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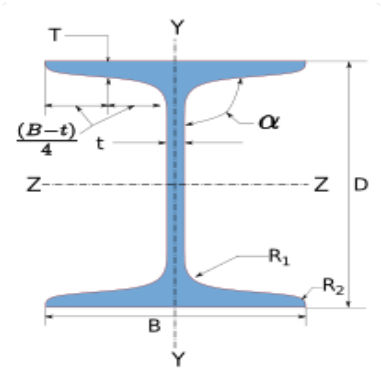
1 Input Parameters

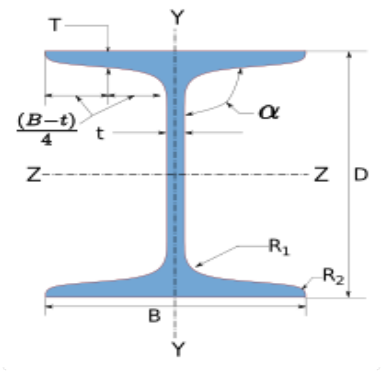
Module	Fin Plate
MainModule	Shear Connection
Connectivity	Column flange-Beam web
Shear(kN)*	10.0

Supporting Section



Supporting Section		HB 200	
Material *		E 250 (Fe 410 W)A	
Ultimate strength, fu (MPa)		410	
Yield Strength , fy (MPa)		250	
Mass	37.3	Iz(cm4)	36000000.0
Area(cm2) - A	4750.0	Iy(cm4)	9670000.0
D(mm)	200.0	rz(cm)	87.10000000000001
B(mm)	200.0	ry(cm)	45.099999999999994
t(mm)	6.1	Zz(cm3)	361000.0
T(mm)	9	Zy(cm3)	96700.0
FlangeSlope	94	Zpz(cm3)	389800.0
R1(mm)	9.0	Zpy(cm3)	96700.0
R2(mm)	4.5		

Supported Section



Supported Section		JB 200	
Material *		E 250 (Fe 410 W)A	
Ultimate strength, fu (MPa)		410	
Yield Strength , fy (MPa)		250	
Mass	9.9	Iz(cm4)	7810000.0
Area(cm2) - A	1260.0	Iy(cm4)	173000.0
D(mm)	200.0	rz(cm)	78.60000000000001
B(mm)	60.0	ry(cm)	11.7
t(mm)	3.4	Zz(cm3)	78100.0
T(mm)	5.0	Zy(cm3)	5800.0
FlangeSlope	91.5	Zpz(cm3)	88000.0
R1(mm)	5.0	Zpy(cm3)	5800.0
R2(mm)	1.5		

Bolt Details

Diameter (mm)*	[12.0, 16.0, 20.0, 24.0, 30.0, 36.0]
Grade *	[3.6, 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 9.8, 10.9, 12.9]
Type *	Bearing Bolt
Bolt hole type	Standard
Slip factor (μ_f)	0.3
Type of edges	a - Sheared or hand flame cut

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Gap between beam and support (mm)	10.0
Are the members exposed to corrosive influences	False
Plate Details	
Thickness(mm)*	[3.0, 4.0, 5.0, 6.0, 8.0, 10.0, 12.0, 14.0, 16.0, 18.0, 20.0]
Material *	E 250 (Fe 410 W)A
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

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2 Design Checks

2.1 Bolt Design Checks

Check	Required	Provided	Remarks
Diameter (mm)*		12.0	
Grade *		3.6	
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b\ n_n\ A_{nb}}{\sqrt{3}\ \gamma_{mb}}$ $= \frac{300.0 * 1 * 84.3}{\sqrt{3}\ *\ 1.25}$ $= 11.68$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5\ k_b\ d\ t\ f_u}{\gamma_{mb}}$ $= \frac{2.5\ * 0.52 * 12.0 * 3.4 * 410}{1.25}$ $= 17.4$	
Capacity (kN)		$V_{db} = min\ (V_{dsb}, V_{dpb})$ $= min\ (11.68, 17.4)$ $= 11.68$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{10.0^2 + 10.0^2}}{11.68}$ $= 2$	2	
No of Columns		1	
No of Rows		2	
Min. Pitch (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 12.0 \quad = 30.0$	0.0	N/A
Max. Pitch (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 3.4,\ 300\ mm)$ $= 300$	0.0	N/A
Min. Gauge (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 12.0 \quad = 30.0$	70	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 3.4,\ 300\ mm)$ $= 300$	70	Pass
Min. End Distance (mm)	$e/e`_{min} = [1.5\ or\ 1.7] * d_0$ $= 1.7 * 13.0 = 22.1$	25	Pass
Max. End Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 4.0 * \sqrt{\frac{250}{250}}$ $= 48.0$	25	Pass

