|  |  |  |  |
| --- | --- | --- | --- |
|  | |  | | --- | | **Simulation of Modified Docking Mechanism**  **Date: Tuesday, December 17, 2024 Designer:Mohammadali Rashidioun, Roberto Torres**  **Study name: Static analysis of docking mechanism**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc185352355)  [Assumptions 2](#_Toc185352356)  [Model Information 3](#_Toc185352357)  [Study Properties 6](#_Toc185352358)  [Units 6](#_Toc185352359)  [Material Properties 7](#_Toc185352360)  [Loads and Fixtures 8](#_Toc185352361)  [Connector Definitions 9](#_Toc185352362)  [Interaction Information 13](#_Toc185352363)  [Mesh information 14](#_Toc185352364)  [Sensor Details 15](#_Toc185352365)  [Resultant Forces 16](#_Toc185352366)  [Beams 16](#_Toc185352367)  [Study Results 17](#_Toc185352368)  [Conclusion 20](#_Toc185352369) | |
| Description No Data |

|  |
| --- |
| Assumptions |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** assemb.1**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Cut-Extrude3** | **Solid Body** | ****Mass:0.972514 kg****  ****Volume:0.000778011 m^3****  ****Density:1,250 kg/m^3****  ****Weight:9.53063 N**** | ****C:\Users\Arman\Desktop\Phd courses\CADFINAL\optimized design\intitial Design-Roberto Torres-Mohammadali Rashidioun\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part A.1.SLDPRT****  **Dec 16 18:27:57 2024** | | **Cut-Extrude3** | **Solid Body** | ****Mass:0.972514 kg****  ****Volume:0.000778011 m^3****  ****Density:1,250 kg/m^3****  ****Weight:9.53063 N**** | ****C:\Users\Arman\Desktop\Phd courses\CADFINAL\optimized design\intitial Design-Roberto Torres-Mohammadali Rashidioun\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part A.1.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** | | **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:0.509284 kg****  ****Volume:0.000407427 m^3****  ****Density:1,250 kg/m^3****  ****Weight:4.99098 N**** | ****C:\Users\Arman\Desktop\Phd courses\CADFINAL\optimized design\intitial Design-Roberto Torres-Mohammadali Rashidioun\intitial Design-Roberto Torres-Mohammadali Rashidioun\Part C\_2.1.SLDPRT****  **Dec 16 18:27:57 2024** | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | 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\optimized design\intitial Design-Roberto Torres-Mohammadali Rashidioun\intitial Design-Roberto Torres-Mohammadali Rashidioun) | |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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.1-2),**  **SolidBody 1(Cut-Extrude3)(Part A.1-3),**  **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\_2.1-1)** | | **Curve Data:N/A** | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-2** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-0.00135776** | **6.86515** | **0.00528677** | **6.86515** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | | | **Fixed Hinge-5** |  | |  |  | | --- | --- | | Entities: | **6 face(s)** | | Type: | **Fixed Hinge** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **0.0216236** | **-10.1116** | **0.00914513** | **10.1117** | | **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-13**** | |  |  | | --- | --- | | ****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)** | **0.0056984** | **-0** | **-0** | **-0.0056984** | | **Shear Force (N)** | **0** | **-1.1344** | **0.2915** | **1.1712** | | **Torque (N.m)** | **-8.5718e-14** | **0** | **0** | **8.5718e-14** | | **Bending moment (N.m)** | **0** | **-0.00036823** | **0.0022765** | **0.0023061** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.0056984** | **-0** | **-0** | **-0.0056984** | | **Shear Force (N)** | **0** | **-1.1344** | **0.2915** | **1.1712** | | **Torque (N.m)** | **-4.1352e-13** | **0** | **0** | **4.1352e-13** | | **Bending