

# KD-INFO

Edition 2024



**Artificial Intelligence  
Automated Detection  
of MT-Indications by CRACKVIEW AI**

**KARL DEUTSCH**



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## Editorial

### Dear customers, partners and friends!

We are pleased to present another comprehensive company magazine for you to read. Many new products, plant projects and positive trends, especially with regard to foreign sales, are described. New employees and partners in Italy, Austria, Italy and France give a lot of fresh impetus. The sales meeting with our international trading partners was also a very enjoyable and beneficial event. It showed that although video meetings are a useful enhancement, they cannot replace personal contact. Looking back, we are stunned by the strange and challenging time of the pandemic.

The savage war in Ukraine continues, many of our customers are suffering from high energy costs and the automotive industry is in a state of transition. We can therefore be justifiably proud of the year 2023, which we were able to close with record sales under these difficult conditions. The multi-channel ECHOGRAPH 1170 inspection electronics for automated ultrasonic testing was our bestseller. The systems engineering departments (UT/MT/PT)

were consistently working to full capacity and we still have a very good order backlog at the start of 2024.

A new company was founded for the railway vehicle market. Experienced partners with relevant expertise have been recruited and we will therefore increasingly focus on the railway maintenance testing market. Solutions for testing wheels, shafts and wheelsets are now available in the portfolio of the KARL DEUTSCH group of companies. This was impressively presented at the “ZfP im Eisenbahnwesen” (NDT in the railway industry) conference in Erfurt at the beginning of the year.

This year, we have already attended the TUBE trade fair in Düsseldorf and the CONTROL trade fair in Stuttgart, both of which were very successful for KARL DEUTSCH. We presented our innovations in the field of ultrasonic testing systems as well as our latest product: CRACKVIEW AI - an artificial intelligence for automating the evaluation of MT indications.

Stay with us,

**Dr. (USA) Wolfram A. Karl Deutsch**



Successful trade fairs for KARL DEUTSCH

## CRACKVIEW AI: AI-Based Automated Detection of MT-Indications



Figure 1: CRACKVIEW AI testing station

**Magnetic particle inspection, which has been established for decades, is still carried out visually by human inspectors. CRACKVIEW AI enables the automated detection of indications from magnetic particle testing by using artificial intelligence.**

Magnetic particle testing (MT) is a testing method that has been established and proven for decades for the detection of near-surface cracks in ferromagnetic components. For the test, the components are prepared in the DEUTROFLUX or customised DEUTROMAT crack detection systems from KARL DEUTSCH by applying FLUXA testing agents in magnetic fields. The preparation allows surface cracks to be visualised with high contrast. The inspectors have to view all

relevant surfaces of the components in a darkened room under UV light and examine them for crack indications. This responsible task requires a high degree of concentration under difficult conditions.

In the context of Industry 4.0 and NDT 4.0, magnetic particle inspection seems to have fallen out of time. The preparation of components in modern DEUTROMAT crack detection systems is highly automated and requires little to no human intervention. However, the subsequent inspection by human inspectors means that, on the one hand, the results are affected by the so-called “human factors” and, on the other hand, that there is often virtually no documentation of the test results. In most cases, the only documentation is the sorting into OK or NOK containers. The

shortage of skilled staff means that many companies are faced with the ever-increasing problem of finding suitable personnel for this demanding task.

This is where CRACKVIEW AI comes into play. The system uses artificial intelligence to analyse the prepared surfaces for crack indications. The latest research results from the field of deep learning are used in the form of multi-layer neural networks that simulate human decision-making. ChatGPT is probably the best-known application of deep learning. However, there are many other examples, such as facial recognition, medical diagnostics (tumour detection on CT images), voice assistants, autonomous driving, personalised content on NETFLIX, Spotify etc. and many more.

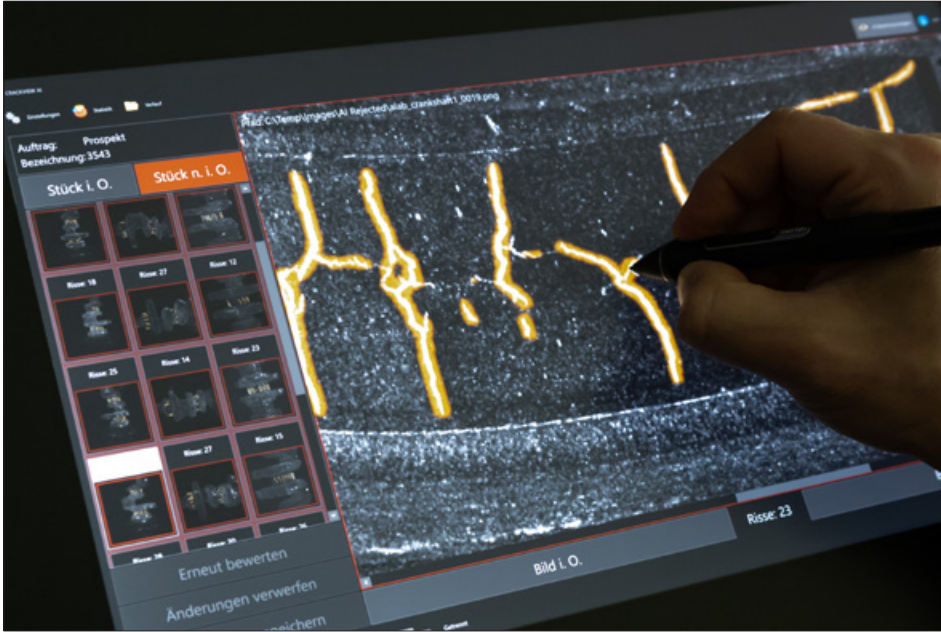


Figure 2: Manual annotation of the training data

What all these examples have in common is that the neural networks used must be trained with suitable data. In the case of ChatGPT, this is text; in others, it is data on consumer behaviour or medical examination results, such as CT images. The use of artificial intelligence is not yet widespread in non-destructive testing, which is mainly due to the availability of suitable training data. Unlike kitty pictures, test results are not usually shared billions of times on social networks. The most widespread of these is X-ray inspection, as the process already generates (image) data that still needs to be digitised in the case of analogue images. However, terabytes of raw data are often already available. Unfortunately, this is not the case with magnetic particle testing, as the test results have not usually been recorded in image form.

The first step in developing a functioning AI was therefore to generate a sufficient amount of suitable training data. In the case of magnetic particle testing, this involves thousands of images of components with crack indications. This data must be elaborately prepared by anno-

tating the relevant indications. This means that for every image that shows a cracked area of a component, a mask must be generated that precisely describes the shape and position of the crack. This is done by manually tracing the crack contours, see Figure 2. KARL DEUTSCH has developed the CRACKVIEW AI test station for this purpose, in

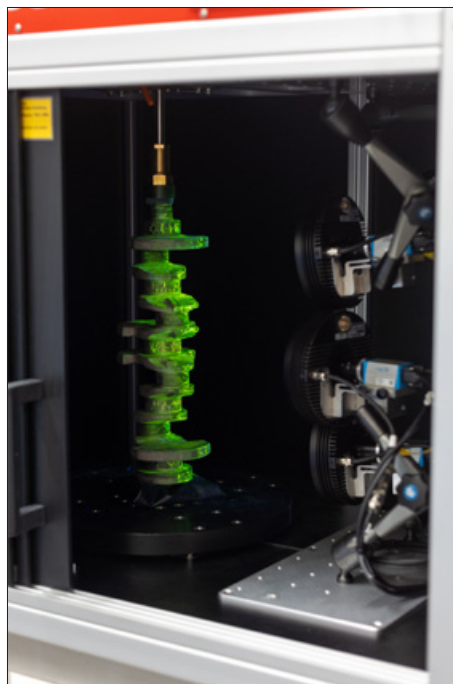


Figure 3: Testing a crankshaft

which high-quality images of the prepared surfaces of a large number of components can be captured in a short cycle time.

The CRACKVIEW AI test station offers a PLC-controlled motorised turntable as a component manipulator, see Figure 3. An additional clamping device allows components with a rather elongated geometry up to a maximum length of approx. 500 mm to be clamped vertically. The turntable and clamping device are prepared to hold individual component fixtures. The flexible setup of four or more industrial cameras in combination with the turntable enables a 360° view of the component. Different lamp designs can be used to irradiate the component with UV light, depending on the component geometry. However, the viewing conditions of ISO 3059 are always met. The test sequence is controlled and the order data recorded via the PLC.

The core of the test station is the CRACKVIEW AI software, see Figure 4, which is the interface between the cameras, PLC and the AI engine. The AI engine contains a neural network that has been trained on the KARL DEUTSCH data set consisting of thousands of images.

When the AI engine evaluates the individual images, a so-called semantic segmentation is executed. In the image, the pixels belonging to cracks are recognised and highlighted in the CRACKVIEW AI software by coloured marking, a so-called heat map, and displayed accordingly on the screen, see Figure 5. The heat map graphically represents the probability calculated by the AI of the individual image pixels belonging to a crack.

The images marked in this way are undoubtedly visually impressive, but must be





Figure 4: CRACKVIEW AI Software

further processed by the software. The threshold value can be used to define the probability of a pixel actually being categorised as a “crack pixel”. In addition, the inspection sensitivity can be adjusted using length and area criteria. The indications

that are actually rated as cracks are then marked in the individual images and the results are documented.

The software has three operating modes for the application: Adjustment, Manual and

Automatic. The adjustment mode is used to set up the cameras. The illumination can be set here and the camera focus can be checked.

Manual mode is used in the first phase of a customer project and is used to collect the necessary training data. Controlled via the PLC, a complete test cycle is run through and images are taken from all relevant perspectives. The software collects these images and has them analysed by the pre-trained AI engine. Order and test piece information, as well as piece start and stop signals, are transferred from the PLC to CRACKVIEW AI. Once the inspection cycle is complete, CRACKVIEW AI requires a human inspector to evaluate the individual images or the test piece in manual mode. As a minimum, the software needs to know whether the component is OK or not OK. The inspector can do this by pressing the

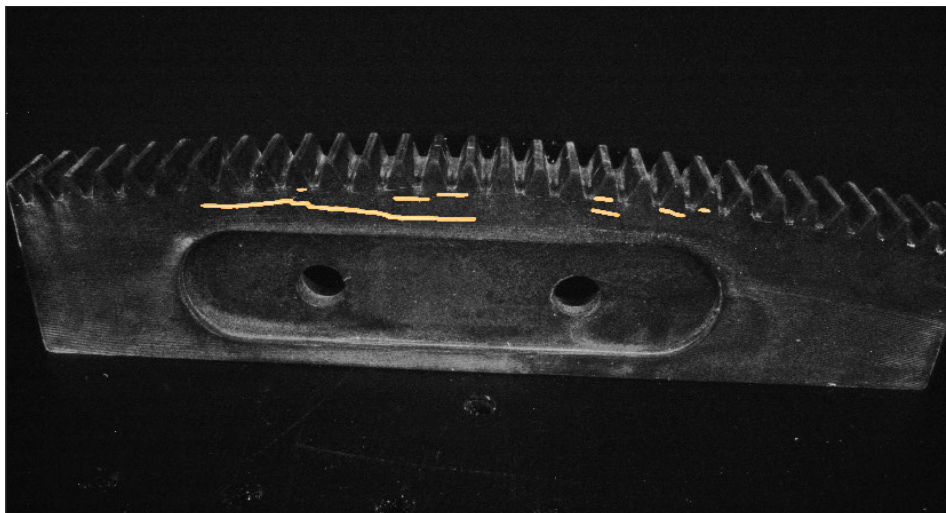


Figure 5: Image of a tested component with overlaying crack heat map



**Figure 6: SIMATIC HMI touchscreen for controlling the test sequence**

corresponding buttons on the 24" touchscreen or the two hardware buttons on the front of the inspection station. For each image, the inspector can also use the "Part OK" or "Part NOK" buttons in the software to judge whether the image contains a crack or not. In addition, an initial annotation of the recorded images can be carried out directly



**Figure 7: Hardware push button for manual component evaluation**

at the inspection station. This probably rather rough annotation is very important, especially in the case of borderline defects, and significantly simplifies the subsequent work. The more comprehensive and precise the information provided by the inspector, the easier and faster it is to prepare the data for AI training. CRACKVIEW AI compares the inspector's assessment with the result of

the loaded neural network and saves the image data and results in a database for later use.

