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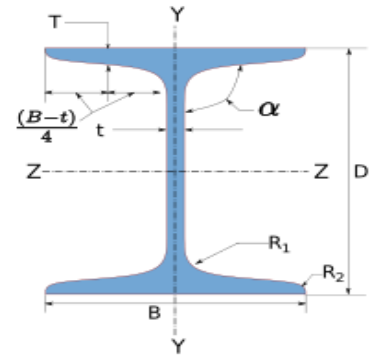
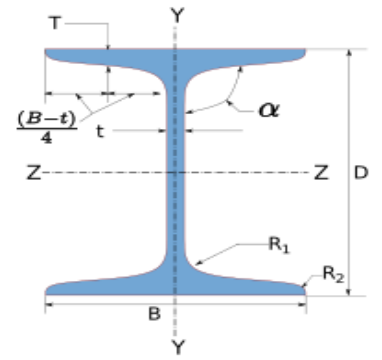
1 Input Parameters

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)B
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)*		30.0	
Grade *		3.6	
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b\ n_n\ A_{nb}}{\sqrt{3}\ \gamma_{mb}}$ $= \frac{300.0 * 1 * 561}{\sqrt{3}\ *\ 1.25}$ $= 77.73$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5\ k_b\ d\ t\ f_u}{\gamma_{mb}}$ $= \frac{2.5\ * 0.51 * 30.0 * 9.5 * 410}{1.25}$ $= 119.19$	
Capacity (kN)		$V_{db} = min\ (V_{dsb}, V_{dpb})$ $= min\ (77.73, 119.19)$ $= 77.73$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{150.0^2 + 300.0^2}}{77.73}$ $= 5$	6	
No of Columns		2	
No of Rows		3	
Min. Pitch (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 30.0 \quad = 75.0$	75	Pass
Max. Pitch (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 9.5,\ 300\ mm)$ $= 304.0$	75	Pass
Min. Gauge (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 30.0 \quad = 75.0$	75	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 9.5,\ 300\ mm)$ $= 304.0$	75	Pass
Min. End Distance (mm)	$e/e`_{min} = [1.5\ or\ 1.7] * d_0$ $= 1.7 * 33.0 = 56.1$	60	Pass
Max. End Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 10.0 * \sqrt{\frac{250}{250}}$ $= 120.0$	60	Pass

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Check	Required	Provided	Remarks
Min. Edge Distance (mm)	$e/e`_{min} = [1.5\ or\ 1.7] * d_0$ $= 1.7 * 33.0 = 56.1$	60	Pass
Max. Edge Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 10.0 * \sqrt{\frac{250}{250}}$ $= 120.0$	60	Pass
Capacity (kN)	99.61	119.19	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 413.0 = 247.8$	270	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 413.0 - 2 * (16.0 + 10.2 + 10)$ $= 360.6$	270	Pass
Min. Plate Length (mm)	$2 * e_{min} + (n\ c - 1) * p_{min})$ $= 2 * 56.1 + (2 - 1) * 75.0$ $= 197.2$	205.0	Pass
Min.Plate Thickness (mm)	$t_w = 9.5$	10.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{270 * 10.0 * 250}{\sqrt{3} * 1.1}$ $= 354.28$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (270 - (3 * 33.0)) * 10.0 * 410$ $= 525.83$	
Block Shear Capacity in Shear (V_db) (kN)		524.12	
Shear Capacity (V_d) (kN)	150.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(354.28, 525.83, 524.12)$ $= 354.28$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{270 * 10.0 * 250}{1.1}$ $= 613.64$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (270 - 3 * 33.0) * 10.0 * 410}{1.25}$ $= 602.21$	
Block Shear Capacity in Tension (T_db) (kN)		701.62	
Tension Capacity (kN)	300.0	$T_d = Min(T_{dg}, T_{dn}, T_{db})$ $= Min(613.64, 602.21, 701.62)$ $= 602.21$	Pass
Moment Capacity (kN-m)	16.12	41.42	Pass
Interaction Ratio	≤ 1	$\frac{16.12}{41.42} + \frac{300.0}{602.21} = 0.89$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$Thickness\ of\ Thicker\ part$ $= max(30.4, 10.0)$ $= 30.4$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 6$	10	Pass
Max Weld Size (mm)	$Thickness\ of\ Thinner\ part$ $= Min(30.4, 10.0) = 10.0$ $t_{w_{max}} = 10.0$	10	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{16125000.0 * 129.0}{2862252.0}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{16125000.0 * 0.0}{2862252.0}$ $V_{wv} = \frac{V}{l_w} = \frac{150000.0}{516}$ $A_{wh} = \frac{A}{l_w} = \frac{300000.0}{516}$ $R_w = \sqrt{(726.74 + 581.4)^2 + (0.0 + 290.7)^2}$ $= 1171.84$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{7.0 * 410}{\sqrt{3} * 1.25}$ $= 1325.6$	Pass

