

KD-INFO

Edition 2022

ECHOGRAPH: Phased Array Probes for Bar Testing

Mobile UV-LED Lamp: Successful Cooperation in Product Development

DEUTROFLUX UMT: State-of-the-Art Magnetic Particle Testing System



**Mercedes-Benz:
Ultrasonic Measurement
for Transmission Oil Level**

ECHOMETER 1077

KARL DEUTSCH

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Cover: Ultrasonic-based measurement of the transmission oil level at the oil pan of a Mercedes-Benz vehicle with the new ECHOMETER oil level gauge

Editorial

Dear customers, partners and friends!

The world keeps moving. COVID-19 is slowly releasing the world from its grip and now the next challenges are already coming: The difficult global procurement situation will be with us for a long time – not least because of the war in Eastern Europe. This applies to chips, which we use in mobile testing equipment, chemical raw materials for crack detection agents as well as control and drive components for special machine construction. With a very good order situation, adherence to delivery dates and pricing now require a lot of “imagination” and clairvoyant abilities. Fortunately, we always have a high level of stock, which secures the production of standard products. Concerning the construction of special machines, we have to hope for the understanding of our customers, who usually have the same problems.

In product development, we break new ground: Together with MR Chemie from the German town of Unna, we are introducing a new mobile UV-LED lamp that perfectly meets current market require-

ments. MR Chemie manufactures many products as our market companion, but mindset and quality standards fit well together. The local proximity between Wuppertal and Unna also helps with joint development.

Moreover, the climate remains a challenge. Recently, our Works 1 „lost“ its building roof in a storm. Even Obelix said that the worst thing is „that the sky may fall on our heads“. We are confident that we will soon have overcome our „roof damage“, also thanks to good insurance.

On pages 26 and 27 you will see that KARL DEUTSCH is reorganising its personnel for the future.

In this spirit we hope: Stay with us (while some of our competitors continue to swap company names and personnel),

Yours

**Dipl.-Ing. Dietger Schäle and
Dr. (USA) Wolfram A. Karl Deutsch**



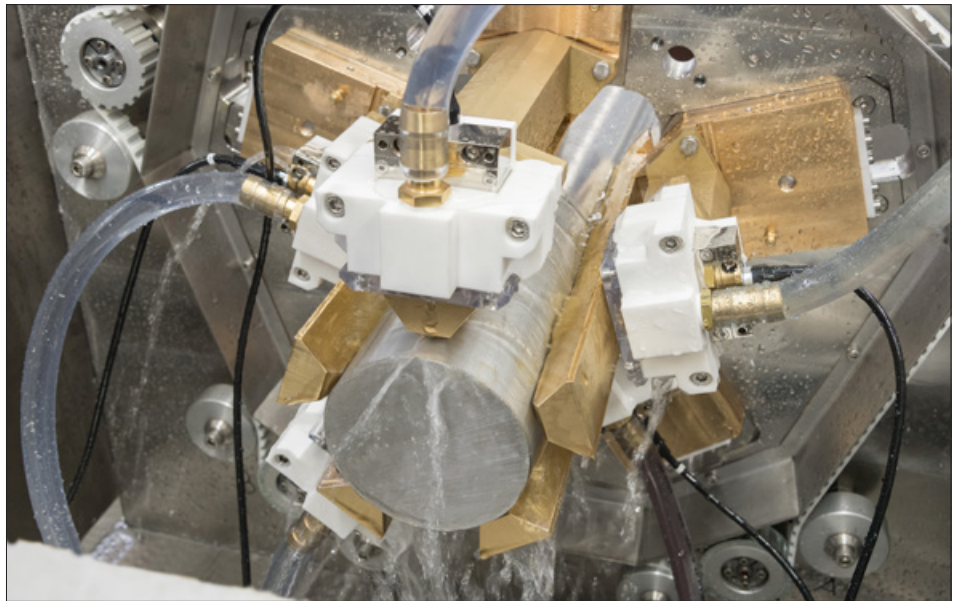
Dr. (USA) Wolfram A. Karl Deutsch (President, left) and
Dipl.-Ing. Dietger Schäle (Managing Director)

ECHOGRAPH STPS PAUT: Phased Array Bar Testing System

The ECHOGRAPH STPS PAUT Bar Testing System features a high testing speed of up to 2 m/s and an easy adjustment of the probe carriers.

The detection of internal defects is done by straight beam shots, while defects close to the surface are detected with angle shots. The ultrasound is coupled via guided water jets (squirters) and enables inspection conditions that are similar to immersion testing with short uninspected ends.

Non-contact coupling ensures low probe wear, even when testing black bars. Five phased array probes, equally spaced (72°) around the bar circumference, are used for defect detection. The probes generate sector scans with up to 20 shots. In total, up to 120 parallel inspection channels are used. The sound fields of the five phased array probes provide multiple overlap with 100 % coverage of the entire cross-section. The probe carriers are mechanically pro-



ECHOGRAPH STPS PAUT Bar Testing System

tected by skids, which also ensure stable coupling and test conditions by guiding the probe carriers along the bar surface. Unavoidable mechanical straightness tolerances of the bars are compensated by the spring-loaded suspension of the probe carriers.

The test mechanism is mounted on a height-adjustable test table. The horizontal sliding device on the test table is used to move the test mechanics between the test position (in-line) and the calibration position (off-line). In the off-line position, calibration and service work can be carried out without disturbing the ongoing production. The specimens are fed in via centric roller drives.

After examination, the tested bars are usually sorted automatically (GO and NO GO). In most cases, the necessary mechanical conveyors are provided by the customer to ensure smooth integration into the production line. **WD**



The KARL DEUTSCH laboratory for ultrasonic testing systems with conveyor enables tests in dynamic operation with realistic testing speeds, also on customer-specific material. Several reference bars with different diameters are available. They contain artificial defects manufactured and certified by the BAM Institute for Materials Research and Testing in Berlin.



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Products » Ultrasonic
Testing Systems » Bars /
Phased Array (STPS PAUT)

ECHOGRAPH RPTR PAUT: Phased Array Testing Bridge for Seamless Pipes

A robust ultrasonic testing bridge ECHOGRAPH RPTR PAUT was developed for our customer ARTROM for full volume and extended oblique flaw detection using ECHOGRAPH phased array electronics.

After successful pre-acceptance last summer, the testing system was delivered to Romania. After completion of the foundation in September 2021, installation took place at the customer's site and was completed on schedule. Special attention had to be paid to the alignment of the test bridge and the rotary roller stations to each other. Any inaccuracy could otherwise limit the ultrasound performance. After alignment, the individual rotary roller stations, the pipe stopper and the supports of the bridge were grouted.

Afterwards, the electrical and electronic components were connected and extensively tested. The objective was to achieve a high degree of automation for the entire system, including automatic transfer of the pipe parameters and individual pipe traceability, as well as an optimised test cycle time in conjunction with the infeed

and outfeed conveyors.

Currently, the customer is being trained on the advanced testing system and preparations are being made for the acceptance tests. In May, the first customer orders are to be run with the new testing system.

The advanced ECHOGRAPH RPTR PAUT system meets the most demanding requirements for volume and surface inspection of seamless pipes. Current and ambitious industry standards, such as API-5CT/-5L, are covered as well as the more demanding inspection requirements for complete de-



Laser technique and justify lines are used to check the alignment of the test bridge to the turntable stations.

tection of oblique defects up to 75° in thick-walled tubes. A new probe holder design for quick coupling and extended



Preparation of grouting activities for the aligned rotary roller stations together with the pipe stopper and the testing bridge



Optimistic faces during commissioning: Dipl.-Ing. Jörn Bolten, Dipl.-Ing. Holger Harmuth and Dipl.-Ing. Raimund Zeman (l.t.r.)

inspection modes, such as parallel shots, enables maximum productivity. The key features of the ECHOGRAPH RPTR PAUT system are:

- Inspection tasks: Detection of longitudinal, transverse and oblique defects (orientation between 0° and 75°) on the external and internal pipe wall as well

as wall thickness deviations and volume defects in seamless pipes with normal and large wall thicknesses up to 60 mm.

- Robust and reliable design, suitable for harsh steel mill environments. Very short coupling times by using a novel and advanced probe holder concept.

- Designed to achieve the highest productivity when testing seamless pipes with straight and uncut pipe ends.

- State-of-the-art ECHOGRAPH PAUT test electronics with 944 parallel phased array channels for the application of advanced test techniques such as parallel firing of the probes and parallel evaluation of multiple reception angles.

- ECHOVIEW software for fast data evaluation and management, and communication with the data processing and pipe tracking system of the client.

- Fulfilment of the testing requirements of the highest standards in the oil and gas industry such as API-5CT, API-5L, Chevron, etc. **BJ**



Function and application tests with pipes of the client's new production line



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Testing Portal (RPTR)

ECHOGRAPH 1095: Ideas and Expertise in Steel

“Ideas and Expertise in Steel” – that is the motto of STAHLBAU RAULF GmbH from the German town of Duisburg. To live up to this motto, ultrasonic testing is now carried out with an ECHOGRAPH 1095.