Automatic mode no longer requires human input. The entire process is completely automatic. Only the AI results are used for the component evaluation and saved. The software collects all images associated with the test piece, has them evaluated by the AI engine and creates an overall evaluation for the test piece. This is archived in a database and returned to the PLC as an OK or NOK signal to the PLC and can be passed on from here for downstream sorting of the inspected components.

A typical AI project goes through three phases. In phase 1, before a system is delivered, image data of cracked customer components is recorded, annotated and used for specialised AI training. Ideally, 100 or more cracked components are provided by the customer for this purpose. In phase 2, the system is used in parallel to the manual inspection in the customer's production facility and the AI results are continu-

ously compared with the results of the human inspectors. The data collected in this process is used to further train the AI model. In phase 3, the system runs completely autonomously and the AI results are only randomly checked. Of course, the parameters of the entire system must also be checked regularly in this final phase, i.e. illuminance, magnetisation, test equipment, cameras, etc. must be verified.

The CRACKVIEW AI test station offers our customers the opportunity to experience the performance of the system on their own components. This can be done in our application technology laboratory in Wuppertal or directly in our customers' production facilities. In doing so, customer and component-specific image data can be obtained for specialisation (retraining) of our pre-trained network on customer components in order to carry out an even more precise evaluation.

Please contact our experts. **Ra**



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## Combined UT/MT Inspection Line for Railway Wheels

A unique combined UT/MT testing line for the inspection of forged railway wheels was recently commissioned at the Durgapur Steel Plant in the province of Bengal in India. In future, this will be used to inspect railway wheels fully automatically for safety and quality.

Our inspection systems have been integrated into a new production line including automated parts handling by means of a gantry and robots for the UT inspection of the web (in addition to the standard inspection functions on hubs, treads and rim). An improved and standardised design reduces costs and risks while fully complying with the Indian standard IRS R 19-93 Part II, which is even stricter than the current railway wheel standard ISO 5948. The wheels have a diameter range of 700 mm to 1250 mm and a maximum weight of 1000 kg.

### Ultrasonic Testing (UT)

The hubs, tread and rim are inspected using the ECHOGRAPH PAUT phased



The UT test cycle for the largest diameter takes less than 60 seconds (without robotics).



Loading carriage with customised test wheel and artificial flaws for process validation during pre-acceptance

array electronics and the associated probes. A 128-element phased array probe is used to inspect both the wheel rim and

the tread, where defects of FBH 1.0 mm must be found. A 64-element phased array probe is used on both sides to inspect the hub. Here, defects in the size of FBH 3.0 mm must be found.



Thorough preparation and optimum co-operation led to an acceptance without any complaints.

To check the wheel web, robot-guided vertical probes are used in combination with the conventional ECHOGRAPH 1170 electronics to detect flaws in the size of an FBH 3.0 mm. Contrary to water gap coupling (hub testing) or immersion testing (wheel rim and tread testing), the water jet coupling established at KARL DEUTSCH is used here. The challenging flaws in the radius area of the treads are successfully detected with the help of advanced phased array sector scans. During the test, the A-scans of each probe are displayed on a PC and a strip chart is recorded for

documentation purposes. A C-scan view is also available as an option. Multiple defect evaluation in accordance with the standard has been implemented in the evaluation software. The UT test cycle for the largest diameter takes less than 60 seconds (without web inspection).

### **Magnetic Particle Testing (MT)**

The MT system DEUTROMAT for fluorescence testing utilises the Minden coil, which is safely parked above the test position while the wheel is being loaded with a loading trolley suitable for the entire range of wheels. The loading trolley communicates with a master control system and automatically moves back and forth between the test position and the gantry loading position. Defect assessment is carried out by an

operator through protective glass from different sides. If necessary, the operator can enter the test area via a safety door. The MT test cycle including demagnetisation requires 1.5 rotations of the wheel. With the recommended rotation speed, less than two minutes are required for the maximum diameter.

KARL DEUTSCH is proud to be the only manufacturer to offer this combined testing solution. However, the project would not have been possible for us without the support of our great partner NDT Technologies (P) Limited from Mumbai. Together we form an unbeatable team and use our expertise and experience to ensure the highest standards in quality assurance. **Ba/BJ**



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## A Cost-Optimised Magnetic Particle Crack Detection System with High Throughput

For a customer in Mexico, we have constructed an interesting special DEUTROMAT DAS-1U machine for fluorescent magnetic particle testing of drive shafts and ring-shaped parts. This enables the routine testing of safety-relevant components with a high throughput, as usual in the automotive sector.

Two short parts (up to 280 mm) at the same time or one longer part (up to 600 mm) can be magnetised. Magnetisation is carried out using interchangeable mandrels, each with an internal flushing, and a flexible centre contact.

After magnetisation, the contacts are automatically released, the parts fall onto a chute specially designed for gentle handling and then slide directly into a inspection cabin at the rear of the system. After visual evaluation, the tested



Front view of DEUTROMAT DAS-1U: magnetisation station with two exchangeable mandrels, each with internal flushing

parts pass through a demagnetisation tunnel.

By parallelising several individual processes (magnetisation/extraction/viewing/demagnetisation), a throughput of approx. two parts every 10 s is possible. The system can also be equipped with a pneumatic mechanism for testing ring-shaped parts, which automatically



Viewing workplace in the darkening booth at the rear of the system

pushes the part to be tested off the mandrel after the test cycle has been completed. **Zb**



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## UMT 350: A Standard System, But No Standard Application

Magnetic particle crack detection is a proven method for quality assurance of components and workpieces in various branches of industry. It enables the reliable detection of cracks and defects that are invisible to the naked eye. But what happens if several different standards apply to the test?

Our customer, a company that mainly produces for the European market, previously followed the specifications of ISO 9934 for magnetic particle testing. This standard defines the test procedures and processes to ensure that the components meet the required quality standards. However, plans for the future included producing parts for the aerospace sector, a sector that is strongly characterised by the American ASTM test specifications.

This is where the actual challenge began. In some aspects, the ASTM standards differ from the European standards. Therefore, a solution had to be found to integrate both processes in one system.



**The UMT Series: Proven durability, outstanding quality and many years of reliability from KARL DEUTSCH**

The solution for this task is the MEMORY CONNECT extension for our testing systems and is based on a sophisticated control concept.

In a constantly changing and globalized world, it is crucial to be flexible and adaptable. The ability to combine different testing standards in one system is just one small example of how innovative solutions and customised technologies can help to meet the demands of modern industry.

This concept allows us to address the individual wishes of our customers and realise them. The ability to carry out standardised tests using both methods in a single system has created considerable added value for our customers.

At KARL DEUTSCH, we are proud to stand by our customers on this path and support them in realising their visions. **Ba**

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				Service		Panel	

Our MEMORY CONNECT platform offers various options for archiving data, whether through network storage on local data media or hybrid solutions. Choose the option that best suits your needs (GUI available in a variety of languages).



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DEUTROFLUX UMT  
350/600/900

## Inspection of Drive Components at Fendt

Agricultural technology from our customer Fendt represents the highest quality and efficiency for farmers and contractors. Fendt Vario transmissions and Fendt tractors ranging from the smallest to the largest Fendt 1000 Vario series are developed and produced by around 5,000 employees at the Fendt headquarters in Marktoberdorf in the Ostallgäu region. Production has an annual capacity of over 20,000 tractors.

To guarantee the quality of the highly stressed drive components of the vehicles, Fendt has been using the DEUTROFLUX magnetic particle crack detection system for many years. A further DEUTROFLUX UWS 1500 SPECIAL device has now been ordered and delivered to expand the possibilities. The machine can be used to test both small and large components up to 1.5 metres in length and 500 mm in diameter.

A test current of up to 4,000 A is used. Alternatively, a yoke magnetisation or



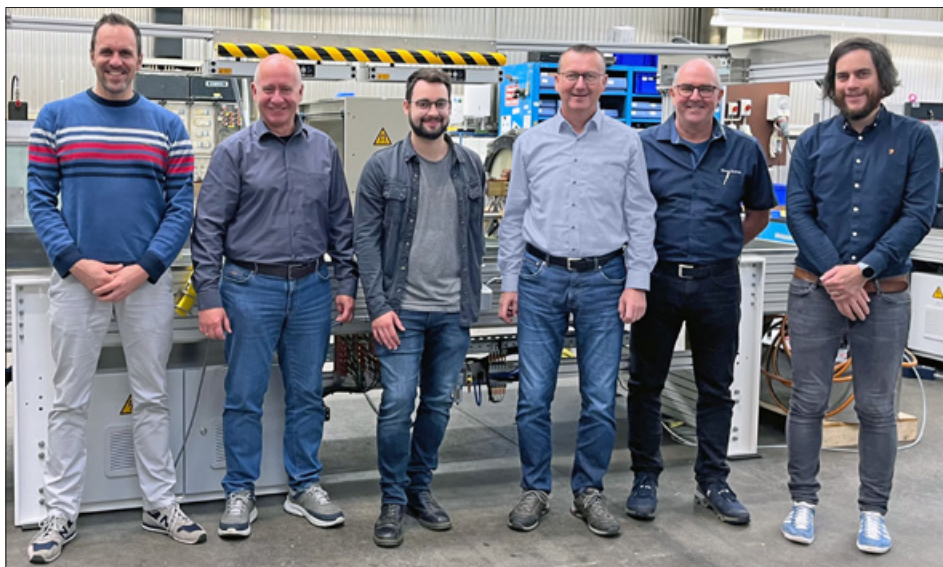
General view of the DEUTROFLUX UWS 1500 SPECIAL testing system incl. pneumatic UV lamp holder for better crane loadability

an overflow coil are available for field flow. For the inspection, the clamped test parts can be rotated via servomotor drives on both sides. The DEUTROFLUX CONNECT system control was customised and equipped with a barcode scanner for component identifica-

tion and a network connection for log output. **KS**



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Group photo after successful preliminary acceptance in Wuppertal. Daniel Braun (1st from left) and Stefan Klein (2nd from left) from KARL DEUTSCH welcomed the Fendt team: Luca Schillinger, Ralf Mattern, Elmar Endras, Markus Knobloch (from left to right).



