FAQs

1. Find the moment of resistance of the flanged beam when $x \leq D_f$
   a. **Total compressive force $C_u = 0.36f_{ck}x_ub_f + A_{sc}(f_{sc} - f_{cc})$**
   b. **Total tensile force $T_u = 0.87f_yA_{st}$**
   c. **To find Neutral Axis x_u**

      @ N.A $C_u = T_u$

      $$0.36f_{ck}x_ub_f + A_{sc}(f_{sc} - f_{cc}) = 0.87f_yA_{st}$$

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

      $$M_u = T_u \times z$$
      $$= 0.87f_yA_{st1}(d\text{-}o.416x_u) + 0.87f_yA_{st2}(d - d')$$
      $$M_u = C_u \times z$$
      $$M_u = 0.36f_{ck}x_ub_f(d\text{-}0.416x_u) + A_{sc}(f_{sc} - f_{cc})(d - d')$$

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

      @ N.A $C_u = T_u$

      $$0.36f_{ck}x_ub_w + A_{sc}(f_{sc} - f_{cc}) + 0.446f_{ck}D_f(b_f\text{-}b_w) = 0.87f_yA_{st}$$

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

      $M_u = T_{uw} \times z_1 + T_{u1} \times z_2 + T_{uf} \times z_3$

      $= 0.87f_yA_{stw}(d\text{-}o.416x_u) + 0.87f_yA_{st2}(d\text{-}d^1) + 0.87f_yA_{stf}(d\text{-}D_f/2)$

      $M_u = C_{uw} \times z_1 + C_{u1} \times z_2 + C_{uf} \times z_3$

   $= 0.36f_{ck}x_ub_w(d\text{-}0.416x_u) + A_{sc}(f_{sc} - f_{cc})(d\text{-}d^1) + 0.446f_{ck}D_f(b_f\text{-}b_w)(d\text{-}D_f/2)$

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

      @ N.A $C_u = T_u$

      $$0.36f_{ck}x_ub_w + A_{sc}(f_{sc} - f_{cc}) + 0.446f_{ck}Y_f(b_f\text{-}b_w) = 0.87f_yA_{st}$$

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

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

$$M_u = T_{uw} \times z_1 + T_{u1} \times z_2 + T_{uf} \times z_3$$

$$= 0.87 f_y A_{stw}(d-0.416x_u) + 0.87 f_y A_{st2} (d-d^1) + 0.87 f_y A_{stf} (d-Y_f/2)$$

$$M_u = C_{uw} \times z_1 + C_{u1} \times z_2 + C_{uf} \times z_3$$

$$= 0.36 f_{ck} x_u b_w (d-0.416x_u) + A_{sc} (f_{sc} - f_{cc}) (d-d^1) + 0.446 f_{ck} Y_f (b_f-b_w) (d-Y_f/2)$$