 Created with	
Company Name	Tata Consulting Engineers Ltd.	Project Title	Design Problem 1
Group/Team Name	Team 1	Subtitle	
Designer	Mazhar	Job Number	1
Date	04 /06 /2016	Method	Limit State Design (No Earthquake Load)

Design Conclusion	
Finplate	Pass
Finplate	
Connection Properties	
Connection	
Connection Title	Single Finplate
Connection Type	Shear Connection
Connection Category	
Connectivity	Column flange-Beam web
Beam Connection	Bolted
Column Connection	Welded
Loading (Factored Load)	
Shear Force (kN)	160
Components	
Column Section	ISSC 200
Material	Fe 410
Beam Section	ISMB 400
Material	Fe 410
Hole	STD
Plate Section	300X100X10
Thickness (mm)	10
Width (mm)	100
Depth (mm)	300
Hole	STD
Weld	
Type	Double Fillet
Size (mm)	8
Bolts	
Type	HSFG
Grade	8.8
Diameter (mm)	20

Bolt Numbers	3
Columns (Vertical Lines)	1
Bolts Per Column	3
Gauge (mm)	0
Pitch (mm)	110
End Distance (mm)	40
Edge Distance (mm)	40
Assembly	
Column-Beam Clearance (mm)	20



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Design Check			
Check	Required	Provided	Remark
Bolt shear capacity (kN)		$V_{dsb} = (800 \times 0.6126 \times 20 \times 20) / (\sqrt{3} \times 1.25 \times 1000)$ = 90.529 [cl. 10.3.3]	
Bolt bearing capacity (kN)		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 8.9 \times 410) / (1.25 \times 1000)$ = 74.148 [cl. 10.3.4]	
Bolt capacity (kN)		Min (90.529, 74.148) = 74.148	
No. of bolts	160/74.148 = 2.2	3	Pass
No. of column(s)	≤ 2	1	
No. of bolts per column		3	
Bolt pitch (mm)	≥ 2.5 * 20 = 50, ≤ Min(32*8.9, 300) = 285 [cl. 10.2.2]	110	Pass
Bolt gauge (mm)	≥ 2.5*20 = 50, ≤ Min(32*8.9, 300) = 285 [cl. 10.2.2]	0	
End distance (mm)	≥ 1.7*22 = 37.4, ≤ 12*8.9 = 106.8 [cl. 10.2.4]	40	Pass
Edge distance (mm)	≥ 1.7*22 = 37.4, ≤ 12*8.9 = 106.8 [cl. 10.2.4]	40	Pass
Block shear capacity (kN)	≥ 160	$V_{db} = 426$	Pass
Plate thickness (mm)	(5*160*1000)/(300*250) = 10.67 [Owens and Cheal, 1989]	10	Pass
Plate height (mm)	≥ 0.6*400=240.0, ≤ 400-16-14-10=330.0 [cl. 10.2.4, Insdag Detailing Manual, 2002]	300	Pass
Plate width (mm)		100	
Plate moment	(2*90.529*110 ²)/(110*1000) =	$M_d = (1.2 \times 250 \times Z) / (1000 \times 1.1) = 40.91$	Pass

