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|  | |  | | --- | | **Simulation of Tensile Specimen- D638.stp**  **Date: Friday, May 2, 2025 Designer: Solidworks**  **Study name: Static PLA 500**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc197078802)  [Assumptions 2](#_Toc197078803)  [Model Information 2](#_Toc197078804)  [Study Properties 3](#_Toc197078805)  [Units 3](#_Toc197078806)  [Material Properties 4](#_Toc197078807)  [Loads and Fixtures 4](#_Toc197078808)  [Connector Definitions 5](#_Toc197078809)  [Interaction Information 5](#_Toc197078810)  [Mesh information 5](#_Toc197078811)  [Sensor Details 5](#_Toc197078812)  [Resultant Forces 6](#_Toc197078813)  [Beams 6](#_Toc197078814)  [Study Results 7](#_Toc197078815)  [Conclusion 9](#_Toc197078816) | |
| Description Static Analysis of ASTM D638  Force - 500 N  Material - ABS |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** Tensile Specimen- D638.stp**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Tensile Specimen- D638.stp<1>** | **Solid Body** | ****Mass:0.00911989 kg****  ****Volume:8.94107e-06 m^3****  ****Density:1,020 kg/m^3****  ****Weight:0.089375 N**** | ****D:\Delta Zero\ASTM D638\Tensile Specimen- D638.stp.SLDPRT**** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Static PLA 500 | | 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 | Automatic | | 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 (D:\Delta Zero\ASTM D638) | |

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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:**** | **ABS** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Tensile strength:**** | **3e+07 N/m^2** | | ****Elastic modulus:**** | **2e+09 N/m^2** | | ****Poisson's ratio:**** | **0.394** | | ****Mass density:**** | **1,020 kg/m^3** | | ****Shear modulus:**** | **3.189e+08 N/m^2** | | **SolidBody 1(Tensile Specimen- D638.stp<1>)(Tensile Specimen- D638.stp)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-2** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-0.000886589** | **-0.000962514** | **500.005** | **500.005** | | **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: | **-500 N** | | |

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| Connector Definitions No Data |

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| Interaction Information No Data |

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| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Blended curvature-based mesh | | Jacobian points for High quality mesh | 16 Points | | Maximum element size | 1.03817 mm | | Minimum element size | 1.03817 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 111831 | | Total Elements | 72640 | | Maximum Aspect Ratio | 3.296 | | % of elements with Aspect Ratio < 3 | 100 | | Percentage of elements with Aspect Ratio > 10 | 0 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:02 | | Computer name: | SYSTEEEM | |

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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 | -0.000886589 | -0.000962514 | 500.005 | 500.005 |  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 | -0.0265844 | -0.0442116 | -0.000604971 | 0.0515923 |  Free body moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 0 | 0 | 0 | 1e-33 | |

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| Beams No Data |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 2.403e+06N/m^2  Node: 98312 | 1.438e+07N/m^2  Node: 6 | | **Tensile Specimen- D638.stp-Static PLA 500-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mm  Node: 5 | 9.384e-01mm  Node: 15 | | **Tensile Specimen- D638.stp-Static PLA 500-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 1.444e-03  Element: 55553 | 6.163e-03  Element: 17260 | | **Tensile Specimen- D638.stp-Static PLA 500-Strain-Strain1** | | | | |

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| Conclusion |