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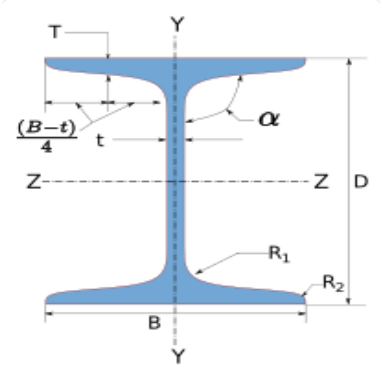
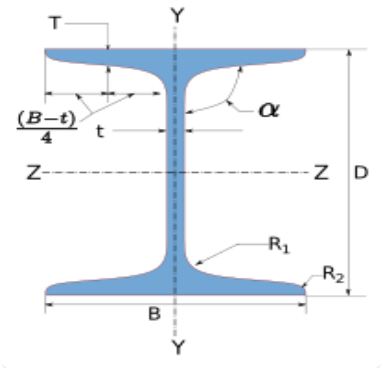
|---|---|---|---|
| Company Name | LoremIpsum | Project Title | Fossee |
| Group/Team Name | LoremIpsum | Subtitle | |
| Designer | LoremIpsum | Job Number | 123 |
| Date | 29 /04 /2020 | Client | LoremIpsum |

# 1 Input Parameters

| Module | | Fin Plate | |
|---|---|---|---|
| MainModule | | Shear Connection | |
| Connectivity | | Column flange-Beam web | |
| Shear(kN)* | | 50.0 | |
| **Supporting Section** | | | |
|  | Supporting Section | PBP 320X146.7 | |
| | Material * | E 250 (Fe 410 W)A | |
| | Ultimate strength, fu (MPa) | 410 | |
| | Yield Strength , fy (MPa) | 230 | |
| | Mass 146.68 | Iz(cm4) | 326707000.0 |
| | Area(cm2) - A 18690.0 | Iy(cm4) | 101505100.0 |
| | D(mm) 319.0 | rz(cm) | 132.20000000000002 |
| | B(mm) 312.0 | ry(cm) | 73.7 |
| | t(mm) 20.0 | Zz(cm3) | 2048320.0000000002 |
| | T(mm) 20 | Zy(cm3) | 650670.0 |
| | FlangeSlope 90 | Zpz(cm3) | 2338490.0 |
| | R1(mm) 2.7 | Zpy(cm3) | 650670.0 |
| | R2(mm) 0.0 | | |
| **Supported Section** | | | |
|  | Supported Section | MB 250 | |
| | Material * | E 250 (Fe 410 W)A | |
| | Ultimate strength, fu (MPa) | 410 | |
| | Yield Strength , fy (MPa) | 230 | |
| | Mass 37.2 | Iz(cm4) | 51190000.0 |
| | Area(cm2) - A 4740.0 | Iy(cm4) | 3210000.0 |
| | D(mm) 250.0 | rz(cm) | 104.0 |
| | B(mm) 125.0 | ry(cm) | 26.0 |
| | t(mm) 6.9 | Zz(cm3) | 409600.0 |
| | T(mm) 12.5 | Zy(cm3) | 51000.0 |
| | FlangeSlope 98 | Zpz(cm3) | 464500.0 |
| | R1(mm) 13.0 | Zpy(cm3) | 51000.0 |
| | R2(mm) 6.5 | | |
| **Bolt Details** | | | |
| Diameter(mm)* | | [12.0, 16.0, 20.0, 24.0, 30.0, 36.0] | |
| 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) | | $V_{dsb} = \frac{f_u b\ n_n\ A_{nb}}{\sqrt{3}\ \gamma_{mb}}$ $= \frac{410 * 1 * 245}{\sqrt{3}\ *\ 1.25}$ $= 45.26$ | |
| Bearing Capacity (kN) | | $V_{dpb} = \frac{2.5\ k_b\ d\ t\ f_u}{\gamma_{mb}}$ $= \frac{2.5\ * 0.51 * 20.0 * 8.0 * 290}{1.25}$ $= 45.26$ | |
| Capacity (KN) | | $V_{db} = min\ (V_{dsb}, V_{dpb})$ $= min\ (45.26, 45.26)$ $= 45.26$ | |
| No of Bolts | $R_u = \sqrt{V_u^2 + A_u^2}$ $n_{trial} = R_u / V_{bolt}$ $R_u = \frac{\sqrt{50.0^2 + 50.0^2}}{45.26}$ $= 2$ | 3 | |
| No of Columns | | 1 | |
| No of Rows | | 3 | |
| Min. Pitch (mm) | $p/g_{min} = 2.5\ d$ $=2.5 * 20.0 \quad = 50.0$ | 0.0 | N/A |
| Max. Pitch (mm) | $p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 6.9,\ 300\ mm)$ $= 300$ | 0.0 | N/A |
| Min. Gauge (mm) | $p/g_{min} = 2.5\ d$ $=2.5 * 20.0 \quad = 50.0$ | 50 | Pass |
| Max. Gauge (mm) | $p/g_{max} = \min(32\ t,\ 300\ mm)$ $= \min(32 *\ 6.9,\ 300\ mm)$ $= 300$ | 50 | Pass |
| Min. End Distance (mm) | $e/e`_{min} = [1.5\ or\ 1.7] * d_0$ $= 1.7 * 22.0 = 37.4$ | 40 | 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>$e/e`_{max} = 12\ * 8.0 * \sqrt{\frac{250}{165}}$<br>$= 118.08$ | 40 | Pass |
| Min. Edge Distance (mm) | $e/e`_{min} = [1.5\ or\ 1.7] * d_0$<br>$= 1.7 * 22.0 = 37.4$ | 40 | Pass |
| Max. Edge Distance (mm) | $e/e`_{max} = 12\ t\ \varepsilon$<br>$\varepsilon = \sqrt{\frac{250}{f_y}}$<br>$e/e`_{max} = 12\ * 8.0 * \sqrt{\frac{250}{165}}$<br>$= 118.08$ | 40 | Pass |
| Capacity (KN) | 44876.37 | 45264.26 | Pass |

