

**ECHOGRAPH-KNPS**  
Ultrasonic Inspection of Billets

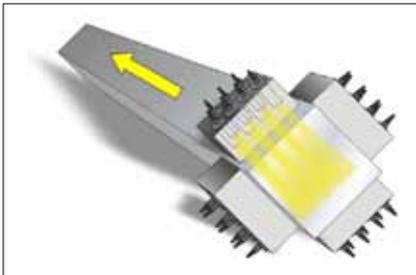
**KARL DEUTSCH**

# 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 9001:2000.

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 (squirter 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

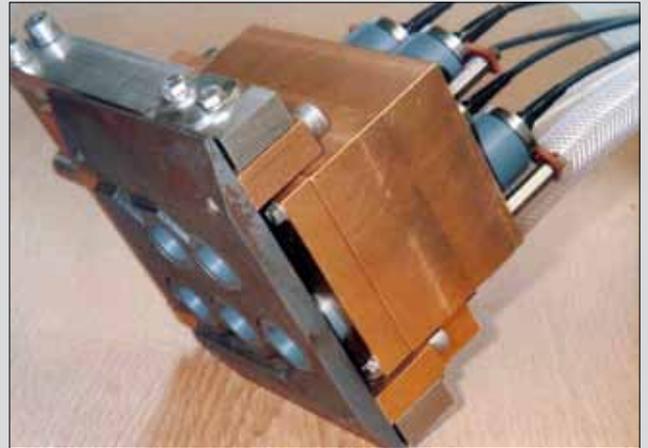
with large bandwidth are used. In combination with the electronic distance amplitude correction (DAC) a constant testing sensitivity is produced for all flaw depths.

The KNPS-Echograph 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 quadratic profiles can be tested with the same testing system. The change-over is realised by quickly changing the probe holders.



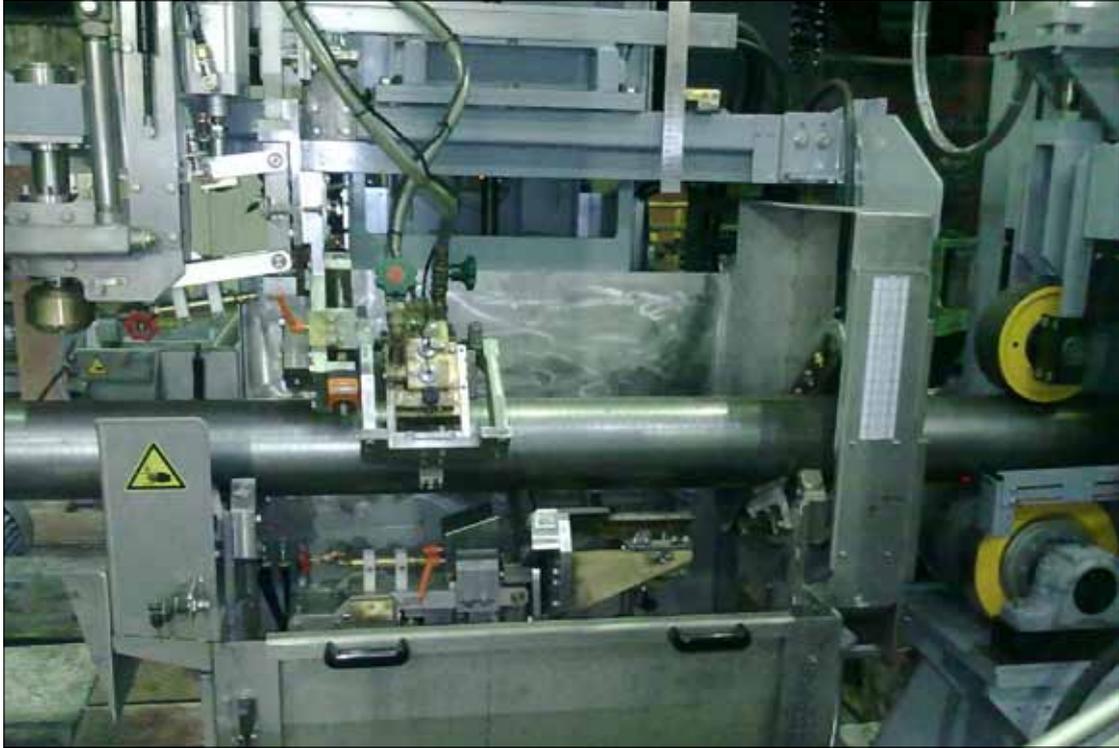
Four probe holders for quadratic billets, each carrier with seven probes and positioning from all four sides. The guidance is achieved by guiding rollers and hard-metal skids.



