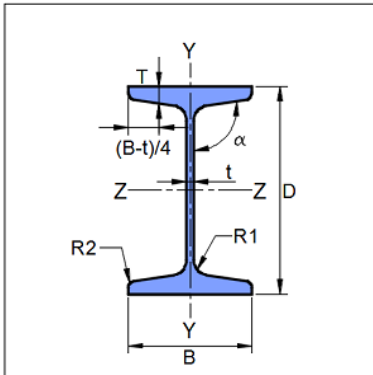
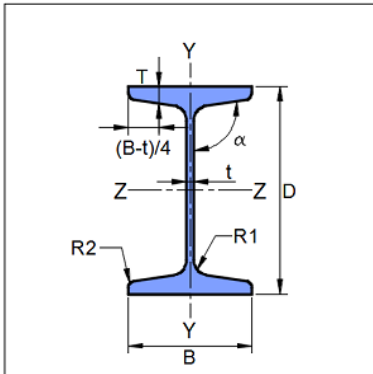




| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

1 Input Parameters

| | | | | |
|---|--|------------------|----------------|---------|
| Main Module | | Shear Connection | | |
| Module | | Cleat Angle | | |
| Connectivity | | Beam-Beam | | |
| Shear Force (kN) | | 160.0 | | |
| Supporting Section - Mechanical Properties | | | | |
|  | Supporting Section | | WB 400 | |
| | Material | | E 300 (Fe 440) | |
| | Ultimate Strength, Fu (MPa) | | 440 | |
| | Yield Strength, Fy (MPa) | | 300 | |
| | Mass, m (kg/m) | 66.71 | Iz (cm4) | 23400.0 |
| | Area, A (cm2) | 85.0 | Iy(cm4) | 1380.0 |
| | D (mm) | 400.0 | rz (cm) | 16.6 |
| | B (mm) | 200.0 | ry (cm) | 4.04 |
| | t (mm) | 8.6 | Zz (cm3) | 1170.0 |
| | T (mm) | 13.0 | Zy (cm3) | 138.0 |
| | Flange Slope | 96 | Zpz (cm3) | 1320.0 |
| | R1 (mm) | 13.0 | Zpy (cm3) | 234.0 |
| | R2 (mm) | 6.5 | | |
| | Supported Section - Mechanical Properties | | | |
|  | Supported Section | | MB 300 | |
| | Material | | E 300 (Fe 440) | |
| | Ultimate Strength, Fu (MPa) | | 440 | |
| | Yield Strength, Fy (MPa) | | 300 | |
| | Mass, m (kg/m) | 46.02 | Iz (cm4) | 8990.0 |
| | Area, A (cm2) | 58.6 | Iy(cm4) | 486.0 |
| | D (mm) | 300.0 | rz (cm) | 12.3 |
| | B (mm) | 140.0 | ry (cm) | 2.87 |
| | t (mm) | 7.7 | Zz (cm3) | 599.0 |
| | T (mm) | 13.1 | Zy (cm3) | 69.4 |
| | Flange Slope | 98 | Zpz (cm3) | 681.0 |
| | R1 (mm) | 14.0 | Zpy (cm3) | 117.0 |
| | R2 (mm) | 7.0 | | |
| | Bolt Details - Input and Design Preference | | | |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
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| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| | |
|--|--|
| Diameter (mm) | [16, 20, 24] |
| Property Class | [8.8, 12.9] |
| Type | Friction Grip Bolt |
| Hole Type | Standard |
| Slip Factor, (μ_f) | 0.48 |
| Detailing - Design Preference | |
| Edge Preparation Method | Rolled, machine-flame cut, sawn and planed |
| Gap Between Members (mm) | 10.0 |
| Are the Members Exposed to Corrosive Influences? | False |

1.1 List of Input Section

| | |
|------------------|--|
| Cleat Angle List | '80 x 80 x 8', '90 x 90 x 6', '90 x 90 x 8', '90 x 90 x 10', '100 x 100 x 8', '100 x 100 x 10', '110 x 110 x 10' |
|------------------|--|