## 2.2 Plate Design Checks

| Check | Required | Provided | Remarks |
|---|---|---|---|
| Min. Plate Height (mm) | $0.6 * d_b = 0.6 * 250.0 = 150.0$ | 180 | Pass |
| Max. Plate Height (mm) | $d_b - 2(t_{bf} + r_{b1} + gap)$<br>$= 250.0 - 2 * (12.5 + 13.0 + 10)$<br>$= 199.0$ | 180 | Pass |
| Min. Plate Length (mm) | $2 * e_{min} + (n\ c - 1) * p_{min})$<br>$= 2 * 37.4 + (1 - 1) * 50.0$<br>$= 84.8$ | 90.0 | Pass |
| Min.Plate Thickness (mm) | $t_w = 6.9$ | 8.0 | Pass |
| Shear yielding Capacity (V_dy) (kN) | | $V_{dg} = \frac{A_v * f_y}{\sqrt{3} * \gamma_{mo}}$<br>$= \frac{180 * 8.0 * 165}{\sqrt{3} * 1.1}$<br>$= 74.82$ | |
| Shear Rupture Capacity (V_dn) (kN) | | $V_{dn} = \frac{0.75 * A_{vn} * f_u}{\sqrt{3} * \gamma_{mo}}$<br>$= 1 * (180 - (3 * 22.0)) * 8.0 * 290$<br>$= 198.36$ | |
| Block Shear Capacity in Shear (V_db) (kN) | | 196.44 | |
| Shear Capacity (V_d) (kN) | 50.0 | $V_d = Min(V_{dy}, V_{dn}, V_{db})$<br>$= Min(74.82, 198.36, 196.44)$<br>$= 74.82$ | Pass |

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| Check | Required | Provided | Remarks |
|---|---|---|---|
| Tension Yielding Capacity (kN) | | $T_{dg} = \frac{l * t * f_y}{\gamma_{mo}} = \frac{90.0 * 8.0 * 165}{\sqrt{3} * 1.1} = 108.0$ | |
| Tension Rupture Capacity(kN) | | $T_{dn} = \frac{0.9 * A_n * f_u}{\gamma_{m1}} = \frac{0.9 * (90.0 - 3 * 22.0) * 8.0 * 290}{1.25} = 113.59$ | |
| Block Shear Capacity in Tension (T_db) (kN) | | 196.44 | |
| Tension Capacity (kN) | 50.0 | $T_d = Min(T_{dg}, T_{dn}, T_{db}) = Min(108.0, 113.59, 196.44) = 108.0$ | Pass |
| Moment Capacity (kNm) | 2.5 | 7.78 | Pass |
| Interaction Ratio | $\leq 1$ | $\frac{2.5}{7.78} + \frac{50.0}{108.0} = 0.78$ | Pass |