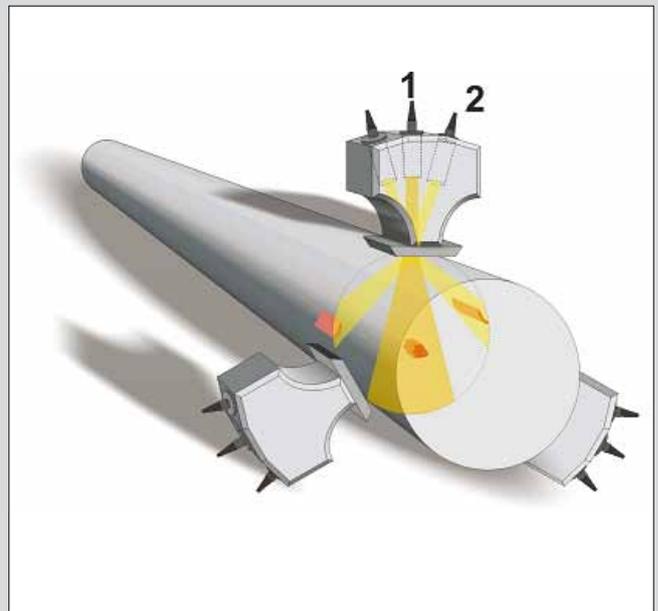
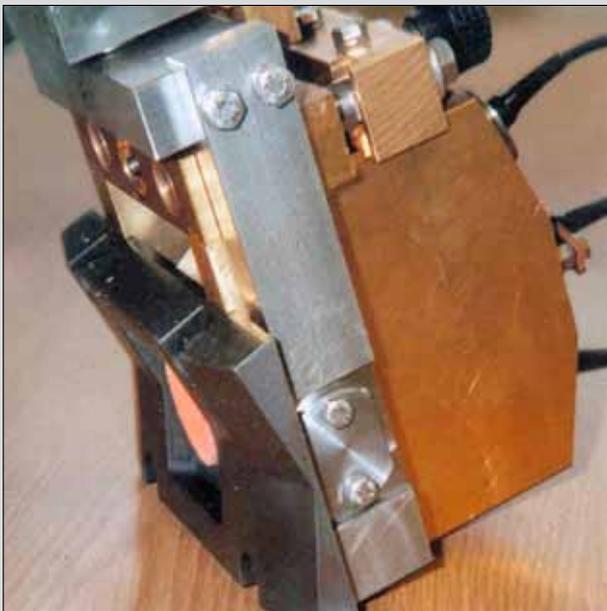
Probe holder for quadratic billets. The ultrasonic coupling is achieved by guided water jets (squirter technique).

# ECHOGRAPH-KNPS

## 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.

### Specimens

#### Round (R) and Quadratic (Q) Billets

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

**KARL DEUTSCH** Prüf- und Messgerätebau GmbH + Co KG

Otto-Hausmann-Ring 101 · 42115 Wuppertal · Germany

Phone (+49 -202) 7192-0 · Fax (+49 -202) 7149 32

info@karldeutsch.de · www.karldeutsch.de

DIN EN ISO  
9001:2000  
certified

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