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1 Input Parameters

Module	Tension Members Welded Design
Axial (kN)	500.0
Length (mm) *	5000.0
Section Size*	Ref List of Input Section
Plate Details	
Plate Thickness (mm)*	[3.0, 4.0, 6.0, 8.0, 10.0, 12.0 , 14.0, 16.0, 20.0, 22.0, 24.0 , 25.0, 26.0, 28.0, 30.0, 32.0 , 36.0, 40.0, 45.0, 50.0, 56.0 , 63.0, 80.0]
Material	E 250 (Fe 410 W)B
Ultimate strength, fu (MPa)	410
Yield Strength , fy (MPa)	250
Weld Details	
Weld Type	Fillet
Type of weld fabrication	Shop Weld
Material grade overwrite (MPa) Fu	410.0
Safety Factors - IS 800:2007 Table 5 (Clause 5.4.1)	
Governed by Yielding	$\gamma_{m0} = 1.1$
Governed by Ultimate Stress	$\gamma_{m1} = 1.25$
Connection Weld	$\gamma_{mw} = 1.25$

1.1 List of Input Section

Section Size*	['MC 75', 'MC 100', 'MC 125', 'MC 125*', 'MC 150', 'MC 150*', 'MC 175', 'MC 175*', '
	MC 200', 'MC 200*', 'MC 225', 'MC 225*', 'MC 250', 'MC 250*', 'MC 250*', 'MC 300',
	'MC 300*', 'MC 300*', 'MC 350', 'MC 400', 'JC 100', 'JC 125', 'JC 150', 'JC 175', '
	JC 200', 'LC 75', 'LC 100', 'LC 125', 'LC (P) 125', 'LC 150', 'LC (P) 150', 'LC 175
	', 'LC 200', 'LC (P) 200', 'LC 225', 'LC 250', 'LC 300', 'LC (P) 300', 'LC 350', 'L
	C 400', 'MPC 75', 'MPC 100', 'MPC 125', 'MPC 125*', 'MPC 150', 'MPC 150*', 'MPC 175
	', 'MPC 175*', 'MPC 200', 'MPC 200*', 'MPC 225', 'MPC 225*', 'MPC 250', 'MPC 250*',
	'MPC 250*', 'MPC 300', 'MPC 300*', 'MPC 300*', 'MPC 350', 'MPC 400']

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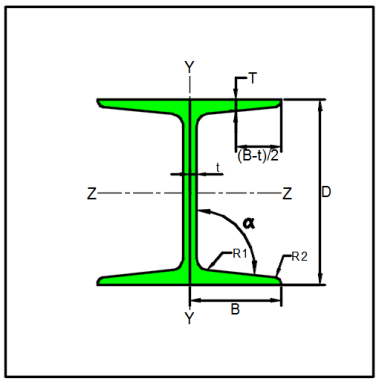
2 Design Checks

2.1 Selected Member Data



Section Size*		('MC 100', 'Back to Back Channels')	
Material		E 250 (Fe 410 W)B	
Ultimate strength, fu (MPa)		410	
Yield Strength , fy (MPa)		250	
Mass	9.56	Iz(mm4)	3820000.0
Area(mm2) - A	1210.0	Iy(mm4)	1099900.0
D(mm)	100	rz(mm)	39.7
B(mm)	50	ry(mm)	21.3
t(mm)	5.0	Zz(mm3)	76400.0
T(mm)	7.7	Zy(mm3)	22000.0
FlangeSlope	96	Zpz(mm3)	88960.0
R1(mm)	9.0	Zpy(mm3)	414340.0
R2(mm)	2.4	r(mm)	21.32

