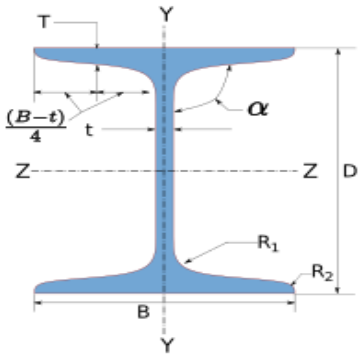
Company Name	IIT Bombay	Project Title	Sample Connection Design
Group/Team Name	Osdag	Subtitle	Beam-Beam End Plate Splice
Designer	Engineer #1	Job Number	1.2.1.2.1.1.1
Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

1 Input Parameters

Main Module			Moment Connection	
Module			Beam-Beam End Plate Splice	
Connectivity			Coplanar Tension-Compression Flange	
End Plate Type			Flushed - Reversible Moment	
Bending Moment (kNm)			250.0	
Shear Force (kN)			120.0	
Axial Force (kN)			35.0	
Beam Section - Mechanical Properties				
	Beam Section		WB 500	
	Material		E 250 (Fe 410 W)C	
	Ultimate Strength, Fu (MPa)		410	
	Yield Strength, Fy (MPa)		250	
	Mass, m (kg/m)	95.12	I_z (cm^4)	52200.0
	Area, A (cm^2)	12100.0	I_y(cm^4)	2980.0
	D (mm)	500.0	r_z (cm)	20.7
	B (mm)	250.0	r_y (cm)	4.96
	t (mm)	9.9	Z_z (cm^3)	2090.0
	T (mm)	14.7	Z_y (cm^3)	239.0
	Flange Slope	96	Z_{pz} (cm^3)	2350.0
	R_1 (mm)	15.0	Z_{py} (cm^3)	406.0
	R_2 (mm)	7.5		
Plate Details - Input and Design Preference				
Thickness (mm)			[20, 22, 25, 28, 32]	
Material			E 300 (Fe 440)	
Ultimate Strength, Fu (MPa)			440	
Yield Strength, Fy (MPa)			290	
Bolt Details - Input and Design Preference				
Diameter (mm)			[20, 24, 30]	
Property Class			[6.8, 8.8]	
Type			Bearing Bolt	
Bolt Tension			Non pre-tensioned	
Hole Type			Standard	

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Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

Slip Factor, (mu_f)	0.3
Weld Details - Input and Design Preference	
Type of Weld Fabrication	Shop Weld
Material Grade Overwrite, f_u (MPa)	500.0
Beam Flange to End Plate	Groove Weld
Beam Web to End Plate	Fillet Weld
Stiffener	Fillet Weld
Detailing - Design Preference	
Edge Preparation Method	Rolled, machine-flame cut, sawn and planed
Gap Between Beams (mm)	0.0
Are the Members Exposed to Corrosive Influences?	False

2 Design Checks

Design Status	Pass

2.1 Member Capacity

Check	Required	Provided	Remarks
Shear Capacity (kN)		$V_{dy} = \frac{A_v\ f_y}{\sqrt{3}\ \gamma_{mo}}$ $= \frac{0.6 \times 470.6 \times 9.9 \times 250}{\sqrt{3} \times 1.1 \times 1000}$ $= 366.8$ $[Ref. IS\ 800:2007, Cl. 10.4.3]$	**Restricted to low shear**
Plastic Moment Capacity (kNm)		$M_{dz-z} = \frac{\beta_b Z_{pz} fy}{\gamma_{mo}}$ $= \frac{1 \times 2350000.0 \times 250}{1.1 \times 10^6}$ $= 534.09$ $[Ref.\ IS\ 800:2007,\ Cl.\ 8.2.1.2]$	**V < 0.6 Vdy**

2.2 Load Consideration

Check	Required	Provided	Remarks
Shear Force (kN)	$V_y = 120.0$	$V_{y_{min}} = min(0.15 \times V_{dy}, 40.0)$ $= min(0.15 \times 366.8,\ 40.0)$ $= min(55.02,\ 40.0)$ $= 40$ $V_u = max(V_y,\ V_{y_{min}})$ $= max(120.0,\ 40)$ $= 120.0$ $[Ref.\ IS\ 800:2007,\ Cl.\ 10.7]$	**OK**
Axial Force (kN)		P_x = 35.0	**OK**

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Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

Check	Required	Provided	Remarks
Bending Moment (kNm)	$M_z = 250.0$	$M_{z\,min} = 0.5 * M_{dz-z}$ $= 0.5 \times 534.09$ $= 267.05$ $M_u = max(M_z,\ M_{z\,min})$ $= max(250.0, 267.05)$ $= 267.05$ $[Ref.\ IS\ 800 : 2007,\ Cl.\ 8.2.1.2]$	**OK**
Effective Bending Moment (kNm)		$M_{ue} = M_u\ +\ P_x \times \left(\frac{D}{2} - \frac{T}{2}\right) \times 10^{-3}$ $= 267.05 +$ $35.0 \times \left(\frac{500.0}{2} - \frac{14.7}{2}\right) \times 10^{-3}$ $= 275.54$	**OK**

