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|  | |  | | --- | | **Simulation of MEMS\_1**  **Date: Monday, December 4, 2023 Designer: Solidworks**  **Study name: Static 3**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc152588558)  [Assumptions 2](#_Toc152588559)  [Model Information 2](#_Toc152588560)  [Study Properties 3](#_Toc152588561)  [Units 3](#_Toc152588562)  [Material Properties 4](#_Toc152588563)  [Loads and Fixtures 4](#_Toc152588564)  [Connector Definitions 5](#_Toc152588565)  [Interaction Information 5](#_Toc152588566)  [Mesh information 5](#_Toc152588567)  [Sensor Details 6](#_Toc152588568)  [Resultant Forces 6](#_Toc152588569)  [Beams 6](#_Toc152588570)  [Study Results 7](#_Toc152588571)  [Conclusion 10](#_Toc152588572) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** MEMS\_1**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **MEMS\_1.dwg<1>** | **Solid Body** | ****Mass:4.30502e-10 kg****  ****Volume:1.84765e-10 m^3****  ****Density:2.33 kg/m^3****  ****Weight:4.21892e-09 N**** | ****C:\Users\241pr\OneDrive - UBC\Desktop\Apps\UBC\ELEC 465\Project\FEA\MEMS\_1.SLDPRT****  **Dec 4 13:18:33 2023** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Static 3 | | 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 (C:\Users\241pr\OneDrive - UBC\Desktop\Apps\UBC\ELEC 465\Project\FEA) | |

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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:**** | **Custom Plastic** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Elastic modulus:**** | **1.7e+11 N/m^2** | | ****Poisson's ratio:**** | **0.29** | | ****Mass density:**** | **2.33 kg/m^3** | | ****Thermal expansion coefficient:**** | **2.6e-06 /Kelvin** | | **SolidBody 1(MEMS\_1.dwg<1>)(MEMS\_1)** | | **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)** | **2.78533e-12** | **9.81e-06** | **1.25056e-12** | **9.81e-06** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply force** | | Values: | **---, -9.81e-06, --- N** | | |

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| Connector Definitions No Data |

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| Interaction 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 | 0.00363897 in | | Minimum element size | 0.00363897 in | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 41336 | | Total Elements | 17143 | | Maximum Aspect Ratio | 54.758 | | % of elements with Aspect Ratio < 3 | 5.69 | | Percentage of elements with Aspect Ratio > 10 | 53.5 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:13 | | Computer name: | RAZER-BLADE | |

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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 | 2.78533e-12 | 9.81e-06 | 1.25056e-12 | 9.81e-06 |  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 | -2.27041e-11 | 1.85319e-09 | 8.51558e-12 | 1.85335e-09 |  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 | 1.122e+00N/m^2  Node: 27919 | 8.623e+05N/m^2  Node: 905 | | **MEMS\_1-Static 3-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mm  Node: 8 | 1.112e-04mm  Node: 579 | | **MEMS\_1-Static 3-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 5.837e-12  Element: 14689 | 2.776e-06  Element: 4347 | | **MEMS\_1-Static 3-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **MEMS\_1-Static 3-Displacement-Displacement1{1}** | | |

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| Conclusion |