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2.2 Member Checks

Check	Required	Provided	Remarks
Tension Yielding Capacity (kN)		$T_{dg}\ or\ A_c = \frac{2 * A_g\ f_y}{\gamma_{m0}}$ $= \frac{2 * 1210.0 * 250}{1.1}$ $= 550.0$	
Tension Rupture Capacity (kN)		$\beta = 1.4 - 0.076 * \frac{w}{t} * \frac{f_y}{0.9 * f_u} * \frac{b_s}{L_c}$ $\leq \frac{0.9 * f_u * \gamma_{m0}}{f_y * \gamma_{m1}} \geq 0.7$ $= 1.4 - 0.076 * \frac{50}{5.0} * \frac{250}{0.9 * 410} * \frac{50}{159}$ $\leq \frac{0.9 * 410 * 1.1}{250 * 1.25} \geq 0.7$ $= 1.24$ $T_{dn} = 2 * (\frac{0.9 * A_{nc} * f_u}{\gamma_{m1}} + \frac{\beta * A_{go} * f_y}{\gamma_{m0}})$ $= 2 * (\frac{0.9 * 423.0 * 410}{1.25} + \frac{1.24 * 770.0 * 250}{1.1})$ $= 683.74$	
Tension Capacity (kN)	500.0	$T_d = min(T_{dg}, T_{dn})$ $= min(550.0, 683.74)$ $= 550.0$	Pass
Slenderness	$\frac{K * L}{r} \leq 400$	$\frac{K * L}{r} = \frac{1 * 5000.0}{21.32}$ $= 234.53$	Pass
Utilization Ratio	$Utilization\ Ratio \leq 1$	$Utilization\ Ratio = \frac{F}{Td} = \frac{500.0}{550.0}$ $= 0.91$	
Axial Load Considered (kN)	$Ac_{min} = 0.3 * A_c$ $= 0.3 * 550.0$ $= 165.0$ $Ac_{max} = 550.0$	$A = 500.0$	Pass

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2.3 Thickness Checks

Check	Required	Provided	Remarks
Tension Yielding Capacity (kN)	500.0	$T_{dg} = \frac{l * t * f_y}{\gamma_{mo}}$ $= \frac{1 * 400 * 24.0 * 250}{1.1}$ $= 545.45$	Pass

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2.4 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$t_{w_{min}}$ *based on thinner part* $= 5$ *or* 3 $IS800:2007\ cl.10.5.2.3\ Table21$ $t_{w_{min}}$ *based on thicker part* $= 6$	5	Pass
Max Weld Size (mm)	*Thickness of Thinner part* $= min(24.0, 5.0) = 5.0$ $t_{w_{max}} = 5$	5	Pass
Throat Thickness (mm)	$t_t \geq 3$	$t_t = 0.7 * t_w$ $= 0.7 * 5$ $t_t = 3.5$	Pass
Effective length (mm)		$l_w = 756$	
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{0.0 * 0.0}{1.0}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{0.0 * 0.0}{1.0}$ $V_{wv} = \frac{V}{l_w} = \frac{0.0}{756}$ $A_{wh} = \frac{A}{l_w} = \frac{500000.0}{756}$ $R_w = \sqrt{(0.0 + 661.38)^2 + (0.0 + 0.0)^2}$ $= 661.38$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{3.5 * 410}{\sqrt{3} * 1.25}$ $= 662.8$	Pass

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2.5 Gusset Plate Checks

Check	Required	Provided	Remarks
Min.Height (mm)		$H = 1 * Depth + clearance$ $= (1 * 400) + 30$ $= 130$	
Min.Length (mm)	5000.0	$L = Flangeweld + clearance$ $= 144 + 30$ $= 174$	Pass
Thickness (mm)		$t_p = 24.0$	
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t * f_y}{\gamma_{mo}}$ $= \frac{1 * 400 * 24.0 * 250}{1.1}$ $= 545.45$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{1 * 0.9 * 400 * 24.0 * 410}{1.25}$ $= 708.48$	
Block Shear Capacity (kN)		$T_{db1} = \frac{A_{vg} f_y}{\sqrt{3}\gamma_{m0}} + \frac{0.9 A_{tn} f_u}{\gamma_{m1}}$ $T_{db2} = \frac{0.9 * A_{vn} f_u}{\sqrt{3}\gamma_{m1}} + \frac{A_{tg} f_y}{\gamma_{m0}}$ $T_{db} = min(T_{db1}, T_{db2}) = 1277.65$	
Tension Capacity (kN)	$A = 500.0$	$T_d = min(T_{dg}, T_{dn}, T_{db})$ $= min(545.45, 708.48, 1277.65)$ $= 545.45$	Pass