2.3 Bolt Optimization

Check	Required	Provided	Remarks
Diameter (mm)	Bolt Diameter Optimization	$d = 24$	**Pass**
Property Class	Bolt Property Class Optimization	8.8	**Pass**
Hole Diameter (mm)		$d_0 = 26.0$	**OK**
No. of Bolt Columns		$n_c = 2$	**Pass**
No. of Bolt Rows		$n_r = 4$	**Pass**
Total No. of Bolts		$n = n_r X n_c = 8$	**Pass**

2.4 Detailing

Check	Required	Provided	Remarks
Min. Pitch Distance (mm)	$p_{min} = 2.5\ d$ $= 2.5 \times 24.0$ $= 60.0$ [$Ref\ IS\ 800:2007,\ Cl.\ 10.2.2$]	80	**Pass**
Max. Pitch Distance (mm)	$p_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 \times 28.0,\ 300\ mm)$ $= \min(896.0,\ 300\ mm)$ $= 300$ $Where,\ t = min(28.0, 28.0)$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.2.3$]	80	**Pass**
Min. End Distance (mm)	$e_{min} = 1.5\ d_0$ $= 1.5 \times 26.0$ $= 39.0$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.2.4.2$]	40	**Pass**
Max. End Distance (mm)	$e_{max} = 12\ t\ \varepsilon;\ \varepsilon = \sqrt{\frac{250}{f_y}}$ $e_1 = 12 \times 28.0 \times \sqrt{\frac{250}{290}} = 311.97$ $e_2 = 12 \times 28.0 \times \sqrt{\frac{250}{290}} = 311.97$ $e_{max} = min(e_1, e_2) = 311.97$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.2.4.3$]	40	**Pass**
Min. Edge Distance (mm)	$e'_{min} = 1.5\ d_0$ $= 1.5 \times 26.0$ $= 39.0$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.2.4.2$]	40	**Pass**

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Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

Check	Required	Provided	Remarks
Max. Edge Distance (mm)	$e'_{max} = 12\ t\ \varepsilon;\ \varepsilon = \sqrt{\frac{250}{f_y}}$ $e_1 = 12 \times 28.0 \times \sqrt{\frac{250}{290}} = 311.97$ $e_2 = 12 \times 28.0 \times \sqrt{\frac{250}{290}} = 311.97$ $e'_{max} = min(e_1, e_2) = 311.97$ [*Ref. IS* 800 : 2007, *Cl.* 10.2.4.3]	40	**Pass**
Cross-centre Gauge Distance (mm)		106	**Pass**

2.5 Critical Bolt Design

Check	Required	Provided	Remarks
Shear Capacity (kN)		$V_{dsb} = \frac{f_{ub}\ n_n\ A_{nb}}{\sqrt{3}\ \gamma_{mb}}$ $= \frac{830.0 \times 1 \times 353}{1000 \times \sqrt{3}\ \times\ 1.25}$ $= 135.33$ [*Ref. IS* 800 : 2007, *Cl.* 10.3.3]	**OK**
Kb		$k_b = min\left(\frac{e}{3d_0},\ \frac{p}{3d_0} - 0.25,\ \frac{f_{ub}}{f_u},\ 1.0\right)$ $= min\left(\frac{40}{3 \times 26.0},\ \frac{80}{3 \times 26.0} - 0.25,\ \frac{830.0}{410},\ 1.0\right)$ $= min(0.51, 0.78, 2.02, 1.0)$ $= 0.51$ [*Ref. IS* 800 : 2007, *Cl.* 10.3.4]	**OK**

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Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

Check	Required	Provided	Remarks
Bearing Capacity (kN)		$V_{dpb} = \frac{2.5\ k_b\ d\ t\ f_u}{\gamma_{mb}}$ $= \frac{2.5 \times 0.51 \times 24.0 \times 28.0 \times 440}{1000 \times 1.25}$ $= 301.59$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.3.4$]	**OK**
Bolt Capacity (kN)		$V_{db} = min\ (V_{dsb}, V_{dpb})$ $= min\ (135.33, 301.59)$ $= 135.33$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.3.2$]	
Large Grip Length Reduction Factor		$l_g = \sum \left(t_p + t_{member}\right)$ $= \sum \left(28.0 + 28.0\right)$ $= 56.0\ mm$ $5d = 5 \times 24.0 = 120.0$ $8d = 8 \times 24.0 = 192.0$ $Since,\ l_g < 5d$ $\beta_{lg} = 1.0$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.3.3.2$]	**Pass**
Bolt Capacity (post reduction factor) (kN)		$V_{db} = V_{db}\beta_{lg}$ $= 135.33 \times 1.0$ $= 135.33$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.3.3.2$]	**OK**
Shear Demand (kN)	$V_{sb} = \frac{V_u}{n}$ $= \frac{120.0}{8}$ $= 15.0$	Vdb = 135.33	**Pass**

