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|  | |  | | --- | | **Simulation of load cell**  **Date: Wednesday, November 23, 2016 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc467697479)  [Assumptions 2](#_Toc467697480)  [Model Information 2](#_Toc467697481)  [Study Properties 3](#_Toc467697482)  [Units 3](#_Toc467697483)  [Material Properties 4](#_Toc467697484)  [Loads and Fixtures 5](#_Toc467697485)  [Connector Definitions 5](#_Toc467697486)  [Contact Information 6](#_Toc467697487)  [Mesh information 7](#_Toc467697488)  [Sensor Details 8](#_Toc467697489)  [Resultant Forces 8](#_Toc467697490)  [Beams 8](#_Toc467697491)  [Study Results 9](#_Toc467697492)  [Conclusion 14](#_Toc467697493) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** load cell**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Cut-Extrude1** | **Solid Body** | ****Mass:0.0984925 kg****  ****Volume:3.67509e-005 m^3****  ****Density:2680 kg/m^3****  ****Weight:0.965227 N**** | ****C:\Users\mbd\Documents\GitHub\drone\_test\_platform\load cell.SLDPRT****  **Nov 23 19:45:50 2016** | |

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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: | h-Adaptive | | Result folder | SOLIDWORKS document (C:\Users\Patrick\Documents\GitHub\drone\_test\_platform) |  h-Adaptive Options  |  |  | | --- | --- | | Target accuracy | 99 % | | Accuracy bias | 93 | | Maximum no. of loops | 4 | | Mesh coarsening | Off | |

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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:**** | **5052-H34** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **2.15e+008 N/m^2** | | ****Tensile strength:**** | **2.6e+008 N/m^2** | | ****Elastic modulus:**** | **7e+010 N/m^2** | | ****Poisson's ratio:**** | **0.33** | | ****Mass density:**** | **2680 kg/m^3** | | ****Shear modulus:**** | **2.59e+010 N/m^2** | | ****Thermal expansion coefficient:**** | **2.4e-005 /Kelvin** | | **SolidBody 1(Cut-Extrude1)(load cell)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **8 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-0.0101633** | **-66.6685** | **0.0389021** | **66.6685** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Torque-1** |  | |  |  | | --- | --- | | Entities: | **4 face(s)** | | Reference: | **Face< 1 >** | | Type: | **Apply torque** | | Value: | **60 lbf.in** | | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply normal force** | | Value: | **15 lbf** | | |

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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: | Curvature based mesh | | Jacobian points | 4 Points | | Maximum element size | 0.179802 in | | Minimum element size | 0.0599335 in | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 131732 | | Total Elements | 83693 | | Maximum Aspect Ratio | 14.034 | | % of elements with Aspect Ratio < 3 | 98.4 | | % of elements with Aspect Ratio > 10 | 0.00936 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:02 | | Computer name: | PATRICK-LAPTOP | |  | | |

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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 | -0.0101633 | -66.6685 | 0.0389021 | 66.6685 |  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 | 13916.1 N/m^2  Node: 22082 | 4.64524e+007 N/m^2  Node: 39760 | | **load cell-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0 mm  Node: 1220 | 0.0231112 mm  Node: 1079 | | **load cell-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 4.50435e-007  Element: 65117 | 0.000572985  Element: 63517 | | **load cell-Static 1-Strain-Strain1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain2 | EPSY: Y Normal Strain | -0.000187044  Node: 85 | 0.000186614  Node: 19798 | | **load cell-Static 1-Strain-Strain2** | | | |  |  | | --- | |  | | **strain** |  |  | | --- | |  | | **displacement** |  |  | | --- | |  | | **strain** | |

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| Conclusion |