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2.6 Intermittent Connection

Check	Required	Provided	Remarks
Connection (nos)		4	
Spacing (mm)	1000	930.4	Pass
Min.Height (mm)		130	
Min.Length (mm)		50	

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3 3D View

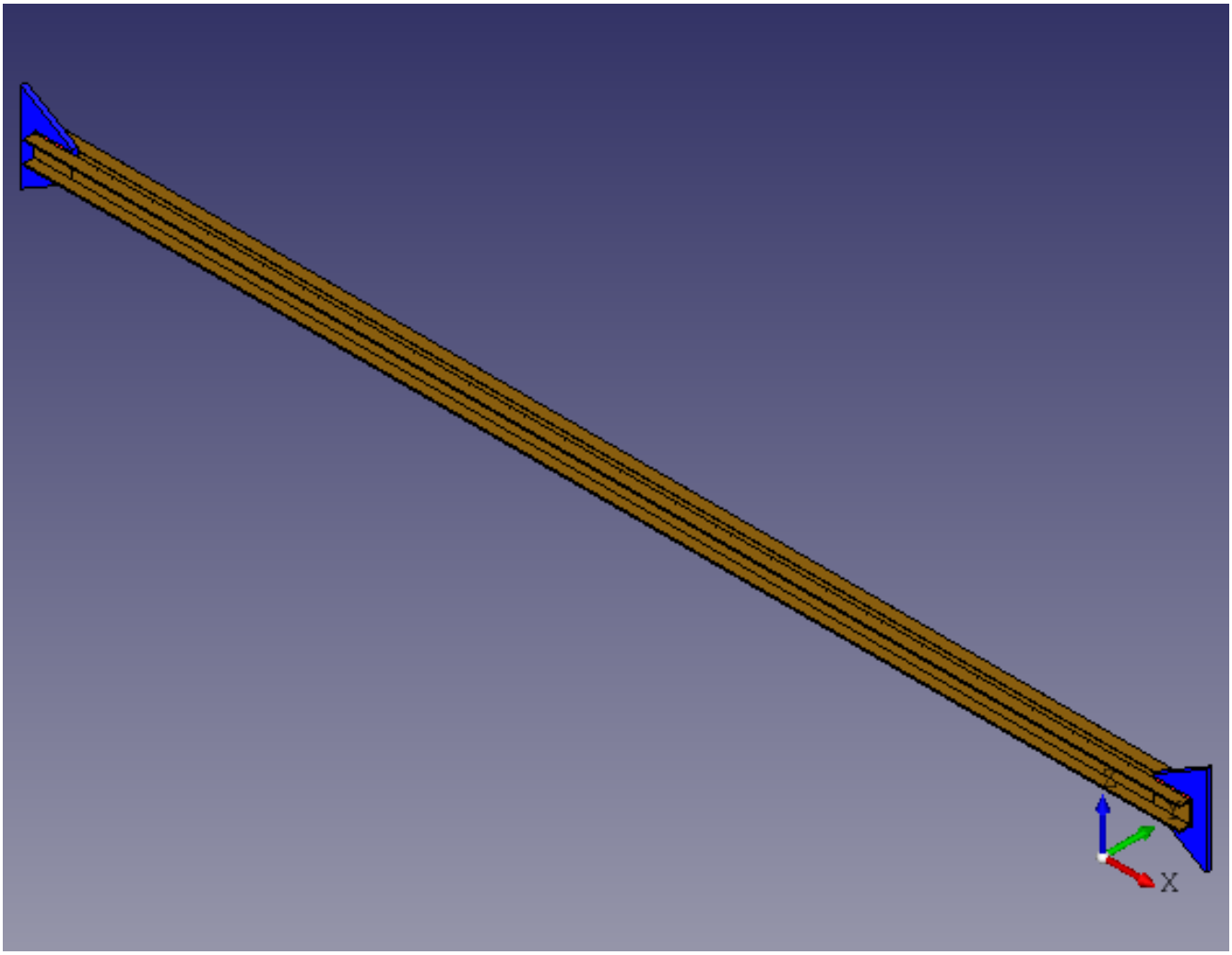

Figure 1: 3D View