

ECHOGRAPH STPS PAUT

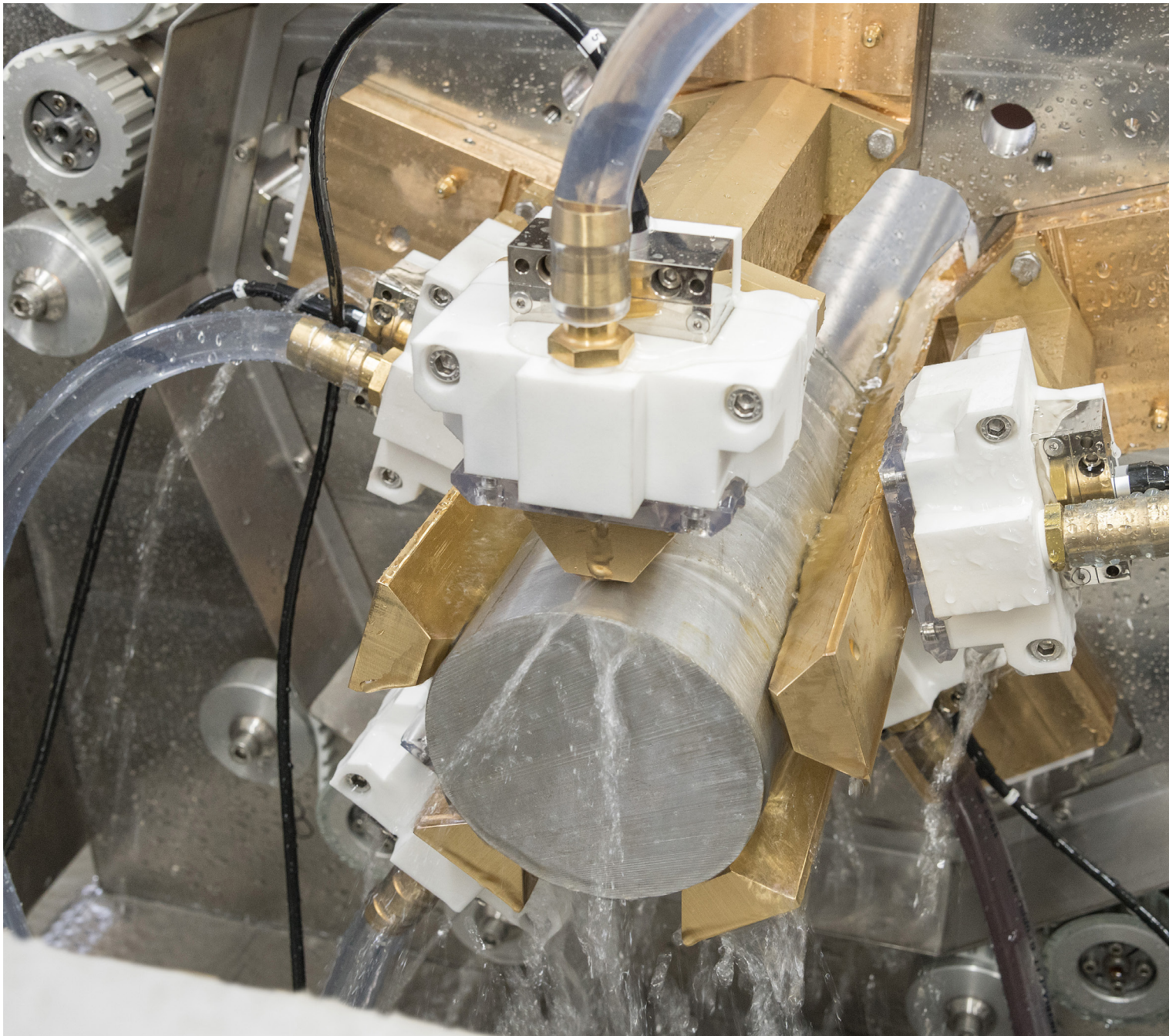
Phased Array Inspection of Bars



The KARL DEUTSCH laboratory for ultrasonic testing systems provides a roller conveyor and allows for trials in dynamic mode with realistic testing speeds – also on material provided by customers. Several reference bars of varying diameters are available. They contain artificial defects, which were produced and certified by the BAM Institute for Material Research and Testing in Berlin, Germany.

