

MONITORAIL - Long range inspection and condition monitoring of rails

Throughout Europe more than 2,600 broken rails are found every year leading to reduced reliability of the rail network and resulting in severe delays and potential derailments. Rail maintenance costs associated with the occurrence of broken rails is estimated to cost European member states more than €2bn per annum. With the rapid and continuous increases in train traffic, speed and tonnage carried on rail networks, there is an urgent need to increase the reliability of rail infrastructure and optimise maintenance. It is therefore necessary to use efficient and cost-effective inspection methods which will enable the accurate evaluation of the structural condition of rails.

The project will reduce the substantial costs related to rail inspection and contribute to achieving the target set by the European rail industry to reduce the overall maintenance expenditure by 30%, by 2020. A 10% increase in the availability of the network due to increased reliability and a reduced requirement for maintenance will also be achieved.

Project objective

The objective of MONITORAIL is to develop a cost-effective guided wave ultrasonic inspection, along with a wireless condition monitoring system, in order to improve and better maintain the European railway system for improved efficiency and safety.

Using guided wave, long lengths of rail track can be monitored at once, making this a cost-efficient technique for continuous monitoring. The condition monitoring of rail will extend the life of the materials through early repairs of rail tracks.

The project will develop:

- Novel sensors that will be embedded in the railway
- A collection data system that will be integrated into the existing systems
- A central software programme, comprising data collection, signal processing, data analysis and representation
- Wireless method for transmission of data from rail to a central base station.

The rail is a natural wave guide where waves can easily propagate for long distances and detect defects in different areas such as the head, the web and the foot.



The inspection of engineering structures using guided waves is attractive because it is possible to investigate complete material volumes in regions over 100m away from the point of measurement. Multiple sensors can be used to cover long distance inspection.

Guided wave ultrasonic inspection is different from conventional ultrasonic inspection, since an array of transducers fitted around the outside of the part being inspected sends a sound wave along the length of the component, rather than through it. The component itself constrains the waves along its length. The received signal depends on the nature of the reflecting surface. Therefore, discontinuities such as corrosion or metal loss can be detected by analysing the reflected wave.

For further information, please visit the project website at www.monitorail.eu.

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