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|  | |  | | --- | | **Simulation of center**  **Date: Tuesday, December 17, 2024 Designer: Mohammadali Rashidioun, Roberto Torres**  **Study name: Finite element analysis of Dockign mechanism initial design**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc185354691)  [Assumptions 2](#_Toc185354692)  [Model Information 3](#_Toc185354693)  [Study Properties 5](#_Toc185354694)  [Units 6](#_Toc185354695)  [Material Properties 6](#_Toc185354696)  [Loads and Fixtures 7](#_Toc185354697)  [Connector Definitions 8](#_Toc185354698)  [Interaction Information 12](#_Toc185354699)  [Mesh information 13](#_Toc185354700)  [Sensor Details 14](#_Toc185354701)  [Resultant Forces 15](#_Toc185354702)  [Beams 15](#_Toc185354703)  [Study Results 16](#_Toc185354704)  [Conclusion 18](#_Toc185354705) | |
| Description No Data |

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| --- |
| Assumptions |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model Information  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** center**  ****Current Configuration:** Default** | | | | | | | | ****Solid Bodies**** | | | | | | | | ****Document Name and Reference**** | ****Treated As**** | | ****Volumetric Properties**** | | ****Document Path/Date Modified**** | | | **Cut-Extrude3** | **Solid Body** | | ****Mass:0.626892 kg****  ****Volume:0.000501514 m^3****  ****Density:1,250 kg/m^3****  ****Weight:6.14354 N**** | | ****C:\Users\Arman\Desktop\Phd courses\CADFINAL\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part A.SLDPRT****  **Dec 16 18:39:49 2024** | | | **Cut-Extrude3** | | **Solid Body** | | **Mass:0.626892 kg**  **Volume:0.000501514 m^3**  **Density:1,250 kg/m^3**  **Weight:6.14354 N** | | **C:\Users\Arman\Desktop\Phd courses\CADFINAL\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part A.SLDPRT**  **Dec 16 18:39:49 2024** | | **Boss-Extrude1** | | **Solid Body** | | **Mass:0.0188776 kg**  **Volume:1.51021e-05 m^3**  **Density:1,250 kg/m^3**  **Weight:0.185 N** | | **C:\Users\Arman\Desktop\Phd courses\CADFINAL\optimized design\intitial Design-Roberto Torres-Mohammadali Rashidioun\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part B.SLDPRT**  **Dec 16 18:27:57 2024** | | **Boss-Extrude1** | | **Solid Body** | | **Mass:0.0188776 kg**  **Volume:1.51021e-05 m^3**  **Density:1,250 kg/m^3**  **Weight:0.185 N** | | **C:\Users\Arman\Desktop\Phd courses\CADFINAL\optimized design\intitial Design-Roberto Torres-Mohammadali Rashidioun\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part B.SLDPRT**  **Dec 16 18:27:57 2024** | | **Mirror1** | | **Solid Body** | | **Mass:0.302353 kg**  **Volume:0.000241883 m^3**  **Density:1,250 kg/m^3**  **Weight:2.96306 N** | | **C:\Users\Arman\Desktop\Phd courses\CADFINAL\optimized design\intitial Design-Roberto Torres-Mohammadali Rashidioun\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part C\_1.SLDPRT**  **Dec 16 18:27:57 2024** | | **Mirror1** | **Solid Body** | | ****Mass:0.484084 kg****  ****Volume:0.000387267 m^3****  ****Density:1,250 kg/m^3****  ****Weight:4.74402 N**** | | ****C:\Users\Arman\Desktop\Phd courses\CADFINAL\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part C\_2.SLDPRT****  **Dec 16 18:39:48 2024** | | |

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| Study Properties  |  |  | | --- | --- | | Study name | Static 1-fineMesh | | 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 (C:\Users\Arman\Desktop\Phd courses\CADFINAL\intitial Design-Roberto Torres-Mohammadali Rashidioun) | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Units  |  |  | | --- | --- | | Unit system: | SI (MKS) | | Length/Displacement | in | | Temperature | Kelvin | | Angular velocity | Rad/sec | | Pressure/Stress | psi | |

