

Member BC

| | | | | | | | | |
|------------------|-------|-------|-------|-------|------|-------|-----|------|
| Input Properties | X_N | Y_N | X_F | Y_F | A | E | I | w |
| | 72 | 144 | 216 | 144 | 16.8 | 29000 | 758 | 0.25 |

| | | | |
|-----------------|-------|-------------|-------------|
| Calc Properties | L | λ_x | λ_y |
| | 144.0 | 1.000 | 0.000 |

Local Coordinate System

| | $d_{Nx'}$ | $d_{Ny'}$ | $\theta_{Nz'}$ | $d_{Fx'}$ | $d_{Fy'}$ | $\theta_{Fz'}$ | q_0 | $q = T Q$ | | |
|------------|-----------|-----------|----------------|-----------|-----------|----------------|--------|-----------|-------|---|
| $q_{Nx'}$ | 3383.3 | 0 | 0 | -3383 | 0 | 0 | 0 | 21.05 | k | |
| $q_{Ny'}$ | 0 | 88.341 | 6360.5 | 0 | -88.34 | 6360.5 | 18.000 | 18.00 | k | |
| $m_{Nz'}$ | 0 | 6360.5 | 610611 | 0 | -6361 | 305306 | 432.0 | 359.87 | k-in. | |
| $q_{NFx'}$ | -3383 | 0 | 0 | 3383.3 | 0 | 0 | 0 | -21.05 | k | |
| $q_{Fy'}$ | 0 | -88.34 | -6361 | 0 | 88.341 | -6361 | 18.000 | 18.00 | k | |
| $m_{Fz'}$ | 0 | 6360.5 | 305306 | 0 | -6361 | 610611 | -432.0 | -359.87 | k-in. | |
| T | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |

T^t k'

| | | | | | | |
|--|--------|--------|--------|--------|--------|--------|
| | 3383.3 | 0 | 0 | -3383 | 0 | 0 |
| | 0 | 88.341 | 6360.5 | 0 | -88.34 | 6360.5 |
| | 0 | 6360.5 | 610611 | 0 | -6361 | 305306 |
| | -3383 | 0 | 0 | 3383.3 | 0 | 0 |
| | 0 | -88.34 | -6361 | 0 | 88.341 | -6361 |
| | 0 | 6360.5 | 305306 | 0 | -6361 | 610611 |

Global Coordinate System

| | D_1 | D_2 | θ_3 | D_4 | D_5 | θ_6 | $Q_0 = T^t q_0$ | D | kD | Q |
|-------|--------|--------|------------|--------|--------|------------|-----------------|--------|----------|---------------|
| Q_1 | 3383.3 | 0 | 0 | -3383 | 0 | 0 | 0 | 0.0031 | 21.0503 | 21.05 k |
| Q_2 | 0 | 88.341 | 6360.5 | 0 | -88.34 | 6360.5 | 18 | -0.011 | 9.3E-15 | 18.00 k |
| M_3 | 0 | 6360.5 | 610611 | 0 | -6361 | 305306 | 432 | -2E-04 | -72.1258 | 359.87 k-in. |
| Q_4 | -3383 | 0 | 0 | 3383.3 | 0 | 0 | 0 | -0.003 | -21.0503 | -21.05 k |
| Q_5 | 0 | -88.34 | -6361 | 0 | 88.341 | -6361 | 18 | -0.011 | -9.3E-15 | 18.00 k |
| M_6 | 0 | 6360.5 | 305306 | 0 | -6361 | 610611 | -432 | 0.0002 | 72.1258 | -359.87 k-in. |

k = T^t k' T

Member CD

| | | | | | | | | |
|------------------|-------|-------|-------|-------|------|-------|-----|-------|
| Input Properties | X_N | Y_N | X_F | Y_F | A | E | I | w |
| | 216 | 144 | 288 | 0 | 16.8 | 29000 | 758 | 0.125 |

| | | | |
|-----------------|-------|-------------|-------------|
| Calc Properties | L | λ_x | λ_y |
| | 161.0 | 0.447 | -0.894 |

Local Coordinate System

| | | | | | | | | | | | | |
|-----------|-------------------|-----------|----------------|-----------|-----------|----------------|----------------------|----------------|--------|----------|---------------|---|
| k' | $d_{Nx'}$ | $d_{Ny'}$ | $\theta_{Nz'}$ | $d_{Fx'}$ | $d_{Fy'}$ | $\theta_{Fz'}$ | q_o | q = T Q | | | | |
| | q _{Nx'} | 3026.1 | 0 | 0 | -3026 | 0 | | | 0 | 25.51 k | | |
| | q _{Ny'} | 0 | 63.211 | 5088.4 | 0 | -63.21 | | | 5088.4 | 10.062 | 10.78 k | |
| | m _{Nz'} | 0 | 5088.4 | 546147 | 0 | -5088 | | | 273074 | 270.0 | 359.87 k-in. | |
| | q _{NFx'} | -3026 | 0 | 0 | 3026.1 | 0 | | | 0 | 0 | -25.51 k | |
| | q _{Fy'} | 0 | -63.21 | -5088 | 0 | 63.211 | | | -5088 | 10.062 | 9.35 k | |
| | m _{Fz'} | 0 | 5088.4 | 273074 | 0 | -5088 | | | 546147 | -270.0 | -244.64 k-in. | |
| T | 0.4472 | -0.894 | 0 | 0 | 0 | 0 | 0.44721 | 0.89443 | 0 | 0 | 0 | 0 |
| | 0.8944 | 0.4472 | 0 | 0 | 0 | 0 | -0.89443 | 0.44721 | 0 | 0 | 0 | 0 |
| | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| | 0 | 0 | 0 | 0.4472 | -0.894 | 0 | 0 | 0 | 0 | 0.44721 | 0.8944 | 0 |
| | 0 | 0 | 0 | 0.8944 | 0.4472 | 0 | 0 | 0 | 0 | -0.89443 | 0.4472 | 0 |
| | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |

