Summary:

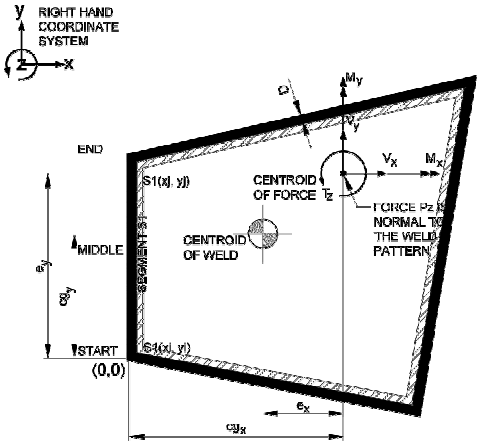
Material Property Factors

Rolled Sections	$\varphi_s = 0.9$
Weld	$\varphi_w = 0.67$
Dead Load Factor	$\alpha_D = 1.25$
Live Load Factor	$\alpha_L = 1.5$

Weld interface is taken at the face of the attached member rather than the centreline of the weld.

$Check\left(\alpha_D \geq 1.25\right) = "...OK"$

$Check\left(\alpha_L \geq 1.5\right) = "...OK"$



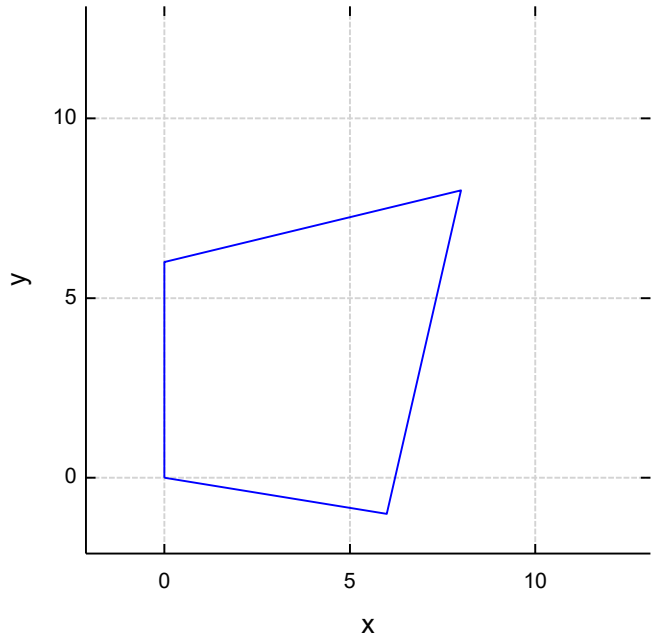
Applied Factored Loads:

Axial Load	$P_{fz} = 0$ K	$P_{fz} = 0$ kN
Shear (X-Axis)	$V_{fx} = 0$ K	$V_{fx} = 0$ kN
Shear (Y-Axis)	$V_{fy} = 0$ K	$V_{fy} = 0$ kN
Moment (X-Axis)	$M_{fx} = 0$ K_ft	$M_{fx} = 0$ kN_m
Moment (Y-Axis)	$M_{fy} = 0$ K_ft	$M_{fy} = 0$ kN_m
Torsion (Z-Axis)	$T_{fz} = 14$ K_ft	$T_{fz} = 18.9815$ kN_m

Load Eccentricity from Origin:

X-Axis Direction	$e_x = 3$ in	$e_x = 76.2$ mm
Y-Axis Direction	$e_y = 5$ in	$e_y = 127$ mm
Z-Axis Direction	$e_z = 0$ in	$e_z = 0$ mm

Weld Pattern



weld

Segment Input Data:

Row Represents Segment
Number Columns represent
S(xi, yi, xj, yj) coordinates

$$pts' = \begin{bmatrix} 0.0 & 0.0 & 0.0 & 6.0 \\ 0.0 & 6.0 & 8.0 & 8.0 \\ 8.0 & 8.0 & 6.0 & -1.0 \\ 6.0 & -1.0 & 0.0 & 0.0 \end{bmatrix} \text{in}$$

$$pts' = \begin{bmatrix} 0 & 0 & 0 & 152.4 \\ 0 & 152.4 & 203.2 & 203.2 \\ 203.2 & 203.2 & 152.4 & -25.4 \\ 152.4 & -25.4 & 0 & 0 \end{bmatrix} \text{mm}$$

Steel Properties

Part

Designation	$desM_1 = \text{"G40.21-350W"}$	
Yield Strength	$f_{y1} = 50\ \text{Ksi}$	$f_{y1} = 345\ \text{MPa}$
Ultimate Strength	$F_{u1} = 65\ \text{Ksi}$	$F_{u1} = 448\ \text{MPa}$

Base

Designation	$desM_2 = \text{"G40.21-300W"}$	
Yield Strength	$f_{y2} = 44\ \text{Ksi}$	$f_{y2} = 303\ \text{MPa}$
Ultimate Strength	$F_{u2} = 65\ \text{Ksi}$	$F_{u2} = 448\ \text{MPa}$
Young's Modulus	$E_s = 29000\ \text{Ksi}$	$E_s = 1.9995 \cdot 10^{5}\ \text{MPa}$
Shear Modulus	$G_s = 11153.8462\ \text{Ksi}$	$G_s = 76903\ \text{MPa}$
Density	$\gamma_s = 489\ \text{pcf}$	$\gamma_s = 76.8158\ \text{kNpcm}$

