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|  | |  | | --- | | **Simulation of Schaft\_10x9**  **Date: 06.03.2020 Designer: Solidworks**  **Study name: Schaft\_10x9\_0N**  **Analysis type: Frequency** | | Table of Contents  [Description 1](#_Toc34391581)  [Assumptions 2](#_Toc34391582)  [Model Information 2](#_Toc34391583)  [Study Properties 3](#_Toc34391584)  [Units 3](#_Toc34391585)  [Material Properties 4](#_Toc34391586)  [Loads and Fixtures 4](#_Toc34391587)  [Connector Definitions 5](#_Toc34391588)  [Contact Information 5](#_Toc34391589)  [Mesh information 6](#_Toc34391590)  [Sensor Details 7](#_Toc34391591)  [Study Results 8](#_Toc34391592)  [Conclusion 13](#_Toc34391593) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** Schaft\_10x9**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Aufsatz-Linear austragen1** | **Solid Body** | ****Mass:0.0384107 kg****  ****Volume:4.92445e-06 m^3****  ****Density:7800 kg/m^3****  ****Weight:0.376425 N**** | ****C:\Users\sq437\Desktop\Masterarbeit\BauV2018\Schaft Ra10mm Ri9mm.SLDPRT****  **Mar 6 12:35:17 2020** | | **Rotation3** | **Solid Body** | ****Mass:0.0319783 kg****  ****Volume:4.09978e-06 m^3****  ****Density:7800 kg/m^3****  ****Weight:0.313387 N**** | ****C:\Users\sq437\Desktop\Masterarbeit\BauV2018\Stopfen Schaft Lagerung.SLDPRT****  **Mar 6 12:35:03 2020** | | **Cut-Extrude1** | **Solid Body** | ****Mass:0.0131297 kg****  ****Volume:1.6833e-06 m^3****  ****Density:7800 kg/m^3****  ****Weight:0.128671 N**** | ****C:\Users\sq437\Desktop\Masterarbeit\BauV2018\Stopfen Schaft Ringschraube\_ohne\_schrauben.SLDPRT****  **Mar 6 12:42:47 2020** | | **Fillet1** | **Solid Body** | ****Mass:0.00792918 kg****  ****Volume:1.09368e-06 m^3****  ****Density:7250 kg/m^3****  ****Weight:0.077706 N**** | ****C:\SOLIDWORKS Data\browser\DIN\bolts and screws\miscellaneous\eyebolt\_din.sldprt****  **Mar 6 12:38:14 2020** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Schaft\_10x9\_0N | | Analysis type | Frequency | | Mesh type | Solid Mesh | | Number of frequencies | 5 | | Solver type | FFEPlus | | Soft Spring: | Off | | Incompatible bonding options | Automatic | | Thermal option | Include temperature loads | | Zero strain temperature | 298 Kelvin | | Include fluid pressure effects from SOLIDWORKS Flow Simulation | Off | | Result folder | SOLIDWORKS document (C:\Users\sq437\Desktop\Masterarbeit\BauV2018) | |

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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:**** | **1.0114 (S235J0)** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **2.35e+08 N/m^2** | | ****Tensile strength:**** | **3.6e+08 N/m^2** | | ****Mass density:**** | **7800 kg/m^3** | | ****Elastic modulus:**** | **2.1e+11 N/m^2** | | ****Poisson's ratio:**** | **0.28** | | ****Thermal expansion coefficient:**** | **1.1e-05 /Kelvin** | | **SolidBody 1(Aufsatz-Linear austragen1)(Schaft Ra10mm Ri9mm-1),**  **SolidBody 1(Rotation3)(Stopfen Schaft Lagerung-1),**  **SolidBody 1(Cut-Extrude1)(Stopfen Schaft Ringschraube\_ohne\_schrauben-1)** | | **Curve Data:N/A** | | | |  | |  |  | | --- | --- | | ****Name:**** | **1.0420 (G200)** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **2e+08 N/m^2** | | ****Tensile strength:**** | **3.8e+08 N/m^2** | | ****Mass density:**** | **7250 kg/m^3** | | ****Elastic modulus:**** | **2.1e+11 N/m^2** | | ****Poisson's ratio:**** | **0.26** | | ****Thermal expansion coefficient:**** | **1.15e-05 /Kelvin** | | **SolidBody 1(Fillet1)(eyebolt\_din-1)** | | **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** | | |

