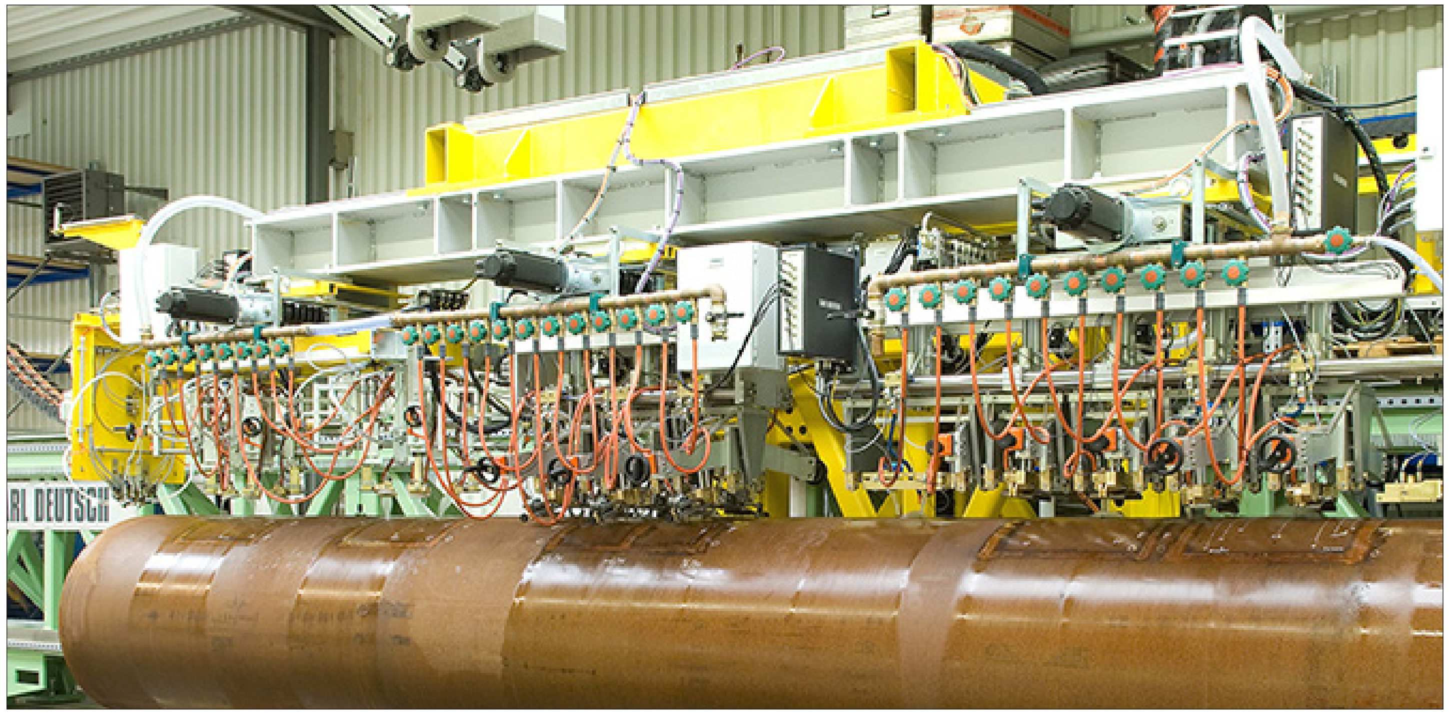
ECHOGRAPH SNUL
Ultrasonic Inspection of LSAW-Pipes



The highest possible throughput for the inspection of LSAW-pipes is achieved with a testing portal where the probes are linearly moved along the resting pipe. Compared to the conventional setup with a machine stand, no vibrations from the pipe transport are encountered. The testing speed can be up to 1 m/s. In this example three separate testing carriages were employed. The carriage positions (and therefore all ultrasonic probes) are kept centered with respect to the weld seam. The crown of the weld seam is automatically tracked by a camera and a corresponding seam tracking PLC.

