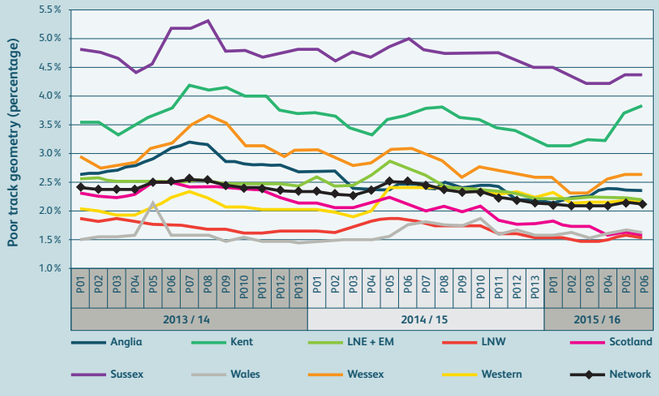
Reliable and resilient track geometry

What is the situation?

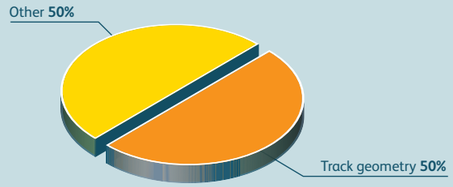
Track geometry resilience is a problem resulting in excessive workload for our maintenance teams and loss of financial efficiency.

Geometry is affected by a number of factors including the condition of rail, pads, fastenings, sleepers, ballast and subgrade. It is monitored by track measurement vehicles (for example the 'New Measurement Train') and the data collected is used to inform us where to plan and undertake repair work. The cost of track maintenance equates to 50 % of our total maintenance spend, with track geometry alone accounting for approximately 10 % of the total maintenance spend. Track geometry faults cause poor condition track which can deteriorate resulting in speed restrictions, having a negative impact on train performance and in extreme cases result in derailments.

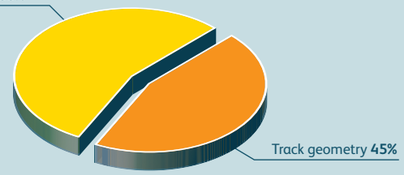
Poor track geometry



Schedule 8 costs for track



Rail Accident investigation Branch (RAIB) investigated derailments causes



Priority problems

Specific priority problems

- Renewals or Enhancements create future faults.
- Emergency and Temporary Speed Restrictions.

Related goals

- True visibility (management, maintenance, effectiveness).
- More maintenance for same resource (cost and access).
- Open at line speed after renewal / refurbish.
- Over-achieve CP5 targets for track quality.
- 100 % P&P geometry treatment (including RCM).
- Reduction in schedule 8 payments for geometry faults.
- Reduction in repeat visits to the same faults.

Analysis of causes

Scope

A number of innovation and development activities to deliver an improvement in track geometry are required or already underway. Current initiatives include the development of a Track Integrated Geometry Engineers' Report (TIGER). This will help to align faults with interventions that are undertaken to measure the effectiveness of repairs and evidence complexity of site-specific repairs to make more informed engineering decisions.

Research is required to utilise current data and develop new data streams to improve management visibility and earlier intervention to minimise deterioration. Development is required to improve our capability to predict and prevent track geometry faults which will reduce 'Schedule 8' delay minute penalties as well as the amount of repeat work. This will help us achieve our track geometry targets and support the effective delivery of repairs using cost effective methods to deliver improved maintenance within the available access windows.

R&D activities are needed to develop:

- Predictive track deterioration modelling for design and decision support.
- New methods of measuring geometry using in-service vehicles in real-time supported by standardised reporting structures to inform maintenance engineers well in advance of significant faults arising.
- Detailed research into the rate of change of trackform stiffness and associated monitoring systems to deliver improvements in track geometry understanding and repair techniques.

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

- Are the current critical limits and reporting systems used to report geometry thresholds adequate to provide maintenance with sufficient data to predict track condition deterioration more effectively?
- Explore the feasibility of a single source system that is capable of receiving and transferring geometry data from various accelerometers based systems and translate it into meaningful and standard reports for maintenance engineers?
- Explore feasibility of developing a data repository with specified inputs into a railway standard specification and agreed with ROSCOs, TOCs and FOCs in particular for new trains to be fitted with the required technology to provide compatible outputs.
- Further enhancement and improvement are required to deliver higher quality and more frequent and consistent track measurements to improve data quality trending and prevent gaps in asset data reporting.

Expected impact & benefits

- R&D will help to assess the effectiveness of repairs by providing more integration in our information systems.
- Real-time geometry measurement will enhance our trend analysis capability and minimise train disruption using a proactive predict and prevent approach.
- Reduction in track geometry faults will improve train service performance leading to less congestion and better customer satisfaction.
- Better understanding of track geometry behaviour from a combination of factors including track geometry deterioration will support whole life cost analysis.