Short Note:

The RASC® Pod - rethinking trackbed inspection

Part 1: Improved ROI for inspection and enhanced track safety

Our reference: Publication
Date: 4th January 2016

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Summary

Traditional approaches to track inspection focus on track geometry measurements carried out on dedicated inspection trains or hy-rail vehicles.

Track geometry can detect unstable track and prompt slow orders to mitigate the risk of a derailment. However, track geometry in itself cannot verify the root cause of unstable track so the time to fix problem track may be delayed while this is investigated. Derailments can also occur on track without a measureable track geometry fault.

Specialist measurement trains are expensive and require a dedicated path to be assigned on revenue earning lines. The cost of planning a survey, occupying track and manning the train is high.
The RASC® Pod is an innovative trackbed inspection solution which has the potential to improve:

- the return on investment in data capture systems
- track safety, and
- the cost effectiveness of follow-on maintenance

The system illustrated above is a versatile platform which can be mounted on a wagon in-consist with a revenue-earning train (above left) or on the chassis of a hy-rail (above right).

The RASC® Pod offers exceptional flexibility with a range of above- and below-ground measurement systems linked to a core of on-board power, data management, accurate location and climate control. The system is deployable wirelessly; data is captured autonomously and can be monitored remotely.

The unified data stream allows integration of above- and below-ground information to; determine the root cause of problem track (fix problems first time), flag derailment risk areas and, reduce the cost of maintenance.

This article describes the potential improvement in return on investment (ROI) for inspection and enhanced track safety.

Part 2 will cover use of the combined data for improved trackbed maintenance planning.

Improvement in the ROI for inspection

The RASC® Pod can simultaneously collect data from track geometry, rail profile, linescan imaging, 2D and 3D high speed lasers, accelerometers, video, 2D and 3D ground penetrating radar (GPR), thermal imaging and catenary inspection systems.

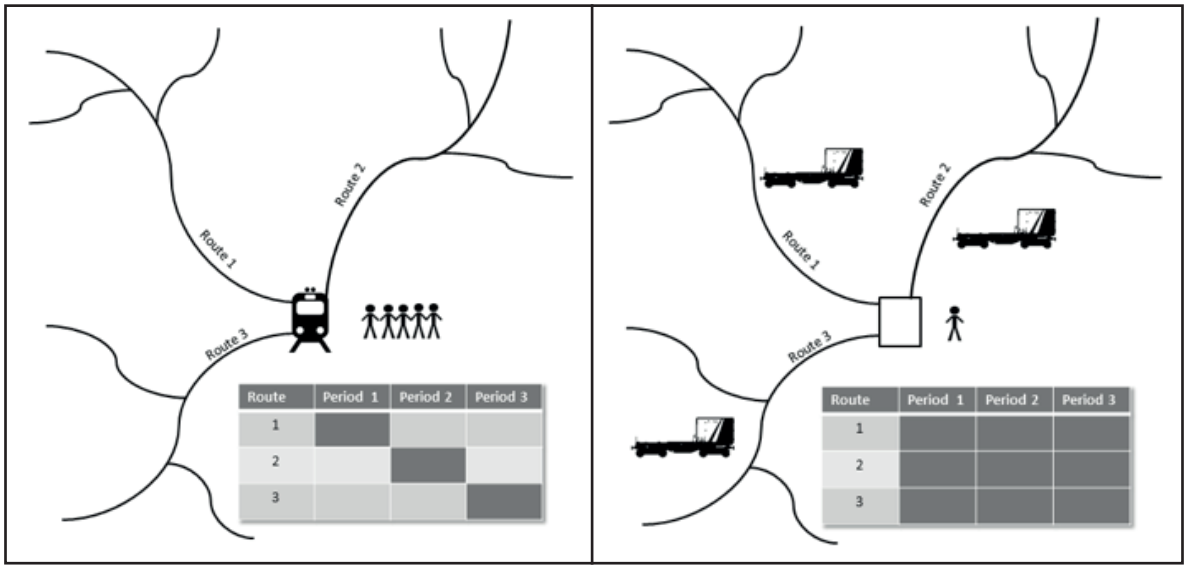
The graphic below illustrates the deployment of a dedicated inspection train (left) and 3no. RASC® Pods (right) on a hypothetical network consisting of 3 routes.

The inspection train has a 5-man crew and a schedule to survey each of 3 routes once between Periods 1 - 3. The inspection train requires forward planning to plan a path and minimise the impact on revenue earning trains.

The RASC® Pods are distributed across 3 routes and controlled centrally with a schedule to repeat scan each route during Periods 1 - 3 whilst mounted in consist with in-service trains.

Multiple RASC® Pods can be deployed for the cost of a single inspection train so the improved ROI for inspection is in better coverage, less impact on revenue earning traffic and less manpower.

The RASC® Pod weighs less than 3tons and can easily be deployed where it is needed on any flat bed. This is beneficial where sections of track require a survey, for example, following heavy rains (to identify trackbed disturbance) or after maintenance (quality control).



