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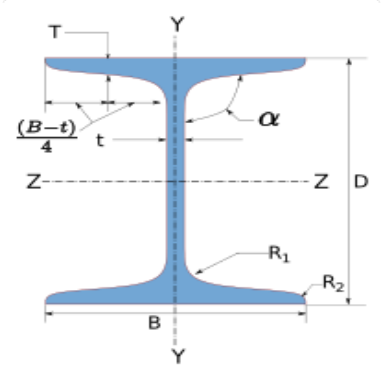
1 Input Parameters

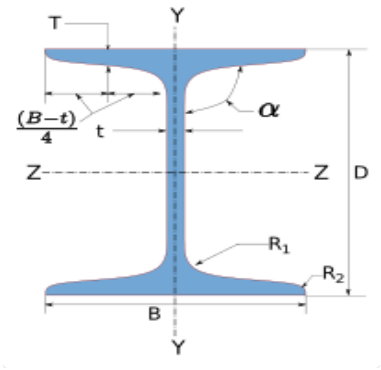
Module	Fin Plate
MainModule	Shear Connection
Connectivity	Column flange-Beam web
Shear(kN)*	150.0

Supporting Section



Supporting Section		HB 400	
Material *		E 250 (Fe 410 W)A	
Ultimate strength, fu (MPa)		410	
Yield Strength , fy (MPa)		250	
Mass	77.4	Iz(cm4)	281000000.0
Area(cm2) - A	9870.0	Iy(cm4)	27300000.0
D(mm)	400.0	rz(cm)	169.0
B(mm)	250.0	ry(cm)	52.599999999999994
t(mm)	9.1	Zz(cm3)	1400000.0
T(mm)	12.7	Zy(cm3)	218000.0
FlangeSlope	94	Zpz(cm3)	1530800.0
R1(mm)	14.0	Zpy(cm3)	218000.0
R2(mm)	7.0		

Supported Section



Supported Section		LB 400	
Material *		E 250 (Fe 410 W)A	
Ultimate strength, fu (MPa)		410	
Yield Strength , fy (MPa)		250	
Mass	56.9	Iz(cm4)	193000000.0
Area(cm2) - A	7240.0	Iy(cm4)	7160000.0
D(mm)	400.0	rz(cm)	163.0
B(mm)	165.0	ry(cm)	31.5
t(mm)	8.0	Zz(cm3)	965000.0
T(mm)	12.5	Zy(cm3)	86800.0
FlangeSlope	98	Zpz(cm3)	1065500.0
R1(mm)	16.0	Zpy(cm3)	86800.0
R2(mm)	8.0		

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 *		6.8	
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b\ n_n\ A_{nb}}{\sqrt{3}\ \gamma_{mb}}$ $= \frac{600.0 * 1 * 157}{\sqrt{3}\ *\ 1.25}$ $= 43.51$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5\ k_b\ d\ t\ f_u}{\gamma_{mb}}$ $= \frac{2.5\ * 0.49 * 16.0 * 8.0 * 410}{1.25}$ $= 51.43$	
Capacity (kN)		$V_{db} = min\ (V_{dsb}, V_{dpb})$ $= min\ (43.51, 51.43)$ $= 43.51$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{150.0^2 + 100.0^2}}{43.51}$ $= 5$	5	
No of Columns		1	
No of Rows		5	
Min. Pitch (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 16.0 \quad = 40.0$	0.0	N/A
Max. Pitch (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 8.0,\ 300\ mm)$ $= 300$	0.0	N/A
Min. Gauge (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 16.0 \quad = 40.0$	65	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 8.0,\ 300\ mm)$ $= 300$	65	Pass
Min. End Distance (mm)	$e/e`_{min} = [1.5\ or\ 1.7] * d_0$ $= 1.7 * 18.0 = 30.6$	35	Pass
Max. End Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 8.0 * \sqrt{\frac{250}{250}}$ $= 96.0$	35	Pass

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Check	Required	Provided	Remarks
Min. Edge Distance (mm)	$e/e`_{min} = [1.5\ or\ 1.7] * d_0$ $= 1.7 * 18.0 = 30.6$	35	Pass
Max. Edge Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 8.0 * \sqrt{\frac{250}{250}}$ $= 96.0$	35	Pass
Capacity (kN)	50.62	51.11	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 400.0 = 240.0$	330	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 400.0 - 2 * (12.5 + 16.0 + 10)$ $= 343.0$	330	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)	$t_w = 8.0$	8.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{330 * 8.0 * 250}{\sqrt{3} * 1.1}$ $= 346.41$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (330 - (5 * 18.0)) * 8.0 * 410$ $= 590.4$	
Block Shear Capacity in Shear (V_db) (kN)		355.42	
Shear Capacity (V_d) (kN)	150.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(346.41, 590.4, 355.42)$ $= 346.41$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{330 * 8.0 * 250}{1.1}$ $= 600.0$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (330 - 5 * 18.0) * 8.0 * 410}{1.25}$ $= 736.82$	
Block Shear Capacity in Tension (T_db) (kN)		395.73	
Tension Capacity (kN)	100.0	$T_d = Min(T_{dg}, T_{dn}, T_{db})$ $= Min(600.0, 736.82, 395.73)$ $= 395.73$	Pass
Moment Capacity (kN-m)	6.75	49.5	Pass
Interaction Ratio	≤ 1	$\frac{6.75}{49.5} + \frac{100.0}{395.73} = 0.39$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$Thickness\ of\ Thicker\ part$ $= max(12.7, 8.0)$ $= 12.7$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 5$	5	Pass
Max Weld Size (mm)	$Thickness\ of\ Thinner\ part$ $= Min(12.7, 8.0) = 8.0$ $t_{w_{max}} = 8.0$	5	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{6750000.0 * 160.0}{5461333.33}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{6750000.0 * 0.0}{5461333.33}$ $V_{wv} = \frac{V}{l_w} = \frac{150000.0}{640}$ $A_{wh} = \frac{A}{l_w} = \frac{100000.0}{640}$ $R_w = \sqrt{(197.75 + 156.25)^2 + (0.0 + 234.38)^2}$ $= 459.51$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{3.5 * 410}{\sqrt{3} * 1.25}$ $= 662.8$	Pass

