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|  | |  | | --- | | **Simulation of EASE\_Assembly**  **Date: Sunday, December 6, 2020 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc58186397)  [Assumptions 2](#_Toc58186398)  [Model Information 2](#_Toc58186399)  [Study Properties 3](#_Toc58186400)  [Units 4](#_Toc58186401)  [Material Properties 4](#_Toc58186402)  [Loads and Fixtures 5](#_Toc58186403)  [Connector Definitions 5](#_Toc58186404)  [Contact Information 6](#_Toc58186405)  [Mesh information 7](#_Toc58186406)  [Sensor Details 8](#_Toc58186407)  [Resultant Forces 8](#_Toc58186408)  [Beams 8](#_Toc58186409)  [Study Results 9](#_Toc58186410)  [Conclusion 12](#_Toc58186411) | |
| Description No Data |

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| Assumptions  |  |  | | --- | --- | | Original Model | Model Analyzed | |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** EASE\_Assembly**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Fillet2** | **Solid Body** | ****Mass:0.407647 kg****  ****Volume:0.000196362 m^3****  ****Density:2,075.99 kg/m^3****  ****Weight:3.99494 N**** | ****C:\Users\luisa\Documents\GrabCAD\Lunar Dust Challenge\EASE\Mechanical\_Components\EASE\_Bottom\_Plate.SLDPRT****  **Dec 6 22:13:43 2020** | | **Split Line1** | **Solid Body** | ****Mass:0.190661 kg****  ****Volume:9.18408e-05 m^3****  ****Density:2,075.99 kg/m^3****  ****Weight:1.86848 N**** | ****C:\Users\luisa\Documents\GrabCAD\Lunar Dust Challenge\EASE\Mechanical\_Components\EASE\_Top\_Plate.SLDPRT****  **Dec 6 22:13:42 2020** | |

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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\luisa\Documents\GrabCAD\Lunar Dust Challenge\EASE) | |

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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:**** | **99.5% Aluminum Oxide** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Mohr-Coulomb Stress** | | ****Yield strength:**** | **2.17185e+07 N/m^2** | | ****Tensile strength:**** | **2.17185e+07 N/m^2** | | ****Compressive strength:**** | **2.99922e+07 N/m^2** | | ****Elastic modulus:**** | **3e+11 N/m^2** | | ****Poisson's ratio:**** | **0.22** | | ****Mass density:**** | **2,075.99 kg/m^3** | | ****Thermal expansion coefficient:**** | **8e-06 /Kelvin** | | **SolidBody 1(Fillet2)(EASE\_Bottom\_Plate-1),**  **SolidBody 1(Split Line1)(EASE\_Top\_Plate-1)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **17 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-2.08813e-06** | **270** | **7.51673e-06** | **270** | | **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: | **270 N** | | |

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| Connector Definitions No Data |

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| Contact Information  | Contact | Contact Image | Contact Properties | | --- | --- | --- | | Contact Set-1 |  | |  |  | | --- | --- | | Type: | **No Penetration contact pair** | | Entities: | **46 face(s)** | | Advanced: | **Node to surface** | | | ****Contact/Friction force****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Contact Force(N)** | **0** | **2.7889E-19** | **0** | **2.7889E-19** | | | | | Global Contact |  | |  |  | | --- | --- | | Type: | **Bonded** | | Components: | **1 component(s)** | | Options: | **Compatible mesh** | | |

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| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Blended curvature-based mesh | | Jacobian points | 4 Points | | Maximum element size | 0.833764 in | | Minimum element size | 0.166753 in | | Mesh Quality Plot | High | | Remesh failed parts with incompatible mesh | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 111699 | | Total Elements | 68056 | | Maximum Aspect Ratio | 80.558 | | % of elements with Aspect Ratio < 3 | 17.3 | | % of elements with Aspect Ratio > 10 | 31.6 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:34 | | Computer name: |  |  Mesh Quality Plots  | Name | Type | Min | Max | | --- | --- | --- | --- | | Mesh Quality Plot1 | Aspect Ratio | 1.103e+00  Element: 17345 | 8.056e+01  Element: 61124 | | **EASE\_Assembly-Static 1-Mesh Quality Plot-Mesh Quality Plot1** | | | | |

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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 | -2.08813e-06 | 270 | 7.51673e-06 | 270 |  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 | 7.767e+00 N/m^2  Node: 8509 | 6.344e+06 N/m^2  Node: 110679 | | **EASE\_Assembly-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00 mm  Node: 4 | 6.447e-03 mm  Node: 38494 | | **EASE\_Assembly-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 2.706e-11  Element: 12054 | 1.568e-05  Element: 67159 | | **EASE\_Assembly-Static 1-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **EASE\_Assembly-Static 1-Displacement-Displacement1{1}** | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Automatic | 3.026e+00  Node: 11411 | 2.830e+06  Node: 115 | | **EASE\_Assembly-Static 1-Factor of Safety-Factor of Safety1** | | | | |

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| Conclusion |