**Project Report On**

# "Structural and Fatigue Life Evaluation of an Engine Mount through CAD and FEA"


Submitted By:

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## 1. Introduction

In any automobile, the engine mount is one of the most important parts that connects the engine with the chassis. Apart from holding the engine in place, it also absorbs vibrations and reduces the shocks transmitted to the vehicle body. Since the mount experiences continuous cyclic loads during operation, it is likely to fail due to fatigue if not designed properly.

In this project, I first designed an engine mount in SolidWorks to create the 3D model. The model was then imported into ANSYS Workbench, where I carried out both structural and fatigue analysis. The idea was to check whether the design can withstand real-world loading conditions and to estimate its life span under repeated loading.

## 2. CAD Modelling in SolidWorks

The geometry of the engine mount was created in SolidWorks. The design included proper fillets and mounting holes to resemble an actual component. The finished CAD model had the following parameters:

- X dimension: 67.6 mm
- Y dimension: 108 mm
- Z dimension: 34.4 mm
- Volume: $1.21 \times 10^{-5}$ m$^3$
- Mass: 0.095 kg

After completing the design, the model was exported in a neutral format and imported into ANSYS for analysis.

## 3. Analysis in ANSYS

Material Properties

Structural Steel was chosen as the material:
- Density: 7850 kg/m$^3$
- Young’s Modulus: 200 GPa
- Poisson’s Ratio: 0.3
- Yield Strength: 250 MPa
- Ultimate Strength: 460 MPa

Meshing

The part was meshed with quadratic elements:
- ~29,600 nodes
- ~14,600 elements
- Element size close to 6.6 mm

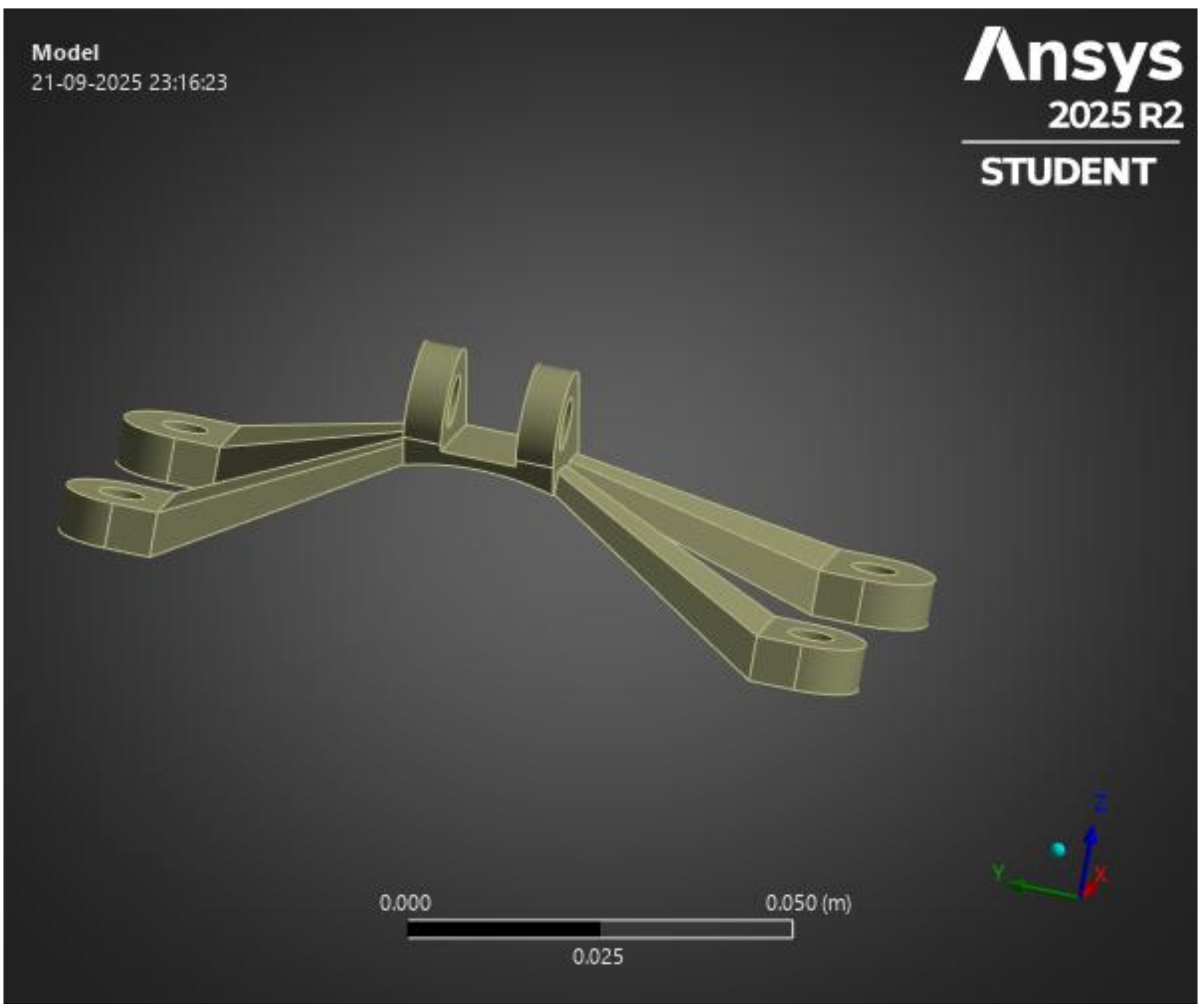
Boundary Conditions
- Mounting faces were fixed supports

- A force of 10,000 N was applied to simulate the load from the engine
- Analysis included both static stress and fatigue life prediction using the Stress-Life method

## Here is the attached file of  ansys final report

## Project*

| | |
|---|---|
| First Saved | Sunday, September 21, 2025 |
| Last Saved | Sunday, September 21, 2025 |
| Product Version | 2025 R2 |
| 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 (A4)

