NON-DESTRUCTIVE TESTING

FULL SCOPE OF INTEGRATED NDT SERVICES

Centre of Competence for Renewable Energy - Varaždin

NON-DESTRUCTIVE TESTING

Non-destructive testing (NDT) includes a number of analysis techniques used to evaluate the properties of a material, part, product, weld or system without causing damage to the article being evaluated. NDT techniques are frequently used in a variety of engineering applications, including forensic, mechanical, electrical, civil, systems, aerospace and aeronautical as well as medical applications.

NDT techniques do not damage or permanently alter the article being inspected, making them efficient and cost-effective analysis methods in product evaluation, troubleshooting and research. **NDT techniques are particularly useful in ensuring the quality of finished products when employed during critical stages of the manufacturing or fabrication process.**

CCRE is fully equipped to provide custom testing and assessment services to address unique application specifications. We also offer NDT testing and analysis services at customer site locations and in the field to provide maximum flexibility. We can provide you with complete and valuable data based on well-designed procedures and highly trained and certified NDT inspectors.

Our scope of services at a glance

NDT techniques of inspection which we can offer are:

- Visual inspection
- Inspection with liquid penetrants (visible and fluorescent)
- Inspection with magnetic particles (dry, wet black and wet fluorescent)
- Conventional and Phased Array ultrasonic inspection

Q TECHNA, Institut za zagotavljanje in kontrolo kakovosti d.o.o.
Q TECHNA, Institute of Quality Assurance and Quality Control Ltd

Your benefits at a glance

CCRE NDT services have various benefits, including:

- Benefit from working with a single source supplier
- Save time and money
- Gain customer confidence
- Stay ahead of technical developments

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VISUAL TESTING

Efficient and Effective Nondestructive Analysis

What is visual inspection?

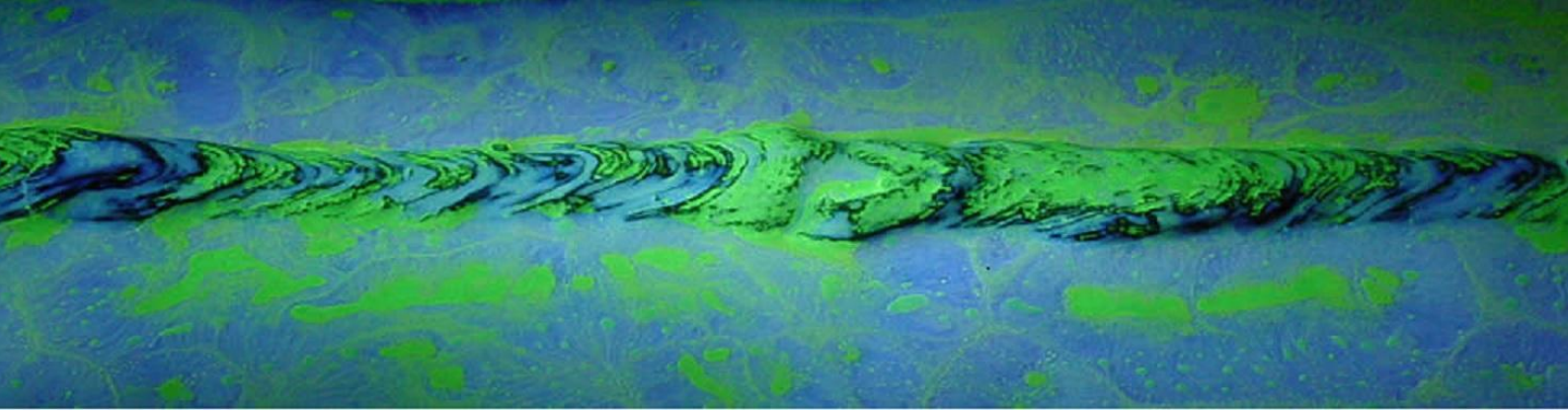
As the name might imply, visual inspection is the most fundamental of nondestructive testing methods. It often requires nothing more than sufficient light to illuminate the material surface being examined and the well-trained eyes of an experienced inspector (sometimes assisted by a magnification lens, or lens system that provide easier access to remote surfaces). In fact, a number of commonly used nondestructive testing methods simply represent the application of advanced visualization technologies to make flaws and imperfections more visible to the eyes of an inspector.

When is visual inspection used?

Visual inspection techniques are generally used to evaluate the surface condition of a material under evaluation, and to search for evidence of cracks or leaks. Visual inspection can also be used to assess the shape of critical components, or the alignment of surfaces of adjacent materials and parts. Finally, visual inspection techniques can be an efficient and cost-effective method for examining interior surfaces of complex equipment.

Why use CCRE for your visual inspection requirements?

Despite its apparent simplicity, visual inspection requires the knowledge and experience of trained professionals. CCRE inspection professionals have level II certifications according to American Society of Nondestructive Testing (ASNT) and ISO 9712 standards, and are skilled in every aspect of NDT inspection and testing techniques. To provide our customers with maximum flexibility, we can conduct visual inspections and other types of NDT testing at customer site locations and in the field as required



LIQUID PENETRANT TESTING (PT)

Assess Non-Porous Materials for Surface Discontinuities

What is liquid penetrant testing?

