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|  | |  | | --- | | **Simulation of Waxo\_C2**  **Date: Wednesday, May 10, 2017 Designer: Solidworks**  **Study name: Static 2**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc482179979)  [Assumptions 2](#_Toc482179980)  [Model Information 2](#_Toc482179981)  [Study Properties 3](#_Toc482179982)  [Units 4](#_Toc482179983)  [Material Properties 4](#_Toc482179984)  [Loads and Fixtures 5](#_Toc482179985)  [Connector Definitions 5](#_Toc482179986)  [Contact Information 6](#_Toc482179987)  [Mesh information 7](#_Toc482179988)  [Sensor Details 9](#_Toc482179989)  [Resultant Forces 10](#_Toc482179990)  [Beams 10](#_Toc482179991)  [Study Results 11](#_Toc482179992)  [Conclusion 14](#_Toc482179993) | |
| Description Al 6061-T4  10 (width) 2 (thickness) |

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| Assumptions  |  |  | | --- | --- | | Original Model | Model Analyzed | |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** Waxo\_C2**  ****Current Configuration:** Default** | | | | | ****Solid Bodies**** | | | | | ****Document Name and Reference**** | ****Treated As**** | ****Volumetric Properties**** | ****Document Path/Date Modified**** | | **Cut-Extrude2** | **Solid Body** | ****Mass:0.00761213 kg****  ****Volume:2.81931e-006 m^3****  ****Density:2700 kg/m^3****  ****Weight:0.0745988 N**** | ****Z:\Research project\myWork\Design\WaxoDesign\curvedBarRight.SLDPRT****  **May 09 19:51:40 2017** | | **Split Line2** | **Solid Body** | ****Mass:0.0176463 kg****  ****Volume:6.53566e-006 m^3****  ****Density:2700 kg/m^3****  ****Weight:0.172934 N**** | ****Z:\Research project\myWork\Design\WaxoDesign\torqueBar.SLDPRT****  **May 09 19:53:09 2017** | |

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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 | FFEPlus | | 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 (Z:\Research project\myWork\Design\WaxoDesign) | |

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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-T4 (SS)** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Max von Mises Stress** | | ****Yield strength:**** | **2.27527e+008 N/m^2** | | ****Tensile strength:**** | **2.4e+008 N/m^2** | | ****Elastic modulus:**** | **6.9e+010 N/m^2** | | ****Poisson's ratio:**** | **0.33** | | ****Mass density:**** | **2700 kg/m^3** | | ****Shear modulus:**** | **2.6e+010 N/m^2** | | ****Thermal expansion coefficient:**** | **2.4e-005 /Kelvin** | | **SolidBody 1(Cut-Extrude2)(curvedBarRight-1),**  **SolidBody 1(Split Line2)(torqueBar-2)** | | **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)** | **-121.521** | **0.00362968** | **122.937** | **172.861** | | **Reaction Moment(N.m)** | **0** | **0** | **0** | **0** | | | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-3** |  | |  |  | | --- | --- | | Entities: | **1 face(s)** | | Type: | **Apply normal force** | | Value: | **200 N** | | |

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| Connector Definitions No Data |

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| Contact Information  | Contact | Contact Image | Contact Properties | | --- | --- | --- | | Global Contact |  | |  |  | | --- | --- | | Type: | **Bonded** | | Components: | **1 component(s)** | | Options: | **Compatible 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 | 4 Points | | Element Size | 4.43824 mm | | Tolerance | 0.221912 mm | | Mesh Quality | High | | Remesh failed parts with incompatible mesh | Off |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 4426 | | Total Elements | 1859 | | Maximum Aspect Ratio | 11.446 | | % of elements with Aspect Ratio < 3 | 72.4 | | % of elements with Aspect Ratio > 10 | 0.108 | | % of distorted elements(Jacobian) | 0 | | Time to complete mesh(hh;mm;ss): | 00:00:04 | | Computer name: | ASUS-YACINE | |  | | |

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| Sensor Details  | Sensor name | Location | Sensor Details | | --- | --- | --- | | Stress1 |  | Value : 1005.73 N/mm^2 (MPa)  Entities :  Result :Stress  Component :VON: von Mises Stress  Criterion :Model Max  Step Criterion : Across all Steps  Step No.:1  Alert Value: is greater than 1e+009 N/mm^2 (MPa) | | Mass1 |  | Value : 25.2584098 g  Entities :2 component(s)  Result :Stress  Component :VON: von Mises Stress  Criterion :Model Max  Step Criterion : Across all Steps  Step No.:1  Alert Value: NA | | Stress2 |  | Value : 145869 psi  Entities :  Result :Stress  Component :VON: von Mises Stress  Criterion :Model Max  Step Criterion : Across all Steps  Step No.:1  Alert Value: NA | | Minimum Factor of Safety1 |  | Value : 0.226231  Entities :  Result :Factor of Safety  Component :Automatic  Criterion :Model Max  Step Criterion : Across all Steps  Step No.:1  Alert Value: NA | | Mass2 |  | Value : 25.2584098 g  Entities :  Result :Stress  Component :VON: von Mises Stress  Criterion :Model Max  Step Criterion : Across all Steps  Step No.:1  Alert Value: NA | |

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| Resultant ForcesReaction forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | N | -121.521 | 0.00362968 | 122.937 | 172.861 |  Reaction 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 | 45778.2 N/m^2  Node: 4066 | 1.00573e+009 N/m^2  Node: 3617 | | **Waxo\_C2-Static 2-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0 mm  Node: 37 | 100.016 mm  Node: 3279 | | **Waxo\_C2-Static 2-Displacement-Displacement1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Strain1 | ESTRN: Equivalent Strain | 8.22947e-007  Element: 1513 | 0.0115751  Element: 1653 | | **Waxo\_C2-Static 2-Strain-Strain1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Factor of Safety1 | Max von Mises Stress | 0.226231  Node: 3617 | 4970.2  Node: 4066 | | **Waxo\_C2-Static 2-Factor of Safety-Factor of Safety1** | | | | |

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| Conclusion |