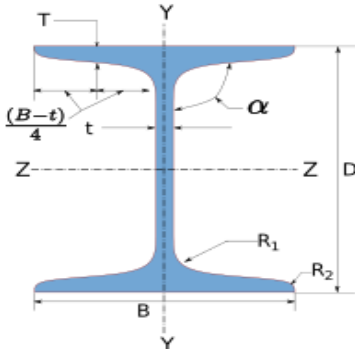
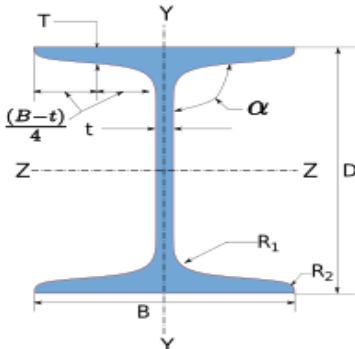


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1 Input Parameters

Module		Fin Plate		
MainModule		Shear Connection		
Connectivity		Column flange-Beam web		
Shear(kN)*		50.0		
Supporting Section				
	Supporting Section		PBP 320X146.7	
	Material *		E 250 (Fe 410 W)A	
	Ultimate strength, fu (MPa)		410	
	Yield Strength , fy (MPa)		250	
	Mass	146.68	Iz(cm4)	326707000.0
	Area(cm2) - A	18690.0	Iy(cm4)	101505100.0
	D(mm)	319.0	rz(cm)	132.20000000000002
	B(mm)	312.0	ry(cm)	73.7
	t(mm)	20.0	Zz(cm3)	2048320.0000000002
	T(mm)	20	Zy(cm3)	650670.0
	FlangeSlope	90	Zpz(cm3)	2338490.0
	R1(mm)	2.7	Zpy(cm3)	650670.0
	R2(mm)	0.0		
Supported Section				
	Supported Section		MB 250	
	Material *		E 250 (Fe 410 W)A	
	Ultimate strength, fu (MPa)		410	
	Yield Strength , fy (MPa)		250	
	Mass	37.2	Iz(cm4)	51190000.0
	Area(cm2) - A	4740.0	Iy(cm4)	3210000.0
	D(mm)	250.0	rz(cm)	104.0
	B(mm)	125.0	ry(cm)	26.0
	t(mm)	6.9	Zz(cm3)	409600.0
	T(mm)	12.5	Zy(cm3)	51000.0
	FlangeSlope	98	Zpz(cm3)	464500.0
	R1(mm)	13.0	Zpy(cm3)	51000.0
	R2(mm)	6.5		
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, 22.0, 24.0]
Material *	E 165 (Fe 290)
Ultimate strength, fu (MPa)	290
Yield Strength , fy (MPa)	165
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)*		24.0	
Grade *		3.6	
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b n_n A_{nb}}{\sqrt{3} \gamma_{mb}}$ $= \frac{300.0 * 1 * 353}{\sqrt{3} * 1.25}$ $= 48.91$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5 k_b d t f_u}{\gamma_{mb}}$ $= \frac{2.5 * 0.52 * 24.0 * 8.0 * 290}{1.25}$ $= 57.91$	
Capacity (kN)		$V_{db} = \min (V_{dsb}, V_{dpb})$ $= \min (48.91, 57.91)$ $= 48.91$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{50.0^2 + 50.0^2}}{48.91}$ $= 2$	4	
No of Columns		2	
No of Rows		2	
Min. Pitch (mm)	$p/g_{min} = 2.5 d$ $= 2.5 * 24.0 = 60.0$	60	Pass
Max. Pitch (mm)	$p/g_{max} = \min(32 t, 300 mm)$ $= \min(32 * 6.9, 300 mm)$ $= 300$	60	Pass
Min. Gauge (mm)	$p/g_{min} = 2.5 d$ $= 2.5 * 24.0 = 60.0$	60	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32 t, 300 mm)$ $= \min(32 * 6.9, 300 mm)$ $= 300$	60	Pass
Min. End Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 26.0 = 44.2$	45	Pass
Max. End Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 8.0 * \sqrt{\frac{250}{165}}$ $= 118.08$	45	Pass

