|  |  |  |  |
| --- | --- | --- | --- |
|  | |  | | --- | | **Simulation of shaft4**  **Date: 23 فبراير, 2016 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc443994936)  [Assumptions 2](#_Toc443994937)  [Model Information 2](#_Toc443994938)  [Study Properties 3](#_Toc443994939)  [Units 3](#_Toc443994940)  [Material Properties 4](#_Toc443994941)  [Loads and Fixtures 5](#_Toc443994942)  [Connector Definitions 6](#_Toc443994943)  [Contact Information 6](#_Toc443994944)  [Mesh information 7](#_Toc443994945)  [Sensor Details 8](#_Toc443994946)  [Resultant Forces 8](#_Toc443994947)  [Beams 8](#_Toc443994948)  [Study Results 9](#_Toc443994949)  [Conclusion 11](#_Toc443994950) | |
| Description No Data |

|  |
| --- |
| Assumptions |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** shaft4**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Cut-Extrude2** | **Solid Body** | ****Mass:1.82715 kg****  ****Volume:0.00023252 m^3****  ****Density:7858 kg/m^3****  ****Weight:17.906 N**** | ****E:\SolidWork\Project\shaft4.SLDPRT****  **Feb 23 03:39:04 2016** | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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:\SolidWork\Project) | |

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Units  |  |  | | --- | --- | | Unit system: | SI (MKS) | | Length/Displacement | mm | | Temperature | Kelvin | | Angular velocity | Rad/sec | | Pressure/Stress | N/m^2 | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Material Properties  |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Properties**** | ****Components**** | |  | |  |  | | --- | --- | | ****Name:**** | **1023 Carbon Steel Sheet (SS)** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **2.82685e+008 N/m^2** | | ****Tensile strength:**** | **4.25e+008 N/m^2** | | ****Elastic modulus:**** | **2.05e+011 N/m^2** | | ****Poisson's ratio:**** | **0.29** | | ****Mass density:**** | **7858 kg/m^3** | | ****Shear modulus:**** | **8e+010 N/m^2** | | ****Thermal expansion coefficient:**** | **1.2e-005 /Kelvin** | | **SolidBody 1(Cut-Extrude2)(shaft4)** | | **Curve Data:N/A** | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **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)** | **-0.00891386** | **-0.229652** | **1.88111** | **1.8951** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Torque-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Reference: | **Axis1** | | Type: | **Apply torque** | | Value: | **1 N.m** | | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **3 face(s)** | | Type: | **Apply normal force** | | Value: | **1 N** | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Connector Definitions **Pin/Bolt/Bearing Connector**   |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Connector Details**** | ****Strength Details**** | | ****Bearing Support-1**** | |  |  | | --- | --- | | ****Entities:**** | **1 face(s)** | | ****Type:**** | **Bearing** | | **No Data** | | ****Connector Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.037115** | **-0** | **-0** | **-0.037115** | | **Shear Force (N)** | **0** | **0.87958** | **-7.319** | **7.3717** | | **Bending moment (N.m)** | **0** | **0** | **0** | **0** | | | | | ****Bearing Support-2**** | |  |  | | --- | --- | | ****Entities:**** | **1 face(s)** | | ****Type:**** | **Bearing** | | **No Data** | | ****Connector Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.046023** | **0** | **0** | **0.046023** | | **Shear Force (N)** | **0** | **0.35007** | **11.466** | **11.471** | | **Bending moment (N.m)** | **0** | **0** | **0** | **0** | | | | |

|  |
| --- |
| Contact Information No Data |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Standard mesh | | Automatic Transition: | Off | | Include Mesh Auto Loops: | Off | | Jacobian points | 4 Points | | Element Size | 6.15095 mm | | Tolerance | 0.307547 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 14447 | | Total Elements | 9339 | | Maximum Aspect Ratio | 7.4185 | | % of elements with Aspect Ratio < 3 | 95.1 | | % of elements with Aspect Ratio > 10 | 0 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:01 | | Computer name: | MONGOOSE-PC | |  | | |

|  |
| --- |
| Sensor Details No Data |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Resultant ForcesReaction forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N | -0.00891386 | -0.229652 | 1.88111 | 1.8951 |  Reaction Moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 0 | 0 | 0 | 0 | |
|  |

|  |
| --- |
| Beams No Data |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 54.2845 N/m^2  Node: 693 | 115296 N/m^2  Node: 10484 | | **shaft4-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0 mm  Node: 52 | 0.000100584 mm  Node: 588 | | **shaft4-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 3.67046e-010  Element: 3042 | 3.95121e-007  Element: 2126 | | **shaft4-Static 1-Strain-Strain1** | | | | |

|  |
| --- |
| Conclusion |