**TABLE 2**
**Model (A4) > Geometry Imports**

| | |
|---|---|
| Object Name | *Geometry Imports* |
| State | Solved |

**TABLE 3**
**Model (A4) > Geometry Imports > Geometry Import (A3)**

| | |
|---|---|
| Object Name | *Geometry Import (A3)* |
| State | Solved |
| **Definition** | |
| Source | C:\Users\grite\Downloads\Engine mount fatigue_files\dp0\SYS\DM\SYS.dsco |
| Type | Discovery |
| **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 | No |
| **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 (A4) > Geometry**

| | |
|---|---|
| Object Name | *Geometry* |
| State | Fully Defined |
| **Definition** | |
| Source | C:\Users\grite\Downloads\Engine mount fatigue_files\dp0\SYS\DM\SYS.dsco |
| Type | Discovery |
| Length Unit | Meters |
| Element Control | Program Controlled |
| Display Style | Body Color |
| **Bounding Box** | |
| Length X | 6.7604e-002 m |
| Length Y | 0.10803 m |
| Length Z | 3.4408e-002 m |
| **Properties** | |
| Volume | 1.2123e-005 m³ |

| | |
|---|---|
| Mass | 9.5169e-002 kg |
| Scale Factor Value | 1. |
| **Statistics** | |
| Bodies | 1 |
| Active Bodies | 1 |
| Nodes | 29636 |
| Elements | 14667 |
| Mesh Metric | None |
| **Update Options** | |
| Assign Default Material | No |
| **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 | No |
| **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 |
| ID_GeometryPrefProcessPhysicsDefinition | No |
| Enclosure and Symmetry Processing | Yes |

**TABLE 5**
**Model (A4) > Geometry > Parts**

| | |
|---|---|
| Object Name | *Default\Default* |
| 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 | 6.7604e-002 m |
| Length Y | 0.10803 m |
| Length Z | 3.4408e-002 m |
| **Properties** | |
| Volume | 1.2123e-005 m³ |
| Mass | 9.5169e-002 kg |
| Centroid X | -3.3279e-002 m |
| Centroid Y | -1.0204e-002 m |
| Centroid Z | -6.8375e-003 m |
| Moment of Inertia Ip1 | 1.1031e-004 kg·m² |
| Moment of Inertia Ip2 | 5.0875e-005 kg·m² |
| Moment of Inertia Ip3 | 1.5056e-004 kg·m² |
| **Statistics** | |
| Nodes | 29636 |
| Elements | 14667 |
| Mesh Metric | None |
| **CAD Attributes** | |
| PartTolerance: | 0.00000001 |
| Color:143.149.175 | |

**TABLE 6**
**Model (A4) > Materials**

| | |
|---|---|
| Object Name | *Materials* |

| | |
|---|---|
| State | Fully Defined |
| **Statistics** | |
| Materials | 1 |
| Material Assignments | 0 |

## Coordinate Systems

**TABLE 7**
**Model (A4) > 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. ] |
| **Transfer Properties** | |
| Source | |
| Read Only | No |

## Connections

**TABLE 8**
**Model (A4) > Connections**

| | |
|---|---|
| Object Name | *Connections* |
| State | Fully Defined |
| **Auto Detection** | |
| Generate Automatic Connection On Refresh | Yes |
| **Transparency** | |
| Enabled | Yes |
| **Statistics** | |
| Contacts | 0 |
| Active Contacts | 0 |
| 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 | *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 | 3.3001e-004 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 | 0 |
| Active Connections | 0 |

## Mesh

**TABLE 10**
**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 (6.6002e-003 m) |
| **Sizing** | |
| Use Adaptive Sizing | No |
| Growth Rate | Default (1.85) |
| Max Size | Default (1.32e-002 m) |
| Mesh Defeaturing | Yes |
| Defeature Size | Default (3.3001e-005 m) |
| Capture Curvature | No |
| Capture Proximity | No |
| Bounding Box Diagonal | 0.132 m |
| Average Surface Area | 1.7113e-004 m² |
| Minimum Edge Length | 9.8662e-004 m |
| **Quality** | |
| Check Mesh Quality | Yes, Errors |
| Error Limits | Aggressive Mechanical |
| Target Element Quality | Default (5.e-002) |
| Smoothing | Medium |
| Mesh Metric | None |
| **Inflation** | |
| Use Automatic Inflation | None |
| Inflation Option | Smooth Transition |
| Transition Ratio | 0.272 |

| | |
|---|---|
| Maximum Layers | 2 |
| Growth Rate | 1.2 |
| Inflation Algorithm | Pre |
| Inflation Element Type | Wedges |
| 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 | Default (5.9401e-005 m) |
| Generate Pinch on Refresh | No |
| Auto-Map Fillets | No |
| **Automatic Methods** | |
| Sheet Body Method | Prime Quad Dominant |
| Sweepable Body Method | Sweep |
| **Statistics** | |
| Nodes | 29636 |
| Elements | 14667 |
| Show Detailed Statistics | No |

**TABLE 11**
**Model (A4) > Mesh > Mesh Controls**

| Object Name | *Body Sizing* | *Automatic Method* | *Refinement* |
|---|---|---|---|
| State | Fully Defined | | |
| **Scope** | | | |

| | | | |
|---|---|---|---|
| Scoping Method | Geometry Selection | | |
| Geometry | 1 Body | | 18 Faces |
| **Definition** | | | |
| Suppressed | No | | |
| Type | Element Size | | |
| Element Size | Default (6.6002e-003 m) | | |
| Method | | Automatic | |
| Element Order | | Quadratic | |
| Refinement | | | 3 |
| **Advanced** | | | |
| Defeature Size | Default (3.3001e-005 m) | | |
| Behavior | Soft | | |
| Growth Rate | Default (1.85) | | |
| Capture Curvature | No | | |
| Capture Proximity | No | | |

## Static Structural (A5)

**TABLE 12**
**Model (A4) > Analysis**

| | |
|---|---|
| Object Name | *Static Structural (A5)* |
| 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 | *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 |

