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|  | |  | | --- | | **Simulation of mte380\_01\_vertical\_mount\_01**  **Date: February 6, 2017 Designer: Solidworks**  **Study name: Vertical Column**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc474176692)  [Assumptions 2](#_Toc474176693)  [Model Information 2](#_Toc474176694)  [Study Properties 3](#_Toc474176695)  [Units 3](#_Toc474176696)  [Material Properties 4](#_Toc474176697)  [Loads and Fixtures 5](#_Toc474176698)  [Connector Definitions 5](#_Toc474176699)  [Contact Information 6](#_Toc474176700)  [Mesh Information 7](#_Toc474176701)  [Sensor Details 8](#_Toc474176702)  [Resultant Forces 8](#_Toc474176703)  [Beams 8](#_Toc474176704)  [Study Results 9](#_Toc474176705)  [Conclusion 11](#_Toc474176706) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** mte380\_01\_vertical\_mount\_01**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Imported1** | **Solid Body** | ****Mass:0.360335 kg****  ****Volume:0.000133457 m^3****  ****Density:2700 kg/m^3****  ****Weight:3.53128 N**** | ****C:\Users\Mickey\Documents\UWaterloo\3rd Year\3B\MTE380\CAD\Lift vJake\mte380\_01\_vertical\_mount\_01.sldprt****  **Jan 31 10:01:22 2017** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Vertical Column | | 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\Mickey\Documents\UWaterloo\3rd Year\3B\MTE380\CAD\Lift vJake) | |

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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:**** | **6061-T6 (SS)** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **2.75e+008 N/m^2** | | ****Tensile strength:**** | **3.1e+008 N/m^2** | | ****Elastic modulus:**** | **6.9e+010 N/m^2** | | ****Poisson's ratio:**** | **0.33** | | ****Mass density:**** | **2700 kg/m^3** | | ****Shear modulus:**** | **2.6e+010 N/m^2** | | ****Thermal expansion coefficient:**** | **2.4e-005 /Kelvin** | | **SolidBody 1(Imported1)(mte380\_01\_vertical\_mount\_01)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **8 edge(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-12.1402** | **0.00701022** | **0.998858** | **12.1812** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 edge(s)** | | Reference: | **Edge< 1 >** | | Type: | **Apply force** | | Values: | **---, ---, 1 N** | | | **Torque-2** |  | |  |  | | --- | --- | | Entities: | **4 face(s)** | | Reference: | **Axis1** | | Type: | **Apply torque** | | Value: | **-1 N.m** | | |

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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 | 4 Points | | Element Size | 5.94049 mm | | Tolerance | 0.297024 mm | | Mesh Quality | High |  Mesh Information - Details  |  |  | | --- | --- | | Total Nodes | 17170 | | Total Elements | 8247 | | Maximum Aspect Ratio | 7.4702 | | % of elements with Aspect Ratio < 3 | 95.8 | | % of elements with Aspect Ratio > 10 | 0 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:02 | | Computer name: | MICKEYWUUU | |  | | |

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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 | -12.1402 | 0.00701022 | 0.998858 | 12.1812 |  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 | 11606.4 N/m^2  Node: 237 | 1.56604e+007 N/m^2  Node: 17108 | | **mte380\_01\_vertical\_mount\_01-Vertical Column-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0 mm  Node: 57 | 0.165054 mm  Node: 1657 | | **mte380\_01\_vertical\_mount\_01-Vertical Column-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 1.13291e-007  Element: 7463 | 0.000163039  Element: 5626 | | **mte380\_01\_vertical\_mount\_01-Vertical Column-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed Shape | | **mte380\_01\_vertical\_mount\_01-Vertical Column-Displacement-Displacement1{1}** | | |

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| Conclusion |