Liquid penetrant testing (PT) uses visible or fluorescent dyes to identify imperfections and discontinuities in any product fabricated from non-porous materials, particularly non-magnetic materials. In PT, the selected dye is applied to the surface being evaluated. After a pre-determined period, the excess dye is removed from the surface, and the surface is allowed to dry. A separate developing chemical is then applied to the surface, and its interaction with any remaining dye indicates the presence of a surface discontinuity. When fluorescent dyes are used, the inspection of the surface being evaluated is conducted under ultraviolet light. The use of visible dyes requires only normal (i.e., white) lighting for inspection.

What are the advantages of liquid penetrant testing?

Liquid penetrant testing is an inexpensive and highly portable NDT technique for detecting fine, tight discontinuities in pipes and fixtures made from a variety of non-porous materials, including non-ferromagnetic materials. It is also a simple method for identifying surface imperfections, since all discontinuities can be detected in a single operation regardless of the orientation of the surface being evaluated. However, liquid penetrant testing cannot be used on porous surfaces and is especially difficult to use on rough surfaces. In addition, tested surfaces must be free from all contaminants, such as oil, grease, rust and dirt, for liquid penetrant testing to produce useful and accurate results.

Why use CCRE for your liquid penetrant testing requirements?

CCRE is a provider of liquid penetrant inspection and testing services, and is also experienced in conducting most types of nondestructive testing methods and techniques. We can perform quality inspections on almost any form of ferrous material, component or product assembly. CCRE inspection professionals have level II certifications according to American Society of Nondestructive Testing (ASNT) and ISO 9712 standards.

CCRE liquid penetrant testing and inspection services include:

• Fluorescent penetrant inspection and testing - Fluorescent penetrant inspection and testing is especially effective for locating extremely small defects, when testing sensitivity is of paramount importance.

•Visible dye penetrant inspection and testing - Visible dye penetrant inspection and testing is appropriate for identifying larger defects, as well as in piping and tubing with rough surfaces. It also offers important advantages in field applications where conditions are not optimal for the use of ultraviolet light.

MAGNETIC PARTICLE TESTING (MT)

Assess the Integrity of Ferromagnetic Materials

What is magnetic particle testing?

Magnetic particle testing (MDT) is a nondestructive testing technique for detecting imperfections and discontinuities in iron, nickel and other types of ferromagnetic materials. When subjected to either direct or indirect magnetization, a material imperfection at the surface or subsurface level of a ferromagnetic material under test "leaks" magnetic flux, and serves as a point of attraction for ferrous iron particles. The accumulation of particles helps inspectors to locate and identify these material imperfections, allowing for further evaluation and analysis.

What are the advantages of magnetic particle testing?