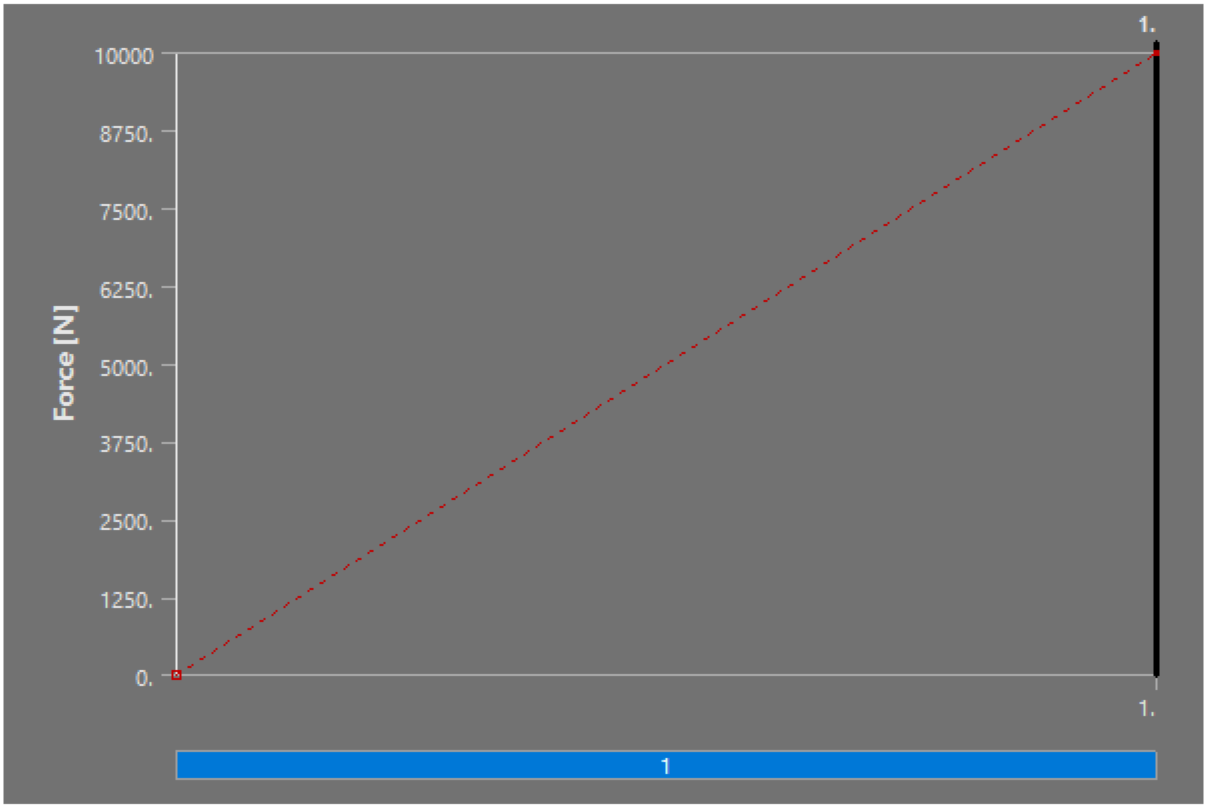
| | |
|---|---|
| Moment Convergence | Program Controlled |
| Displacement Convergence | Program Controlled |
| Rotation Convergence | Program Controlled |
| Line Search | Program Controlled |
| Stabilization | Program Controlled |
| **Advanced** | |
| Inverse Option | No |
| Contact Split (DMP) | Program Controlled |
| **Output Controls** | |
| Output Selection | None |
| 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 |
| **Analysis Data Management** | |
| Solver Files Directory | C:\Users\grite\Downloads\Engine mount fatigue_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) > Loads**

| Object Name | *Force* | *Fixed Support* |
|---|---|---|
| State | Fully Defined | |
| **Scope** | | |
| Scoping Method | Geometry Selection | |
| Geometry | 2 Faces | 4 Faces |
| **Definition** | | |
| Type | Force | Fixed Support |
| Define By | Vector | |
| Applied By | Surface Effect | |
| Magnitude | 10000 N (ramped) | |
| Direction | Defined | |
| Suppressed | No | |

**FIGURE 1**
**Model (A4) > Static Structural (A5) > Force**




## Solution (A6)

**TABLE 15**
**Model (A4) > Static Structural (A5) > Solution**

| | |
|---|---|
| Object Name | *Solution (A6)* |
| State | Solved |
| **Adaptive Mesh Refinement** | |
| Max Refinement Loops | 1. |
| Refinement Depth | 2. |
| **Information** | |
| Status | Done |
| MAPDL Elapsed Time | 22. s |
| MAPDL Memory Used | 300. MB |
| MAPDL Result File Size | 9.5625 MB |
| **Post Processing** | |

| | |
|---|---|
| Beam Section Results | No |
| On Demand Stress/Strain | No |

**TABLE 16**
**Model (A4) > Static Structural (A5) > Solution (A6) > 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 17**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tools**

| | |
|---|---|
| Object Name | *Fatigue Tool* |
| State | Solved |
| **Domain** | |
| Domain Type | Time |

| Materials | |
|---|---|
| Fatigue Strength Factor (Kf) | 1. |
| **Loading** | |
| Type | Fully Reversed |
| Scale Factor | 1. |
| **Definition** | |
| Display Time | End Time |
| **Options** | |
| Analysis Type | Stress Life |
| Mean Stress Theory | Soderberg |
| Stress Component | Equivalent (von-Mises) |
| **Life Units** | |
| Units Name | cycles |
| 1 cycle is equal to | 1. cycles |