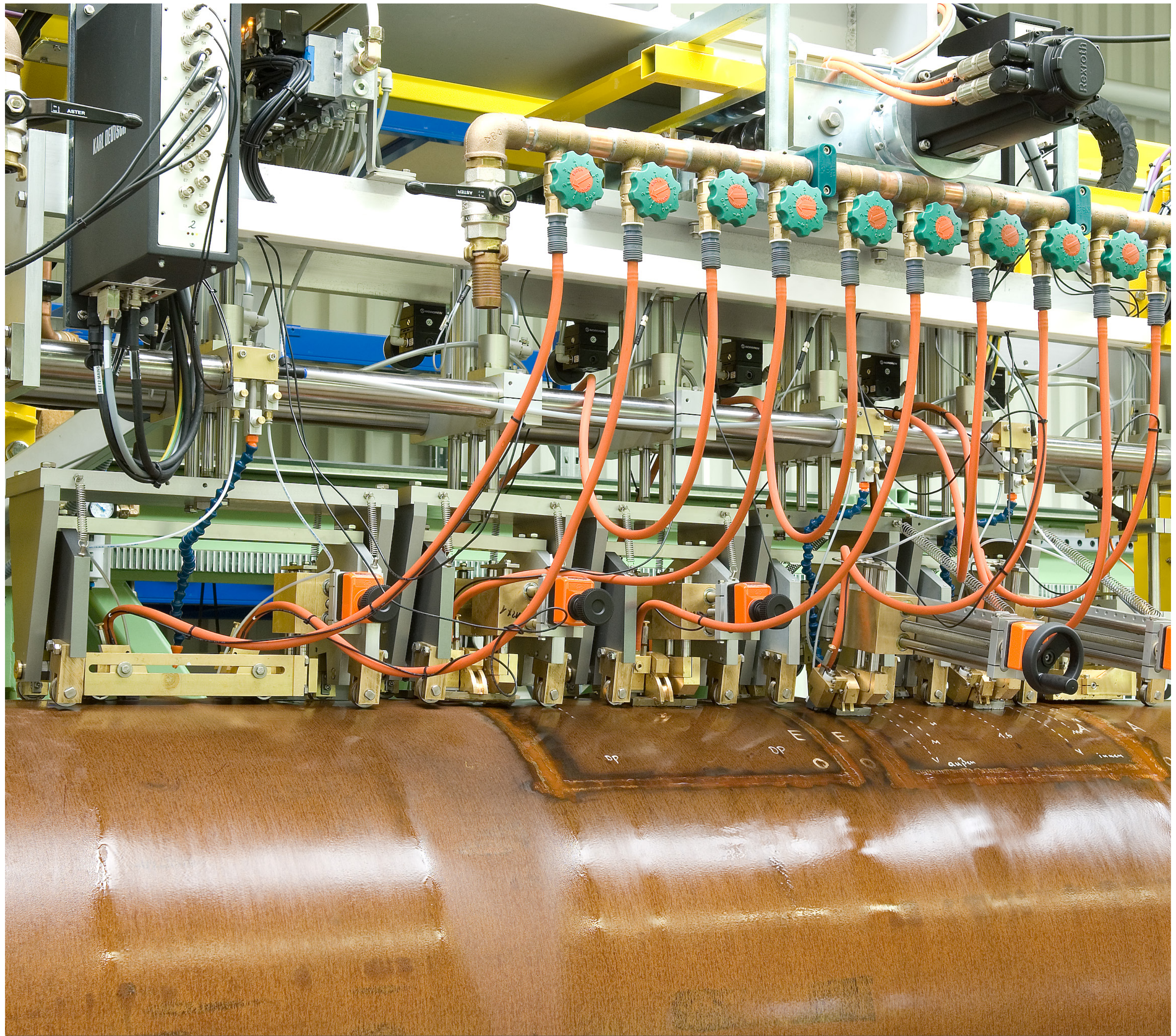
Specimens and typical project data	
SAW-tubes with longitudinal seam	
Material	hot rolled plates, formed (UOE or 3-roll bending) and welded
Diameter range (D)	400 – 3600 mm
Wall thickness (s)	4 – 70 mm
Length	6 – 18 mm
Straightness deviation	max. 2 mm/m
Ovality	max. 2 % of D
Width of weld seam	8 – 70 mm
Seam position	12-o'clock ± 100 mm
Detectable flaws	longitudinal and transverse defects in the weld laminations in the heat affected zone next to the weld

Leaflet P SNUL e June 2022 · Subject to change without notice

KARL DEUTSCH Pruef- und Messgeraetebau GmbH + Co KG
Otto-Hausmann-Ring 101 · 42115 Wuppertal · Germany
Phone +49 202 7192 0 · Fax +49 202 7192 123
info@karldeutsch.de · www.karldeutsch.de

