

ECHOGRAPH-KNPS
Ultrasonic Inspection of Billets

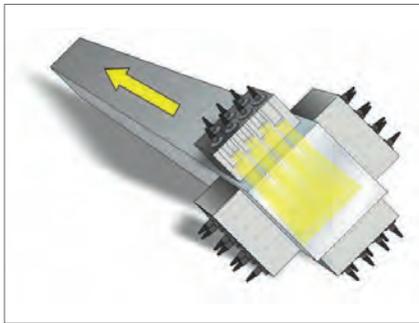
KARL DEUTSCH

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ECHOGRAPH-KNPS testing system



Testing principle for quadratric billets
(28 probes)

Ultrasonic Inspection of Billets

The inspection system for billets is capable of testing quadratric and round billets with the same mechanical setup. The number of probes and the shape of the probe holders are optimised with respect to billet geometry and inspection criteria.

KARL DEUTSCH has developed ultrasonic testing equipment since 1951 and shipped the first 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.

A key property of the billet inspection system (type ECHOGRAPH-KNPS) is the coupling technique. The coupling of the ultrasound is achieved with guided water jets (squitter technique) permitting almost wear-free probe holders and short change-over times for different billet diameters. The distance between probe and billet surface is in the order of several centimetres which leads to long-lasting probes. Instead of dual-element probes (used for gap coupling in older testing

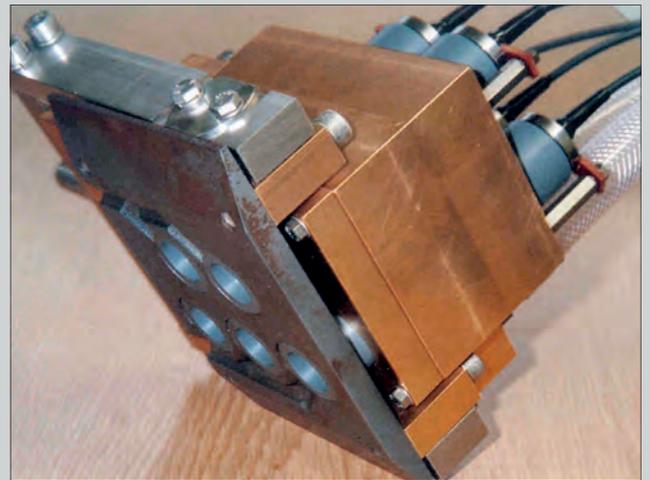
systems), immersion type probes with large bandwidth are used. In combination with the electronic distance amplitude correction (DAC) a constant testing sensitivity is produced for all flaw depths.

The ECHOGRAPH-KNPS testing mechanic is of robust design. The probe holders are guided along the profile by means of skids and rollers. Large straightness deviations and dimensional tolerances can be compensated with this setup. During standard system operation, the probe holders are pneumatically lowered and lifted for each specimen. The timing for lowering and lifting can be precisely adjusted in accordance with the position and speed measurement of the billets. Therefore, the mechanics are not harmed by protruding burrs or deformed specimen ends.

Round and quadratric profiles can be tested with the same testing system. The change-over is realised by quickly changing the probe holders.



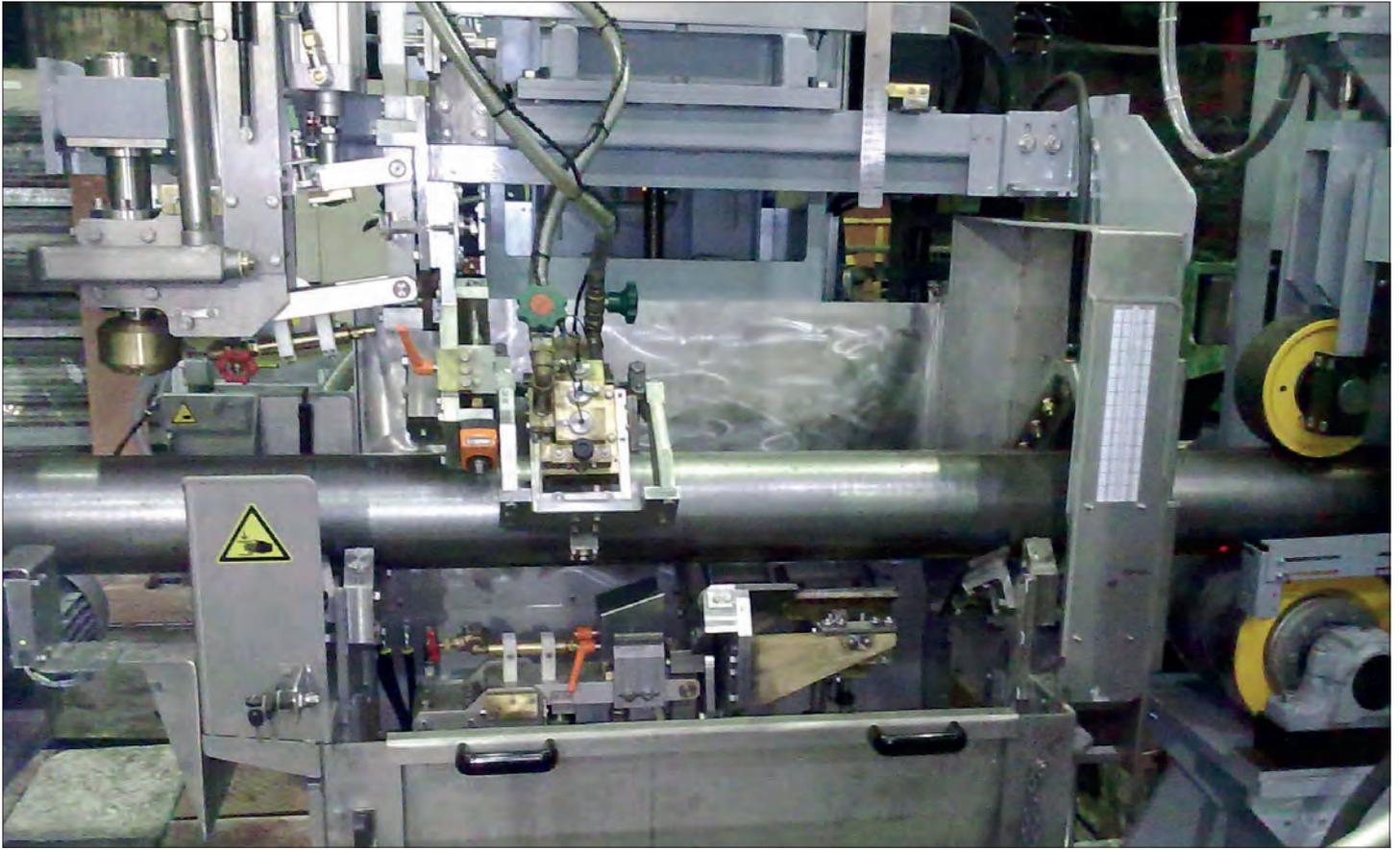
Four probe holders for quadratric billets, each carrier with seven probes and positioning from all four sides. The guidance is achieved by guiding rollers and hard metal skids.