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

2 Design Checks

| | |
|---------------|------|
| Design Status | Pass |
|---------------|------|

2.1 Selected Member Data

| | | | | |
|--|--------------------------------|------|-----------------------------|-------|
| | Section Size | | 80 x 80 x 8 | |
| | Material | | E 165 (Fe 290) | |
| | Ultimate Strength, F_u (MPa) | | 290 | |
| | Yield Strength, F_y (MPa) | | 165 | |
| | Mass, m (kg/m) | 9.65 | I_u (cm ⁴) | 117.0 |
| | Area, A (cm ²) | 12.3 | I_v (cm ⁴) | 30.5 |
| | A (mm) | 80.0 | r_z (cm) | 2.45 |
| | B (mm) | 80.0 | r_y (cm) | 2.45 |
| | t (mm) | 8.0 | r_u (cm) | 3.09 |
| | R_1 (mm) | 8.0 | r_v (cm) | 1.58 |
| | R_2 (mm) | 0.0 | Z_z (cm ³) | 12.9 |
| | C_y (mm) | 22.8 | Z_y (cm ³) | 12.9 |
| | C_z (mm) | 22.8 | Z_{pz} (cm ³) | 23.3 |
| | I_z (cm ⁴) | 74.0 | Z_{py} (cm ³) | 12.9 |
| | I_y (cm ⁴) | 74.0 | | |

2.2 Initial Section Check

| Check | Required | Provided | Remarks |
|-------------------------------|----------|--|---------|
| Shear Yielding Capacity (kN) | 160.0 | $V_{dy} = \frac{A_v f_y}{\sqrt{3} \gamma_{mo}}$ $= \frac{260.0 \times 7.7 \times 300}{\sqrt{3} \times 1.1 \times 1000}$ $= 315.23$ [Ref.IS 800 : 2007, Cl.10.4.3] | Pass |
| Allowable Shear Capacity (kN) | 160.0 | $V_d = 0.6 V_{dy}$ $= 0.6 \times 315.23$ $= 189.14$ [Limited to low shear] | Pass |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

2.3 Load Consideration

| Check | Required | Provided | Remarks |
|--------------------------|----------|--|---------|
| Applied Shear Force (kN) | 160.0 | $V_{ymin} = \min(0.15 \times V_{dy}, 40.0)$ $= \min(0.15 \times 315.23, 40.0)$ $= 40$ $V_u = \max(V_y, V_{ymin})$ $= \max(160.0, 40)$ $= 160.0$ [Ref. IS 800 : 2007, Cl. 10.7] | |