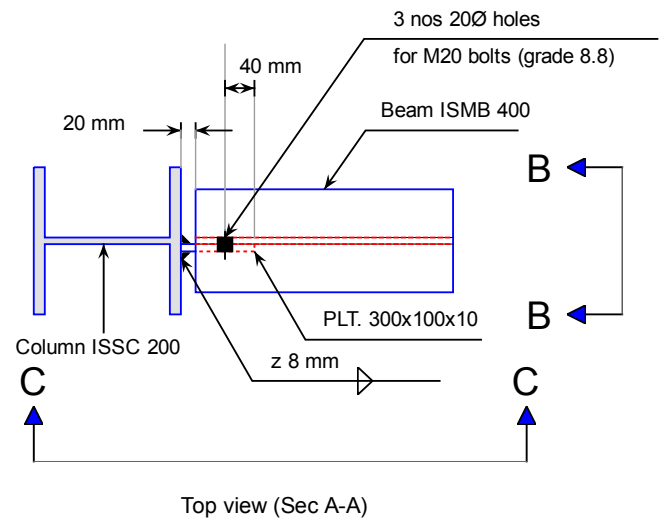
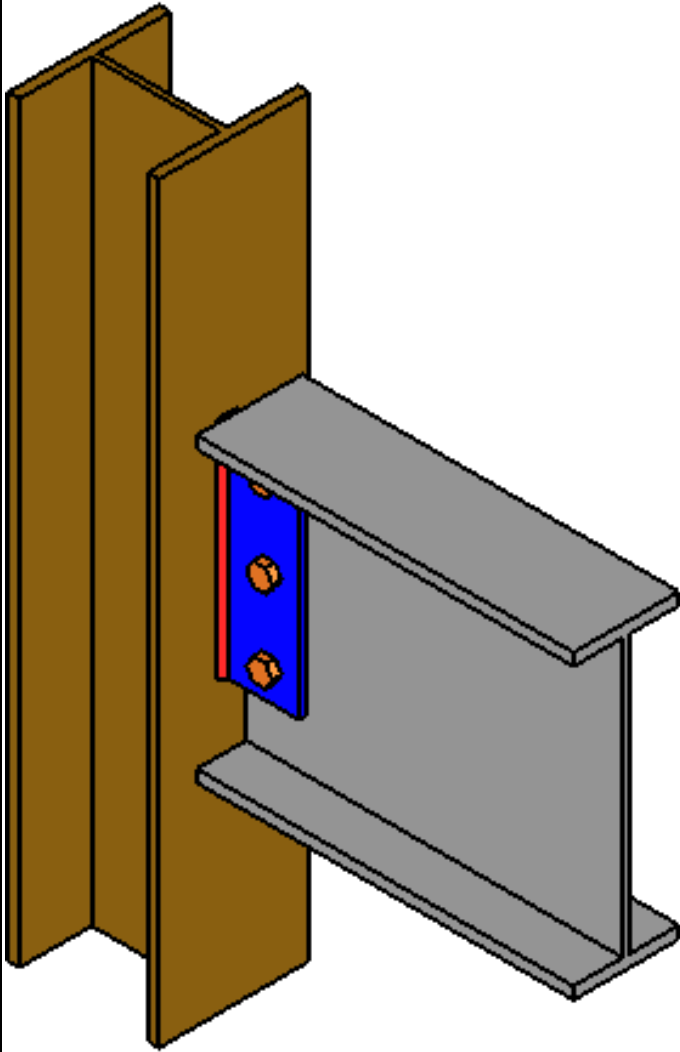
capacity (kNm)	19.916	[cl. 8.2.1.2]	
Effective weld length (mm)		$300 - 2 \cdot 8 = 284$	
Weld strength (kN/mm)	$\sqrt{[(19916 \cdot 6) / (2 \cdot 284^2)]^2 + [160 / (2 \cdot 284)]^2} = 0.793$	$f_v = (0.7 \cdot 8 \cdot 410) / (\sqrt{3} \cdot 1.25) = 1.06$ [cl. 10.5.7]	Pass
Weld thickness (mm)	$\text{Max}((0.793 \cdot 1000 \cdot \sqrt{3} \cdot 1.25) / (0.7 \cdot 410), 10 \cdot 0.8) = 8.0$ [cl. 10.5.7, Insdag Detailing Manual, 2002]	8	Pass

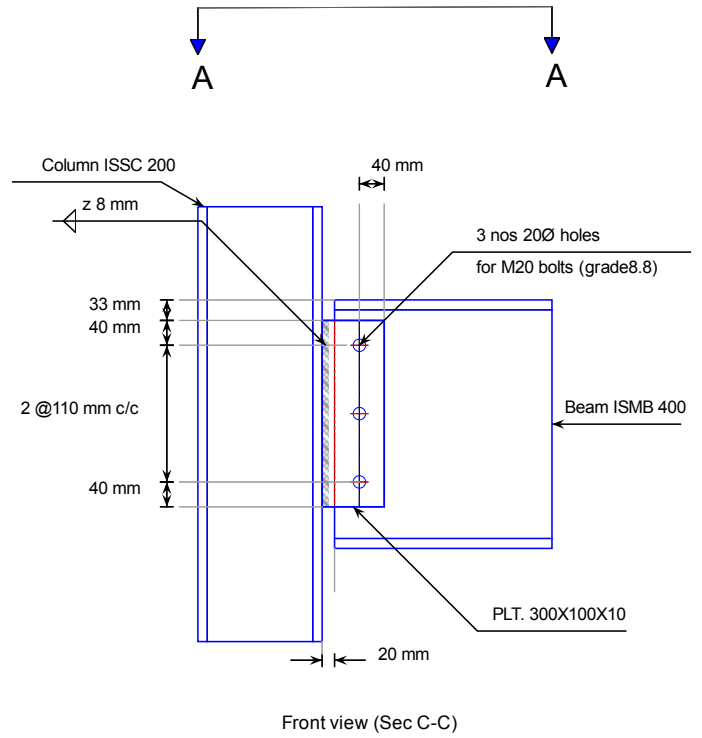
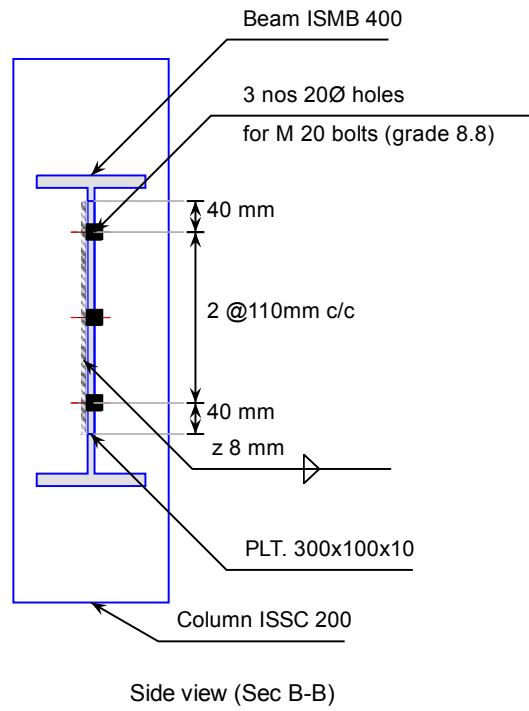


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Views







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Additional Comments	Comment for design problem 1
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