Welding Electrodes

Imperial Designation	$desI_w = \text{"E70xx"}$	
Metric Designation	$desM_w = \text{"E49xx"}$	
Ultimate Strength	$X_u = 70\ \text{ksi}$	$X_u = 483\ \text{MPa}$

Weld Size

Imperial Designation	$desI_D = \text{""}$	
Metric Designation	$desM_D = \text{"10mm"}$	
Size	$D = 0.3937\ \text{in}$	$D = 10\ \text{mm}$
Limit Weld Stress	$v_{rw} = 22.2\ \text{ksi}$	$v_{rw} = 153.2\ \text{MPa}$
Weld Material Strength	$v_{rw} = 22.2\ \text{ksi}$	$v_{rw} = 153.2\ \text{MPa}$
Part Metal Strength	$v_{rb1} = 29.2\ \text{Ksi}$	$v_{rb1} = 201.2\ \text{MPa}$
Base Metal Strength	$v_{rb2} = 29.2\ \text{Ksi}$	$v_{rb2} = 201.2\ \text{MPa}$
Minimum Weld Capacity	$V_{rw} = 22.2\ \text{Ksi}$	$V_{rw} = 153.2\ \text{MPa}$
Min Resistance per Unit Len	$v_r = 8.7\ \text{Kpi}$	$v_r = 1.5\ \text{kNpmm}$

Weld Properties

Total Length of Weld	$A = 29.5485\ \text{in}$	$A = 750.5\ \text{mm}$
Centroid of Weld X-Axis	$cg_x = 3.918\ \text{in}$	$cg_x = 99.5\ \text{mm}$
Centroid of Weld Y-Axis	$cg_y = 3.5518\ \text{in}$	$cg_y = 90.2\ \text{mm}$
Moment of Inertia (X-Axis)	$I'_{xx} = 283.2\ \text{in}^3$	$I'_{xx} = 4.64 \cdot 10^{6}\ \text{mm}^3$
Moment of Inertia (Y-Axis)	$I'_{yy} = 250.2\ \text{in}^3$	$I'_{yy} = 4.10 \cdot 10^{6}\ \text{mm}^3$
Product of Inertia	$I'_{xy} = 36.5\ \text{in}^3$	$I'_{xy} = 5.97 \cdot 10^{5}\ \text{mm}^3$
Polar Moment of Inertia	$I'_p = 533.4\ \text{in}^3$	$I'_p = 8.74 \cdot 10^{6}\ \text{mm}^3$
Prod of Moment of Inertia	$I'_{prod} = 69528.7\ \text{in}^6$	$I'_{prod} = 1.87 \cdot 10^{13}\ \text{mm}^6$

Weld Force from Direct Loads

X-Axis Direction	$\sigma_{fx} = 0.00\ \text{Kpi}$	$\sigma_{fx} = 0.00\ \text{kNpmm}$
Y-Axis Direction	$\sigma_{fy} = 0.00\ \text{Kpi}$	$\sigma_{fy} = 0.00\ \text{kNpmm}$
Z-Axis Direction	$\sigma_{fz} = 0.00\ \text{Kpi}$	$\sigma_{fz} = 0.00\ \text{kNpmm}$

Load at Weld Group Centroid:

Moment (X-Axis)	$M'_{fx} = 0$ K_ft	$M'_{fx} = 0$ kN_m
Moment (Y-Axis)	$M'_{fy} = 0$ K_ft	$M'_{fy} = 0$ kN_m
Torsion (Z-Axis)	$T'_{fz} = 14$ K_ft	$T'_{fz} = 18.9815$ kN_m
Max Weld Force at Start of Segment in Pattern	$\sigma'_x = 1.90$ Kpi	$\sigma'_x = 0.33$ kNpmm
Min Weld Force at Start of Segment in Pattern	$op'_1 = 1$ Kpi	$op'_1 = 0$ kNpmm
Max Weld Force at End of Segment in Pattern	$\sigma'_y = 1.31$ Kpi	$\sigma'_y = 0.23$ kNpmm
Min Weld Force at End of Segment in Pattern	$op'_2 = 1.46$ Kpi	$op'_2 = 0.25$ kNpmm
Max Weld Force at Mid Point of Segment in Pattern	$\sigma'_z = 1.90$ Kpi	$\sigma'_z = 0.33$ kNpmm
Min Weld Force at Mid Point of Segment in Pattern	$op'_3 = 0.97$ Kpi	$op'_3 = 0.17$ kNpmm
Maximum Weld Force in Pattern	$op_{max} = 1.90$ Kpi	$op_{max} = 0.33$ kNpmm
Minimum Weld Force in Pattern	$op'_{min} = 0.97$ Kpi	$op'_{min} = 0.17$ kNpmm
Weld Resistance:	$v_r = 8.75$ Kpi	$v_r = 1.53$ kNpmm

$Check\left(v_r \geq op_{max}\right) = \text{"...OK"}$

$Check\left(v_r \geq 0.95 \cdot op_{max}\right) = \text{"...OK"}$

$Check\left(v_r \geq \left|op'_{min}\right|\right) = \text{"...OK"}$