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3 3D View

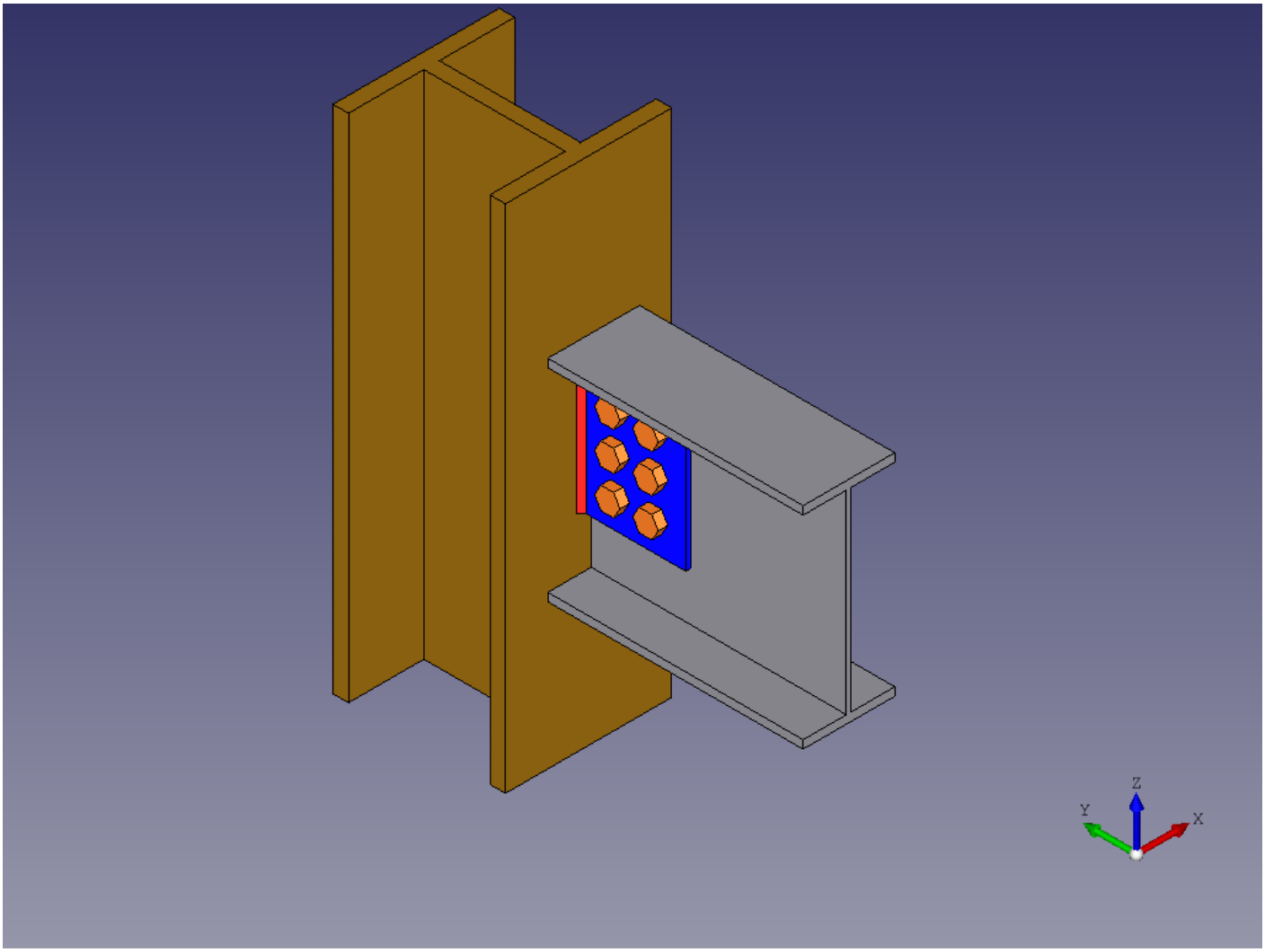

Figure 1: 3D View