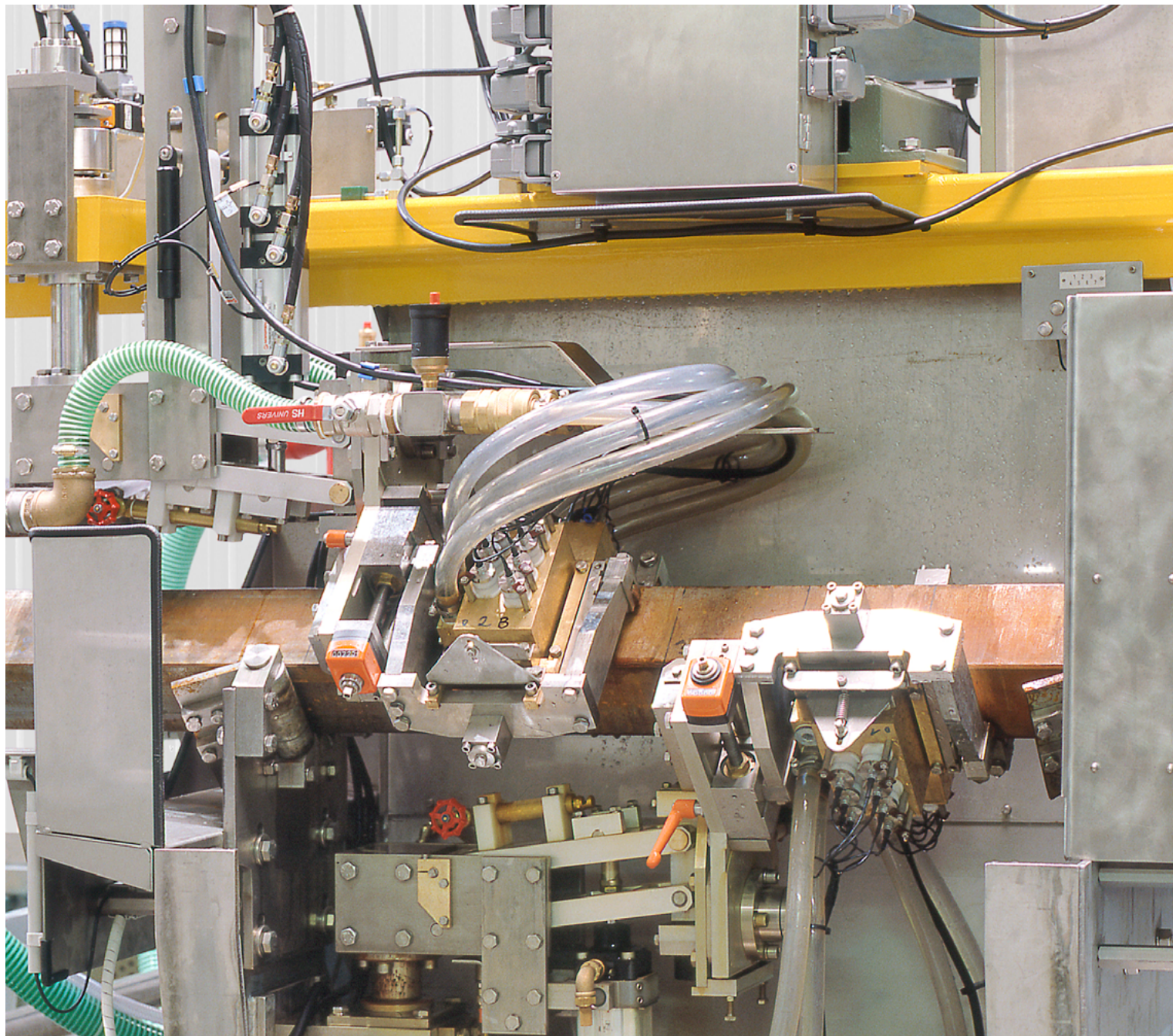




ECHOGRAPH KNPS
Ultrasonic Inspection of Billets

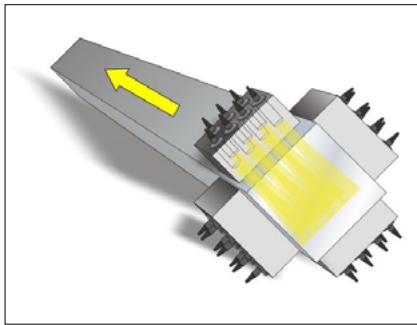
KARL DEUTSCH

ECHOGRAPH KNPS

Ultrasonic Inspection of Billets



ECHOGRAPH-KNPS testing system



Testing principle for quadratic billets (28 probes)

Ultrasonic Inspection of Billets

The inspection system for billets is capable to test quadratic and round billets with the same mechanical set-up. 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 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.

