SAFTInspect - Ultrasonic synthetic aperture focusing technique for the inspection of railway crossings

In line with pan-European policy to cut carbon emissions, the European rail network is targeting a considerable expansion, with a 43% increase in commercial passengers and 70% increase in freight by 2020. Achieving this target requires increased reliability and availability of vehicles and track whilst maintaining the same level of safety.

European rail infrastructure employs high manganese steel components at high impact safety critical locations such as crossings. The inherent coarse grain, anisotropic and non-homogeneous material properties associated with high manganese steel in conjunction with track side health and safety regulations have meant NDT methods used to assist in structural integrity assessments are limited to visual and dye penetrant.

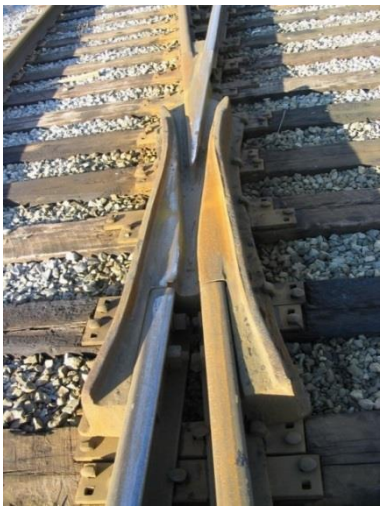
As a result of only surface inspection methods being used to inspect high manganese crossings, the structural integrity of these safety critical components cannot be determined accurately while in-situ. Consequently, structurally sound components may be taken out of service, therefore directly increasing life cycle costs. It also forces rail operators to place highly conservative speed restrictions causing disruption and delays to rail transport.

Project objective

SAFTInspect aims to develop an affordable and reliable ultrasonic inspection solution for sections of high manganese steel rail crossing points, which are used in the European railways. A non-destructive testing (NDT) inspection solution will be developed in the project to facilitate early defect detection of crack defects at safety critical locations.

Within the project a novel array transducer working in a synthetic aperture focusing technique (SAFT) inspection mode will be developed. This novel design will enable efficient acquisition of data for SAFT processing. SAFT post-processing will generate 2 and 3D reconstructions of the ultrasonic volumetric image to produce a simple pass or fail indication for the user. If defects such as cracks are detected at an early stage in their growth, their structural integrity can be monitored and assessed, resulting in less stringent speed restrictions, increased asset lifecycle and improved levels of track safety and reliability.

The project results will increase industrial confidence in NDT by achieving better quality levels in the identification, classification and sizing of defects compared to existing techniques. The automated output will increase efficiency and reduce scanning mistakes associated with manual methods. The rapid, automated solution will reduce time required for personnel to be located in potentially hazardous environments. This will provide NDT workers with safer, healthier and better working conditions in European industry related inspection and maintenance activities.



The project focuses on the rail transport industry within the EU. However techniques developed by the project would not be specific to high manganese steel rail track, but applicable to many other coarse grained, anisotropic or non-homogeneous materials.

For further information, please visit the project website at: **www.airtren.com/saftinspect**

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