

Transforming Railway Structure Inspections using Novel NDT Approaches

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The comprehensive assessment of structural defects within railway infrastructure, such as tenanted arches, plays a crucial role in maintaining the safety, reliability, and efficiency of transportation systems. These structures are currently examined using rudimentary manual techniques to examine for surface and subsurface defects, which are slow, subjective, paper-based and expose engineers to hazardous conditions for extended periods of time. This MTC has developed several methodologies to implement novel Non-Destructive Testing (NDT) techniques for railway infrastructure examinations, utilising techniques such as X-ray Backscatter (XBS) and Ground Penetrating Radar (GPR) technologies to acquire and generate comprehensive analysis for digital defect mapping and characterisation within arches. A case study on comprehensive XBS and GPR inspection of cladded railway tenanted arches will be presented. The acquired data underwent rigorous processing and analysis to identify and classify various types of surface and subsurface defects present in the structures such as mortar degradation, spalling, calcite deposition, missing bricks, fractures and subsurface voiding. The integration of XBS and GPR data proved invaluable, providing detailed insights into both the external and internal conditions of rail infrastructure assets with improvements in inspection speed, reliability, accuracy, digital traceability and improve the health and safety for examiners. This integrated approach facilitated accurate defect identification, assessment, and informed decision-making regarding maintenance and repair strategies. The outcomes of this study contribute to the field of NDT and inspection of railway infrastructure, providing practical insights into the characterisation and assessment of surface and subsurface defects within arch structures. The findings have implications for management and maintenance strategies, enhancing the safety and longevity of railway assets.