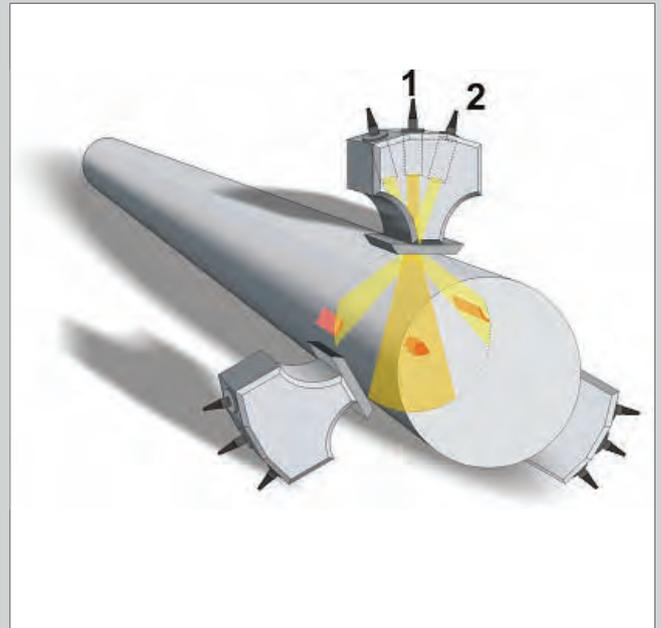
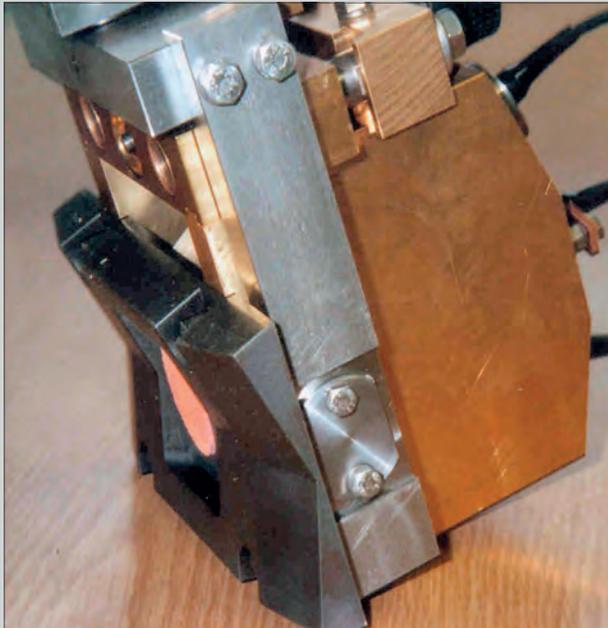
Probe holder for quadratric billets. Ultrasonic coupling is achieved by guided water jets (squitter technique).

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Test of round billets



Probe holder for round billets with one straight beam probe. Two optional probes are used for angular incidence.

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ECHOGRAPH-KNPS billet testing system: Light barriers check the billet position.

Specimens

Round (R) and Quadratic (Q) Billets

Material	ingots, continuous cast
Processing stage	rolled and straightened
Cross section D	50 - 250 mm
Length	> 3 m
Straightness deviation	max. 5 mm/m, max. 10 mm/100 mm at the ends
Surface condition	as rolled, no loose scale
Temperature	5 - 80 °C
Billet ends	cut or sawn, without protruding burr
Detectable flaws	internal flaws >1.5 FBH (dependent on D)
Ovality (R)	max. 2.5% of D
Edge radius (Q)	approx. 10% of D
Angle tolerance (Q)	90° ± 2°
Twist of profile (Q)	max. 2°/m
Amount of crown (Q)	max. 4 mm

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