



Flaw Detection in Friction Welds on Valve Shafts

Ultrasonic Application Solutions

Application

Figure 1 shows valves which are used in car engines (smaller valves) and in diesel engines of ships or locomotives (larger valves).

The friction welded valve shafts must be inspected. This applies to new valves and assembled valves, where only the top of the valve shaft is accessible.



Figure 1: Different types of valve shafts

Solution

Therefore, the European Solutions Center developed the probe K 5 KS1 (as an example) with direct coupling to the top of the valve shaft.

The probe's transducer element diameter is matched to the shaft's diameter. The acoustically absorbent protection layer (coupling membrane) reduces coupling deviations caused by standard hard-faced probes. The complete weld area is covered by guiding the sound beam into the valve shafts.

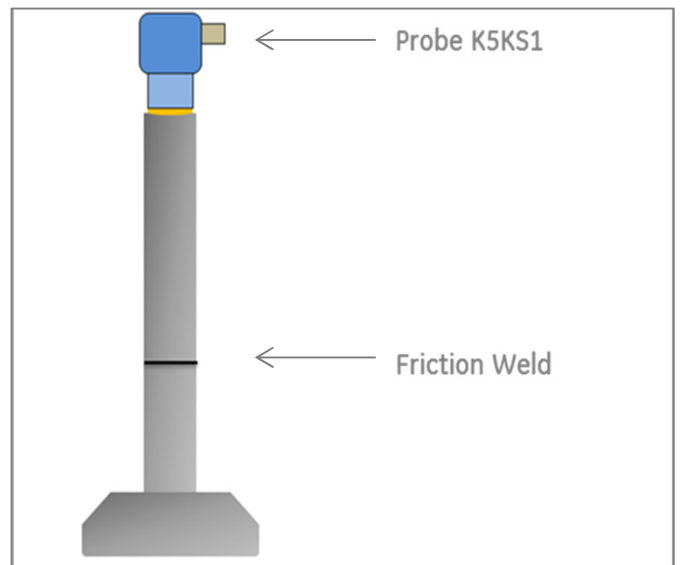


Figure 2: Measurement concept

Straight Beam Probe K 5 K S1

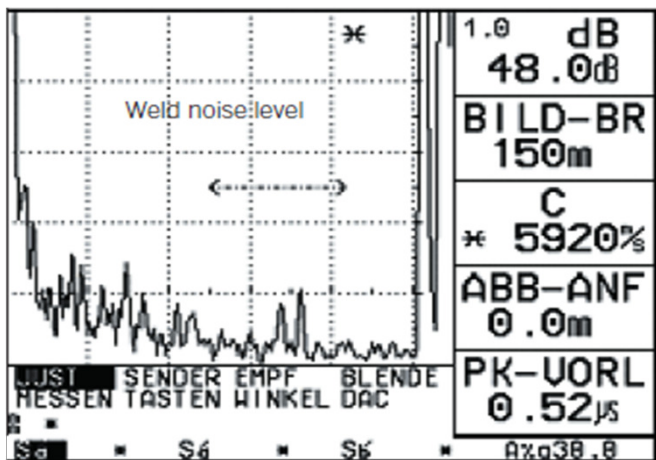


Figure 2: Noise from the weld, no defect

The coarse grain structure of the welded zone generates a noise level, see first picture on the left. Flaws, usually lack of fusion, are indicated by clear echoes, see 2nd and 3rd picture on the left. It is recommended that the test method is used due to its easy application and its clear indications in engine production and in-service checks.

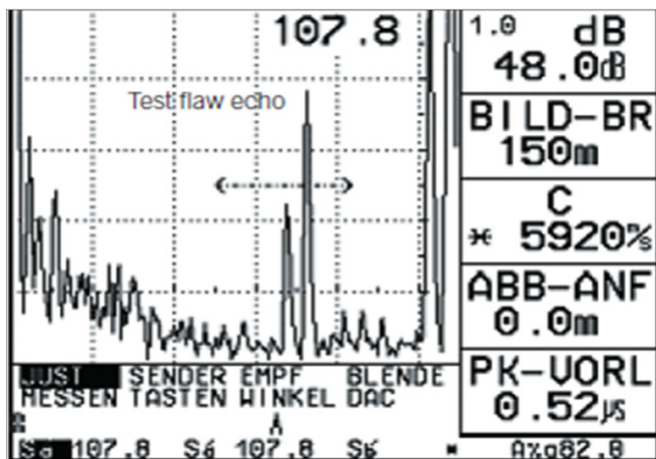


Figure 3: Echo from the defect, saw notch 0.2mm deep

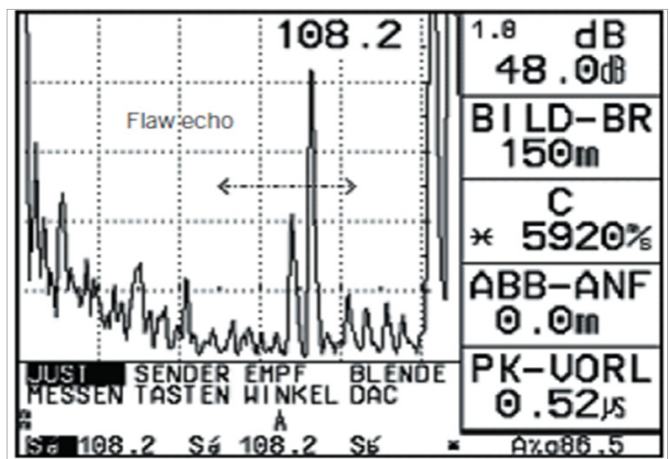


Figure 4: Echo from a natural bonding defect

General solution information

- Flaw Detector: USM 36
- Probe: K 5 KS1

Your benefits

- Ensure high quality
- Easy application
- Clear indications in engine production and in-service checks
- Save money by eliminating destructive testing and by improving your process

Part numbers			
USM 36	0037400	K5KS1	0067373