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| Material Properties  |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Properties**** | ****Components**** | |  | |  |  | | --- | --- | | ****Name:**** | **PLA** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **8,702.26 psi** | | ****Tensile strength:**** | **7,251.89 psi** | | ****Compressive strength:**** | **2,600 psi** | | ****Elastic modulus:**** | **507,632 psi** | | ****Poisson's ratio:**** | **0.35** | | ****Mass density:**** | **0.0451591 lb/in^3** | | ****Shear modulus:**** | **348,091 psi** | | **SolidBody 1(Cut-Extrude3)(Part A-2),**  **SolidBody 1(Cut-Extrude3)(Part A-3),**  **SolidBody 1(Boss-Extrude1)(Part B-3),**  **SolidBody 1(Boss-Extrude1)(Part B-4),**  **SolidBody 1(Mirror1)(Part C\_1-1),**  **SolidBody 1(Mirror1)(Part C\_2-1)** | | **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)** | **-0.00120345** | **7.61637** | **-0.00582237** | **7.61637** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | | | **Fixed Hinge-3** |  | |  |  | | --- | --- | | Entities: | **6 face(s)** | | Type: | **Fixed Hinge** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-0.013711** | **-9.47799** | **-0.00898058** | **9.47801** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **2 face(s)** | | Type: | **Apply normal force** | | Value: | **50 N** | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Connector Definitions **Pin/Bolt/Bearing Connector**   |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Connector Details**** | ****Strength Details**** | | ****Pin Connector-7**** | |  |  | | --- | --- | | ****Entities:**** | **3 face(s)** | | ****Type:**** | **Pin** | | ****With retaining ring (No translation):**** | **Yes** | | ****With key (No rotation):**** | **No** | | ****Connection Type:**** | **Distributed** | | ****Units:**** | **SI** | | ****Rotational stiffness value:**** | **0** | | **No Data** | | ****Connector Forces Joint 1****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.02626** | **0** | **0** | **0.02626** | | **Shear Force (N)** | **0** | **-1.5554** | **-0.33351** | **1.5908** | | **Torque (N.m)** | **-1.1691e-13** | **0** | **0** | **1.1691e-13** | | **Bending moment (N.m)** | **0** | **-0.00028687** | **0.00072923** | **0.00078362** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.02626** | **0** | **0** | **0.02626** | | **Shear Force (N)** | **0** | **-1.5554** | **-0.33351** | **1.5908** | | **Torque (N.m)** | **-4.7569e-13** | **0** | **0** | **4.7569e-13** | | **Bending moment (N.m)** | **0** | **-0.0022456** | **0.011082** | **0.011307** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.019635** | **-0** | **-0** | **-0.019635** | | **Shear Force (N)** | **0** | **-1.5462** | **-0.33112** | **1.5812** | | **Torque (N.m)** | **-1.1667e-13** | **0** | **0** | **1.1667e-13** | | **Bending moment (N.m)** | **0** | **0.0002609** | **-0.00062169** | **0.00067422** | | | | | ****Pin Connector-8**** | |  |  | | --- | --- | | ****Entities:**** | **3 face(s)** | | ****Type:**** | **Pin** | | ****With retaining ring (No translation):**** | **Yes** | | ****With key (No rotation):**** | **No** | | ****Connection Type:**** | **Distributed** | | ****Units:**** | **SI** | | ****Rotational stiffness value:**** | **0** | | **No Data** | | ****Connector Forces Joint 1****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.024386** | **0** | **0** | **0.024386** | | **Shear Force (N)** | **0** | **-1.5397** | **0.31763** | **1.5721** | | **Torque (N.m)** | **1.1666e-13** | **-0** | **-0** | **-1.1666e-13** | | **Bending moment (N.m)** | **0** | **0.00024089** | **0.00077478** | **0.00081136** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.017535** | **0** | **0** | **0.017535** | | **Shear Force (N)** | **0** | **1.5352** | **-0.32606** | **1.5695** | | **Torque (N.m)** | **4.7161e-13** | **-0** | **-0** | **-4.7161e-13** | | **Bending moment (N.m)** | **0** | **-0.0021932** | **-0.010941** | **0.011159** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.017535** | **-0** | **-0** | **-0.017535** | | **Shear Force (N)** | **0** | **-1.5352** | **0.32606** | **1.5695** | | **Torque (N.m)** | **1.1674e-13** | **-0** | **-0** | **-1.1674e-13** | | **Bending moment (N.m)** | **0** | **-0.00026073** | **-0.00061313** | **0.00066627** | | | | | ****Pin Connector-9**** | |  |  | | --- | --- | | ****Entities:**** | **3 face(s)** | | ****Type:**** | **Pin** | | ****With retaining ring (No translation):**** | **Yes** | | ****With key (No rotation):**** | **No** | | ****Connection Type:**** | **Distributed** | | ****Units:**** | **SI** | | ****Rotational stiffness value:**** | **0** | | **No Data** | | ****Connector Forces Joint 1****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.0069123** | **0** | **0** | **0.0069123** | | **Shear Force (N)** | **0** | **-0.13118** | **0.26722** | **0.29768** | | **Torque (N.m)** | **4.2521e-14** | **0** | **0** | **4.2521e-14** | | **Bending moment (N.m)** | **0** | **2.4828e-05** | **1.6379e-05** | **2.9744e-05** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.0076038** | **0** | **0** | **0.0076038** | | **Shear Force (N)** | **0** | **0.13155** | **-0.26746** | **0.29806** | | **Torque (N.m)** | **6.2956e-15** | **0** | **0** | **6.2956e-15** | | **Bending moment (N.m)** | **0** | **0.0020338** | **0.0010059** | **0.002269** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.0076038** | **-0** | **-0** | **-0.0076038** | | **Shear Force (N)** | **0** | **-0.13155** | **0.26746** | **0.29806** | | **Torque (N.m)** | **4.2554e-14** | **0** | **0** | **4.2554e-14** | | **Bending moment (N.m)** | **0** | **-6.6369e-06** | **-8.8432e-06** | **1.1057e-05** | | | | | ****Pin Connector-10**** | |  |  | | --- | --- | | ****Entities:**** | **3 face(s)** | | ****Type:**** | **Pin** | | ****With retaining ring (No translation):**** | **Yes** | | ****With key (No rotation):**** | **No** | | ****Connection Type:**** | **Distributed** | | ****Units:**** | **SI** | | ****Rotational stiffness value:**** | **0** | | **No Data** | | ****Connector Forces Joint 1****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.0070726** | **0** | **0** | **0.0070726** | | **Shear Force (N)** | **0** | **-0.13119** | **-0.26745** | **0.29789** | | **Torque (N.m)** | **-4.2267e-14** | **0** | **0** | **4.2267e-14** | | **Bending moment (N.m)** | **0** | **4.3906e-06** | **-6.9151e-06** | **8.1912e-06** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.0075674** | **0** | **0** | **0.0075674** | | **Shear Force (N)** | **0** | **0.13141** | **0.26794** | **0.29843** | | **Torque (N.m)** | **-6.003e-15** | **0** | **0** | **6.003e-15** | | **Bending moment (N.m)** | **0** | **0.0020351** | **-0.0010044** | **0.0022695** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.0075674** | **-0** | **-0** | **-0.0075674** | | **Shear Force (N)** | **0** | **-0.13141** | **-0.26794** | **0.29843** | | **Torque (N.m)** | **-4.228e-14** | **0** | **0** | **4.228e-14** | | **Bending moment (N.m)** | **0** | **-4.8278e-05** | **2.9987e-05** | **5.6833e-05** | | | | | ****Pin Connector-11**** | |  |  | | --- | --- | | ****Entities:**** | **3 face(s)** | | ****Type:**** | **Pin** | | ****With retaining ring (No translation):**** | **Yes** | | ****With key (No rotation):**** | **No** | | ****Connection Type:**** | **Distributed** | | ****Units:**** | **SI** | | ****Rotational stiffness value:**** | **0** | | **No Data** | | ****Connector Forces Joint 1****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **1.0129** | **0** | **0** | **1.0129** | | **Shear Force (N)** | **0** | **50.652** | **-19.489** | **54.272** | | **Torque (N.m)** | **-3.5098e-12** | **-0** | **-0** | **-3.5098e-12** | | **Bending moment (N.m)** | **0** | **0.0030949** | **0.0033345** | **0.0045495** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **1.0138** | **0** | **0** | **1.0138** | | **Shear Force (N)** | **0** | **-50.656** | **19.492** | **54.277** | | **Torque (N.m)** | **8.9324e-14** | **0** | **0** | **8.9324e-14** | | **Bending moment (N.m)** | **0** | **-0.1431** | **-0.37661** | **0.40288** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-1.0138** | **-0** | **-0** | **-1.0138** | | **Shear Force (N)** | **0** | **50.656** | **-19.492** | **54.277** | | **Torque (N.m)** | **-3.5119e-12** | **-0** | **-0** | **-3.5119e-12** | | **Bending moment (N.m)** | **0** | **-0.0030199** | **-0.0031207** | **0.0043427** | | | | | ****Pin Connector-12**** | |  |  | | --- | --- | | ****Entities:**** | **3 face(s)** | | ****Type:**** | **Pin** | | ****With retaining ring (No translation):**** | **Yes** | | ****With key (No rotation):**** | **No** | | ****Connection Type:**** | **Distributed** | | ****Units:**** | **SI** | | ****Rotational stiffness value:**** | **0** | | **No Data** | | ****Connector Forces Joint 1****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **1.0463** | **0** | **0** | **1.0463** | | **Shear Force (N)** | **0** | **50.666** | **19.5** | **54.288** | | **Torque (N.m)** | **3.5111e-12** | **0** | **0** | **3.5111e-12** | | **Bending moment (N.m)** | **0** | **-0.0029806** | **0.0030181** | **0.0042418** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **1.0463** | **0** | **0** | **1.0463** | | **Shear Force (N)** | **0** | **50.666** | **19.5** | **54.288** | | **Torque (N.m)** | **-8.6735e-14** | **-0** | **-0** | **-8.6735e-14** | | **Bending moment (N.m)** | **0** | **-0.14311** | **0.37657** | **0.40284** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-1.0467** | **-0** | **-0** | **-1.0467** | | **Shear Force (N)** | **0** | **50.649** | **19.483** | **54.267** | | **Torque (N.m)** | **3.5119e-12** | **0** | **0** | **3.5119e-12** | | **Bending moment (N.m)** | **0** | **0.0030907** | **-0.003297** | **0.0045192** | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Blended curvature-based mesh | | Jacobian points for High quality mesh | 16 Points | | Maximum element size | 5.5455 mm | | Minimum element size | 0.568629 mm | | Mesh Quality | High | | Remesh failed parts independently | Off | | Reuse mesh for identical parts in an assembly (Blended curvature-based mesher only) | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 132887 | | Total Elements | 84242 | | Maximum Aspect Ratio | 58.863 | | % of elements with Aspect Ratio < 3 | 99.1 | | Percentage of elements with Aspect Ratio > 10 | 0.148 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:12 | | Computer name: |  |  Mesh Quality Plots  | Name | Type | Min | Max | | --- | --- | --- | --- | | Quality1 | Mesh | - | - | | **center-Static 1-fineMesh-Quality-Quality1** | | | | |

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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 | -0.0149144 | -1.86163 | -0.0148029 | 1.86175 |  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 | 2.09487e-05 | 1.40928e-05 | -3.69735e-07 | 2.52506e-05 |  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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|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 5.779e-05psi  Node: 82795 | 1.959e+02psi  Node: 76036 | | **center-Static 1-fineMesh-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00in  Node: 101035 | 3.126e-03in  Node: 37808 | | **center-Static 1-fineMesh-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 4.045e-10  Element: 62493 | 2.671e-04  Element: 13402 | | **center-Static 1-fineMesh-Strain-Strain1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Automatic | 4.442e+01  Node: 76036 | 1.506e+08  Node: 82795 | | **center-Static 1-fineMesh-Factor of Safety-Factor of Safety1** | | | | |

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| Conclusion |