

Evident/Olympus

Axle Inspection Made Easy with Phased Array Technology

Rail car axles are critical components that encounter a high level of stress during operation. As such, ensuring their inspection and maintenance during manufacturing and service is of utmost importance.

Approached traditionally, non-destructive testing (NDT) of rail axles presents a laborious task using conventional methods such as magnetic particle inspection (MPI) or conventional ultrasonic testing (UT) approaches. In the case of MPI, reliable data can be gathered, but a full disassembly of the wheelset is required, which is both time-consuming and costly when rail car downtime is taken into account. UT on the other hand, enables axle inspection without disassembly, but yields less reliable data and remains time-consuming as multiple single element transducers are required to inspect critical areas for defects. Furthermore, UT can be costly due to the need for expensive gantry systems. In either case, these methods are imperfect when seeking to implement a robust axle inspection in a timely and cost-effective manner.

Axle inspection poses many challenges, yet is a central process for every rail maintenance depot to detect axle faults such as manufacturing flaws, defects and fatigue cracks. Since axle inspection is key to ensuring safety on the railways, solutions that can make the inspection process more convenient, while simultaneously detecting faults with high reliability, could provide great value to stakeholders in the railway maintenance sector.

Phased Array Ultrasonic Testing

Phased array ultrasonic testing (PAUT) is an advanced NDT method that can be harnessed for almost any test where conventional ultrasonic flaw detectors have traditionally been used, but is especially pertinent for axle inspection. Unlike conventional UT that is reliant upon multiple single element transducers, PAUT utilises probes that contain an array encompassing multiple elements. Rather than having to manually calibrate, move and adjust the transducer as is required in conventional UT, PAUT transducers can be calibrated, focused and swept electronically, greatly speeding up the inspection process.

PAUT technology also increases the likelihood of detecting potentially dangerous indications through its ability to generate wide-angled beams thanks to the multi-transducer array. During a scan, each transducer is pulsed independently, creating its angled beam by applying delays to each individual pulser of the UT equipment. PAUT technology therefore provides more

Conventional UT versus PAUT: by testing multiple angles/depths at once, the likelihood of detecting anomalies or faults increases significantly



value than traditional UT because a single PAUT probe is able to test multiple angles and depths, scanning all critical areas during a one-rotation scan.

A Dedicated Portable PAUT Solution for Axle Inspection

In light of the myriad advantages PAUT technology can bring to axle inspection, Evident Scientific has developed a tailored PAUT solution designed especially for axle inspection applications. Compatible with Evident's phased array instruments, like the powerful OmniScan X3, this scanner stands to make the process of axle inspection more convenient and reliable, saving time and money while improving safety.

The solution is a portable instrument that benefits from the latest PAUT technology and can be used for axle inspection both on and off the vehicle. Weighing just 1.5kg, high portability makes it ideal for use as a frontline tool for field applications as well as in rail depots, making for a highly versatile solution. A full scan can be completed in a matter of minutes thanks to increased automation, while its simplicity allows axle inspection to be carried out without the need for specialist training. Some of the additional benefits include:

- 16-element array that allows minute defects to be detected deeper into the axle compared with conventional UT
- Axle CAD drawings can be imported and displayed on top of the acquired data, making for a clear visualisation of any flaws detected
- An integrated encoder captures C-SCAN data that can be reviewed live or after the scan is complete
- Interchangeable centring pin allows for multiple axle configurations



Deployment of the scanner and probe with OmniScan™ X3

Empower your axle inspection workflow further by combining the scanner with the latest phased array solution from Evident, the OmniScan™ X3. This next generation flaw detector stands as a complete phased array solution. The OmniScan™ X3 series comprises total focusing method (TFM) imaging and advanced visualisation capabilities. Coupled with a user-friendly interface, the OmniScan™ X3 range can enable you to complete your inspection with greater confidence.

