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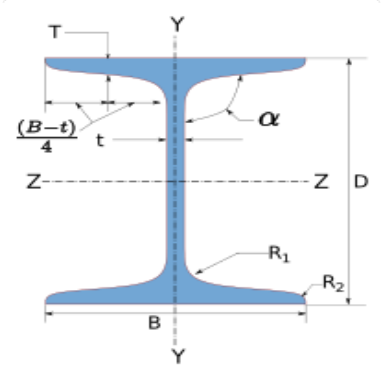
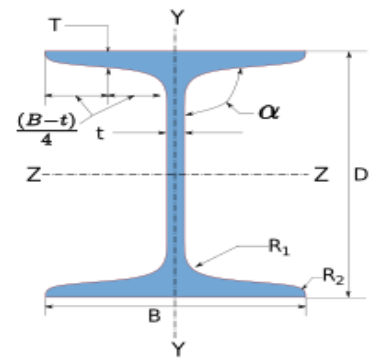
1 Input Parameters

Module		Fin Plate	
MainModule		Shear Connection	
Connectivity		Column flange-Beam web	
Shear(kN)*		150.0	
Supporting Section			
			
Supporting Section		PBP 300X222.9	
Material *		E 300 (Fe 440)	
Ultimate strength, fu (MPa)		440	
Yield Strength , fy (MPa)		280	
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 410 (Fe 540)	
Ultimate strength, fu (MPa)		540	
Yield Strength , fy (MPa)		380	
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
Weld Details	
Weld Type	Fillet
Type of weld fabrication	Shop Weld
Material grade overwrite (MPa) Fu	410.0

2 Design Checks

2.1 Bolt Design Checks

Check	Required	Provided	Remarks
Shear Capacity (kN)		$V_{dsb} = \frac{f_u b \; n_n \; A_{nb}}{\sqrt{3} \; \gamma_{mb}}$ $= \frac{410 * 1 * 561}{\sqrt{3} \; * \; 1.25}$ $= 129.56$	
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5 \; k_b \; d \; t \; f_u}{\gamma_{mb}}$ $= \frac{2.5 \; * 0.51 * 30.0 * 9.5 * 540}{1.25}$ $= 129.56$	
Capacity (KN)		$V_{db} = min \; (V_{dsb}, V_{dpb})$ $= min \; (129.56, 129.56)$ $= 129.56$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{150.0^2 + 300.0^2}}{129.56}$ $= 3$	4	
No of Columns		1	
No of Rows		4	
Min. Pitch (mm)	$p/g_{min} = 2.5 \; d$ $=2.5 * 30.0 \quad = 75.0$	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)	$p/g_{min} = 2.5 \; d$ $=2.5 * 30.0 \quad = 75.0$	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)	$e/e`_{min} = [1.5 \; or \; 1.7] * d_0$ $= 1.7 * 33.0 = 56.1$	60	Pass

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Check	Required	Provided	Remarks
Max. End Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 14.0 * \sqrt{\frac{250}{230}}$ $= 174.72$	60	Pass
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)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 14.0 * \sqrt{\frac{250}{230}}$ $= 174.72$	60	Pass
Capacity (KN)	52774.72	124863.64	Pass

2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 413.0 = 247.79999999999998$	345	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 413.0 - 2 * (16.0 + 10.2 + 10)$ $= 360.6$	345	Pass
Min. Plate Length (mm)	$2 * e_{min} + (n\ c - 1) * p_{min})$ $= 2 * 56.1 + (1 - 1) * 75.0$ $= 122.2$	130.0	Pass
Min.Plate Thickness (mm)	$t_w = 9.5$	14.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{345 * 14.0 * 230}{\sqrt{3} * 1.1}$ $= 349.84$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (345 - (4 * 33.0)) * 14.0 * 410$ $= 916.96$	
Block Shear Capacity in Shear (V_db) (kN)		948.56	
Shear Capacity (V_d) (kN)	150.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(349.84, 916.96, 948.56)$ $= 349.84$	Pass

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Check	Required	Provided	Remarks
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t * f_y}{\gamma_{mo}} = \frac{130.0 * 14.0 * 230}{\sqrt{3} * 1.1} = 380.55$	
Tension Rupture Capacity(kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}} = \frac{0.9 * (130.0 - 4 * 33.0) * 14.0 * 410}{1.25} = 400.88$	
Block Shear Capacity in Tension (T_db) (kN)		948.56	
Tension Capacity (kN)	300.0	$T_d = Min(T_{dg}, T_{dn}, T_{db}) = Min(380.55, 400.88, 948.56) = 380.55$	Pass
Moment Capacity (kNm)	10.5	69.68	Pass
Interaction Ratio	≤ 1	$\frac{10.5}{69.68} + \frac{300.0}{380.55} = 0.94$	Pass

