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|  | |  | | --- | | **Simulation of LandingLegAssem2**  **Date: Tuesday, April 12, 2022 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc100663463)  [Assumptions 2](#_Toc100663464)  [Model Information 2](#_Toc100663465)  [Study Properties 3](#_Toc100663466)  [Units 3](#_Toc100663467)  [Material Properties 4](#_Toc100663468)  [Loads and Fixtures 4](#_Toc100663469)  [Connector Definitions 5](#_Toc100663470)  [Contact Information 5](#_Toc100663471)  [Mesh information 6](#_Toc100663472)  [Sensor Details 7](#_Toc100663473)  [Resultant Forces 8](#_Toc100663474)  [Beams 8](#_Toc100663475)  [Study Results 9](#_Toc100663476)  [Conclusion 11](#_Toc100663477) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** LandingLegAssem2**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Fillet4** | **Solid Body** | ****Mass:191.619 kg****  ****Volume:0.0684353 m^3****  ****Density:2,800 kg/m^3****  ****Weight:1,877.86 N**** | ****\\austin.utexas.edu\disk\engrstu\ase\sp45545\My Documents\AIAA\_Space\_Design\_Competition\_2021\CAD\Landing Legs\Foot.SLDPRT****  **Feb 22 13:07:28 2022** | | **Cut-Extrude7** | **Solid Body** | ****Mass:173.143 kg****  ****Volume:0.0618369 m^3****  ****Density:2,800 kg/m^3****  ****Weight:1,696.8 N**** | ****\\austin.utexas.edu\disk\engrstu\ase\sp45545\My Documents\AIAA\_Space\_Design\_Competition\_2021\CAD\Landing Legs\leg1.SLDPRT****  **Apr 12 13:30:05 2022** | |

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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 | On | | Compute free body forces | On | | Friction | Off | | Use Adaptive Method: | Off | | Result folder | SOLIDWORKS document (\\austin.utexas.edu\disk\engrstu\ase\sp45545\My Documents\AIAA\_Space\_Design\_Competition\_2021\CAD\Landing Legs) | |

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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:**** | **2014 Alloy** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **9.65098e+07 N/m^2** | | ****Tensile strength:**** | **1.65445e+08 N/m^2** | | ****Elastic modulus:**** | **7.3e+10 N/m^2** | | ****Poisson's ratio:**** | **0.33** | | ****Mass density:**** | **2,800 kg/m^3** | | ****Shear modulus:**** | **2.8e+10 N/m^2** | | ****Thermal expansion coefficient:**** | **2.3e-05 /Kelvin** | | **SolidBody 1(Fillet4)(Foot-1),**  **SolidBody 1(Cut-Extrude7)(leg1-1)** | | **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)** | **-0.00146484** | **-1,600** | **-0.000244141** | **1,600** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply normal force** | | Value: | **1,600 N** | | |

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| Connector Definitions No Data |

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| Contact Information  | Contact | Contact Image | Contact Properties | | --- | --- | --- | | Global Contact |  | |  |  | | --- | --- | | Type: | **Bonded** | | Components: | **1 component(s)** | | Options: | **Incompatible 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 for High quality mesh | 16 Points | | Element Size | 0.0506966 m | | Tolerance | 0.00253483 m | | Mesh Quality | High | | Remesh failed parts with incompatible mesh | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 15726 | | Total Elements | 8971 | | Maximum Aspect Ratio | 52.905 | | % of elements with Aspect Ratio < 3 | 94.7 | | Percentage of elements with Aspect Ratio > 10 | 0.111 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:02 | | Computer name: | ASE-LRC-F3 | |  | | |

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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 | -0.00146484 | -1,600 | -0.000244141 | 1,600 |  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 | 0 | 0 | 0 |  Free body 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 | 1.535e+03N/m^2  Node: 6068 | 5.513e+07N/m^2  Node: 10227 | | **LandingLegAssem2-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mm  Node: 7563 | 2.175e+01mm  Node: 6087 | | **LandingLegAssem2-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 2.044e-08  Element: 3899 | 3.740e-04  Element: 6221 | | **LandingLegAssem2-Static 1-Strain-Strain1** | | | |  |  | | --- | |  | | **Image-1** | |

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| Conclusion |