2.4 Bolt Design - Connected to Beam

| Check | Required | Provided | Remarks |
|--------------------------|--|-------------|---------|
| Diameter (mm) | | 16 | |
| Property Class | | 12.9 | |
| Cleat Angle | | 80 x 80 x 8 | |
| No. of Bolt Columns | | 1 | |
| No. of Bolt Rows | | 2 | |
| Min. Pitch Distance (mm) | $p_{min} = 2.5 d$ $= 2.5 \times 16$ $= 40.0$ [Ref IS 800 : 2007, Cl. 10.2.2] | 120 | Pass |
| Max. Pitch Distance (mm) | $p_{max} = \min(32 t, 300 \text{ mm})$ $= \min(32 \times 7.7, 300 \text{ mm})$ $= \min(246.4, 300 \text{ mm})$ $= 246.4$ Where, $t = \min(8.0, 7.7)$ [Ref. IS 800 : 2007, Cl. 10.2.3] | 120 | Pass |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|--------------------------|---|----------|---------|
| Min. Gauge Distance (mm) | $g_{min} = 2.5 d$ $= 2.5 \times 16$ $= 40.0$ [Ref IS 800 : 2007, Cl. 10.2.2] | N/A | |
| Max. Gauge Distance (mm) | $g_{max} = \min(32 t, 300 \text{ mm})$ $= \min(32 \times 7.7, 300 \text{ mm})$ $= \min(246.4, 300 \text{ mm})$ $= 246.4$ Where, $t = \min(8.0, 7.7)$ [Ref. IS 800 : 2007, Cl. 10.2.3] | N/A | |
| Min. End Distance (mm) | $e_{min} = 1.5 d_0$ $= 1.5 \times 18.0$ $= 27.0$ [Ref. IS 800 : 2007, Cl. 10.2.4.2] | 30 | Pass |
| Max. End Distance (mm) | $e_{max} = 12 t \varepsilon; \varepsilon = \sqrt{\frac{250}{f_y}}$ $e_1 = 12 \times 8.0 \times \sqrt{\frac{250}{165}} = 118.17$ $e_2 = 12 \times 7.7 \times \sqrt{\frac{250}{300}} = 84.35$ $e_{max} = \min(e_1, e_2) = 84.35$ [Ref. IS 800 : 2007, Cl. 10.2.4.3] | 30 | Pass |
| Min. Edge Distance (mm) | $e'_{min} = 1.5 d_0$ $= 1.5 \times 18.0$ $= 27.0$ [Ref. IS 800 : 2007, Cl. 10.2.4.2] | 30 | Pass |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|------------------------------|--|---|---------|
| Max. Edge Distance (mm) | $e'_{max} = 12 t \varepsilon; \varepsilon = \sqrt{\frac{250}{f_y}}$ $e_1 = 12 \times 8.0 \times \sqrt{\frac{250}{165}} = 118.17$ $e_2 = 12 \times 7.7 \times \sqrt{\frac{250}{300}} = 84.35$ $e'_{max} = \min(e_1, e_2) = 84.35$ <p>[Ref. IS 800 : 2007, Cl. 10.2.4.3]</p> | 30 | Pass |
| Moment Demand (kNm) | | $M_d = (V_u \times ecc + M_w)$ <p><i>ecc = eccentricity</i> <i>M_w = external moment acting on web</i></p> $= \frac{(160.0 \times 10^3 \times 46.0 + 0.0 \times 10^6)}{10^6}$ $= 7360.0$ | |
| Bolt Force Parameter(s) (mm) | $l_n = \text{length available}$ $l_n = p (n_r - 1)$ $= 120 \times (2 - 1)$ $= 120$ $y_{max} = l_n / 2$ $= 120 / 2$ $= 60.0$ $x_{max} = g(n_c - 1) / 2$ $= 0.0 \times (1 - 1) / 2$ $= 0.0$ | | |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|-----------------|---|--|---------|
| Bolt.Force (kN) | $v_b v_u = V_u / (n_r \times n_c)$ $= \frac{160.0}{(2 \times 1)}$ $= 80.0$ $t_m h = \frac{M_d \times y_{max}}{\sum r_i^2}$ $= \frac{7360.0 \times 60.0}{7.2}$ $= 61.33$ $t_m v = \frac{M_d \times x_{max}}{\sum r_i^2}$ $= \frac{7360.0 \times 0.0}{7.2}$ $= 0.0$ $a_b h = \frac{A_u}{(n_r \times n_c)}$ $= \frac{0.0}{(2 \times 1)}$ $= 0.0$ $v_{res} = \sqrt{(v_b v_u + t_m v)^2 + (t_m h + a_b h)^2}$ $= \sqrt{(80.0 + 0.0)^2 + (61.33 + 0.0)^2}$ $= 100.81$ | | |
| Slip Resistance | | $V_{dsf} = \frac{\mu_f n_e K_h F_o}{\gamma_{mf}}$ <p>Where, $F_o = 0.7 f_{ub} A_{nb}$</p> $V_{dsf} = \frac{0.48 \times 1 \times 1.0 \times 0.7 \times 1220.0 \times 157}{1.25 \times 10^3}$ $= 102.97$ <p>[Ref. IS 800 : 2007, Cl. 10.4.3]</p> | |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
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| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|--|----------|---|---------|
| Long Joint Reduction Factor | | $l_j = (n_r - 1) \times p$ $= (2 - 1) \times 120 = 120$ $l = 120$ $15 \times d = 15 \times 16 = 240$ $\text{since, } l_j < 15 \times d \text{ then } \beta_{lj} = 1.0$ $[\text{Ref. IS 800 : 2007, Cl. 10.3.3.1}]$ | |
| Large Grip Length Reduction Factor | | $l_g = \Sigma (t_p + t_{member})$ $= 23.7$ $5d = 80$ $8d = 128$ $\text{since, } l_g < 5d ; \beta_{lg} = 1.0$ $[\text{Ref. IS 800 : 2007, Cl. 10.3.3.2}]$ | N/A |
| Bolt Capacity (post reduction factor) (kN) | | $V_{rd} = \beta_{lj} \beta_{lg} V_{db}$ $= 1.0 \times 1.0 \times 102.97$ $= 102.97$ | |
| Capacity (kN) | 100.81 | 102.97 | Pass |