DEUTROFLUX MEMORY CONNECT parameter memory with additional handheld scanner for component identification



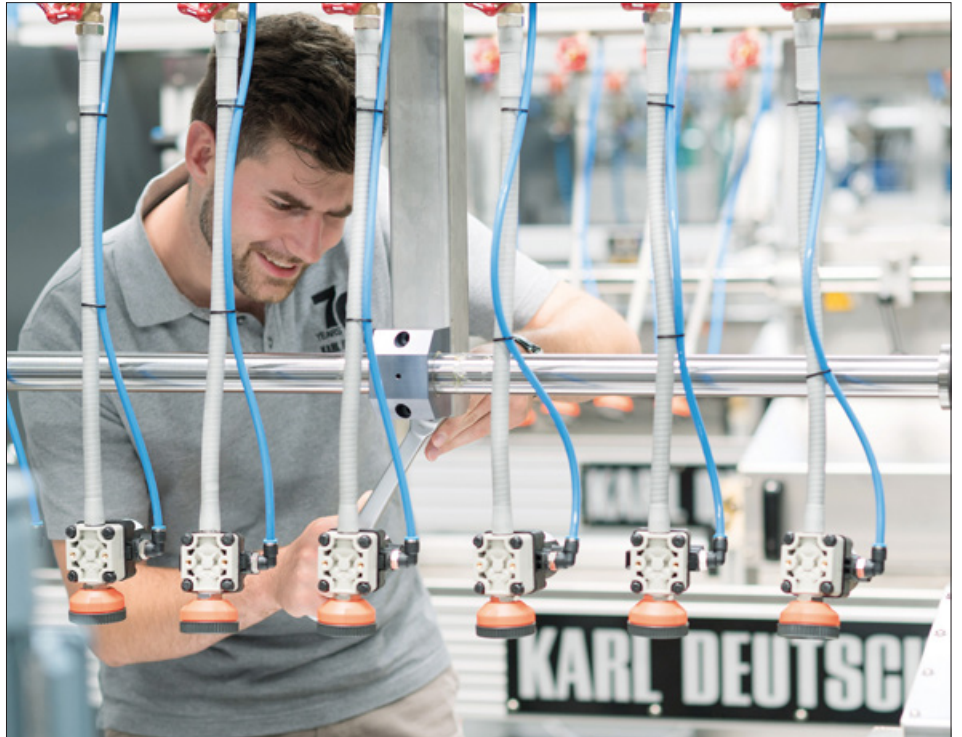
## KARL DEUTSCH: Your Expert for Certification of Crack Detection Systems from all Manufacturers

**Do you need an inspection appointment at short notice? Welcome to KARL DEUTSCH - your reliable partner for the certification of crack detection systems from a wide range of manufacturers.**

Thanks to our many years of experience and in-depth expertise, our certification processes always meet the highest standards. We follow all relevant standards, including ISO 9934, ISO 3059, ASTM E144 and ASTM E709, ASTM E 3024, to ensure that your crack detection systems perform optimally and that your operational safety is guaranteed.

Why should you opt for KARL DEUTSCH?

**Highest quality:** KARL DEUTSCH stands for quality and excellence. Our certification procedures ensure that your crack detection systems meet the highest standards and provide optimum performance.



**KARL DEUTSCH certification procedures always meet the highest standards.**

**Comprehensive expertise:** Our specialists have in-depth expertise in the certification of crack detection systems and are familiar with the

most recent standards and best practices.

**Professional organisation:** Our service manager keeps an eye on all customer enquiries and needs and also offers comprehensive after-service support.

**Reliability:** You can rely on KARL DEUTSCH. We are your trustworthy partner who will help you achieve your objectives and operate your systems safely and efficiently.

Put your trust in KARL DEUTSCH for your crack detection equipment certification needs. Contact us today to learn more about how we can help you keep your equipment operating at the highest level. You can reach our contact persons via the group e-mail address: [mt-systems@karldeutsch.de](mailto:mt-systems@karldeutsch.de). **Ba**



**Our specialists have in-depth expertise in certification.**

## New Development ECHOGRAPH SNHF PAUT

Increasing global cost pressure and customer demands for greater flexibility and simplicity require constant innovation, also in the field of automated ultrasonic testing systems. Therefore, as part of an order for our customer Marcegaglia (Italy), a new and advanced inspection solution with robot handling and phased array technology was developed and a new product introduced for the online inspection of RF-welded pipes (ERW pipes) directly after the welding process.

With the newly developed ECHOGRAPH SNHF PAUT ultrasonic inspection system, a robot arm is positioned next to the customer's intended inspection line. The robot arm holds a probe holder into which various phased array probes can be inserted depending on the required diameter range. The concave-shaped probes cover a large area on both sides of the weld seam. Diameter-specific glide pads allow perfect guidance of the probe holder on the surface and therefore reproducible transmission of the ultrasound into the material. Coupling takes place by means of a water gap.

In test mode, the phased array probe is positioned concentrically to the tube, with the tube passing under the probe holder. A calibration station is provided alongside the test line, into which tube half-shells are inserted, providing different diameters with reference flaws. To verify the test settings (reference measurement), which must be carried out at certain intervals, the robot moves the probe holder over the reference body at the same test speed as the test line.

During the online inspection of ERW tubes, the tubes are inspected in continuous



**ECHOGRAPH SNHF PAUT with dynamic reference measurement on the pipe half-shell with artificial flaws during internal commissioning in our Works 2**



mode, which can equate to a total tube length of up to 1000 metres. The aim is to find weld seam defects that can occur during the scraping or welding process. Typical reference defects here are external and internal longitudinal grooves N5 or N10 (i.e. 5 % or 10 % depth of the wall thickness) and circular disc reflectors of 3.2 mm.

The phased array technology used here offers a major advantage in weld seam inspection, as the operator does not have to move the inspection system radially if the weld seam deviates from the ideal position, due to the sector scan used covering a wide area around the weld seam. No seam tracking technology is required either. However, if the operator detects an excessive deviation of the weld seam from the ideal position by means of the installed camera, the probe holder can be adjusted online using a joystick.

The development of the described ECHOGRAPH SNHF PAUT was carried out in close cooperation with colleagues from KARL DEUTSCH ITALY. Within six months, from project planning to internal



**ECHOGRAPH SNHF PAUT probe holder with phased array probe**

commissioning, a flexible, high-performance and cost-effective ultrasonic in-

spection system was jointly developed, demonstrating the excellent co-operation between the two sites. KARL DEUTSCH ITALY is also currently developing a similar system for the same customer. **BJ**



**ECHOGRAPH SNHF PAUT system overview: robot arm with probe holder, phased array electronics cabinet and calibration station**



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Testing Systems

## LSAW Tube Testing System ECHOGRAPH SNUL

In March last year, we received a large order from our Korean partner and customer JSNT for an ECHOGRAPH SNUL ultrasonic testing system for testing LSAW (longitudinally submerged arc-welded) pipes. The system is to be put into operation at the end customer Husteel in Korea in the middle of the year.

KARL DEUTSCH supplied the first test system for testing LSAW pipes 40 years ago. Over the years, we have gained a great deal of experience, which has led to our current advanced state of the art. We are all the more pleased that we have once again succeeded in selling such a testing system ECHOGRAPH SNUL.

The customer's requirements consist of testing LSAW pipes with diameters from 406.4 mm to 1677.0 mm with wall thicknesses between 6.0 mm and 70.0 mm and lengths between 6.0 m and 18.3 m in accordance with common test standards, such as API5L Ed 46 and DIN EN ISO 3183. The pipes are tested as a final quality check after the hydrostatic test.

Various testing systems with two or more single transducer probes next to and on the seam as well as TR probes for lamina-

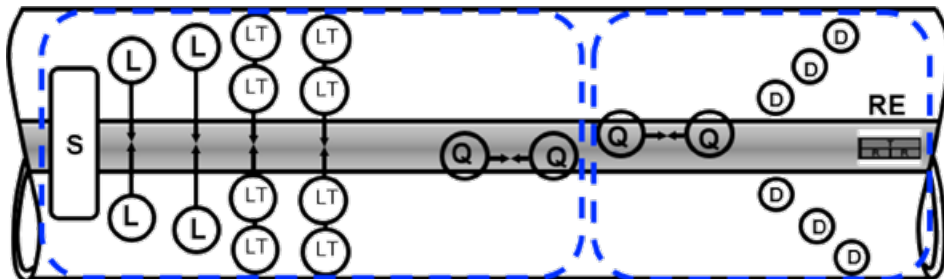


**ECHOGRAPH SNUL: Height-adjustable trolley with test carriage and testing systems lowered onto the test pipe for application tests by means of the in-house roller conveyor**

tions and pipe end testing are used for standardised testing of the weld seam and the area next to it. The test systems are arranged in two test carriages, which

are kept centred in relation to the weld seam by a seam tracking system. A simplified diagram of the inspection systems and their testing function is shown in the schematic sketch.

Schematic sketch:



S = Automatic seam tracking

LT = Detection of longitudinal flaws w/ tandem technology

D = Detection of laminations in the heat-affected zone

L = Detection of longitudinal flaws

Q = Detection of transverse flaws

RE = Pipe end testing

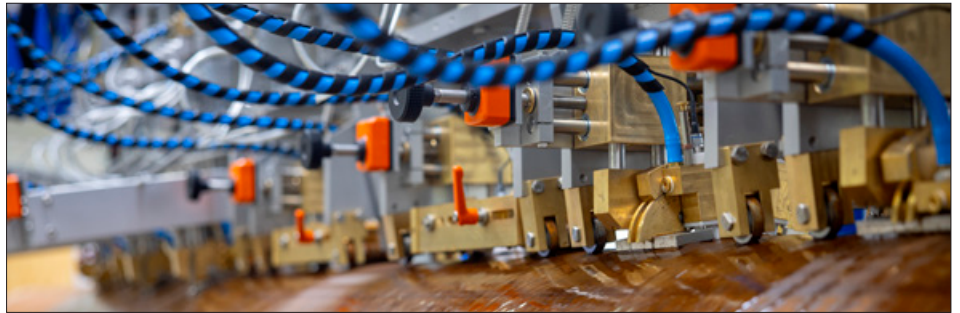
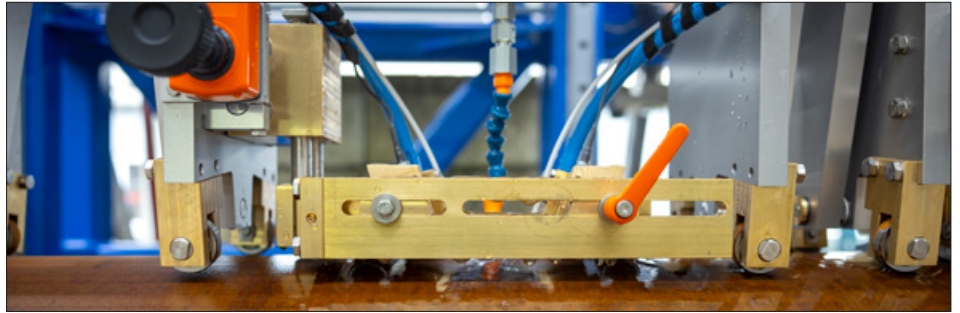
A unique feature of our testing system is the method of ultrasonic coupling, which utilises not only the water gap coupling of the TR probes but also the water jet coupling developed over the last few years for the single transducer probes. With this type of ultrasonic coupling, there is a water column between the probe and the pipe surface in the order of a few centimetres, which leads to low wear of the probes and of the probe guiding devices.