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), which allows 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

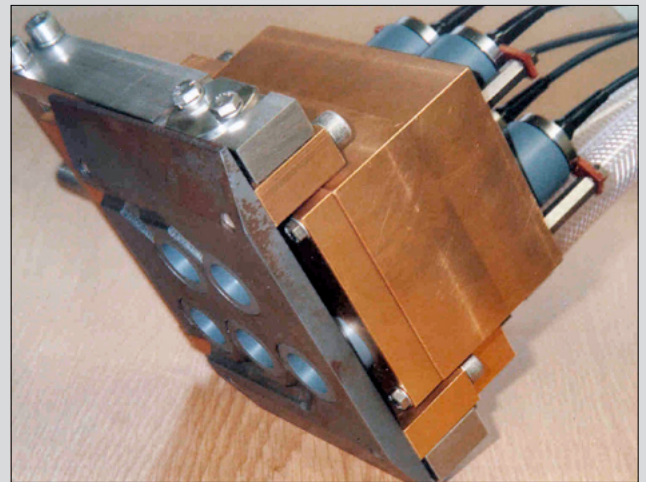
to long-lasting probes. Instead of dual-element probes (used for gap coupling in older testing systems), immersion type probes with large bandwidth are used. In combination with the electronic distance amplitude correction (DAC) a constant testing sensitivity is produced for all flaw depths.

The ECHOGRAPH KNPS testing mechanics 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 set-up. 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 to the position and speed measurement of the billets. Therefore, the mechanics are not harmed by protruding burrs or deformed specimen ends.

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



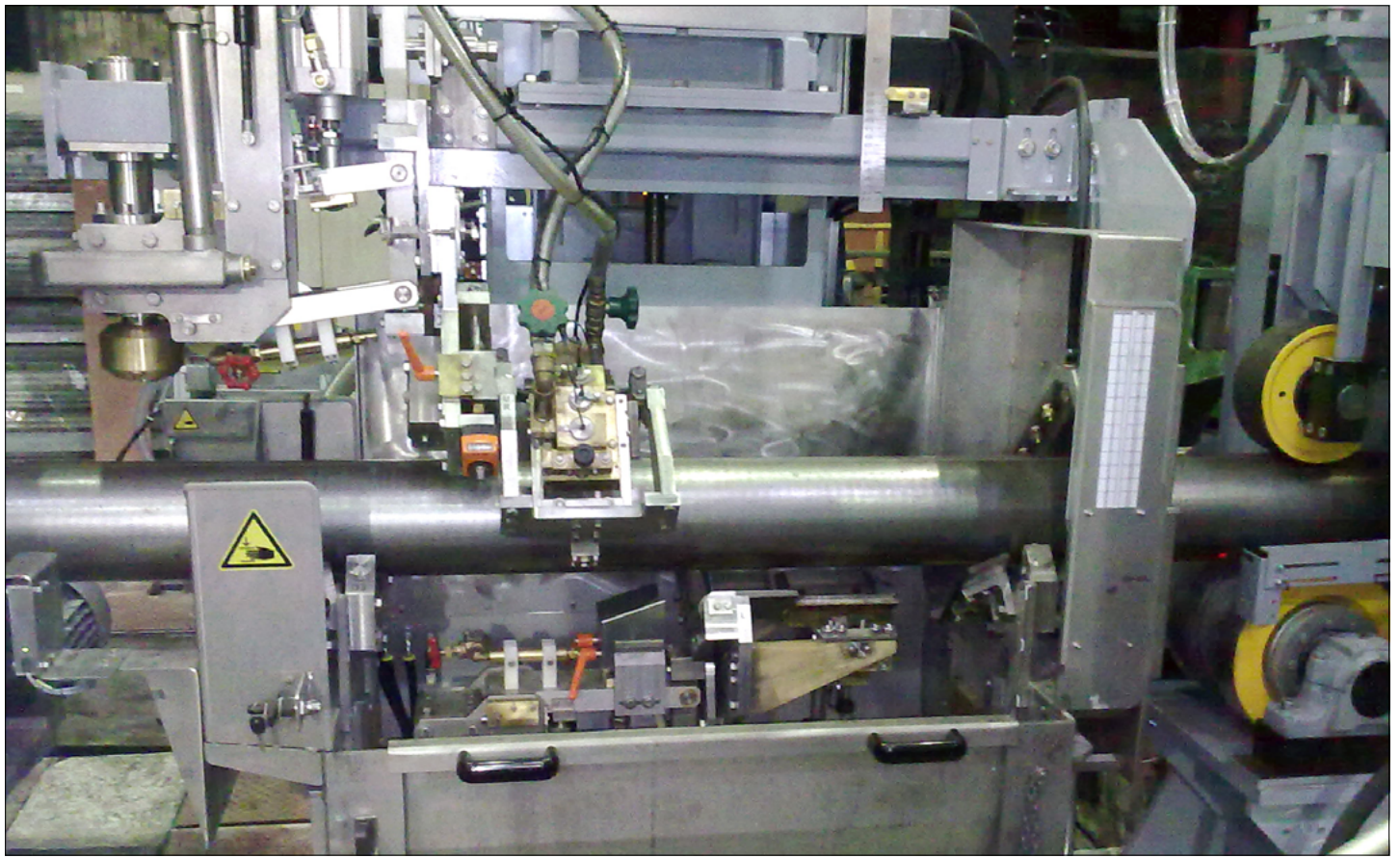
Four probe holders for quadratic billets, each carrier with seven probes and positioning from all four sides. The guidance is achieved by guiding rollers and hard-metal skids.