2.5 Bolt Design - Connected to Column

| Check | Required | Provided | Remarks |
|--------------------------|--|-------------|---------|
| Diameter (mm) | | 16 | |
| Property Class | | 12.9 | |
| Cleat Angle | | 80 x 80 x 8 | |
| No. of Bolt Columns | | 1 | |
| No. of Bolt Rows | | 2 | |
| Min. Pitch Distance (mm) | $p_{min} = 2.5 d$ $= 2.5 \times 16$ $= 40.0$ $[\text{Ref IS 800 : 2007, Cl. 10.2.2}]$ | 120 | Pass |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|--------------------------|---|----------|---------|
| Max. Pitch Distance (mm) | $p_{max} = \min(32 t, 300 \text{ mm})$ $= \min(32 \times 8.0, 300 \text{ mm})$ $= \min(256.0, 300 \text{ mm})$ $= 256.0$ $\text{Where, } t = \min(8.0, 8.6)$ [Ref. IS 800 : 2007, Cl. 10.2.3] | 120 | Pass |
| Min. Gauge Distance (mm) | $g_{min} = 2.5 d$ $= 2.5 \times 16$ $= 40.0$ [Ref IS 800 : 2007, Cl. 10.2.2] | N/A | |
| Max. Gauge Distance (mm) | $g_{max} = \min(32 t, 300 \text{ mm})$ $= \min(32 \times 8.0, 300 \text{ mm})$ $= \min(256.0, 300 \text{ mm})$ $= 256.0$ $\text{Where, } t = \min(8.0, 8.6)$ [Ref. IS 800 : 2007, Cl. 10.2.3] | N/A | |
| Min. End Distance (mm) | $e_{min} = 1.5 d_0$ $= 1.5 \times 18.0$ $= 27.0$ [Ref. IS 800 : 2007, Cl. 10.2.4.2] | 30 | Pass |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|-------------------------|--|--|---------|
| Max. End Distance (mm) | $e_{max} = 12 t \varepsilon; \varepsilon = \sqrt{\frac{250}{f_y}}$ $e_1 = 12 \times 8.0 \times \sqrt{\frac{250}{165}} = 118.17$ $e_2 = 12 \times 8.6 \times \sqrt{\frac{250}{300}} = 94.21$ $e_{max} = \min(e_1, e_2) = 94.21$ <p>[Ref. IS 800 : 2007, Cl. 10.2.4.3]</p> | 30 | Pass |
| Min. Edge Distance (mm) | $e'_{min} = 1.5 d_0$ $= 1.5 \times 18.0$ $= 27.0$ <p>[Ref. IS 800 : 2007, Cl. 10.2.4.2]</p> | 30 | Pass |
| Max. Edge Distance (mm) | $e'_{max} = 12 t \varepsilon; \varepsilon = \sqrt{\frac{250}{f_y}}$ $e_1 = 12 \times 8.0 \times \sqrt{\frac{250}{165}} = 118.17$ $e_2 = 12 \times 8.6 \times \sqrt{\frac{250}{300}} = 94.21$ $e'_{max} = \min(e_1, e_2) = 94.21$ <p>[Ref. IS 800 : 2007, Cl. 10.2.4.3]</p> | 30 | Pass |
| Moment Demand (kNm) | | $M_d = (V_u \times ecc + M_w)$ <p><i>ecc = eccentricity</i></p> <p><i>M_w = external moment acting on web</i></p> $= \frac{(80.0 \times 10^3 \times 46.0 + 0.0 \times 10^6)}{10^6}$ $= 3680.0$ | |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|---------------------------------|--|----------|---------|
| Bolt Force Parameter(s) (mm) | $l_n = \text{length available}$ $l_n = p (n_r - 1)$ $= 120 \times (2 - 1)$ $= 120$ $y_{max} = l_n/2$ $= 120/2$ $= 60.0$ $x_{max} = g(n_c - 1)/2$ $= 0.0 \times (1 - 1)/2$ $= 0.0$ | | |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
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| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|-----------------|---|---|---------|
| Bolt.Force (kN) | $v_b v_u = V_u / (n_r \times n_c)$ $= \frac{160.0}{(2 \times 1)}$ $= 40.0$ $t_m h = \frac{M_d \times y_{max}}{\sum r_i^2}$ $= \frac{3680.0 \times 60.0}{7.2}$ $= 30.67$ $t_m v = \frac{M_d \times x_{max}}{\sum r_i^2}$ $= \frac{3680.0 \times 0.0}{7.2}$ $= 0.0$ $a_b h = \frac{A_u}{(n_r \times n_c)}$ $= \frac{0.0}{(2 \times 1)}$ $= 0.0$ $v_{res} = \sqrt{(v_b v_u + t_m v)^2 + (t_m h + a_b h)^2}$ $= \sqrt{(40.0 + 0.0)^2 + (30.67 + 0.0)^2}$ $= 50.4$ | | |
| Slip Resistance | | $V_{dsf} = \frac{\mu_f n_e K_h F_o}{\gamma_{mf}}$ <p>Where, $F_o = 0.7 f_{ub} A_{nb}$</p> $V_{dsf} = \frac{0.48 \times 1 \times 1.0 \times 0.7 \times 1220.0 \times 157}{1.25 \times 10^3}$ $= 51.49$ <p>[Ref. IS 800 : 2007, Cl. 10.4.3]</p> | |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|--|----------|---|---------|
| Long Joint Reduction Factor | | $l_j = (n_r - 1) \times p$ $= (2 - 1) \times 120 = 120$ $l = 120$ $15 \times d = 15 \times 16 = 240$ $\text{since, } l_j < 15 \times d \text{ then } \beta_{lj} = 1.0$ $[\text{Ref. IS 800 : 2007, Cl. 10.3.3.1}]$ | |
| Large Grip Length Reduction Factor | | $l_g = \Sigma (t_p + t_{member})$ $= 16.6$ $5d = 80$ $8d = 128$ $\text{since, } l_g < 5d ; \beta_{lg} = 1.0$ $[\text{Ref. IS 800 : 2007, Cl. 10.3.3.2}]$ | N/A |
| Bolt Capacity (post reduction factor) (kN) | | $V_{rd} = \beta_{lj} \beta_{lg} V_{db}$ $= 1.0 \times 1.0 \times 51.49$ $= 51.49$ | |
| Capacity (kN) | 50.4 | 51.49 | Pass |

