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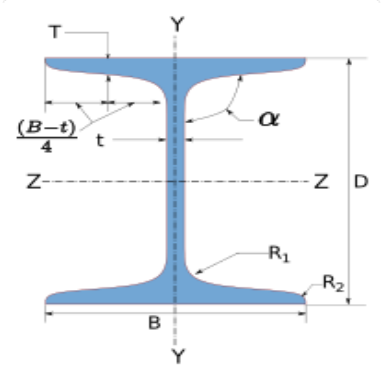
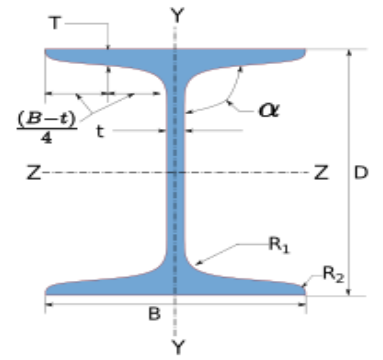
|---|---|---|---|
| Company Name | LoremIpsum | Project Title | Fossee |
| Group/Team Name | LoremIpsum | Subtitle | |
| Designer | LoremIpsum | Job Number | 123 |
| Date | 29 /04 /2020 | Client | LoremIpsum |

# 1 Input Parameters

| Module | | Fin Plate | |
|---|---|---|---|
| MainModule | | Shear Connection | |
| Connectivity | | Column flange-Beam web | |
| Shear(kN)* | | 50.0 | |
| **Supporting Section** | | | |
|  | | | |
| Supporting Section | | PBP 360X152 | |
| Material * | | E 250 (Fe 410 W)A | |
| Ultimate strength, fu (MPa) | | 410 | |
| Yield Strength , fy (MPa) | | 230 | |
| Mass | 152.02 | Iz(cm4) | 439716000.0 |
| Area(cm2) - A | 19370.0 | Iy(cm4) | 158755000.0 |
| D(mm) | 356.4 | rz(cm) | 150.7 |
| B(mm) | 376.0 | ry(cm) | 90.5 |
| t(mm) | 17.8 | Zz(cm3) | 2467540.0 |
| T(mm) | 17.9 | Zy(cm3) | 844440.0 |
| FlangeSlope | 90 | Zpz(cm3) | 2766750.0 |
| R1(mm) | 1.52 | Zpy(cm3) | 844440.0 |
| R2(mm) | 0.0 | | |
| **Supported Section** | | | |
|  | | | |
| Supported Section | | MB 200 | |
| Material * | | E 250 (Fe 410 W)A | |
| Ultimate strength, fu (MPa) | | 410 | |
| Yield Strength , fy (MPa) | | 230 | |
| Mass | 24.1 | Iz(cm4) | 21100000.0 |
| Area(cm2) - A | 3070.0 | Iy(cm4) | 1310000.0 |
| D(mm) | 200.0 | rz(cm) | 82.8 |
| B(mm) | 100.0 | ry(cm) | 20.7 |
| t(mm) | 5.7 | Zz(cm3) | 211000.0 |
| T(mm) | 10.0 | Zy(cm3) | 26000.0 |
| FlangeSlope | 98 | Zpz(cm3) | 239800.0 |
| R1(mm) | 11.0 | Zpy(cm3) | 26000.0 |
| R2(mm) | 5.5 | | |
| **Bolt Details** | | | |
| Diameter(mm)* | | [12.0, 16.0, 20.0] | |
| Grade * | | [3.6, 4.6, 4.8, 5.6, 5.8, 6.8, 8.8, 9.8, 10.9, 12.9] | |
| Type * | | Bearing Bolt | |
| Bolt hole type | | Standard | |
| Slip factor (μ_f) | | 0.3 | |
| Type of edges | | a - Sheared or hand flame cut | |

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| | |
|---|---|
| Gap between beam and <br>support (mm) | 10.0 |
| Are the members exposed to <br>corrosive influences | False |
| **Weld Details** | |
| Weld Type | Fillet |
| Type of weld fabrication | Shop Weld |
| Material grade overwrite (MPa) Fu | 410.0 |

