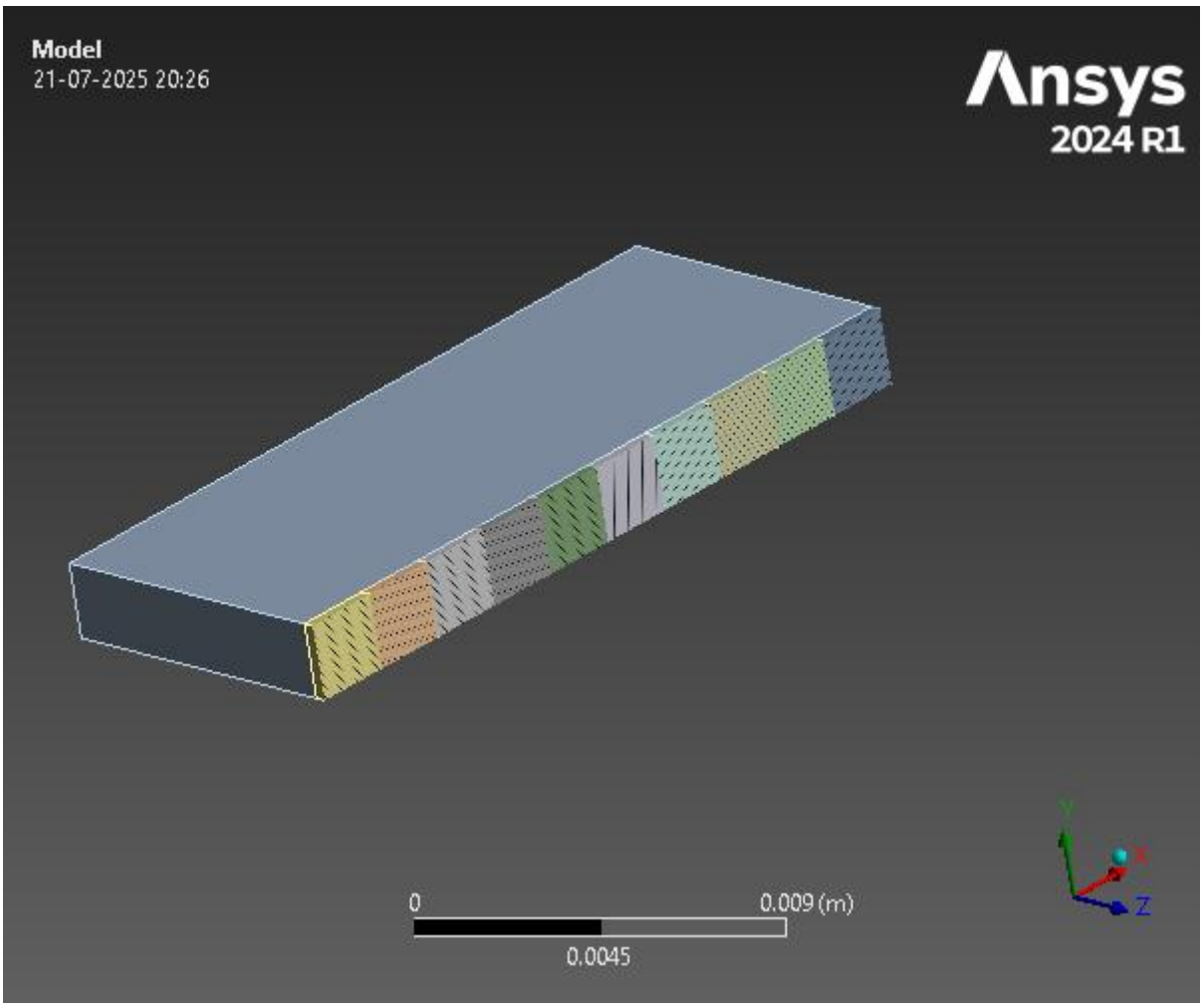
LaserCut_CoupledSimulation*

First Saved	Monday, July 21, 2025
Last Saved	Monday, July 21, 2025
Product Version	2024 R1
Save Project Before Solution	No
Save Project After Solution	No



Contents

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 (B2)

TABLE 2
Model (B2) > Geometry Imports

Object Name	*Geometry Imports*
State	Solved

TABLE 3
Model (B2) > Geometry Imports > Geometry Import (A3)

Object Name	*Geometry Import (A3)*
State	Solved
Definition	
Source	C:\Users\sanket kumar\Desktop\simulation thermal\Laser cut simulation_files\dp0\global\MECH\SYS-2\AssembledModel\SYS-2.pmdb
Type	Model Assembly
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
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 4
Model (B2) > Geometry

