 <small>Created with</small>	
<b>Company Name</b>	<b>IIT-M</b>	<b>Project Title</b>	<b>Cleatangle1</b>
<b>Group/Team Name</b>		<b>Subtitle</b>	
<b>Designer</b>	<b>satish</b>	<b>Job Number</b>	
<b>Date</b>	<b>05 /06 /2016</b>	<b>Method</b>	<b>Limit State Design (No Earthquake Load)</b>

<b>Design Conclusion</b>	
<b>Cleat Angle</b>	<b>Pass</b>
<b>Cleat Angle</b>	
<b>Connection Properties</b>	
<b>Connection</b>	
Connection Title	Double Angle Web Cleat
Connection Type	Shear Connection
<b>Connection Category</b>	
Connectivity	Beam-Beam
Beam Connection	Bolted
Column Connection	Bolted
<b>Loading (Factored Load)</b>	
Shear Force (kN)	100.0
<b>Components</b>	
<b>Column Section</b>	ISMB 450
Material	Fe 410
<b>Beam Section</b>	ISMB 300
Material	Fe 410
Hole	STD
<b>Cleat Section</b>	ISA 100X100X8
Thickness (mm)	8
Cleat Leg Size B (mm)	100
Cleat Leg Size A (mm)	100
Hole	STD
<b>Bolts on Beam</b>	
Type	Black Bolt
Grade	4.8
Diameter (mm)	20
Bolt Numbers	4
Columns (Vertical Lines)	1
Bolts Per Column	4
Gauge (mm)	0
Pitch (mm)	50
End Distance (mm)	37

Edge Distance (mm)	37
<b>Bolts on Column</b>	
Type	Black Bolt
Grade	4.8
Diameter (mm)	20
Bolt Numbers	6
Columns (Vertical Lines)	1
Bolts Per Column	3
Gauge (mm)	0
Pitch (mm)	50
End Distance (mm)	62
Edge Distance (mm)	37
<b>Assembly</b>	
Column-Beam Clearance (mm)	20

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<b>Design Check: Secondary Beam Connectivity</b>			
<b>Check</b>	<b>Required</b>	<b>Provided</b>	<b>Remark</b>
<b>Bolt shear capacity (kN)</b>		$V_{dsb} = ((2*400*0.6126*20*20)/(\sqrt{3}*1.25*1000)) = 90.529$ [cl. 10.3.3]	
<b>Bolt bearing capacity (kN)</b>		$V_{dpb} = (2.5*0.508*20*7.7*400)/(1.25*1000) = 62.586$ [cl. 10.3.4]	
<b>Bearing capacity of beam web (kN)</b>		$V_{dpb} = (2.5*0.508*20*7.7*410)/(1.25*1000) = 64.15$ [cl. 10.3.4]	
<b>Bearing capacity of cleat (kN)</b>		$V_{dpb} = (2.5*0.508*20*8*410)/(1.25*1000) = 66.65$ [cl. 10.3.4]	
<b>Bearing capacity (kN)</b>		Min (62.586, 64.15, 66.65) = 62.586	
<b>Bolt capacity (kN)</b>		Min (90.529, 62.586) = 62.586	
<b>Critical bolt shear (kN)</b>	$\leq 62.586$	22.66	<b>Pass</b>
<b>No. of bolts</b>		4	
<b>No.of column(s)</b>	$\leq 2$	1	
<b>No. of bolts per column</b>		4	
<b>Bolt pitch (mm)</b>	$\geq 2.5*20 = 50, \leq \text{Min}(32*7.7, 300) = 247$ [cl. 10.2.2]	50	<b>Pass</b>
<b>Bolt gauge (mm)</b>	$\geq ;2.5*20 = 50, \leq \text{Min}(32*7.7, 300) = 247$ [cl. 10.2.2]	0	
<b>End distance (mm)</b>	$\geq 1.7*22.0 = 37.4, \leq 12*7.7 = 92.4$ [cl. 10.2.4]	37	<b>Pass</b>
<b>Edge distance</b>	$\geq 1.7*22.0 = 37.4, \leq 12*7.7 = 92.4$	37	<b>Pass</b>

