



Created with



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	18 /06 /2017	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 300
Material	Fe 410.0
Beam Section	NPB 250x125x30.1
Material	Fe 410.0
Hole	STD
Plate Section	180X90X14
Thickness (mm)	14
Width (mm)	90
Depth (mm)	180
Hole	STD
Weld	
Type	Double Fillet
Size (mm)	12
Bolts	
Type	HSFG
Grade	10.9
Diameter (mm)	20
Bolt Numbers	3
Columns (Vertical Lines)	1
Bolts Per Column	3
Gauge (mm)	0
Pitch (mm)	50

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



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	18 /06 /2017	Client	SR Satish Kumar, IIT Madras, Chennai

Design Preferences

Bolt	
Hole Type	Over-sized
Hole Clearance (mm)	4.0
Material Grade (MPa) (overwrite)	1040.0
Slip factor	0.52

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



Created with



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	18 /06 /2017	Client	SR Satish Kumar, IIT Madras, Chennai

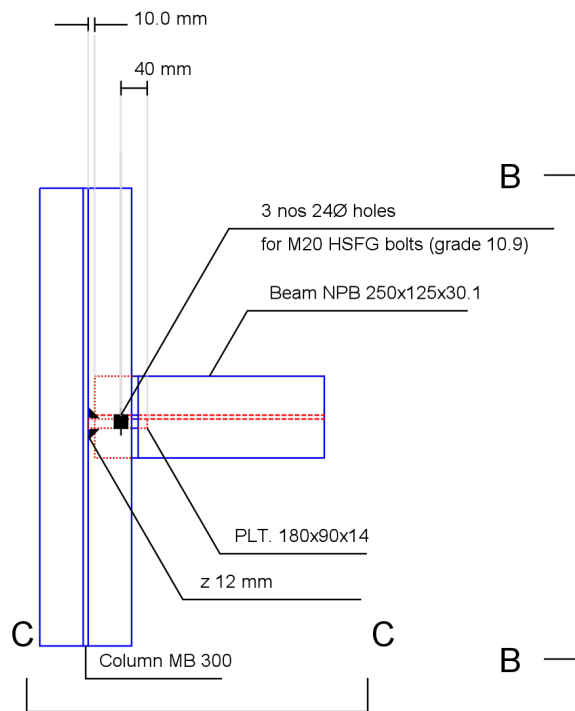
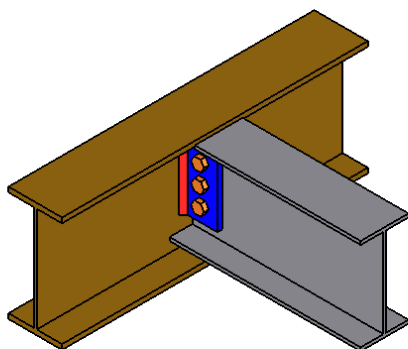
Design Check			
Check	Required	Provided	Remark
Bolt shear capacity (kN)		$V_{dsf} = ((0.52 \times 1 \times 0.85 \times 178.36) / (1.25)) = 60.6424$ [cl. 10.4.3]	
Bolt bearing capacity (kN)		N/A	
Bolt capacity (kN)		60.6424	Pass
No. of bolts	$110 / 60.6424 = 1.8$	3	Pass
No. of column(s)	≤ 2	1	
No. of bolts per column		3	
Bolt pitch (mm)	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 6.0, 300) = 192$ [cl. 10.2.2]	50	Pass
Bolt gauge (mm)	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 6.0, 300) = 192$ [cl. 10.2.2]	0	
End distance (mm)	$\geq 1.5 \times 24 = 36, \leq 12 \times 6.0 = 72.0$ [cl. 10.2.4]	40	Pass
Edge distance (mm)	$\geq 1.5 \times 24 = 36, \leq 12 \times 6.0 = 72.0$ [cl. 10.2.4]	40	Pass
Block shear capacity (kN)	≥ 110	$V_{db} = 136$	Pass
Plate thickness (mm)	$(5 \times 110 \times 1000) / (180 \times 250.0) = 12$ [Owens and Cheal, 1989]	14	Pass
Plate height (mm)	$\geq 0.6 \times 250 = 150.0, \leq 250 - 9 - 1 - 13 - 14 - 5 = 208.0$ [cl. 10.2.4, Insdag Detailing Manual, 2002]	180	Pass
Plate width (mm)		100	
Plate moment capacity (kNm)	$(2 \times 60.6424 \times 50^2) / (50 \times 1000) = 6.064$	$M_d = (1.2 \times 250.0 \times Z) / (1000 \times 1.1) = 20.62$ [cl. 8.2.1.2]	Pass
Effective weld length on each side (mm)		$180 - 2 \times 12 = 156$	
Weld strength (kN/mm)	$\sqrt{[(6064 \times 6) / (2 \times 156^2)]^2 + [110 / (2 \times 156)]^2} = 0.827$	$f_v = (0.7 \times 12 \times 410) / (\sqrt{3} \times 1.25) = 1.591$ [cl. 10.5.7]	Pass

Weld thickness (mm)	$\text{Max}((0.827 \cdot 1000 \cdot \sqrt{3} \cdot 1.25) / (0.7 \cdot 410), 14 \cdot 0.8) = 11.2$ [cl. 10.5.7, Insdag Detailing Manual, 2002]	12	Pass
----------------------------	--	----	-------------

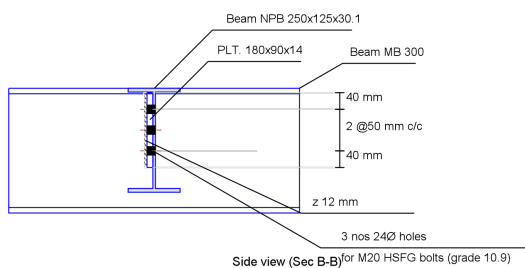


Company Name	IIT Bombay	Project Title	Connection Design Examples
Group/Team Name	Osdag	Subtitle	Fin Plate shear connection
Designer	Engineer #1	Job Number	1.1.1.3.1
Date	18 /06 /2017	Client	SR Satish Kumar, IIT Madras, Chennai

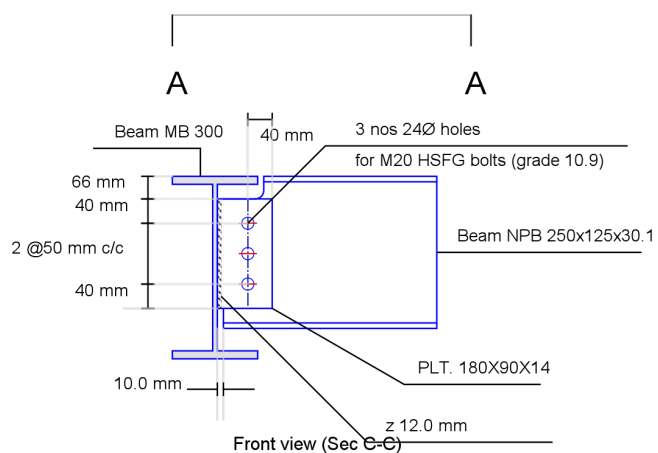
Views



Top view (Sec A-A)



Side view (Sec B-B) for M20 HSFG bolts (grade 10.9)



Front view (Sec C-C)



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	18 /06 /2017	Client	SR Satish Kumar, IIT Madras, Chennai

Additional Comments	
----------------------------	--