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|  | |  | | --- | | **Simulation of Quiz 4**  **Date: Tuesday, October 3, 2023 Designer: Jakob Werle**  **Study name: JW Q4**  **Analysis type: Static** | | Table of Contents  [Description 1](#_Toc147235514)  [Assumptions 2](#_Toc147235515)  [Model Information 3](#_Toc147235516)  [Study Properties 5](#_Toc147235517)  [Units 5](#_Toc147235518)  [Material Properties 6](#_Toc147235519)  [Loads and Fixtures 7](#_Toc147235520)  [Connector Definitions 8](#_Toc147235521)  [Interaction Information 8](#_Toc147235522)  [Mesh information 8](#_Toc147235523)  [Sensor Details 8](#_Toc147235524)  [Resultant Forces 9](#_Toc147235525)  [Beams 10](#_Toc147235526)  [Study Results 11](#_Toc147235527)  [Conclusion 14](#_Toc147235528) | |
| Description No Data |

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| Assumptions |

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| Model Information  |  |  |  |  |  | | --- | --- | --- | --- | --- | | |  | | --- | |  |   ****Model name:** Quiz 4**  ****Current Configuration:** Default<As Machined>** | | | | | ****Beam Bodies:**** | | | | | ****Document Name and Reference**** | ****Formulation**** | ****Properties**** | ****Document Path/Date Modified**** | | **SolidBody 1( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[1])** | **Beam – Uniform C/S** | ****Section Standard-custom/english/1.5 by .75 in rec 2****  ****Section Area: 1.125in^2****  ****Length:72in****  ****Volume:81in^3****  ****Mass Density:0.0975437lb/in^3****  ****Mass:7.90104lb****  ****Weight:7.89568lbf**** | ****C:\Users\jakob\software\TU\23FL\CAD\Q4\Quiz 4.SLDPRT****  **Oct 3 14:22:36 2023** | | **SolidBody 2( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[2])** | **Beam – Uniform C/S** | ****Section Standard-custom/english/1.5 by .75 in rec 2****  ****Section Area: 1.125in^2****  ****Length:60in****  ****Volume:67.5in^3****  ****Mass Density:0.0975437lb/in^3****  ****Mass:6.5842lb****  ****Weight:6.57973lbf**** | ****C:\Users\jakob\software\TU\23FL\CAD\Q4\Quiz 4.SLDPRT****  **Oct 3 14:22:36 2023** | |

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| Study Properties  |  |  | | --- | --- | | Study name | JW Q4 | | Analysis type | Static | | Mesh type | Beam Mesh | | Solver type | Automatic | | Inplane Effect: | Off | | Soft Spring: | Off | | Inertial Relief: | Off | | Incompatible bonding options | Automatic | | Large displacement | Off | | Compute free body forces | On | | Result folder | SOLIDWORKS document (C:\Users\jakob\software\TU\23FL\CAD\Q4) | |

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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:**** | **6061-T6 (SS)** | | ****Model type:**** | **Linear Elastic Isotropic** | | ****Default failure criterion:**** | **Unknown** | | ****Yield strength:**** | **39,885.4 psi** | | ****Tensile strength:**** | **44,961.7 psi** | | ****Elastic modulus:**** | **1.00076e+07 psi** | | ****Poisson's ratio:**** | **0.33** | | ****Mass density:**** | **0.0975437 lb/in^3** | | ****Shear modulus:**** | **3.77098e+06 psi** | | ****Thermal expansion coefficient:**** | **1.33333e-05 /Fahrenheit** | | **SolidBody 1( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[1])(Quiz 4),**  **SolidBody 2( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[2])(Quiz 4)** | | **Curve Data:N/A** | | | |

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| **Loads and Fixtures**  | ****Fixture name**** | ****Fixture Image**** | ****Fixture Details**** | | --- | --- | --- | | **Reference Geometry-1** |  | |  |  | | --- | --- | | Entities: | **1 Joint(s)** | | Reference: | **Front** | | Type: | **Use reference geometry** | | Translation: | **0, 0, 0** | | Rotation: | **0, 0, ---** | | Units: | **in, rad** | | | **Reference Geometry-2** |  | |  |  | | --- | --- | | Entities: | **1 Joint(s)** | | Reference: | **Face< 1 >** | | Type: | **Use reference geometry** | | Translation: | **0, ---, 0** | | Rotation: | **---, 0, 0** | | Units: | **in, rad** | | | **Reference Geometry-3** |  | |  |  | | --- | --- | | Entities: | **1 Joint(s)** | | Reference: | **Front** | | Type: | **Use reference geometry** | | Translation: | **---, ---, 0** | | Rotation: | **0, 0, ---** | | Units: | **in, rad** | |  | ****Load name**** | ****Load Image**** | ****Load Details**** | | --- | --- | --- | | **Force-1** |  | |  |  | | --- | --- | | Entities: | **1 Point Load(s)** | | Reference: | **Face< 1 >** | | Type: | **Apply force** | | Values: | **---, ---, 700 lbf** | | Moments: | **---, ---, --- lbf.in** | | | **Force-2** |  | |  |  | | --- | --- | | Entities: | **1 Beam (s)** | | Reference: | **Face< 1 >** | | Type: | **Apply force** | | Values: | **---, ---, 7.5 lbf/in** | | Moments: | **---, ---, --- lbf·in/in** | | |

