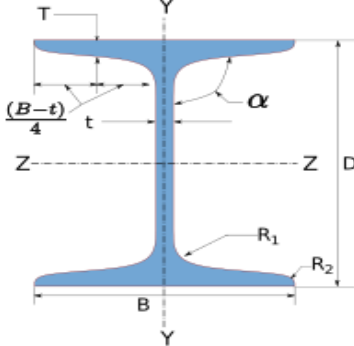
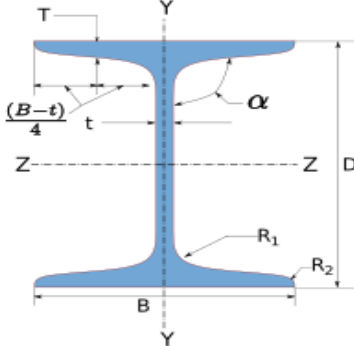


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1 Input Parameters

Module		Fin Plate		
MainModule		Shear Connection		
Connectivity		Column flange-Beam web		
Shear(kN)*		150.0		
Supporting Section				
	Supporting Section		PBP 300X222.9	
	Material *		E 250 (Fe 410 W)B	
	Ultimate strength, fu (MPa)		410	
	Yield Strength , fy (MPa)		250	
	Mass	222.92	Iz(cm4)	526988000.0
	Area(cm2) - A	28400.0	Iy(cm4)	175746300.0
	D(mm)	337.9	rz(cm)	136.2
	B(mm)	325.7	ry(cm)	78.7
	t(mm)	30.3	Zz(cm3)	3119190.0
	T(mm)	30.4	Zy(cm3)	1079190.0
	FlangeSlope	90	Zpz(cm3)	3653090.0
	R1(mm)	1.52	Zpy(cm3)	1079190.0
	R2(mm)	0.0		
Supported Section				
	Supported Section		UB 406 x 178 x 74	
	Material *		E 250 (Fe 410 W)B	
	Ultimate strength, fu (MPa)		410	
	Yield Strength , fy (MPa)		250	
	Mass	74.2	Iz(cm4)	273100000.0
	Area(cm2) - A	9450.0	Iy(cm4)	15450000.0
	D(mm)	413.0	rz(cm)	170.0
	B(mm)	179.5	ry(cm)	40.0
	t(mm)	9.5	Zz(cm3)	1323000.0
	T(mm)	16.0	Zy(cm3)	172000.0
	FlangeSlope	90	Zpz(cm3)	1501000.0
	R1(mm)	10.2	Zpy(cm3)	172000.0
	R2(mm)	0.0		
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)*		20.0	
Grade *		6.8	
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b n_n A_{nb}}{\sqrt{3} \gamma_{mb}}$ $= \frac{600.0 * 1 * 245}{\sqrt{3} * 1.25}$ $= 67.9$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5 k_b d t f_u}{\gamma_{mb}}$ $= \frac{2.5 * 0.51 * 20.0 * 9.5 * 410}{1.25}$ $= 79.46$	
Capacity (kN)		$V_{db} = \min (V_{dsb}, V_{dpb})$ $= \min (67.9, 79.46)$ $= 67.9$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{150.0^2 + 30.0^2}}{67.9}$ $= 3$	3	
No of Columns		1	
No of Rows		3	
Min. Pitch (mm)	$p/g_{min} = 2.5 d$ $= 2.5 * 20.0 = 50.0$	0.0	N/A
Max. Pitch (mm)	$p/g_{max} = \min(32 t, 300 mm)$ $= \min(32 * 9.5, 300 mm)$ $= 304.0$	0.0	N/A
Min. Gauge (mm)	$p/g_{min} = 2.5 d$ $= 2.5 * 20.0 = 50.0$	85	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32 t, 300 mm)$ $= \min(32 * 9.5, 300 mm)$ $= 304.0$	85	Pass
Min. End Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 22.0 = 37.4$	40	Pass
Max. End Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 10.0 * \sqrt{\frac{250}{250}}$ $= 120.0$	40	Pass