Check	Required	Provided	Remarks
Lever Arm (mm)	$r = [437.95, 47.35, 357.95, 127.35]$ *Note :* r_1 *is the first row inside tension/top flange* r_2 *is the first row inside compression/bottom flange* *Further row(s) are added in a symmetrical manner with odd row placed near the tension/top flange and even row placed near the compression/bottom flange respectively* *Note :* *The lever arm is computed by considering the* NA *at the centre of the bottom flange. Rows with identical lever arm values mean they are considered acting as bolt group near the tension or compression flange.*		**Pass**
Tension Due to Moment (kN)	$T_1 = \frac{M_{ue}}{n_c \times \left(r_1 + \sum_{i=2}^{n_r} \frac{r_i^2}{r_1}\right)}$ $= \frac{275.54 \times 10^3}{2 \times \left(437.95 + \sum_{i=2}^{4} \frac{r_i^2}{437.95}\right)}$ $= 178.31$ *Note :* T_1 *is the tension in the critical bolt* *The critical bolt is the bolt nearest to the tension flange*		**OK**

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Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

Check	Required	Provided	Remarks
Prying Force (kN)	$Q = \frac{l_v}{2 \times l_e}\left[T_e - \frac{\beta \times \eta \times f_o \times b_e \times t^4}{27 \times l_e \times l_v^2}\right]$ $l_v = e - \frac{R_1}{2}$ $= 40 - \frac{15.0}{2} = 32.5\ mm$ $f_o = 0.7 \times f_{ub}$ $= 0.7 \times 830.0$ $= 581.0\ N/mm^2$ $l_e = min\left(e, 1.1\ t\ \sqrt{\frac{\beta\ f_o}{f_y}}\right)$ $= min\left(40, 1.1 \times 28 \times \sqrt{\frac{2 \times 581.0}{290}}\right)$ $= min(40, 61.65) = 40\ mm$ $\beta = 2\ (non\ pre-tensioned\ bolt)$ $\eta = 1.5$ $b_e = \frac{B}{n_c}$ $= \frac{250.0}{2} = 125.0\ mm$ $Q = \frac{32.5}{2 \times 40} \times$ $\left[178.31 - \left(\frac{2 \times 1.5 \times 581.0 \times 125.0 \times 28^4}{27 \times 40 \times 32.5^2}\right) \times 10^{-3}\right]$ $Q = 24.74$ $[Ref.\ IS\ 800:2007,\ Cl.\ 10.4.7]$		**OK**

Check	Required	Provided	Remarks
Tension Demand (kN)	$T_b = T_1 + Q$ $= 178.31 + 24.74$ $= 203.05$	$T_{db} = 0.90\ f_{ub}\ A_n\ /\ \gamma_{mb}$ $<\ f_{yb}\ A_{sb}\ (\gamma_{mb}\ /\ \gamma_{m0})$ $= min\Big(0.90\ \times 830.0 \times 353\ /\ 1.25,$ $660.0 \times 452.0 \times (1.25/1.1)\Big)$ $= min(210.95,\ 339.0)$ $= 210.95$ $[Ref.\ IS\ 800 : 2007,\ Cl.\ 10.3.5]$	**Pass**
Combined Capacity, (I.R)	≤ 1	$\left(\frac{V_{sb}}{V_{db}}\right)^2 + \left(\frac{T_b}{T_{db}}\right)^2 \leq 1.0$ $\left(\frac{15.0}{135.33}\right)^2 + \left(\frac{203.05}{210.95}\right)^2 = 0.94$ $[Ref.\ IS\ 800 : 2007,\ Cl.\ 10.3.6]$	**Pass**

2.6 Compression Flange Check

Check	Required	Provided	Remarks
Tension in Bolt Rows (kN)		$T = [178.31, 19.28, 145.73, 51.85]$	**OK**
Reaction at Compression Flange (kN)	$R_c = n_c \sum_{n_r=1}^{n_r} T_{n_r}$ $= 2 \times \sum_{n_r=1}^{4} T_{n_r}$ $= 2 \times 395.17$ $= 790.34$	$F_c = A_g f_y\ /\ \gamma_{m0}$ $= \frac{B \times T \times f_y}{\gamma_{m0}}$ $= \frac{250.0 \times 14.7 \times 250}{1.1 \times 1000}$ $= 835.23$	**Pass**

2.7 End Plate Checks

Check	Required	Provided	Remarks
Height (mm)		$H_p = D + 25$ $= 500.0 + 25$ $= 525.0$	**Pass**
Width (mm)		$B_p = B + 25$ $= 250.0 + 25$ $= 275.0$	**Pass**
Moment at Critical Section (kNm)		$M_{cr} = T_1\ l_v - Q\ l_e$ $= (178.31 \times 32.5 - 24.74 \times 40) \times 10^{-3}$ $= 4.81$ *Note : The critical section is at the toe of the weld or the edge of the flange from bolt center − line*	**OK**
Plate Thickness (mm)	$t_p = \sqrt{\frac{4M_{cr}}{b_e(f_y/\gamma_{m0})}}$ $= \sqrt{\frac{4 \times 4.81 \times 10^6}{125 \times (290/1.1)}}$ $= 24.15$	28	**Pass**
Moment Capacity (kNm)	4.81	$M_p = \left(\frac{b_e t_p^2}{4}\right) \times \frac{f_y}{\gamma_{m0}}$ $= \frac{125 \times 28^2}{4} \times \frac{290}{1.1} \times 10^{-6}$ $= 6.46$	**Pass**

2.8 Longitudinal Stiffener Design

Check	Required	Provided	Remarks
Width (mm)		$W_{st} = B_p - \frac{t}{2}$ $= 275.0 - \frac{9.9}{2}$ $= 132.55$	**Pass**
Length (mm)		$L_{st} = 2 * W_{st}$ $= 2 * 132.55$ $= 265.1$	**Pass**
Thickness (mm)	$t = 9.9$	$tst = 10$	**Pass**