moment (N.m)** | **0** | **0.0033247** | **0.0092282** | **0.0098089** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.0047685** | **-0** | **-0** | **-0.0047685** | | **Shear Force (N)** | **0** | **-1.1048** | **0.30236** | **1.1455** | | **Torque (N.m)** | **-8.4598e-14** | **0** | **0** | **8.4598e-14** | | **Bending moment (N.m)** | **0** | **0.0003655** | **-0.0018486** | **0.0018844** | | | | | ****Pin Connector-14**** | |  |  | | --- | --- | | ****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)** | **-0.0013966** | **0** | **0** | **0.0013966** | | **Shear Force (N)** | **0** | **-1.0837** | **-0.31043** | **1.1272** | | **Torque (N.m)** | **8.3682e-14** | **-0** | **-0** | **-8.3682e-14** | | **Bending moment (N.m)** | **0** | **0.00028448** | **0.0021041** | **0.0021233** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.010115** | **0** | **0** | **0.010115** | | **Shear Force (N)** | **0** | **1.1334** | **0.26276** | **1.1634** | | **Torque (N.m)** | **4.2484e-13** | **-0** | **-0** | **-4.2484e-13** | | **Bending moment (N.m)** | **0** | **0.0029003** | **-0.0091816** | **0.0096288** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.010115** | **-0** | **-0** | **-0.010115** | | **Shear Force (N)** | **0** | **-1.1334** | **-0.26276** | **1.1634** | | **Torque (N.m)** | **8.5959e-14** | **-0** | **-0** | **-8.5959e-14** | | **Bending moment (N.m)** | **0** | **-0.0002558** | **-0.0022249** | **0.0022396** | | | | | ****Pin Connector-15**** | |  |  | | --- | --- | | ****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)** | **0.0063325** | **0** | **0** | **0.0063325** | | **Shear Force (N)** | **0** | **-0.11639** | **0.23825** | **0.26516** | | **Torque (N.m)** | **3.6959e-14** | **0** | **0** | **3.6959e-14** | | **Bending moment (N.m)** | **0** | **2.3365e-05** | **1.5308e-05** | **2.7933e-05** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.0068954** | **0** | **0** | **0.0068954** | | **Shear Force (N)** | **0** | **0.11677** | **-0.2383** | **0.26537** | | **Torque (N.m)** | **7.6323e-15** | **0** | **0** | **7.6323e-15** | | **Bending moment (N.m)** | **0** | **0.0018132** | **0.00089311** | **0.0020212** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.0068954** | **-0** | **-0** | **-0.0068954** | | **Shear Force (N)** | **0** | **-0.11677** | **0.2383** | **0.26537** | | **Torque (N.m)** | **3.6847e-14** | **0** | **0** | **3.6847e-14** | | **Bending moment (N.m)** | **0** | **-7.1229e-06** | **-8.15e-06** | **1.0824e-05** | | | | | ****Pin Connector-16**** | |  |  | | --- | --- | | ****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)** | **-0.0063261** | **0** | **0** | **0.0063261** | | **Shear Force (N)** | **0** | **-0.11424** | **-0.23171** | **0.25835** | | **Torque (N.m)** | **-3.7246e-14** | **0** | **0** | **3.7246e-14** | | **Bending moment (N.m)** | **0** | **4.7735e-06** | **-6.9522e-06** | **8.4332e-06** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.0062902** | **0** | **0** | **0.0062902** | | **Shear Force (N)** | **0** | **0.11429** | **0.23207** | **0.25868** | | **Torque (N.m)** | **-7.7014e-15** | **0** | **0** | **7.7014e-15** | | **Bending moment (N.m)** | **0** | **0.0017622** | **-0.00087292** | **0.0019665** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.0062902** | **-0** | **-0** | **-0.0062902** | | **Shear Force (N)** | **0** | **-0.11429** | **-0.23207** | **0.25868** | | **Torque (N.m)** | **-3.7358e-14** | **0** | **0** | **3.7358e-14** | | **Bending moment (N.m)** | **0** | **-3.881e-05** | **2.4217e-05** | **4.5746e-05** | | | | | ****Pin Connector-17**** | |  |  | | --- | --- | | ****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)** | **0.42731** | **0** | **0** | **0.42731** | | **Shear