STAHLBAU RAULF stands for innovative steel and metal construction. The company was founded in 1929 by Robert Raulf. Today, STAHLBAU RAULF GmbH employs 30 people and deals with the production and maintenance of steel and steel composite bridges. For this purpose – in addition to a production area of over 3500 m² – all the necessary operating equipment is available: from CNC-controlled sheet metal processing to equipment for welding of bridge components up to 48 m long. Experienced engineers work at the in-house technical office.



Buchenbach railway bridge in the German town of Backnang



Pedestrian bridge crossing the Urfsee lake in the Eifel National Park



Lifting of the Buchenbach railway bridge with a weight of approx. 190 tonnes



Grimmbergsichel pedestrian and cycle bridge in Gelsenkirchen crossing the Rhine-Herne Canal

In order to be able to respond more flexibly to the production processes, STAHLBAU RAULF decided to perform the ultrasonic testing in-house. They chose the ECHOGRAPH 1095 ultrasonic flaw detector from KARL DEUTSCH because it has a very clear and easy-to-understand operating concept.

“Made in Germany” and a fast and good service round off the overall package. **En**



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Flaw Detectors »
ECHOGRAPH 1095

ECHOGRAPH 1095: DGS Testing with TR Probes

The ECHOGRAPH 1095 offers a variety of advanced testing options such as the DGS method with TR probes to determine equivalent reflector sizes.

In addition to the generally valid DGS diagrams for straight and angle beam probes, the ECHOGRAPH 1095 also provides special DGS diagrams for a defect size determination with TR probes. A combination with other test methods, such as backwall echo drop, is possible. The very fast gain change during backwall echo drop enables DGS flaw size determination up to 0.1 mm in front of the backwall echo. Age-related wear of the probe wedge can be compensated for by a wiz-

ard-supported delay line adjustment.

Pre-adjusted probes can be stored with their serial number in a probe database.

By selecting a probe from the database, the data determined by the last delay line adjustment is automatically reused. **Gd**



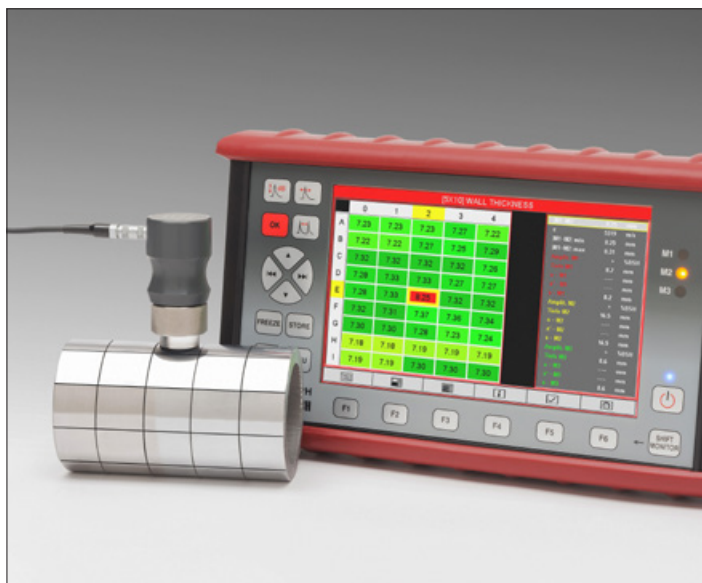
DGS-test via TR-probe with active backwall echo drop



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Flaw Detectors »
ECHOGRAPH 1095

ECHOGRAPH 1095: Matrix Memory

In combination with the wall thickness measurement, the matrix memory is an ideal supplement for a corrosion test.



Evaluation of the wall thickness of a test piece in the matrix memory

The matrix memory can also display asymmetrical measurement series, e.g. different levels with different measuring positions. The individual measuring points are evaluated in colour and a comprehensive evaluation, such as standard deviation, mean value, maximum and minimum value, are visible directly on the ECHOGRAPH 1095 screen. Optionally, each A-scan of the measurement series can be saved and faulty measurements can be overwritten or

deleted. Another advantage is the possibility to save templates to repeat standard measurements easily and quickly. In addition to wall thicknesses, amplitudes and transit times of all three gates can be recorded.

Changing the evaluation, e.g. to amplitude evaluation, is possible even after the measurement series has been completed. The matrix memory can be used as a helpful supplement wherever a fast evaluation of measurement series with runtime, amplitude or wall thickness is required. **Gd**



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Flaw Detectors »
ECHOGRAPH 1095

ECHOGRAPH 1095: SCHMEES Examines with KARL DEUTSCH Flaw Detector

SCHMEES CAST GmbH is a medium-sized, family-run company and proud of its knowledge, which has grown over generations. SCHMEES stands for sustainable product quality, competent and outstanding service.

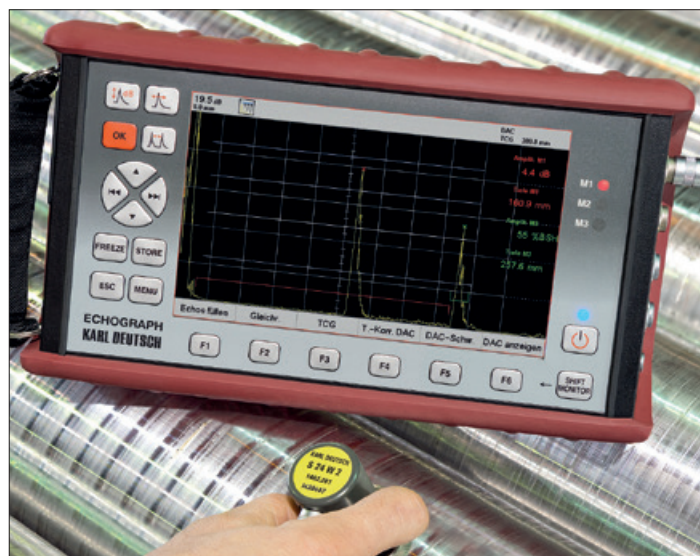
At the Langenfeld and Pirna sites, 1,200 tonnes of stainless steel are processed annually into high-quality machine elements, with the focus on high-alloy cast steel grades.

The clearly structured processes and experience in the company enable continuous product quality and adherence to delivery dates. The further development of technologies, the streamlining of processes, the efficient consumption of raw materials and resources and the retention of employees have top priority in order to remain com-

petitive in the long term.

In order to achieve these goals, mobile ultrasonic testing has been expanded at the Langenfeld site and investment has been made in an ECHOGRAPH 1095 from KARL DEUTSCH.

KARL DEUTSCH wishes you a successful working time supported by the new ECHOGRAPH 1095 and look forward to a continued good cooperation with the SCHMEES company. **En**



New at SCHMEES: UT testing with the ECHOGRAPH 1095



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Flaw Detectors »
ECHOGRAPH 1095

ECHOGRAPH: Repair of Ultrasonic Probes



Many of our long-term customers appreciate the repair service of ECHOGRAPH probes, because KARL DEUTSCH also works at the highest quality level and in compliance with "Made in Germany" standards when it comes to repairs.

At first, specially trained personnel at Wuppertal carry out a free inspection. The customer then receives a message regarding the condition of the probes and, if necessary, a cost estimate for the repair. If this is not economical, a new probe from our current product range will be offered as an alternative. In many cases, however, the original function can be restored by repairing damaged contact surfaces or replacing a defective connector. This service offer provides benefits for

all parties involved: As a company with a high level of innovation, we at KARL DEUTSCH have a strong interest in working closely with our customers to continuously improve our products. For our customers, the increased product life offers the opportunity to save costs and at the same time a joint contribution is made to more sustainability. **Sj**



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Products »
UT Probes

ECHOGRAPH: Phased Array Probes for Bar Testing

Phased array inspection systems have been in use for rapid bar inspection for over 20 years. The bars are transported linearly through a closed ring of curved phased array probes. Coupling is done using local immersion technology. The probes must be matched to the diameter of the bars and must be exchanged in case of major dimensional changes.

Nowadays, this inspection concept is very widespread due to the advantages provided by phased array technology, although it comes with a high number of channels and, above all, high probe costs. Depending on the diameter and manufacturer, four to twelve phased array probes are used per dimensional range.

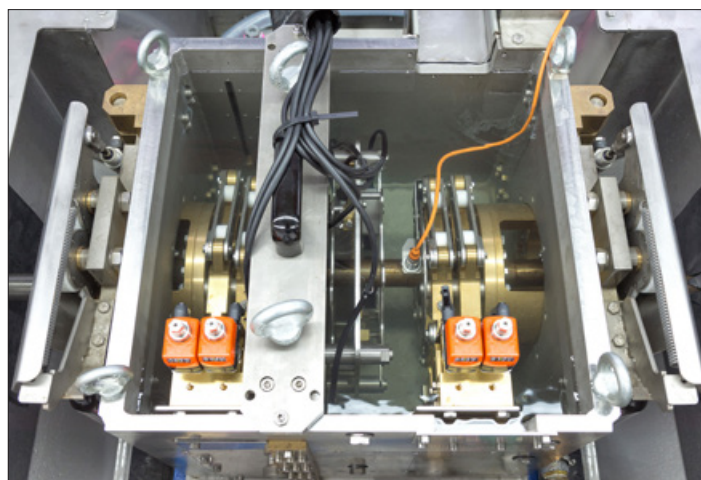
For bar diameters from 20 mm to 130 mm, two probe rings with four to six probes respectively are usually used – i.e. 10 probes in total, requiring more than 700 test channels! The probes each contain between 100 and 128 elements with a pitch between 0.5 mm and 1.2 mm.

