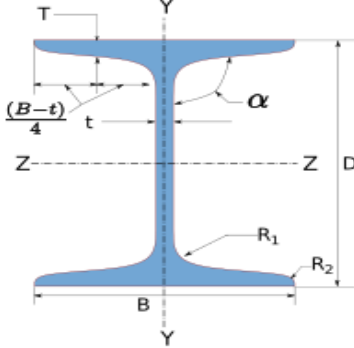
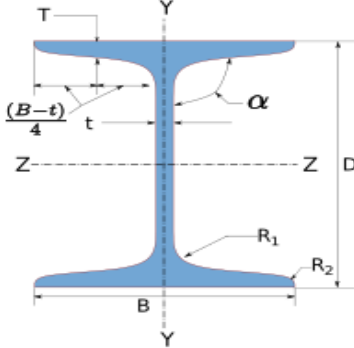


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1 Input Parameters

Module		Fin Plate		
MainModule		Shear Connection		
Connectivity		Column flange-Beam web		
Shear(kN)*		20.0		
Supporting Section				
	Supporting Section		HB 150	
	Material *		E 250 (Fe 410 W)B	
	Ultimate strength, fu (MPa)		410	
	Yield Strength , fy (MPa)		250	
	Mass	27.1	Iz(cm4)	14600000.0
	Area(cm2) - A	3450.0	Iy(cm4)	4320000.0
	D(mm)	150.0	rz(cm)	65.0
	B(mm)	150.0	ry(cm)	35.4
	t(mm)	5.4	Zz(cm3)	194000.0
	T(mm)	9	Zy(cm3)	57600.0
	FlangeSlope	94	Zpz(cm3)	210900.0
	R1(mm)	8.0	Zpy(cm3)	57600.0
	R2(mm)	4.0		
Supported Section				
	Supported Section		JB 200	
	Material *		E 250 (Fe 410 W)B	
	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]		
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)*		16.0	
Grade *		3.6	
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b n_n A_{nb}}{\sqrt{3} \gamma_{mb}}$ $= \frac{300.0 * 1 * 157}{\sqrt{3} * 1.25}$ $= 21.75$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5 k_b d t f_u}{\gamma_{mb}}$ $= \frac{2.5 * 0.49 * 16.0 * 3.4 * 410}{1.25}$ $= 21.86$	
Capacity (kN)		$V_{db} = \min (V_{dsb}, V_{dpb})$ $= \min (21.75, 21.86)$ $= 21.75$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{20.0^2 + 30.0^2}}{21.75}$ $= 2$	3	
No of Columns		1	
No of Rows		3	
Min. Pitch (mm)	$p/g_{min} = 2.5 d$ $= 2.5 * 16.0 = 40.0$	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)	$p/g_{min} = 2.5 d$ $= 2.5 * 16.0 = 40.0$	45	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32 t, 300 mm)$ $= \min(32 * 3.4, 300 mm)$ $= 300$	45	Pass
Min. End Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 18.0 = 30.6$	35	Pass
Max. End Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 4.0 * \sqrt{\frac{250}{250}}$ $= 48.0$	35	Pass

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Check	Required	Provided	Remarks
Min. Edge Distance (mm)	$e/e'_{min} = [1.5 \text{ or } 1.7] * d_0$ $= 1.7 * 18.0 = 30.6$	35	Pass
Max. Edge Distance (mm)	$e/e'_{max} = 12 t \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e'_{max} = 12 * 4.0 * \sqrt{\frac{250}{250}}$ $= 48.0$	35	Pass
Capacity (kN)	21.08	21.86	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 200.0 = 120.0$	160	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 200.0 - 2 * (5.0 + 5.0 + 10)$ $= 180.0$	160	Pass
Min. Plate Length (mm)	$2 * e_{min} + (n_c - 1) * p_{min})$ $= 2 * 30.6 + (1 - 1) * 40.0$ $= 71.2$	80.0	Pass
Min. Plate Thickness (mm)	$t_w = 3.4$	4.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{160 * 4.0 * 250}{\sqrt{3} * 1.1}$ $= 83.98$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (160 - (3 * 18.0)) * 4.0 * 410$ $= 130.38$	
Block Shear Capacity in Shear (V_db) (kN)		86.36	
Shear Capacity (V_d) (kN)	20.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(83.98, 130.38, 86.36)$ $= 83.98$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{160 * 4.0 * 250}{1.1}$ $= 145.45$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (160 - 3 * 18.0) * 4.0 * 410}{1.25}$ $= 167.67$	
Block Shear Capacity in Tension (T_db) (kN)		108.64	
Tension Capacity (kN)	30.0	$T_d = Min(T_{dg}, T_{dn}, T_{db})$ $= Min(145.45, 167.67, 108.64)$ $= 108.64$	Pass
Moment Capacity (kN-m)	0.9	5.82	Pass
Interaction Ratio	≤ 1	$\frac{0.9}{5.82} + \frac{30.0}{108.64} = 0.43$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	<i>Thickness of Thicker part</i> $= \max(9, 4.0)$ $= 9$ <i>IS800 : 2007 cl.10.5.2.3 Table21,</i> $t_{w_{min}} = 3$	3	Pass
Max Weld Size (mm)	<i>Thickness of Thinner part</i> $= \min(9, 4.0) = 4.0$ $t_{w_{max}} = 4.0$	3	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{I_{pw}} = \frac{900000.0 * 77.0}{608710.67}$ $T_{wv} = \frac{M * x_{max}}{I_{pw}} = \frac{900000.0 * 0.0}{608710.67}$ $V_{wv} = \frac{V}{l_w} = \frac{20000.0}{308}$ $A_{wh} = \frac{A}{l_w} = \frac{30000.0}{308}$ $R_w = \sqrt{(113.85 + 97.4)^2 + (0.0 + 64.94)^2}$ $= 203.59$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{3 * 410}{\sqrt{3} * 1.25}$ $= 568.11$	Pass

