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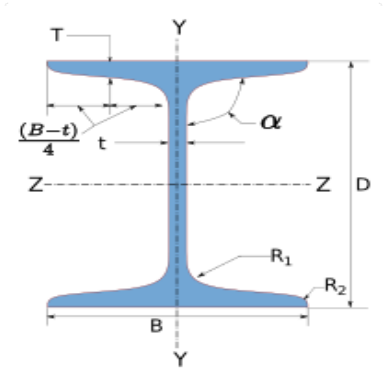
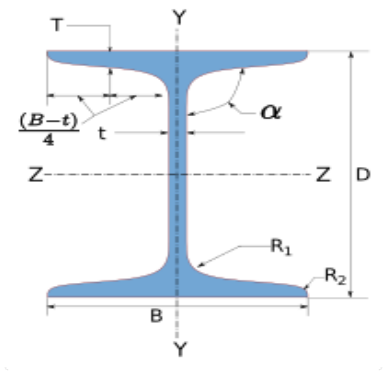
1 Input Parameters

Module		Fin Plate	
MainModule		Shear Connection	
Connectivity		Beam-Beam	
Shear(kN)*		50.0	
Supporting Section			
			
Supporting Section		UB 305 x 127 x 48	
Material *		E 250 (Fe 410 W)A	
Ultimate strength, fu (MPa)		410	
Yield Strength , fy (MPa)		250	
Mass	48.1	Iz(cm4)	95750000.0
Area(cm2) - A	6120.0	Iy(cm4)	4610000.0
D(mm)	311.0	rz(cm)	125.0
B(mm)	125.3	ry(cm)	27.0
t(mm)	9.0	Zz(cm3)	616000.0
T(mm)	14.0	Zy(cm3)	74000.0
FlangeSlope	90	Zpz(cm3)	711000.0
R1(mm)	8.9	Zpy(cm3)	74000.0
R2(mm)	0.0		
Supported Section			
			
Supported Section		NPB 250x175x43.9	
Material *		E 250 (Fe 410 W)A	
Ultimate strength, fu (MPa)		410	
Yield Strength , fy (MPa)		250	
Mass	43.94	Iz(cm4)	60914000.0
Area(cm2) - A	5600.0	Iy(cm4)	9836100.0
D(mm)	244.0	rz(cm)	104.3
B(mm)	175.0	ry(cm)	41.900000000000006
t(mm)	7.0	Zz(cm3)	499290.0
T(mm)	11.0	Zy(cm3)	112410.0
FlangeSlope	90	Zpz(cm3)	555560.0
R1(mm)	1.5	Zpy(cm3)	112410.0
R2(mm)	0.0		
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)		$V_{dpb} = \frac{2.5\ k_b\ d\ t\ f_u}{\gamma_{mb}}$ $= \frac{2.5\ * 0.49 * 16.0 * 7.0 * 410}{1.25}$ $= 45.0$	
Capacity (kN)		$V_{db} = min\ (V_{dsb}, V_{dpb})$ $= min\ (43.51, 45.0)$ $= 43.51$	
No of Bolts	$R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{50.0^2 + 50.0^2}}{43.51}$ $= 2$	3	
No of Columns		1	
No of Rows		3	
Min. Pitch (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 16.0 \quad = 40.0$	0.0	N/A
Max. Pitch (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 7.0,\ 300\ mm)$ $= 300$	0.0	N/A
Min. Gauge (mm)	$p/g_{min} = 2.5\ d$ $=2.5 * 16.0 \quad = 40.0$	45	Pass
Max. Gauge (mm)	$p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 7.0,\ 300\ mm)$ $= 300$	45	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)	44.88	45.0	Pass

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2.2 Plate Design Checks

Check	Required	Provided	Remarks
Min. Plate Height (mm)	$0.6 * d_b = 0.6 * 244.0 = 146.4$	160	Pass
Max. Plate Height (mm)	$d_b - t_{bf} + r_{b1} - notch_h$ $= 244.0 - 11.0 + 1.5 - 30$ $= 194.0$	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)	$t_w = 7.0$	8.0	Pass
Shear yielding Capacity (V_dy) (kN)		$V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$ $= \frac{160 * 8.0 * 250}{\sqrt{3} * 1.1}$ $= 167.96$	
Shear Rupture Capacity (V_dn) (kN)		$V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$ $= 1 * (160 - (3 * 18.0)) * 8.0 * 410$ $= 260.76$	
Block Shear Capacity in Shear (V_db) (kN)		172.71	
Shear Capacity (V_d) (kN)	50.0	$V_d = Min(V_{dy}, V_{dn}, V_{db})$ $= Min(167.96, 260.76, 172.71)$ $= 167.96$	Pass
Tension Yielding Capacity (kN)		$T_{dg} = \frac{l * t_p * f_y}{\gamma_{mo}}$ $= \frac{160 * 8.0 * 250}{1.1}$ $= 290.91$	
Tension Rupture Capacity (kN)		$T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}}$ $= \frac{0.9 * (160 - 3 * 18.0) * 8.0 * 410}{1.25}$ $= 335.35$	
Block Shear Capacity in Tension (T_db) (kN)		217.28	
Tension Capacity (kN)	50.0	$T_d = Min(T_{dg}, T_{dn}, T_{db})$ $= Min(290.91, 335.35, 217.28)$ $= 217.28$	Pass
Moment Capacity (kN-m)	2.25	11.64	Pass
Interaction Ratio	≤ 1	$\frac{2.25}{11.64} + \frac{50.0}{217.28} = 0.42$	Pass

