8. Deflection Limits

Limits are imposed in AS 1418.18 on vertical and lateral deflections of the runways for the purpose of obtaining satisfactory service performance of the crane. The following deflection limits for runways and monorails under serviceability loads, using dynamic factors of 1.0:

Vertical deflection due to the maximum wheel loads and level supports:

$$\Delta_z = L/500 \qquad \text{but not more than 60 mm (L/300 for cantilevers)}$$

Vertical settlement plus axial shortening of a support column:

$$\Delta_z = \pm\, L/1000 \qquad \text{but not more than 10 mm}$$

Lateral deflection of the top flange of a top running crane, measured from the chord:

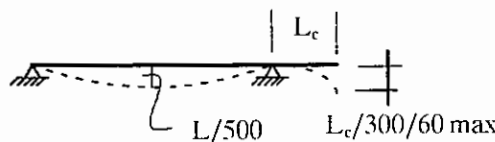$$\Delta_{ty} = \pm\, L/600 \qquad \text{but not more than 20 mm}$$

Lateral deflection of the bottom flange of a monorail beam (author's additional recommendation):

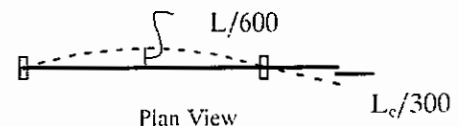$$\Delta_{by} = \pm\, L/500 \qquad \text{but} \le 20 \text{ mm}$$

Differential lateral deflection between two neighbouring frames (authors recommendation) *:
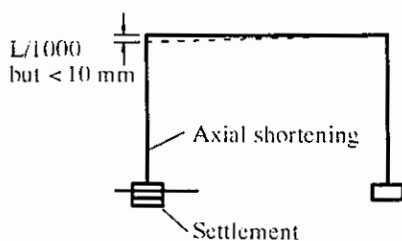
$$\Delta_{fy} = L/600$$

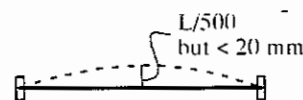* this is necessary to prevent damage to crane from raking.
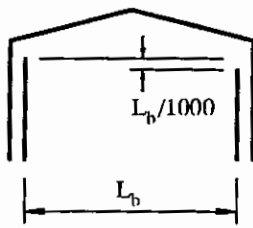

(a) Vertical deflection limits
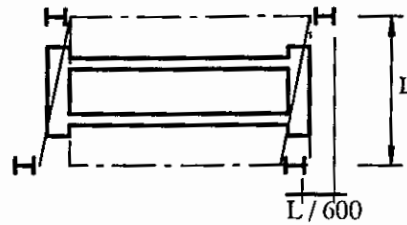
(c) Horizontal deflection on crane runway

(b) Column top displacement limit

(d) Horizontal deflection of a monorail beam

(e) Cross slope

(f) Frame raking deflection

Fig 28. Deflection limits

It should be borne in mind that, while the above deflection limits may appear quite stringent, the deflections and constructive deviations can be, and often are cummulative. For example if the lateral deflection of the top flange were +10 mm, and if the construction sweep tolerance were +6 mm and crane rail eccentricity were +5 mm, the differential displacement could amount to 42 mm. The crane wheel flange clearance provided by the crane manufacturer may be only 10 mm and thus it is easy to see why crane wheel flanges and threads are can bind. Excessive lateral meandering of the crane rail is a reality in many installations. Rigby, ref 71, and Wilyman, ref 87 provide results of an alignment survey showing alignment deviations of up to 40 mm.

Section of One Beam and Rail

Plan of two crane runway girders
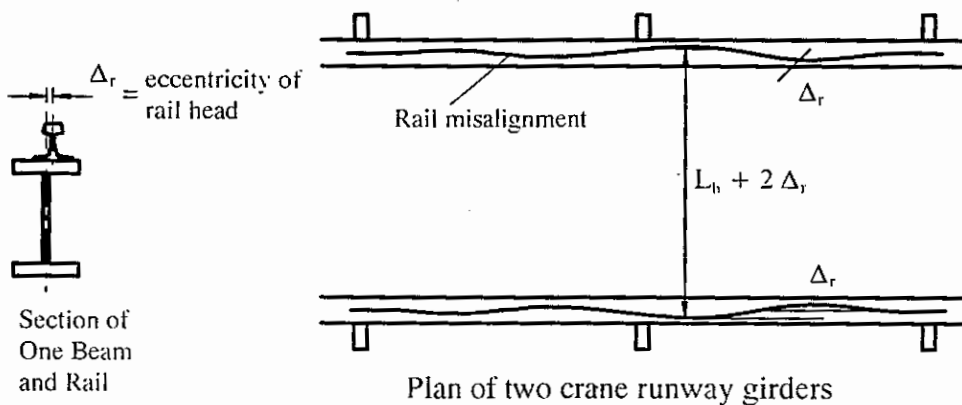
Fig 29. Rail meandering in practice