Company Name	IIT Bombay	Project Title	Connection Design Example
Group/Team Name	Osdag	Subtitle	Cover Plate Connection
Designer	Engineer#1	Job Number	1.2.1.1.1.1
Date	12 /06 /2019	Client	Manas M. Ghosh, INSDAG, Kolkata

Design Conclusion	
Beam to Beam Spliced Cover Plate	**Fail**
Beam to Beam Spliced Cover Plate	
Connection Properties	
Connection	
Connection Title	Beam to Beam Spliced Cover Plate
Connection Type	Moment Connection
Connection Category	
Connectivity	Bolted
Loading (Factored Load)	
Moment (kNm)	150.0
Shear Force (kN)	100.0
Axial Force (kN)	75.0
Components	
Beam Section	UB 406 x 178 x 67
Material	Fe 410.0
Hole	Standard
Flange Splice Plate	865 X 178 X 14
Preference	Outside
Thickness (mm)	14
Height (mm)	865
Width (mm)	178
Hole	Standard
Web Splice Plate	210 X 165 X 6
Thickness (mm)	6
Height (mm)	210
Width (mm)	165
Hole	Standard
Bolts	
Type	Friction Grip Bolt
Grade	10.9
Diameter (mm)	20
Flange Splice Plate	
Total no. of Bolts	48

No. of Rows (Parallel to Beam Length; Connecting Each Beam)	6
No. of Columns (Perpendicular to Beam Length; Connecting Each Beam)	2
Gauge (mm)	104
Pitch (mm)	70
End Distance (mm)	40
Edge Distance (mm)	37
Web Splice Plate	
Total no. of Bolts	6
No. of Rows (Parallel to Beam Length; Connecting Each Beam)	3
No. of Columns (Perpendicular to Beam Length; Connecting Each Beam)	1
Gauge (mm)	85
Pitch (mm)	65
End Distance (mm)	40
Edge Distance (mm)	40
Assembly	
Beam-Beam Clearance (mm)	5.0

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Design Preferences	
Bolt	
Hole Type	Standard
Hole Clearance (mm)	2.0
Material Grade (MPa) (overwrite)	1000.0
Slip Factor	0.3
Detailing	
Type of Edges	Sheared or hand flame cut
Minimum Edge/End Distance	1.7 times the hole diameter
Gap between Beams (mm)	5.0
Are Members Exposed to Corrosive Influences?	No
Design	
Design Method	Limit State Design

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Design Check: Flange Splice Plate			
Check	**Required**	**Provided**	**Remark**
Bolt shear capacity (kN)		V_{dsf} = ((0.3 * 1 * 1.0 * 171.5) / (1.25)) = 41.16 [cl. 10.4.3]	
Bolt bearing capacity (kN)		N/A	
Bolt capacity (kN)		41.16	
No. of bolts parallel to beam length; connecting each beam	(1.05 * 417.54) / 41.16 = 10.7	12	**Pass**
No. of rows of bolt (parallel to beam length; connecting each beam)		6	
No. of column(s) of bolt (perpendicular to beam length; connecting each beam)		2	
Total no. of bolts	4 * 12 = 48	48	**Pass**
Bolt pitch (mm)	≥ 2.5 * 20 = 50.0, ≤ min(32 * 14.0, 300) = 300.0 [cl. 10.2.2]	70	**Pass**
Bolt gauge (mm)	≥ 2.5 * 20 = 50, ≤ min(32 * 14.0, 300) = 300.0 [cl. 10.2.2]	104	**Pass**
End distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 14.0 = 105.6 [cl. 10.2.4]	40	**Pass**
Edge distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 14.0 = 105.6 [cl. 10.2.4]	37	**Pass**
Block shear capacity (kN)	≥ 417.54	V_{db} = 1651.09 [cl. 6.4.1]	**Pass**
Strength due to yielding of gross section (kN)	≥ 417.54	V_{db} = 568.91 [cl. 6.2]	**Pass**
Strength due to rupture of critical section (kN)	≥ 417.54	V_{db} = 557.1 [cl. 6.3.1]	**Pass**
Flange splice plate thickness (mm)	15.0 [Cl. 6.2]	14	**Fail**

Flange splice plate height (mm)	≥ 2 * min(178.8, 225) + 5.0 = 362.6 [SCI - 6th edition, page-754]	865	**Pass**
Flange splice plate width (mm)	≥ 158.8, ≤178.8	178	**Pass**

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Design Check: Web Splice Plate			
Check	**Required**	**Provided**	**Remark**
Bolt shear capacity (kN)		V_{dsf} = ((0.3 * 2 * 1.0 * 171.5) / (1.25)) = 82.32 [cl. 10.4.3]	
Bolt bearing capacity (kN)		N/A	
Bolt capacity (kN)		82.32	
No. of bolts parallel to beam length; connecting each beam	100.0 / 82.32 = 1.21	3.0	**Pass**
No. of rows of bolt (parallel to beam length; connecting each beam)		3	
No. of column(s) of bolt (perpendicular to beam length; connecting each beam)		1	
Total no. of bolts	2 * 3.0 = 6	6	**Pass**
Bolt pitch (mm)	≥ 2.5 * 20 = 50.0, ≤ min(32 * 8.8, 300) = 300.0 [cl. 10.2.2]	65	**Pass**
Bolt gauge (mm)	≥ 2.5 * 20 = 50, ≤ min(32 * 8.8, 300) = 300.0 [cl. 10.2.2]	85	**Pass**
End distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 8.8 = 105.6 [cl. 10.2.4]	40	**Pass**
Edge distance (mm)	≥ 1.7 * 22 = 37, ≤ 12 * 8.8 = 105.6 [cl. 10.2.4]	40	**Pass**
Block shear capacity (kN)	≥ 100.0	V_{db} = 185.21 [cl. 6.4.1]	**Pass**
Shear yielding (kN)	≥ 100.0	V_{db} = 148.8 [cl. 8.4.1]	**Pass**
Shear rupture (kN)	≥ 100.0	V_{db} = 172.69 [cl. 8.4.1]	**Pass**
Web plate thickness (mm)	≥ max(9.8, 4.4) = 9.8	6	**Fail**
	≤ 409.0 - 2 * 14.3 - 2 *		

Web plate height (mm)	10.2 - 2 * 5 = 340.0 [SCI - 6th edition, page 754]	210	**Pass**
Web plate width (mm)		165	

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Additional Comments	