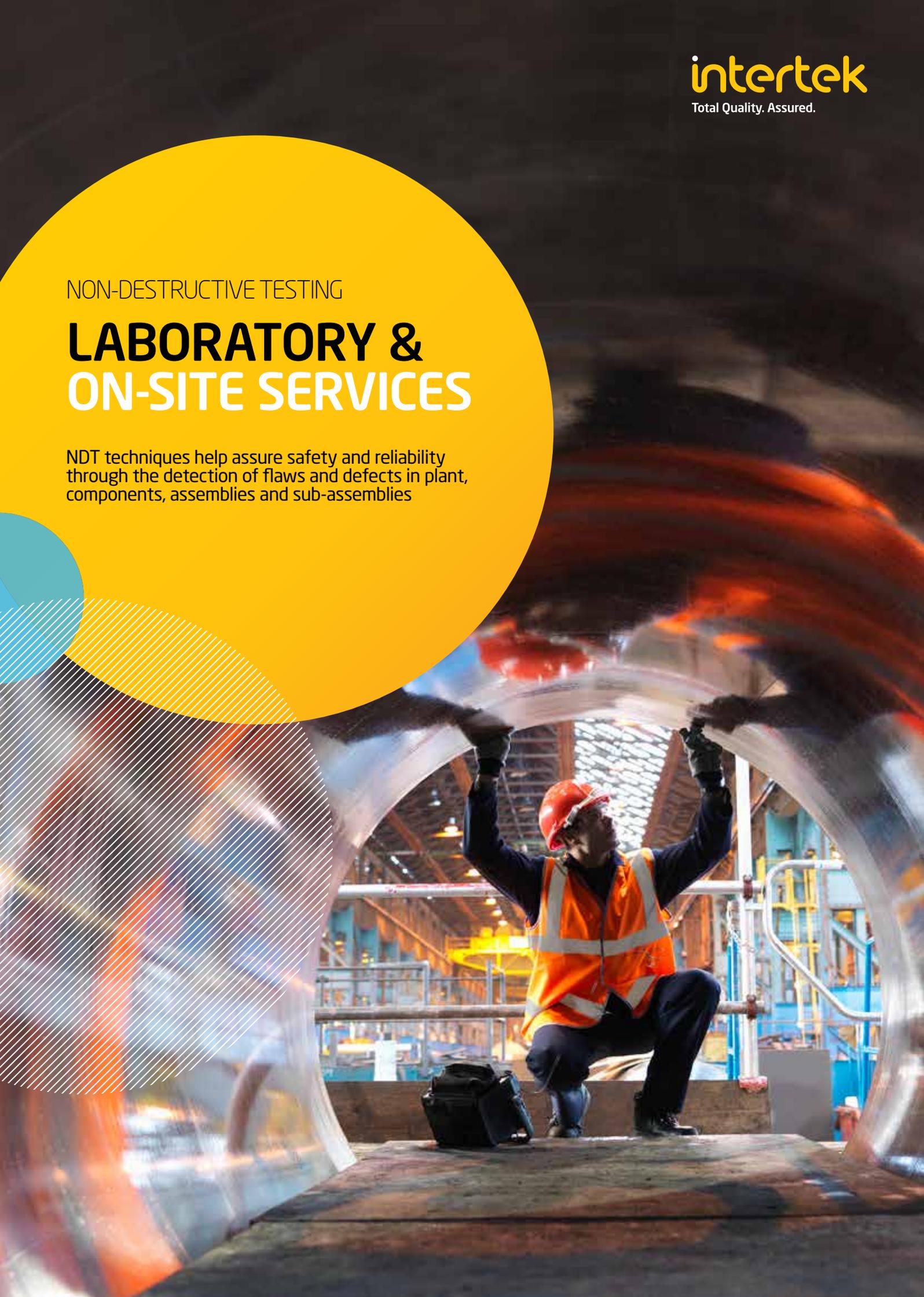


NON-DESTRUCTIVE TESTING

# LABORATORY & ON-SITE SERVICES

NDT techniques help assure safety and reliability through the detection of flaws and defects in plant, components, assemblies and sub-assemblies





# Delivering trusted and innovative integrated solutions that ensure quality, safety and reliability in your operations, supply chains and business processes

## **Our Total Quality Assurance Solutions**

The need for quality, safety and reliability is paramount as companies strive to meet the growing global demands within diverse industries such as aerospace, rail, automotive, nuclear, marine, oil and gas, construction, power generation, motor sport, fabrication and precision engineering.

