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|  | |  | | --- | | **Simulation of P2\_1**  **Date: Tuesday, November 2, 2021 Designer: Solidworks**  **Study name: Static 2**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc86777026)  [Assumptions 2](#_Toc86777027)  [Model Information 3](#_Toc86777028)  [Study Properties 6](#_Toc86777029)  [Units 6](#_Toc86777030)  [Material Properties 7](#_Toc86777031)  [Loads and Fixtures 8](#_Toc86777032)  [Connector Definitions 8](#_Toc86777033)  [Contact Information 9](#_Toc86777034)  [Mesh information 9](#_Toc86777035)  [Sensor Details 10](#_Toc86777036)  [Resultant Forces 10](#_Toc86777037)  [Beams 10](#_Toc86777038)  [Study Results 11](#_Toc86777039)  [Conclusion 14](#_Toc86777040) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** P2\_1**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Boss-Extrude3** | **Solid Body** | ****Mass:0.000345665 kg****  ****Volume:1.28024e-07 m^3****  ****Density:2,700 kg/m^3****  ****Weight:0.00338751 N**** | ****C:\Users\willb\Documents\Fall 2021\ME 366\Project 2\P2\_1.SLDPRT****  **Nov 2 20:17:34 2021** | | **Cut-Extrude4** | **Solid Body** | ****Mass:0.0100062 kg****  ****Volume:3.70599e-06 m^3****  ****Density:2,700 kg/m^3****  ****Weight:0.0980605 N**** | ****C:\Users\willb\Documents\Fall 2021\ME 366\Project 2\P2\_1.SLDPRT****  **Nov 2 20:17:34 2021** | | **Boss-Extrude4** | **Solid Body** | ****Mass:0.000345665 kg****  ****Volume:1.28024e-07 m^3****  ****Density:2,700 kg/m^3****  ****Weight:0.00338751 N**** | ****C:\Users\willb\Documents\Fall 2021\ME 366\Project 2\P2\_1.SLDPRT****  **Nov 2 20:17:34 2021** | | **Boss-Extrude6** | **Solid Body** | ****Mass:0.000345665 kg****  ****Volume:1.28024e-07 m^3****  ****Density:2,700 kg/m^3****  ****Weight:0.00338751 N**** | ****C:\Users\willb\Documents\Fall 2021\ME 366\Project 2\P2\_1.SLDPRT****  **Nov 2 20:17:34 2021** | | **Boss-Extrude7** | **Solid Body** | ****Mass:0.000345665 kg****  ****Volume:1.28024e-07 m^3****  ****Density:2,700 kg/m^3****  ****Weight:0.00338751 N**** | ****C:\Users\willb\Documents\Fall 2021\ME 366\Project 2\P2\_1.SLDPRT****  **Nov 2 20:17:34 2021** | | **Boss-Extrude8** | **Solid Body** | ****Mass:0.000691329 kg****  ****Volume:2.56048e-07 m^3****  ****Density:2,700 kg/m^3****  ****Weight:0.00677503 N**** | ****C:\Users\willb\Documents\Fall 2021\ME 366\Project 2\P2\_1.SLDPRT****  **Nov 2 20:17:34 2021** | | **Boss-Extrude9** | **Solid Body** | ****Mass:0.000691329 kg****  ****Volume:2.56048e-07 m^3****  ****Density:2,700 kg/m^3****  ****Weight:0.00677503 N**** | ****C:\Users\willb\Documents\Fall 2021\ME 366\Project 2\P2\_1.SLDPRT****  **Nov 2 20:17:34 2021** | |

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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 | 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\willb\Documents\Fall 2021\ME 366\Project 2) | |

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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:**** | **6061 Alloy** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **5.51485e+07 N/m^2** | | ****Tensile strength:**** | **1.24084e+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:**** | **2.6e+10 N/m^2** | | ****Thermal expansion coefficient:**** | **2.4e-05 /Kelvin** | | **SolidBody 1(Boss-Extrude3)(P2),**  **SolidBody 2(Cut-Extrude4)(P2),**  **SolidBody 3(Boss-Extrude4)(P2),**  **SolidBody 4(Boss-Extrude6)(P2),**  **SolidBody 5(Boss-Extrude7)(P2),**  **SolidBody 6(Boss-Extrude8)(P2),**  **SolidBody 7(Boss-Extrude9)(P2)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Fixed-1** |  | |  |  | | --- | --- | | Entities: | **2 face(s)** | | Type: | **Fixed Geometry** | | | ****Resultant Forces****   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Components** | **X** | **Y** | **Z** | **Resultant** | | **Reaction force(N)** | **-266.896** | **0.00477403** | **-0.00455046** | **266.896** | | **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: | **-35 lbf** | | | **Force-2** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply normal force** | | Value: | **-25 lbf** | | |

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| Connector Definitions No Data |

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| Contact Information  | Contact | Contact Image | Contact Properties | | --- | --- | --- | | Global Interaction |  | |  |  | | --- | --- | | Type: | **Bonded** | | Components: | **1 component(s)** | | Options: | **Independent 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 for High quality mesh | 16 Points | | Element Size | 0.0661152 in | | Tolerance | 0.00330576 in | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 14132 | | Total Elements | 8069 | | Maximum Aspect Ratio | 3.6328 | | % of elements with Aspect Ratio < 3 | 99.9 | | 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: |  | |

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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 | -266.896 | 0.00477403 | -0.00455046 | 266.896 |  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 | -0.118036 | -0.0344707 | -0.0991071 | 0.157933 |  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 | 4.882e-03ksi  Node: 11533 | 1.956e+00ksi  Node: 11522 | | **P2\_1-Static 2-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mil  Node: 7 | 1.704e-01mil  Node: 12077 | | **P2\_1-Static 2-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 4.421e-07  Element: 3396 | 1.437e-04  Element: 4693 | | **P2\_1-Static 2-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **P2\_1-Static 2-Displacement-Displacement1{1}** | | |

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| Conclusion |