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|  | |  | | --- | | **Simulation of stress**  **Date: 06 October 2020 Designer: Solidworks**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc52921168)  [Assumptions 2](#_Toc52921169)  [Model Information 2](#_Toc52921170)  [Study Properties 4](#_Toc52921171)  [Units 4](#_Toc52921172)  [Material Properties 5](#_Toc52921173)  [Loads and Fixtures 6](#_Toc52921174)  [Connector Definitions 7](#_Toc52921175)  [Contact Information 8](#_Toc52921176)  [Mesh information 9](#_Toc52921177)  [Sensor Details 10](#_Toc52921178)  [Resultant Forces 10](#_Toc52921179)  [Beams 10](#_Toc52921180)  [Study Results 11](#_Toc52921181)  [Conclusion 14](#_Toc52921182) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** stress**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **PadrãoCircular1** | **Solid Body** | ****Mass:0.000202058 kg****  ****Volume:1.55429e-07 m^3****  ****Density:1,300 kg/m^3****  ****Weight:0.00198017 N**** | ****C:\Users\MAYANK\Desktop\electronichousing\Bio-Snake\_Robot\sg90-micro-servo-9g-tower-pro-1.snapshot.3\SG90 - Micro Servo 9g - Tower Pro.2.SLDPRT****  **Sep 1 08:04:40 2020** | | **Fillet6** | **Solid Body** | ****Mass:0.0484352 kg****  ****Volume:4.52654e-05 m^3****  ****Density:1,070.03 kg/m^3****  ****Weight:0.474665 N**** | ****C:\Users\MAYANK\Desktop\electronichousing\New snake\eel\_new\d1\_75.SLDPRT****  **Oct 6 23:41:14 2020** | | **Cut-Extrude12** | **Solid Body** | ****Mass:0.0510281 kg****  ****Volume:4.76887e-05 m^3****  ****Density:1,070.03 kg/m^3****  ****Weight:0.500076 N**** | ****C:\Users\MAYANK\Desktop\electronichousing\New snake\eel\_new\d2\_75.SLDPRT****  **Oct 6 23:41:15 2020** | | **Cut-Extrude1** | **Solid Body** | ****Mass:0.000238048 kg****  ****Volume:2.22475e-07 m^3****  ****Density:1,070 kg/m^3****  ****Weight:0.00233287 N**** | ****C:\Users\MAYANK\Desktop\electronichousing\New snake\eel\_new\danda.SLDPRT****  **Sep 1 08:04:46 2020** | |

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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 | FFEPlus | | Inplane Effect: | Off | | Soft Spring: | Off | | Inertial Relief: | Off | | Incompatible bonding options | Automatic | | Large displacement | On | | Compute free body forces | On | | Friction | Off | | Use Adaptive Method: | Off | | Result folder | SOLIDWORKS document (C:\Users\MAYANK\Desktop\electronichousing\New snake\eel\_new) | |

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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:**** | **PVC Rígido** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Tensile strength:**** | **4.07e+07 N/m^2** | | ****Elastic modulus:**** | **2.41e+09 N/m^2** | | ****Poisson's ratio:**** | **0.3825** | | ****Mass density:**** | **1,300 kg/m^3** | | ****Shear modulus:**** | **8.667e+08 N/m^2** | | **SolidBody 1(PadrãoCircular1)(SG90 - Micro Servo 9g - Tower Pro.2-1)** | | **Curve Data:N/A** | | | |  | |  |  | | --- | --- | | ****Name:**** | **abqs** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **3e+13 N/m^2** | | ****Tensile strength:**** | **4e+07 N/m^2** | | ****Elastic modulus:**** | **2.41e+09 N/m^2** | | ****Poisson's ratio:**** | **0.3897** | | ****Mass density:**** | **1,070 kg/m^3** | | ****Shear modulus:**** | **8.622e+08 N/m^2** | | **SolidBody 1(Fillet6)(d1\_75-3),**  **SolidBody 1(Cut-Extrude12)(d2\_75-1),**  **SolidBody 1(Cut-Extrude1)(danda-1)** | | **Curve Data:N/A** | | | |

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| **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)** | **6.10759** | **5.43259e-08** | **0.0387696** | **6.10771** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Torque-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply torque** | | Value: | **0.19 N.m** | | |

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| Connector Definitions **Pin/Bolt/Bearing Connector**   |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Connector Details**** | ****Strength Details**** | | ****Pin Connector-1**** | |  |  | | --- | --- | | ****Entities:**** | **2 face(s)** | | ****Type:**** | **Pin** | | ****Connection type:**** | **With retaining ring (No translation)** | | ****Rotational stiffness value:**** | **0** | | ****Units:**** | **SI** | | **No Data** | | ****Connector Forces Joint 1****No Data | | | | ****Connector Forces Joint 2No Data**** | | | | ****Pin Connector-2**** | |  |  | | --- | --- | | ****Entities:**** | **2 face(s)** | | ****Type:**** | **Pin** | | ****Connection type:**** | **With retaining ring (No translation)** | | ****Rotational stiffness value:**** | **0** | | ****Units:**** | **SI** | | **No Data** | | ****Connector Forces Joint 1****No Data | | | | ****Connector Forces Joint 2No 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 | 3.5 mm | | Tolerance | 0.175 mm | | Mesh Quality Plot | High | | Remesh failed parts with incompatible mesh | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 39730 | | Total Elements | 23192 | | Maximum Aspect Ratio | 11.438 | | % of elements with Aspect Ratio < 3 | 94.8 | | % of elements with Aspect Ratio > 10 | 0.00862 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:17 | | 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 | 6.10759 | 5.43259e-08 | 0.0387696 | 6.10771 |  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 | 3.153e+00 N/m^2  Node: 15320 | 2.801e+07 N/m^2  Node: 39639 | | **stress-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00 mm  Node: 1972 | 1.897e+00 mm  Node: 20622 | | **stress-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 2.521e-09  Element: 6520 | 7.825e-03  Element: 23090 | | **stress-Static 1-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **stress-Static 1-Displacement-Displacement1{1}** | | |

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| Conclusion |