Force (N)** | **0** | **48.744** | **-15.089** | **51.026** | | **Torque (N.m)** | **-2.9731e-12** | **-0** | **-0** | **-2.9731e-12** | | **Bending moment (N.m)** | **0** | **0.0018236** | **0.0021714** | **0.0028356** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.42669** | **0** | **0** | **0.42669** | | **Shear Force (N)** | **0** | **-48.752** | **15.097** | **51.036** | | **Torque (N.m)** | **1.0805e-13** | **0** | **0** | **1.0805e-13** | | **Bending moment (N.m)** | **0** | **-0.11135** | **-0.36341** | **0.38008** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.42669** | **-0** | **-0** | **-0.42669** | | **Shear Force (N)** | **0** | **48.752** | **-15.097** | **51.036** | | **Torque (N.m)** | **-2.9716e-12** | **-0** | **-0** | **-2.9716e-12** | | **Bending moment (N.m)** | **0** | **-0.0033504** | **-0.0069865** | **0.0077484** | | | | | ****Pin Connector-18**** | |  |  | | --- | --- | | ****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)** | **0.46428** | **0** | **0** | **0.46428** | | **Shear Force (N)** | **0** | **48.725** | **15.084** | **51.007** | | **Torque (N.m)** | **2.9728e-12** | **0** | **0** | **2.9728e-12** | | **Bending moment (N.m)** | **0** | **-0.0029281** | **0.005705** | **0.0064125** | | | | | ****Connector Forces Joint 2****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **0.46322** | **0** | **0** | **0.46322** | | **Shear Force (N)** | **0** | **-48.757** | **-15.101** | **51.042** | | **Torque (N.m)** | **-1.0725e-13** | **-0** | **-0** | **-1.0725e-13** | | **Bending moment (N.m)** | **0** | **0.11148** | **-0.3638** | **0.3805** | | | | | ****Connector Forces Joint 3****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Type** | **X-Component** | **Y-Component** | **Z-Component** | **Resultant** | | **Axial Force (N)** | **-0.46322** | **-0** | **-0** | **-0.46322** | | **Shear Force (N)** | **0** | **48.757** | **15.101** | **51.042** | | **Torque (N.m)** | **2.9713e-12** | **0** | **0** | **2.9713e-12** | | **Bending moment (N.m)** | **0** | **0.002346** | **-0.0037338** | **0.0044096** | | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 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 | 6.53911 mm | | Minimum element size | 0.655345 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 | 117064 | | Total Elements | 74828 | | Maximum Aspect Ratio | 86.458 | | % of elements with Aspect Ratio < 3 | 99 | | Percentage of elements with Aspect Ratio > 10 | 0.155 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:09 | | Computer name: |  |  Mesh Quality Plots  | Name | Type | Min | Max | | --- | --- | --- | --- | | Quality1 | Mesh | - | - | | **assemb.1-Static 1-Quality-Quality1** | | | | |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Resultant ForcesReaction forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N | 0.0202659 | -3.24649 | 0.0144319 | 3.24658 |  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 | -2.4709e-06 | 2.25428e-05 | -5.77044e-07 | 2.26851e-05 |  Free body moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 0 | 0 | 0 | 1e-33 | |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 4.689e-05psi  Node: 85439 | 1.641e+02psi  Node: 61898 | | **assemb.1-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00in  Node: 92431 | 1.774e-03in  Node: 60347 | | **assemb.1-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 4.313e-10  Element: 58912 | 2.478e-04  Element: 25306 | | **assemb.1-Static 1-Strain-Strain1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Automatic | 5.303e+01  Node: 61898 | 1.856e+08  Node: 85439 | | **assemb.1-Static 1-Factor of Safety-Factor of Safety1** | | | | |

|  |
| --- |
| Conclusion |