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|  | |  | | --- | | **Simulation of 45deg\_Side\_Thuster\_Bracket**  **Date: Sunday, May 29, 2022 Designer: Solidworks**  **Study name: Nonlinear 1**  **Analysis type: Nonlinear - Static** | | Table of Contents  [Description 1](#_Toc104748186)  [Assumptions 2](#_Toc104748187)  [Model Information 2](#_Toc104748188)  [Study Properties 3](#_Toc104748189)  [Units 3](#_Toc104748190)  [Material Properties 4](#_Toc104748191)  [Loads and Fixtures 5](#_Toc104748192)  [Connector Definitions 5](#_Toc104748193)  [Contact Information 6](#_Toc104748194)  [Mesh information 6](#_Toc104748195)  [Sensor Details 6](#_Toc104748196)  [Resultant Forces 7](#_Toc104748197)  [Beams 7](#_Toc104748198)  [Study Results 8](#_Toc104748199)  [Conclusion 10](#_Toc104748200) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** 45deg\_Side\_Thuster\_Bracket**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Fillet1** | **Solid Body** | ****Mass:0.00970378 kg****  ****Volume:9.51351e-06 m^3****  ****Density:1,020 kg/m^3****  ****Weight:0.095097 N**** | ****C:\Users\Isac\OneDrive\ROV-2022\MECHAICAL\45deg\_Side\_Thuster\_Bracket.SLDPRT****  **May 29 20:21:47 2022** | |

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| Study Properties  |  |  | | --- | --- | | Study name | Nonlinear 1 | | Analysis type | Nonlinear - Static | | Mesh type | Solid Mesh | | Start time | 0 Seconds | | End time | 1 Seconds | | Time increment | Auto stepping | | Compute free body forces | Off | | Large displacement formulation: | On | | Update load direction with deflection: | Off | | Large strain formulation: | Off | | Save data for restarting the analysis | Off | | Thermal Effect: | On | | Thermal option | Include temperature loads | | Zero strain temperature | 298 Kelvin | | Solver type | Large Problem Direct Sparse | | Incompatible bonding options | Simplified | | Control technique: | Force | | Iterative technique: | NR(Newton-Raphson) | | Integration Method | Newmark | | Result folder | SOLIDWORKS document (C:\Users\Isac\OneDrive\ROV-2022\MECHAICAL) | |

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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:**** | **ABS** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Tensile strength:**** | **3e+07 N/m^2** | | ****Elastic modulus:**** | **2e+09 N/m^2** | | ****Poisson's ratio:**** | **0.394** | | ****Mass density:**** | **1,020 kg/m^3** | | ****Shear modulus:**** | **3.189e+08 N/m^2** | | **SolidBody 1(Fillet1)(45deg\_Side\_Thuster\_Bracket)** | | **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)** | **-2.83083** | **2.83083** | **7.03149e-08** | **4.0034** | | **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: | **45 lbf** | | | **Force-2** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply normal force** | | Value: | **-45 lbf** | | |

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| Connector Definitions No Data |

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| Contact Information No Data |

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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 | 2.11973 mm | | Tolerance | 0.105987 mm | | Mesh Quality | High |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 11235 | | Total Elements | 7120 | | Maximum Aspect Ratio | 4.2982 | | % of elements with Aspect Ratio < 3 | 99.6 | | Percentage of elements with Aspect Ratio > 10 | 0 | | Percentage of distorted elements | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:01 | | 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 | -2.83083 | 2.83083 | 7.03149e-08 | 4.0034 |  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 | 0 | 0 | 0 |  Free body 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 at Step No: 13(1 Seconds) | 5.770e+03N/m^2  Node: 10987 | 4.729e+07N/m^2  Node: 234 | | **45deg\_Side\_Thuster\_Bracket-Nonlinear 1-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement at Step No: 13(1 Seconds) | 0.000e+00mm  Node: 30 | 1.822e+00mm  Node: 586 | | **45deg\_Side\_Thuster\_Bracket-Nonlinear 1-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain at Step No: 13(1 Seconds) | 2.958e-05  Element: 3951 | 1.962e-02  Element: 3075 | | **45deg\_Side\_Thuster\_Bracket-Nonlinear 1-Strain-Strain1** | | | | |

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| Conclusion |