17PT 34GT 20PA 80FW --- 17O75H300MD48.0R1		straight bevel gear_iso_ISO - Straight bevel gear 14M 34GT 17PT 20PA 80FW --- 34O200H300MD80.0R1
Information				
Time	1. s			
Load Step	1			
Substep	1			
Iteration Number	1			
Integration Point Results				
Display Option		Averaged		
Average Across Bodies		No		

FIGURE 5
Model (A4) > Static Structural (A5) > Solution (A6) > Directional Deformation

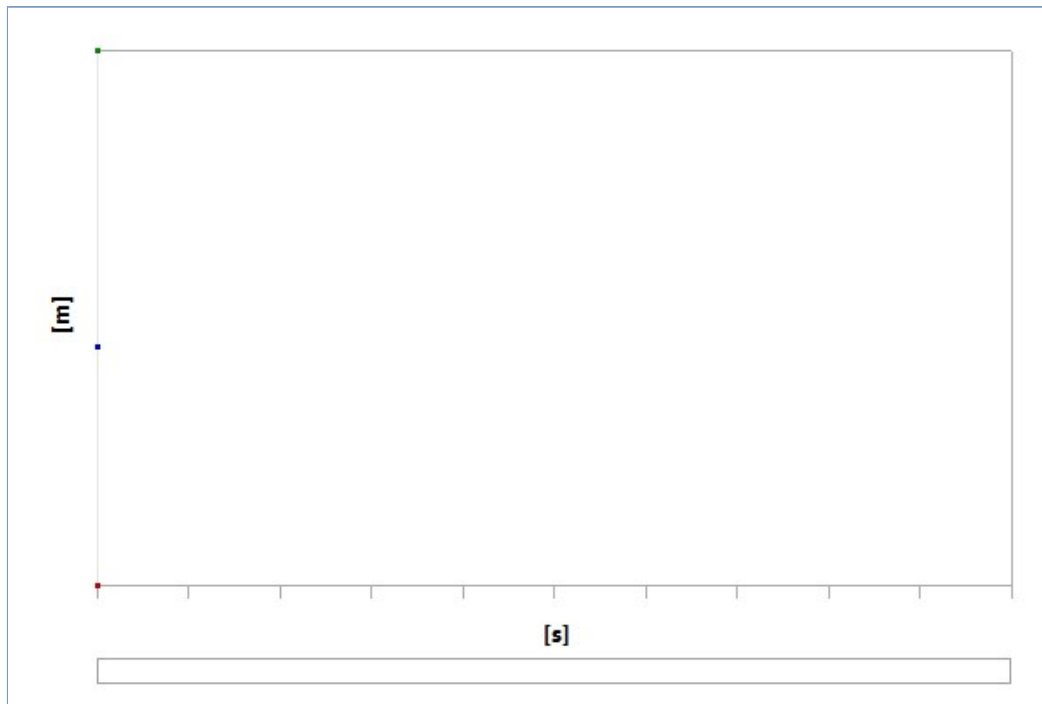


TABLE 19
Model (A4) > Static Structural (A5) > Solution (A6) > Directional Deformation

Time [s]	Minimum [m]	Maximum [m]	Average [m]
1.	-5.3787e-005	7.9277e-005	5.5825e-006