Enhancing track safety

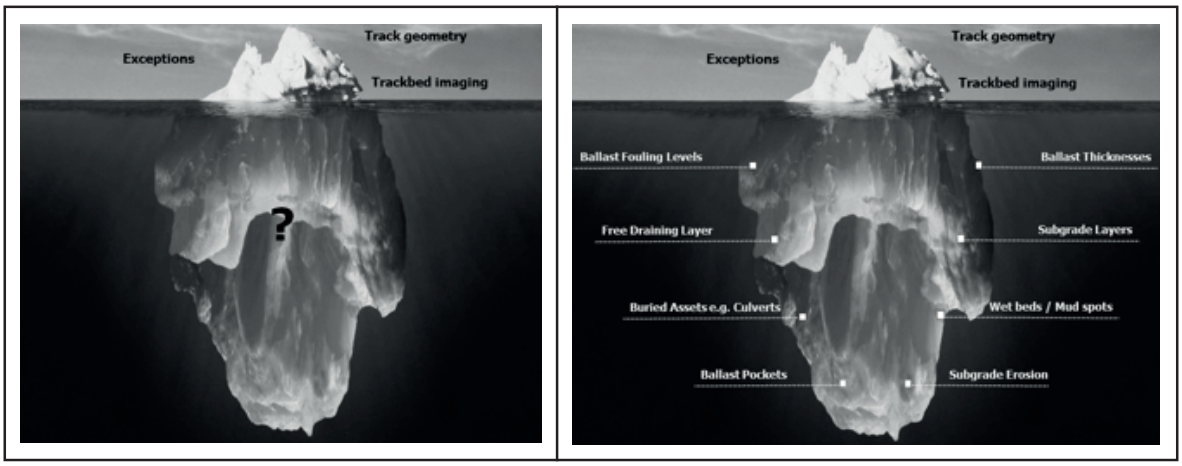
Track geometry measures changes in the relative position of running rails which can be affected by above- and below-ground influences.

Values in excess of predetermined safety margins are flagged for maintenance and depending on the severity could result in slow orders, which limit the speed of revenue-earning traffic over unstable track.

Track geometry in itself cannot verify the root cause of unstable track so the time to fix problem track can be delayed.

The RASC® Pod has autonomous solutions for extracting above- and below-ground data streams targeted on track geometry exceptions. Combining these measurements speeds up the determination of the root cause of track geometry faults and can lead to the problem being repaired correctly first time. The benefits are in reduced delay times and a decrease in costly revisits which translate to improved train speeds.

A useful analogy for this collective approach is an iceberg where track geometry and visual measurements represent just the top of the trackbed structure (below left) and combined above- and below-ground measurements more fully describe the whole trackbed (below right).

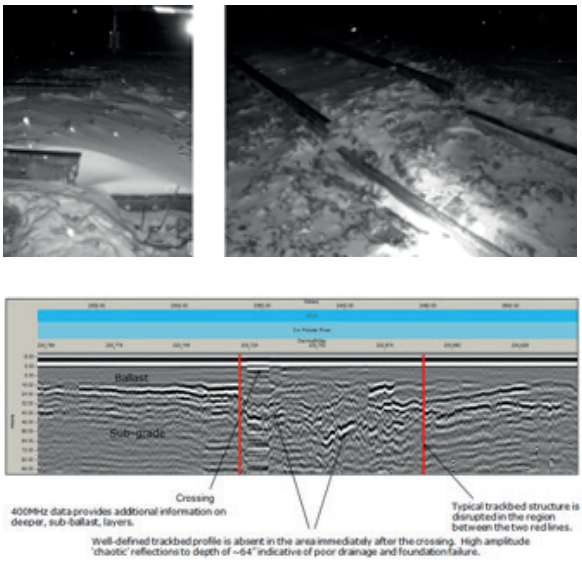


Derailments can occur on track without a measureable track geometry fault or where incorrect maintenance was applied due to incomplete knowledge of the cause.

Examples are provided below where prior knowledge of the below-ground condition of the track could have helped prevent a derailment event.

UK: Cause of cyclic top condition which caused derailment (shallow formation) was not addressed.

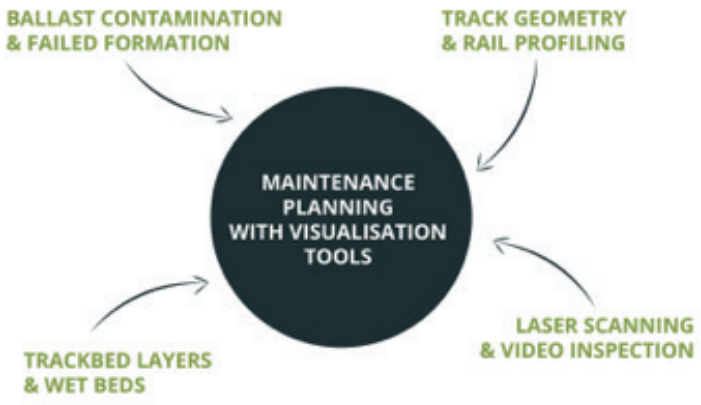
Australia: Undetected weakness in the track formation. Dip in track and adverse twist caused bogie to derail.



USA: Failed formation at a road crossing shown by GPR measurement. There were no recorded track geometry exceptions leading up to the derailment event (broken rails).

Measurement of both above- and below-ground trackbed attributes using the RASC® Pod can help to better characterise irregular trackbed that may require closer inspection and enhance track safety.

Part 2 will deal with integrating data for improved maintenance planning.



Profile:

Zetica Ltd is an experienced service provider offering an integrated above- and below-ground measurement solution for trackbed inspection which offers the following benefits:

- Identification of subgrade erosion, drainage and ballast fouling issues which could affect track stability and explain track geometry exceptions
- Provision of a system to target trackbed maintenance effectively using evidence-based information thus reducing wasted time and resource unnecessarily maintaining track where this is not needed
- Reduction of material costs by optimising ballast cleaning and trackbed rehabilitation programmes
- Provision of an effective means of quality controlling new build trackbed or recently maintained trackbed to verify the work carried out
- Update of above-ground asset mapping information

In 2015 the RASC® Pod received vehicle acceptance certification for carrying out work on the UK rail network.

RASC POD

Railway Asset Scanning Car Pod

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