

SERVICE EXPERIENCE WITH THE LOW CONTACT STRESS RAIL HEAD PROFILE

Previous work indicated that the geometry of the rail head plays a critical role in controlling contact stress and theoretical models have been formulated to define rail head profiles which will substantially reduce the contact stress while producing acceptable vehicle ride characteristics. As the high rail of high-speed curves has been shown to be especially prone to squat cracking, a low contact stress profile (LCS) has been specified for this application and it is proposed that the rail grinding train be used to grind this profile. As this profile should reduce contact stresses, it should delay or even eliminate the rolling contact fatigue cracks and hence control squat failures. However, before this approach can be implemented it was felt prudent to organise a site trial to demonstrate the effectiveness of this profile in reducing contact stresses and cracking in representative service conditions.

The results of this trial are given in this report and show that the LCS profile:

- Can be ground to the required tolerance by the Speno RPS32 train.
- Is stable in service.
- Reduces the contact stress by about 300MN/m^2 and this reduction persists in service.
- Improves vehicle curving characteristics and this reduces rail sidewear.

No rolling contact fatigue cracks were observed in the LCS profile rail or the control BS113A rails after 15 months in service. It is recommended that crack monitoring should continue for another year and LCS profile grinding should be implemented if cracks only form in BS113A rail.