|  |  |  |  |
| --- | --- | --- | --- |
|  | |  | | --- | | **Simulation of Part1 - Copy**  **Date: 04 حزيران, 2023 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc136776777)  [Assumptions 2](#_Toc136776778)  [Model Information 2](#_Toc136776779)  [Study Properties 4](#_Toc136776780)  [Units 4](#_Toc136776781)  [Material Properties 5](#_Toc136776782)  [Loads and Fixtures 6](#_Toc136776783)  [Connector Definitions 6](#_Toc136776784)  [Contact Information 6](#_Toc136776785)  [Mesh information 7](#_Toc136776786)  [Sensor Details 7](#_Toc136776787)  [Resultant Forces 8](#_Toc136776788)  [Beams 9](#_Toc136776789)  [Study Results 11](#_Toc136776790)  [Conclusion 13](#_Toc136776791) | |
| Description No Data |

|  |
| --- |
| Assumptions |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** Part1 - Copy**  ****Current Configuration:** Default<As Machined>** | | | | | ****Beam Bodies:**** | | | | | ****Document Name and Reference**** | ****Formulation**** | ****Properties**** | ****Document Path/Date Modified**** | | **Beam-5(Square tube 20 X 20 X 2(1)[1])** | **Beam – Uniform C/S** | ****Section Standard-iso/square tube/20 x 20 x 2****  ****Section Area: 0.000133699m^2****  ****Length:0.17m****  ****Volume:2.27289e-05m^3****  ****Mass Density:7700kg/m^3****  ****Mass:0.175012kg****  ****Weight:1.71512N**** | ****C:\Users\meexam4\Desktop\Final\_132883\Part1 - Copy.SLDPRT****  **Jun 4 12:29:17 2023** | | **Beam-8(Square tube 20 X 20 X 2(1)[4])** | **Beam – Uniform C/S** | ****Section Standard-iso/square tube/20 x 20 x 2****  ****Section Area: 0.000133699m^2****  ****Length:0.03m****  ****Volume:4.01097e-06m^3****  ****Mass Density:7700kg/m^3****  ****Mass:0.0308845kg****  ****Weight:0.302668N**** | ****C:\Users\meexam4\Desktop\Final\_132883\Part1 - Copy.SLDPRT****  **Jun 4 12:29:17 2023** | | **Beam-9(Square tube 20 X 20 X 2(1)[6])** | **Beam – Uniform C/S** | ****Section Standard-iso/square tube/20 x 20 x 2****  ****Section Area: 0.000133699m^2****  ****Length:0.1m****  ****Volume:1.33699e-05m^3****  ****Mass Density:7700kg/m^3****  ****Mass:0.102948kg****  ****Weight:1.00889N**** | ****C:\Users\meexam4\Desktop\Final\_132883\Part1 - Copy.SLDPRT****  **Jun 4 12:29:17 2023** | | **Beam-10(Square tube 20 X 20 X 2(1)[2])** | **Beam – Uniform C/S** | ****Section Standard-iso/square tube/20 x 20 x 2****  ****Section Area: 0.000133699m^2****  ****Length:0.17m****  ****Volume:2.27292e-05m^3****  ****Mass Density:7700kg/m^3****  ****Mass:0.175015kg****  ****Weight:1.71515N**** | ****C:\Users\meexam4\Desktop\Final\_132883\Part1 - Copy.SLDPRT****  **Jun 4 12:29:17 2023** | | **Beam-11(Square tube 20 X 20 X 2(1)[4])** | **Beam – Uniform C/S** | ****Section Standard-iso/square tube/20 x 20 x 2****  ****Section Area: 0.000133699m^2****  ****Length:0.03m****  ****Volume:4.01097e-06m^3****  ****Mass Density:7700kg/m^3****  ****Mass:0.0308845kg****  ****Weight:0.302668N**** | ****C:\Users\meexam4\Desktop\Final\_132883\Part1 - Copy.SLDPRT****  **Jun 4 12:29:17 2023** | | **Beam-12(Square tube 20 X 20 X 2(1)[5])** | **Beam – Uniform C/S** | ****Section Standard-iso/square tube/20 x 20 x 2****  ****Section Area: 0.000133699m^2****  ****Length:0.1m****  ****Volume:1.33701e-05m^3****  ****Mass Density:7700kg/m^3****  ****Mass:0.10295kg****  ****Weight:1.00891N**** | ****C:\Users\meexam4\Desktop\Final\_132883\Part1 - Copy.SLDPRT****  **Jun 4 12:29:17 2023** | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Study Properties  |  |  | | --- | --- | | Study name | Static 1 | | Analysis type | Static | | Mesh type | Beam Mesh | | Solver type | Direct sparse solver | | Inplane Effect: | Off | | Soft Spring: | Off | | Inertial Relief: | Off | | Incompatible bonding options | Automatic | | Large displacement | Off | | Compute free body forces | On | | Result folder | SOLIDWORKS document (C:\Users\meexam4\Desktop\Final\_132883) | |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Material Properties  |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Properties**** | ****Components**** | |  | |  |  | | --- | --- | | ****Name:**** | **Alloy Steel** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **6.20422e+08 N/m^2** | | ****Tensile strength:**** | **7.23826e+08 N/m^2** | | ****Elastic modulus:**** | **2.1e+11 N/m^2** | | ****Poisson's ratio:**** | **0.28** | | ****Mass density:**** | **7700 kg/m^3** | | ****Shear modulus:**** | **7.9e+10 N/m^2** | | ****Thermal expansion coefficient:**** | **1.3e-05 /Kelvin** | | **SolidBody 2(Square tube 20 X 20 X 2(1)[1])(Part1 - Copy),**  **SolidBody 5(Square tube 20 X 20 X 2(Square tube 20 X 20 X 2(Square tube 20 X 20 X 2(1)[3])(Part1 - Copy),**  **SolidBody 6(Square tube 20 X 20 X 2(1)[6])(Part1 - Copy),**  **SolidBody 7(Square tube 20 X 20 X 2(1)[2])(Part1 - Copy),**  **SolidBody 8(Square tube 20 X 20 X 2(1)[4])(Part1 - Copy),**  **SolidBody 9(Square tube 20 X 20 X 2(1)[5])(Part1 - Copy)** | | **Curve Data:N/A** | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **1 Joint(s)** | | Type: | **Fixed Geometry** | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 Beam (s)** | | Reference: | **Edge< 1 >** | | Values: | **Table Driven** | | Non uniform load options: | **Table Driven Load Distribution (Percentage)** | | Values: | **(%, N/m)** | |  | **(0, 0)** | |  | **(100, 1000)** | | | **Force-2** |  | |  |  | | --- | --- | | Entities: | **1 Beam (s)** | | Reference: | **Edge< 1 >** | | Values: | **Table Driven** | | Non uniform load options: | **Table Driven Load Distribution (Percentage)** | | Values: | **(%, N/m)** | |  | **(0, 0)** | |  | **(100, -1000)** | | |

