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|  | |  | | --- | | **Simulation of ShelledModel1**  **Date: April 1, 2023 Designer: Solidworks**  **Study name: Static 5**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc131259036)  [Assumptions 2](#_Toc131259037)  [Model Information 2](#_Toc131259038)  [Study Properties 3](#_Toc131259039)  [Units 3](#_Toc131259040)  [Material Properties 4](#_Toc131259041)  [Loads and Fixtures 5](#_Toc131259042)  [Connector Definitions 5](#_Toc131259043)  [Contact Information 6](#_Toc131259044)  [Mesh information 7](#_Toc131259045)  [Sensor Details 8](#_Toc131259046)  [Resultant Forces 8](#_Toc131259047)  [Beams 8](#_Toc131259048)  [Study Results 9](#_Toc131259049)  [Conclusion 11](#_Toc131259050) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** ShelledModel1**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Mirror4** | **Solid Body** | ****Mass:8.72198 kg****  ****Volume:0.00111137 m^3****  ****Density:7,847.94 kg/m^3****  ****Weight:85.4754 N**** | ****C:\Users\westy\OneDrive\Documents\SubFrame Documents\Frame\_Documents\ShelledModel1.SLDPRT****  **Mar 30 12:43:40 2023** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Static 5 | | Analysis type | Static | | Mesh type | Solid Mesh | | Thermal Effect: | On | | Thermal option | Include temperature loads | | Zero strain temperature | 298 Kelvin | | Include fluid pressure effects from SOLIDWORKS Flow Simulation | Off | | Solver type | FFEPlus | | Inplane Effect: | Off | | Soft Spring: | Off | | Inertial Relief: | Off | | Incompatible bonding options | Automatic | | Large displacement | Off | | Compute free body forces | On | | Friction | Off | | Use Adaptive Method: | Off | | Result folder | SOLIDWORKS document (C:\Users\westy\OneDrive\Documents\SubFrame Documents\Frame\_Documents) | |

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| Units  |  |  | | --- | --- | | Unit system: | SI (MKS) | | Length/Displacement | mm | | Temperature | Kelvin | | Angular velocity | Rad/sec | | Pressure/Stress | N/mm^2 (MPa) | |

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| Material Properties  |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Properties**** | ****Components**** | |  | |  |  | | --- | --- | | ****Name:**** | **AISI 4130 Steel, normalized at 870C** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **460 N/mm^2** | | ****Tensile strength:**** | **731 N/mm^2** | | ****Elastic modulus:**** | **205,000 N/mm^2** | | ****Poisson's ratio:**** | **0.285** | | ****Mass density:**** | **7.85 g/cm^3** | | ****Shear modulus:**** | **80,000 N/mm^2** | | **SolidBody 1(Mirror4)(ShelledModel1)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **4 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **0.0191936** | **160.849** | **0.00788128** | **160.849** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Distributed Mass-1** |  | |  |  | | --- | --- | | Entities: | **4 face(s)** | | Type: | **Displacement (Direct transfer)** | | Coordinate System: | **Global cartesian coordinates** | | Translation Values: | **---, ---, --- mm** | | Rotation Values: | **---, ---, --- deg** | | Reference coordinates: | **0 0 0 mm** | | Remote Mass: | **7.7 kg** | | Moment of Inertia: | **0,0,0,0,0,0 kg.m^2** | | Components transferred: | **NA** | | | **Gravity-1** |  | |  |  | | --- | --- | | Reference: | **Top Plane** | | Values: | **0 0 -9.81** | | Units: | **m/s^2** | | |

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| Connector Definitions No Data |

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| Contact Information No Data |

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| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Standard mesh | | Automatic Transition: | Off | | Include Mesh Auto Loops: | Off | | Jacobian points for High quality mesh | 16 Points | | Element Size | 10.361 mm | | Tolerance | 0.518051 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 21826 | | Total Elements | 11009 | | Maximum Aspect Ratio | 19.259 | | % of elements with Aspect Ratio < 3 | 92.8 | | Percentage of elements with Aspect Ratio > 10 | 0.109 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:05 | | Computer name: | JOSH-G15 | |  | | |

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| Sensor Details No Data |

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| Resultant ForcesReaction forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N | 0.0191936 | 160.849 | 0.00788128 | 160.849 |  Reaction Moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 0 | 0 | 0 | 0 | |
| Free body forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N | -0.137809 | 56.7884 | -0.0657987 | 56.7886 |  Free body moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 0 | 0 | 0 | 1e-33 | |

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| Beams No Data |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 2.890e-03N/mm^2 (MPa)  Node: 11640 | 7.336e+00N/mm^2 (MPa)  Node: 12816 | | **ShelledModel1-Static 5-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mm  Node: 259 | 6.042e-02mm  Node: 993 | | **ShelledModel1-Static 5-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 3.681e-08  Element: 986 | 2.281e-05  Element: 2566 | | **ShelledModel1-Static 5-Strain-Strain1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Max von Mises Stress | 3.000e+00  Node: 1 | 3.000e+00  Node: 1 | | **ShelledModel1-Static 5-Factor of Safety-Factor of Safety1** | | | | |

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| Conclusion |