DIN EN ISO 9001 certified

KARL DEUTSCH



ECHOGRAPH SNUL
Ultrasonic Inspection of LSAW-Pipes

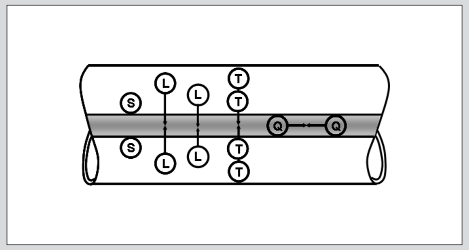
KARL DEUTSCH

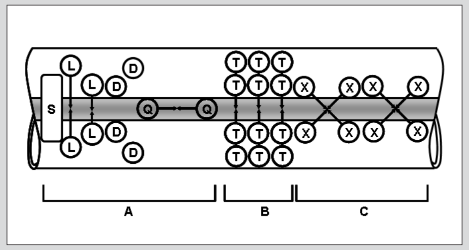
The testing mechanics with the probe holders is mounted to a stable machine stand. The ultrasonic probes are positioned near the weld seam in the 12 o'clock position and symmetrically to the weld seam. The height of the horizontal boom (in yellow) and the ultrasonic probes are pre-positioned in accordance with the pipe diameter.

Ultrasonic Inspection of LSAW-Pipes
KARL DEUTSCH has shipped the first inspection system for the inspection of SAW-pipes (submerged arc welded) 40 years ago. In this brochure, pipes with longitudinal seam are discussed (LSAW). Over the years, we have gained a lot of experience which has led to our current state-of-the-art.

Unique about our testing system is the way to couple the ultrasound into the specimen. Water jet coupling is used, which means that the water path between probe and tube surface is in the order of several centimetres. This method of ultrasonic coupling results in little wear for the probes and the probe guiding devices. Also, the angle adjustment is carried out within the probe holder – unlike with water gap coupling where the refraction angle is fixed within the ultrasonic probe. Also for a rough pipe surface, stable coupling conditions are achieved because the water path can vary more than with gap coupling. The technique of ultrasonic water jet coupling (squirter set-up) enables the positioning of the probes for on-bead transverse flaw detection directly on the weld. This results in a very high probability for detecting transverse defects because the probes are used in pulse-echo mode.

The ultrasonic probes are also KARL DEUTSCH products and are chosen in accordance with the application. For the system, immersion type probes with normal sound transmission are used. The probes are mounted into probe carriers with a water nozzle for guiding the water jet. For the weld inspection, angled transmission of ultrasound is required and is dependent on the respective wall thickness and tube diameter. The angle of the water jet (and therefore the incidence angle of ultrasound) can be infinitely variable and is precisely adjustable for all probes. The probe carriers are guided along the tube surface. The guiding elements (skids, shoes, rollers) and the probes do not have to be changed for varying tube diameter due to the coupling technique. This results in short change-over times and a long-lasting mechanical set-up.



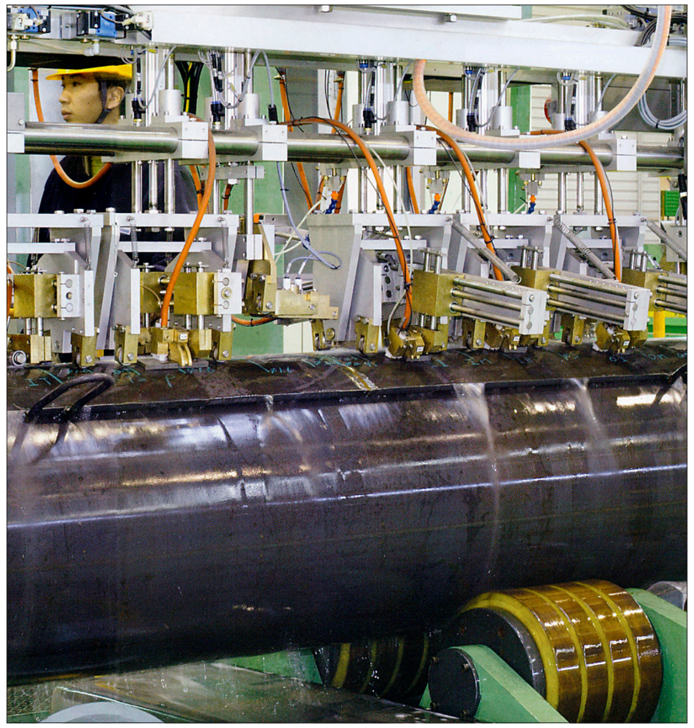


Typical testing tasks for LSAW-pipe inspection:

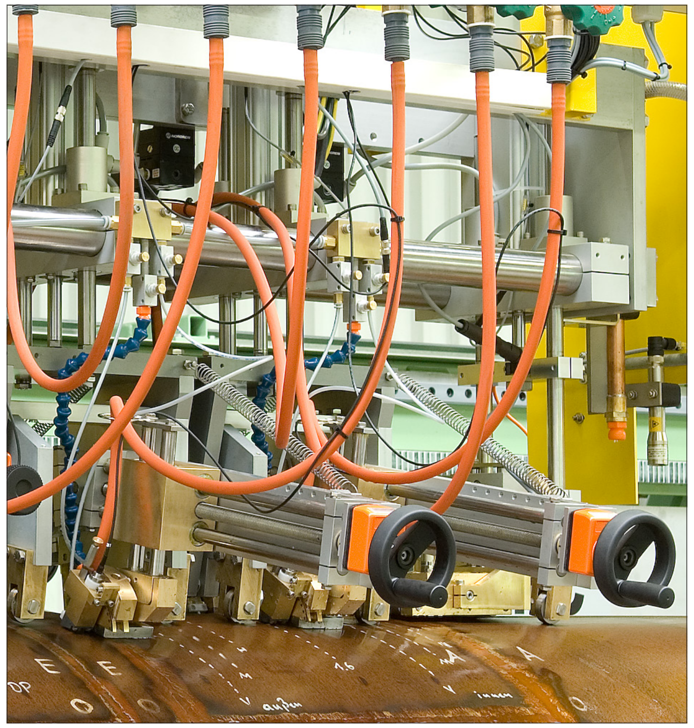
L = detection of longitudinal defects
T = detection of longitudinal defects with the tandem technique (for heavy wall thickness, SHELL specification)
Q = on-bead detection of transverse defects
D = detection of laminations in the heat-affected zone
X = off-bead detection of transverse / oblique defects
S = automated seam tracking device
PE = pipe end testing can be carried out in the same system (not shown) or in a separate testing system (ECHOGRAPH-REPS)

In dependence of the number of probes, more than one testing carriage is used (e.g. 3 carriages A B C in lower example).

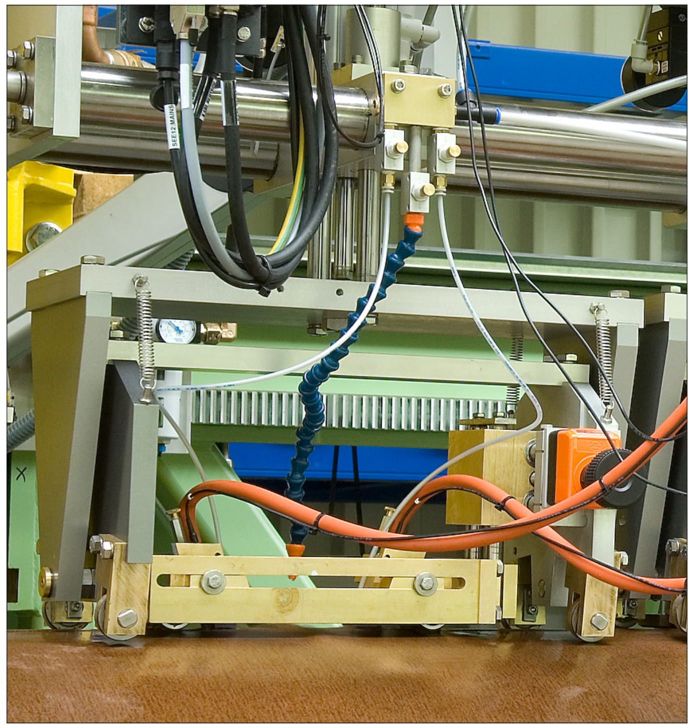
ECHOGRAPH SNUL
Ultrasonic Inspection of LSAW-Pipes



Probe holders of weld testing system on pipe segment for system calibration (photo courtesy of EEW-Korea)



Probe holders for the detection of longitudinal defects: Spindles with position gauges are used to adjust the distance between the probes and the weld seam.



Probe holders for the on-bead detection of transverse defects: Water jet coupling enables the positioning of the probes directly on the weld crown.

Upon customer request one (or all) test functions can also be implemented using the phased array technique (picture courtesy of EEW-Germany).