Current standards require that the probe is replaced when several adjacent elements have failed. Proper maintenance (incl. cleaning) of the test equipment and the surface condition of the bars (black or bright) have a decisive influence on the service life of the probes.

For some years now, KARL DEUTSCH has been able to manufacture such sensors completely at our headquarters in Wuppertal, and also to supply replacement probes for systems of the common competitors. The radii of curvature range from 35 mm to 235 mm, in special cases even larger. The test frequencies are between 4 MHz and 10 MHz. Common connector types are Hypertronics, I-PEX and Tyco.



ECHOGRAPH HRPS PAUT bar testing system in the KARL DEUTSCH test laboratory – ready for use at any time for customer-specific trials!



View into the water tank with inserts (cassettes) on which the probes are mounted in a ring around the bar (see the black cables). Additional waterproof guide triples are mounted in the test tank, which are adjusted to the bar diameter with the orange dial gauges and ensure precise, centric guidance of the bars.



Examples of phased array probes for bar testing, manufactured with up to 128 elements in various radii of curvature and test frequencies

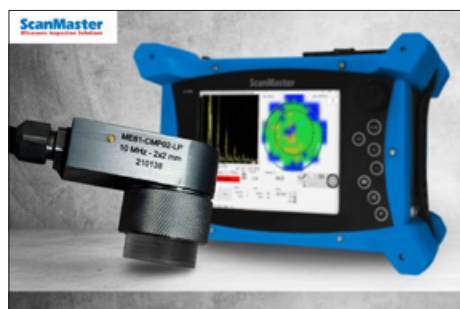


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Products »
UT Probes

ScanMaster UT/X: Measuring Large Spotweld Diameters

In contrast to spot weld inspection by means of conventional ultrasound, the phased array based UT/X not only allows different-sized spots to be inspected but also measurement with a single probe.

With conventional testing, a nominal welding lens diameter is compared with the defined sonic beam diameter of the probe.



Phased array probe for UT/X with larger diameter (16 mm)

Different probes must be used for different lens diameters. Measurement of the spot does not take place.

With PA-based testing, 61 elements are arranged in the probe in the form of a matrix, allowing to measure spotwelds with a diameter of up to 9 mm.

For many aluminium sheet joints, weld spots with considerably larger diameters also occur. A probe with larger individual elements and a diameter of 16 mm was developed for this purpose. Of course, either a fixed delay line (Plexiglas) or a flexible coupling surface (membrane with water column) can be used. **Ki**



Comparison of both available probes: on the left for a diameter up to 16 mm, on the right for a diameter up to 9 mm

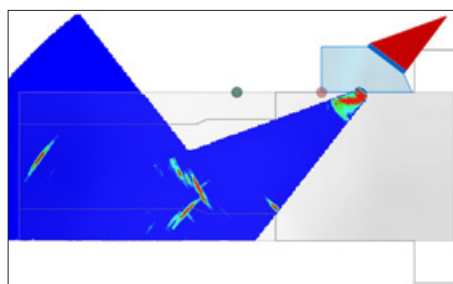


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Spot Weld Testing

GEKKO and MANTIS: Storage of Workpiece Geometry in CAD Format

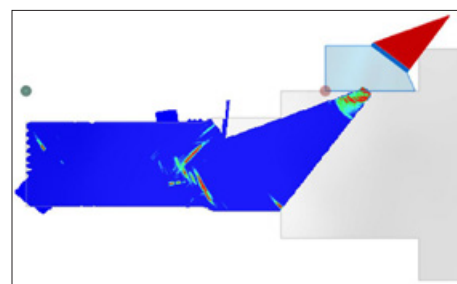
With the introduction of version 3.3 of the CAPTURE operating software for the portable PA units GEKKO and MANTIS, 2D-CAD drawings of test parts can be stored representing more than just an overlay.

For more complex structural geometries, the interpretation of phased array ultrasonic testing (PAUT) has been difficult. The complicated sound paths could not be mapped graphically during the test, and interpreting the origin of certain indications sometimes required skilled inspectors in terms of their spatial imagination. Since version 3.3, the CAPTURE operating software now allows import of CAD files in dxf format, which map the sound path within the component and



PA test on a gear shaft with component sketch shown. The different diameters lead to a representation of indications that is not positionally accurate.

can thus show the true position of indications. This is achieved by assigning individual drawing segments as test surface, rear wall, side wall or auxiliary lines. If the sound beam hits one of the interfaces, the further path is calculated accordingly and correctly. **Ki**



PA test of the same gear shaft with integrated 2D-CAD drawing in dxf format. Geometry and flaw indications (chevrons) are displayed true-to-position.



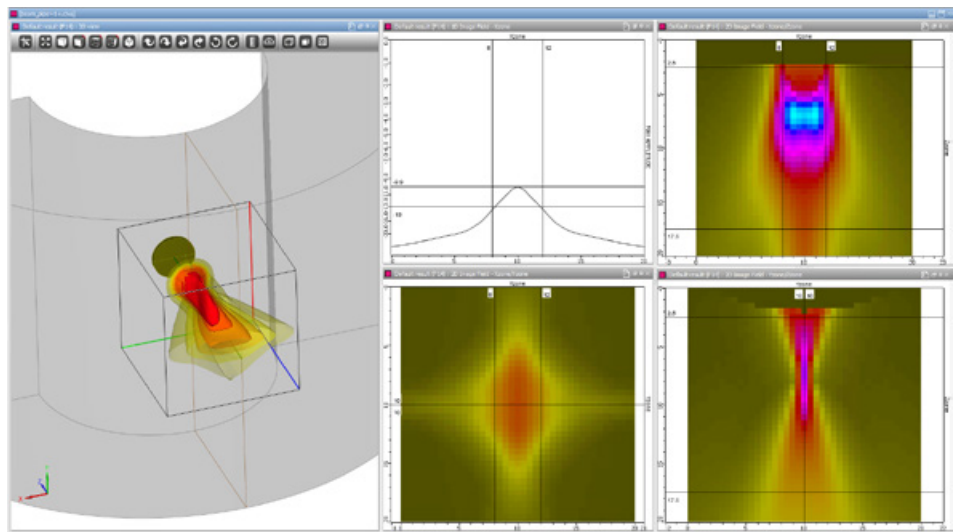
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Products »
Phased Array

CIVA: Computer Simulation in Ultrasonic Testing

Computer simulations make it possible to evaluate various options virtually in an economically efficient manner without having to conduct elaborate test series with a large number of prototype probes. The leading software platform in the field of NDT simulation is CIVA and has modules for UT, ET and RT, among others.

The CIVA platform was and is developed by CEA-List and their partners. KARL DEUTSCH uses CIVA for the simulation of ultrasonic testing, using the UT and UT Analysis modules.

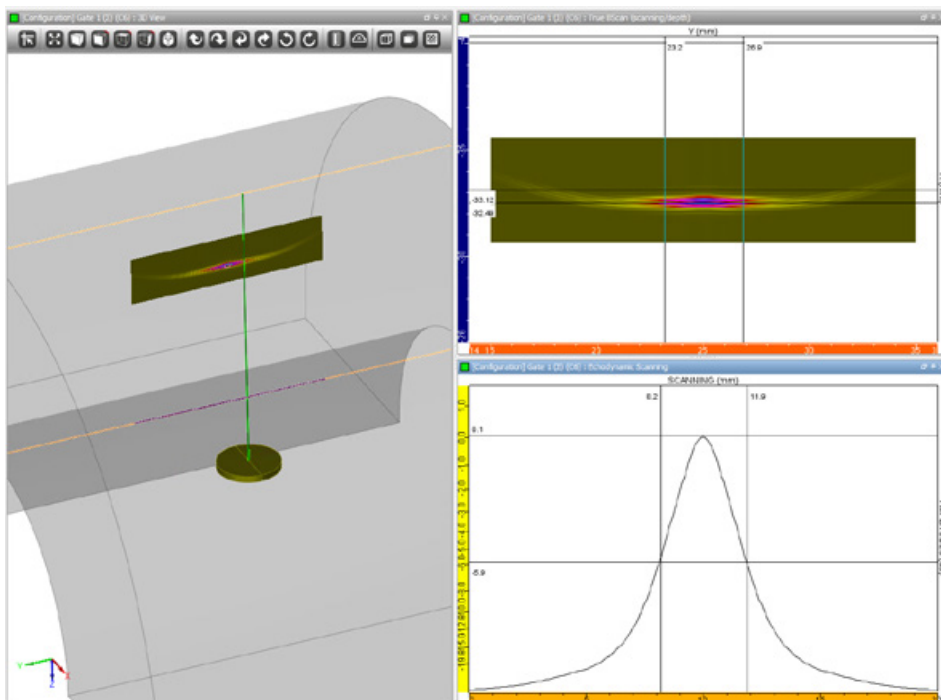
For the development of conventional and phased array probes, for example, we use the Beam Computation Tool included in the UT module, which simulates sound fields of conventional or phased array probes in 2D and 3D. This allows customer- and application-specific special probes to be developed and manufactured more quickly. Probe pro-



Simulation of the sound field of a probe with the Beam Computation Tool

totypes resulting from a simulation study usually show the required properties and can thus be transferred to a series product without time-consuming intermediate steps. Complex test situations with complicated component geometries or complex application requirements in the development of automated testing systems can also be simu-

lated and examined. In particular, the influence of different probes or phased array configurations on sensitivity, track widths, inspection speeds, etc. can be analysed quickly and efficiently. The Inspection Simulation Tool makes it possible to simulate the entire inspection of components with artificial defects.