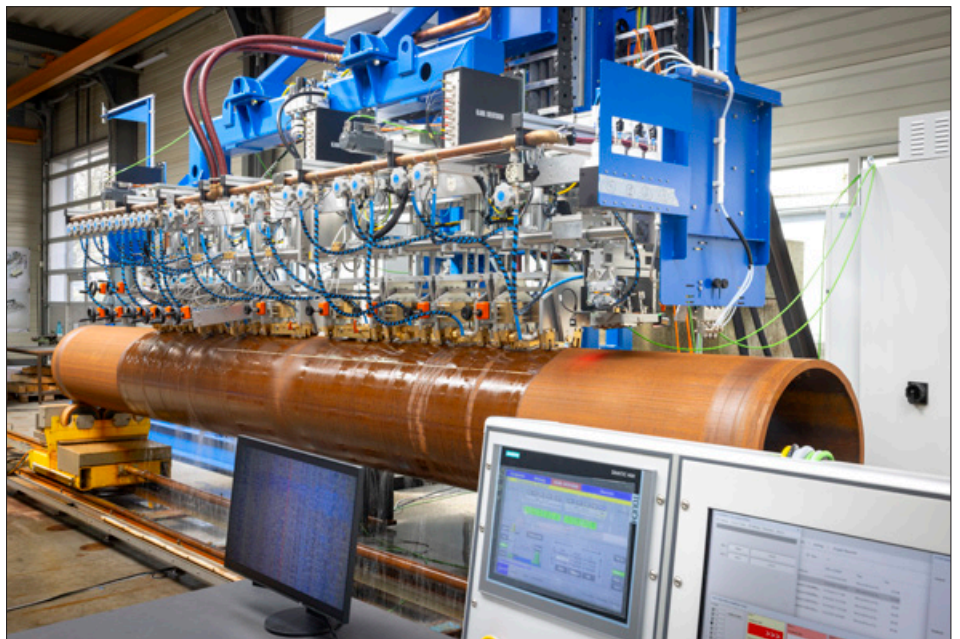
In addition, stable coupling conditions are achieved with a rough pipe surface, which is particularly advantageous for transverse defect testing with a test system on the seam.

The two test carriages, and thus the probes, are moved linearly along the stationary pipe via a height-adjustable travelling carriage, which is attached to an almost 30 m long test gantry. For cost reasons, the test portal itself is manufactured and supplied directly in Korea by JSNT with well-defined interfaces. KARL DEUTSCH's scope of delivery also includes two double rotating roller stations, which are designed to carry and rotate pipes weighing up to 40 tonnes.

Due to the split delivery shares, commissioning at the end customer's site will be a major challenge. For this reason, extensive internal commissioning of the testing system is currently being carried out using our in-house roller conveyor. This will allow the linear movement of the carriage along the pipe to be simulated and the automatic test sequence and application settings to be tested before delivery. Pre-acceptance is scheduled for the end of April and commissioning for the middle of this year. **BJ**



Various testing systems: tandem testing systems (top), transverse flaw detection system (centre), laminations testing systems (bottom)



ECHOGRAPH SNUL: Application tests from the point of view of our commissioning team at the operating panel for ultrasonic settings and system control



[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Ultrasonic  
Testing Systems » LSAW SNUL

## UT System with Modern Testing Electronics ECHOGRAPH 1170 and X-Y-Z 3D Spatial Gantry

**Linde Hydraulics GmbH & Co. KG**, based in the German town of **Aschaffenburg**, is a renowned supplier of modular hydraulic and electronic drive systems. The product range includes hydraulic pumps, motors, valves, electronic controls and peripheral equipment for well-known, globally active manufacturers of mobile machinery in the construction, mining, agricultural and forestry sectors.

An ECHOGRAPH 1170 TTPS ultrasonic testing system was developed and built for the Aschaffenburg site for quality assurance during the manufacture of Linde finished parts, such as cylinder blocks and slide shoes.

The part to be tested consists mainly of a steel cylinder to which a bronze layer is applied. Process-related bonding defects are possible between the cylinder surface and the bronze layer. The bronze layer is checked with ultrasonic testing to ensure quality.

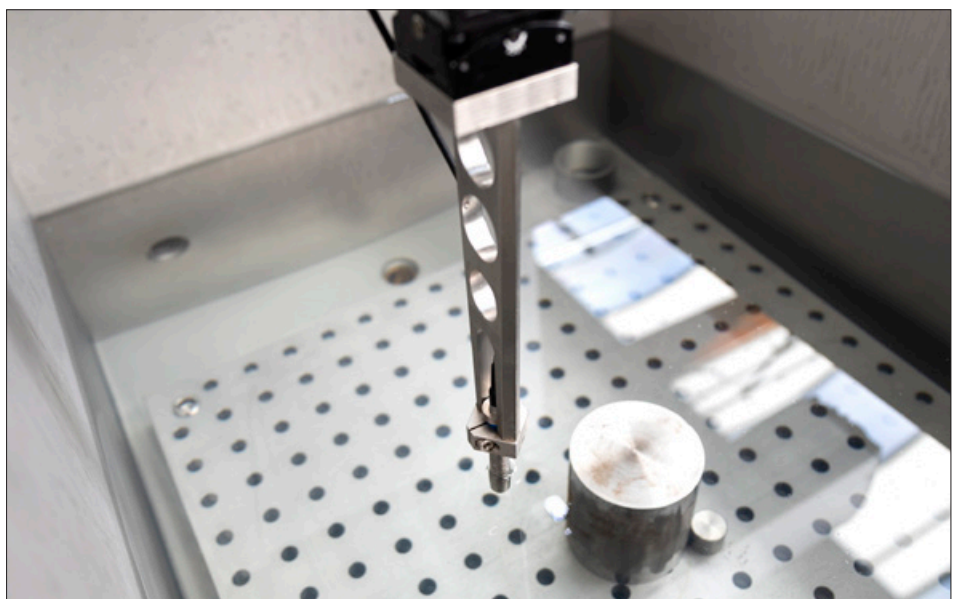
The testing device consists of an immersion tank filled with water and corrosion protection (ECHOKOR 9027) and a 3D spatial gantry for moving the ultrasonic probe. It is designed for several components with different geometries and can be customised.

The ultrasonic testing system works mainly in automatic mode. The operator places the part to be tested in the exact position on the component holder equipped with fixing elements in the water basin and then starts the testing process.

During testing, flaw signals and monitor events are collected in order to pass on

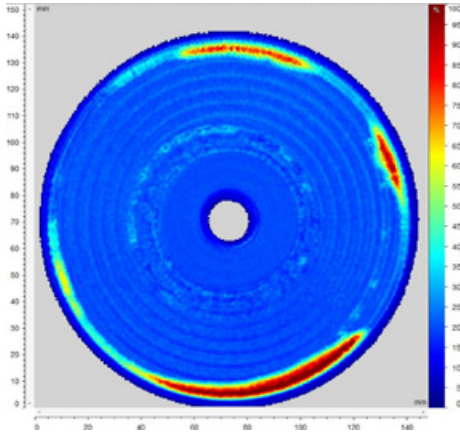


UT inspection device ECHOGRAPH 1170 for steel cylinder blocks



Immersion tank with vertically arranged, focussed ultrasonic probe





**C-scan of the cylinder block: The blue circles represent the range of smaller signal amplitudes. The areas shown in light blue through yellow to red provide echoes, i.e. they have no contact with the underlying material.**

the summarised results to the control system. The separate 19" monitor in the control cabinet, which is controlled by a PC, displays the test results as a colour-coded C-scan for the individual assessment cri-

teria (see image: "C-scan of the cylinder block").

Finally, the operator evaluates the findings according to OK/NOK criteria, with the result of the test also being generated and saved as a report in PDF format for statistical purposes.

The required test positions depend on the geometry of the respective component type and can be approached freely using the X-Y-Z drives. Prior to the first test, the positions are set manually and then saved as a data record for the corresponding component type. A built-in PC manages the parameters and enables fast data acquisition of the test results.

This compact system with electronics cabinet and X-Y-Z spatial gantry provides

a simple but convenient and flexible application solution for an area scan to provide two-dimensional colour ultrasound evaluation. **Sn/Rz**



[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Ultrasonic Testing  
Electronics » ECHOGRAPH 1170

## 13th Conference on NDT in the Railway Industry

**3 interesting days, about 400 participants, 30 exciting presentations, 19 booths in the equipment exhibition, great discussions and much more – that was the 13th Conference on NDT in the Railway Industry in the German town of Erfurt!**

KARL DEUTSCH presented at a well-attended exhibition stand. Our colleagues Michael Ratmann and Stefan Kierspel contributed presentations: "UT and MT Testing of Railway Components" and "UT Testing of Hollow and Solid Shafts in Workshop Use." Thanks to DGZfP for a successful event! **Kr**



**Hollow shaft testing system**



## NDT Testing Services with Equipment from KARL DEUTSCH



**Materialprüfung Hesselink GmbH** is an SME testing service provider based in the German region of Western

Lower Saxony. The team of 10 experienced inspectors is successfully represented with services in various industry sectors.

Power plants, energy suppliers, municipal infrastructure providers and system manufacturers belong to the customer base.

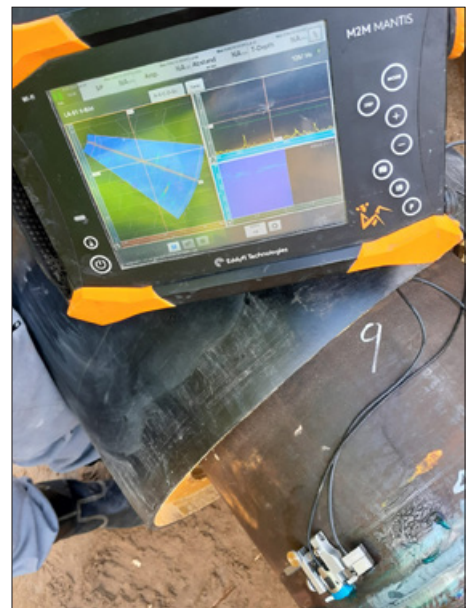
In addition to the common VT, PT, MT, RT and UT methods, phased array is also offered.

Work has recently been made easier by three new ECHOGRAPH 1095 flaw detectors. The intuitive menu navigation and clear display represent significant added value for inspectors in their daily work.



Typical operating conditions for the MANTIS system

Phased array inspection with MANTIS instruments is supported by modern weld seam scanners, among other things. **HI**



Phased array testing with position encoder



ECHOGRAPH 1095 providing the evaluation methods DGS, DAC, TCG



[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Ultrasonic Flaw  
Detectors » ECHOGRAPH 1095



[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Phased Array »  
MANTIS

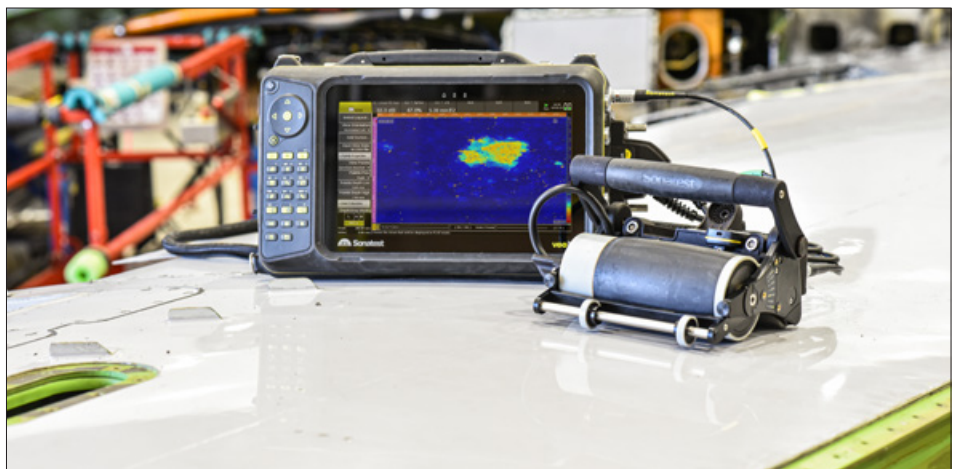


## SONATEST VEO3: New Addition to the KARL DEUTSCH Phased Array Portfolio

The partnership established in May 2023 between SONATEST Ltd. in the UK and KARL DEUTSCH has added a new, powerful member to our phased array portfolio – the VEO3.