| | | | | | | |
|-------------------------|--------|--------|--------|--------|--------|--------|
| T^t k' | 1353.3 | 56.538 | 4551.2 | -1353 | -56.54 | 4551.2 |
| | -2707 | 28.269 | 2275.6 | 2706.7 | -28.27 | 2275.6 |
| | 0 | 5088.4 | 546147 | 0 | -5088 | 273074 |
| | -1353 | -56.54 | -4551 | 1353.3 | 56.538 | -4551 |
| | 2706.7 | -28.27 | -2276 | -2707 | 28.269 | -2276 |
| | 0 | 5088.4 | 273074 | 0 | -5088 | 546147 |

Global Coordinate System

| | | | | | | | | | | | | | | | |
|-------------------------------|----------------|--------|------------|--|----------|-----------|----------|--------|--------|--------|--------|------|--------|----------|---------------|
| k = T^t k' T | D_4 | D_5 | θ_6 | Q_o = T^t q_o | D | kD | Q | | | | | | | | |
| | Q ₄ | 655.8 | -1185 | | | | | 4551.2 | -655.8 | 1185.2 | 4551.2 | 9 | -0.003 | 12.0503 | 21.05 k |
| | Q ₅ | -1185 | 2433.6 | | | | | 2275.6 | 1185.2 | -2434 | 2275.6 | 4.5 | -0.011 | -22.5 | -18.00 k |
| | M ₆ | 4551.2 | 2275.6 | | | | | 546147 | -4551 | -2276 | 273074 | 270 | 0.0002 | 89.8742 | 359.87 k-in. |
| | | -655.8 | 1185.2 | | | | | -4551 | 655.8 | -1185 | -4551 | 9 | 0 | -12.0503 | -3.05 k |
| | | 1185.2 | -2434 | | | | | -2276 | -1185 | 2433.6 | -2276 | 4.5 | 0 | 22.5 | 27.00 k |
| | | 4551.2 | 2275.6 | | | | | 273074 | -4551 | -2276 | 546147 | -270 | 0 | 25.3629 | -244.64 k-in. |

Structural Stiffness Matrix

| | D ₁ | D ₂ | θ ₃ | D ₄ | D ₅ | θ ₆ | |
|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------|
| Q ₁ | 4039.1 | 1185.2 | 4551.2 | -3383 | 0 | 0 | |
| Q ₂ | 1185.2 | 2521.9 | 4084.9 | 0 | -88.34 | 6360.5 | |
| M ₃ | 4551.2 | 4084.9 | 1E+06 | 0 | -6361 | 305306 | |
| Q ₄ | -3383 | 0 | 0 | 4039.1 | -1185 | 4551.2 | k/in. |
| Q ₅ | 0 | -88.34 | -6361 | -1185 | 2521.9 | -4085 | |
| M ₆ | 0 | 6360.5 | 305306 | 4551.2 | -4085 | 1E+06 | |

| | | | | | | | | |
|---------------------------|--------|--------|--------|--------|--------|--------|-----------------------|------------|
| | 0.0043 | -0.002 | 8E-08 | 0.0042 | 0.0019 | 1E-06 | | -9 k |
| | -0.002 | 0.0013 | -9E-07 | -0.002 | -9E-04 | -2E-06 | | 22.5 k |
| K₁₁(in) | 8E-08 | -9E-07 | 9E-07 | 1E-06 | 2E-06 | -2E-07 | Q₀₁ | 162 k-in. |
| | 0.0042 | -0.002 | 1E-06 | 0.0043 | 0.002 | 8E-08 | | 9 k |
| | 0.0019 | -9E-04 | 2E-06 | 0.002 | 0.0013 | 9E-07 | | 22.5 k |
| | 1E-06 | -2E-06 | -2E-07 | 8E-08 | 9E-07 | 9E-07 | | -162 k-in. |

| | | | | | | |
|----------------------|---------|-------------------------------------|------------|----------------|----------|---------|
| | 0 k | | 9 k | D ₁ | 0.00311 | inches |
| | 0 k | | -22.5 k | D ₂ | -0.01098 | inches |
| Q_k | 0 k-in. | Q_k-Q₀₁ | -162 k-in. | θ ₃ | -0.00024 | radians |
| | 0 k | | -9 k | D ₄ | -0.00311 | inches |
| | 0 k | | -22.5 k | D ₅ | -0.01098 | inches |
| | 0 k-in. | | 162 k-in. | θ ₆ | 0.00024 | radians |