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Check	Required	Provided	Remarks
Min. Edge Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 26.0 = 44.2$	45	Pass
Max. Edge Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 8.0 * \sqrt{\frac{250}{165}}$ $= 118.08$	45	Pass
Capacity (kN)	42.72	57.91	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 250.0 = 150.0$	150	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 250.0 - 2 * (12.5 + 13.0 + 10)$ $= 199.0$	150	Pass
Min. Plate Length (mm)	$2 * e_{min} + (n - 1) * p_{min}$ $= 2 * 44.2 + (2 - 1) * 60.0$ $= 158.4$	160.0	Pass
Min. Plate Thickness (mm)	$t_w = 6.9$	8.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{150 * 8.0 * 165}{\sqrt{3} * 1.1}$ $= 103.92$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (150 - (2 * 26.0)) * 8.0 * 290$ $= 170.52$	
Block Shear Capacity in Shear (V_db) (kN)		182.99	
Shear Capacity (V_d) (kN)	50.0	$V_d = \text{Min}(V_{dy}, V_{dn}, V_{db})$ $= \text{Min}(103.92, 170.52, 182.99)$ $= 103.92$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{150 * 8.0 * 165}{1.1}$ $= 180.0$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (150 - 2 * 26.0) * 8.0 * 290}{1.25}$ $= 163.7$	
Block Shear Capacity in Tension (T_db) (kN)		262.06	
Tension Capacity (kN)	50.0	$T_d = \text{Min}(T_{dg}, T_{dn}, T_{db})$ $= \text{Min}(180.0, 163.7, 262.06)$ $= 163.7$	Pass
Moment Capacity (kN-m)	4.25	6.75	Pass
Interaction Ratio	≤ 1	$\frac{4.25}{6.75} + \frac{50.0}{163.7} = 0.94$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	<i>Thickness of Thicker part</i> $= \max(20, 8.0)$ $= 20$ <i>IS800 : 2007 cl.10.5.2.3 Table21,</i> $t_{w_{min}} = 5$	8	Pass
Max Weld Size (mm)	<i>Thickness of Thinner part</i> $= \min(20, 8.0) = 8.0$ $t_{w_{max}} = 8.0$	8	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{I_{pw}} = \frac{4250000.0 * 70.0}{457333.33}$ $T_{wv} = \frac{M * x_{max}}{I_{pw}} = \frac{4250000.0 * 0.0}{457333.33}$ $V_{wv} = \frac{V}{l_w} = \frac{50000.0}{280}$ $A_{wh} = \frac{A}{l_w} = \frac{50000.0}{280}$ $R_w = \sqrt{(650.51 + 178.57)^2 + (0.0 + 178.57)^2}$ $= 848.09$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{5.6 * 290}{\sqrt{3} * 1.25}$ $= 1060.48$	Pass

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3 3D View

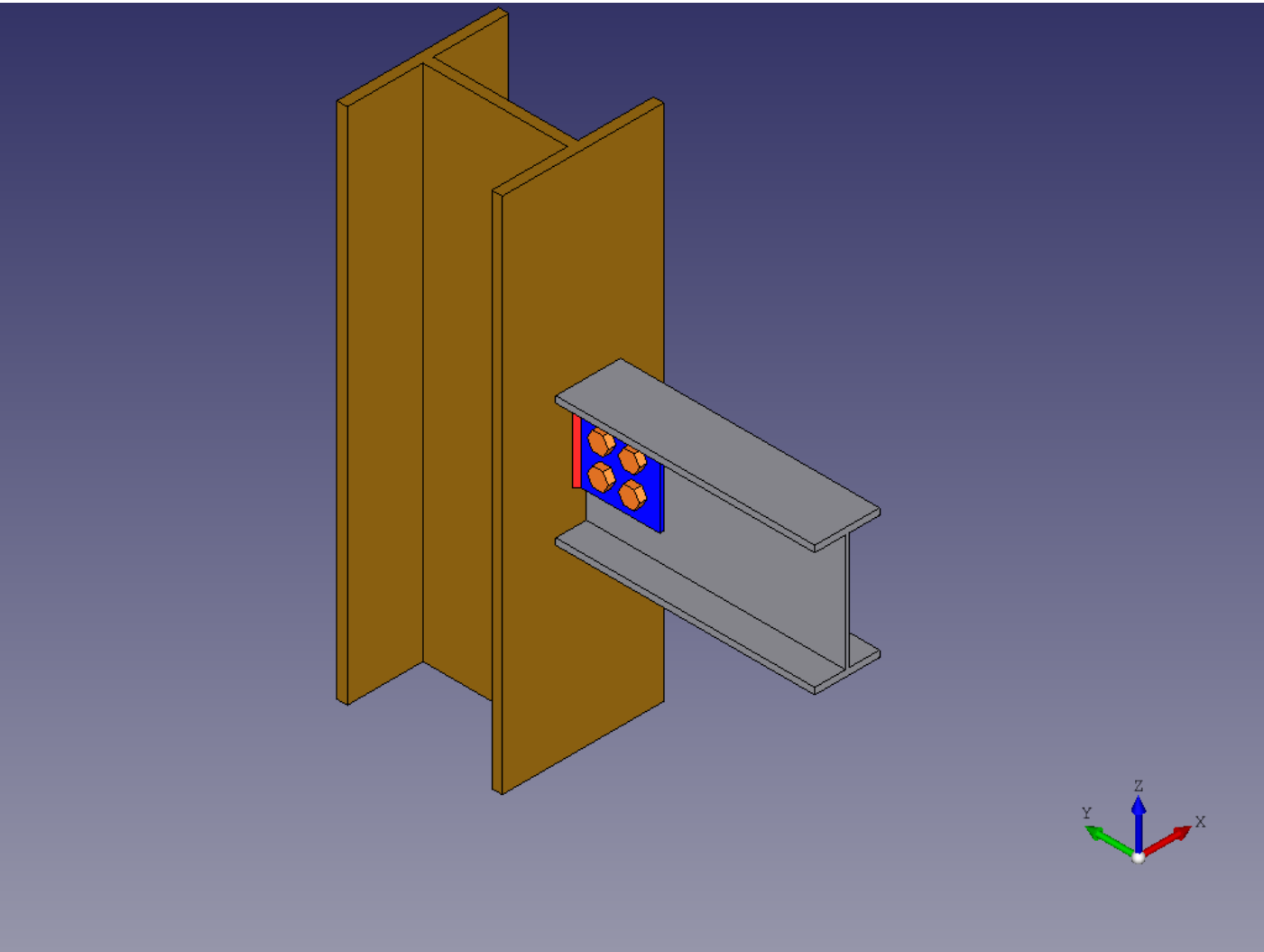


Figure 1: 3D View