UT inspection simulation of a laser-welded gear shaft from the internal bore with the aid of the Inspection Simulation Tool

In addition to simulation tasks, the CIVA-Analysis module is a powerful tool for evaluating UT data recorded with Eddyfi products such as GEKKO, MANTIS or PANTHER. Flaw sizes can be determined automatically and defect tables can be created. We would also be happy to use CIVA to investigate or optimise your testing task. Just contact us: alab@karldeutsch.de. **Ra**



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Products » UT Probes

ECHOMETER 1076 K: Indirect Measurement

If we want to measure a length, we can read it directly from a ruler or tape measure. Likewise, we can measure electrical voltage and current directly. However, we often have to measure quantities indirectly. For example, we measure temperature via the expansion of liquids or speed via the number of wheel revolutions per time.

By combining different direct measurement methods, we can record measurands for which we do not know any direct measurement method. One of these measurands is the concentration of the components of liquids. Changes in concentration are often accompanied by a change in density, which can be measured, for example, via the refraction of light or the buoyancy of a floating body. The sound velocity also changes as a function of concentration. The precise measurement of sound travel times is the task for which KARL DEUTSCH developed its ECHOMETER.

The ECHOMETER 1076 K successfully complies with this task! The device comes with a special ultrasonic probe so that you can measure the sound travel time for a defined sound path and thus determine the sound velocity of a liquid.

With the high resolution of the transit time,

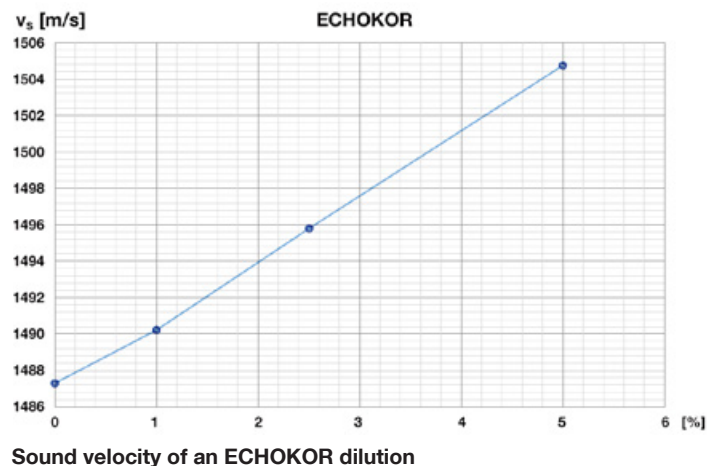


ECHOMETER 1076 K with special probe 1498.023

it is possible to display the sound velocity of liquids with 2 digits after the decimal point which corresponds to an accuracy of 0.001 %. This high resolution is necessary for concentration measurement, as the sound velocity often changes only slightly when there are changes in the concentration. Therefore, the exact knowledge of the actual free path distance is crucial and must also be known accurately to 0.001 %. For the probe shown in the picture (above) with a path length of 20 mm, this corresponds to 0.2 μm , indicating that the high

measurement accuracy as an absolute value is only possible with precise calibration. The temperature of the solution is also highly relevant, as it also influences the sound velocity. In addition to the sound velocity, the temperature must also be recorded or kept constant. A digital thermometer is included in the ECHOMETER 1076 K scope of delivery to check the temperature.

The graph (left) shows the correlation between concentration and sound velocity for the corrosion protection agent ECHOKOR in ultrapure water at 19 °C. It is now easy to check whether the concentration of a dilution is within the recommended range of 1.0 to 2.5 % by measuring whether the sound velocity is between 1490 m/s and 1496 m/s. **Bu**



measurement accuracy as an absolute value is only possible with precise calibration. The temperature of the solution is also highly relevant, as it also influences the sound velocity. In addition to the sound velocity, the temperature must also be recorded or kept con-



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Products » Concentration
Measuring Instrument »
ECHOMETER 1076 K

Mobile UV-LED Lamp: Successful Cooperation in Product Development

Both, the companies **KARL DEUTSCH** and **MR CHEMIE** are very successful, globally active medium-sized family businesses in the field of non-destructive materials testing.

In order to address the increasing market challenges, the two companies have decided on a joint project-based product development. This does not affect the companies' core chemical businesses, which will continue to be characterised by independent products at the same high level as before.

It is important to both companies to manufacture their top-quality product solutions in Germany. This ensures the premium standards of our customers and strengthens the local and national economy. At the same time, the dependence on – especially right now – unstable supply chains and strongly fluctuating raw material markets should be minimised.



Compact and mains-independent mobile UV-LED lamp with white light switch on the handle

One of the first joint projects is a new enhanced mobile UV-LED lamp, which was developed entirely in Germany. This

UV-LED lamp incorporates decades of experience of both companies and thus also the feedback of our customers.



A large illuminated area and the ASTM mirror filter ensure optimum crack detectability and make the lamp the ideal tool for the MT/PT-inspector.

The ergonomic and lightweight lamp has a pleasantly large and homogeneous UV illumination area, is equipped with an ASTM mirror filter to improve crack detectability and comes with a white light switch, as well. The two replaceable batteries are built into the handle. **KS**



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Products » Magnetic Particle Crack Detection »
Accessories » UV-Lamps and Accessories

Developed for Mercedes-Benz: Ultrasonic Measurement for Transmission Oil Level

For Mercedes-Benz, KARL DEUTSCH developed an innovative ultrasonic measuring instrument to measure the transmission oil level.

The 9-speed automatic transmission (9G-Tronic) from Mercedes-Benz promises, in contrast to the previous 7-speed transmission, a reduced fuel consumption of up to 6.5 % and ensures a low engine speed and correspondingly smooth running.

The transmission has been in use in the rear-wheel driven models as well as 4-wheel, hybrid and plug-in hybrid drives since September 2013 and is constantly optimised. In the premium segment, it was the world's first 9-speed automatic transmission with a hydrodynamic torque converter. The transmission was developed in-house by Mercedes-Benz.

Conventionally, the transmission oil level is

set at exactly 40 °C by means of a mechanical tube with an overflow opening. To do this, the transmission box must be overfilled with transmission oil and the level is checked via a so-called drip pattern. This procedure is extremely time-consuming and the assessment of the drip pattern is very subjective, which can be a source of error in the measurement. Due to temperature-dependent volume expansion between 20 °C and 80 °C, the transmission oil level fluctuates by up to 20 mm. Especially in warm countries, this is a problem and can lead to an oil level measurement only being able to be carried out in air-conditioned rooms after longer waiting times.

In order to increase service-friendliness, Mercedes-Benz desired a time reduction for oil level setting/measurement with a simultaneous improvement in the setting accuracy. For these rea-

sons, Mercedes-Benz commissioned KARL DEUTSCH to develop a corresponding measuring device for a faster, more accurate and less error-prone determination of the transmission oil level.

The handling of the measuring device newly developed by KARL DEUTSCH is very simple: A special ultrasonic sensor is connected to the oil pan of the transmission box with the help of a bayonet mount. The oil sump contains a calming tube, which allows the transmission oil level to be measured during vibrations and even when the vehicle is slightly tilted. The measured value is then compared with the set value in the diagnostic device, taking into account the transmission oil temperature. This eliminates the previous cumbersome process. The exact oil level is obtained very quickly and without great effort, and earlier sources of error can no longer



New development for Mercedes-Benz: An innovative ultrasonic measuring instrument for measuring the transmission oil level

occur. The Mercedes-Benz workshops therefore have an exact value with simultaneous time and cost savings.

The KARL DEUTSCH unit offers a further advantage when the transmission box oil level needs to be corrected or the oil needs to be changed: The transmission box is filled to the change oil level from below by means of a pump station. After the engine has been started and the pre-conditioning of the transmission box has been initiated by means of the diagnostic device, the correct oil level can be set quickly. This process can be completed much faster with the help of the innovative measuring device. This means that overfilling and subsequent correction of the oil level is no longer necessary.

We are very proud that KARL DEUTSCH was chosen as a development partner for this task. Mercedes-Benz is extremely satisfied with our solution and there are already more than 3000 instruments in use in authorised workshops. The device is also used for the current 8G dual-clutch transmission of the MFA-2 platform. Further development projects are already under discussion. **Bn**



Easy preparation and calibration of the new oil level gauge



The ultrasonic sensor is connected to the gearbox oil pan via a bayonet mount.



The new technology determines the exact oil level, prevents errors and saves costs.

DEUTROFLUX UMT: State-of-the-Art Magnetic Particle Testing System

The DEUTROFLUX UMT magnetic particle testing system sets new standards. Two phase-shifted AC magnetic fields reliably detect cracks of all orientations.