**FIGURE 2**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool**

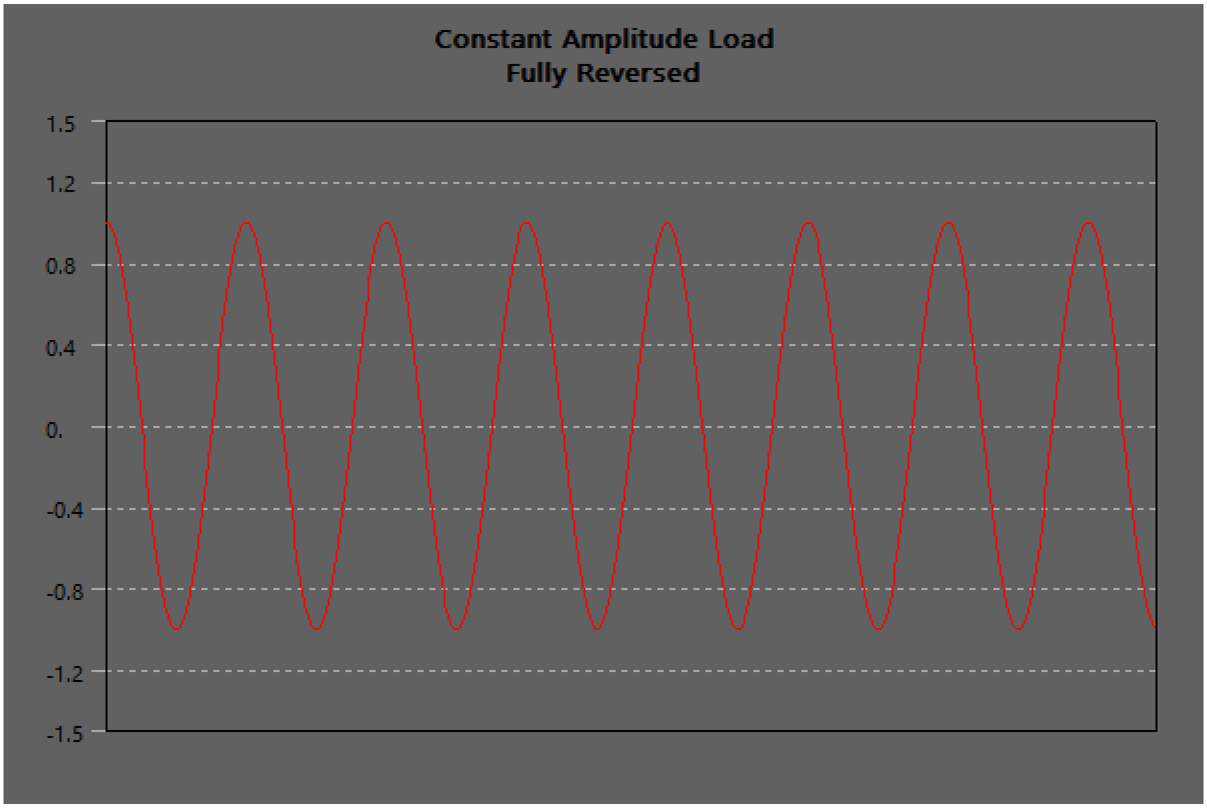



**FIGURE 3**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool**

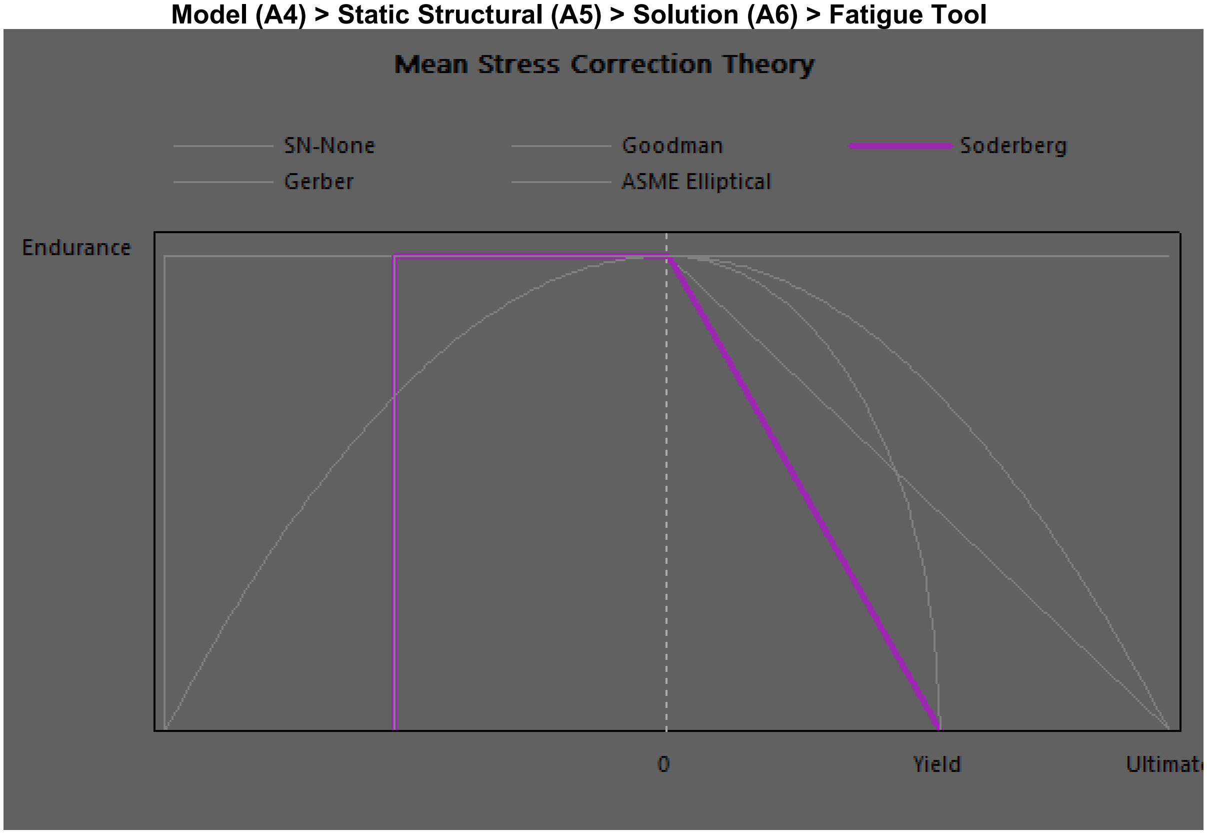


**TABLE 18**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Results**

| Object Name | *Life* | *Safety Factor* | *Equivalent Alternating Stress* | *Damage* |
|---|---|---|---|---|
| State | Solved | | | |
| **Scope** | | | | |
| Scoping Method | Geometry Selection | | | |
| Geometry | All Bodies | | | |
| **Definition** | | | | |
| Type | Life | Safety Factor | Equivalent Alternating Stress | Damage |
| Identifier | | | | |
| Suppressed | No | | | |
| Design Life | | 1.e+009 cycles | | 1.e+009 cycles |
| **Results** | | | | |
| Minimum | 18.648 cycles | 2.9266e-002 | 67768 Pa | |
| Minimum Occurs On | Default\Default | | | |
| Maximum | | | 2.9454e+009 Pa | 5.3626e+007 |
| Average | | | 1.7713e+008 Pa | |
| Maximum Occurs On | | | Default\Default | |