The VEO3 is an extremely robust, site-compatible instrument with IP66 protection. The system is operated either exclusively via a fast and precise PCT screen and, if required, with additional quick access buttons. External input devices, such as a keyboard or mouse, can also be connected. A wireless network connection for data transfer and remote control is possible via a USB WLAN adapter supplied. The operating time is around six hours with lithium-ion batteries. Thanks to its 64-bit Linux operating system, data records of almost any size and quantity can be stored - with a 128 GB SSD storage capacity, large amounts of information can be recorded in a single log file.

The VEO3 has a choice of 16 or 32 parallel and 64 or 128 controllable phased array channels. All variants are available with or without TFM and all have four conventional ultrasonic connections for single-transducer or TR probes and/or TOFD. An outstanding unique feature is the ability to combine phased array and TFM scans in



VEO3 with the WP2 128 roller probe for testing aircraft wings

one inspection data set and display them in parallel on the screen.

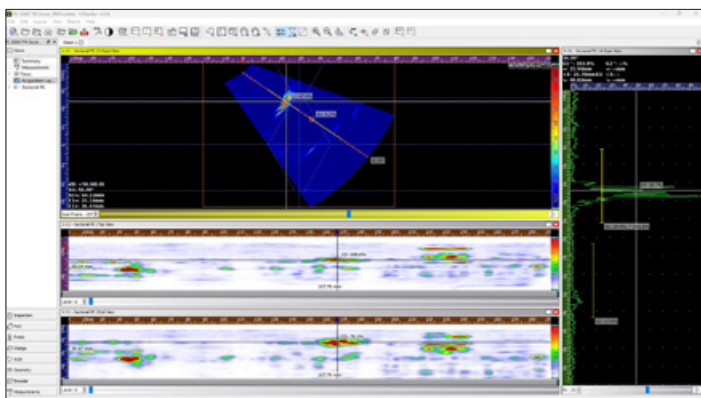
In the unique TFMi mode, up to four live TFM modes can be combined in one image. The image displays of the individual modes are combined with each other and the overall image is merged into a single display. The display of flaws is closer to reality than ever before. The display enables high-precision height determination and improved shape accuracy, making it easier to characterise defects.

Path-dependent data recording can be carried out via two axes, so that both linear and area scanning can be carried out without any problems. If no position encoder is available, time-dependent recordings are also possible.

The roller probe with 128 elements (WP2 128), which has recently become commercially available, is brand new. As a further development of the proven WP 2 with

64 elements, the WP2 128 allows test tracks of up to 100 mm in width. This makes it very easy to carry out extensive surface scans in the shortest possible time. Test frequencies of 2 MHz, 3.5 MHz, 5 MHz and 10 MHz can be selected – ideal for corrosion tests and composite materials.

The package is complemented by a licence for the “UT studio” PC software, which is included in the price and can be used to create test data sets, analyse recorded scans and create test reports. Other software solutions, such as “UT map” for merging scans and “X pair” for connecting the VEO3 to other computers, complete the possibilities of a connected inspection system. **KI**



PC software “UT studio”: External creation of test data sets, analysis of recorded scans and generation of test reports



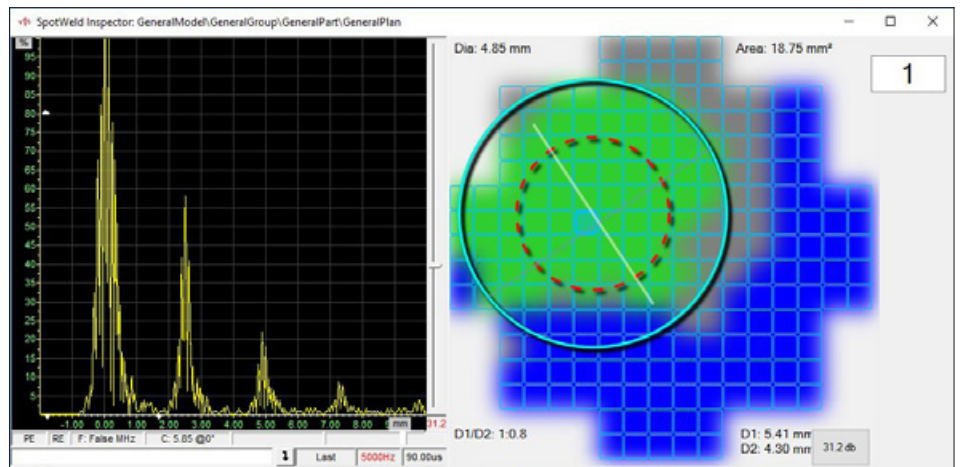
[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Phased Array »  
VEO3

## ScanMaster UT/X – New Functions for Imaging Spot Weld Inspection

The UT/X system for imaging spot weld inspection with phased arrays, which has been established for many years, is constantly being improved. Not only are unavoidable software bugs identified and fixed, but new features are also constantly being developed to give the inspector every possible freedom for a wide range of inspection settings. This article will briefly describe four new features.

**Data format for test reports:** Previously, it was possible to export generated test reports in PDF or EXCEL format. However, this led to restrictions if the reports were to be transferred to a different, user-specific format. For this reason, it is now possible to transfer the test reports to a CSV format, which makes data handling much more flexible.

**Movable display for minimum diameter:** The smallest permissible welding lens diameter was previously displayed as a red circle in the pixel matrix of the UT/X display. This circle was centred and rigidly arranged, which made it difficult to visually compare it with the actual diameter during the test. In the current software, the minimum circle always follows the current live

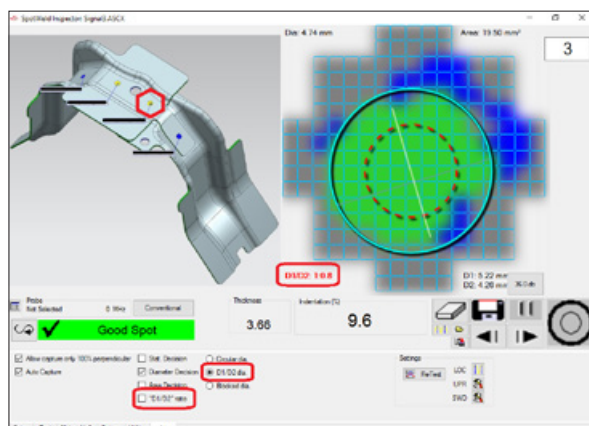


**Direct comparison of the minimum diameter to the welding lens diameter measured in real time using seam tracking**

image of the welding lens, allowing direct visual comparison during the test.

**Diameter as evaluation criterion:** Up to now, the following evaluation options were provided for evaluating the measured diameter: Largest circular diameter, smallest blocked diameter and the mean value of the largest and smallest diagonal D1 and D2. The latter evaluation method is directly related to the measurement of tensile tests in destructive spot weld testing. What was missing until now was the use of the length ratio between D1 and D2 as an evaluation criterion. The current software version closes this gap by allowing an individually adjustable ratio value to be used as a yes/no criterion in the automatic evaluation.

the evaluation again with the modified parameters using the “Re-evaluate” command. This process could be repeated until the evaluation by the UT/X correlated as closely as possible with the real welding lens situation. It is now also possible to re-evaluate complete test series with modified parameter settings. This allows the evaluation criteria to be cross-checked over a large number of points and also statistically validates the result. After the re-evaluation, a modified test report is obtained, which can then be compared with the original evaluation results. **Ki**



**Specification of the length ratio of the largest and smallest diagonal as an evaluation criterion**

**Re-evaluation of measuring points with altered parameters:** In order to adapt the evaluation criteria on which the test is based and which are stored in special data sets to the actual situation in destructive testing, it was previously possible to modify them for a measured spot and run



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**Products » Spot Weld Testing »**  
**SCANMASTER UT/X**

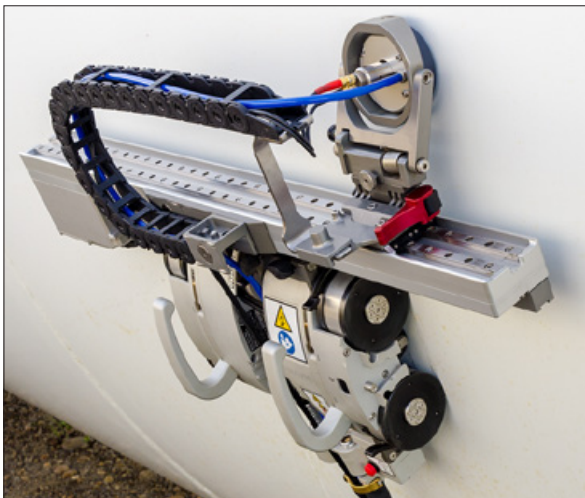


## Robotics Innovation with Phased Array

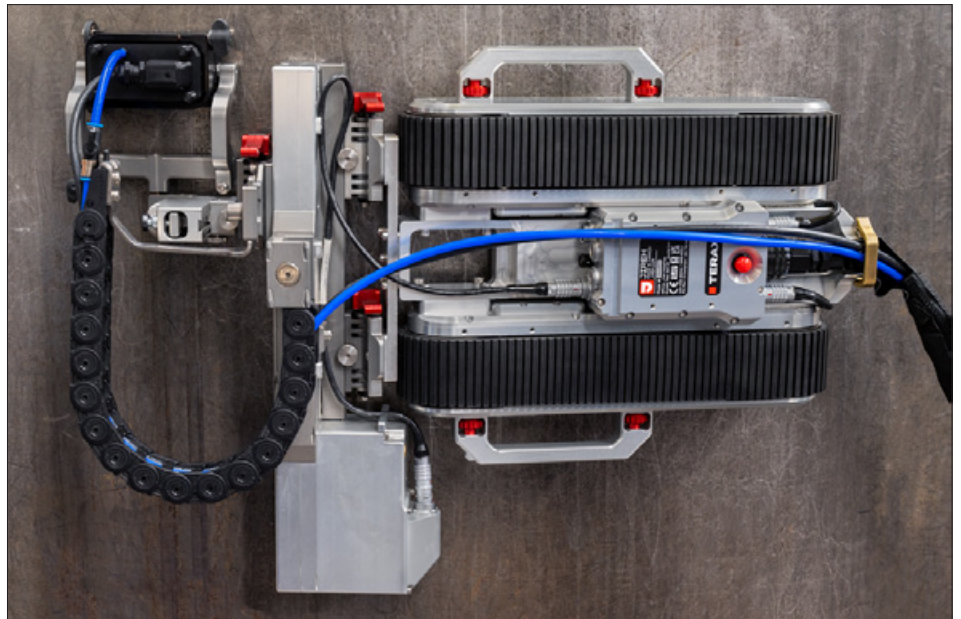
**KARL DEUTSCH** offers its customers high-quality and customised solutions for semi-automated ultrasonic testing using advanced techniques such as Phased Array (PA), Time of Flight Diffraction (TOFD), Total Focusing Method (TFM) or Plane Wave Imaging (PWI). With 75 years of engineering experience at the Wuppertal site, **KARL DEUTSCH** is a trusted partner for companies looking for outstanding quality and reliable performance.

For the precise and reliable detection of defects in critical structures such as pipes or pressure vessels, **KARL DEUTSCH** supports its customers with feasibility studies in its application laboratories, simulative applications (ES BEAM TOOL, CIVA) and competent on-site training.