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Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

Check	Required	Provided	Remarks
Weld Size (mm)	6	tw = 6	**Pass**

2.9 Weld Design - Beam Web to End Plate Connection

Check	Required	Provided	Remarks
Weld Strength (N/mm2)	$f_{uw} = min(f_w,\ f_u)$ $= min(500.0,\ 440)$ $[Ref.\ IS\ 800:2007,\ Cl.\ 10.5.7.1.1]$	$f_{uw} = 440$	**Pass**
Total Weld Length (mm)		$L_w = 2 \times \left[D - (2 \times T) - (2 \times R1) - 20\right]$ $= 2 \times \left[500.0 - (2 \times 14.7) - (2 \times 15.0) - 20\right]$ $= 841.2$ *Note : Weld is provided on both sides of the web*	
Weld Size (mm)	$t_w = \frac{V_u}{f_{uw} k L_w} \times \sqrt{3}\ \gamma_{mw}$ $= \frac{120.0 \times 10^3}{440 \times 0.7 \times 841.2} \times \sqrt{3} \times 1.25$ $= 1.0$ $[Ref.\ IS\ 800:2007,\ Cl.\ 10.5.7]$	6	**Pass**

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Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

Check	Required	Provided	Remarks
Min. Weld Size (mm)	1) $t_{w\,min}$ – *based on thickness of the thicker part* $t_{thicker} = max(28.0,\ 9.9)$ $= 28.0$ $t_{w\,min} = 6$ 2) $t_{w\,min}$ – *based on thickness of the thinner part* $t_{thinner} = min(28.0,\ 9.9)$ $= 9.9$ $t_{w\,min} \leq min(6,\ 9.9)$ [*Ref IS* 800 : 2007, *Table* 21 , *Cl*10.5.2.3]	$t_w = max(t_w,\ t_{w\,min})$ $= max(1.0,\ 6)$ $= 6$	**Pass**
Max. Weld Size (mm)	$t_{w\,max}$ *based on thickness of the thinner part* $t_{thinner} = min(28.0,\ 9.9)$ $= 9.9$ $t_{w\,max} = 9.9$ [*Ref. IS* 800 : 2007, *Cl.* 10.5.3.1]	$t_w \leq t_{w\,max}$ $6 \leq 9.9$	**Pass**
Normal Stress (N/mm2)		$f_a = \frac{H}{0.7 \times t_w \times L_w}$ $= \frac{35.0 \times 10^3}{0.7 \times 6 \times 841.2}$ $= 9.91$ [*Ref. IS* 800 : 2007, *Cl.* 10.5.9]	**OK**

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Check	Required	Provided	Remarks
Shear Stress (N/mm2)		$q = \frac{V}{0.7 \times t_w \times L_w}$ $= \frac{120.0 \times 10^3}{0.7 \times 6 \times 841.2}$ $= 33.97$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.5.9$]	**OK**
Equivalent Stress (N/mm2)	$f_e = \sqrt{f_a^2 + 3q^2}$ $= \sqrt{9.91^2 + (3 \times 33.97^2)}$ $= 58.92$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.5.10.1.1$]	$f_w = \frac{f_u}{\sqrt{3}\ \gamma_{mw}}$ $= \frac{440}{\sqrt{3} \times 1.25}$ $= 203.23$ [$Ref.\ IS\ 800:2007,\ Cl.\ 10.5.7.1.1$]	**Pass**