# 2 Design Checks

## 2.1 Bolt Design Checks

| Check | Required | Provided | Remarks |
|---|---|---|---|
| Shear Capacity (kN) | | $V_{dsb} = \frac{f_u b \; n_n \; A_{nb}}{\sqrt{3} \; \gamma_{mb}}$ $= \frac{410 * 1 * 157}{\sqrt{3} \; * \; 1.25}$ $= 36.26$ | |
| Bearing Capacity (kN) | | $V_{dpb} = \frac{2.5 \; k_b \; d \; t \; f_u}{\gamma_{mb}}$ $= \frac{2.5 \; * 0.49 * 16.0 * 5.7 * 410}{1.25}$ $= 36.26$ | |
| Capacity (KN) | | $V_{db} = min \; (V_{dsb}, V_{dpb})$ $= min \; (36.26, 36.26)$ $= 36.26$ | |
| No of Bolts | $R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{50.0^2 + 50.0^2}}{36.26}$ $= 2$ | 4 | |
| No of Columns | | 2 | |
| No of Rows | | 2 | |
| Min. Pitch (mm) | $p/g_{min} = 2.5 \; d$ $=2.5 * 16.0 \quad = 40.0$ | 40 | Pass |
| Max. Pitch (mm) | $p/g_{max} = \min(32 \; t, \; 300 \; mm)$ $= \min(32 * \; 5.7, \; 300 \; mm)$ $= 300$ | 40 | Pass |
| Min. Gauge (mm) | $p/g_{min} = 2.5 \; d$ $=2.5 * 16.0 \quad = 40.0$ | 80 | Pass |
| Max. Gauge (mm) | $p/g_{max} = \min(32 \; t, \; 300 \; mm)$ $= \min(32 * \; 5.7, \; 300 \; mm)$ $= 300$ | 80 | Pass |
| Min. End Distance (mm) | $e/e`_{min} = [1.5 \; or \; 1.7] * d_0$ $= 1.7 * 18.0 = 30.6$ | 35 | Pass |

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| Check | Required | Provided | Remarks |
|---|---|---|---|
| Max. End Distance (mm) | $e/e`_{max} = 12\ t\ \varepsilon$<br>$\varepsilon = \sqrt{\frac{250}{f_y}}$<br>$e/e`_{max} = 12\ * 6.0 * \sqrt{\frac{250}{230}}$<br>$= 74.88$ | 35 | Pass |
| Min. Edge Distance (mm) | $e/e`_{min} = [1.5\ or\ 1.7] * d_0$<br>$= 1.7 * 18.0 = 30.6$ | 35 | Pass |
| Max. Edge Distance (mm) | $e/e`_{max} = 12\ t\ \varepsilon$<br>$\varepsilon = \sqrt{\frac{250}{f_y}}$<br>$e/e`_{max} = 12\ * 6.0 * \sqrt{\frac{250}{230}}$<br>$= 74.88$ | 35 | Pass |
| Capacity (KN) | 35382.95 | 36257.6 | Pass |

## 2.2 Plate Design Checks

| Check | Required | Provided | Remarks |
|---|---|---|---|
| Min. Plate Height (mm) | $0.6 * d_b = 0.6 * 200.0 = 120.0$ | 150 | Pass |
| Max. Plate Height (mm) | $d_b - 2(t_{bf} + r_{b1} + gap)$<br>$= 200.0 - 2 * (10.0 + 11.0 + 10)$<br>$= 158.0$ | 150 | Pass |
| Min. Plate Length (mm) | $2 * e_{min} + (n\ c - 1) * p_{min})$<br>$= 2 * 30.6 + (2 - 1) * 40.0$<br>$= 111.2$ | 120.0 | Pass |
| Min.Plate Thickness (mm) | $t_w = 5.7$ | 6.0 | Pass |
| Shear yielding Capacity (V_dy) (kN) | | $V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$<br>$= \frac{150 * 6.0 * 230}{\sqrt{3} * 1.1}$<br>$= 65.19$ | |
| Shear Rupture Capacity (V_dn) (kN) | | $V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$<br>$= 1 * (150 - (2 * 18.0)) * 6.0 * 410$<br>$= 210.33$ | |
| Block Shear Capacity in Shear (V_db) (kN) | | 175.56 | |
| Shear Capacity (V_d) (kN) | 50.0 | $V_d = Min(V_{dy}, V_{dn}, V_{db})$<br>$= Min(65.19, 210.33, 175.56)$<br>$= 65.19$ | Pass |

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| Check | Required | Provided | Remarks |
|---|---|---|---|
| Tension Yielding Capacity (kN) | | $T_{dg} = \frac{l * t * f_y}{\gamma_{mo}} = \frac{120.0 * 6.0 * 230}{\sqrt{3} * 1.1} = 150.55$ | |
| Tension Rupture Capacity(kN) | | $T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}} = \frac{0.9 * (120.0 - 2 * 18.0) * 6.0 * 410}{1.25} = 148.78$ | |
| Block Shear Capacity in Tension (T_db) (kN) | | 175.56 | |
| Tension Capacity (kN) | 50.0 | $T_d = Min(T_{dg}, T_{dn}, T_{db}) = Min(150.55, 148.78, 175.56) = 148.78$ | Pass |
| Moment Capacity (kNm) | 3.25 | 5.65 | Pass |
| Interaction Ratio | $\leq 1$ | $\frac{3.25}{5.65} + \frac{50.0}{148.78} = 0.91$ | Pass |