**FIGURE 4**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Life**

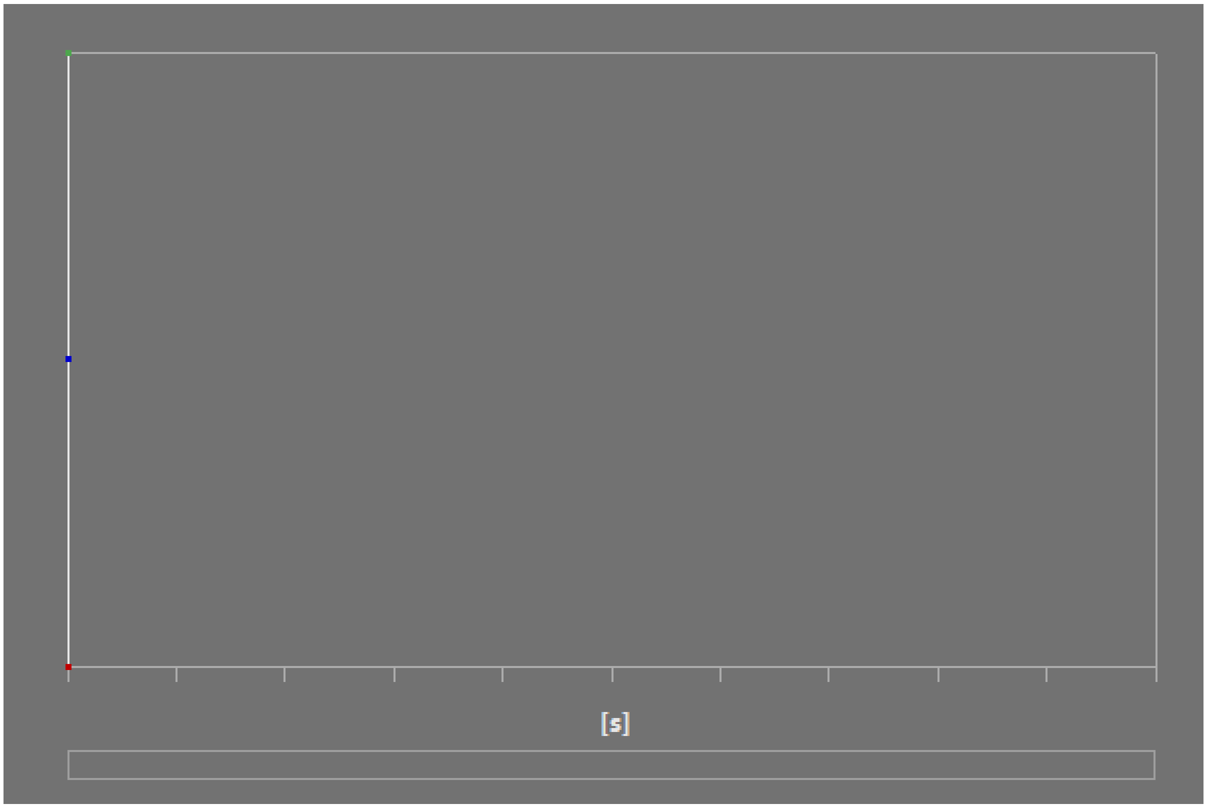



**TABLE 19**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Life**

| Time [s] | Minimum | Maximum | Average |
|---|---|---|---|
| 1. | 18.648 | 1.e+006 | 5.0005e+005 |

**FIGURE 5**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Safety Factor**

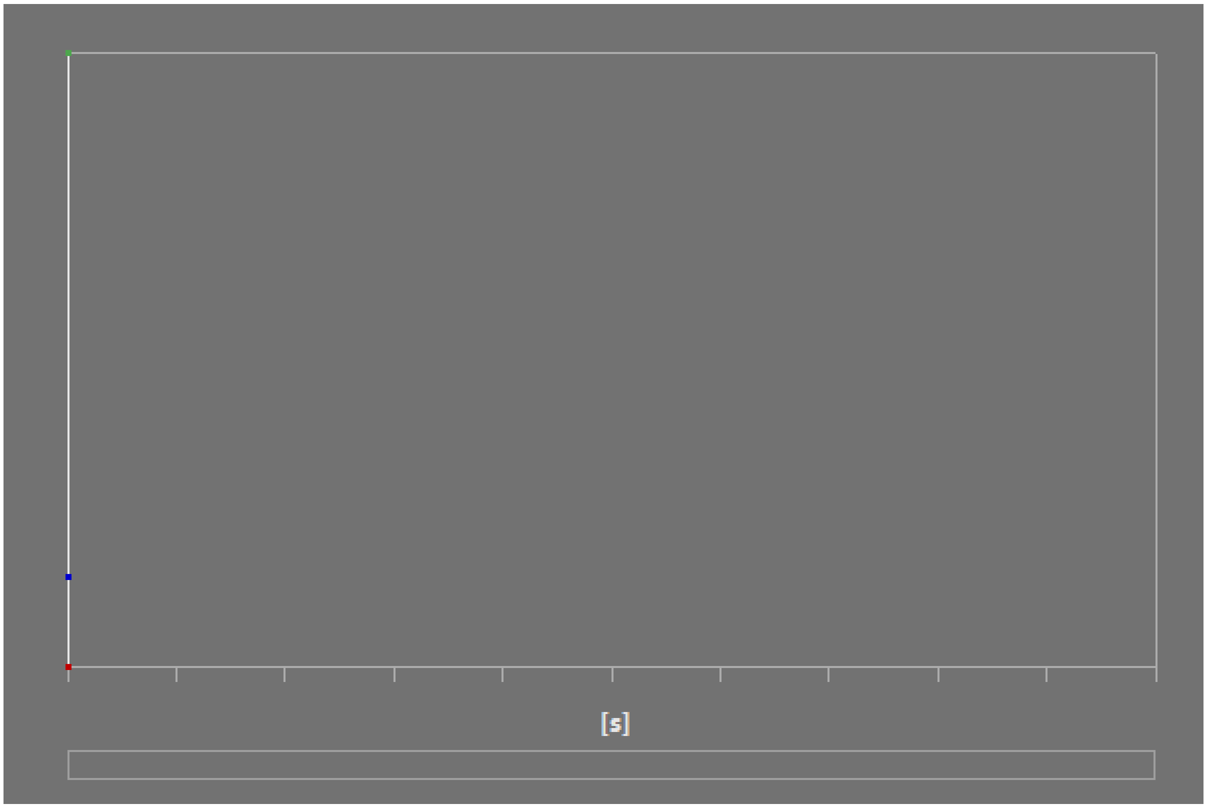



**TABLE 20**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Safety Factor**

| Time [s] | Minimum | Maximum | Average |
|---|---|---|---|
| 1. | 2.9266e-002 | 15. | 2.2194 |