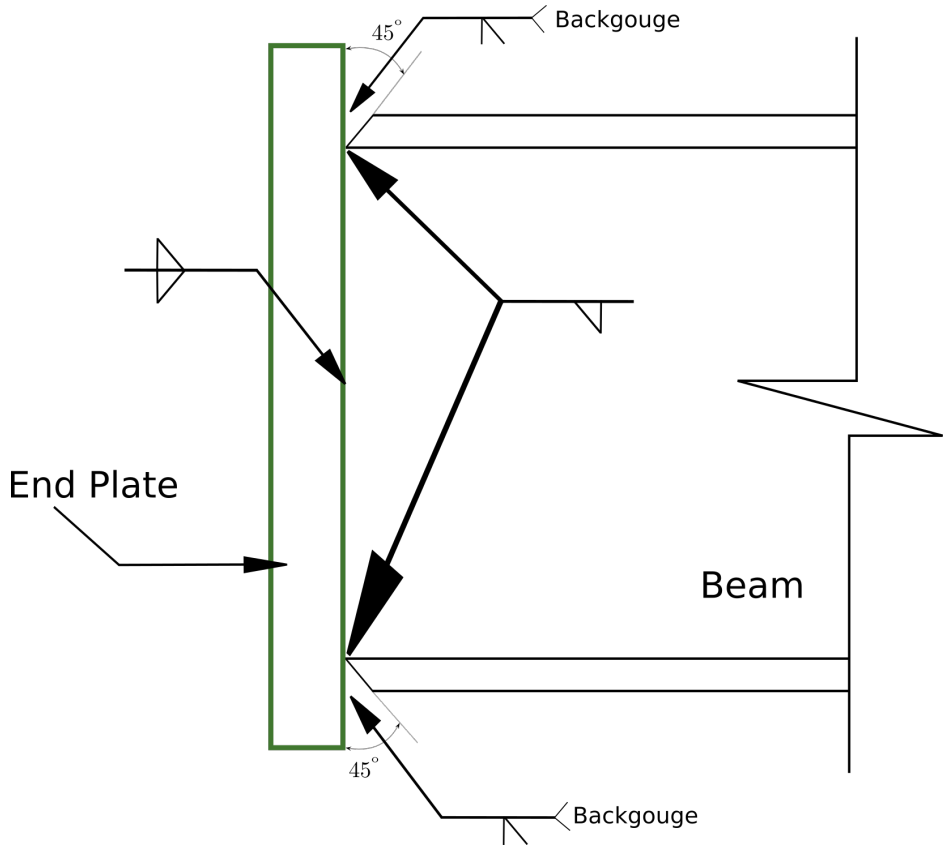

Figure 1: Typical Weld Details - Beam to End Plate Connection

3 2D Drawings (Typical)

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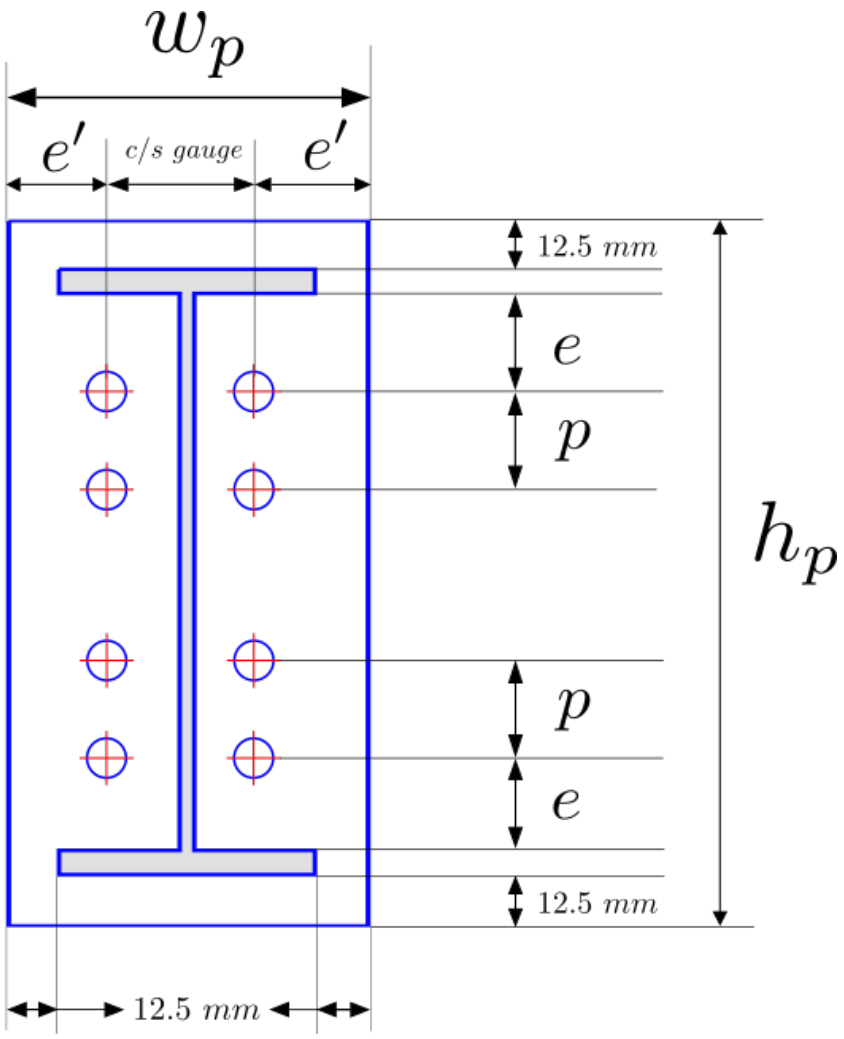


