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|  | |  | | --- | | **Simulation of mount ass**  **Date: Saturday, 25 May 2019 Designer: Edward Munns**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc9712758)  [Assumptions 2](#_Toc9712759)  [Model Information 2](#_Toc9712760)  [Study Properties 3](#_Toc9712761)  [Units 4](#_Toc9712762)  [Material Properties 4](#_Toc9712763)  [Loads and Fixtures 5](#_Toc9712764)  [Connector Definitions 6](#_Toc9712765)  [Contact Information 6](#_Toc9712766)  [Mesh information 7](#_Toc9712767)  [Sensor Details 8](#_Toc9712768)  [Resultant Forces 8](#_Toc9712769)  [Beams 8](#_Toc9712770)  [Study Results 9](#_Toc9712771)  [Conclusion 11](#_Toc9712772) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** mount ass**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Boss-Extrude1** | **Solid Body** | ****Mass:2.95031 kg****  ****Volume:0.00037488 m^3****  ****Density:7870 kg/m^3****  ****Weight:28.913 N**** | ****C:\Users\ed\Desktop\mech ass 3\backplate.SLDPRT****  **May 21 00:48:18 2019** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.614789 kg****  ****Volume:7.8118e-05 m^3****  ****Density:7870 kg/m^3****  ****Weight:6.02493 N**** | ****C:\Users\ed\Desktop\mech ass 4\cross bar.SLDPRT****  **May 22 22:12:38 2019** | | **Cut-Extrude2** | **Solid Body** | ****Mass:1.55012 kg****  ****Volume:0.000196965 m^3****  ****Density:7870 kg/m^3****  ****Weight:15.1911 N**** | ****C:\Users\ed\Desktop\mech ass 3\outrigger.SLDPRT****  **May 23 01:30:53 2019** | | **Cut-Extrude2** | **Solid Body** | ****Mass:1.55012 kg****  ****Volume:0.000196965 m^3****  ****Density:7870 kg/m^3****  ****Weight:15.1911 N**** | ****C:\Users\ed\Desktop\mech ass 3\outrigger.SLDPRT****  **May 23 01:30:53 2019** | | **Cut-Extrude2** | **Solid Body** | ****Mass:0.96055 kg****  ****Volume:0.000122052 m^3****  ****Density:7870 kg/m^3****  ****Weight:9.41339 N**** | ****C:\Users\ed\Desktop\mech ass 4\top outrigger 2.SLDPRT****  **May 22 21:35:05 2019** | | **Cut-Extrude2** | **Solid Body** | ****Mass:0.96055 kg****  ****Volume:0.000122052 m^3****  ****Density:7870 kg/m^3****  ****Weight:9.41339 N**** | ****C:\Users\ed\Desktop\mech ass 4\top outrigger 2.SLDPRT****  **May 22 21:35:05 2019** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Static 1 | | 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\ed\Desktop\mech ass 4) | |

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

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| Material Properties  |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Properties**** | ****Components**** | |  | |  |  | | --- | --- | | ****Name:**** | **AISI 1020 Steel, Cold Rolled** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **3.5e+08 N/m^2** | | ****Tensile strength:**** | **4.2e+08 N/m^2** | | ****Elastic modulus:**** | **2.05e+11 N/m^2** | | ****Poisson's ratio:**** | **0.29** | | ****Mass density:**** | **7870 kg/m^3** | | ****Shear modulus:**** | **8e+10 N/m^2** | | ****Thermal expansion coefficient:**** | **1.2e-05 /Kelvin** | | **SolidBody 1(Boss-Extrude1)(backplate-1),**  **SolidBody 1(Boss-Extrude1)(cross bar-1),**  **SolidBody 1(Cut-Extrude2)(outrigger-1),**  **SolidBody 1(Cut-Extrude2)(outrigger-2),**  **SolidBody 1(Cut-Extrude2)(top outrigger 2-1),**  **SolidBody 1(Cut-Extrude2)(top outrigger 2-2)** | | **Curve Data:N/A** | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **1575.5** | **89.6161** | **6.19888e-05** | **1578.04** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Gravity-1** |  | |  |  | | --- | --- | | Reference: | **Top Plane** | | Values: | **0 0 -9.81** | | Units: | **m/s^2** | | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **8 edge(s)** | | Type: | **Apply force** | | Values: | **---, ---, -816.37 N** | | | **Force-2** |  | |  |  | | --- | --- | | Entities: | **8 edge(s)** | | Type: | **Apply force** | | Values: | **---, ---, 320.69 N** | | | **Force-3** |  | |  |  | | --- | --- | | Entities: | **4 edge(s)** | | Type: | **Apply force** | | Values: | **---, ---, -414.26 N** | | | **Force-4** |  | |  |  | | --- | --- | | Entities: | **4 edge(s)** | | Type: | **Apply force** | | Values: | **---, ---, -425 N** | | |

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| Connector Definitions  | ****Connector Name**** | ****Connector Details**** | ****Connector Image**** | | --- | --- | --- | | **Rigid Connector-1** | |  |  | | --- | --- | | Entities: | **2 face(s)** | | Type: | **Rigid** | | |  | | --- | |  | | **Rigid Connector-1** | | | **Rigid Connector-2** | |  |  | | --- | --- | | Entities: | **2 face(s)** | | Type: | **Rigid** | | |  | | --- | |  | | **Rigid Connector-2** | | | **Rigid Connector-3** | |  |  | | --- | --- | | Entities: | **2 face(s)** | | Type: | **Rigid** | | |  | | --- | |  | | **Rigid Connector-3** | | |

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| Contact Information  | Contact | Contact Image | Contact Properties | | --- | --- | --- | | Global Contact |  | |  |  | | --- | --- | | Type: | **Bonded** | | Components: | **1 component(s)** | | Options: | **Compatible mesh** | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Standard mesh | | Automatic Transition: | Off | | Include Mesh Auto Loops: | Off | | Jacobian points | 4 Points | | Element Size | 15.998 mm | | Tolerance | 0.799899 mm | | Mesh Quality Plot | High | | Remesh failed parts with incompatible mesh | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 21477 | | Total Elements | 10661 | | Maximum Aspect Ratio | 37.638 | | % of elements with Aspect Ratio < 3 | 4.78 | | % of elements with Aspect Ratio > 10 | 5.26 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:03 | | Computer name: |  | |  | | |

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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 | 1575.5 | 89.6161 | 6.19888e-05 | 1578.04 |  Reaction Moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 0 | 0 | 0 | 0 | |
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| Beams No Data |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 0.008 N/m^2  Node: 165 | 10,881,582.000N/m^2  Node: 3998 | | **mount ass-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0 mm  Node: 444 | 0.00789 mm  Node: 9876 | | **mount ass-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 2.708e-10  Element: 1016 | 3.238e-05  Element: 694 | | **mount ass-Static 1-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **mount ass-Static 1-Displacement-Displacement1{1}** | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Automatic | 28.3  Node: 4000 | 4.64e+10  Node: 165 | | **mount ass-Static 1-Factor of Safety-Factor of Safety1** | | | | |

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| Conclusion |