Object Name	*Geometry*
State	Fully Defined
Definition	
Source	C:\Users\sanket kumar\Desktop\simulation thermal\Laser cut simulation_files\dp0\global\MECH\SYS-2\AssembledModel\SYS-2.pmdb
Type	DesignModeler
Length Unit	Meters
Element Control	Program Controlled
Display Style	Body Color
Bounding Box	
Length X	2.e-002 m
Length Y	2.e-003 m
Length Z	1.65e-002 m
Properties	

Volume	6.6e-007 m³
Mass	5.181e-003 kg
Statistics	
Bodies	12
Active Bodies	12
Nodes	7982
Elements	1196
Mesh Metric	None
Update Options	
Assign Default Material	No
Advanced Geometry Options	
Analysis Type	3-D

TABLE 5
Model (B2) > Geometry > Parts

laser (Transient hermal)	*laser cut(Transient Thermal)*	*laser cut(Transient Thermal)*	*laser cut(Transient Thermal)*	*laser cut(Transient Thermal)*	*laser cut(Transient Thermal)*	*laser cut(Transient Thermal)*	*laser cut(Transient Thermal)*	*laser cut(Transient Thermal)*	*laser cut(Trans Therma*
Meshed									
Graphics Properties									
Yes									
1									
Definition									
No									
Flexible									
Global Coordinate System(Transient Thermal)									
By Environment									
None									
Material									
Structural Steel									
Yes									
Yes									
Bounding Box									
e-003 m	2.e-002 m	2.e-003 m							
2.e-003 m									
e-004 m	8.e-003 m	5.e-004 m							
Properties									
e-009 m³	3.2e-007 m³	2.e-009 m³							
7e-005 kg	2.512e-003 kg	1.57e-005 kg							
e-003 m	1.e-002 m	1.7e-002 m	3.e-003 m	1.3e-002 m	1.e-003 m	1.1e-002 m	1.5e-002 m	7.e-003 m	1.9e-002
1.e-003 m									
5e-004 m	-4.e-003 m	2.5e-004 m							
604e-012 kg·m²	1.4235e-008 kg·m²	5.5604e-012 kg·m²							
604e-012 kg·m²	9.7131e-008 kg·m²	5.5604e-012 kg·m²							

467e-011 kg·m²	8.4571e-008 kg·m²	1.0467e-011 kg·m²
Statistics		
497	1506	497
72	238	72
		None
Transfer Properties		
		A4::Transient Thermal
		Yes

TABLE 6
Model (B2) > Geometry > Parts

Object Name	*laser cut(Transient Thermal)*
State	Meshed
Graphics Properties	
Visible	Yes
Transparency	1
Definition	
Suppressed	No
Stiffness Behavior	Flexible
Coordinate System	Global Coordinate System(Transient Thermal)
Reference Temperature	By Environment
Treatment	None
Material	
Assignment	Structural Steel
Nonlinear Effects	Yes
Thermal Strain Effects	Yes
Bounding Box	
Length X	2.e-002 m
Length Y	2.e-003 m
Length Z	8.e-003 m
Properties	
Volume	3.2e-007 m³
Mass	2.512e-003 kg
Centroid X	1.e-002 m
Centroid Y	1.e-003 m
Centroid Z	4.5e-003 m
Moment of Inertia Ip1	1.4235e-008 kg·m²
Moment of Inertia Ip2	9.7131e-008 kg·m²
Moment of Inertia Ip3	8.4571e-008 kg·m²
Statistics	
Nodes	1506
Elements	238
Mesh Metric	None
Transfer Properties	
Source	A4::Transient Thermal
Read Only	Yes

TABLE 7
Model (B2) > Materials

Object Name	*Materials*
State	Fully Defined
Statistics	

Materials	1
Material Assignments	0

Coordinate Systems

TABLE 8
Model (B2) > Coordinate Systems > Coordinate System

Object Name	*Global Coordinate System*	*Global Coordinate System(Transient Thermal)*
State	Fully Defined	
Definition		
Type	Cartesian	
Coordinate System ID	0.	
Coordinate System		Program Controlled
APDL Name		
Suppressed		No
Origin		
Origin X	0. m	
Origin Y	0. m	
Origin Z	0. m	
Define By		Global Coordinates
Location		Defined
Directional Vectors		
X Axis Data	[1. 0. 0.]	
Y Axis Data	[0. 1. 0.]	
Z Axis Data	[0. 0. 1.]	
Transfer Properties		
Source		A4::Transient Thermal
Read Only	No	Yes
Principal Axis		
Axis		X
Define By		Fixed Vector
Orientation About Principal Axis		
Axis		Y
Define By		Fixed Vector
Transformations		
Base Configuration		Absolute
Transformed Configuration		[0. 0. 0.]