## 2.3 Weld Checks

| Check | Required | Provided | Remarks |
|---|---|---|---|
| Min Weld Size (mm) | $Thickness\ of\ Thicker\ part = Max(20, 20) = 20$ $IS800:2007\ cl.10.5.2.3\ Table21,$ $t_{w_{min}} = 5$ | 5 | Pass |
| Max Weld Size (mm) | $Thickness\ of\ Thinner\ part = Min(20, 20) = 8.0$ $t_{w_{max}} = 8.0$ | 5 | Pass |
| Weld Strength (kN/mm) | $R_w = \sqrt{(T_{wh} + A_{wh})^2 + (T_{wv} + V_{wv})^2}$ $T_{wh} = \frac{M * y_{max}}{Ipw} = \frac{2500000.0 * 85.0}{818833.33}$ $T_{wv} = \frac{M * x_{max}}{Ipw} = \frac{2500000.0 * 0.0}{818833.33}$ $V_{wv} = \frac{V}{l_w} = \frac{50000.0}{340}$ $A_{wh} = \frac{A}{l_w} = \frac{50000.0}{340}$ $R_w = \sqrt{(259.52 + 147.06)^2 + (0.0 + 147.06)^2} = 432.35$ | $f_w = \frac{t_t * f_u}{\sqrt{3} * \gamma_{mw}} = \frac{3.5 * 290}{\sqrt{3}} * 1.25 = 662.8$ | Pass |

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# 3 3D View

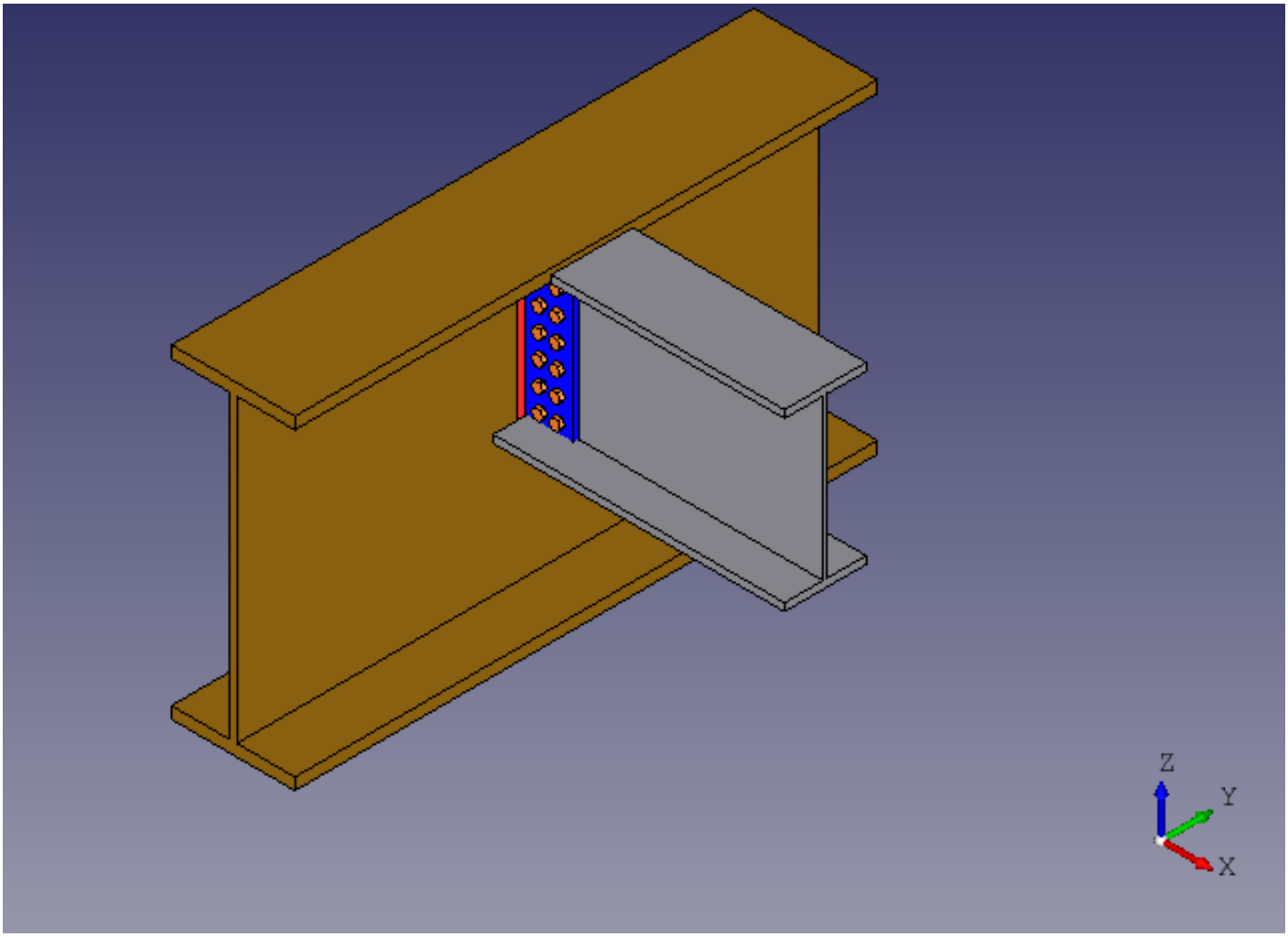


Figure 1: 3D View