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Check	Required	Provided	Remarks
Min. Edge Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 22.0 = 37.4$	40	Pass
Max. Edge Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 10.0 * \sqrt{\frac{250}{250}}$ $= 120.0$	40	Pass
Capacity (kN)	73.68	79.46	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 413.0 = 247.8$	250	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 413.0 - 2 * (16.0 + 10.2 + 10)$ $= 360.6$	250	Pass
Min. Plate Length (mm)	$2 * e_{min} + (n_c - 1) * p_{min}$ $= 2 * 37.4 + (1 - 1) * 50.0$ $= 84.8$	90.0	Pass
Min. Plate Thickness (mm)	$t_w = 9.5$	10.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{250 * 10.0 * 250}{\sqrt{3} * 1.1}$ $= 328.04$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (250 - (3 * 22.0)) * 10.0 * 410$ $= 565.8$	
Block Shear Capacity in Shear (V_db) (kN)		355.08	
Shear Capacity (V_d) (kN)	150.0	$V_d = \text{Min}(V_{dy}, V_{dn}, V_{db})$ $= \text{Min}(328.04, 565.8, 355.08)$ $= 328.04$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{250 * 10.0 * 250}{1.1}$ $= 568.18$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (250 - 3 * 22.0) * 10.0 * 410}{1.25}$ $= 673.06$	
Block Shear Capacity in Tension (T_db) (kN)		394.28	
Tension Capacity (kN)	30.0	$T_d = \text{Min}(T_{dg}, T_{dn}, T_{db})$ $= \text{Min}(568.18, 673.06, 394.28)$ $= 394.28$	Pass
Moment Capacity (kN-m)	7.5	35.51	Pass
Interaction Ratio	≤ 1	$\frac{7.5}{35.51} + \frac{30.0}{394.28} = 0.29$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	<i>Thickness of Thicker part</i> $= \max(30.4, 10.0)$ $= 30.4$ <i>IS800 : 2007 cl.10.5.2.3 Table21,</i> $t_{w_{min}} = 6$	6	Pass
Max Weld Size (mm)	<i>Thickness of Thinner part</i> $= \min(30.4, 10.0) = 10.0$ $t_{w_{max}} = 10.0$	6	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{I_{pw}} = \frac{7500000.0 * 119.0}{2246878.67}$ $T_{wv} = \frac{M * x_{max}}{I_{pw}} = \frac{7500000.0 * 0.0}{2246878.67}$ $V_{wv} = \frac{V}{l_w} = \frac{150000.0}{476}$ $A_{wh} = \frac{A}{l_w} = \frac{30000.0}{476}$ $R_w = \sqrt{(397.22 + 63.03)^2 + (0.0 + 315.13)^2}$ $= 715.13$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{4.2 * 410}{\sqrt{3} * 1.25}$ $= 795.36$	Pass

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3 3D View

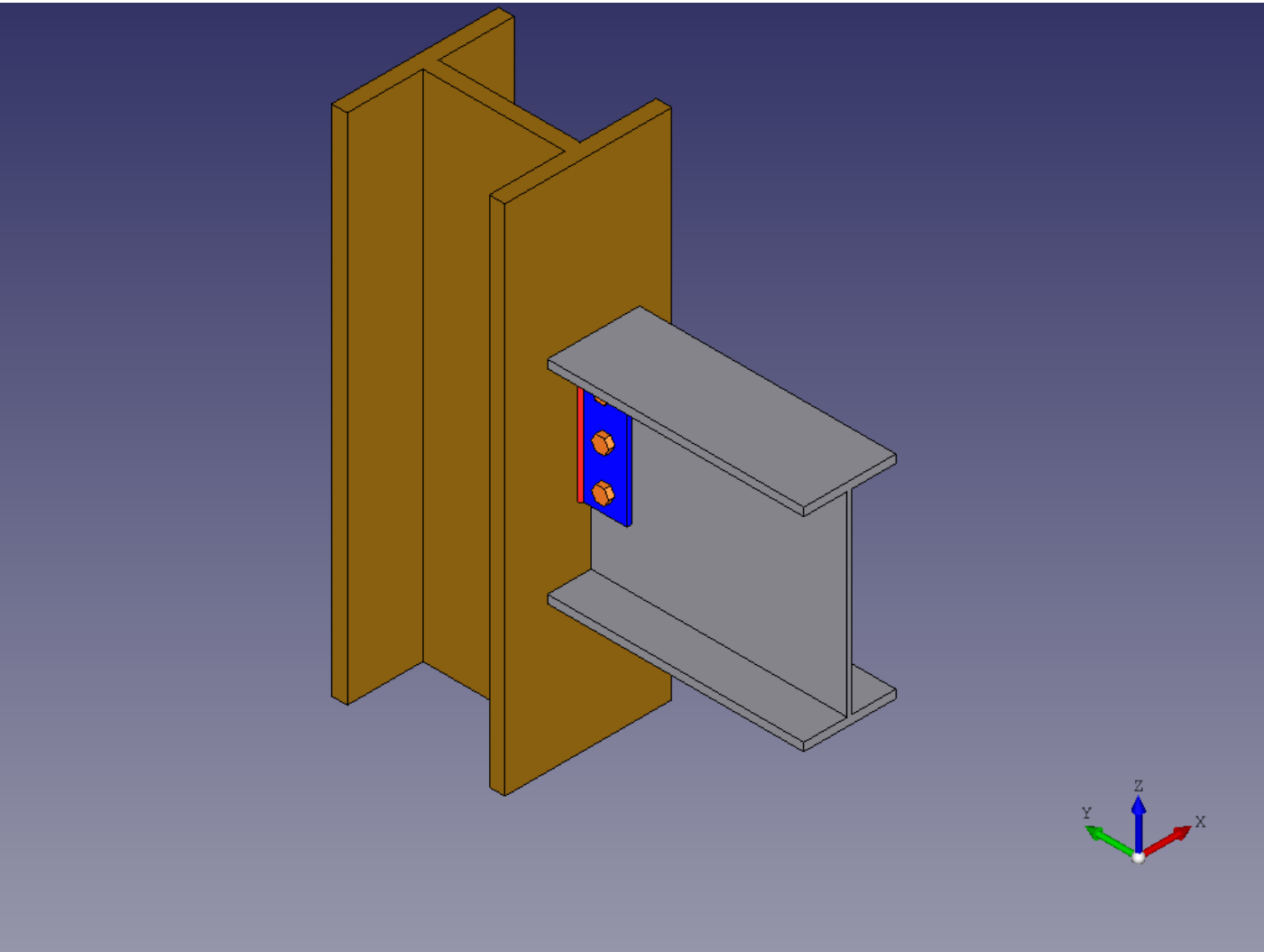


Figure 1: 3D View