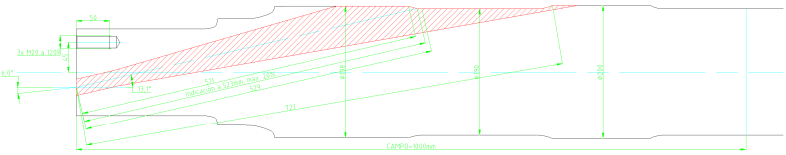
ULTRASEN® Solid Axle Inspection System

"The new 2009 ULTRASEN® Solid Axle Inspection System represents the latest trend in rolling stock security"



PRODUCT HIGHLIGHTS

- Compact portable system
- Inspection time: 3 min/axle
- Only system approved by RENFE (Spanish Railways) for their maintenance workshops
- Software tools include storage, management and hardcopy reports of calibration, reference axle, and axles inspected.
- Connectivity to factory computer network via Ethernet
- Based on ULTRASEN® modular ultrasound data processor architecture

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OBJECTIVES

- **Increase passenger safety**
- **Increase lifetime of axle units**
- **Decrease inspection time and costs**
- **Decrease downtime of inspected units**
- **Comply thoroughly with inspection regulations**

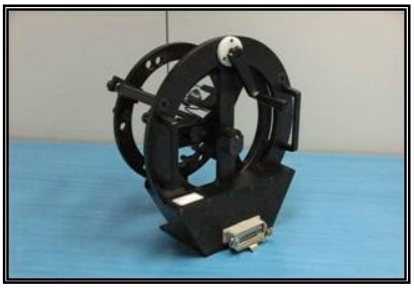
PRODUCT DESCRIPTION

ULTRASEN® Solid Axle Inspection System provides a reliable, foolproof method for the systematic detection of cracks. The system is based upon an advanced digital processing and control system employing ULTRASEN® technology, as well as on a comprehensive set of automatic assessment tools for determination of axle status, together with storage, retrieval and calibration software applications.

Storing full inspection results, provides complete traceability and enables subsequent retrieval and reassessment of any given inspection. The storing capability is greatly advantageous for rolling stock operators and maintainers alike, providing full record of work performed, available for future use in trend analysis or auditing, and increasing confidence in the inspection results.

MECHANICAL SUBSYSTEM

Inspection of solid axles is performed from the axle head using a set of 3 probes at different incidence angles. A number of simple interchangeable adapter elements (ring adapters), allow the inspection of different types of locomotives employing a common inspection system, resulting in a convenient, optimized and versatile solution.



Mechanical module and ring adapter

ULTRASONIC PROCESSOR AND CONTROL UNIT

Based on proprietary ULTRASEN® architecture, it carries out the following tasks:

- Generating the trigger pulses for the ultrasonic transducers.
- Synchronising signal acquisition with transducer positioning.
- Real time ultrasonic data acquisition and signal processing.

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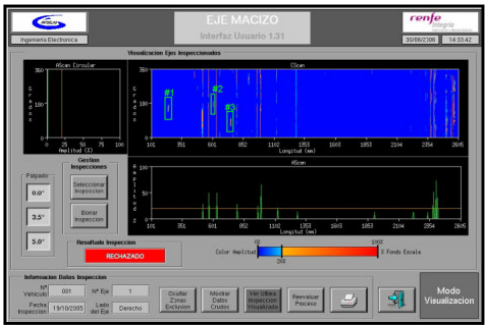
PROCESSING COMPUTER

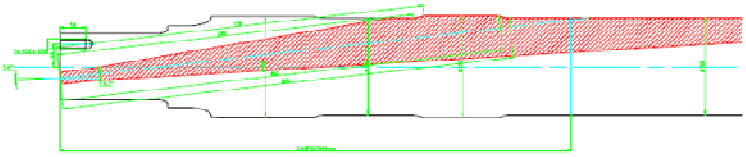
Host to the Human Machine Interface (HMI), which displays inspection results and includes a variety of auxiliary tools to store, transfer and check the results of previous inspections. Inspection results are stored in a standard format, prepared to work with commercial data analysis tools (e.g. Microsoft Excel®), which makes creating reports very easy.



HMI: Display of inspection results

Signal processing includes specific time of flight data analysis algorithms for detection of cracks with special focus around the critical areas defined by the manufacturer.

Processing module



TECHNICAL CHARACTERISTICS	
• Inspection technique:	Pulse-echo system, with oil coupling
• Number of channels:	3 (up to 8 simultaneous channels supported by ultrasound hardware)
• Transducer type:	2.25MHz, single crystal, 20 mm Diameter
• Train models:	Universal (specific adapters may be required depending on the unit being inspection)
• Inspection time:	3 minutes, for an uncovered axle head
• PRF:	Up to 3kHz
• Angular resolution:	Up to 5 pulses per degree of rotation
• Inspected length:	Up to 5 meters
• Differential gain	Independently programmable for each channel up to 52 dB
• Delay compensation range:	Independently programmable for each channel up to 100 µs
• Digitalization stage	Up to 12 bits, 50 MSPS
• Digital Filters:	Real-time Digital Signal Processing Tools using dedicated ALTERA EP3C120F780 FPGA
• DAC profile:	Fully programmable, -6dB to +24 dB gain in 256 steps.
• Excitation pulse amplitude:	Adjustable up to –350 V unipolar or +/- 180V bipolar
• Excitation pulse width:	Up to 3µs, programmable in 12.5 ns steps
• EN 12668	Fully compliant -1 and -2
• Connectivity to factory computer network:	Via FTP client on Ethernet
• Weight	Processing module: 13.9 kg (w/o battery) Mechanical module: 6.5 kg

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