Connections

TABLE 9
Model (B2) > Connections

Object Name	*Connections*
State	Fully Defined
Auto Detection	
Generate Automatic Connection On Refresh	Yes
Transparency	
Enabled	Yes
Statistics	
Contacts	29

Active Contacts	29
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 10
Model (B2) > Connections > Contacts(Transient Thermal)

Object Name	*Contacts(Transient Thermal)*
State	Fully Defined
Definition	
Connection Type	Contact
Scope	
Scoping Method	Source Assembly
Source Assembly	A4::Transient Thermal
Auto Detection	
Tolerance Type	Slider
Tolerance Slider	0.
Tolerance Value	6.5012e-005 m
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	Bodies
Statistics	
Connections	29
Active Connections	29
Transfer Properties	
Source	A4::Transient Thermal
Read Only	Yes

TABLE 11
Model (B2) > Connections > Contacts(Transient Thermal) > Contact Regions

Contact Region(Transient Thermal)	*Contact Region 2(Transient Thermal)*	*Contact Region 3(Transient Thermal)*	*Contact Region 4(Transient Thermal)*	*Contact Region 5(Transient Thermal)*	*Contact Region 6(Transient Thermal)*	*Contact Region 7(Transient Thermal)*	*Contact Region 8(Transient Thermal)*	*Contact Region 9(Transient Thermal)*	*Contact Region 10(Transient Thermal)*	
Fully Defined										
Scope										
Geometry Selection										
1 Face										

1 Face
laser cut(Transient Thermal)
laser cut(Transient Thermal)
No
Definition
Bonded
Automatic
Program Controlled
Program Controlled
6.5012e-005 m
No
Display
No
Advanced
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Program Controlled
Geometric Modification
None
None
Transfer Properties
A4::Transient Thermal
Yes

TABLE 12
Model (B2) > Connections > Contacts(Transient Thermal) > Contact Regions

Contact Region 2(Transient Thermal)	*Contact Region 13(Transient Thermal)*	*Contact Region 14(Transient Thermal)*	*Contact Region 15(Transient Thermal)*	*Contact Region 16(Transient Thermal)*	*Contact Region 17(Transient Thermal)*	*Contact Region 18(Transient Thermal)*	*Contact Region 19(Transient Thermal)*	*Contact Region 20(Transient Thermal)*	*Contact Region 21(Transien Thermal)*
Fully Defined									
Scope									
Geometry Selection									
1 Face									
1 Face									
laser cut(Transient Thermal)									
laser cut(Transient Thermal)									
No									
Definition									
Bonded									
Automatic									
Program Controlled									
Program Controlled									
6.5012e-005 m									
No									
Display									
No									
Advanced									
Program Controlled									
Program Controlled									
Program Controlled									
Program Controlled									
Program Controlled									
Program Controlled									
Program Controlled									
Program Controlled									
Geometric Modification									
None									

None
Transfer Properties
A4::Transient Thermal
Yes

TABLE 13
Model (B2) > Connections > Contacts(Transient Thermal) > Contact Regions

Object Name	*Contact Region 23(Transient Thermal)*	*Contact Region 24(Transient Thermal)*	*Contact Region 25(Transient Thermal)*	*Contact Region 26(Transient Thermal)*	*Contact Region 27(Transient Thermal)*	*Contact Region 28(Transient Thermal)*	*Contact Region 29(Transient Thermal)*
State	Fully Defined						
Scope							
Scoping Method	Geometry Selection						
Contact	1 Face						
Target	1 Face						
Contact Bodies	laser cut(Transient Thermal)						
Target Bodies	laser cut(Transient Thermal)						
Protected	No						
Definition							
Type	Bonded						
Scope Mode	Automatic						
Behavior	Program Controlled						
Trim Contact	Program Controlled						
Trim Tolerance	6.5012e-005 m						
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
Pinball Region	Program Controlled
Geometric Modification	
Contact Geometry Correction	None
Target Geometry Correction	None
Transfer Properties	
Source	A4::Transient Thermal
Read Only	Yes

Mesh

TABLE 14
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	7982
Elements	1196
Show Detailed Statistics	No
Model Assembly	
Read Only	Yes

Named Selections

TABLE 15
Model (B2) > Named Selections > Named Selections

Object Name	*NamedSel1All(Transient Thermal)*
State	Fully Defined
Scope	
Scoping Method	Geometry Selection
Geometry	32 Faces
Definition	
Send to Solver	Yes
Protected	Program Controlled
Visible	Yes
Program Controlled Inflation	Exclude
Statistics	
Type	Imported
Total Selection	32 Faces
Surface Area	8.06e-004 m²
Suppressed	0

Used by Mesh Worksheet	No
Transfer Properties	
Source	A4::Transient Thermal
Read Only	Yes

Transient (B3)