Specimens	
Round bars	
Material	steel hot rolled or cold drawn, aluminium extruded or cast, copper, brass, etc.
Diameter range (D)	16 to 130 mm (standard), option: from 8 mm up to 150 mm, various system set-ups are available
Length	min 2.5 m
Ovality	max. 2 % of D
Straightness deviation	max. 2 mm/m
Surface condition	black, bright, drawn or cast
Temperature	max. 60 °C
Bar ends	machined, no burr
Sensitivity	min. 0.7 – 2 mm FBH (dependent on diameter, surface, material, straightness)

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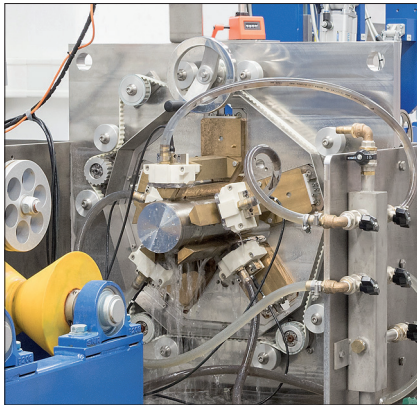


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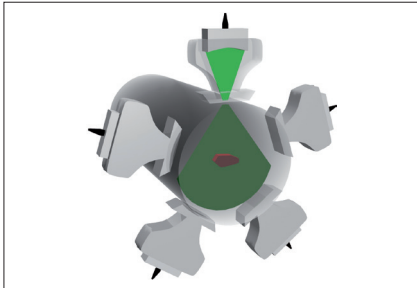
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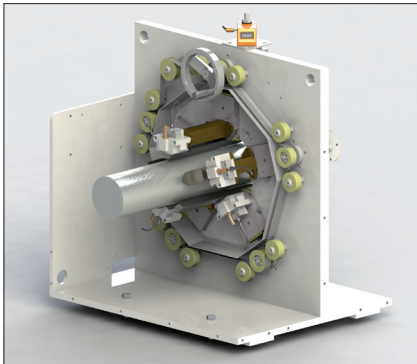
Phased Array Inspection of Bars



ECHOGRAPH STPS bar testing system



Testing principle (5 arrays): sector scan for each array



CAD drawing of a test mechanics: If the bar diameter varies, a central adjustment of the probe carriers enables short change-over times without changing parts within the diameter range.



ECHOVIEW GUI with strip charts and assigned event and coupling information

KARL DEUTSCH has developed ultrasonic testing equipment since 1951 and has shipped the first inspection system for automated billet inspection in 1965. Many improvements on the ECHOGRAPH electronics, the robust testing mechanics and the ultrasonic probes have led to our current state-of-the-art. KARL DEUTSCH maintains a strict quality management system according to DIN EN ISO 9001.

Key properties

The ECHOGRAPH-STPS bar inspection system features a high testing speed of up to 2 m/s and simultaneous and simple adjustment of the probe carriers, resulting in short change-over times.

Testing principle and UT coupling

The detection of internal flaws is carried out with straight beam shots, whereas surface-near flaws are detected with angle beam shots. The ultrasound is coupled via guided water jets (squirters) and permits test conditions comparable to immersion testing and short untested ends. The contact-free coupling ensures little probe wear, also in case of black bar testing. An image of a CIVA simulated insonification with 8 and 17 shots is shown at the bottom of the opposite page.

Probe configuration

Five phased array probes, which are equally spaced (72°) around the bar circumference, are employed for flaw detection. The probes generate sector scans with up to 20 shots and, in total, up to 120 parallel test channels are active. The sound fields of the five phased array probes provide multiple overlapping with 100% coverage of the complete cross section. The probe carriers are mechanically protected by guiding skids, which are also responsible for stable coupling and testing conditions by guiding the probe carriers along the bar surface. Unavoidable mechanical straightness tolerances are compensated for by the spring-loaded suspension of the probe carriers.

Mechanics

The testing mechanics is mounted on a height adjustable test table. A horizontal support (slid-

ing device) is mounted onto the test table and is used to move the test mechanics between test position (in-line) and calibration position (off-line). In off-line position, calibration and service work can be carried out without interfering with the ongoing production. Feeding of specimens is carried out by centric roller drivers (triple rollers are advisable, double rollers also possible). Normally, after testing, automated sorting of the tested bars (go and no-go sorting) is applied. The required mechanical conveyors are usually supplied by the customer to ensure smooth integration into the manufacturing process line.

