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|  | |  | | --- | | **Simulation of arm full ass**  **Date: Tuesday, 21 May 2019 Designer: Edward Munns**  **Study name: Static 2**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc9294983)  [Assumptions 2](#_Toc9294984)  [Model Information 2](#_Toc9294985)  [Study Properties 4](#_Toc9294986)  [Units 4](#_Toc9294987)  [Material Properties 5](#_Toc9294988)  [Loads and Fixtures 6](#_Toc9294989)  [Connector Definitions 6](#_Toc9294990)  [Contact Information 7](#_Toc9294991)  [Mesh information 8](#_Toc9294992)  [Sensor Details 9](#_Toc9294993)  [Resultant Forces 9](#_Toc9294994)  [Beams 9](#_Toc9294995)  [Study Results 10](#_Toc9294996)  [Conclusion 12](#_Toc9294997) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** arm full ass**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Cut-Extrude1** | **Solid Body** | ****Mass:2.58962 kg****  ****Volume:0.000329049 m^3****  ****Density:7870 kg/m^3****  ****Weight:25.3782 N**** | ****C:\Users\ed\Desktop\mech ass 3\arm.SLDPRT****  **May 18 21:48:19 2019** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.210657 kg****  ****Volume:2.67671e-05 m^3****  ****Density:7870 kg/m^3****  ****Weight:2.06444 N**** | ****C:\Users\ed\Desktop\mech ass 3\arm cleat.SLDPRT****  **May 15 05:59:58 2019** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.210657 kg****  ****Volume:2.67671e-05 m^3****  ****Density:7870 kg/m^3****  ****Weight:2.06444 N**** | ****C:\Users\ed\Desktop\mech ass 3\arm cleat.SLDPRT****  **May 15 05:59:58 2019** | | **Cut-Extrude1** | **Solid Body** | ****Mass:2.58962 kg****  ****Volume:0.000329049 m^3****  ****Density:7870 kg/m^3****  ****Weight:25.3782 N**** | ****C:\Users\ed\Desktop\mech ass 3\arm.SLDPRT****  **May 18 21:48:19 2019** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.210657 kg****  ****Volume:2.67671e-05 m^3****  ****Density:7870 kg/m^3****  ****Weight:2.06444 N**** | ****C:\Users\ed\Desktop\mech ass 3\arm cleat.SLDPRT****  **May 15 05:59:58 2019** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.210657 kg****  ****Volume:2.67671e-05 m^3****  ****Density:7870 kg/m^3****  ****Weight:2.06444 N**** | ****C:\Users\ed\Desktop\mech ass 3\arm cleat.SLDPRT****  **May 15 05:59:58 2019** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.614789 kg****  ****Volume:7.8118e-05 m^3****  ****Density:7870 kg/m^3****  ****Weight:6.02493 N**** | ****C:\Users\ed\Desktop\mech ass 4\cross bar.SLDPRT****  **May 20 18:59:46 2019** | | **Boss-Extrude1** | **Solid Body** | ****Mass:0.614789 kg****  ****Volume:7.8118e-05 m^3****  ****Density:7870 kg/m^3****  ****Weight:6.02493 N**** | ****C:\Users\ed\Desktop\mech ass 4\cross bar.SLDPRT****  **May 20 18:59:46 2019** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Static 2 | | 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 (C:\Users\ed\Desktop\mech ass 4) | |

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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:**** | **AISI 1020 Steel, Cold Rolled** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **3.5e+08 N/m^2** | | ****Tensile strength:**** | **4.2e+08 N/m^2** | | ****Elastic modulus:**** | **2.05e+11 N/m^2** | | ****Poisson's ratio:**** | **0.29** | | ****Mass density:**** | **7870 kg/m^3** | | ****Shear modulus:**** | **8e+10 N/m^2** | | ****Thermal expansion coefficient:**** | **1.2e-05 /Kelvin** | | **SolidBody 1(Cut-Extrude1)(arm ass final-1/arm ass-1/arm-1),**  **SolidBody 1(Boss-Extrude1)(arm ass final-1/arm cleat-1),**  **SolidBody 1(Boss-Extrude1)(arm ass final-1/arm cleat-2),**  **SolidBody 1(Cut-Extrude1)(arm ass final-2/arm ass-1/arm-1),**  **SolidBody 1(Boss-Extrude1)(arm ass final-2/arm cleat-1),**  **SolidBody 1(Boss-Extrude1)(arm ass final-2/arm cleat-2),**  **SolidBody 1(Boss-Extrude1)(cross bar-1),**  **SolidBody 1(Boss-Extrude1)(cross bar-2)** | | **Curve Data:N/A** | | | |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **4 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-0.247776** | **-599.925** | **-6096.23** | **6125.68** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Gravity-1** |  | |  |  | | --- | --- | | Values: | **0 0 -9.81** | | Units: | **m/s^2** | | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **12 edge(s)** | | Type: | **Apply force** | | Values: | **---, ---, -500 N** | | | **Force-2** |  | |  |  | | --- | --- | | Entities: | **8 edge(s)** | | Type: | **Apply force** | | Values: | **---, ---, -65 N** | | |

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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 | 15.4948 mm | | Tolerance | 0.774742 mm | | Mesh Quality Plot | High | | Remesh failed parts with incompatible mesh | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 24151 | | Total Elements | 12358 | | Maximum Aspect Ratio | 27.531 | | % of elements with Aspect Ratio < 3 | 7.91 | | % of elements with Aspect Ratio > 10 | 12.6 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:04 | | Computer name: |  | |  | | |

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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 | -0.247776 | -599.925 | -6096.23 | 6125.68 |  Reaction Moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N.m | 0 | 0 | 0 | 0 | |
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| Beams No Data |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 4,962.149 N/m^2  Node: 20850 | 71,918,848.000N/m^2  Node: 19740 | | **arm full ass-Static 2-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000 mm  Node: 9308 | 2.286 mm  Node: 516 | | **arm full ass-Static 2-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 1.11e-08  Element: 10884 | 0.000244  Element: 10471 | | **arm full ass-Static 2-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **arm full ass-Static 2-Displacement-Displacement1{1}** | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Automatic | 4.8  Node: 10731 | 7.05e+04  Node: 20850 | | **arm full ass-Static 2-Factor of Safety-Factor of Safety1** | | | | |

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| Conclusion |