TABLE 16
Model (B2) > Analysis

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

TABLE 17
Model (B2) > Transient (B3) > Initial Conditions

Object Name	*Initial Conditions*
State	Fully Defined

TABLE 18
Model (B2) > Transient (B3) > Initial Conditions > Initial Condition

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

TABLE 19
Model (B2) > Transient (B3) > Analysis Settings

Object Name	*Analysis Settings*
State	Fully Defined
Step Controls	
Number Of Steps	10.
Current Step Number	10.
Step End Time	10. s
Auto Time Stepping	Off
Define By	Substeps
Number Of Substeps	10.
Time Integration	On
Solver Controls	
Solver Type	Program Controlled
Weak Springs	Off
Large Deflection	On
App. Based Settings	Moderate Speed Dynamics
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
--Energy Dissipation Ratio	1.e-004
Advanced	
Contact Split (DMP)	Program Controlled
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	No
Contact Miscellaneous	No
Store Results At	All Time Points
Result File Compression	Program Controlled
Damping Controls	
Stiffness Coefficient Define By	Direct Input
Stiffness Coefficient	0.
Mass Coefficient	0.
Analysis Data Management	
Solver Files Directory	C:\Users\sanket kumar\Desktop\simulation thermal\Laser cut Simulation2_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	mks

TABLE 20
Model (B2) > Transient (B3) > Analysis Settings
Step-Specific "Step Controls"

Step	Step End Time
1	1. s
2	2. s

3	3. s
4	4. s
5	5. s
6	6. s
7	7. s
8	8. s
9	9. s
10	10. s

TABLE 21
Model (B2) > Transient (B3) > Loads

Object Name	*Frictionless Support*	*Frictionless Support 2*	*Frictionless Support 3*
State	Fully Defined		
Scope			
Scoping Method	Geometry Selection		
Geometry	1 Face		
Definition			
Type	Frictionless Support		
Suppressed	No		

TABLE 22
Model (B2) > Transient (B3) > Imported Load (A6)

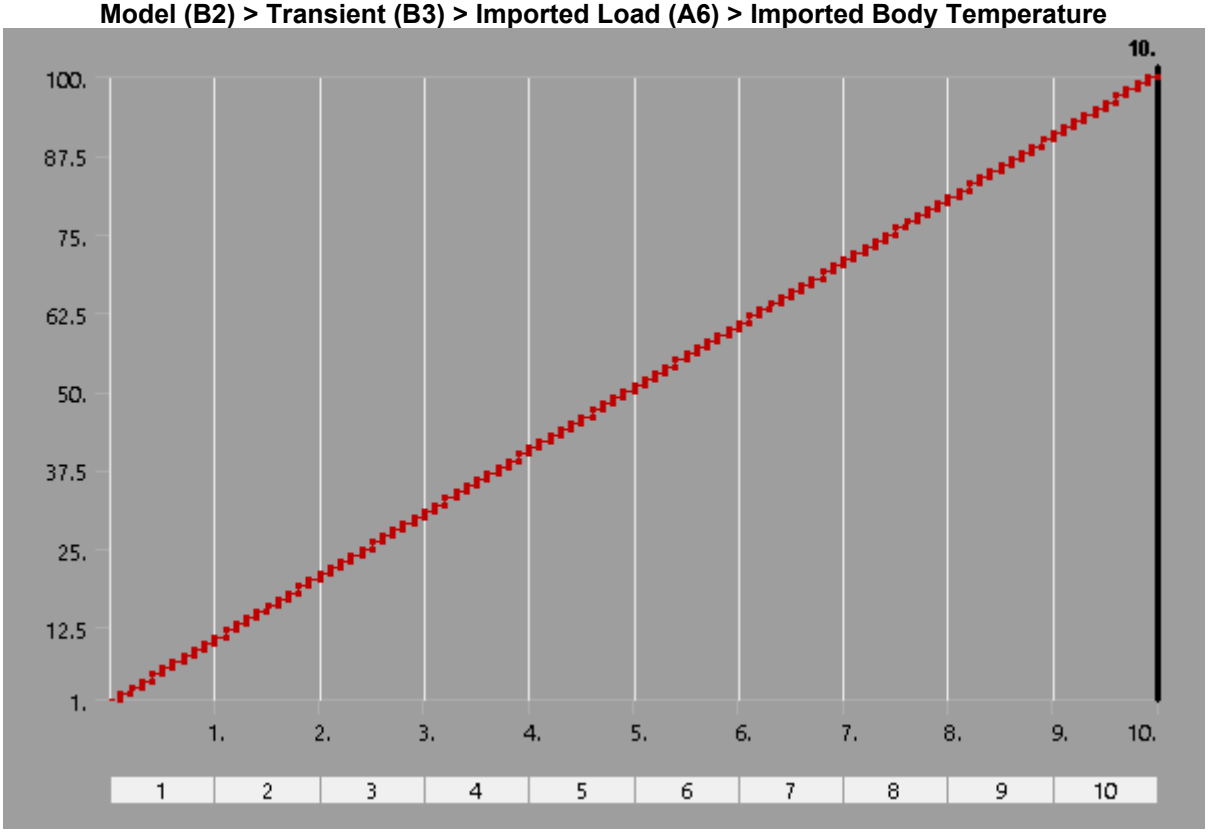
Object Name	*Imported Load (A6)*
State	Fully Defined
Definition	
Type	Imported Data
Interpolation Type	Mechanical Results Transfer
Suppressed	No
Source	A6::Solution
Data Management	
Delete Mapped Data Files	Yes