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| Connector Definitions No Data |

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| Contact Information  | Contact | Contact Image | Contact Properties | | --- | --- | --- | | Global Contact |  | |  |  | | --- | --- | | Type: | **Bonded** | | Components: | **1 component(s)** | | Options: | **Compatible mesh** | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Standard mesh | | Automatic Transition: | Off | | Include Mesh Auto Loops: | Off | | Jacobian points | 4 Points | | Element Size | 1.54759 mm | | Tolerance | 0.0773796 mm | | Mesh Quality Plot | High | | Remesh failed parts with incompatible mesh | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 70017 | | Total Elements | 39100 | | Maximum Aspect Ratio | 11.159 | | % of elements with Aspect Ratio < 3 | 45.3 | | % of elements with Aspect Ratio > 10 | 0.0102 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:12 | | Computer name: | QX2021 | |  | | |

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| Sensor Details No Data |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Amplitude1 | AMPRES: Resultant Amplitude Plot for Mode Shape: 1(Value = 52.4792 Hz) | 0.000e+00  Node: 50677 | 6.344e+00  Node: 66820 | | **Schaft\_10x9-Schaft\_10x9\_0N-Amplitude-Amplitude1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Amplitude2 | AMPRES: Resultant Amplitude Plot for Mode Shape: 2(Value = 52.4803 Hz) | 0.000e+00  Node: 50677 | 6.344e+00  Node: 66820 | | **Schaft\_10x9-Schaft\_10x9\_0N-Amplitude-Amplitude2** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Amplitude3 | AMPRES: Resultant Amplitude Plot for Mode Shape: 3(Value = 442.372 Hz) | 0.000e+00  Node: 50677 | 7.400e+00  Node: 11642 | | **Schaft\_10x9-Schaft\_10x9\_0N-Amplitude-Amplitude3** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Amplitude4 | AMPRES: Resultant Amplitude Plot for Mode Shape: 4(Value = 442.445 Hz) | 0.000e+00  Node: 50677 | 7.401e+00  Node: 15959 | | **Schaft\_10x9-Schaft\_10x9\_0N-Amplitude-Amplitude4** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Amplitude5 | AMPRES: Resultant Amplitude Plot for Mode Shape: 5(Value = 1308.55 Hz) | 0.000e+00  Node: 50677 | 7.582e+00  Node: 13078 | | **Schaft\_10x9-Schaft\_10x9\_0N-Amplitude-Amplitude5** | | | |   **Mode List**   | ****Frequency Number**** | ****Rad/sec**** | ****Hertz**** | ****Seconds**** | | --- | --- | --- | --- | | **1** | **329.74** | **52.479** | **0.019055** | | **2** | **329.74** | **52.48** | **0.019055** | | **3** | **2779.5** | **442.37** | **0.0022605** | | **4** | **2780** | **442.44** | **0.0022602** | | **5** | **8221.9** | **1308.6** | **0.0007642** |   **Mass Participation (Normalized)**   | ****Mode Number**** | ****Frequency(Hertz)**** | ****X direction**** | ****Y direction**** | ****Z direction**** | | --- | --- | --- | --- | --- | | **1** | **52.479** | **0.44607** | **1.8758e-13** | **0.0038504** | | **2** | **52.48** | **0.0038505** | **3.8482e-14** | **0.44608** | | **3** | **442.37** | **0.09809** | **4.6961e-11** | **6.5658e-05** | | **4** | **442.44** | **6.5679e-05** | **5.2227e-12** | **0.098095** | | **5** | **1308.6** | **0.034248** | **1.6354e-10** | **9.8073e-06** | |  |  | **Sum X = 0.58232** | **Sum Y = 2.1595e-10** | **Sum Z = 0.5481** | |

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| Conclusion |