Figure 2: Typical Detailing

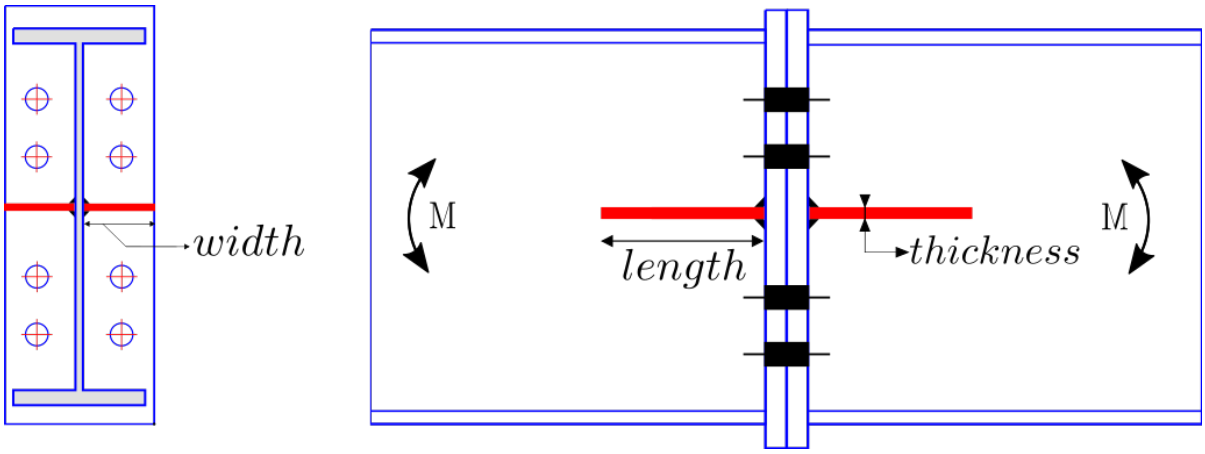
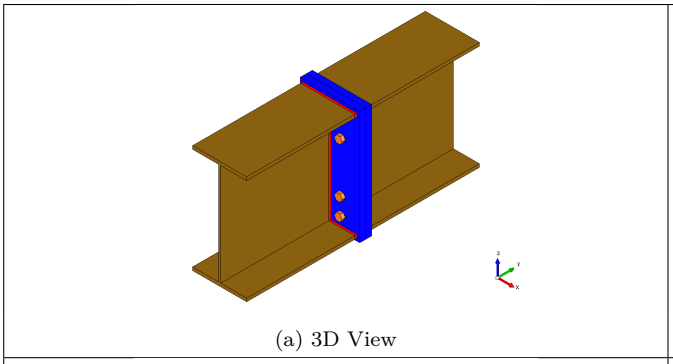
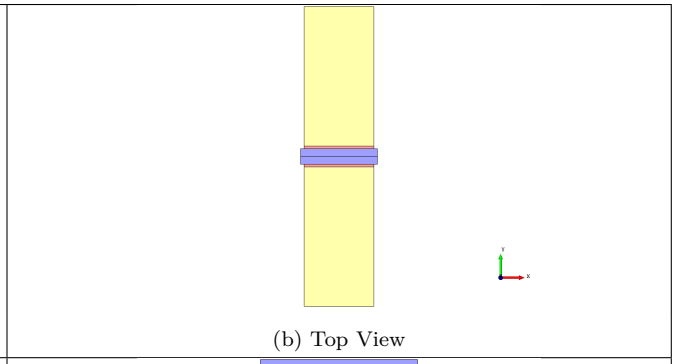


Figure 3: Typical Stiffener Details

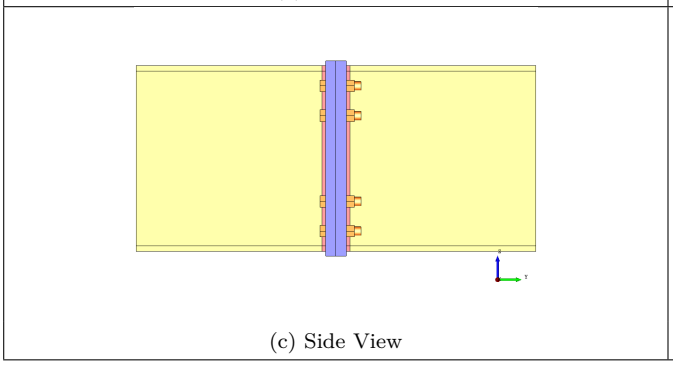
4 3D Views



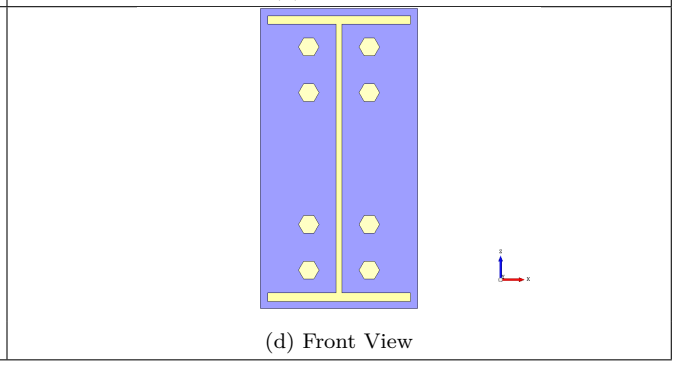
(a) 3D View



(b) Top View



(c) Side View



(d) Front View

5 Design Log

2020-12-17 23:46:33 - Osdag - WARNING - The Load(s) defined is/are less than the minimum recommended value [Ref. IS 800:2007, Cl.10.7].
2020-12-17 23:46:33 - Osdag - WARNING - [Minimum Factored Load] The external factored bending moment (250.0 kNm) is less than 0.5 times the plastic moment capacity of the beam (534.09 kNm)
2020-12-17 23:46:33 - Osdag - INFO - The minimum factored bending moment should be at least 0.5 times the plastic moment capacity of the beam to qualify the connection as rigid connection (Annex. F-4.3.1, IS 800:2007)
2020-12-17 23:46:33 - Osdag - INFO - The value of load(s) is/are set at minimum recommended value as per Cl.10.7 and Annex. F, IS 800:2007
2020-12-17 23:46:33 - Osdag - INFO - Designing the connection for a factored moment of 267.05 kNm
2020-12-17 23:46:33 - Osdag - INFO - [Bolt Design] Bolt diameter and grade combination ready to perform bolt design
2020-12-17 23:46:33 - Osdag - INFO - The solver has selected 6 combinations of bolt diameter and grade to perform optimum bolt design in an iterative manner
2020-12-17 23:46:33 - Osdag - INFO - Checking the design with the following bolt diameter-grade combination [(20.0, 6.8), (20.0, 8.8), (24.0, 6.8), (24.0, 8.8), (30.0, 6.8), (30.0, 8.8)]
2020-12-17 23:46:33 - Osdag - INFO - [Optimisation] Performing the design by optimising the plate thickness, using the thin plate and large (suitable) bolt diameter approach
2020-12-17 23:46:33 - Osdag - INFO - If you wish to optimise the bolt diameter-grade combination, pass a higher value of plate thickness using the Input Dock
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 23.94 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 415.44095239616416 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 15.602
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 20.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check