TABLE 23
Model (B2) > Transient (B3) > Imported Load (A6) > Imported Body Temperature

Object Name	*Imported Body Temperature*
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	12 Bodies
Definition	
Type	Imported Body Temperature
Tabular Loading	Program Controlled
Mapped Data	To Input File
Suppressed	No
Source Bodies	All
Source Time	All
Graphics Controls	
By	Active Row
Active Row	100
Display Source Points	Off
Display Source Point Ids	Off
Settings	
Mapping Control	Program Controlled

Mapping	Profile Preserving
Weighting	Shape Function
Transfer Type	Volumetric
Rigid Transformation	
Mesh Alignment	Use Origin and Euler Angles
Origin X	0. m
Origin Y	0. m
Origin Z	0. m
Theta XY	0. degree
Theta YZ	0. degree
Theta ZX	0. degree
Legend Controls	
Legend Range	Program Controlled
Minimum Source	22 °C
Maximum Source	165.14 °C
Named Selection Creation	
Unmapped Nodes	Off
Mapped Nodes	Off
Outside Nodes	Off

FIGURE 1
Model (B2) > Transient (B3) > Imported Load (A6) > Imported Body Temperature



Model (B2) > Transient (B3) > Imported Load (A6) > Imported Body Temperature

	Source Time (s)	Analysis Time (s)
1	0.1	0.1
2	0.2	0.2
3	0.3	0.3
4	0.4	0.4
5	0.5	0.5

6	0.6	0.6
7	0.7	0.7
8	0.8	0.8
9	0.9	0.9
10	1	1
11	1.1	1.1
12	1.2	1.2
13	1.3	1.3
14	1.4	1.4
15	1.5	1.5
16	1.6	1.6
17	1.7	1.7
18	1.8	1.8
19	1.900000000000001	1.900000000000001
20	2	2
21	2.1	2.1
22	2.2	2.2
23	2.3	2.3
24	2.4	2.4
25	2.5	2.5
26	2.600000000000001	2.600000000000001
27	2.700000000000001	2.700000000000001
28	2.800000000000001	2.800000000000001
29	2.900000000000001	2.900000000000001
30	3	3
31	3.1	3.1
32	3.2	3.2
33	3.3	3.3
34	3.4	3.4
35	3.5	3.5
36	3.600000000000001	3.600000000000001
37	3.700000000000001	3.700000000000001
38	3.800000000000001	3.800000000000001
39	3.900000000000001	3.900000000000001
40	4	4
41	4.1	4.1
42	4.199999999999999	4.199999999999999
43	4.299999999999999	4.299999999999999
44	4.399999999999999	4.399999999999999
45	4.499999999999998	4.499999999999998
46	4.599999999999998	4.599999999999998
47	4.699999999999998	4.699999999999998
48	4.799999999999997	4.799999999999997
49	4.899999999999997	4.899999999999997
50	4.999999999999996	4.999999999999996
51	5.099999999999996	5.099999999999996
52	5.199999999999996	5.199999999999996
53	5.299999999999995	5.299999999999995
54	5.399999999999995	5.399999999999995
55	5.499999999999995	5.499999999999995
56	5.599999999999994	5.599999999999994
57	5.699999999999994	5.699999999999994

