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|  | |  | | --- | | **Simulation of knee\_structure**  **Date: Monday, March 14, 2016 Designer: Jorge Rodriguez**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc445722710)  [Assumptions 2](#_Toc445722711)  [Model Information 2](#_Toc445722712)  [Study Properties 3](#_Toc445722713)  [Units 3](#_Toc445722714)  [Material Properties 4](#_Toc445722715)  [Loads and Fixtures 5](#_Toc445722716)  [Connector Definitions 5](#_Toc445722717)  [Contact Information 6](#_Toc445722718)  [Mesh Information 7](#_Toc445722719)  [Sensor Details 8](#_Toc445722720)  [Resultant Forces 9](#_Toc445722721)  [Beams 9](#_Toc445722722)  [Study Results 10](#_Toc445722723)  [Conclusion 13](#_Toc445722724) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** knee\_structure**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.0203042 kg****  ****Volume:1.26901e-005 m^3****  ****Density:1600 kg/m^3****  ****Weight:0.198982 N**** | ****D:\Drive\Projects\Legs\src\legs\_description\meshes\Iteration 1\structure\knee\_structure.SLDPRT****  **Mar 13 20:21:27 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 | Off | | Friction | Off | | Use Adaptive Method: | Off | | Result folder | SolidWorks document (D:\Drive\Projects\Legs\src\legs\_description\meshes\Iteration 1\structure) | |

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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:**** | **Toray T700** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Tensile strength:**** | **4e+008 N/m^2** | | ****Compressive strength:**** | **3.5e+008 N/m^2** | | ****Elastic modulus:**** | **1.9e+010 N/m^2** | | ****Poisson's ratio:**** | **0.14** | | ****Mass density:**** | **1600 kg/m^3** | | ****Shear modulus:**** | **4.6e+009 N/m^2** | | **SolidBody 1(Boss-Extrude1)(knee\_structure)** | | **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)** | **0.0268427** | **0.0375519** | **-293.247** | **293.247** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Reference: | **Axis1** | | Type: | **Apply force** | | Values: | **---, ---, -293.3 N** | | |

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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 | 1.59686 mm | | Minimum element size | 1.59686 mm | | Mesh Quality | High |  Mesh Information - Details  |  |  | | --- | --- | | Total Nodes | 63496 | | Total Elements | 31816 | | Maximum Aspect Ratio | 7.2328 | | % of elements with Aspect Ratio < 3 | 99.1 | | % of elements with Aspect Ratio > 10 | 0 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:04 | | Computer name: | JORGE-WINDOWS | |  | |  Mesh Control Information:  | **Mesh Control Name** | **Mesh Control Image** | **Mesh Control Details** | | --- | --- | --- | | **Control-1** |  | |  |  | | --- | --- | | Entities: | **1 component(s)** | | Units: | **mm** | | Size: | **1.59686** | | Ratio: | **1.5** | | |

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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 | 0.0268427 | 0.0375519 | -293.247 | 293.247 |  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 | 1.7183e+006 N/m^2  Node: 38677 | 2.45927e+008 N/m^2  Node: 4900 | | **knee\_structure-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0 mm  Node: 42 | 18.6053 mm  Node: 19 | | **knee\_structure-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 7.96386e-005  Element: 28451 | 0.00900996  Element: 23735 | | **knee\_structure-Static 1-Strain-Strain1** | | | |  |  | | --- | |  | | **Image-1** | |

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| Conclusion |