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Check	Required	Provided	Remarks
Min. Edge Distance (mm)	$e/e`_{min} = [1.5\ or\ 1.7] * d_0$ $= 1.7 * 13.0 = 22.1$	25	Pass
Max. Edge Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 4.0 * \sqrt{\frac{250}{250}}$ $= 48.0$	25	Pass
Capacity (kN)	11.18	17.4	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 200.0 = 120.0$	120	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 200.0 - 2 * (5.0 + 5.0 + 10)$ $= 180.0$	120	Pass
Min. Plate Length (mm)	$2 * e_{min} + (n\ c - 1) * p_{min})$ $= 2 * 22.1 + (1 - 1) * 30.0$ $= 54.2$	60.0	Pass
Min.Plate Thickness (mm)	$t_w = 3.4$	4.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{120 * 4.0 * 250}{\sqrt{3} * 1.1}$ $= 62.98$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (120 - (2 * 13.0)) * 4.0 * 410$ $= 115.62$	
Block Shear Capacity in Shear (V_db) (kN)		71.71	
Shear Capacity (V_d) (kN)	10.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(62.98, 115.62, 71.71)$ $= 62.98$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{120 * 4.0 * 250}{1.1}$ $= 109.09$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (120 - 2 * 13.0) * 4.0 * 410}{1.25}$ $= 126.35$	
Block Shear Capacity in Tension (T_db) (kN)		80.43	
Tension Capacity (kN)	10.0	$T_d = Min(T_{dg}, T_{dn}, T_{db})$ $= Min(109.09, 126.35, 80.43)$ $= 80.43$	Pass
Moment Capacity (kN-m)	0.35	3.27	Pass
Interaction Ratio	≤ 1	$\frac{0.35}{3.27} + \frac{10.0}{80.43} = 0.23$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$Thickness\ of\ Thicker\ part$ $= max(9, 4.0)$ $= 9$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 3$	3	Pass
Max Weld Size (mm)	$Thickness\ of\ Thinner\ part$ $= Min(9, 4.0) = 4.0$ $t_{w_{max}} = 4.0$	3	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{350000.0 * 57.0}{246924.0}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{350000.0 * 0.0}{246924.0}$ $V_{wv} = \frac{V}{l_w} = \frac{10000.0}{228}$ $A_{wh} = \frac{A}{l_w} = \frac{10000.0}{228}$ $R_w = \sqrt{(80.79 + 43.86)^2 + (0.0 + 43.86)^2}$ $= 132.14$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{3 * 410}{\sqrt{3} * 1.25}$ $= 568.11$	Pass

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3 3D View

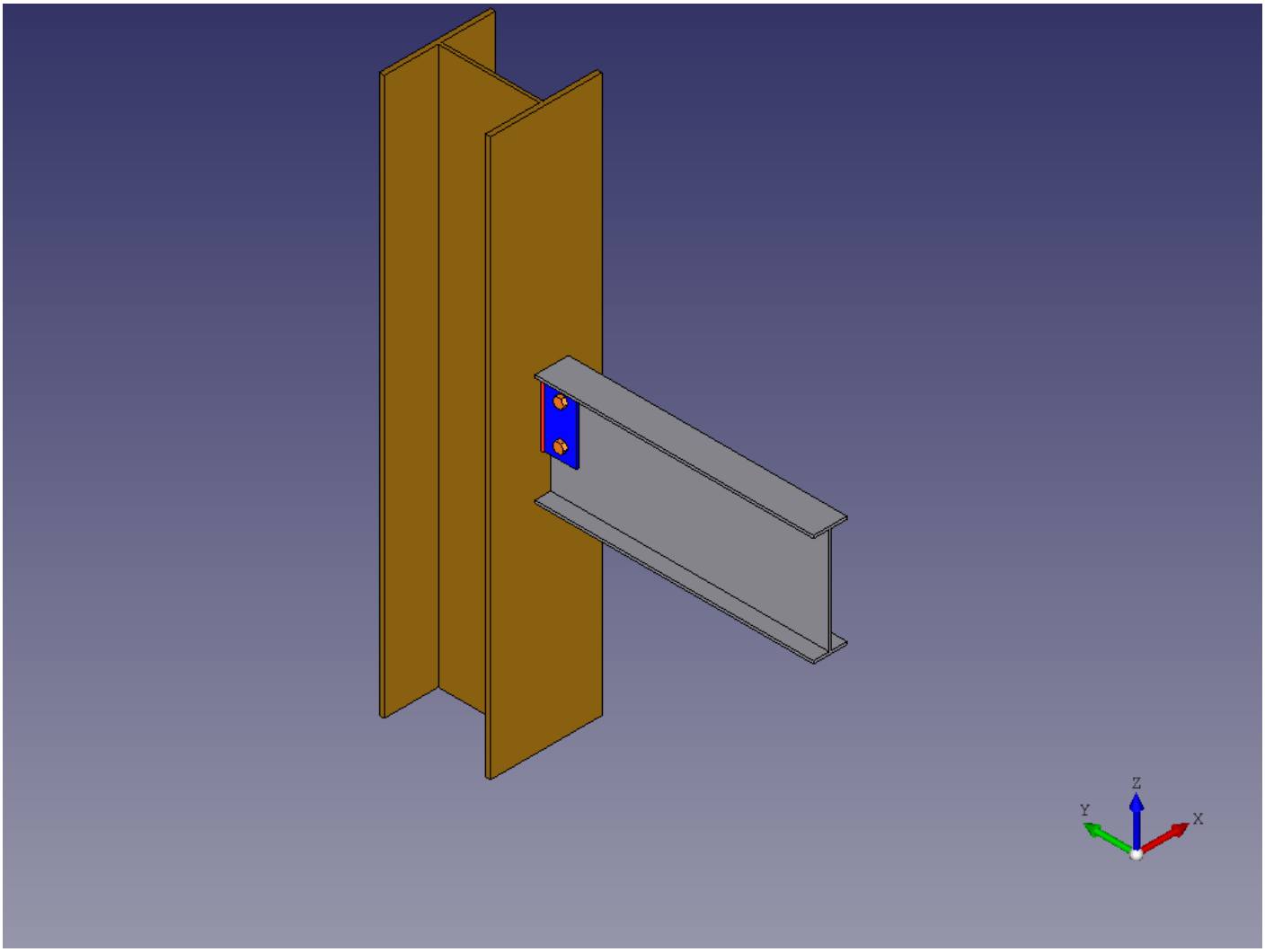

Figure 1: 3D View