

EFFECT OF LOCAL RAIL HEAD CORROSION ON DYNAMIC FORCES IN RAILS

The dynamic effect of irregularities in the railhead caused by local corrosion has been found to cause significant increases in rail foot stress. This report investigates such effects and develops a method to calculate the resulting increases in stress.

The report concludes that:

- Significant dynamic effects can occur where material has been lost locally from the rail head by corrosion.
- The magnitudes of these effects are a complex function of profile length and depth, track type and vehicle axle load, unsprung mass and speed.
- There is a trade off between the length and depth of local head loss site, where a short shallow one may be more damaging than a long deep one.
- Dynamic effects can be increased by a factor of up to 2.5 where there is a sequence of adjacent local head loss sites corresponding to the axle spacing, and the trains travel at high speeds.
- Stress waves are propagated in both directions by impacts from wheels leaving the rail and falling back into it. Such waves would tend to increase the growth rate of any nearby fatigue cracks, and reduce the critical crack size of such cracks.

The report recommends that measurements should be carried out in track to determine the forces and rail stresses associated with local head irregularities.