|  |
| --- |
| Connector Definitions No Data |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Mesh information  |  |  | | --- | --- | | Mesh type | Beam Mesh |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 111 | | Total Elements | 104 | | Time to complete mesh(hh;mm;ss): | 00:00:00 | | Computer name: |  | |  | | |

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

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Resultant ForcesReaction forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N | 2.86522e-10 | 0 | -1.91292e-27 | 2.86522e-10 |  Reaction Moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 3.5577e-17 | -1.28293e-27 | 0 | 3.5577e-17 | |
|  |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| BeamsBeam Forces  | Beam Name | Joints | Axial(N) | Shear1(N) | Shear2(N) | Moment1(N.m) | Moment2(N.m) | Torque(N.m) | | --- | --- | --- | --- | --- | --- | --- | --- | | Beam-5(Square tube 20 X 20 X 2(1)[1]) | 1 | 1.06013e-11 | -15 | 1.12849e-21 | -2.25696e-23 | -0.3 | 6.07997e-17 | | 2 | -1.34213e-10 | 15 | -1.12849e-21 | 2.14412e-22 | 2.85 | -6.07998e-17 | | Beam-8(Square tube 20 X 20 X 2(1)[4]) | 1 | 2.87217e-12 | 1.15177e-07 | 7.9597e-30 | 1.61746e-29 | 4.36197e-11 | -1.32232e-28 | | 2 | 2.19976e-12 | 15 | 1.06731e-14 | -2.13463e-16 | 0.3 | 1.44605e-16 | | Beam-9(Square tube 20 X 20 X 2(1)[6]) | 1 | -15 | 1.50198e-10 | -6.14233e-30 | -1.46505e-18 | 2.85 | -9.87122e-32 | | 2 | 15 | -1.49763e-10 | 5.01724e-30 | 1.46505e-18 | -2.85 | 9.87122e-32 | | Beam-10(Square tube 20 X 20 X 2(1)[2]) | 1 | -1.51967e-10 | -15 | 5.70148e-30 | -9.88379e-32 | -2.85 | 1.46505e-18 | | 2 | 7.42694e-12 | 15 | 8.24338e-31 | 0 | 0.3 | -1.46505e-18 | | Beam-11(Square tube 20 X 20 X 2(1)[4]) | 1 | -1.56098e-12 | -1.15193e-07 | 6.07194e-31 | 0 | -4.36337e-11 | 3.57005e-30 | | 2 | -6.70399e-13 | -15 | -2.57184e-16 | 5.14367e-18 | -0.3 | -3.48445e-18 | | Beam-12(Square tube 20 X 20 X 2(1)[5]) | 1 | 15 | 1.35185e-10 | 4.0388e-15 | 2.20195e-15 | -2.85 | 7.67371e-16 | | 2 | -15 | -1.36759e-10 | 1.90791e-27 | -3.70421e-17 | 2.85 | 1.28283e-27 |  Beam Stresses  | Beam Name | Joints | Axial(N/m^2) | Bending Dir1(N/m^2) | Bending Dir2(N/m^2) | Torsional (N/m^2) | Upper bound axial and bending(N/m^2) | | --- | --- | --- | --- | --- | --- | --- | | Beam-5(Square tube 20 X 20 X 2(1)[1]) | 1 | 7.92925e-08 | -3.26072e-17 | 433422 | 6.2661e-11 | 433422 | | 2 | 1.00385e-06 | -3.0977e-16 | 4.11751e+06 | -6.2661e-11 | 4.11751e+06 | | Beam-8(Square tube 20 X 20 X 2(1)[4]) | 1 | 2.14824e-08 | 2.33681e-23 | -6.3019e-05 | -1.3628e-22 | 6.30405e-05 | | 2 | -1.64531e-08 | 3.08398e-10 | 433422 | 1.49031e-10 | 433422 | | Beam-9(Square tube 20 X 20 X 2(1)[6]) | 1 | 112192 | 2.11662e-12 | 4.11751e+06 | -1.01734e-25 | 4.2297e+06 | | 2 | 112192 | 2.11662e-12 | 4.11751e+06 | 1.01734e-25 | 4.2297e+06 | | Beam-10(Square tube 20 X 20 X 2(1)[2]) | 1 | 1.13664e-06 | 1.42795e-25 | -4.11751e+06 | 1.50987e-12 | 4.11751e+06 | | 2 | 5.55497e-08 | -5.78974e-27 | -433422 | -1.50987e-12 | 433422 | | Beam-11(Square tube 20 X 20 X 2(1)[4]) | 1 | -1.16753e-08 | 5.51982e-28 | 6.30394e-05 | 3.67926e-24 | 6.3051e-05 | | 2 | 5.01423e-09 | -7.43127e-12 | -433422 | -3.59104e-12 | 433422 | | Beam-12(Square tube 20 X 20 X 2(1)[5]) | 1 | 112192 | 3.18125e-09 | 4.11751e+06 | 7.90862e-10 | 4.2297e+06 | | 2 | 112192 | 5.35162e-11 | 4.11751e+06 | 1.3221e-21 | 4.2297e+06 | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | Upper bound axial and bending | 2.427e+04 N/m^2  Element: 35 | 4.230e+06 N/m^2  Element: 36 | | **Part1 - Copy-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00 m  Node: 54 | 6.604e-05 m  Node: 36 | | **Part1 - Copy-Static 1-Displacement-Displacement1** | | | |  | Name | Type | | --- | --- | | Shear-Moment Plot1 | Shear Force in Dir1 | | **Part1 - Copy-Static 1-Shear-Moment Plot-Shear-Moment Plot1** | |  | Name | Type | | --- | --- | | Shear-Moment Plot2 | Moment about Dir2 | | **Part1 - Copy-Static 1-Shear-Moment Plot-Shear-Moment Plot2** | | |

|  |
| --- |
| Conclusion |