The clamping length of the testing system can be easily adjusted - even after long periods of use, as the adjustment mechanism is located outside the spraying area. The modular machine concept

allows many options to optimally design the testing system according to your testing task.

A MEMORY Control

The test parameters are managed via an (optional) touch panel and incorrect operation is avoided.

B Contacts

Two combined contacts are provided for current and field flow.

C UV-Lamp

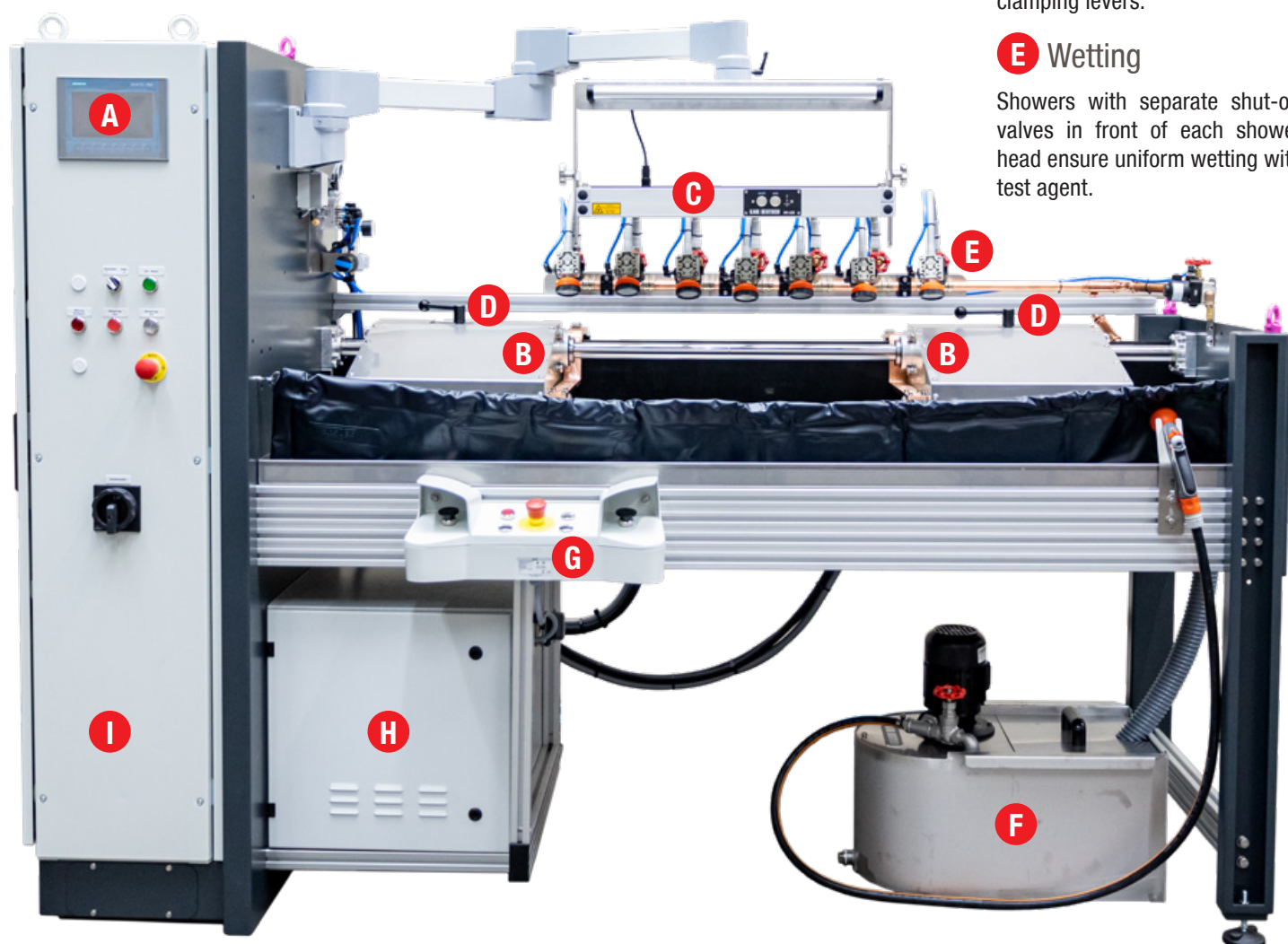
The UV-LED large-area lamp enables pleasant and energy-saving work (option: swivel arm).

D Clamping Length Adjustment

Quick and easy adjustment is ensured via one (optionally two) clamping levers.

E Wetting

Showers with separate shut-off valves in front of each shower head ensure uniform wetting with test agent.



I Control Cabinet

The control cabinet contains high-quality components from SIEMENS and other well-known manufacturers. The control system can be adapted very individually to customer requirements.

H Transformers

Powerful transformers ensure many years of trouble-free three-shift operation.

G Two-Hand Operation

Start the test cycle using an (optional) two-hand control or a foot switch (standard).

F Test Agent Container

The stainless steel test medium container with circulation pump and coarse dirt filter ensures FLUXA test agent in top form.

Clamping lengths

The clamping length depends on the maximum component length. Three sizes are available: 350, 600 and 900 mm.



UMT 350



UMT 600



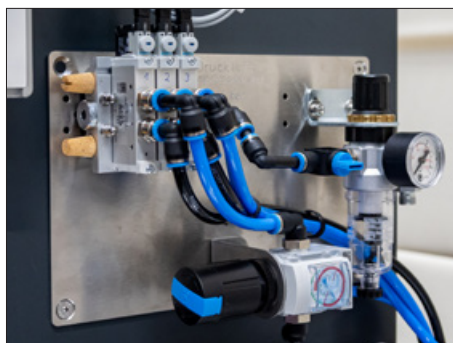
UMT 900

Adjustable test cycle

A test cycle consists of several phases: Clamping, magnetisation, rinsing, post-magnetisation, (optionally) demagnetisation and releasing. In total, the magnetic particle test usually takes between 8 and 10 seconds. All process parameters can be freely selected and thus optimally adapted to the respective testing task.

High quality components

KARL DEUTSCH relies exclusively on high-quality machine components from renowned manufacturers. In addition to SIEMENS controls and switchgear, pneumatic components from FESTO and others are used.



Pneumatic components from the renowned brand manufacturer FESTO



High-quality components for the electronics

Stainless steel quality

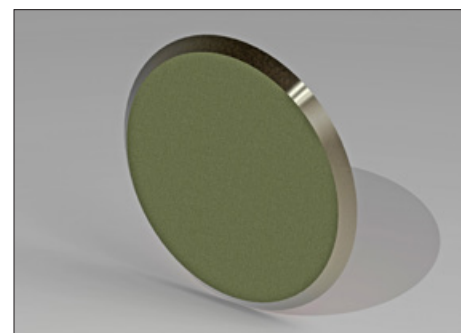
The machine tub, test agent container and covers in the wet area of the system are made of stainless steel. All other machine elements that come into contact with the media are made from non-corrosive materials. Corrosion is thus avoided in the long term.

The magnetic particles are continuously circulated so that they cannot sink to the bottom of the container. With the optionally available trolley, cleaning the stainless steel tank is now even easier. The machine tub is made in one piece, and all surfaces are inclined towards the centre and the drainage. This leads to a rapid run-off of

the test agent and thus to reduced settling of magnetic particles. Deposits are therefore reduced.

Contact plates

The contact plates between the machine and the test part are crucial for stable and process-reliable magnetisation. With the manufacturing possibilities at KARL DEUTSCH, we are able to ensure optimum transition conditions even for very complex contours. Our contact plates are characterised by particularly long service lives. In particular, the possibility of rotating the round contact plates allows them to be worn evenly over the entire circumference, thus enabling very long operating times.



Contact plate, round (standard)

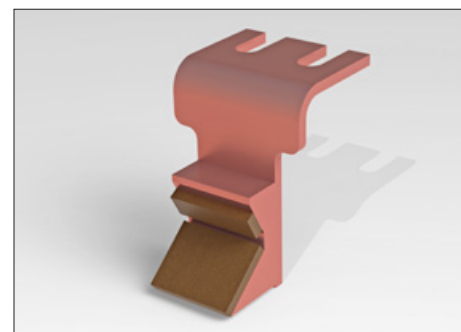
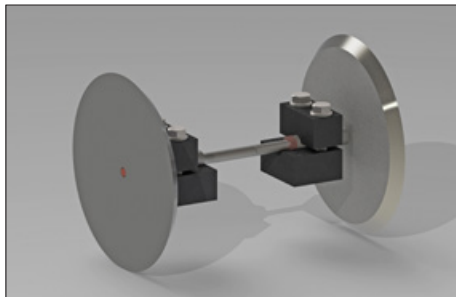
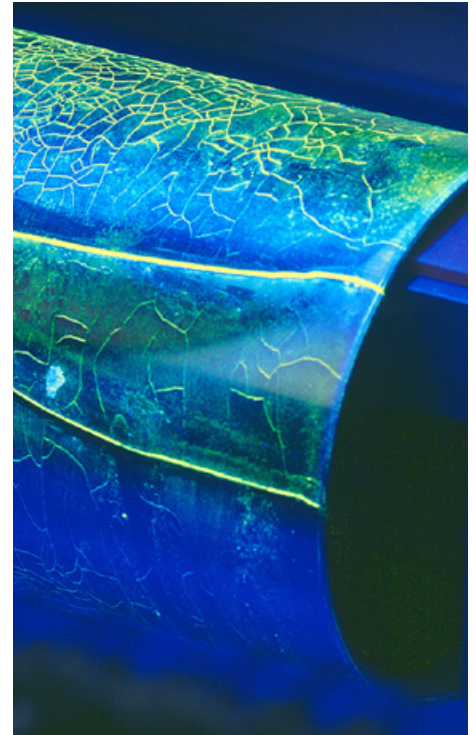