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3 3D View

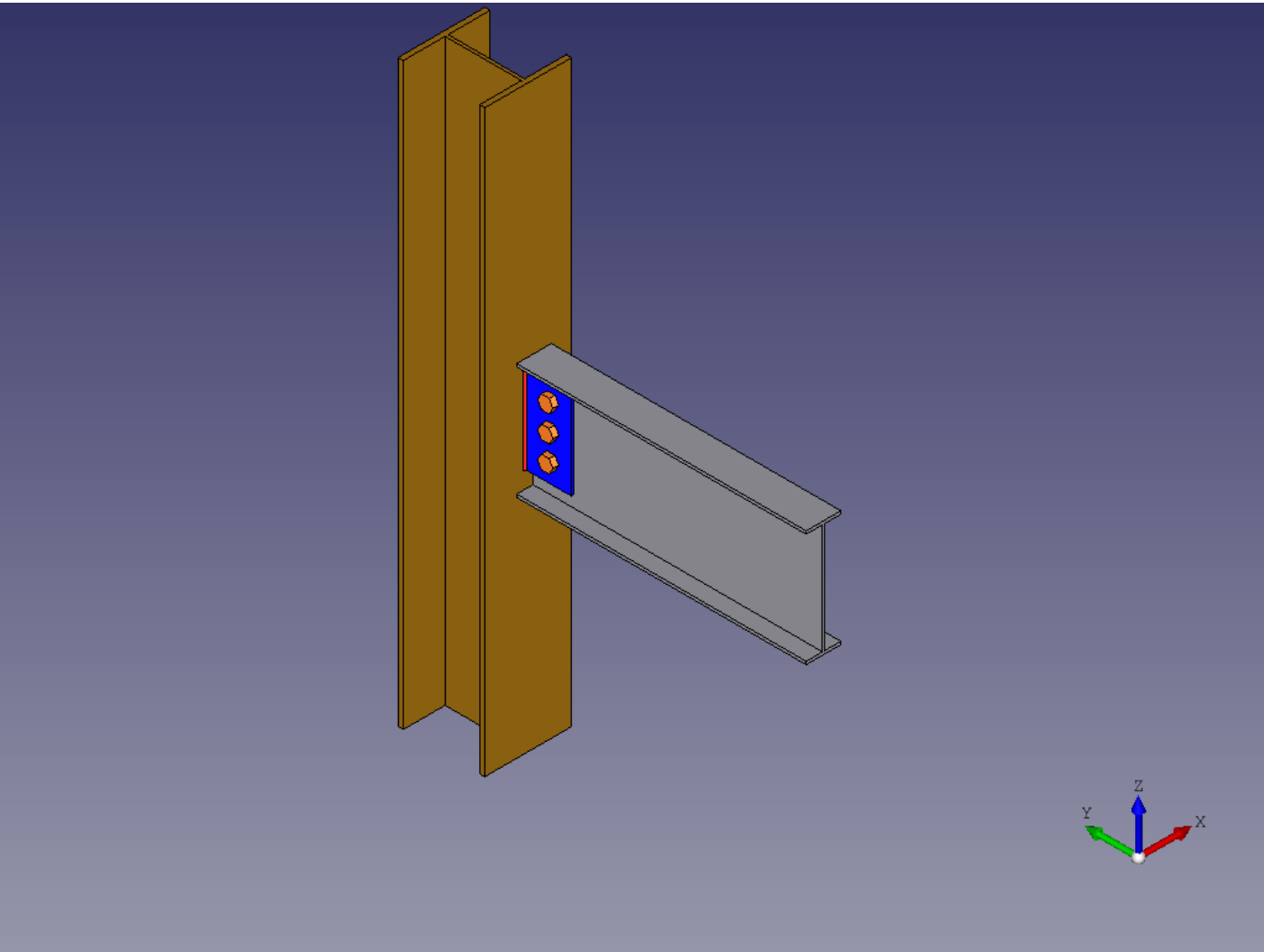


Figure 1: 3D View