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|  | |  | | --- | | **Simulation of Hacksaw 2-2**  **Date: Monday, October 23, 2023 Designer: Jakob Werle**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc148920069)  [Assumptions 2](#_Toc148920070)  [Model Information 2](#_Toc148920071)  [Study Properties 3](#_Toc148920072)  [Units 3](#_Toc148920073)  [Material Properties 4](#_Toc148920074)  [Loads and Fixtures 5](#_Toc148920075)  [Connector Definitions 5](#_Toc148920076)  [Interaction Information 6](#_Toc148920077)  [Mesh information 7](#_Toc148920078)  [Sensor Details 8](#_Toc148920079)  [Resultant Forces 8](#_Toc148920080)  [Beams 8](#_Toc148920081)  [Study Results 9](#_Toc148920082)  [Conclusion 13](#_Toc148920083) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** Hacksaw 2-2**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Split Line1** | **Solid Body** | ****Mass:0.991233 lb****  ****Volume:3.48631 in^3****  ****Density:0.284322 lb/in^3****  ****Weight:0.990561 lbf**** | ****C:\Users\jakob\software\TU\23FL\CAD\HW5.2\Models and Drawings\Hacksaw 2-2.SLDPRT****  **Oct 23 02:01:23 2023** | |

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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 (C:\Users\jakob\software\TU\23FL\CAD\HW5.2\Models and Drawings) | |

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| Units  |  |  | | --- | --- | | Unit system: | English (IPS) | | Length/Displacement | in | | Temperature | Fahrenheit | | Angular velocity | Hertz | | Pressure/Stress | psi | |

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| Material Properties  |  |  |  | | --- | --- | --- | | ****Model Reference**** | ****Properties**** | ****Components**** | |  | |  |  | | --- | --- | | ****Name:**** | **AISI 1020 Steel, Cold Rolled** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **50,763.2 psi** | | ****Tensile strength:**** | **60,915.8 psi** | | ****Elastic modulus:**** | **2.97327e+07 psi** | | ****Poisson's ratio:**** | **0.29** | | ****Mass density:**** | **0.284322 lb/in^3** | | ****Shear modulus:**** | **1.1603e+07 psi** | | ****Thermal expansion coefficient:**** | **6.5e-06 /Fahrenheit** | | **SolidBody 1(Split Line1)(Hacksaw 2-2)** | | **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(lbf)** | **50** | **7.23581e-07** | **1.27297e-07** | **50** | | **Reaction Moment(lbf.in)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Reference: | **Edge< 1 >** | | Type: | **Apply force** | | Values: | **---, ---, -50 lbf** | | |

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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 | 0.325991 in | | Minimum element size | 0.0651982 in | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 12179 | | Total Elements | 6897 | | Maximum Aspect Ratio | 6.711 | | % of elements with Aspect Ratio < 3 | 98.1 | | Percentage of elements with Aspect Ratio > 10 | 0 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:04 | | Computer name: | JW-MACHINE |  Mesh Control Information:  | **Mesh Control Name** | **Mesh Control Image** | **Mesh Control Details** | | --- | --- | --- | | **Control-1** |  | |  |  | | --- | --- | | Entities: | **2 edge(s)** | | Units: | **in** | | Size: | **0.00814977** | | Ratio: | **0.00814977** | | |

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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 | lbf | 50 | 7.23581e-07 | 1.27297e-07 | 50 |  Reaction Moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | lbf.in | 0 | 0 | 0 | 0 | |
| Free body forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | lbf | -5.95615e-05 | 7.20892e-06 | -6.36047e-08 | 5.99962e-05 |  Free body moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | lbf.in | 0 | 0 | 0 | 8.85075e-33 | |

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| Beams No Data |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | VON: von Mises Stress | 6.766psi  Node: 5699 | 14,685.761psi  Node: 305 | | **Hacksaw 2-2-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Copy[ 1 ] Stress1 | SX: X Normal Stress | -14,441.507psi  Node: 329 | 11,450.264psi  Node: 594 | | **Hacksaw 2-2-Static 1-Stress-Copy[ 1 ] Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00in  Node: 37 | 1.086e-01in  Node: 23 | | **Hacksaw 2-2-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 9.818e-08  Element: 5505 | 4.085e-04  Element: 3191 | | **Hacksaw 2-2-Static 1-Strain-Strain1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Automatic | 3.457e+00  Node: 305 | 7.502e+03  Node: 5699 | | **Hacksaw 2-2-Static 1-Factor of Safety-Factor of Safety1** | | | | |

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| Conclusion |