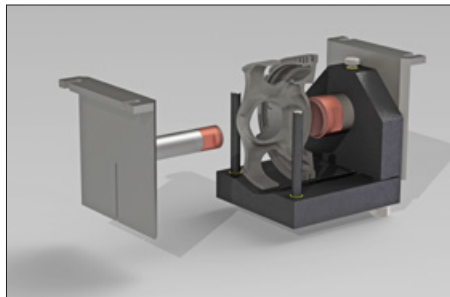
Plate for connecting rod, cranked (option)

DEUTROFLUX UMT – Options and Enhancements

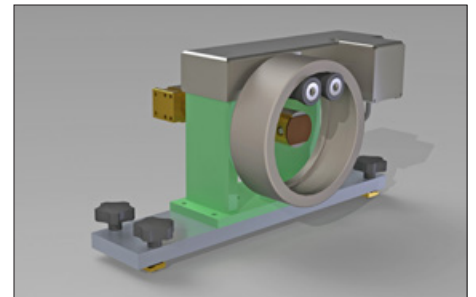
- Customised workpiece fixtures
- Customised contact plates
- Magnetising mandrels from a wide variety of designs
- Contact rockers for testing fork-shaped test parts
- Motorised rotating devices for rotationally symmetrical parts
- Clamping extensions and double-sided execution of the clamping movement
- Trolley for the test agent container
- The control cabinet can be flange-mounted on the left or right side of the machine frame (no additional charge). Optional: free-standing control cabinet.
- UV-lamp holder are axially adjustable or optionally freely adjustable in any direction by means of a swivel arm.
- Test equipment circuit as ring wetting to avoid deposits of test agent during test breaks
- Special wetting for complex geometries
- Execution for oil-based testing agents (safety devices: fire and explosion protection to prevent oil ignition in the event of sparking or overtemperature).
- Magnetisation with direct current
- Special paint
- Heavy-duty rollers below the machine frame for easy transport to different places of use
- Remote maintenance via network or by mobile communication



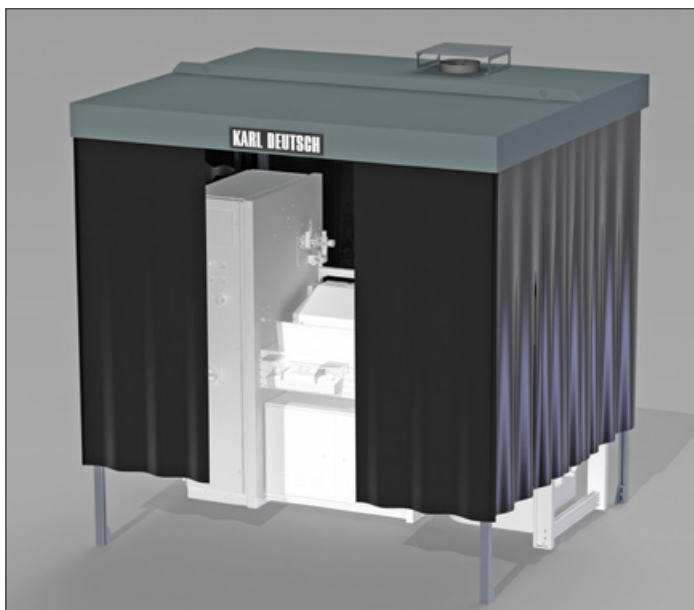
Small parts inspection



Workpiece holder



Electric rotating device for ring testing



Darkening cabin, free-standing



General view

DEUTROFLUX Machine Control

Conventional control

Still the simplest operation: Both field directions are adjusted via a rotary knob and can be activated or deactivated via rotary switches. Three further toggle switches are used to preselect automatic demagnetisation for the respective circuits or demagnetisation as a single function without a preceding magnetisation cycle. Another toggle switch is used to activate or deactivate the wetting for a single or continuous cycle.

DEUTROFLUX MEMORY Parameter Control

MEMORY

The standard version of the parameter control with 7" touch panel already offers a lot: menus and error messages appear as plain text. The essential test parameters are stored in the PLC as a recipe for up to 50 components. Up to 50 inspectors can log in with their names. The test results (go, no go) are stored and counted with date and number of pieces. Batches are stored with date and time.

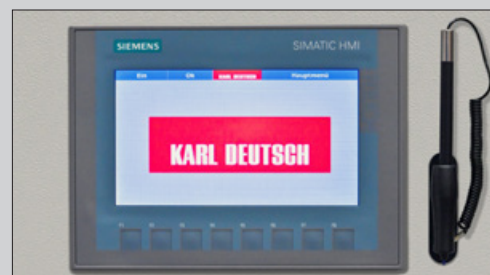
MEMORY CONNECT

The CONNECT version has many more functions that make your testing process even more convenient: The control can be operated via a 9" touch panel. Up to 500 test pieces can be managed and data can be stored via USB stick or network hard drive. In this way, data can be transferred to the customer's network. Operator registration is possible via chip. Component scanners and the interface for automated loading and discharging can be integrated. An important feature is the access via remote maintenance. With MEMORY CONNECT, many special functions can be easily implemented. These include, for example, light grids for cycle start and safety controls.

MEMORY customised

Additional customer requirements can be met individually, as we create the PLC software in-house. For this purpose, e.g. pictures of components can be displayed or the test instruction can be digitally mapped in the PLC. Even extended requirements for the testing sequence, e.g. aviation requirements (NADCAP), can be implemented. In addition, we offer comprehensive monitoring to ensure a stable inspection process in fully automated and interlinked applications. **Ba**

Simple operation with analogue display instruments for current and field flow (top left). The units with parameter memory are available in MEMORY and MEMORY CONNECT versions (bottom left).



Selection and memorising of test parameters via touch panel



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Systems » DEUTROFLUX
UMT

DEUTROMAT: Chain Conveyor of the Latest Generation

An impressive DEUTROMAT chain conveyor was recently developed and built at KARL DEUTSCH for the Dutch foundry NEFIT INDUSTRIAL.

This modern system enables the customer to perform combined fluorescent magnetic particle testing on six castings simultaneously in one magnetisation cycle with a throughput of one component every two seconds (incl. transport time within the magnetisation station). The testing system contains three enhanced magnetising units of the UMT type.

The machine is designed for many different types of components with varying geometries. The components of the respective type are inserted at the machine infeed into the appropriate (quickly exchangeable) workpiece holders. Each magnetising unit is equip-



Individual, quickly convertible workpiece fixtures at the infeed of the MT system

ped with special swivelling, laminated attachment yokes for fork-shaped parts and

devices for one-sided internal flushing of hollow parts. The enhanced magnetic coils



DEUTROMAT chain conveyor – general view (from left to right: infeed area, magnetisation station, conveyor belts, darkening cabin)

built into each unit ensure sufficient magnetisation of long workpieces. The many individual component-specific magnetisation parameters (recipes) are conveniently recorded, stored and activated as required using the DEUTROFLUX MEMORY PLC software.

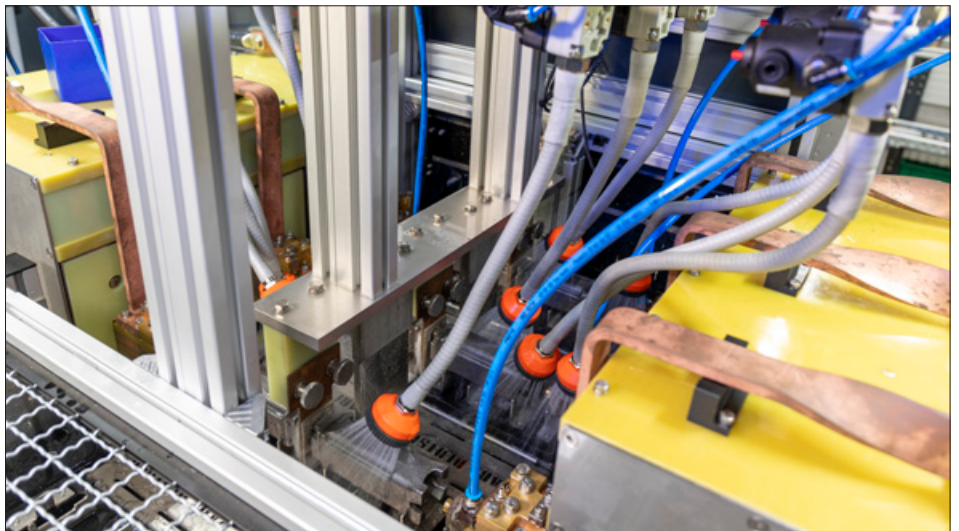
Upon customer request, we have built long conveyor belts at the outlet of the magnetisation unit so the components enter the darkening cabin as dry as possible (without the light-reflecting water film), which reduces the effort of the employees when executing the visual inspection and thus makes the inspection more reliable overall.