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2.3 Weld Checks

Check	Required	Provided	Remarks
Min Weld Size (mm)	$Thickness\ of\ Thicker\ part$ $= max(9.0, 8.0)$ $= 9.0$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 3$	3	Pass
Max Weld Size (mm)	$Thickness\ of\ Thinner\ part$ $= Min(9.0, 8.0) = 8.0$ $t_{w_{max}} = 8.0$	3	Pass
Weld Strength (kN/mm)	$R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{2250000.0 * 77.0}{608710.67}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{2250000.0 * 0.0}{608710.67}$ $V_{wv} = \frac{V}{l_w} = \frac{50000.0}{308}$ $A_{wh} = \frac{A}{l_w} = \frac{50000.0}{308}$ $R_w = \sqrt{(284.62 + 162.34)^2 + (0.0 + 162.34)^2}$ $= 475.52$	$f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}}$ $= \frac{3 * 410}{\sqrt{3} * 1.25}$ $= 568.11$	Pass

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3 3D View

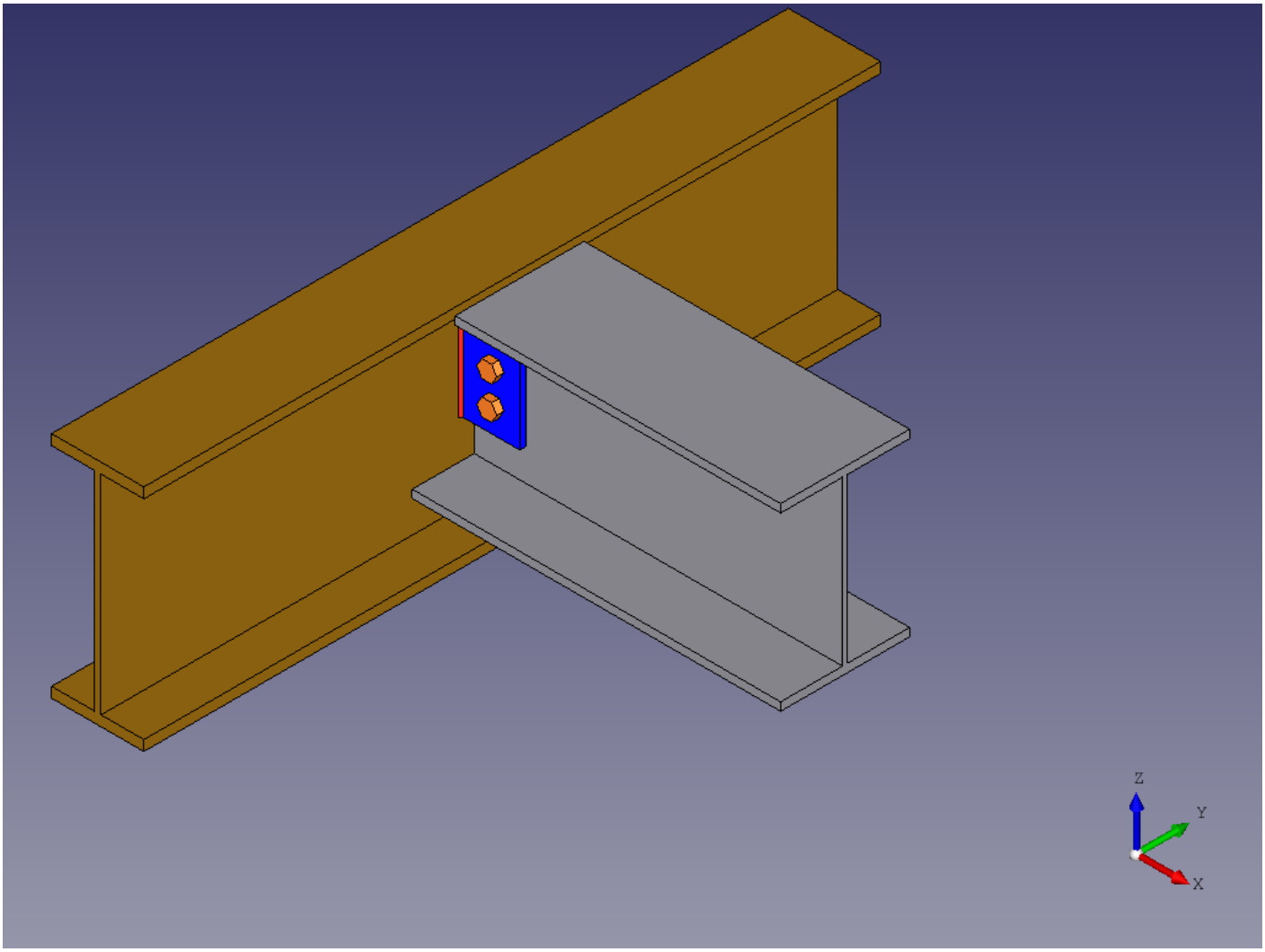

Figure 1: 3D View