58	5.799999999999994	5.799999999999994
59	5.899999999999993	5.899999999999993
60	5.999999999999993	5.999999999999993
61	6.099999999999993	6.099999999999993
62	6.199999999999992	6.199999999999992
63	6.299999999999992	6.299999999999992
64	6.399999999999991	6.399999999999991
65	6.499999999999991	6.499999999999991
66	6.599999999999991	6.599999999999991
67	6.69999999999999	6.69999999999999
68	6.79999999999999	6.79999999999999
69	6.89999999999999	6.89999999999999
70	6.999999999999989	6.999999999999989
71	7.099999999999989	7.099999999999989
72	7.199999999999989	7.199999999999989
73	7.299999999999988	7.299999999999988
74	7.399999999999988	7.399999999999988
75	7.499999999999988	7.499999999999988
76	7.599999999999987	7.599999999999987
77	7.699999999999987	7.699999999999987
78	7.799999999999986	7.799999999999986
79	7.899999999999986	7.899999999999986
80	7.999999999999986	7.999999999999986
81	8.099999999999985	8.099999999999985
82	8.199999999999985	8.199999999999985
83	8.299999999999985	8.299999999999985
84	8.399999999999984	8.399999999999984
85	8.499999999999984	8.499999999999984
86	8.599999999999984	8.599999999999984
87	8.699999999999983	8.699999999999983
88	8.799999999999983	8.799999999999983
89	8.899999999999983	8.899999999999983
90	8.999999999999982	8.999999999999982
91	9.099999999999982	9.099999999999982
92	9.199999999999982	9.199999999999982
93	9.299999999999981	9.299999999999981
94	9.399999999999981	9.399999999999981
95	9.49999999999998	9.49999999999998
96	9.59999999999998	9.59999999999998
97	9.69999999999998	9.69999999999998
98	9.799999999999979	9.799999999999979
99	9.899999999999979	9.899999999999979
100	9.999999999999979	9.999999999999979
*		

Model (B2) > Transient (B3) > Imported Load (A6) > Imported Body Temperature > Imported Load Transfer Summary

Mon Jul 21, 2025 18:57:44

Using multiple cores: [Yes]
Number of cores requested: 16

Number of source nodes: 7982
Number of target nodes: 7982

Number of nodes mapped : 7982
Number of nodes not mapped : 0
Number of nodes outside : 0

Percent nodes mapped: 100%
Weight calculation time: 0.133 (s)
Interpolation time: 7.5e-002 (s)

Solution (B4)

TABLE 24
Model (B2) > Transient (B3) > Solution

Object Name	*Solution (B4)*
State	Solved
Adaptive Mesh Refinement	
Max Refinement Loops	1.
Refinement Depth	2.
Information	
Status	Done
MAPDL Elapsed Time	5 m 41 s
MAPDL Memory Used	918. MB
MAPDL Result File Size	176. MB
Post Processing	
Beam Section Results	No

TABLE 25
Model (B2) > Transient (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 26
Model (B2) > Transient (B3) > Solution (B4) > Results

Object Name	*Equivalent Stress*
State	Solved
Scope	
Scoping Method	Geometry Selection
Geometry	All Bodies
Definition	
Type	Equivalent (von-Mises) Stress
By	Time
Display Time	0.1 s
Separate Data by Entity	No
Calculate Time History	Yes
Identifier	
Suppressed	No
Integration Point Results	
Display Option	Averaged
Average Across Bodies	No
Results	
Minimum	12099 Pa
Maximum	1.8741e+008 Pa
Average	7.3848e+006 Pa
Minimum Occurs On	laser cut(Transient Thermal)
Maximum Occurs On	laser cut(Transient Thermal)
Minimum Value Over Time	
Minimum	12099 Pa
Maximum	2.0133e+006 Pa
Maximum Value Over Time	
Minimum	1.8741e+008 Pa
Maximum	3.241e+009 Pa
Information	
Time	0.1 s
Load Step	1
Substep	1
Iteration Number	3