ECHOGRAPH evaluation electronics

Evaluation of the ultrasonic signals is carried out with parallel phased array electronics, which is specially designed for automatic systems. Various flaw gates, amplitude thresholds, programmable time-corrected gain TCG (DAC) and multiple evaluation parameters are available. The electronics is mounted in a shielded and fully air-conditioned electronic cabinet (ELNS). A movable operating panel (BAG) that may be re-located next to the test mechanics is fitted with a 24"-monitor used for setting of the test parameters and for visual data display (i. a. for the indication of A-scans during calibration). Remote access of the electronics is provided by the diagnosis module.

ECHOVIEW data management software

This KARL DEUTSCH software package is designed for an industrial PC with a RAID managed HD system for highest data safety under Windows® 10. It documents, stores and processes the test parameters, test reports and results, and optionally supports communication with a remote host computer.

Optional accessories

- Light barrier for the generation of test enable signals
- Coupling agent filter system (KMA4)
- Marking device (FME) for true-to-position flaw location and/or go/no-go marking
- Optical/acoustical alarm unit (SGN)

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Typical layout for an ECHOGRAPH STPS PAUT bar testing system with roller conveyor, eddy current testing system and test table

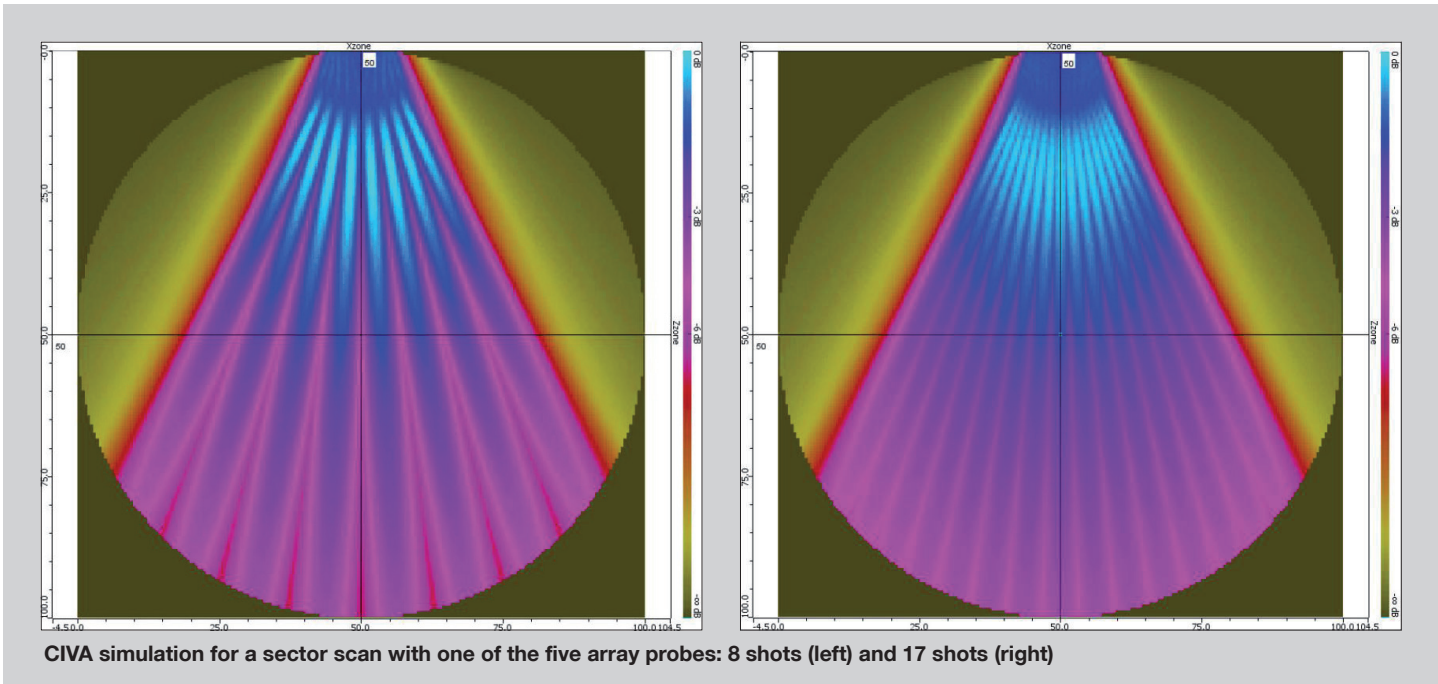
Please check our homepage www.karldeutsch.de for more information. In addition, KARL DEUTSCH hosts the YouTube channel "NDTChannel", where you can find numerous videos on our NDT instruments and testing systems including the ECHOGRAPH STPS system.



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CIVA simulation for a sector scan with one of the five array probes: 8 shots (left) and 17 shots (right)