Improved Application of Friction Management to Prevent Defects, Derailments & Extend Rail Life

What is the situation?

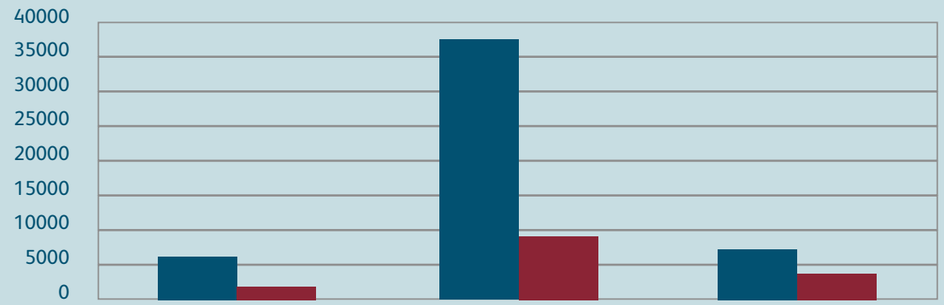
The continuous contact between the wheel and the rail surface is less than one square centimetre (around that of a 10 pence coin) and the infrequent flange contact surface area less than that of a one pence coin. Managing rail friction enables the management of these contact stresses to prevent flange climb, rail/wheel slip and rail wear.

In short radius curves or locations where there are significant centrifugal forces, flange contact generates significant lateral stress, flange wear and derailment risk (particularly at low speeds on tight radius curves). The impact of these forces is reduced by effective friction management.

Studies suggest that a rail on a curve that is lubricated has an EGMT life of 4+ times that of an unlubricated rail. Reducing the lateral stress also reduces the carbon footprint (C02 emissions) of locomotives.

Friction management is an evolving field. Research, development and application of friction management techniques and remote condition monitoring offer an opportunity to mitigate the risks arising from high friction more efficiently, effectively and safely.

National Lubricator Volumes



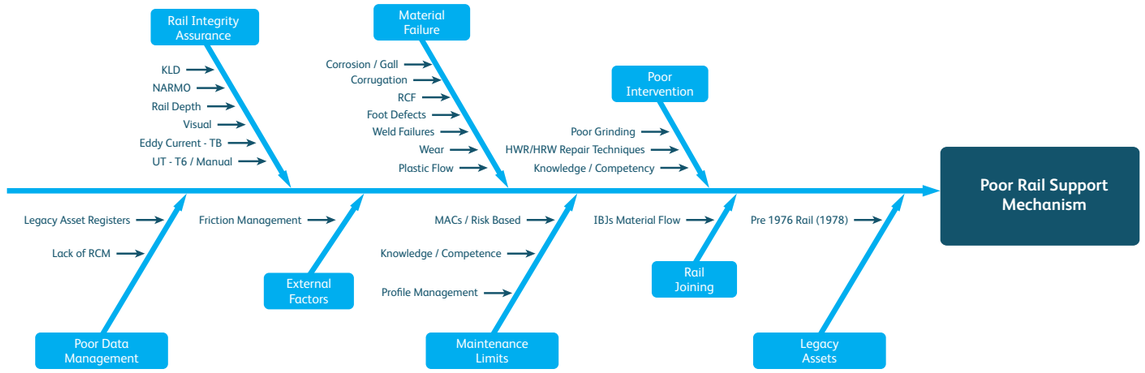
	Total Number of Trackside Units	Individual Maintenance Visits (8 Weekly Freq)	Showing M&H 80% Elec 60% Reduction
Mechanical & Hydraulic Units	6158	36948	7390
Electic Units	6158	36948	7390

Efficiencies from implementation of the challenge statement would drive a saving of maintenance costs (no information to predict the measure) but would benefit everyone home safe every day by a reduction of 35000 trackside visits per year required nationally. There would also be benefits to the TOC's and FOC's in wheel wear and fuel reductions by reducing forces.

Scope

The scope of the challenge is to explore how a more effective way of friction management can be introduced into the UK network that requires engagement and benefits for all the key stakeholders.

Analysis of causes



Priority problems

Specific priority problems

- Failing to manage the friction between the wheel and the rail reduces wheel and rail life and increases the risk of derailment due to flange climb.

Related goal

- To develop technology that enables reliable management of friction between the rail and the wheel.

Benefit

- Reduce asset whole life cost.
- Reduce the track asset risk profile.
- Reduce the track worker risk profile.

Specific research needs

To address these challenges it is expected that R&D actions will need to address the following aspects:

- Analyse the costs and benefits of improved friction management for each of the key stakeholders incuding NR, DfT, RSSB, vehicle manufacturers and FOCS/TOCS, encompass new build and existing rolling stock.
- Explore the benefits and limitations of TOR will enable us to manage the impact of steering forces on the rail reducing damage and extending rail life.
- Conduct a market review to identify existing or products under development that are cost effctive, environmentally friendly and deliver equivalent or enhanced performance.
- Research and development of existing non rail products and technology to reduce wheel/rail friction and consequential rail wear by the application of surface coatings to the rail head.
- Research the capability to measure the thickness of lubricant applied, the degradation of the lubricant in situ and the rail surface coverage will enable us to monitor the performance of friction modification systems and ensure they are efficient, effective and have minimal environmental impact.