Furthermore, probes are manufactured and repaired according to specification. This service ensures a high level of safety and integrity in the application. In addition, **KARL DEUTSCH** offers the integration of remote vision and control for a target-oriented inspection of hard-to-reach or hazardous areas. This shortens



**NAVIC 2** for corrosion testing using conventional UT or, for example, TFM using HydroForm



**TERAX** for corrosion/weld seam testing

inspection times and minimises the risk for inspection personnel.

In addition to the extensive portfolio of scanners, probes and ultrasonic devices, a fully automated evaluation of the inspection data is offered, for example using CIVA software. This supports the inspection personnel, reduces human error and ensures precise analysis of the data, resulting in efficient maintenance.

The added value for the customer lies in the combination of technical excellence, customised solutions and a strong focus on quality and reliability. By partnering with **KARL DEUTSCH**, companies can operate their systems safely, minimise downtime and save costs in the long term.

**KARL DEUTSCH** is therefore the perfect choice for custom-

ers looking for leading technology and first-class service. **Hoa**



**NAVIC 2** with RVI and optional laser tracker

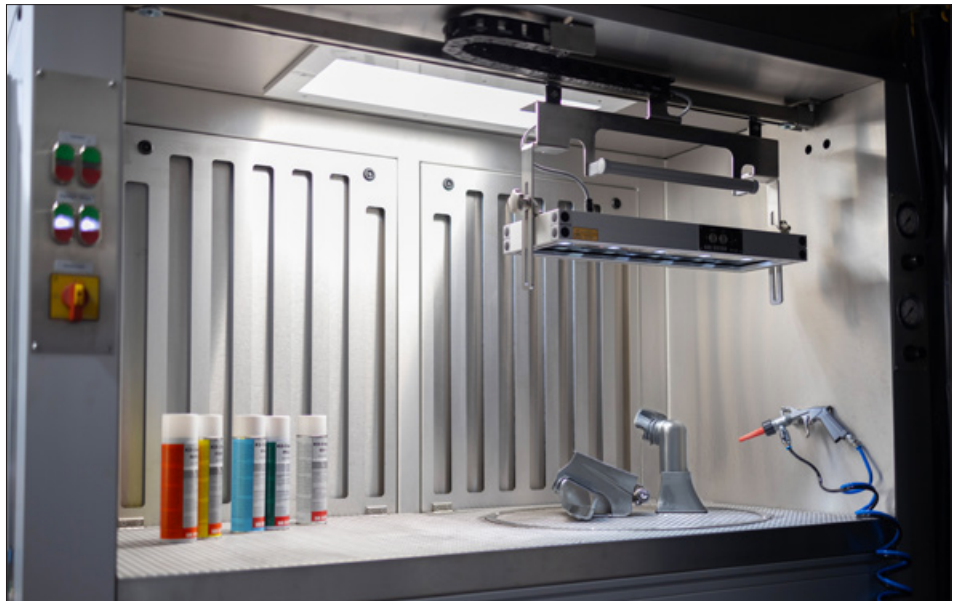


You can use this QR code to arrange your non-binding consultation appointment online. Or contact us by e-mail to [PA-Solutions@karldeutsch.de](mailto:PA-Solutions@karldeutsch.de)

## PT Testing Stations and Systems from KARL DEUTSCH

**KARL DEUTSCH** has been developing, building and selling testing stations and automated penetrant systems for PT testing for many years. The product range covers small units for training courses, test stations for laboratories and in-process testing as well as partially and fully automated systems with complex water treatment and pre-cleaning stages.

All procedures of the various standards such as DIN EN ISO or AMS are covered. Whether red-white tests with aerosol cans, tests with fluorescent penetrants that are applied electrostatically or post-emulsifiable systems for serial testing of aerospace components in dip tank systems. We find the right solution for every testing task.



**New KD-CHECK test station of the Pro Line Series with baffle plate pre-filter separation, integrated daylight lamp in the roof and movable holder for large-area UV LED lamps**

Our team gives customers advice on topics such as design, parts handling and throughput from the very first enquiry.

Customised standards are also taken into account. If no suitable system can be found from our extensive range, customised solutions are developed and built.



**Fully automatic testing system for penetrant testing with water-washable penetrants**

Confidence in the systems is an important factor. For this reason, every unit, whether a small testing station or a large automated system, is set up at our factory in Wuppertal and tested as closely as possible to the subsequent production standard. This means that our technicians are able to clarify questions with the customer in advance and the customer knows what they are getting. This makes subsequent assembly and commissioning easier for both sides.

Do you have an exciting testing task for us? Then please contact us. **Rb**



[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Penetrant Testing »  
Testing Stations and Systems

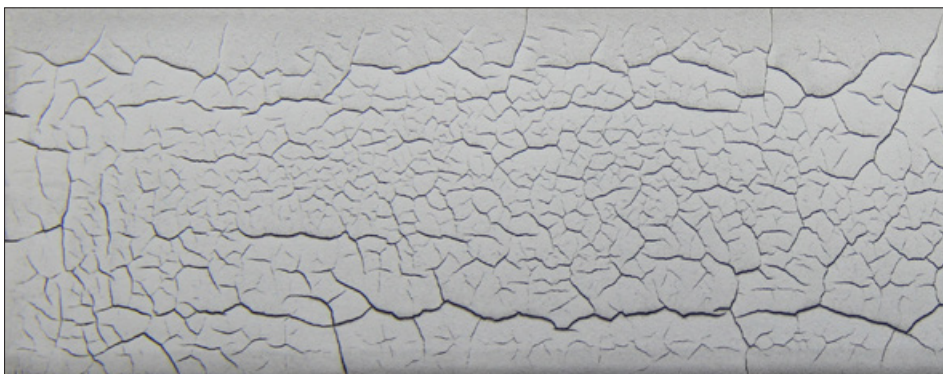


## New Background Paint in Aerosol Cans for Magnetic Particle Testing

One of the most widely used test methods in magnetic particle testing is the black and white method.

A thin white contrasting layer is applied to the components to make the black magnetic powder of the crack formation more visible. This paint must meet many requirements. The quantity of paint particles must not be too high in order to minimise the risk of an excessively thick covering layer. Nonetheless, the paint should cover in one spray pass. The degree of whiteness and drying speed are also important.

All these parameters were re-evaluated, examined and optimised in advance in the new version of the FLUXA 9015 background paint. Together with the black mag-



Crack indications with FLUXA Concentrate BLACK-W on new background paint FLUXA UG-W

netic powders from our FLUXA range, whether in aerosol cans, as concentrates or ready-mixed, you will receive a reliable testing system.

We will gladly advise you on your testing task and find the right product for you. **Rb**



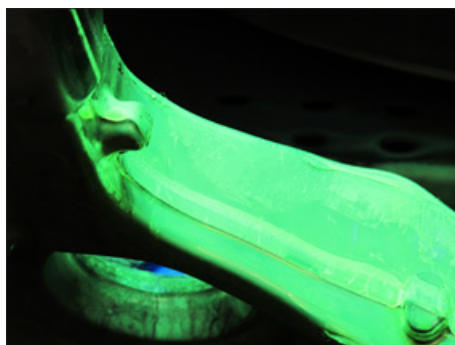
[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Chemical Products »  
Magnetic Particle Testing »  
Non-Fluorescent

## Why Still Use Oil-Based Penetrants?

For some years now, NDT has also been paying greater attention to environmental aspects and occupational safety in the area of inspection media.

Where water-miscible magnetic powder concentrates have long been a standard, oil-free, water-based penetrants have also established themselves on the market. Labelling-free aerosol cans, solvent-reduced or solvent-free developers, skin-friendly test oils — many things have improved. As a result, many users believe that older testing media, such as oil-based penetrants, have now disappeared from the market as they are no longer used.

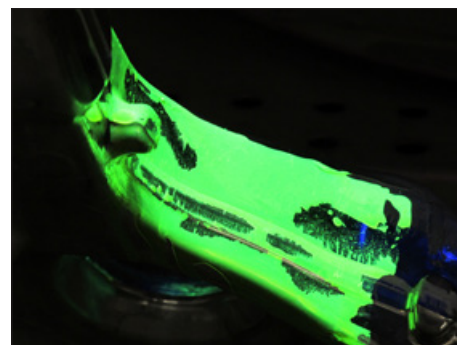
But no: these testing agents are still available for certain special cases or critical applications. Be it for compli-



Good wetting, oil-based penetrant

cated wetting properties or rare materials, we can select the right product for you from our wide and varied product range.

Of course, these classic testing agents are also constantly being further developed and therefore meet all current and common standards.



Poor wetting, water-based penetrant

Where would you like to see an improvement in your testing processes? We are happy to advise you and look forward to exciting projects! **Rb**



[www.karldeutsch.de](http://www.karldeutsch.de) »  
Products » Penetrant Testing »  
Penetrant Media

## New Foundation BTD



Hollow shaft testing system for rail vehicles

**On 1 April 2024, we founded BTD GmbH, based in Brandenburg, together with our partner “Material Science Campus”.**

We are proud to see that the KARL DEUTSCH group of companies is growing and that this foundation opens up exciting new sales channels for us. The new company in the KARL DEUTSCH family is primarily involved in the manufacture of testing systems for non-destructive material testing in the railway vehicle sector. In addition, with the founding of BTD GmbH, we are reorganising our sales activities for KARL DEUTSCH products in eastern Germany. As a result, we are now even closer to

our customers with competent specialist staff.

The company BTD GmbH & Co. KG, whose former owner, Wolfgang Spruch, will also be part of the management of the newly founded company. By acquiring the expertise from BTD GmbH & Co. KG (for more than 15 years on the market in the field of testing systems for railway vehicle engineering), the innovations in the KARL DEUTSCH Group will be further developed. The company is managed by the Managing Directors Sven Rühle (Material Science Campus) and Sascha Rosenbaum (KARL DEUTSCH). The management team is

complemented by the two authorised signatories Wolfgang Spruch and Olaf Wiedfeldt (CTO).

We are looking forward to a large number of exciting railway vehicle projects that we have already been able to realise for interesting customers this year. This demonstrates the strong market confidence in KARL DEUTSCH as a reliable partner in the field of non-destructive testing.

Do you have any questions about the new foundation? Please feel free to contact us. **Kr**



**Olaf Wiedfeldt (CTO BTD), Sascha Rosenbaum (CFO KARL DEUTSCH), Sven Rühle (Managing Director Material Science Campus) and Wolfgang Spruch (authorised signatory BTD), from left to right**



## ECOMAG To Become KARL DEUTSCH ITALY S.R.L.

For 40 years now, as one of the first subsidiaries, the Italian company ECOMAG has symbolised international cooperation at KARL DEUTSCH like no other company.

The two companies have always been characterised by close ties and a shared success story. In order to meet the increasing demand on the Italian market and to further expand KARL DEUTSCH's broad product portfolio, the cooperation was taken to a new level in March 2024: From now on, ECOMAG will be represented on the Italian market under the name KARL DEUTSCH ITALY S.R.L.