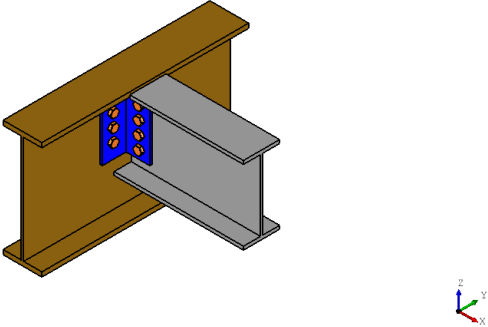
(mm)	[cl. 10.2.4]		
<b>Block shear capacity (kN)</b>	$\geq 100.0$	$V_{db} = 217.254$ [cl. 6.4.1]	<b>Pass</b>
<b>Cleat height (mm)</b>	$\geq 0.6 \cdot 300.0 = 180.0, \leq 300.0 - 13.1 - 14.0 - 17.4 - 15.0 - 5 = 235.5$ [cl. 10.2.4, Insdag Detailing Manual, 2002]	224	<b>Pass</b>
<b>Cleat moment capacity (kNm)</b>	$(2 \cdot 90.529 \cdot 50^2) / (50 \cdot 1000) = 3.15$	$M_d = (1.2 \cdot 250 \cdot Z) / (1000 \cdot 1.1) = 120.422$ [cl. 8.2.1.2]	<b>Pass</b>


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<b>Design Check: Primary Beam Connectivity</b>			
<b>Check</b>	<b>Required</b>	<b>Provided</b>	<b>Remark</b>
<b>Bolt shear capacity (kN)</b>		$V_{dsb} = ((400 \times 0.6126 \times 20 \times 20) / (\sqrt{3} \times 1.25 \times 1000)) = 45.264$ [cl. 10.3.3]	
<b>Bolt bearing capacity (kN)</b>		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 8.0 \times 400) / (1.25 \times 1000) = 65.024$ [cl. 10.3.4]	
<b>Bearing capacity of beam web (kN)</b>		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 9.4 \times 410) / (1.25 \times 1000) = 78.313$ [cl. 10.3.4]	
<b>Bearing capacity of cleat (kN)</b>		$V_{dpb} = (2.5 \times 0.508 \times 20 \times 8 \times 410) / (1.25 \times 1000) = 66.65$ [cl. 10.3.4]	
<b>Bearing capacity (kN)</b>		Min (65.024, 78.313, 66.65) = 66.65	
<b>Bolt capacity (kN)</b>		Min (45.264, 66.65) = 45.264	
<b>Critical bolt shear (kN)</b>	$\leq 45.264$	37.35	<b>Pass</b>
<b>No. of bolts</b>		6	
<b>No. of column(s) per angle</b>	$\leq 2$	1	
<b>No. of bolts per column per angle</b>		3	
<b>Bolt pitch (mm)</b>	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 8.0, 300) = 256$ [cl. 10.2.2]	50	<b>Pass</b>
<b>Bolt gauge (mm)</b>	$\geq 2.5 \times 20 = 50, \leq \text{Min}(32 \times 8.0, 300) = 256$ [cl. 10.2.2]	0	
<b>End distance (mm)</b>	$\geq 1.7 \times 22.0 = 37.4, \leq 12 \times 8.0 = 96.0$ [cl. 10.2.4]	62	<b>Pass</b>
	$\geq 1.7 \times 22.0 = 37.4, \leq 12 \times 8.0 =$		

<b>Edge distance (mm)</b>	96.0 [cl. 10.2.4]	37	<b>Pass</b>
<b>Block shear capacity (kN)</b>	$\geq 100.0$	$V_{db} = 213.164$ [cl. 6.4.1]	<b>Pass</b>
<b>Cleat height (mm)</b>	$\geq 0.6 \cdot 300.0 = 180.0, \leq 300.0 - 13.1 - 14.0 - 17.4 - 15.0 - 5 = 235.5$ [cl. 10.2.4, Insdag Detailing Manual, 2002]	224	<b>Pass</b>
<b>Cleat moment capacity (kNm)</b>	$(2 \cdot 45.264 \cdot 50^2) / (50 \cdot 1000) = 3.342$	$M_d = (1.2 \cdot 250 \cdot Z) / (1000 \cdot 1.1) = 120.422$ [cl. 8.2.1.2]	<b>Pass</b>

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Designer	satish	Job Number	
Date	05 /06 /2016	Method	Limit State Design (No Earthquake Load)

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<b>Additional Comments</b>			