To fully utilise the high potential of this system, eight employees are needed: Two for loading the workpieces, another six for the visual inspection of the parts in an appropriately large and ventilated darkening cabin. The six operator positions are equipped with large-area UV-LED lamps from KARL DEUTSCH. Depending on the number of employees available at the in-feed and in the darkening booth, the speed of the component transport can be adjusted accordingly with a push of a button. Defect-free components are placed on a centrally positioned conveyor belt by the employees in the darkening booth and then pass through the demagnetisation process by means of a suitable ESV coil.

The system has been in continuous operation at NEFIT INDUSTRIAL for several months to their complete satisfaction. **Zb**



Outlet side of the magnetisation station with spatial separation and transfer of the magnetised and rinsed parts to the conveyor belts



Magnetisation station for simultaneous testing of six components



Darkening cabin with six operator positions, each equipped with a large-area UV-LED lamp



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Systems » DEUTROMAT Chain Conveyor

KD-CHECK Systems: Dye Penetrant Testing System for Castings



Layout of a penetrant testing system with crane runway

For the company **METTEC GUSS Metallgießerei und Formenbau GmbH** in Wels, Austria, a manual and modular dye penetrant testing system was implemented for small and medium-sized castings, which are tested using the red-white method. In addition to small series in baskets and racks, larger components can also be moved individually through the system and tested.

After the test parts have been washed and dried in the first stations, the penetrant is applied. Here, the customer may choose from various options: The penetrant station has an immersion tank, an electrostatic unit and a suction wall. This allows the inspector to choose whether he wants to apply the test agent by immersion, e.g. for baskets with many small components, or whether he prefers to apply it electrostatically for complex and

structured castings. The use of spray cans is also possible without any problems.

After the penetration time, intermediate cleaning takes place. The wash water is circulated in activated carbon columns



Electrostatic application of test agent at the penetrant station

where it is freed from test agent residues. This means that it can be used several times for intermediate cleaning, which not only saves costs but also preserves resources.

Before the developer is finally applied, the parts have to be dried. In addition to adjustable air baffles inside, the isolated unit also contains height-adjustable insert grids so that the inspector can adjust the optimal air flow for the respective component.

At the subsequent station the developer is applied with spray cans. Afterwards, the inspection takes place – either with the parts hanging on the crane or, in the case of small parts, on the inspection table. Finally, the test parts are sorted (GO and NO GO) and made available for further processing. **Rb**



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Testing » Testing Stations
and Systems



Water treatment with activated carbon columns



Inside view of drying oven



Height-adjustable insert grids in the dryer

ECHOTRACE HT-170: New High-Temperature Coupling Agent

Many of our customers inspect components or piping elements that cannot be completely switched off or cooled down due to their operating condition. This is a challenge for the ultrasonic coupling.



Testing with ECHOTRACE HT-170

The coupling agent should ensure a good sound transmission. At the same time, it must not become too thin at higher temperatures. The disadvantage of such high-temperature coupling agents is that they are often difficult to handle at room temperature due to their high viscosity.

This is where the new coupling agent ECHOTRACE HT-170 from KARL DEUTSCH comes in: As the name already indicates, it can be used up to a temperature of 170 °C – for a short time also at somewhat higher temperatures; this has to be tested on a case-by-case basis.

One of the first customers is wesernetz Bremen GmbH, which uses the agent to inspect the pipeline systems while in op-



Usage at our customer wesernetz

eration. Our ultrasonic flaw detector ECHOGRAF 1095 is also used there. **Rb**

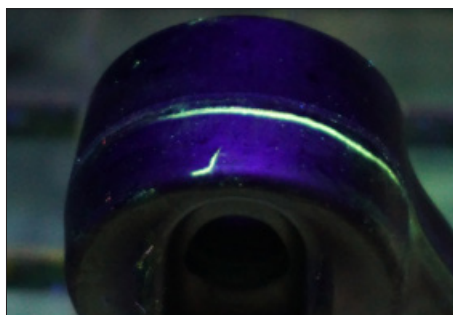


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Products »
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Corrosion Inhibitors »
ECHOTRACE HT-170

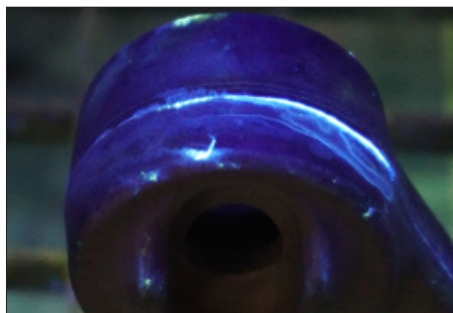
KD-CHECK: Water-Based Suspendable Wet Developer for Penetrant Testing

During recent years, the use of water-based wet developers, both water-soluble and suspendable, has become established in many areas of serial testing of aluminium components.

The newly developed wet developer KD-CHECK WDD provides the advantage that water is used as a carrier medium and thus there is no exposure of the environment or inspectors to solvent vapours. With water-based wet developers, no highly flammable air-solvent mixtures can form, even in the case of improper handling, which improves operational safety. In addition, KD-CHECK WDD does not require special labelling. When used in PT systems, it is also advantageous that you can omit the use of drying ovens in most cases after intermediate cleaning when operated with pre-heated immersion tanks.



Fluorescent penetrant with solvent-based wet developer



Fluorescent penetrant with water-based wet developer

KARL DEUTSCH now offers the type-tested, water-based suspendable wet developer (form c) KD-CHECK WDD, order no. 9923, according to DIN EN ISO 3452-1, for testing with fluorescent penetrants. Of course, we are happy to provide samples for our customers. **Rb**



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Penetrant Media »
Fluorescent Testing

Thrills in the Bergisches Land Region - the Müngsten Bridge Climb!

BRÜCKEN STEIG



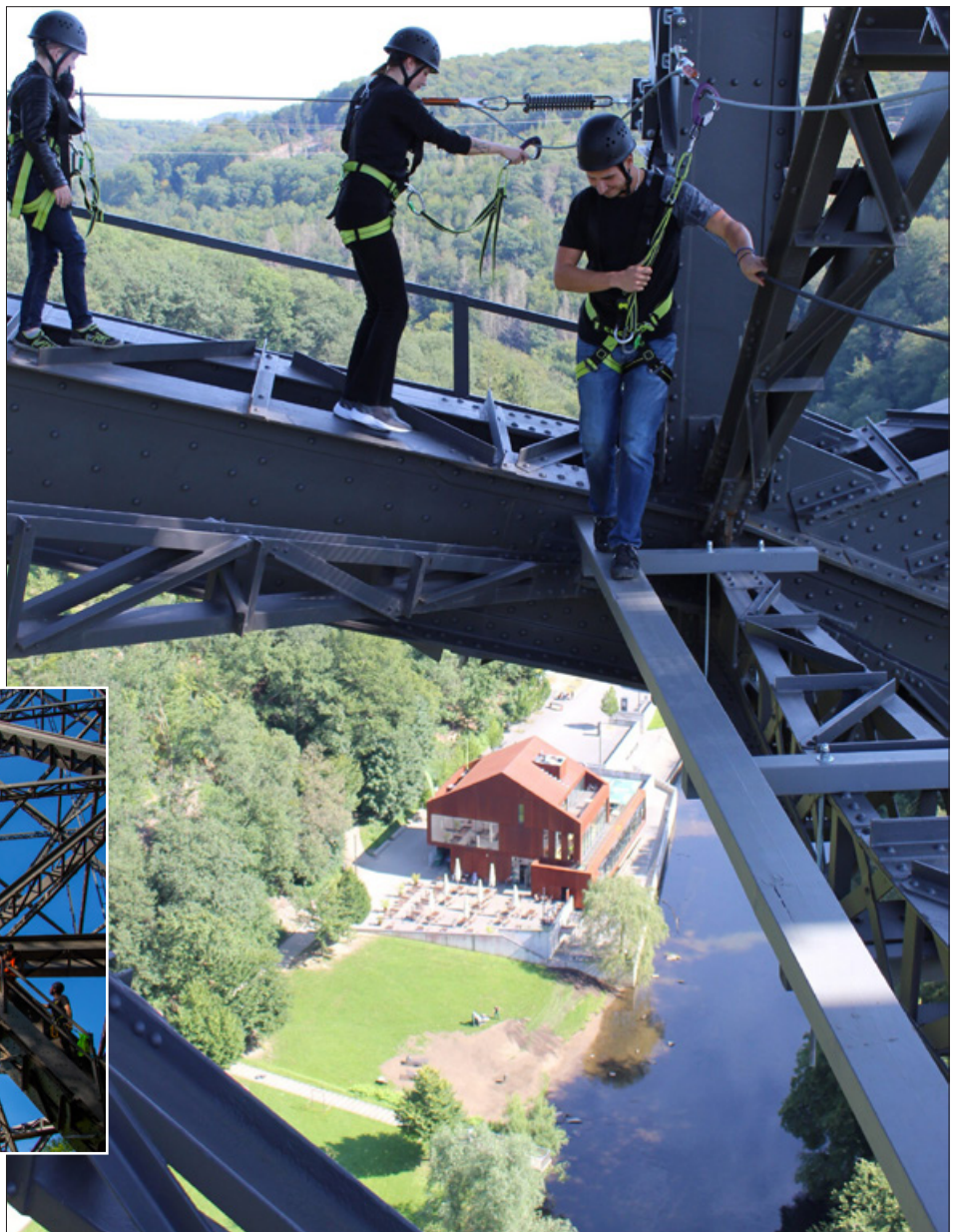
The Bergisches Land region with the cities of Remscheid, Solingen and Wuppertal has one more attraction. Germany's highest railway bridge (107 m) has connected the cities of Remscheid and Solingen since 1897 and spans the Wupper valley with a length of 465 m.

