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|  | |  | | --- | | **Simulation of 12mm**  **Date: Tuesday, 2 June 2015 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc421027820)  [Model Information 2](#_Toc421027821)  [Study Properties 3](#_Toc421027822)  [Units 3](#_Toc421027823)  [Material Properties 4](#_Toc421027824)  [Loads and Fixtures 4](#_Toc421027825)  [Connector Definitions 5](#_Toc421027826)  [Contact Information 5](#_Toc421027827)  [Mesh information 6](#_Toc421027828)  [Sensor Details 7](#_Toc421027829)  [Resultant Forces 7](#_Toc421027830)  [Beams 7](#_Toc421027831)  [Study Results 8](#_Toc421027832)  [Conclusion 10](#_Toc421027833) | |
| Description 12mm shaft with 9mm hollow section |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** 12mm**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.0388419 kg****  ****Volume:4.94801e-006 m^3****  ****Density:7850 kg/m^3****  ****Weight:0.38065 N**** | ****E:\CAD\Shaft proof\12mm.SLDPRT****  **Jun 02 16:53:40 2015** | |

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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 (E:\CAD\Shaft proof) | |

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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:**** | **AISI 4340 Steel, normalized** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **7.1e+008 N/m^2** | | ****Tensile strength:**** | **1.11e+009 N/m^2** | | ****Elastic modulus:**** | **2.05e+011 N/m^2** | | ****Poisson's ratio:**** | **0.32** | | ****Mass density:**** | **7850 kg/m^3** | | ****Shear modulus:**** | **8e+010 N/m^2** | | ****Thermal expansion coefficient:**** | **1.2e-005 /Kelvin** | | **SolidBody 1(Boss-Extrude1)(Part2)** | | **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)** | **-500.036** | **-0.072588** | **-0.0358565** | **500.036** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Reference: | **Face< 1 >** | | Type: | **Apply force** | | Values: | **500, ---, --- 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 | 0 mm | | Minimum element size | 0 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 13960 | | Total Elements | 6963 | | Maximum Aspect Ratio | 3.6242 | | % 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): | 00:00:01 | | Computer name: | SAKKARIN-PC | |  | | |

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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 | -500.036 | -0.072588 | -0.0358565 | 500.036 |  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 | 3.98747 N/mm^2 (MPa)  Node: 6176 | 439.443 N/mm^2 (MPa)  Node: 3108 | | **12mm-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0 mm  Node: 1 | 1.1896 mm  Node: 1680 | | **12mm-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 1.33067e-005  Element: 6181 | 0.00173162  Element: 6341 | | **12mm-Static 1-Strain-Strain1** | | | | |

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| Conclusion |