

SAFERAIL - Development of novel inspection systems for railway wheelsets

Today, rail networks across Europe are getting busier, with trains travelling at higher speeds and carrying more passengers and heavier axle loads than ever before. The combination of these factors has put considerable pressure on the existing infrastructure, leading to increased demands in inspection and maintenance of rail assets. The continuous increase in train operating speeds means that catastrophic failure of a wheel or axle may result in very serious derailments. The importance of detecting defects in wheel sets as early as possible is therefore of paramount importance for the rail industry in order to reduce maintenance costs and improve safety standards.

Project objective

The main objective of the SAFERAIL project is to provide a foundation to enable the development of novel non-destructive testing (NDT) instrumentation for inspection of railway wheelsets. Currently, ultrasonic phased arrays have problems in finding small surface defects. The incorporation of alternating current field measurement (ACFM) probes will allow the accurate and fast inspection of wheelsets for any surface breaking faults. ACFM technology is superior to Eddy current in the sense that the probe does not need to have perfect contact with the component being inspected and its overall operation is also much less affected by lift-off variations.

The SAFERAIL project has two main objectives:

- The development of an on-line inspection system that will be placed at pre-chosen strategic points on the rail network tracks for inspection of faults in wheels and axles of passing trains. The system will be able to inspect passing trains for flats in the wheels, defective wheelset bearings, significant cracks and wheel profile abnormalities using an identification system for each passing train whereby each wheelset will be given an identification code.
- The development of a novel off-line inspection system of new and old wheelsets based on ultrasonic phased arrays and ACFM probes for the identification of surface breaking faults.

SAFERAIL has recently demonstrated the final project prototypes. The manual phased array ultrasonic (PAUT) inspection system design comprises a number of inspection techniques and probe and shoe designs specific to the inspection area of the wheelset.



Off-the-shelf PAUT data acquisition was used, and the value added by the SAFERAIL project was in the development of the inspection techniques and unique deployment of the PAUT probes. Probe holders including encoders have been developed and together with level two written procedures offer reliable inspection solutions for both axles and wheels.

The successful implementation of the SAFERAIL deliverables and subsequent commercialisation of the principle prototype will offer the rail industry several technical advantages.

For further information, please visit the project website at www.saferail.net.

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