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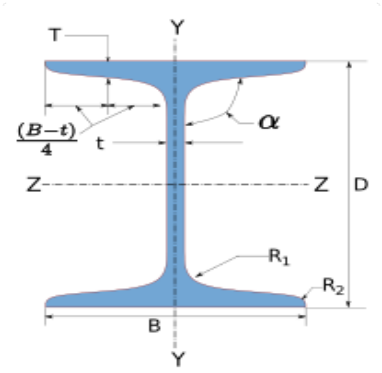
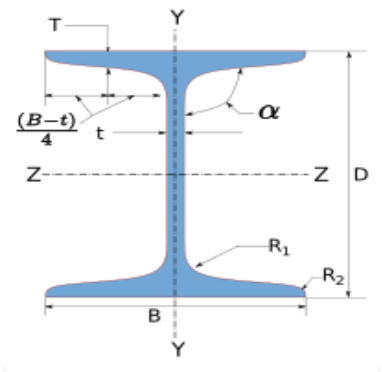
1 Input Parameters

Module				Fin Plate
MainModule				Shear Connection
Connectivity				Column flange-Beam web
Shear(kN)*				400.0
Supporting Section				
	Supporting Section			UC 356 x 406 x 393
	Material *			E 250 (Fe 410 W)A
	Ultimate strength, fu (MPa)			410
	Yield Strength , fy (MPa)			250
	Mass	393.0	Iz(cm4)	1466180000.0
	Area(cm2) - A	50060.0	Iy(cm4)	553650000.0
	D(mm)	419.0	rz(cm)	171.0
	B(mm)	407.0	ry(cm)	105.0
	t(mm)	30.6	Zz(cm3)	6998000.0
	T(mm)	49.2	Zy(cm3)	2721000.0
	FlangeSlope	90	Zpz(cm3)	8222000.0
	R1(mm)	15.2	Zpy(cm3)	2721000.0
	R2(mm)	0.0		
Supported Section				
	Supported Section			NPB 600x220x122.4
	Material *			E 250 (Fe 410 W)A
	Ultimate strength, fu (MPa)			410
	Yield Strength , fy (MPa)			250
	Mass	122.45	Iz(cm4)	920834000.0
	Area(cm2) - A	15600.0	Iy(cm4)	33828700.0
	D(mm)	600.0	rz(cm)	243.0
	B(mm)	220.0	ry(cm)	46.6
	t(mm)	12.0	Zz(cm3)	3069450.0
	T(mm)	19.0	Zy(cm3)	307530.0
	FlangeSlope	90	Zpz(cm3)	3512400.0
	R1(mm)	2.4	Zpy(cm3)	307530.0
	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 *				Friction Grip 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, 2
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)*		30.0	
Grade *		10.9	
Slip Resistance		$V_{dsf} = \frac{\mu_f \ n_e \ K_h \ F_o}{\gamma_{mf}}$ $Where, F_o = 0.7 * f_{ub} A_{nb}$ $V_{dsf} = \frac{0.3 * 1 * 1.0 * 0.7 * 1000.0 * 561}{1.25}$ $= 94.25$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{400.0^2 + 300.0^2}}{94.25}$ $= 6$	8	
No of Columns		2	
No of Rows		4	
Min. Pitch (mm)	$p/g_{min} = 2.5 \ d$ $=2.5 * 30.0 \quad = 75.0$	75	Pass
Max. Pitch (mm)	$p/g_{max} = \min(32 \ t, \ 300 \ mm)$ $= \min(32 * \ 12.0, \ 300 \ mm)$ $= 384.0$	75	Pass
Min. Gauge (mm)	$p/g_{min} = 2.5 \ d$ $=2.5 * 30.0 \quad = 75.0$	105	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32 \ t, \ 300 \ mm)$ $= \min(32 * \ 12.0, \ 300 \ mm)$ $= 384.0$	105	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)	$e/e`_{max} = 12 \ t \ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12 \ * 12.0 * \sqrt{\frac{250}{250}}$ $= 144.0$	60	Pass
Min. Edge 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. Edge Distance (mm)	$e/e`_{max} = 12\ t\ \varepsilon$ $\varepsilon = \sqrt{\frac{250}{f_y}}$ $e/e`_{max} = 12\ * 12.0 * \sqrt{\frac{250}{250}}$ $= 144.0$	60	Pass
Capacity (kN)	112.68	113.1	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 600.0 = 360.0$	435	Pass
Max. Plate Height (mm)	$d_b - 2(t_{bf} + r_{b1} + gap)$ $= 600.0 - 2 * (19.0 + 2.4 + 10)$ $= 557.2$	435	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)	$t_w = 12.0$	12.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{435 * 12.0 * 250}{\sqrt{3} * 1.1}$ $= 684.95$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (435 - (4 * 33.0)) * 12.0 * 410$ $= 1118.07$	
Block Shear Capacity in Shear (V_db) (kN)		893.35	
Shear Capacity (V_d) (kN)	400.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(684.95, 1118.07, 893.35)$ $= 684.95$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{435 * 12.0 * 250}{1.1}$ $= 1186.36$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (435 - 4 * 33.0) * 12.0 * 410}{1.25}$ $= 1307.15$	
Block Shear Capacity in Tension (T_db) (kN)		1101.75	
Tension Capacity (kN)	300.0	$T_d = Min(T_{dg}, T_{dn}, T_{db})$ $= Min(1186.36, 1307.15, 1101.75)$ $= 1101.75$	Pass
Moment Capacity (kN-m)	43.0	129.02	Pass
Interaction Ratio	≤ 1	$\frac{43.0}{129.02} + \frac{300.0}{1101.75} = 0.61$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$Thickness\ of\ Thicker\ part$ $= max(49.2, 12.0)$ $= 49.2$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 10$	10	Pass
Max Weld Size (mm)	$Thickness\ of\ Thinner\ part$ $= Min(49.2, 12.0) = 12.0$ $t_{w_{max}} = 12.0$	10	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{43000000.0 * 207.5}{11912229.17}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{43000000.0 * 0.0}{11912229.17}$ $V_{wv} = \frac{V}{l_w} = \frac{400000.0}{830}$ $A_{wh} = \frac{A}{l_w} = \frac{300000.0}{830}$ $R_w = \sqrt{(749.02 + 361.45)^2 + (0.0 + 481.93)^2}$ $= 1282.92$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{7.0 * 410}{\sqrt{3} * 1.25}$ $= 1325.6$	Pass