FIGURE 2
Model (B2) > Transient (B3) > Solution (B4) > Equivalent Stress

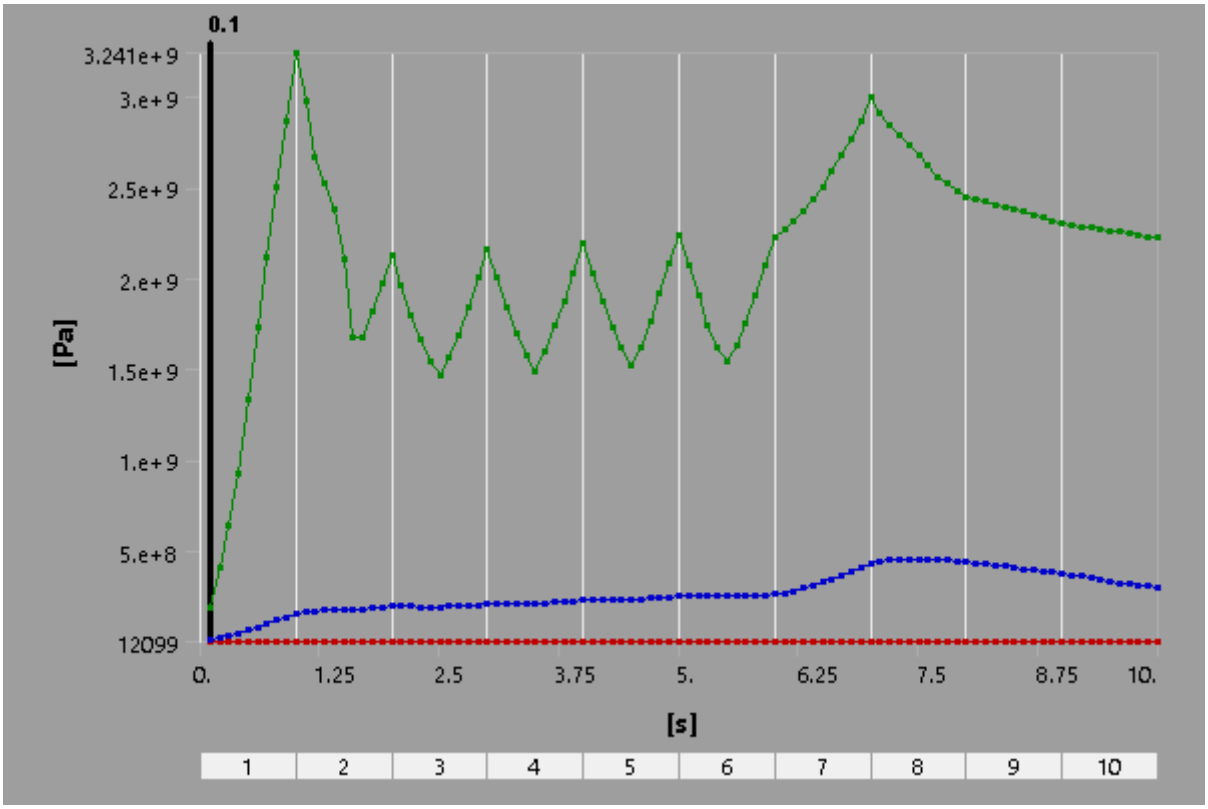


TABLE 27
Model (B2) > Transient (B3) > Solution (B4) > Equivalent Stress

Time [s]	Minimum [Pa]	Maximum [Pa]	Average [Pa]
0.1	12099	1.8741e+008	7.3848e+006
0.2	22397	4.0739e+008	1.8027e+007
0.3	36322	6.3658e+008	3.1116e+007
0.4	59265	9.2689e+008	4.6143e+007
0.5	92547	1.3305e+009	6.2543e+007
0.6	1.3597e+005	1.73e+009	7.9911e+007
0.7	1.8912e+005	2.1173e+009	9.7986e+007
0.8	2.5163e+005	2.4975e+009	1.166e+008
0.9	3.2315e+005	2.8683e+009	1.356e+008
1.	4.0347e+005	3.241e+009	1.5491e+008
1.1	4.973e+005	2.9728e+009	1.6455e+008
1.2	5.906e+005	2.6722e+009	1.7e+008
1.3	6.8173e+005	2.5246e+009	1.732e+008
1.4	7.7072e+005	2.3771e+009	1.752e+008
1.5	8.1205e+005	2.1018e+009	1.7664e+008
1.6	8.2095e+005	1.6765e+009	1.7787e+008
1.7	9.2615e+005	1.674e+009	1.8112e+008
1.8	1.0398e+006	1.8235e+009	1.8509e+008
1.9	1.0676e+006	1.9748e+009	1.8968e+008
2.	1.1268e+006	2.1263e+009	1.9439e+008
2.1	1.2178e+006	1.9622e+009	1.943e+008
2.2	1.3368e+006	1.7998e+009	1.934e+008
2.3	1.4339e+006	1.6604e+009	1.9265e+008
2.4	1.5108e+006	1.5438e+009	1.9241e+008
2.5	1.5677e+006	1.4627e+009	1.9284e+008
2.6	1.6211e+006	1.5638e+009	1.9406e+008

