Re-Profiling Rail to Remove Defects & Extend Rail Life

What is the situation?

Rail grinding was reintroduced in 2003/04 post Hatfield derailment (Oct 2000) to manage the contact stresses that cause the development of RCF cracks, by removing rail and re-profiling the rail head. Grinding can be used to remove light and moderate RCF.

Train borne rail milling is a proven technology not currently used in the UK, which can be used to remove heavy and severe RCF and re-profile the rail.

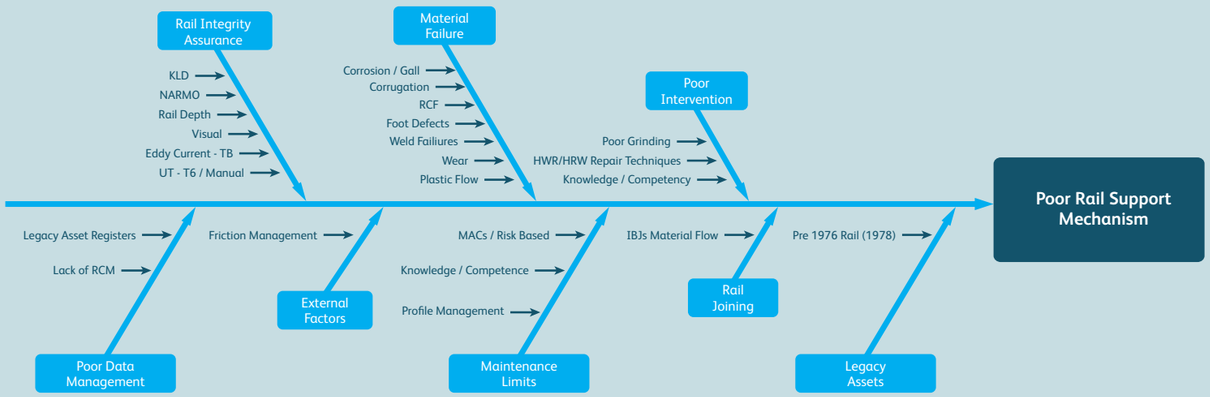
Managing the rail profile using grinding only (light & moderate) provides a potential rail life extension of the order of 3x the unground rail life (Hatfield study). When Hatfield rails were replaced the original rail was treated by rail milling and this proved to give a further life extension of 10 years. This compares with a 4 year life pre-rail profiling.

Proactive management of rail contact stresses extends the life of the rail by:

- Reducing the development of RCF type defects
- Reduces the requirement to re-rail sites with heavy/severe RCF
- Cost effective heavy re-profiling where grinding requires multiple passes

Our approach to rail profile management is “one size fits all” and relies on rail grinding. Using current NDT data and developments in rail grinding and milling technology offers us the opportunity to develop a more targeted approach using both grinding and milling to extend rail life.

Analysis of causes



Priority problems

Specific priority problems

- Lack of understanding of the rail profile requirements based on a site specific approach means that our “one size fits all” strategy does not maximise rail life.

Related goal

- Extend rail life which is hindered by inability to adopt site specific approach.
- Develop improved process and methodology for managing rail profiles to reduce sidewear, RCF and related rail/wheel damage.

Benefit

- Condition based rail profile management, leading to more efficient use of rail profiling machines and equipment (rail grinder / milling machine).
- Increased rail life due to less re-profiling where this is not needed and through small defect removal.

Scope

The scope of the challenge is to explore how data can be collected and combined so prioritised intervention can take place before failure occurs and manage the conicity to a level before the forces create damage.

The scope covers the development of techniques, processes or systems to help improve extend and monitor rail profiles.

Specific research needs

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

- Study the effects of grinding profile treatment against changes of rail metallurgy
- Using data available from various inspection techniques develop techniques or systems to manage conicity
- Study the possibilities of material coatings in a rail interface environment
- Study the identification techniques required to capture embryonic defects forming