FIGURE 6
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

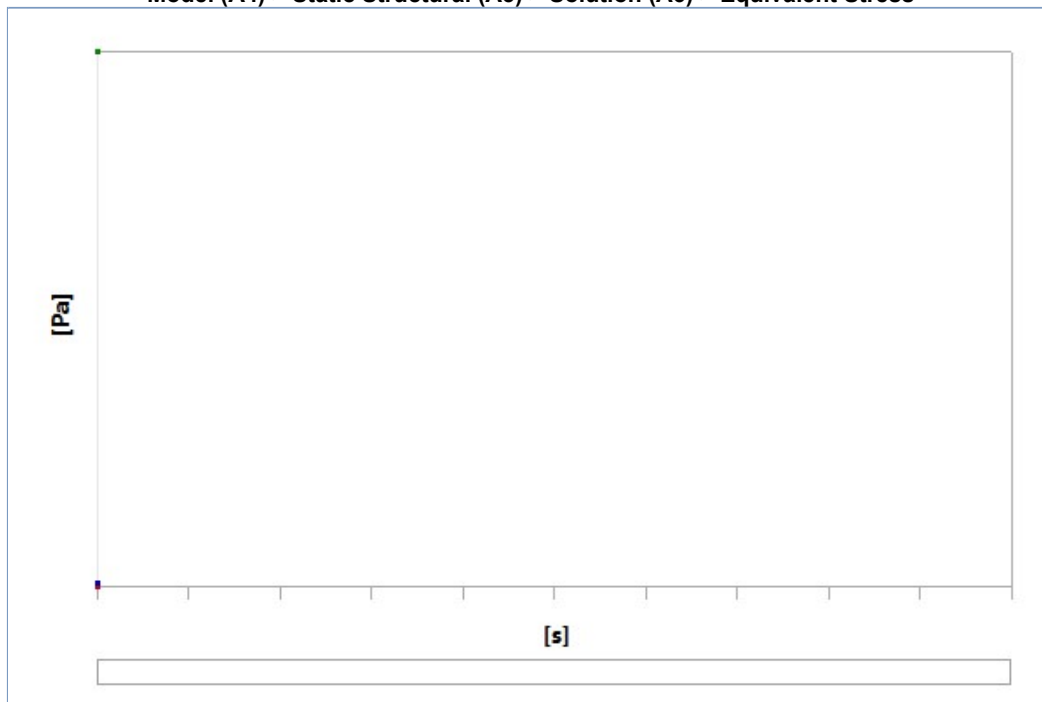


TABLE 20
Model (A4) > Static Structural (A5) > Solution (A6) > Equivalent Stress

Time [s]	Minimum [Pa]	Maximum [Pa]	Average [Pa]
1.	5.8858	3.3065e+007	1.9606e+005

FIGURE 7
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation

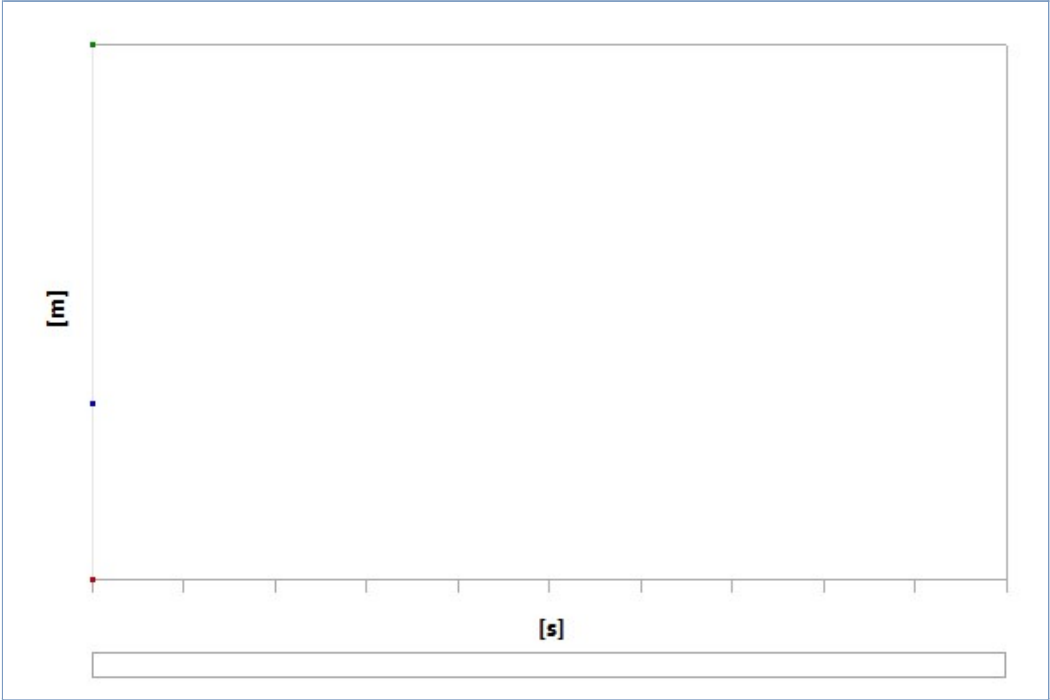


TABLE 21
Model (A4) > Static Structural (A5) > Solution (A6) > Total Deformation

Time [s]	Minimum [m]	Maximum [m]	Average [m]
1.	0.	7.9865e-005	2.6338e-005

Material Data

Structural Steel

TABLE 22
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 23
Structural Steel > Color

Red	Green	Blue
132	139	179

TABLE 24
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength Pa
0

TABLE 25
Structural Steel > Compressive Yield Strength

Compressive Yield Strength Pa
2.5e+008

TABLE 26
Structural Steel > Tensile Yield Strength

Tensile Yield Strength Pa
2.5e+008

TABLE 27
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
4.6e+008

TABLE 28
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 29
Structural Steel > S-N Curve

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 30
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 31
Structural Steel > Isotropic Elasticity

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

TABLE 32
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000