2.7	1.6711e+006	1.6841e+009	1.9608e+008
2.8	1.7179e+006	1.8435e+009	1.9893e+008
2.9	1.7614e+006	2.0039e+009	2.0264e+008
3.	1.8018e+006	2.1652e+009	2.0721e+008
3.1	1.8414e+006	2.0022e+009	2.0831e+008
3.2	1.8761e+006	1.8404e+009	2.0861e+008
3.3	1.9059e+006	1.695e+009	2.0891e+008
3.4	1.9312e+006	1.5747e+009	2.0957e+008
3.5	1.9522e+006	1.4936e+009	2.1077e+008
3.6	1.9695e+006	1.6034e+009	2.1262e+008
3.7	1.4445e+006	1.7385e+009	2.1519e+008
3.8	1.9945e+006	1.8749e+009	2.185e+008
3.9	1.6955e+006	2.0291e+009	2.2255e+008
4.	2.0088e+006	2.1884e+009	2.2739e+008
4.1	2.0133e+006	2.0277e+009	2.2931e+008
4.2	2.012e+006	1.8744e+009	2.3055e+008
4.3	1.4304e+006	1.7361e+009	2.3166e+008
4.4	1.9951e+006	1.6214e+009	2.3296e+008
4.5	1.538e+006	1.5181e+009	2.3463e+008
4.6	1.9674e+006	1.6174e+009	2.3674e+008
4.7	1.9412e+006	1.7606e+009	2.3932e+008
4.8	1.5546e+006	1.9199e+009	2.4238e+008
4.9	1.7857e+006	2.0794e+009	2.4595e+008
5.	1.1448e+006	2.2392e+009	2.5001e+008
5.1	1.6195e+006	2.0733e+009	2.5151e+008
5.2	1.37e+006	1.9081e+009	2.5225e+008
5.3	1.4515e+006	1.7461e+009	2.5267e+008
5.4	1.3803e+006	1.6249e+009	2.5303e+008
5.5	1.3244e+006	1.5382e+009	2.5345e+008
5.6	1.288e+006	1.6366e+009	2.5404e+008
5.7	1.2739e+006	1.7561e+009	2.5487e+008
5.8	1.2835e+006	1.9121e+009	2.5599e+008
5.9	1.3167e+006	2.071e+009	2.5744e+008
6.	1.3723e+006	2.2299e+009	2.5925e+008
6.1	1.4673e+006	2.2696e+009	2.6747e+008
6.2	1.6137e+006	2.3193e+009	2.7932e+008
6.3	1.5413e+006	2.3741e+009	2.9376e+008
6.4	1.4672e+006	2.4315e+009	3.1014e+008
6.5	1.407e+006	2.5013e+009	3.2803e+008
6.6	1.3604e+006	2.5876e+009	3.4709e+008
6.7	1.308e+006	2.6746e+009	3.6707e+008
6.8	9.0896e+005	2.7619e+009	3.8778e+008
6.9	1.2428e+006	2.8664e+009	4.0904e+008
7.	1.1939e+006	2.9995e+009	4.3071e+008
7.1	1.1561e+006	2.9128e+009	4.4189e+008
7.2	1.3488e+006	2.844e+009	4.4822e+008
7.3	1.1203e+006	2.7895e+009	4.5149e+008
7.4	1.2508e+006	2.734e+009	4.5267e+008
7.5	1.2738e+006	2.6775e+009	4.5239e+008
7.6	1.2363e+006	2.6202e+009	4.5109e+008
7.7	1.2043e+006	2.5622e+009	4.4909e+008
7.8	1.1784e+006	2.5228e+009	4.4665e+008

7.9	1.1591e+006	2.4836e+009	4.4393e+008
8.	1.1465e+006	2.444e+009	4.4109e+008
8.1	1.1359e+006	2.4318e+009	4.35e+008
8.2	1.0734e+006	2.4201e+009	4.2805e+008
8.3	1.0257e+006	2.4071e+009	4.2086e+008
8.4	9.9308e+005	2.3934e+009	4.1375e+008
8.5	9.7495e+005	2.3791e+009	4.0684e+008
8.6	8.7297e+005	2.3647e+009	4.0019e+008
8.7	9.7788e+005	2.35e+009	3.9387e+008
8.8	9.9603e+005	2.3353e+009	3.8794e+008
8.9	1.023e+006	2.3205e+009	3.8244e+008
9.	1.0572e+006	2.3056e+009	3.7742e+008
9.1	1.0964e+006	2.2956e+009	3.6818e+008
9.2	1.1387e+006	2.2871e+009	3.586e+008
9.3	1.182e+006	2.2791e+009	3.493e+008
9.4	1.2256e+006	2.2711e+009	3.4046e+008
9.5	1.2684e+006	2.2632e+009	3.3213e+008
9.6	1.3097e+006	2.2553e+009	3.2437e+008
9.7	1.3493e+006	2.2474e+009	3.1726e+008
9.8	1.2855e+006	2.2395e+009	3.1089e+008
9.9	1.4215e+006	2.2316e+009	3.0533e+008
10.	1.4535e+006	2.2238e+009	3.0067e+008

Material Data

Structural Steel

TABLE 28
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 29
Structural Steel > Color

Red	Green	Blue
132	139	179

TABLE 30
Structural Steel > Compressive Ultimate Strength

Compressive Ultimate Strength Pa
0

TABLE 31
Structural Steel > Compressive Yield Strength

Compressive Yield Strength Pa
2.5e+008

TABLE 32
Structural Steel > Tensile Yield Strength

Tensile Yield Strength Pa
2.5e+008

TABLE 33
Structural Steel > Tensile Ultimate Strength

Tensile Ultimate Strength Pa
4.6e+008

TABLE 34
Structural Steel > Isotropic Secant Coefficient of Thermal Expansion

Zero-Thermal-Strain Reference Temperature C
22

TABLE 35
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 36
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 37
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 38
Structural Steel > Isotropic Relative Permeability

Relative Permeability
10000