Against much opposition, the DEEPWOOD company is now able to offer the climb at the Müngsten Bridge. The Bridge Climb of the Sydney Harbour Bridge served as a famous model. A removable staircase and a viewing platform were built into the historic bridge. The climb is done in a group with an experienced guide and you are secured by ropes. Reportedly, only one participant

has turned back during the climb since the opening. KARL DEUTSCH now secured tickets for all employees who are free from giddiness in the 2022 season.

The Müngsten Bridge was built by the MAN company (Maschinenfabrik Augsburg-Nürnberg) in only four years from approx. 5000 tonnes of steel. The fragile-looking steel elements were connected with 950,000 rivets. The last rivet is said to

have been made of gold - but it was not found despite an intensive search. In the Bergisches Land region, efforts have been underway for some time to have the Müngsten Bridge recognised as a World Heritage Site along with five other spectacular European bridges. **WD**



Reward after a steep climb:
Well-secured thrill with a breathtaking view
over the Wupper valley

Obituary for an NDT-Expert: Dr. Werner Roye



Dr. Werner Roye

In December 2021, sad news reached us: Dr. Werner Roye passed away far too early at the age of 70! Werner Roye studied metallurgy at RWTH Aachen and, after a first industrial phase, moved to TU Dortmund, where he became the first doctoral student of Prof. Volker Deutsch on an NDT

topic: Further Development of Acoustic Holography for Use in Materials Testing. After several years as a lecturer at DGZfP in Dortmund, Dr. Werner Roye worked for the PHILIPS company in Hamburg in the field of X-ray testing before becoming head of the application laboratory at the KRAUTKRÄMER company in Hürth. After two years at LVQ-WP in Mülheim, he started at KARL DEUTSCH in 2011, also in the application laboratory. His passion were complex testing tasks, which he preferred to solve with the help of the phased array technology. He was a very good teacher for colleagues and our customers! In 2019, he summarised his expertise in book form and presented the new standard work on industrial ultrasonic testing (in German language). He is survived by his wife, was a father of three grown-up children and an enthusiastic grandpa. Flying



small aircraft was his private passion – always non-destructively, of course! We will have a lasting and honourable memory of Dr. Werner Roye! **WD**

New Sales Director and CFO at KARL DEUTSCH

In terms of personnel, we are glad to announce a prominent returnee: Dr. Michael Maaß returned to Wuppertal as the new sales director after four years with KARL DEUTSCH (2012 – 2016) and six years with two competitors. He started at KARL DEUTSCH on June 1st, 2022. Thanks to his many years of NDT experience, he does not need any training. The entire KARL DEUTSCH team is delighted about his return. **WD**



Sascha Rosenbaum



Dr. Michael Maaß

In addition to Dr. Maaß, there is another new face in the management board. On August 16th, 2021, Mr. Sascha Rosenbaum took up his position at KARL DEUTSCH and succeeded Mr. Wiemer as CFO. He holds a degree in business administration and has spent many years working as a CFO for internationally operating medium-sized companies. **WD**

New Employees at KARL DEUTSCH

Since KARL DEUTSCH was founded over 70 years ago, our employees have made a special contribution to the company's success. Many have been working for KARL DEUTSCH for decades. Our customers benefit from the long-term, close relationships and the know-how we have acquired together.



Björn Burmeister
Chemicals Production



Tim Dochtermann
PLC Programming

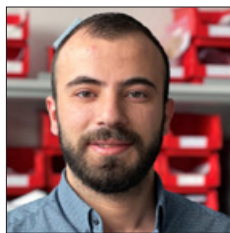


Sedat Dogan
Shipping



Angela Lo Galbo
Export Sales

We would like to take this opportunity to briefly introduce our new colleagues to you. Welcome to KARL DEUTSCH! **RS**



Modar Krris
Probe Production



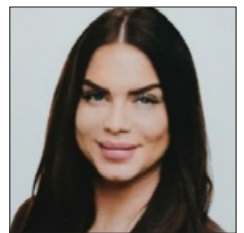
Sabine Plempe
Reception /
Sales Support



Andreas Potzkai
Head of Production
of Testing Systems

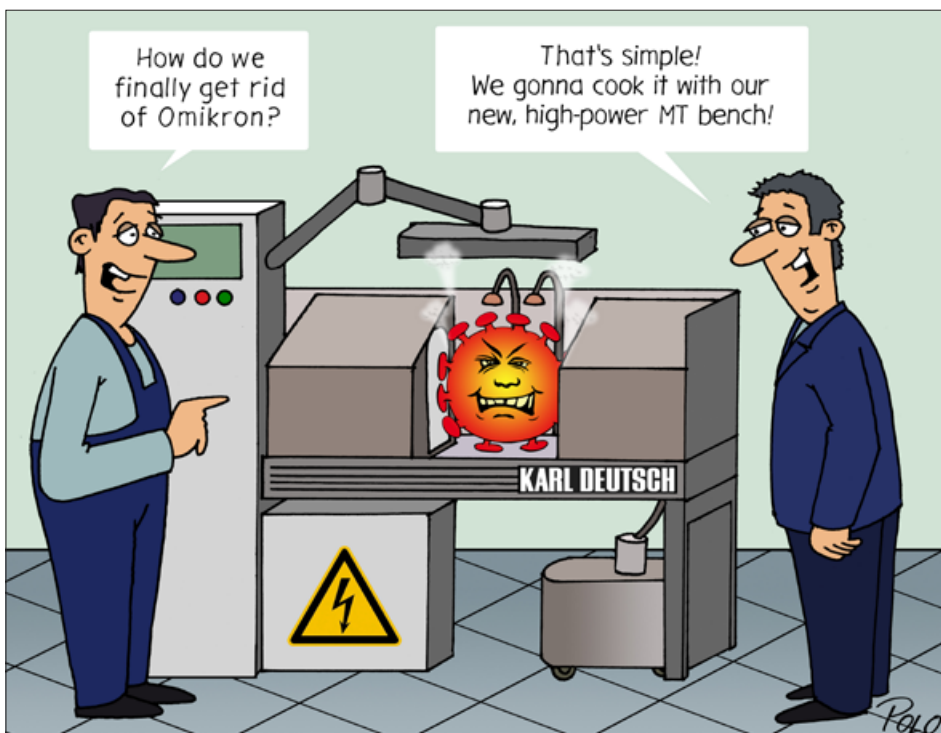


Hannes Reitemeier
Working Student
Chemicals



Janice Wickinghoff
Sales Support

Cartoon



Graphic artist André Poloczec, aka POLO, from Wuppertal prepares scenes of non-destructive testing or current topics at KARL DEUTSCH in a humorous way for the KD-INFO company magazine. **WD**

Events and Trade Fairs



20 – 24 June 2022
International Trade Fair for
Tubes and Tube Processing
Duesseldorf, Germany



19 – 21 October 2022
AlPnD – Conferenza Nazionale
Prove Non Distruttive
PALAEXPO, Veronafiere (VR)
Verona, Italy



20 – 23 September 2022
InnoTrans – International Tradefair for
Transport Technology
Berlin, Germany



09 – 12 May 2023
35th Control
International Trade Fair for
Quality Assurance
Stuttgart, Germany



11 – 13 October 2022
IZB
International Suppliers Fair
Wolfsburg, Germany



The subjects of our lectures given at trade fairs and conferences and other current dates can be found on our homepage:

www.karldeutsch.de » **News & Dates** » **Dates**

About KARL DEUTSCH

KARL DEUTSCH

Pruef- und Messgeraetebau GmbH + Co KG

The privately owned company KARL DEUTSCH was founded in 1949 and develops and produces instruments for non-destructive material testing. Portable instruments, stationary testing systems, sensors and crack detection liquids are produced by 130 motivated employees in two works in Wuppertal. Additional 20 employees in international offices and a worldwide network of dealers support the export business which accounts for more than 50 % of the turnover.

Characterised by continuous innovation and product reliability, the trade marks

ECHOGRAPH,
ECHOMETER,
DEUTROFLUX,

LEPTOSKOP, FLUXA, KD-CHECK and **RMG** are well-recognised. Our customers are metal producing and processing industries, e. g. steel works, automotive companies and bearing manufacturers. Typical test tasks are ultrasonic weld



Main offices and manufacturing site for portables, sensors and chemicals (Works 1)



Offices and manufacturing site for testing systems (Works 2)

testing, detection of shrink holes in castings, crack detection in forgings with magnetic particles and dye penetrants, safety components for railway and aerospace as well as the wall and coating thickness measurement.

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KARL DEUTSCH