**FIGURE 6**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Equivalent Alternating Stress**

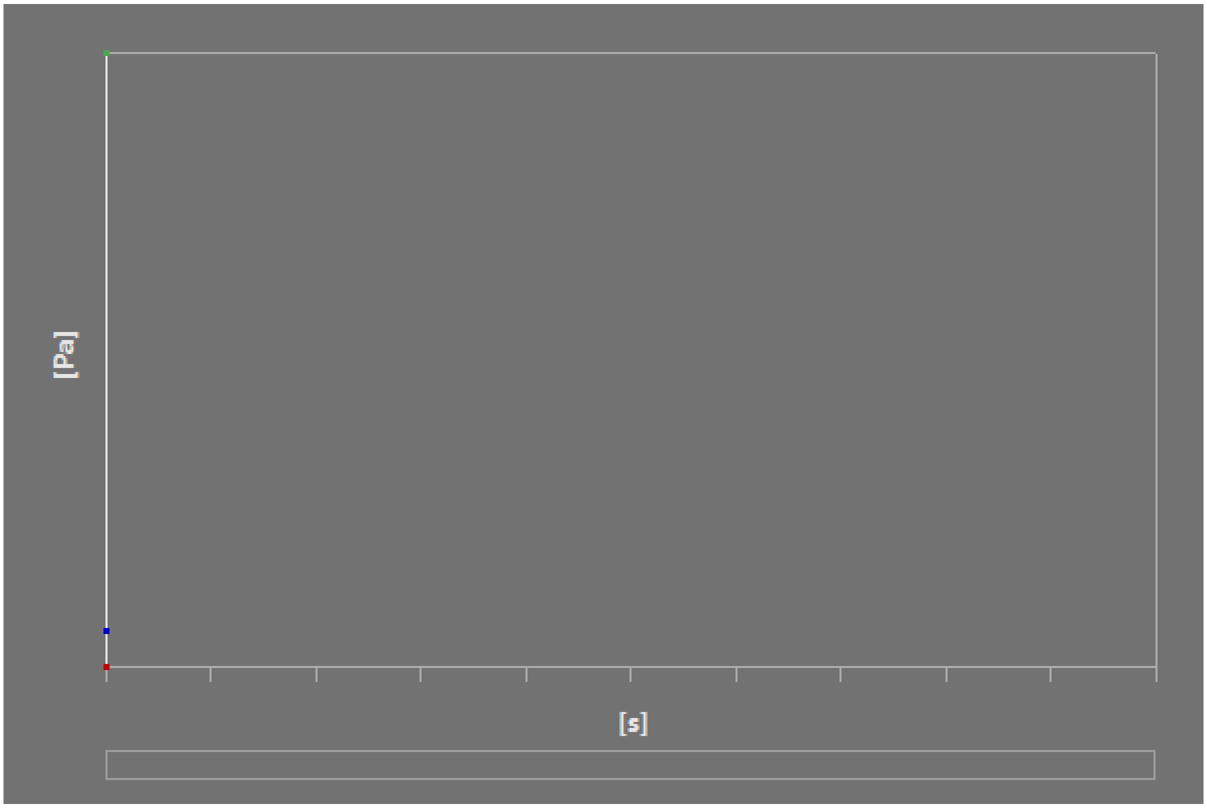



**TABLE 21**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Equivalent Alternating Stress**

| Time [s] | Minimum [Pa] | Maximum [Pa] | Average [Pa] |
|---|---|---|---|
| 1. | 67768 | 2.9454e+009 | 1.7713e+008 |

