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Company Name	**IIT Bombay**	**Project Title**	**Connection Design Examples**
Group/Team Name	**Osdag**	**Subtitle**	**Fin plate shear connection**
Designer	**Engineer #1**	**Job Number**	**1.1.1.3.1**
Date	**20 /06 /2018**	**Client**	**SR Satish Kumar, IIT Madras, Chennai**

Design Conclusion	
Fin Plate	**Pass**
Fin Plate	
Connection Properties	
Connection	
Connection Title	Single Fin Plate
Connection Type	Shear Connection
Connection Category	
Connectivity	Beam-Beam
Beam Connection	Bolted
Column Connection	Welded
Loading (Factored Load)	
Shear Force (kN)	110
Components	
Column Section	MB 350
Material	Fe 410.0
Beam Section	NPB 270x135x36.1
Material	Fe 410.0
Hole	STD
Plate Section	220X90X10
Thickness (mm)	10
Width (mm)	90
Depth (mm)	220
Hole	STD
Weld	
Type	Double Fillet
Size (mm)	8
Bolts	
Type	Friction Grip Bolt
Grade	10.9
Diameter (mm)	20
Bolt Numbers	3
Columns (Vertical Lines)	1
Bolts Per Column	3
Gauge (mm)	0
Pitch (mm)	70

End Distance (mm)	40
Edge Distance (mm)	40
Assembly	
Column-Beam Clearance (mm)	10.0

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Design Preferences	
Bolt	
Hole Type	Over-sized
Hole Clearance (mm)	4.0
Material Grade (MPa) (overwrite)	1040.0
Slip factor	N/A
Weld	
Type of Weld	Shop weld
Material Grade (MPa) (overwrite)	410.0
Detailing	
Type of Edges	Rolled, machine-flame cut, sawn and planed
Minimum Edge-End Distance	1.5 times the hole diameter
Gap between Beam and Column (mm)	10.0
Are members exposed to corrosive influences?	No
Design	
Design Method	Limit State Design

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Design Check			
Check	**Required**	**Provided**	**Remark**
Bolt shear capacity (kN)		V_{dsf} = ((0.52*1*0.85*178.36)/(1.25)) = 60.6424 [cl. 10.4.3]	
Bolt bearing capacity (kN)		N/A	
Bolt capacity (kN)		60.6424	**Pass**
No. of bolts	110/60.6424 = 1.8	3	**Pass**
No.of column(s)	≤ 2	1	
No. of bolts per column		3	
Bolt pitch (mm)	≥ 2.5* 20 = 50, ≤ Min(32*6.6, 300) = 212 [cl. 10.2.2]	70	**Pass**
Bolt gauge (mm)	≥ 2.5*20 = 50, ≤ Min(32*6.6, 300) = 212 [cl. 10.2.2]	0	
End distance (mm)	≥ 1.5*24 = 36, ≤ 12*6.6 = 79.2 [cl. 10.2.4]	40	**Pass**
Edge distance (mm)	≥ 1.5*24 = 36, ≤ 12*6.6 = 79.2 [cl. 10.2.4]	40	**Pass**
Block shear capacity (kN)	≥ 110	V_{db} = 195	**Pass**
Plate thickness (mm)	(5*110*1000)/(220*250.0) = 10 [Owens and Cheal, 1989]	10	**Pass**
Plate height (mm)	≥ 0.6*270=162.0, ≤ 270-10-1-14-14- 5=226.0 [cl. 10.2.4, Insdag Detailing Manual, 2002]	220	**Pass**
Plate width (mm)		100	
Plate moment capacity (kNm)	$(2*60.6424*70^2)/(70*1000)$ = 6.064	M_d = (1.2*250.0*Z)/(1000*1.1) = 22.0 [cl. 8.2.1.2]	**Pass**
Effective weld length on each side (mm)		220-2*8 = 204	
Weld strength (kN/mm)	$\sqrt{[(6064*6)/(2*204^2)]^2 + [110/(2*204)]^2}$ = 0.514	f_v= (0.7*8*410)/($\sqrt{3}$*1.25) = 1.06 [cl. 10.5.7]	**Pass**

Weld thickness (mm)	Max((0.514*1000*√3* 1.25)/(0.7 * 410),10* 0.8) = 8.0 [cl. 10.5.7, Insdag Detailing Manual, 2002]	8	**Pass**

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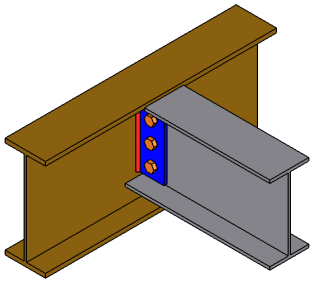
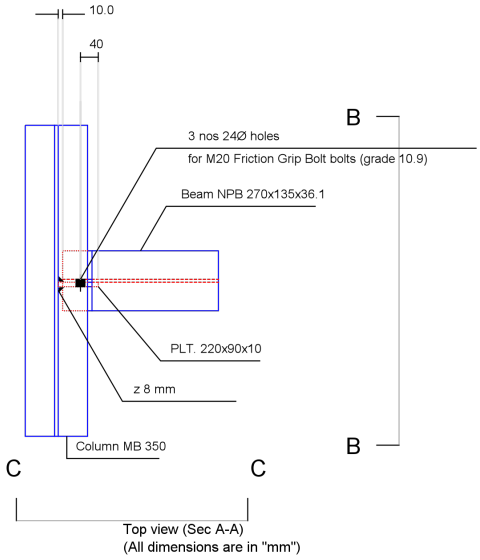
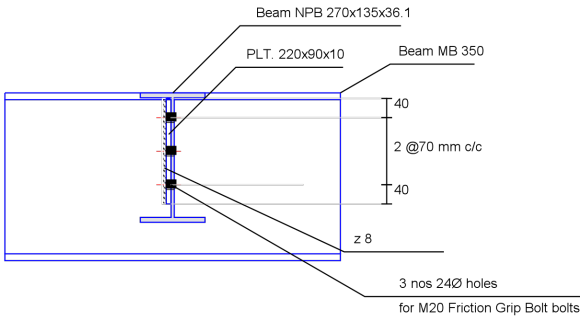
Views

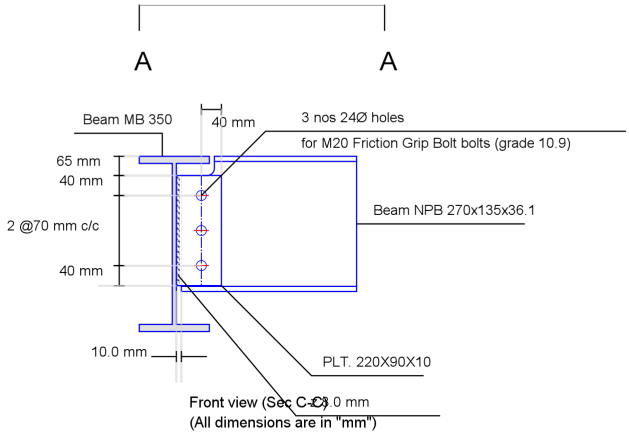




Top view (Sec A-A)
(All dimensions are in "mm")



Side view (Sec B-B)
(All dimensions are in "mm")



Front view (Sec C-C)
(All dimensions are in "mm")

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Date	**20 /06 /2018**	**Client**	**SR Satish Kumar, IIT Madras, Chennai**

Additional Comments	This is a sample design report generated in Osdag!