The renaming of the company is accompanied by a reorganisation of the business. For the Italian site, this involves spatial modernisation and refocusing. A new headquarters for administration and sales



Vasyl Tomnyuk (Head of Sales), Sascha Rosenbaum (CFO KARL DEUTSCH, CEO KARL DEUTSCH ITALY), Max Cadeddu (Direttore Generale), from left to right

is being built in Cesate, west of Milan, while a new production facility is being set up in Pontecurone (Voghera). As part of the reorganisation, we are strengthening the man-

agement team around Sascha Rosenbaum and have brought extensive market experience on board with Massimo Cadeddu as Direttore Generale and Vasyl Tomnyuk as Sales Manager. The team will guide the new KARL DEUTSCH ITALY S.R.L. safely through the structural change and offer our customers in Italy perfect KARL DEUTSCH service. Despite these far-reaching changes, we are proud that we have managed to keep many of our long-time employees in the company. As a traditional family business with 75 years of history, we see our employees as an essential element for a successful future. Look forward to even better advice and modern production on the Italian market.

Do you have any questions about the reorganisation? Please feel free to contact us. **Kr**

# KARL DEUTSCH

KARL DEUTSCH ITALY S.R.L.

ECOMAG

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Website: [www.karldeutsch.it](http://www.karldeutsch.it)  
P.I./C.F. 07153850156

## New Office for KD CHINA Opens in Beijing

**Our subsidiary KD CHINA has recently moved to new premises as the company has grown considerably and new colleagues have joined the team.**

Among other things, three instead of two after-sales engineers now support our Chinese customers and one colleague takes care of local marketing. The team now comprises a total of eleven people. The new office offers 350 square metres of space (previously: 160 square metres) with great workplaces and state-of-the-art technology. Another reason for the move was that KD CHINA now has its own application technology laboratory on site, where interested parties can, among other things, see an ECHOGRAPH 1170 ultrasonic testing electronics with local mechanics in action. Just recently, a deal was only signed because we were able to offer the customer a 24-hour endurance test. The Beijing representative office of KARL DEUTSCH looks after all customers in the People's Republic of China and also supports our representatives in Taipei. The office is located in the Chaoyang district, where almost all foreign embassies and the majority of international companies are based. The transport connections are also excellent: our office can usually be reached within 30 to 40 minutes from Beijing Capital International Airport. **Kr**



KARL DEUTSCH CHINA in the Chaoyang district of Beijing



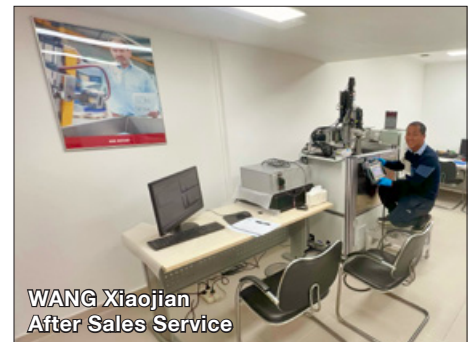
LIU Ling  
Sales



SUN Yue  
Social Media & Sales



WANG Yongsheng  
Administration



WANG Xiaojian  
After Sales Service



Air quality in the office (left)  
and outdoors (right)



Olaf DEUTSCH  
and his team



## KARL DEUTSCH International: USA

2023 was an interesting year for KARL DEUTSCH in terms of the international market. By adding new employees to the team, KARL DEUTSCH was able to significantly improve its global profile and record significant growth in many regions, which also contributed to the record result in 2023.

Our most recent international sales meeting was also of great importance for improving the quality of cooperation with our international partners and was rated very positively by the participants. Several important goals that our company has always strived for were agreed at this event.

**The situation in North America:** The USA, for many the promised land and a country of unlimited possibilities, has so far not proved to be an outstanding market for us. But KARL DEUTSCH has proven in its almost 75 years on the market that you shouldn't give up. Further discussions on the implementation of expansion plans in the USA were held with existing distribu-

tors. One of them has just restructured its ownership structure, gained full control of the company and decided to expand the existing area of cooperation. We are talking about the company Rohmann LLC and its new owner Dietmar Griem.

As an independent owner, he saw the opportunity just as we did, and a meet-

ing in Wuppertal served to work out our joint plans. It was decided to hire a new sales manager, purchase a number of demonstration units and work hard over the coming months and years. Shortly thereafter, Jim Corleano joined the staff of Rohmann LLC and KARL DEUTSCH. Dur-



Krystian Rostkowski (left) and Jim Corleano at the ASNT Show in Houston, Texas

ing an intensive training course in Wuppertal, he familiarised himself thoroughly with our equipment. Dietmar Griem has already achieved a great deal in the American market by integrating ET, UT and MT solutions and providing excellent service. Our joint appearance at the ASNT trade fair in Houston also showed that our ECHOGRAPH 1170

has good potential. There are large American integrators who are interested in working with us to provide the best possible solutions for their end customers. The reliability of our devices, the German build quality and the good local support are also very well received by American customers.

We are aware that the path to the desired goal requires a lot of work and commitment. There is a lot to do. That is why we actively support Jim and Dietmar in their daily challenges and wish them continued success. **RoK**



Dietmar Griem (right)

## KARL DEUTSCH Even Closer to Customers in Europe



Dr. Wolfram Deutsch (Managing Director KARL DEUTSCH), Anton Sevryukov (CEO KDS-CND) and Danila Kabanov (Sales KDS-CND), from left to right



Florian Zeman (Sales Director Austria)

**KARL DEUTSCH is expanding! Two new partners have been acquired in Europe in recent months:**

France: During the last French COFREND NDT conference, a new trading partner,

“KDS-CND” (KARL DEUTSCH Systems - Contrôle Non Destructif), was founded in Grenoble. We are delighted that our French customers are now being supported locally.

Austria: We founded the subsidiary “KARL DEUTSCH Austria” in Vienna and the local team will support our customers in Austria with their testing requirements. Leading the way is Florian Zeman as Sales Manager. **Kr**

## NDT Equipment for DGZfP in Reutlingen

The DGZfP (German Society of Non-Destructive Testing) has opened a new training centre in Reutlingen and KARL DEUTSCH was able to equip the training facility with two PT testing stations, ten ECHOGRAPH 1095 UT flaw detectors including accessories and an MT system.

The UMT MT testing system was handed over to Michael Schmidt (Regional Manager DGZfP) just in time for the next MT course 1/2. KARL DEUTSCH wishes him and his team lots of fun with the new test system and successful MT courses. **Kr**



Happy faces at the handover of the new MT system: Michael Schmidt (left) from DGZfP and Titus Peltsh from KARL DEUTSCH



## International Sales Meeting



**More than 50 people from almost 20 nations from our subsidiaries and representatives visited us for the KARL DEUTSCH International Sales Meeting.**

The four days in Wuppertal focussed on training and courses in the areas of UT, MT and PT. In addition to technical presentations and demonstrations, there was of course also practical training.

Of course, there was also plenty of socialising, which everyone was delighted about, as the previous International Sales Meeting took place before the pandemic.



We had a great time together and are already looking forward to the next Sales Meeting!

You can find impressions of the Sales Meeting on our YouTube channel "NDTChannel" or via this QR code:



<https://www.youtube.com/@NDTChannel1949>



## KARL DEUTSCH at DGZfP Munich Working Group

Working group leader Torsten Nancke had kept good records and noted that KARL DEUTSCH had last been a guest of the Munich working group seven years ago. A new lecture date was therefore jointly agreed at the DGZfP annual conference in Friedrichshafen.

As the Oktoberfest was taking place at the same time, Dr. Wolfram Deutsch not only brought his colleagues Stefan Kierspel and Titus Peltsch to the lecture, but also his brand new lederhosen.



**Dr. Wolfram Deutsch wearing lederhosen – in keeping with the season**

KARL DEUTSCH's presentation covered ultrasonic testing and magnetic particle crack detection. The presentation opened



**High-performance and customised ECHOVIEW UT software: this is an example of nine amplitude strip charts (amplitude plotted over distance)**

with a look at the ECHOGRAPH 1170 testing electronics, which is used for many automated ultrasonic testing applications. The electronics are based on four-channel modules that can be cascaded depending on the application.

The superordinate ECHOVIEW software is used to manage the test parameters and for customised processing of the test data. The A-scan, B-scan, C-scan, D-scan and strip chart can be selected for each

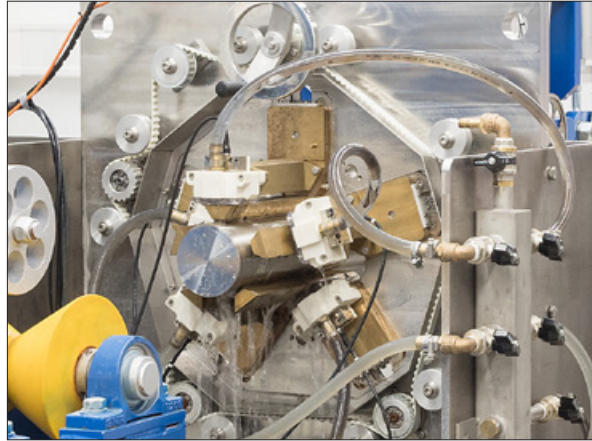
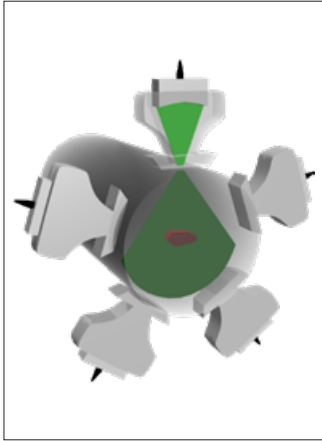
channel. Statistics and test reports are generated and customised by the in-house software team.

ECHOVIEW is also used to operate phased array inspection systems or combinations of conventional inspection technology and phased array. The operator is provided with extensive software wizards, for example to set the delay laws of phased array probes and to carry out the alignment of the ele-



**The Munich working group was well attended and there was plenty of time for socialising in addition to the professional exchange.**





**ECHOGRAPH STPS PAUT phased array testing system for bars with five probes**

ments per probe as conveniently as possible.

KARL DEUTSCH can offer its customers both a conventional and a phased array solution for virtually any application. As an example, a bar inspection system was presented in which five phased array probes are coupled with water nozzles. With the help of five sector scans, complete volume coverage of bars in the diameter range from 20 mm to 130 mm is achieved. Inspection speeds of up to 2 m/s are possible.

Stefan Kierspel has been intensively specialised in manual and semi-automatic

phased array testing for many years. The Total Focusing Method (TFM) provides high-resolution focussed sectional images (B-scan) of the inside of the test parts.

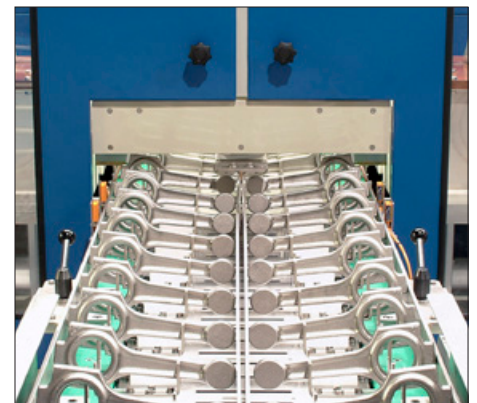
The VEO3 from SONATEST was presented as part of a live demo. The VEO3 is characterised by the fact that the TFM findings of several evaluations are superimposed in the same image. As the TFM method is based on sound propagation times, it is important to select the correct wave mode (long wave, trans wave, consideration of wave conversions). The superimposition of several modes, called TFMi, now provides test results that always contain the relevant information.