**FIGURE 7**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Damage**

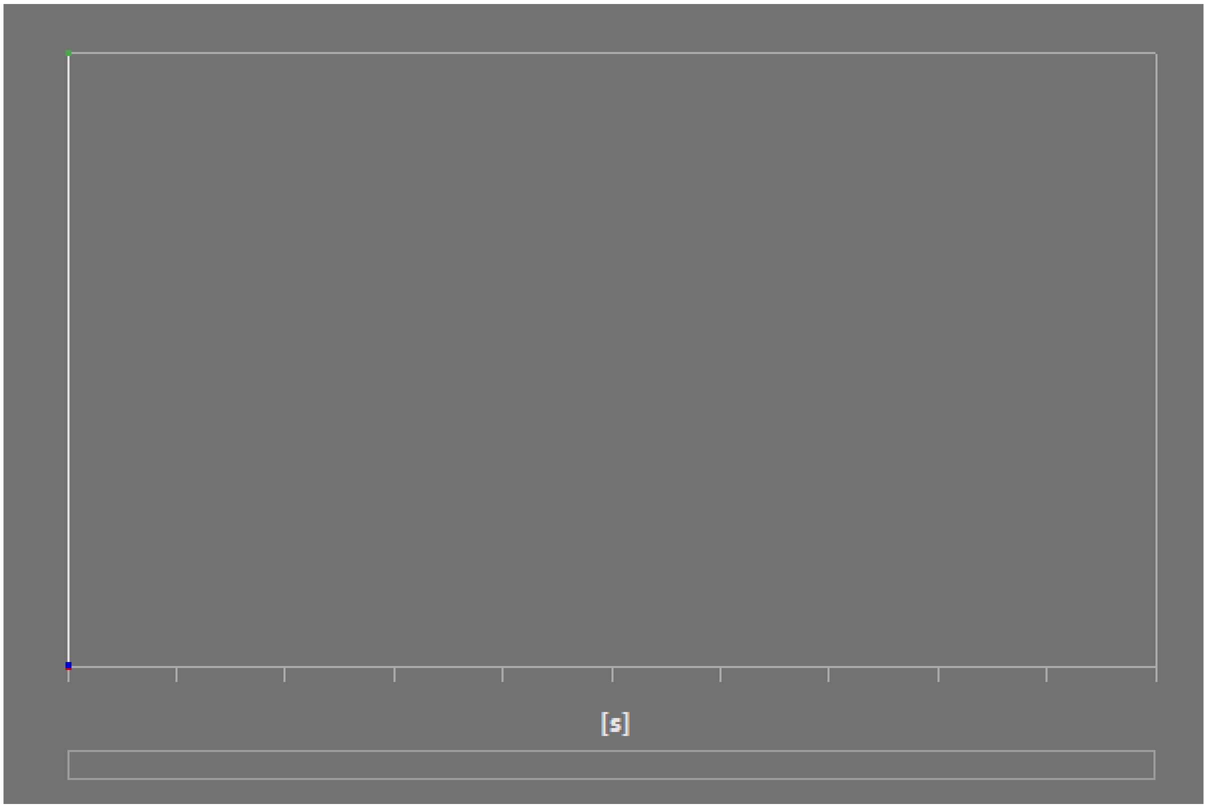



**TABLE 22**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Damage**

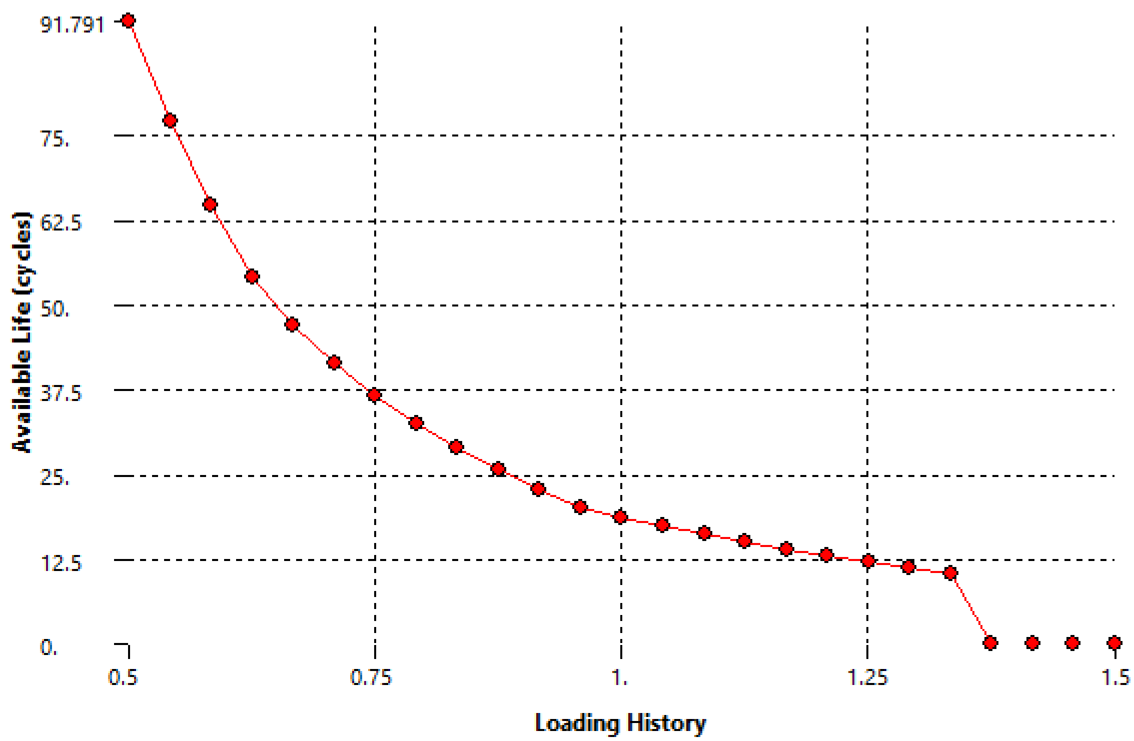
| Time [s] | Minimum | Maximum | Average |
|---|---|---|---|
| 1. | 1000. | 5.3626e+007 | 2.1657e+005 |

**TABLE 23**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Result Charts**

| | |
|---|---|
| Object Name | *Fatigue Sensitivity* |
| State | Solved |
| **Scope** | |
| Geometry | All Bodies |
| **Definition** | |
| Sensitivity For | Life |
| Suppressed | No |
| **Options** | |

| | |
|---|---|
| Lower Variation | 50. % |
| Upper Variation | 150. % |
| Number of Fill Points | 25 |
| Chart Viewing Style | Linear |

**FIGURE 8**
**Model (A4) > Static Structural (A5) > Solution (A6) > Fatigue Tool > Fatigue Sensitivity**




## Material Data

### Structural Steel

**TABLE 24**
**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 kg m^3 A^-2 s^-3 |

**TABLE 25**
**Structural Steel > Color**

| Red | Green | Blue |
|---|---|---|
| 132 | 139 | 179 |

**TABLE 26**
**Structural Steel > Compressive Ultimate Strength**

| Compressive Ultimate Strength Pa |
|---|
| 4.2e+008 |

**TABLE 27**
**Structural Steel > Compressive Yield Strength**

| Compressive Yield Strength Pa |
|---|
| 2.5e+008 |

**TABLE 28**
**Structural Steel > Tensile Yield Strength**

| Tensile Yield Strength Pa |
|---|
| 2.5e+008 |

**TABLE 29**
**Structural Steel > Tensile Ultimate Strength**

| Tensile Ultimate Strength Pa |
|---|
| 4.6e+008 |

**TABLE 30**
**Structural Steel > Isotropic Secant Coefficient of Thermal Expansion**

| Zero-Thermal-Strain Reference Temperature C |
|---|
| 22 |

**TABLE 31**
**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 32**
**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 |