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| Connector Definitions No Data |

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| Interaction Information No Data |

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| Mesh information  |  |  | | --- | --- | | Mesh type | Beam Mesh |  Mesh information - Details  |  |  | | --- | --- | | Total Nodes | 62 | | Total Elements | 59 | | Time to complete mesh(hh;mm;ss): | 00:00:01 | | Computer name: | JW-MACHINE | |

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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 | -270 | 1,060 | 4.18883e-12 | 1,093.85 |  Reaction Moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | lbf.in | 9.38793e-12 | -6.28603e-11 | -1.62425e-25 | 6.35574e-11 | |
| Free body forces  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | lbf | 0 | 0 | 0 | 0 |  Free body moments  | Selection set | Units | Sum X | Sum Y | Sum Z | Resultant | | --- | --- | --- | --- | --- | --- | | Entire Model | lbf.in | 0 | 0 | 0 | 0 | |

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| BeamsBeam Forces  | Beam Name | Joints | Axial(lbf) | Shear1(lbf) | Shear2(lbf) | Moment1(lbf.in) | Moment2(lbf.in) | Torque(lbf.in) | | --- | --- | --- | --- | --- | --- | --- | --- | | Beam-1( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[1]) | 1 | -59.6939 | -620.408 | -1.7042e-13 | 6.58889e-12 | 4.39176e-08 | -2.82621e-14 | | 2 | 59.6939 | -79.5918 | 2.97906e-13 | -2.34486e-11 | 19,469.4 | -2.82621e-14 | | Beam-2( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[2]) | 1 | 6.44673e-06 | -549.49 | -1.33984e-12 | 4.46032e-11 | -8.39579e-08 | -3.59821e-14 | | 2 | -0.00010103 | 99.4898 | 1.68548e-12 | 8.98462e-11 | -19,469.4 | 4.49457e-12 |  Beam Stresses  | Beam Name | Joints | Axial(psi) | Bending Dir1(psi) | Bending Dir2(psi) | Torsional (psi) | Upper bound axial and bending(psi) | | --- | --- | --- | --- | --- | --- | --- | | Beam-1( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[1]) | 1 | -53.0612 | 4.68543e-11 | -1.56152e-07 | -1.6366e-13 | 53.0612 | | 2 | -53.0612 | 1.66746e-10 | 69,224.5 | 1.6366e-13 | 69,277.6 | | Beam-2( C:\PROGRAM FILES\SOLIDWORKS CORP\SOLIDWORKS\LANG\ENGLISH\WELDMENT PROFILES\CUSTOM\ENGLISH\1.5 BY .75 IN REC 2 - IS MISSING(1)[2]) | 1 | -5.73043e-06 | -3.17178e-10 | -2.98517e-07 | 2.08365e-13 | 6.02927e-06 | | 2 | -8.98046e-05 | 6.38907e-10 | 69,224.5 | 2.60272e-11 | 69,224.5 | |

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| Study Results  | Name | Type | Min | Max | | --- | --- | --- | --- | | Stress1 | Upper bound axial and bending | 4,275.801psi  Element: 33 | 79,465.297psi  Element: 16 | | **Quiz 4-JW Q4-Stress-Stress1** | | | |  | Name | Type | Min | Max | | --- | --- | --- | --- | | Displacement1 | URES: Resultant Displacement | 0.000in  Node: 33 | 20.169in  Node: 3 | | **Quiz 4-JW Q4-Displacement-Displacement1** | | | |  | Name | Type | | --- | --- | | Shear-Moment Plot1 | Shear Force in Dir1 | | **Quiz 4-JW Q4-Shear-Moment Plot-Shear-Moment Plot1** | |  | Name | Type | | --- | --- | | Shear-Moment Plot2 | Moment about Dir2 | | **Quiz 4-JW Q4-Shear-Moment Plot-Shear-Moment Plot2** | | |

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| Conclusion |