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3 3D View

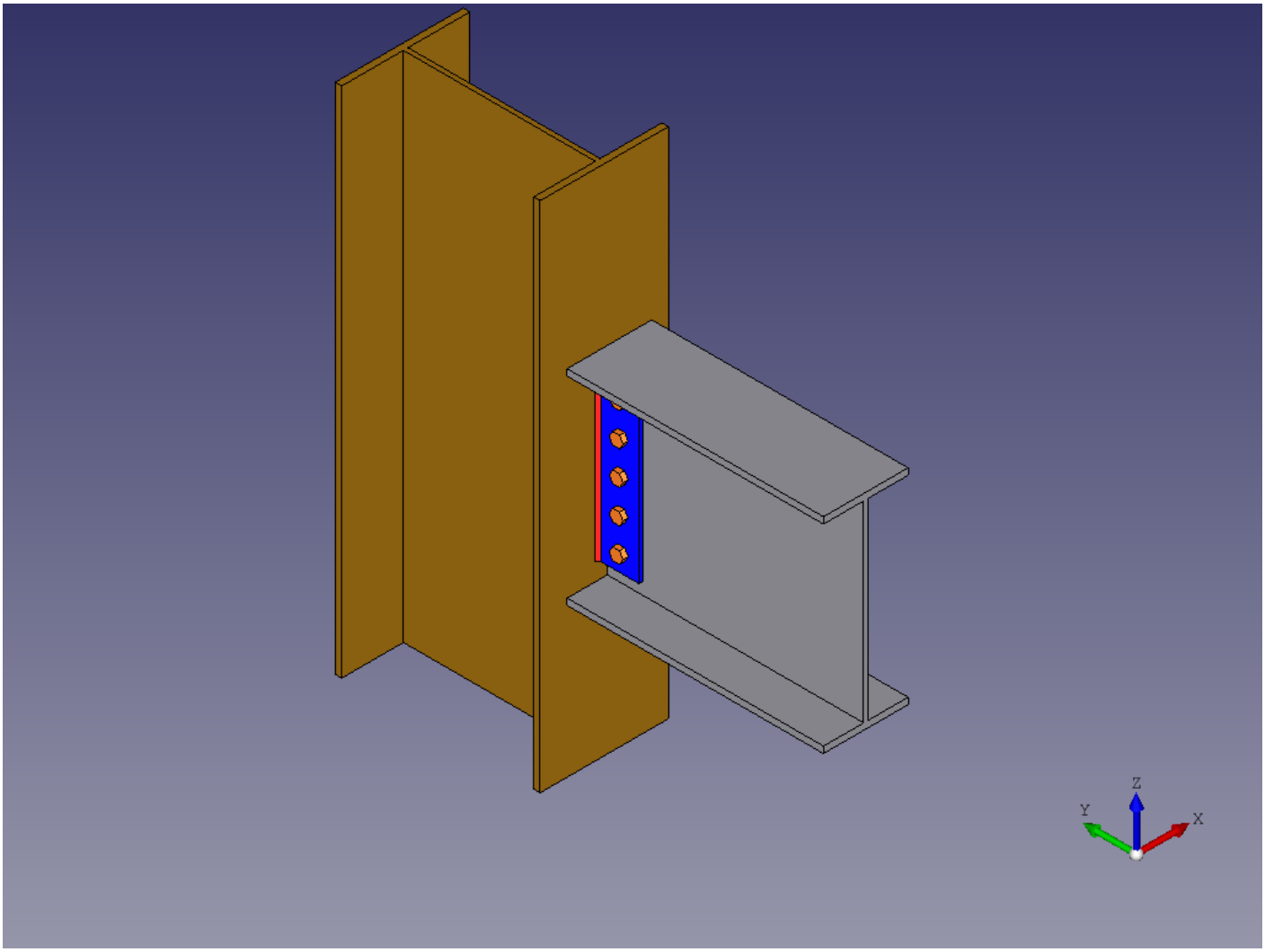

Figure 1: 3D View