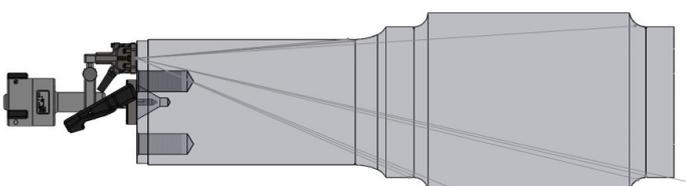
Bring the Power of PAUT to Your Axle Inspection

Why not discover the power of PAUT for your axle inspection applications? With complete solutions from the specialised scanner to the powerful OmniScan™ X3, Evident can provide robust solutions and expert advice to help simplify your axle inspection workflow and save you time and money.

Want to find out more?

Contact our expert team today.

olympus-ims.com

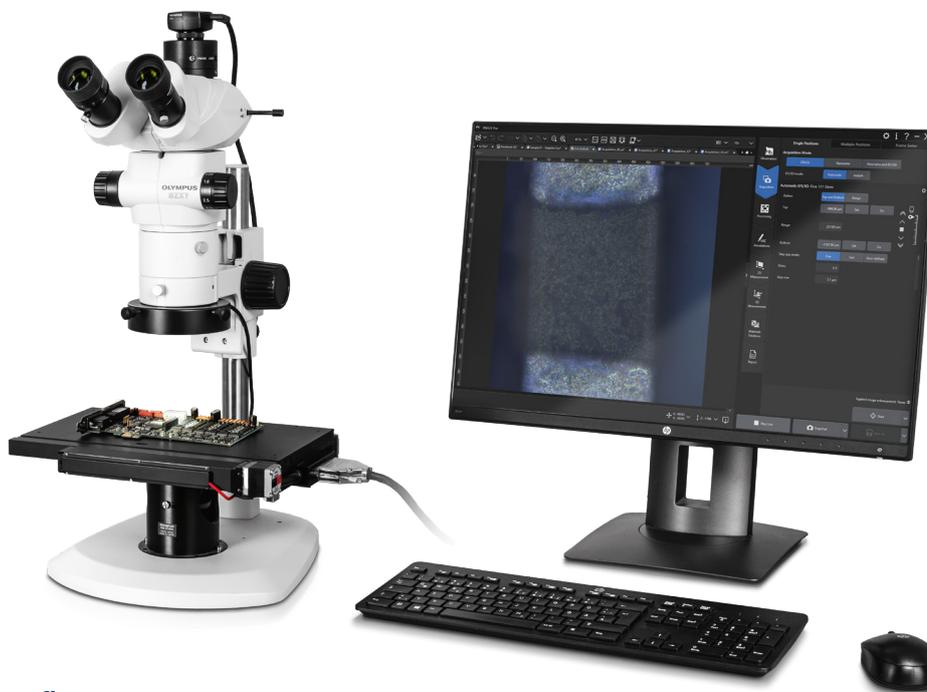


Representation of tailored solution (left) attached to axle centring pin during scan

Expand Your Inspection Capabilities

Comprehensive Inspection and Measurement with PRECiV 1.2

Upgrade your product evaluation and measurement workflows with PRECiV 1.2 inspection and measurement software. Whether you're in the inspection room, quality control or R&D, PRECiV 1.2 has a host of powerful new features for all your inspection needs—delivering rapid, accurate and efficient analyses. Also supports standard DIN 50602, method K for non-metallic inclusions.



Discover the benefits:

- **Versatile:** Supports a wide range of imaging conditions including brightfield, darkfield, polarization and all standard imaging conditions
- **Simple to Use:** Advanced imaging and measurement tools make it easy to conduct measurements that comply with international standards
- **Complex Image Analysis:** TruAI Technology segments images to quickly and easily separate features that cannot be handled by purely analytical solutions
- **Semiautomated Inspection Support:** Controls all Olympus microscope cameras as well as select third-party Z-focus drives and motorized stages

To learn more about PRECiV software, visit: [▶ www.olympus-ims.com/en/microscope/preciv/](https://www.olympus-ims.com/en/microscope/preciv/)
OLYMPUS Stream customer? Upgrading is easy! Contact us to learn how.