2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 229.20114086587427 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 4.738
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:33 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:33 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:33 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 20.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 165.19378743179135 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.458
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 24.41 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 410.13095239616416 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 7.949
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the

flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 20.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 223.89114086587426 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.364
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:33 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:33 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:33 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 20.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 159.88378743179135 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.204
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 25.69 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 435.6545457039054 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension

check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 8.255
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 790.34 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 20.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 245.44505592020056 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.614
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 25.95 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 424.8545457039054 kN and exceeds the bolt tension capacity (210.95 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 4.105
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 790.34 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 20.3 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 238.32505592020058 kN and exceeds the bolt tension capacity (210.95 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter

2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.289
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 717.26 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 29.18 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 487.9006052867769 kN and exceeds the bolt tension capacity (242.35 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 4.09
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 843.44 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 8.21 kN
2020-12-17 23:46:33 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:33 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:33 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 22.7 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 283.63996488947976 kN and exceeds the bolt tension capacity (242.35 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.379
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]

2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 717.26 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 29.28 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 461.0206052867769 kN and exceeds the bolt tension capacity (335.25 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.911
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 843.44 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 8.21 kN
2020-12-17 23:46:33 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:33 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:33 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 20.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 22.84 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - INFO - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade passes the tension check
2020-12-17 23:46:33 - Osdag - INFO - Total tension demand on bolt (due to direct tension + prying action) is 267.82996488947975 kN and the bolt tension capacity is (335.25 kN)
2020-12-17 23:46:33 - Osdag - INFO - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade passes the combined shear + tension check
2020-12-17 23:46:33 - Osdag - INFO - The Interaction Ratio (IR) of the critical bolt is 0.643
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 24.51 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check

2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 409.01095239616416 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 15.129
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 22.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 222.77114086587426 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 4.479
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:33 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:33 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:33 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 22.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 158.76378743179134 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.272
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment

capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 25.17 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 401.2409523961642 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 7.613
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 22.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 215.00114086587425 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.182
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:33 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:33 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:33 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 22.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 150.98378743179134 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.075
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]

2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 26.02 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 424.1245457039054 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 7.829
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 790.34 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 22.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 237.60505592020058 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.451
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 26.49 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 419.0945457039054 kN and exceeds the bolt tension capacity (210.95 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the combined shear + tension check

Company Name	IIT Bombay	Project Title	Sample Connection Design
Group/Team Name	Osdag	Subtitle	Beam-Beam End Plate Splice
Designer	Engineer #1	Job Number	1.2.1.2.1.1.1
Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 3.996
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 790.34 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - INFO - [End Plate] The end plate of 22.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 232.56505592020056 kN and exceeds the bolt tension capacity (210.95 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.228
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 717.26 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 29.38 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 469.9406052867769 kN and exceeds the bolt tension capacity (242.35 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 3.797
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 843.44 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 8.21 kN
2020-12-17 23:46:33 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:33 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:33 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 22.96 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness

2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 272.39996488947975 kN and exceeds the bolt tension capacity (242.35 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.273
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:33 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:33 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 717.26 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:33 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:33 - Osdag - INFO - The minimum required thickness of end plate is 29.52 mm
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:33 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 445.5006052867769 kN and exceeds the bolt tension capacity (335.25 kN)
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:33 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.785
2020-12-17 23:46:33 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:33 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 843.44 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:33 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 8.21 kN
2020-12-17 23:46:34 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:34 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:34 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 22.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 23.14 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade passes the tension check
2020-12-17 23:46:34 - Osdag - INFO - Total tension demand on bolt (due to direct tension + prying action) is 258.02996488947974 kN and the bolt tension capacity is (335.25 kN)
2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade passes the combined shear + tension check
2020-12-17 23:46:34 - Osdag - INFO - The Interaction Ratio (IR) of the critical bolt is 0.597

2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 25.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 25.65 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 395.47095239616414 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 14.157
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 209.23114086587424 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 3.957
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:34 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:34 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:34 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:34 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 145.22378743179135 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter

2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.904
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 25.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 26.7 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 382.51095239616416 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 6.928
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 196.27114086587426 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.823
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:34 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:34 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:34 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:34 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force

