7.6.6.3 Throat Plate

The Throat Plate is used to carry high concentrated loads into, for example, a beam flange or tension clip, where the flange, or base leg of the clip, is too weak according to the analysis in §7.6.5 & 6. This reinforcement, also known in the US as “a filler”, is typically used where it is not possible to fit a bathtub fitting backup structure onto the web of a beam. Remember that the moment created during the load carry-through on a bathtub fitting, must be reacted by suitable structure. (Bathtub fittings are adequately dealt with in Ref. 5 and all company manuals)

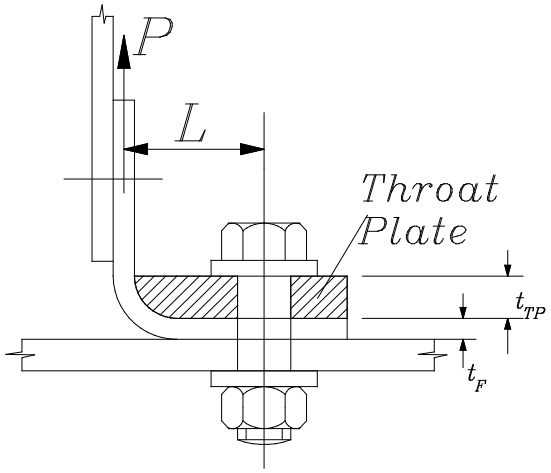

Figure 7.6-31 **Throat Plate Critical Parameters**

Figure 7.6–31 represents the throat plate problem. The angle flange has thickness $\mathbf{t_F}$ and the TP has thickness $\mathbf{t_{TP}}$. The assembly has an effective width, say $\mathbf{w_e}$, so that inertia properties can be calculated.

The TP is considered as a cantilever of length L and section stiffness properties $\mathbf{E_{TP}}\ \mathbf{I_{TP}}$.

The tip deflection is δ_{TP}, and is given by: -

$$\delta_{TP} = P_{TP}\cdot L^3/(3\cdot E_{TP}\cdot I_{TP})$$

The bent flange is a guided cantilever of length L and section properties $\mathbf{E_F\cdot I_F}$.

The tip deflection is δ_F, (see §7.1.5.4, (x)) and is given by: -

$$\delta_F = P_F\cdot L^3/(12\cdot E_F\cdot I_F)$$

Also: -

$$P = P_{TP} + P_F$$

The deflections are set equal and the mathematical gymnastics performed to get the fraction of the load carried by the Throat Plate. This yields: -

$$P_{TP} = P/[1 + (4\cdot E_F\cdot I_F)/(E_{TP}\cdot I_{TP})]$$

Check stressing is done on the cantilevers using maximum moments of: -

$$M_{TP} = P_{TP} \cdot L$$

$$M_F = P_F \cdot L/2$$