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|  | |  | | --- | | **Simulation of Arm2**  **Date: March 30, 2022 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc99536738)  [Assumptions 2](#_Toc99536739)  [Model Information 3](#_Toc99536740)  [Study Properties 4](#_Toc99536741)  [Units 4](#_Toc99536742)  [Material Properties 5](#_Toc99536743)  [Loads and Fixtures 6](#_Toc99536744)  [Connector Definitions 6](#_Toc99536745)  [Contact Information 7](#_Toc99536746)  [Mesh information 7](#_Toc99536747)  [Sensor Details 8](#_Toc99536748)  [Resultant Forces 8](#_Toc99536749)  [Beams 8](#_Toc99536750)  [Study Results 9](#_Toc99536751)  [Conclusion 12](#_Toc99536752) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** Arm2**  ****Current Configuration:** Single Assem** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Cut-Extrude13** | **Solid Body** | ****Mass:1.21822 kg****  ****Volume:0.000451192 m^3****  ****Density:2,700 kg/m^3****  ****Weight:11.9385 N**** | ****D:\ELEC391\0\_git\Mechanical-Modelling\SolidworksCAD\Arm2.SLDPRT****  **Mar 27 23:00:00 2022** | |

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| 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 (D:\ELEC391\0\_git\Mechanical-Modelling\SolidworksCAD) | |

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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:**** | **3003 Alloy** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **4.13613e+07 N/m^2** | | ****Tensile strength:**** | **1.10297e+08 N/m^2** | | ****Elastic modulus:**** | **6.9e+10 N/m^2** | | ****Poisson's ratio:**** | **0.33** | | ****Mass density:**** | **2,700 kg/m^3** | | ****Shear modulus:**** | **2.7e+10 N/m^2** | | ****Thermal expansion coefficient:**** | **2.3e-05 /Kelvin** | | **SolidBody 1(Cut-Extrude13)(Arm2)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **1 edge(s), 1 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-1.01142e-06** | **9.99999** | **9.68575e-07** | **9.99999** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply normal force** | | Value: | **10 N** | | |

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| Connector Definitions No Data |

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| Contact Information No Data |

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| Mesh information  |  |  | | --- | --- | | Mesh type | Solid Mesh | | Mesher Used: | Standard mesh | | Automatic Transition: | Off | | Include Mesh Auto Loops: | Off | | Jacobian points for High quality mesh | 16 Points | | Element Size | 7.67182 mm | | Tolerance | 0.383591 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 18008 | | Total Elements | 9950 | | Maximum Aspect Ratio | 15.429 | | % of elements with Aspect Ratio < 3 | 95.8 | | Percentage of elements with Aspect Ratio > 10 | 0.0503 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:02 | | Computer name: |  | |

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| Sensor Details  | Sensor name | Location | Sensor Details | | --- | --- | --- | | Displacement1 |  | Value : 1.878e-02 mm  Entities :  Result :Displacement  Component :URES: Resultant Displacement  Criterion :Model Max  Step Criterion : Across all Steps  Step No.:1  Alert Value: NA | |

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| Resultant ForcesReaction forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N | -1.01142e-06 | 9.99999 | 9.68575e-07 | 9.99999 |  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 | -2.90084e-06 | 7.67702e-06 | 1.50506e-06 | 8.34366e-06 |  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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| Beams No Data |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 2.433e+03N/m^2  Node: 9962 | 1.120e+06N/m^2  Node: 11853 | | **Arm2-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mm  Node: 45 | 1.878e-02mm  Node: 359 | | **Arm2-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 3.018e-08  Element: 8026 | 1.058e-05  Element: 6530 | | **Arm2-Static 1-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **Arm2-Static 1-Displacement-Displacement1{1}** | | |

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| Conclusion |