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|  | |  | | --- | | **Simulation of ARM\_09**  **Date: Friday, March 28, 2025 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc194076292)  [Assumptions 2](#_Toc194076293)  [Model Information 2](#_Toc194076294)  [Study Properties 3](#_Toc194076295)  [Units 3](#_Toc194076296)  [Material Properties 4](#_Toc194076297)  [Loads and Fixtures 4](#_Toc194076298)  [Connector Definitions 5](#_Toc194076299)  [Contact Information 5](#_Toc194076300)  [Mesh information 5](#_Toc194076301)  [Sensor Details 6](#_Toc194076302)  [Resultant Forces 6](#_Toc194076303)  [Beams 6](#_Toc194076304)  [Study Results 7](#_Toc194076305)  [Conclusion 9](#_Toc194076306) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** ARM\_09**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Cut-Extrude1** | **Solid Body** | ****Mass:0.00164587 kg****  ****Volume:1.02873e-05 m^3****  ****Density:159.99 kg/m^3****  ****Weight:0.0161295 N**** | ****D:\Mustafa\Solid work\Robot V2\Arm\ARM\_09.SLDPRT****  **Mar 26 04:14:27 2025** | |

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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:\Mustafa\Solid work\Robot V2\Arm) | |

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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:**** | **Balsa** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **2e+07 N/m^2** | | ****Elastic modulus:**** | **3e+09 N/m^2** | | ****Poisson's ratio:**** | **0.29** | | ****Mass density:**** | **159.99 kg/m^3** | | ****Shear modulus:**** | **3e+08 N/m^2** | | **SolidBody 1(Cut-Extrude1)(ARM\_09)** | | **Curve Data:N/A** | | | |

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| **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)** | **0.00022738** | **-3.8513e-05** | **-0.000208356** | **0.000310801** | | **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: | **5 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: | Blended curvature-based mesh | | Jacobian points for High quality mesh | 16 Points | | Maximum element size | 2.17571 mm | | Minimum element size | 0.108785 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 17781 | | Total Elements | 10122 | | Maximum Aspect Ratio | 4.717 | | % of elements with Aspect Ratio < 3 | 99.7 | | Percentage of elements with Aspect Ratio > 10 | 0 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:02 | | Computer name: | MOSTAFA\_LABIB | |

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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 | 0.00022738 | -3.8513e-05 | -0.000208356 | 0.000310801 |  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 | 1.45228e-07 | -3.81842e-08 | -1.41648e-07 | 2.0643e-07 |  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 | 1.193e-01N/m^2  Node: 16743 | 1.247e+05N/m^2  Node: 16323 | | **ARM\_09-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mm  Node: 1 | 8.441e-05mm  Node: 1100 | | **ARM\_09-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 3.119e-11  Element: 695 | 2.305e-05  Element: 9988 | | **ARM\_09-Static 1-Strain-Strain1** | | | | |

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| Conclusion |