

Residual Stress in Railway Rails Components Measured by Neutron Diffraction

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Rail degradation typically occurs through a combination of wear and rolling contact fatigue in the rail head. Both of these degradation modes are associated with the plastic deformation and failure behaviour of rail steels. Increased rates of degradation are associated with special trackwork such as switches and crossings, and insulated rail joints; these components therefore incur higher maintenance costs and shorter service lives compared to open rail. In response to the demand for increased axle loads and/or annual haulage rates, rail steel manufacturers are required to continuously develop improved rail materials, which can offer reduced rates of degradation and extended maintenance intervals, while the rail infrastructure operators are required to continuously improve rail maintenance strategies.

The presented work forms part of a PRE Ltd. collaboration research project on the application of non-destructive neutron diffraction residual stress measurements to the rail application. In this paper the measurements results of industrially important large-scale railway rail components such as bends and crossing, will be discussed.

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