2.6 Cleat Angle Check

| Check | Required | Provided | Remarks |
|---------------------------------------|---|----------|---------|
| Min. Cleat Angle Height | $0.6 \times (d_b - 2 \times t_f - 2 \times r_r)$ $= 0.6 \times (300.0 - 2 \times 13.1 - 2 \times 14.0)$ $= 147.48$ $[\text{Ref. INSDAG - Chpt.5, Sect.5.2.3}]$ | 180 | Pass |
| Max. Cleat Angle Height | $d_b - t_{bf} + r_{b1} - \text{notch}_h$ $= 400.0 - 13.0 + 13.0 - 0.0$ $= 232.9$ | 180 | Pass |
| Min. Leg Length (mm) on supported leg | $\max(\text{gap}, t_{cleat} + r_{r-angle}) + 2e'_{min} + (n_c - 1)g_{min}$ $= \max(10.0, 8.0 + 8.0) + 2 \times 27.0 + (1 - 1) \times 40.0$ $= 70.0$ | 80.0 | Pass |



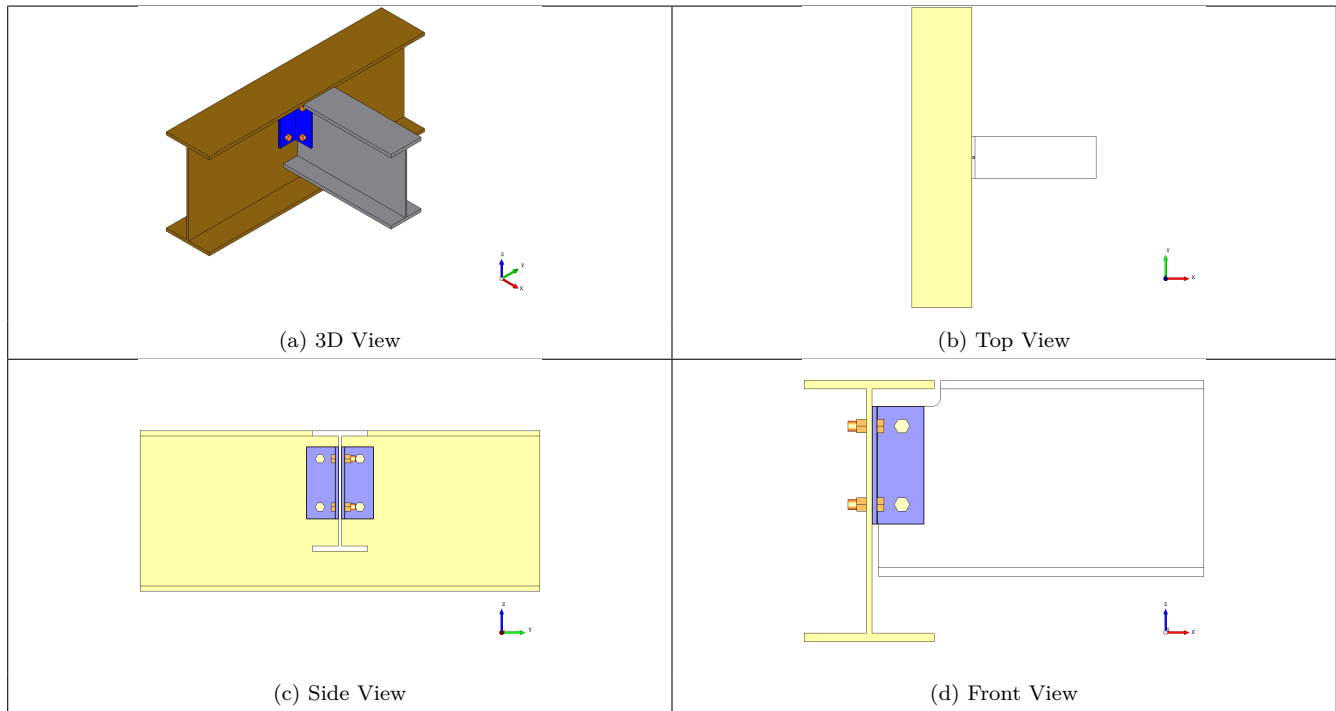
| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

| Check | Required | Provided | Remarks |
|--|---|--|---------|
| Min. Leg Length (mm) on supporting leg | $t_{cleat} + r_{r-angle} + 2e'_{min} + (n_c - 1)g_{min}$ $= 8.0 + 8.0 + 2 \times 27.0 + (1 - 1) \times 40.0$ $= 70.0$ | 80.0 | Pass |
| Min. Cleat Angle Thickness (mm) | $t_w = 0.5 \times 7.7 = 3.85$ | 8.0 | Pass |
