

GE
Measurement & Control

CHAT: Compact Hollow Axle Tester



Fast and accurate hollow axle inspection

High speed railway and urban train systems, equipped with hollow axles, are nowadays frequently used in the transportation industry. Because of increased speeds greater than 200 km/h and the consequent higher stresses on the systems, special attention has to be paid to the structural integrity and reliability of these trains. In particular, the hollow axles must be inspected periodically to prevent failure. Ultrasonic testing is the most commonly used technique to detect defects on outer surface via the longitudinal drilled bore inner surface, after careful cleaning to remove any dust, grease and metallic particle and make it in condition compatible with ultrasonic inspection.

The manual ultrasonic inspection of hollow axles with GE's well-known conventional angle beam HW probes has, for many years, been one of the market standards.

The newly developed Compact Hollow Axle Tester CHAT combines these proven HW probes with GE's high quality USIP 40 ultrasonic instrument. This integrated system brings a new level of inspection quality and performance to the rail industry.

The use of the new CHAT system allows a significant productivity increase compared with the manual inspection of hollow axles and allows recording of parts traceability.

With up to eight probes in a probe customizable set covering a diameter range from 30 to 90 millimeters (granting a ± 0.5 mm tolerance from nominal diameter), full A-scan data recording, C-scan displays (separate or merged with TOF correction), and two motorized scanning axes, CHAT offers a typical inspection time of 12 to 15 minutes for an entire axle.

The spiral scan pattern guarantees full coverage of the test object.

The arrangement of electronics and mechanics in a light-weight plastic trolley ensures fast and reliable, one-man inspection of hollow rail axles, and provides protection against electrocution in subways where electrified rails are present.





Fully equipped inspection system in a mobile trolley

CHAT, the modular designed system for mechanized inspections consists of the following elements:

- A Multi-Channel UT instrument type USIP 40 in 2, 5 or 10 channel configuration, according to the probe configuration and inspection procedure
- Software: intuitive, modern, fully integrated imaging software suite controlling the entire system
- Operating system: Windows 7™
- PLC to control and track the motorized axis and coupling system

- PC (Creation of inspection plan, data acquisition, signal display, post-processing and documentation)
- Coupling system consisting of oil tank, pumps and filter
- Motorized inspection mechanics for a repeatable inspection
- Interchangeable probe holder equipped with HW probes and quick connector
- UPS module for non-stop working
- Intuitive GUI with a probe and axle editor user-friendly tool for tailored inspection
- Dedicated post-processing software

HW Fix Probe holder hosts multiple probes in one housing

- Multiple choices available in diameter range from 30 to 90 millimeters (± 0.5 mm)
- Multiple configurations of transducers available for detection of transverse defects (typical: 38°, 70°, 45°)
- Can integrate special transducers for different defects type and coupling control
- The number of transducers relates directly to the number of channels of the UT instrument

The CHAT system key features are:

- Electronics and mechanics designed to cover the entire diameter range
- Rapid adaption to new diameters just by exchanging centering devices (3 parts in total)
- Motorized motion (closed control circuits) in linear direction and for probe holder rotation
- Signal connection through slip ring to allow continuous rotation of the probe holder and to reduce the inspection time
- Quick pluggable cable connections between trolley and inspection mechanics
- Light design of inspection mechanics that can be handled "just by one person" with no need for lifting
- Closed loop for oil coupling to minimize oil loss during the inspection
- Full post-processing possibilities thanks to A-scan recording





Technical Specifications – CHAT: Compact Hollow Axle Tester

Signal display	C-scan per transducer or merged from all transducers. A-scan recording of all transducers to hard drive possible.
Mechanics	Inspection mechanics provide an endless rotation of the probe holder, oil coupling closed loop system, modular push/pull U-profile to inspect the whole axle length just from one side.
Speed	Rotation: 35 RPM; Linear: $30^{mm}/s_{max}$ Position tracking with encoders on both axis.
Inspection length	2,4 m typical with connectable U-profiles, extensions available.
Inspection time	15 min typical, depending on UT setup.
Trolley	Moveable trolley carrying PC (notebook equipped with own battery), UT-Instrument, PLC, oil tank with pumps and storage space for inspection mechanics and U-profiles.
Weight	Inspection mechanics approx. 10 kg plus trolley approx. 90kg (without Oil, UPS, main power cable).
Electric	220-240V ~50Hz, 15 m mains cable at trolley. Optional: 10 min UPS (+13kg) to allow UT-Instrument and PLC stay online while changing main power plug connection.



Imagination at work

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