FAQs

1. Find the moment of resistance of the flanged beam when $\mathbf{x \leq D_f}$
   a. **Total compressive force $C_u = 0.36 f_{ck} x_u b_f$**
   b. **Total tensile force $T_u = 0.87 f_y A_{st}$**
   c. **To find Neutral Axis x_u**

      @ N.A $C_u = T_u$

      $$0.36 f_{ck} x_u b_f = 0.87 f_y A_{st}$$

      $$x_u = 0.87 f_y A_{st} / 0.36 f_{ck} b_f$$

   d. **To find the Distance of C.G total compressive force from top**

      $$Y = 0.416\, X_U$$

   e. **Ultimate moment of resistance (M_u)**

      $$M_u = T_u \times z$$

      $$= 0.87 f_y A_{st} (d - o.416 x_u)$$

      $$M_u = C_u \times z$$

      $$= 0.36 f_{ck} x_u b_f (d - 0.416 x_u)$$

2. Find the moment of resistance of the flanged beam when $\mathbf{x > D_f}$ **and** $\mathbf{0.43X_u \geq D_f}$
   a. **Total compressive force $C_u = 0.36 f_{ck} x_u b_w + 0.446 f_{ck} D_f (b_f - b_w)$**
   b. **Total tensile force $T_u = 0.87 f_y A_{st}$**
   c. **To find Neutral Axis x_u**

      @ N.A $C_u = T_u$

      $$0.36 f_{ck} x_u b_w + 0.446 f_{ck} D_f (b_f - b_w) = 0.87 f_y A_{st}$$

   d. **Ultimate moment of resistance (M_u)**

      $$M_u = T_{uw} \times z_1 + T_{uf} \times z_1$$

      $$= 0.87 f_y A_{stw} (d - o.416 x_u) + 0.87 f_y A_{stf} (d - D_f/2)$$

      $$M_u = C_{uw} \times z_1 + C_{uf} \times z_2$$

      $$= 0.36 f_{ck} x_u b_w (d - 0.416 x_u) + 0.446 f_{ck} D_f (b_f - b_w) (d - D_f/2)$$

3. Find the moment of resistance of the flanged beam when $\mathbf{x > D_f}$ **and** $\mathbf{0.43X_u < D_f}$
   a. **Total compressive force $C_u = 0.36 f_{ck} x_u b_w + 0.446 f_{ck} Y_f (b_f - b_w)$**
   b. **Total tensile force $T_u = 0.87 f_y A_{st}$**
   c. **To find Neutral Axis x_u**

      @ N.A $C_u = T_u$

      $$0.36 f_{ck} x_u b_w + 0.446 f_{ck} Y_f (b_f - b_w) = 0.87 f_y A_{st}$$

      where, $Y_f = (0.15 x_u + 0.65 D_f) < D_f$

d. **Ultimate moment of resistance (M_u)**

$$M_u = T_{uw} \times z_1 + T_{uf} \times z_1$$

$$= 0.87 f_y A_{stw}(d-0.416x_u) + 0.87 f_y A_{stf}(d-Y_f/2)$$

$$M_u = C_{uw} \times z_1 + C_{uf} \times z_2$$

$$= 0.36 f_{ck} x_u b_w (d-0.416x_u) + 0.446 f_{ck} Y_f (b_f-b_w)(d-Y_f/2)$$