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3 3D View

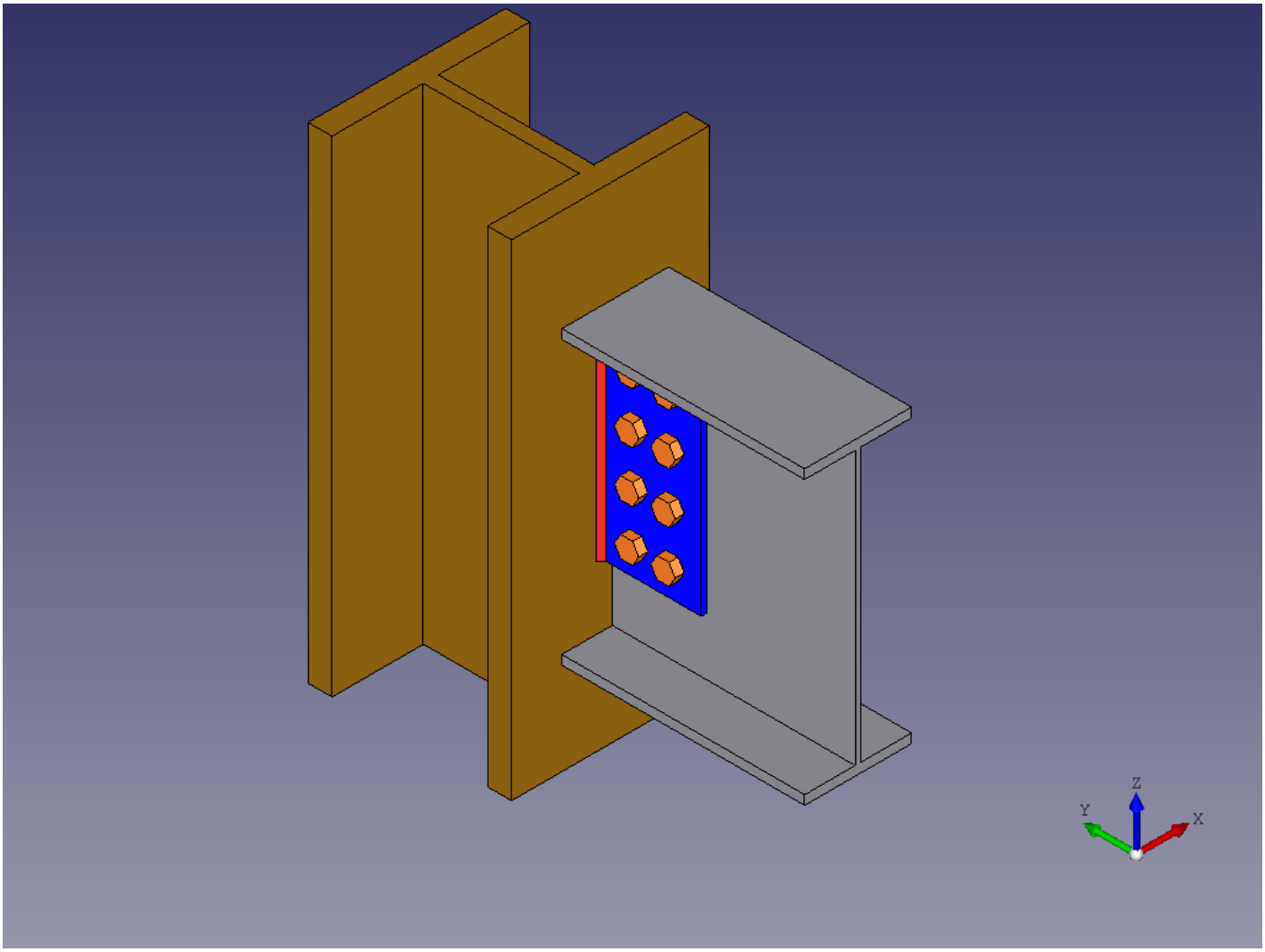

Figure 1: 3D View