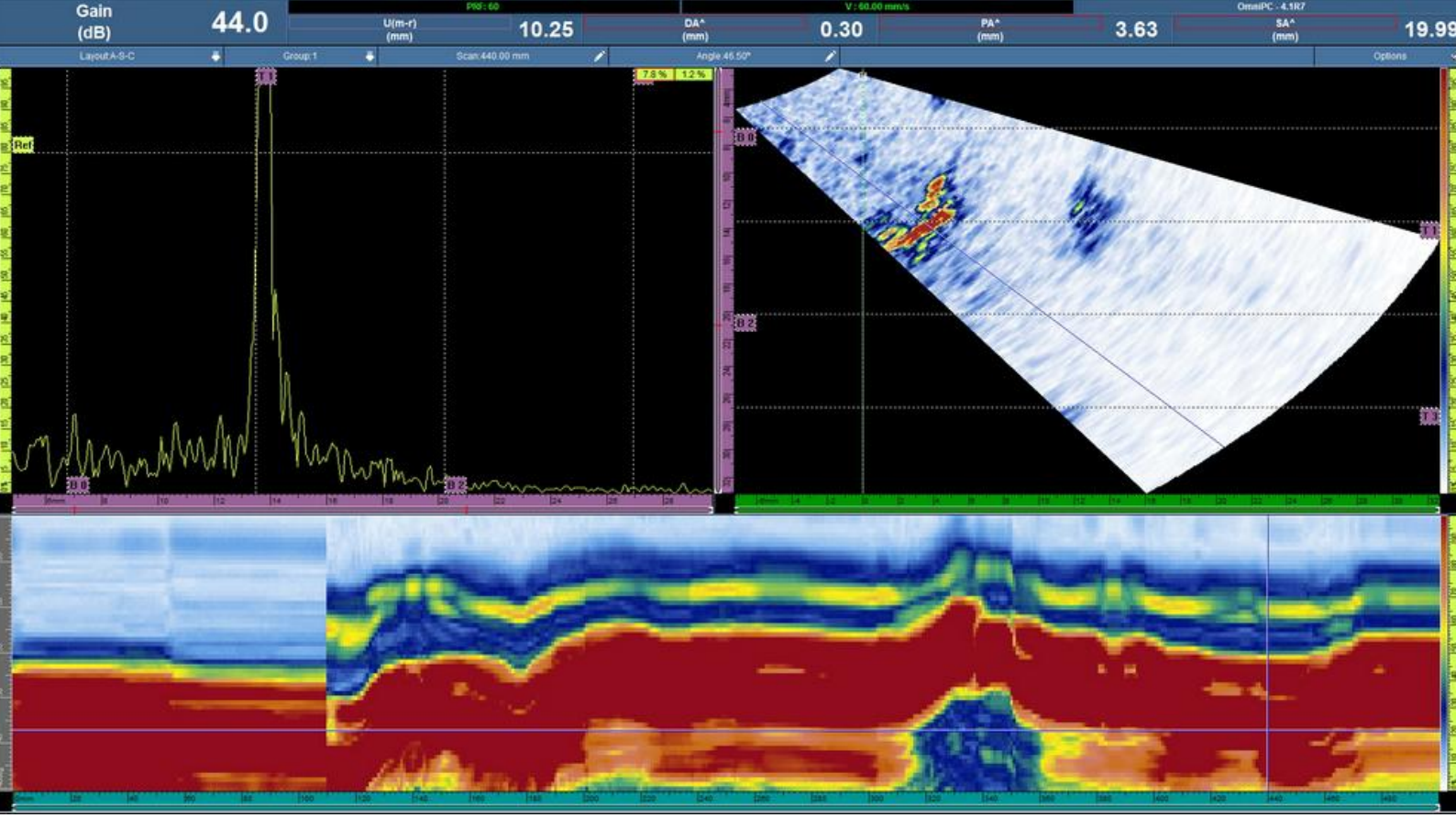
Magnetic particle testing is a fast, simple, inexpensive and highly portable NDT technique for detecting fine or shallow surface cracks in pipes and fixtures made of ferromagnetic material. It is a versatile evaluation technique that can be used to detect imperfections on test specimens of widely varying shapes and sizes. Further, the use of magnetic particle testing does not require extensive surface preparation of testing materials. In fact, it can be used to detect discontinuities even through thin exterior coatings.

CCRE magnetic particle testing services include:

• Wet fluorescent magnetic particle testing - This MDT technique uses extremely small iron oxide pigment particles (less than 0.5 to 10 micrometers in size) immersed in water or oil, and which can be viewed under ultraviolet light. Wet fluorescent magnetic particle testing can be used in wet or dry conditions.

• Wet black magnetic particle testing - This MDT technique uses extremely small iron oxide black particles (less than 0.5 to 10 micrometers in size) immersed in water or oil, and which can be viewed under white light conditions. In this technique for better viewing contrast, white color is used as background on test part. Wet black magnetic particle testing can be used in wet or dry conditions.

• Dry powder magnetic particle testing - This technique uses larger iron oxide particles (5 to 170 micrometers in size) that are normally applied manually and which can be viewed under white light conditions. Dry powder magnetic particle testing is not intended for use in wet conditions.



PHASED ARRAY ULTRASONIC TESTING (PAUT)

Optimize the detection of defects with reduced inspection time

What is phased array ultrasonic testing?

Phased array ultrasonic testing (or PAUT) electronically modifies the acoustic probe characteristics of conventional transducers. PA testing units use multiple elements in a single housing, excited at specific intervals, to generate uniform wave fronts at specific angles. Electronic images are then created from the received ultrasonic energy, allowing for the identification of defects and their location.

Phased array ultrasonic testing is typically conducted in accordance with the requirements of ISO 13588, "Non-destructive testing of welds - Ultrasonic testing - Use of automated phased array technology." As with most advanced nondestructive testing techniques, extensive experience in the use of phased array ultrasonic testing is generally required to accurately interpret the data produced through testing.

What are the advantages of phased array ultrasonic testing?

PA ultrasonic inspection offers high speed electronic scanning without moving parts, and can inspect multiple angles using a single, electronically-controlled probe. Data can be collected in either manual or encoded modes. Most ultrasonic techniques for flaw detection can be applied using PA probes.

However, environmental temperature can impose limitations on the use of PA ultrasonic inspection, due to the sensitivity of the small electronic components and transducer elements used. Other limitations on the use of PA ultrasonic technology include the size of the transducer footprint, and low amplitude responses from energy diffusing or scattering reflectors, such as material porosity.

Why use CCRE for your phased array ultrasonic testing requirements?

CCRE is provider of advanced nondestructive testing services, including conventional and phased array ultrasonic testing. CCRE personnel have extensive training and experience in the use of phased array ultrasonic testing in a wide range of industrial environments and consistent with the requirements of ISO 13588. In addition, our inspectors have level II certifications according to American Society of Nondestructive Testing (ASNT) and ISO 9712 standards.

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