| Shear Yielding Capacity (kN) | | $V_{dy} = \frac{A_v f_y}{\sqrt{3} \gamma_{mo}}$ $= \frac{2 \times 180 \times 8.0 \times 165}{\sqrt{3} \times 1.1 \times 1000}$ $= 249.42$ [Ref. IS 800 : 2007, Cl.10.4.3] | |
| Block Shear Capacity in Shear (kN) | | $V_{dbl1} = \frac{A_{vg} f_y}{\sqrt{3} \gamma_{m0}} + \frac{0.9 A_{tn} f_u}{\gamma_{m1}}$ $V_{dbl2} = \frac{0.9 A_{vn} f_u}{\sqrt{3} \gamma_{m1}} + \frac{A_{tg} f_y}{\gamma_{m0}}$ $V_{db} = \min(V_{db1}, V_{db2}) = 278.0$ [Ref. IS 800 : 2007, Cl. 6.4] | |
| Shear Capacity (kN) | 160.0 | $V_d = \min(V_{dy}, V_{db})$ $= \min(249.42, 278.0)$ $= 249.42$ [Ref. IS 800 : 2007, Cl. 6.1] | Pass |
| Moment Capacity (kNm) | 7.36 | $M_{dzz} = \frac{\beta_b \times Z_p \times f_y}{\gamma_{m0} \times 10^6}$ $= \frac{1.0 \times 129600.0 \times 165}{1.1 \times 10^6}$ $= 19.44$ [Ref. IS 800 : 2007, Cl. 8.2.1.2] | Pass |



| | | | |
|-----------------|--------------|---------------|-----------------------------------|
| Company Name | IIT Bombay | Project Title | Sample Connection Design |
| Group/Team Name | Osdag | Subtitle | Cleat Angle |
| Designer | Engineer #1 | Job Number | 1.1.3.3.1 |
| Date | 17 /12 /2020 | Client | Pratip Bhattacharya, TCE, Kolkata |

3 3D Views



4 Design Log