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ME 643

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Deliverable 2

# Beam Equations

## Maximum and Minimum Axial Stress:

## Maximum and Minimum Bending Stress:

## Maximum and Minimum Combined Stress:

## Mean & Alternating Stress:

## Buckling

## Deflection

## Factor of Safety’s

# Pin Equations

## Pin Shear Stress

## Pin Bearing Stress

## Pin Tear-Out Stress

## Factor of Safety’s

# Beam Dimensions

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Link | Length (in) | Base (in) | h, in (mm) | Schematic Drawing |
| OA | 0.5 | 0.35 | 0.15 |  |
| AB | 4.68 | 0.35 | 0.3 |  |
| BD | 3.5 | 0.5 | 0.4 |  |
| DE | 3.4 | 0.35 | 0.3 |  |

# Beam Calculations and Values

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **Member OA** | **Member AB** | **Member BD** | **Member DE** |
| **Maximum Stress (psi)** | 434.3 | 14.2 | 76.9 | 14.3 |
| **Minimum Stress (psi)** | 418.9 | 5.0 | 20.6 | 5.1 |
| **Mean Stress (psi)** | 426.6 | 9.6 | 48.7 | 9.7 |
| **Alternating Stress (psi)** | 7.7 | 4.6 | 28.2 | 4.6 |
| **Tearout Stress (psi)** | 6.6 | 12.3 | 1.6 | 12.4 |
|  | 6.5 | 98.7 | 17.0 | 98.4 |
|  | 85.6 | 144.4 | 23.4 | 144.4 |
|  | 6.0 | 495.3 | 121.7 | 486.1 |
|  | 5.8 | 176.2 | 32.5 | 175.0 |
|  | 117.3 | 5.0 | 210.2 | 7.8 |
|  | 3.5 | Infinite | 2.5 | Infinite |
|  | 270.6 | 145.3 | 1283.0 | 144.3 |
| **Failure Mode** | **Deflection** | **Buckling** | **Deflection** | **Buckling** |

# Pin Calculations and Values

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Pin** | **A** | **B** | **C** | **D** | **E** |
| **Diameter (in)** | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 |
| **Length (in)** | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 |
| **Max Force (lb)** | 1.5 | 1.5 | 3.0 | 1.5 | 1.5 |
| **Shear Stress (psi)** | 10.8 | 10.8 | 9.3 | 10.9 | 10.9 |
| **Bending Stress (psi)** | 69.9 | 69.9 | 91.5 | 70.4 | 70.4 |
|  | 231.1 | 231.1 | 269.3 | 229.6 | 229.6 |
|  | 35.7 | 35.7 | 27.3 | 35.5 | 35.5 |
| **Failure Mode** | **Bearing** | **Bearing** | **Bearing** | **Bearing** | **Bearing** |

# Solidworks Drawings of Members