**Stefan Kierspel presenting the VEO3 phased array flaw detector with TFMi technology**

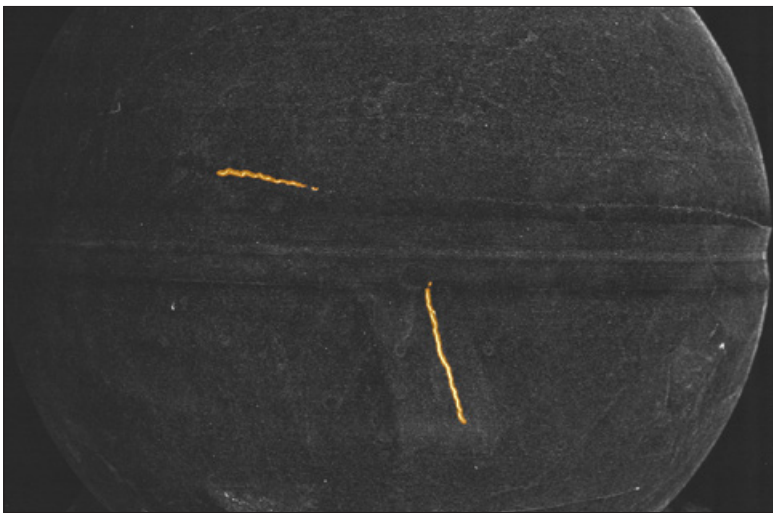
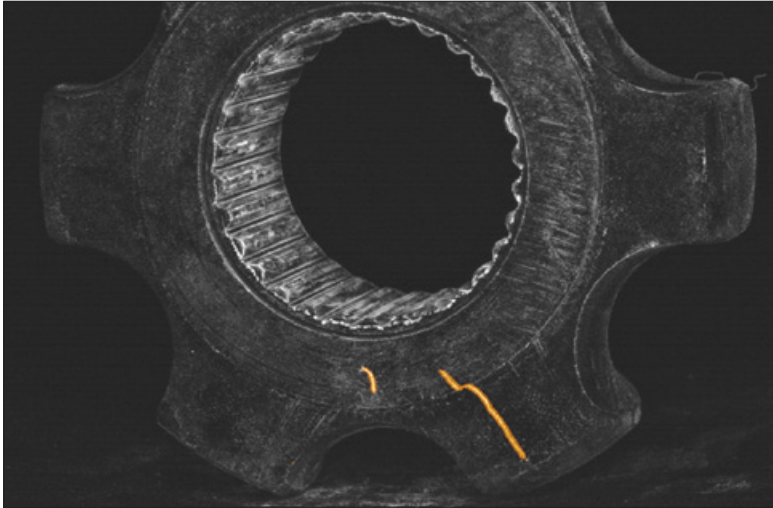
Magnetic particle inspection has been a proven method for detecting surface cracks for many decades. For around 40 years, attempts have been made to automate crack evaluation using image processing. Especially for mass-produced parts with a high throughput, the workload for the inspection personnel is considerable. Usually, the product quality is already very high, so that the inspectors only have few “success experiences”. The difficulty of finding test personnel is also forcing many customers to rethink their approach. Nevertheless, the high costs and the great effort involved in adapting the image evaluation algorithm to the component have so far prevented widespread use.

KARL DEUTSCH has been working intensively on solving this testing problem for



**High-performance DEUTROMAT crack detection system with a cycle time of 2.5 seconds per component (con rod)**

three years. Modern computing technology paired with algorithms based on artificial intelligence (AI) have now led to a breakthrough. CRACKVIEW AI was presented for the first time at the DGZfP Annual Conference 2023. The underlying algorithm has now been trained with thousands of images of cracked parts. High-performance cameras and powerful UV lighting were selected and assembled. Two CRACKVIEW AI demonstrators were built for trials at KARL DEUTSCH and at the customer’s premises.



**CRACKVIEW AI crack detection on various components with marking of crack indications**



**View of a CRACKVIEW AI test station with turntable for holding components, UV lights and camera**

At the start of the project, the pre-trained AI model is trained with component-specific image data. The crack evaluation proves to be robust against pseudo indications such as the display of component edges and surface roughness. Of course, the automation

of the component transport and the number of cameras need to be adapted to the project-specific cycle time requirements.

Following the presentations, KARL DEUTSCH hosted a Bavarian buffet so that

the expert discussions could be continued in a relaxed atmosphere. **WD/Kr**



**Conclusion with buffet at the DGZfP training centre in Munich**



## DGZfP Committee of Experts on Ultrasonic Testing in Kassel

Our colleague Alexander Hoheisel gave an interesting presentation on “KD Robotics Innovation: New Approaches to Mechanised Testing Using Automated Defect Detection and Remote Control Support” to 80 experts at the DGZfP Expert Committee on Ultrasonic Testing in Kassel. He was supported by Dr. Wolfram Deutsch and Dr. Helge Rast. **Kr**



Dr. Wolfram Deutsch, Dr. Helge Rast and Alexander Hoheisel (from left to right) at the DGZfP Committee of Experts on Ultrasonic Testing in Kassel with exhibits on the topic of “Robotics in Mechanised Material Testing”

## Symposium on Digitisation, AI and NDT 4.0



Reinhold Engels (left) shows the UV-LED Hand Lamp and DEUTROMETER, a gauge for magnetic field strength, UV and white light.



Dr. Helge Rast during the presentation “CRACKVIEW AI – AI-based crack evaluation in magnetic particle crack detection”

### Interesting Symposium on Digitisation, AI and NDT 4.0 in Hattingen

As part of the interesting lecture programme, the head of our application technology laboratory, Dr Helge Rast, gave a lecture on “CRACKVIEW AI – AI-based crack evaluation in magnetic particle crack detection”.

Our long-time sales representative Reinhold Engels was on site to support the specialist conference on Digitisation, AI and NDT 4.0.

KARL DEUTSCH would like to thank TÜV Saarland and VECTOR Technische Unternehmensberatung (TUB) GmbH for a successful event! **Kr**

## KARL DEUTSCH Now With a Certified Environmental Management System According to ISO 14001!

**KARL DEUTSCH has been successfully operating a certified quality management system in accordance with ISO 9001 since 1993. In 2023, an environmental management system in accordance with ISO 14001 was introduced at the request of many customers, particularly major customers from the automotive sector.**

Following a successful audit, KARL DEUTSCH has now also had a certified environmental management system since December 2023. The continuous improvement process from quality management is now being applied to KARL DEUTSCH's environmental performance, leading to a better environment and fulfilling the requirements and wishes of many KARL DEUTSCH customers.

Since December, the environmental management certificate in accordance with ISO 14001 has therefore been available for all customers to download from the KARL DEUTSCH website along with the quality management certificate in accordance with ISO 9001. As a KARL DEUTSCH customer, use the downloads in your audits as proof of a qualified supplier: KARL DEUTSCH - not just quality made in Wuppertal. **Fu**



[www.karldeutsch.de](http://www.karldeutsch.de) »  
**Company » Quality and Environmental Management**



## Peace In The Arts

**Can, should, may, must art be political? In Frank N's (art activist and initiator of the art collective OAA) understanding of both art and politics, this question does not arise at all. For him, art is simply (also) political.**

The book FRIEDEN (peace) is a compendium that documents the Out and About (OAA) projects of the past year. The book is supplemented by various texts, including those by Andreu Ginestet and Frank N, which shed light on the relationship between art and peace.

KARL DEUTSCH is a regular supporter of local cultural projects and co-financed the book. **OAA/Kr**



Andreu Ginestet, Dr. Wolfram Deutsch and Frank N (from left to right)



## KARL DEUTSCH To Support Theatres

**See, be amazed, play. For fifty years, the Wuppertal Children's and Youth Theatre has not only been making theatre FOR children and young people, but also WITH THEM!**

Every year, three new productions are created that relate to current themes in children's and youth literature. This makes the Children's and Youth Theatre the only institution in Wuppertal to offer a year-round theatre programme for children, young people, young adults and families. The wide range of courses provides young people of all ages with a variety of opportunities to participate in cultural education, actively shape their leisure time in dialogue with others and gain valuable personal development experiences. KARL DEUTSCH

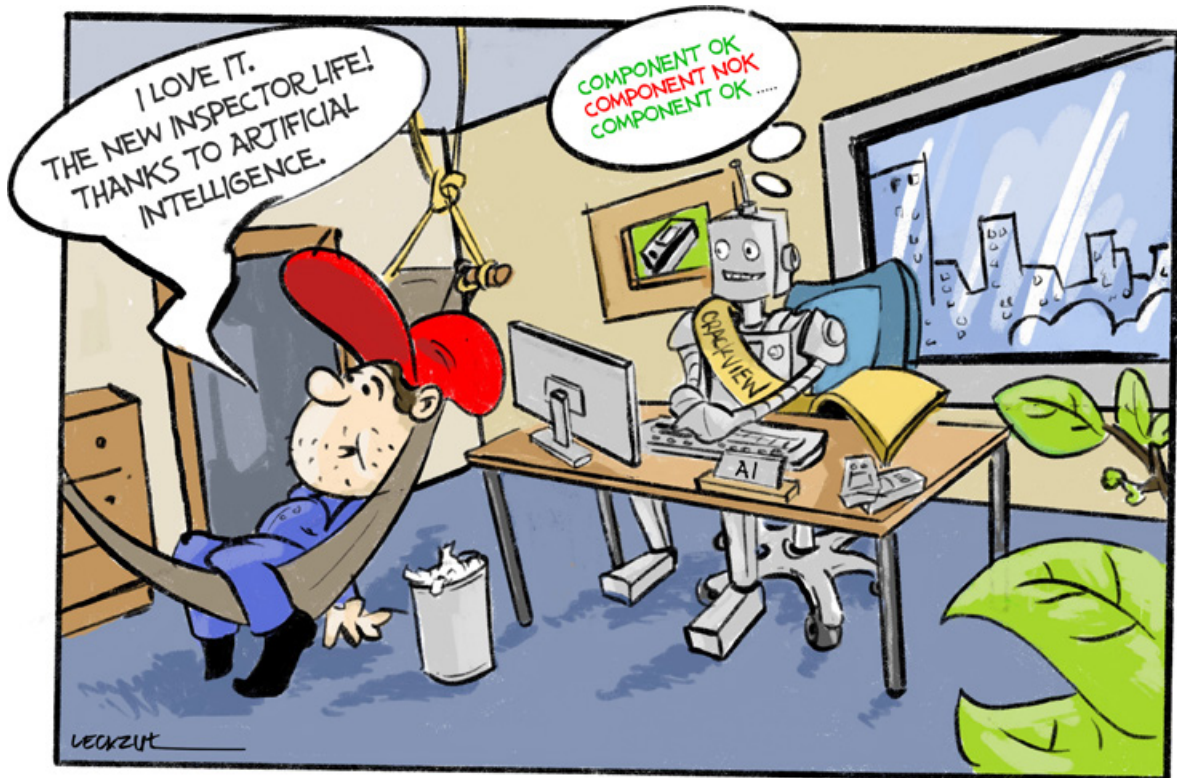


© Kinder- und Jugendtheater Wuppertal

is regularly involved in local projects and has donated a significant amount to the Children's and Youth Theatre.

Further information can be found on the website: [www.kinder-jugendtheater.de](http://www.kinder-jugendtheater.de). **Kr**

## Cartoon



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[www.facebook.com/graffitigestaltungen/](http://www.facebook.com/graffitigestaltungen/)

Events and Trade Fairs

**testXpo**

21 – 24 October 2024

32nd testXpo

ZwickRoell GmbH & Co. KG

August-Nagel-Straße 11

89079 Ulm

Germany

**ASNT 2024**  
EMERGE

21 – 24 October 2024

**ASNT Annual Conference**

Westgate Las Vegas Resort & Casino

Las Vegas, Nevada

USA



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