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| Assembly {reference} | |  | | --- | | **Simulation of JAW[1]**  **Date: Friday, December 31, 2021 Designer: Solidworks, Setup by Isaac Wax**  **Study name: Static 1**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc91840724)  [Assumptions 2](#_Toc91840725)  [Model Information 2](#_Toc91840726)  [Study Properties 3](#_Toc91840727)  [Units 3](#_Toc91840728)  [Material Properties 4](#_Toc91840729)  [Loads and Fixtures 4](#_Toc91840730)  [Connector Definitions **Error! Bookmark not defined.**](#_Toc91840731)  [Contact Information 5](#_Toc91840732)  [Mesh information 5](#_Toc91840733)  [Sensor Details 5](#_Toc91840734)  [Resultant Forces 6](#_Toc91840735)  [Beams 6](#_Toc91840736)  [Study Results 7](#_Toc91840737)  [Conclusion 10](#_Toc91840738) | |
| Description Static optimization simulation for claw in horizontal fixture on ROV. |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** JAW[1]**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Fillet15** | **Solid Body** | ****Mass:0.00774607 kg****  ****Volume:7.04181e-06 m^3****  ****Density:1,100.01 kg/m^3****  ****Weight:0.0759115 N**** | ****G:\My Drive\ROV--2022\MECHAICAL\Claw\Claw 2.3\JAW[1].SLDPRT****  **Dec 31 10:55:03 2021** | |

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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 (G:\My Drive\ROV--2022\MECHAICAL\Claw\Claw 2.3) | |

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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:**** | **Epoxy, Unfilled** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Tensile strength:**** | **2.8e+07 N/m^2** | | ****Compressive strength:**** | **1.04e+08 N/m^2** | | ****Elastic modulus:**** | **2.415e+09 N/m^2** | | ****Poisson's ratio:**** | **0.35** | | ****Mass density:**** | **1,100 kg/m^3** | | **SolidBody 1(Fillet15)(JAW[1])** | | **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)** | **63.4159** | **-0.00435513** | **-9.65982** | **64.1474** | | **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: | **7 kgf** | | |

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| Contact Information The goal is only to look at that jaw component and not at the gears, so it is constrained rigidly throughout the 6 mm pin-hole |

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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 | 1.91745 mm | | Tolerance | 0.0958726 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 15020 | | Total Elements | 9076 | | Maximum Aspect Ratio | 6.9571 | | % of elements with Aspect Ratio < 3 | 98.9 | | 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 | 63.4159 | -0.00435513 | -9.65982 | 64.1474 |  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 | -0.00134599 | -0.0239432 | 0.0137557 | 0.0276461 |  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 | 5.406e+02N/m^2  Node: 6010 | 1.041e+07N/m^2  Node: 881 | | **JAW[1]-Static 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000e+00mm  Node: 1 | 9.537e-01mm  Node: 11920 | | **JAW[1]-Static 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 2.936e-07  Element: 2505 | 3.381e-03  Element: 6683 | | **JAW[1]-Static 1-Strain-Strain1** | | | |  | Name | Type | | --- | --- | | Displacement1{1} | Deformed shape | | **JAW[1]-Static 1-Displacement-Displacement1{1}** | | |

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| Conclusion |

This part seems adequate at 7Kgf in the horizontal mounting position, but may want to add more aggressive filets to the high stress areas.