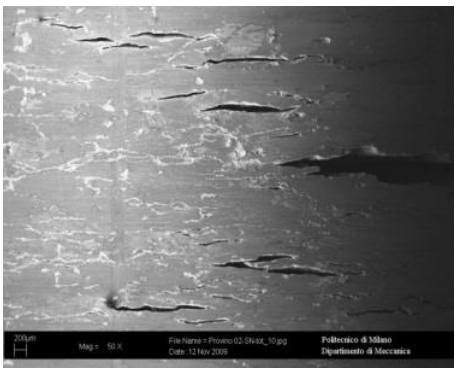
WOLAXIM - Whole life rail axle assessment and improvement

The concept of the WOLAXIM project was to produce and make available three new and better methods of crack detection and corrosion assessment for railway axle inspection.

Axles for trains are carefully engineered, high value items that are designed to last 20 years or more. There is however a current trend for axles to be withdrawn from service before this because of corrosion on the surface long before their design lives. The decision to withdraw from service is taken without the full knowledge of the way in which the failure will result from corrosion, as this requires a crack to initiate and the mechanism for this is unknown.

Cracks in axles can also initiate from ballast strikes and electrical faults. The failure rate is about two axles per year in the UK. If these withdrawals take place while a train is in-service there is consequently a significant cost associated while the train is out of service for additional maintenance.



Inspection of the axles for cracking takes place at intervals set by knowledge of crack growth rates and inspection sensitivities. The most sensitive inspection methods are surface inspection methods designed for crack detection (such as magnetic particle inspection, eddy current and alternating current field measurement) and these do not typically attempt to measure the corrosion. However, inspection of axles while the train is in service is still required and this is inconvenient and costly for the train operators.

Project objective

WOLAXIM has investigated three new methods of crack detection and corrosion assessment for railway axle inspection. One method is for the exposed body of the axles (intended primarily for freight wagon or passenger trailing axles) and can be carried out automatically as the vehicles pass an inspection station, installed in carriage sidings or marshalling yards. The second method aims to improve speed of inspection and improve crack detection reliability, specifically for the hollow axles of high speed trains. This could be deployed while the train is in depot, without dismantling of the wheelset. The third method is to improve the measurement of corrosion and therefore the sentencing of corroded axles.

The objectives of WOLAXIM were to:

- Produce a prototype instrument to detect cracks on the exposed part of an axle of a moving train.
- Produce an instrument to measure and assess corrosion damage and risk of fatigue crack growth.
- Produce an instrument to inspect hollow axles using a non-rotating probe.
- Produce equations for installation into STRUREL software to calculate inspection intervals incorporating crack growth by corrosion fatigue.

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

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