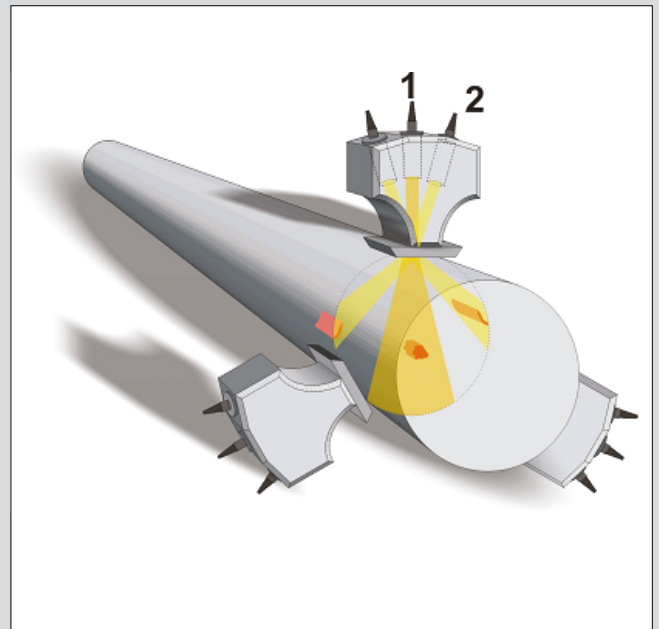
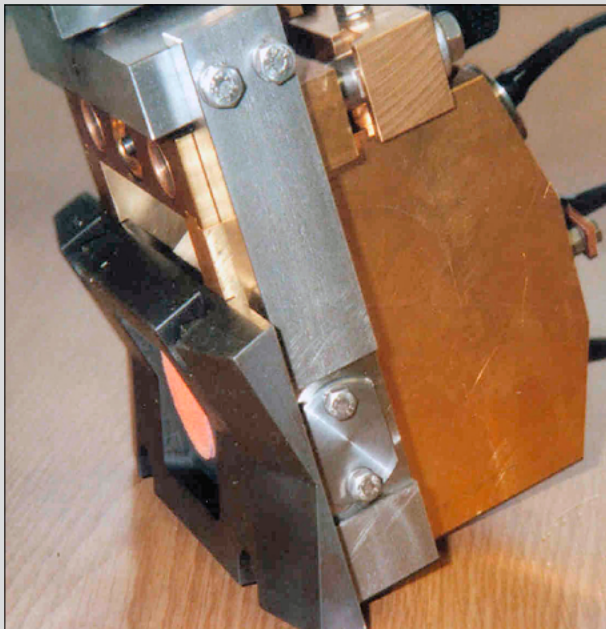
Probe holder for quadratic billets. The ultrasonic coupling is achieved by guided water jets (squitter technique).

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Ultrasonic Inspection of Billets



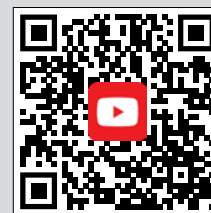
Test of round billets



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

ECHOGRAPH KNPS

Ultrasonic Inspection of Billets



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

ECHOGRAPH KNPS

Applications	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 diameter, material, surface)
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

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