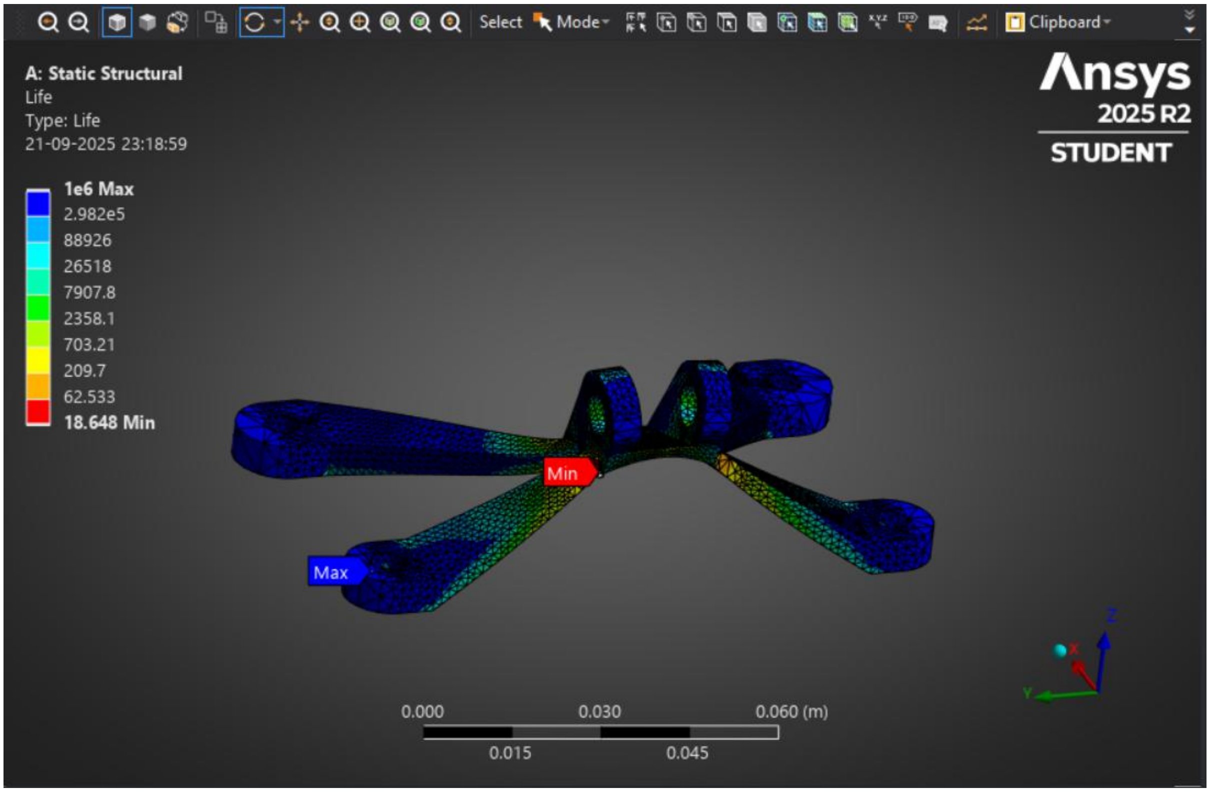
**TABLE 33**
**Structural Steel > Isotropic Elasticity**

| 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 | |

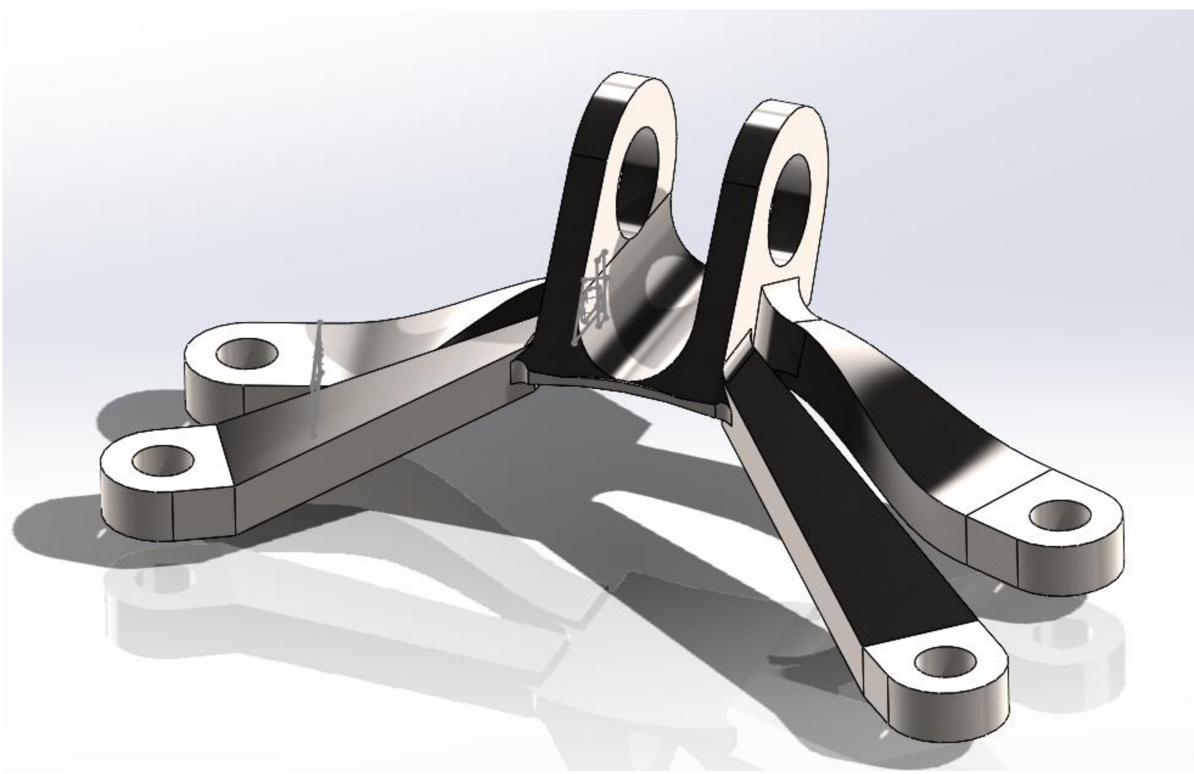
**TABLE 34**
**Structural Steel > Isotropic Relative Permeability**

| Relative Permeability |
|---|
| 10000 |

Simulation




CAD Model



## 4. Results

Structural Results
- Maximum stress: ~$2.94 \times 10^9$ Pa, concentrated near mounting holes and fillets.

Fatigue Life
- Minimum life: 18–20 cycles
- Maximum life: ~1 million cycles
- Average life: ~$5 \times 10^5$ cycles

Fatigue Safety Factor
- Minimum: ~0.03
- Maximum: ~15
- Average: ~2.2

## 5. Discussion

The results show that while most of the mount can survive millions of cycles, the weak spots around holes and fillets reduce its reliability. Stress concentrations are the main issue here.

Possible improvements include:
- Increasing fillet radii to reduce stress
- Using higher-strength alloys or composites
- Adding damping inserts
- Redesigning geometry to distribute load better

## 6. Conclusion

- The engine mount was successfully designed in SolidWorks and analyzed in ANSYS
- High stresses were observed at mounting points
- Fatigue life is uneven, with critical regions failing quickly under cyclic loads
- The design needs optimization for better reliability

This project shows how CAD design and simulation together can validate a design virtually before manufacturing.

## 7. References


1. ANSYS Workbench Documentation
2. Dassault Systèmes, SolidWorks User Guide
3. Shigley, J. E. Mechanical Engineering Design
4. Juvinall, R. C. Fundamentals of Machine Component Design