5.7.3.3 *Vertical loads on web*

The stiff bearing length of the crane rail required for verification of adequacy of the flange-to-web transition shall be computed on the basis that the length of rail contact with the flange is equal to $2H_r$. The rules of the nominated Standard shall be applied for verification of the web capacity in bearing and buckling. The critical section is the web immediately below the compression flange. The rail load may be deemed to be distributed uniformly along a length of web L_{wx} as follows:

$$L_{wx} = 2 \times H_r + (5T_f) + (t_r) \quad \ldots 5.7.3.3(1)$$

where

t_r = root radius or fillet weld size.

The effect of an interaction between the global bending and the local transverse loads shall be verified as follows:

(a) *Permissible stress design* The web shall be checked by the 'equivalent stress' inequality, as follows:

$$\sqrt{(\sigma_x^2 + \sigma_z^2 - \sigma_x \sigma_z + 3\tau^2)} \le 0.66 f_y \quad \ldots 5.7.3.3(2)$$

where

σ_x = the calculated global stress in the top flange

σ_z = the bearing stress

$$= \frac{N_w}{L_{wx} \times T_w} \quad \ldots 5.7.3.3(3)$$

where

L_{wx} = effective length as defined above

T_w = thickness of web being considered

$$\tau = \tau = \frac{V}{dT_w} \quad \ldots 5.7.3.3(4)$$

V = the shear force at the position of the wheel giving the maximum bending moment

(b) *Limit states design* The following inequality shall be satisfied:

$$\left(\frac{N_w^*}{\phi L_{wx} T_w f_y}\right)^2 + \left(\frac{M_x^*}{\phi M_{bx}}\right)^2 \le 1.0 \quad \ldots 5.7.3.3(5)$$

where

M_x^* = the applied factored bending moment

M_{bx} = is the moment capacity

5.7.3.4 *Local torsion*

Vertical wheel loads shall be assumed to act eccentrically with respect to the girder web midplane when designing heavy duty runways. Local torsional effects may be omitted in the analysis of light duty crane runways.

The main reasons for the eccentricity are as follows:

(a) The wheel contact area is not central on the centre-line of the railhead, as a result of uneven wear or deviation from proper geometry.