2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade passes the tension check
2020-12-17 23:46:34 - Osdag - INFO - Total tension demand on bolt (due to direct tension + prying action) is 132.25378743179135 kN and the bolt tension capacity is (146.41 kN)
2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade passes the combined shear + tension check
2020-12-17 23:46:34 - Osdag - INFO - The Interaction Ratio (IR) of the critical bolt is 0.827
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 25.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 26.83 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 415.3545457039054 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 7.512
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 790.34 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 228.83505592020057 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.275
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 25.0 mm is insufficient and fails in the moment capacity check

2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 27.58 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 406.9545457039054 kN and exceeds the bolt tension capacity (210.95 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 3.771
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 790.34 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 220.43505592020057 kN and exceeds the bolt tension capacity (210.95 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.104
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 717.26 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 25.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 29.75 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 447.60060528677684 kN and exceeds the bolt tension capacity (242.35 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 3.448
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 843.44 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:34 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 8.21 kN

2020-12-17 23:46:34 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:34 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:34 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 258.1199648894798 kN and exceeds the bolt tension capacity (242.35 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.144
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 717.26 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 25.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 30.1 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 435.82060528677687 kN and exceeds the bolt tension capacity (335.25 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.709
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 843.44 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:34 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 8.21 kN
2020-12-17 23:46:34 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:34 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:34 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 25.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade passes the tension check
2020-12-17 23:46:34 - Osdag - INFO - Total tension demand on bolt (due to direct tension + prying action) is 250.12996488947974 kN

and the bolt tension capacity is (335.25 kN)
2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 30.0 mm diameter and 8.8 grade passes the combined shear + tension check
2020-12-17 23:46:34 - Osdag - INFO - The Interaction Ratio (IR) of the critical bolt is 0.562
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 28.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 376.08095239616415 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 12.821
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 28.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 189.84114086587425 kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 3.266
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:34 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:34 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:34 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:34 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 28.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 128.54378743179134

kN and exceeds the bolt tension capacity (105.84 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.497
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 675.36 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 28.0 mm is insufficient and fails in the moment capacity check
2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 28.76 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 355.6809523961641 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 6.004
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 764.72 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 28.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 174.50114086587425 kN and exceeds the bolt tension capacity (146.41 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 1.446
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Flange Strength] The reaction at the compression flange of the beam 845.0 kN exceeds the flange capacity 835.23 kN
2020-12-17 23:46:34 - Osdag - ERROR - Reaction on the flange exceeds the flange capacity by 9.77 kN
2020-12-17 23:46:34 - Osdag - WARNING - The beam flange can have local buckling
2020-12-17 23:46:34 - Osdag - INFO - Select a different beam with more flange area or provide stiffening at the flange to increase the beam flange thickness. Re-design connection using the effective flange thickness after stiffening
2020-12-17 23:46:34 - Osdag - INFO - Custom beams can be defined through the Osdag Design Preferences tab

2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 28.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade passes the tension check
2020-12-17 23:46:34 - Osdag - INFO - Total tension demand on bolt (due to direct tension + prying action) is 128.54378743179134 kN and the bolt tension capacity is (146.41 kN)
2020-12-17 23:46:34 - Osdag - INFO - [Bolt Design] The bolt of 20.0 mm diameter and 8.8 grade passes the combined shear + tension check
2020-12-17 23:46:34 - Osdag - INFO - The Interaction Ratio (IR) of the critical bolt is 0.782
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 28.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 402.79454570390544 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 7.07
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 790.34 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - INFO - [End Plate] The end plate of 28.0 mm passes the moment capacity check. The end plate is checked for yielding due tension caused by bending moment and prying force
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 216.26505592020058 kN and exceeds the bolt tension capacity (152.5 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 6.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 2.035
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - INFO - The provided beam can accommodate a single column of bolt on either side of the web [Ref. based on the detailing requirement]
2020-12-17 23:46:34 - Osdag - INFO - Performing the design with a single column of bolt on each side
2020-12-17 23:46:34 - Osdag - INFO - [Flange Strength] The reaction at the compression flange of the beam 689.12 kN is less than the flange capacity 835.23 kN. The flange strength requirement is satisfied.
2020-12-17 23:46:34 - Osdag - ERROR - [End Plate] The selected trial end plate of 28.0 mm is insufficient and fails in the moment capacity check

Company Name	IIT Bombay	Project Title	Sample Connection Design
Group/Team Name	Osdag	Subtitle	Beam-Beam End Plate Splice
Designer	Engineer #1	Job Number	1.2.1.2.1.1.1
Date	17 /12 /2020	Client	Harshavardhan Subbarao, Construma Consultancy, Mumbai

2020-12-17 23:46:34 - Osdag - INFO - The minimum required thickness of end plate is 29.07 mm
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a plate of available higher thickness
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the tension check
2020-12-17 23:46:34 - Osdag - ERROR - Total tension demand on bolt (due to direct tension + prying action) is 389.5745457039054 kN and exceeds the bolt tension capacity (210.95 kN)
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter
2020-12-17 23:46:34 - Osdag - ERROR - [Bolt Design] The bolt of 24.0 mm diameter and 8.8 grade fails the combined shear + tension check
2020-12-17 23:46:34 - Osdag - ERROR - The Interaction Ratio (IR) of the critical bolt is 3.46
2020-12-17 23:46:34 - Osdag - INFO - Re-designing the connection with a bolt of higher grade and/or diameter