## 2.3 Weld Checks

| Check | Required | Provided | Remarks |
|---|---|---|---|
| Min Weld Size (mm) | $Thickness\ of\ Thicker\ part = Max(17.9, 17.9) = 17.9$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 5$ | 6 | Pass |
| Max Weld Size (mm) | $Thickness\ of\ Thinner\ part = Min(17.9, 17.9) = 6.0$ $t_{w_{max}} = 6.0$ | 6 | Fail |
| Weld Strength (kN/mm) | $R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{3250000.0 * 69.0}{438012.0}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{3250000.0 * 0.0}{438012.0}$ $V_{wv} = \frac{V}{l_w} = \frac{50000.0}{276}$ $A_{wh} = \frac{A}{l_w} = \frac{50000.0}{276}$ $R_w = \sqrt{(511.97 + 181.16)^2 + (0.0 + 181.16)^2} = 716.41$ | $f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}} = \frac{4.2 * 410}{\sqrt{3}} * 1.25 = 795.36$ | Pass |

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# 3 3D View

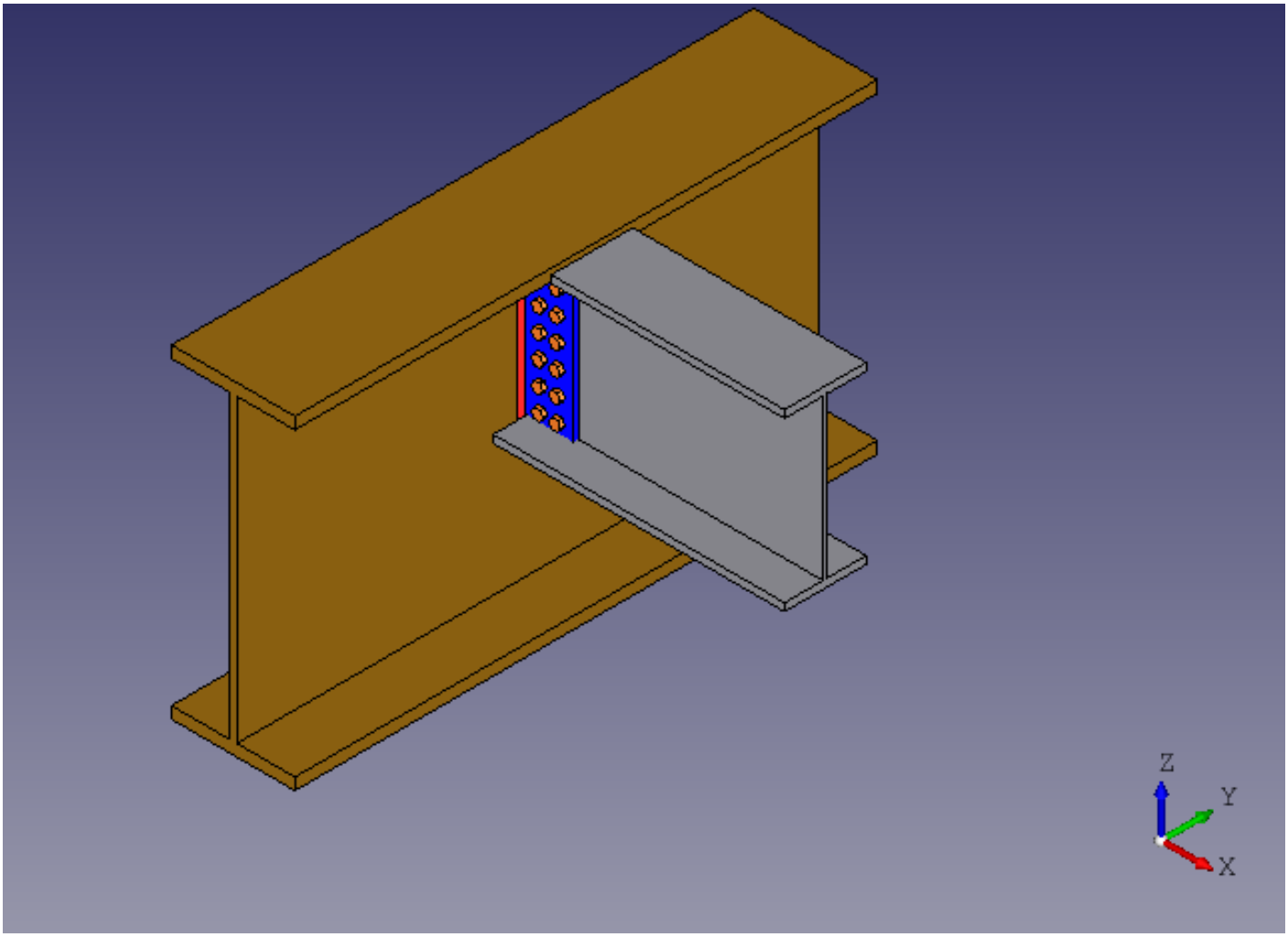


Figure 1: 3D View