2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$Thickness\ of\ Thicker\ part = Max(30.4, 30.4) = 30.4$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 6$	6	Pass
Max Weld Size (mm)	$Thickness\ of\ Thinner\ part = Min(30.4, 30.4) = 14.0$ $t_{w_{max}} = 14.0$	6	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{10500000.0 * 166.5}{6154339.5}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{10500000.0 * 0.0}{6154339.5}$ $V_{wv} = \frac{V}{l_w} = \frac{150000.0}{666}$ $A_{wh} = \frac{A}{l_w} = \frac{300000.0}{666}$ $R_w = \sqrt{(284.07 + 450.45)^2 + (0.0 + 225.23)^2} = 768.27$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}} = \frac{4.2 * 410}{\sqrt{3}} * 1.25 = 795.36$	Pass

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3 3D View

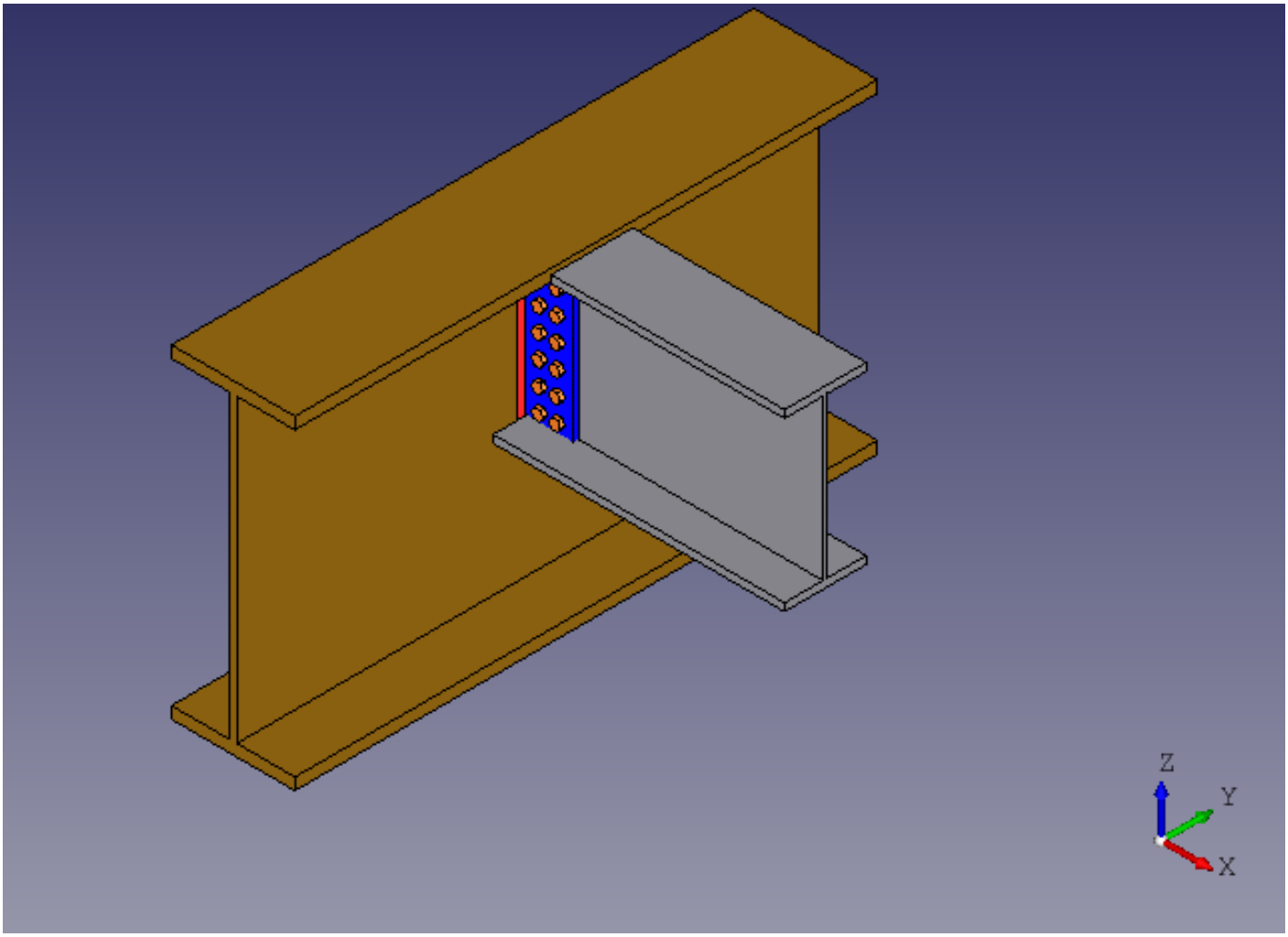

Figure 1: 3D View