For many years we have provided industry leading (UKAS\* accredited in the UK) services such as non-destructive testing, materials testing and metallography, mechanical testing and welding quality services as well

as consulting and training, technical auditing and technical staffing services.

Utilising services such as these help our customers maximise efficiency, ensure the quality of their products, components, processes, and assets, and minimise risks that could impact personnel safety and the environment.

*\*For details of services covered by our UKAS accreditations please visit the UKAS website and search for NDT Services Limited and ITS Testing Services (UK) Limited.*

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**A commitment to understanding and meeting our customers' needs and expectations lies at the heart of what we do.**

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# Non-Destructive Testing (NDT) is a specialised activity that requires advanced testing equipment and expert personnel.

## Experience and Expertise

On-site or from our purpose-built testing facilities, our accredited NDT specialists serve a wide range of sectors around the globe including aerospace, nuclear and conventional power generation, oil and gas, petrochemical, mining, engineering, fabrication, rail, defence, marine, motorsport and construction. Intertek's global network of qualified, experienced technical specialists is dedicated to maintaining consistently high levels of expertise.

In addition to training, development, and current professional certification, our technical staff undertake regular recertification of Personnel Certification in Non-Destructive Testing (PCN) qualifications in multiple specialisations to verify their knowledge in their field of expertise.

Our technicians are equipped to apply a full range of techniques including:

- Manual ultrasonic testing
- Phased array
- Immersion ultrasonic testing
- Magnetic particle inspection
- Dye penetrant inspection
- Eddy current testing
- Radiographic testing – conventional and digital
- On-site NDT services
- PCN level 2 and 3 technical services and consultancy
- Auditing and system certification
- Composite testing
- Testing of Additive manufactured parts

### Manual Ultrasonic Testing

Manual ultrasonic testing, also known as ultrasonic NDT or simply UT, is a method of characterising the internal structure of welded material or the thickness of material. This NDT application uses high frequency sound waves in the inspection of various types of material. One advantage of UT is the fact that the material to be inspected does not have to be cut, sectioned or exposed. Other advantages include highly repeatable results, reliable evaluation of the piece, no health hazards, the ability to inspect hard to reach areas and real-time results.



Manual ultrasonic testing of a plate

### Phased Array

Phased array is a form of ultrasonic testing, but unlike manual ultrasonic testing, the beam from a phased array probe can be focused and swept electronically without physically moving the probe.

This is possible because a phased array probe is made up of multiple small elements, each of which can be pulsed individually and at very precise computer-calculated timing.

By varying the timing of the electrical impulses, using what we call focal laws, the beam can be steered or focused electronically.

The data from multiple beams can be put together to generate a visual image showing a slice through the object.



Phased array is widely used for non-destructive testing in several industrial sectors, such as aerospace, construction, oil and gas, nuclear, petrochemical, pipelines and power generation.

This advanced NDT method can be used to detect discontinuities such as lack of fusion, cracks or other flaws and thereby determine weld quality.

Apart from detecting flaws in welds, phased array can also be used to look for in-service damage in materials or components and also perform wall thickness measurements in conjunction with corrosion mapping examinations.

Phased array has several advantages over conventional techniques. It provides a data record of the scanned weld which can be archived for future analysis or review. Scanning can be achieved with a single pass which is substantially faster than manual ultrasonics.

### Immersion Ultrasonic Testing

Immersion testing is an advanced form of ultrasonic testing and is a more controlled method of inspecting than manual ultrasonic testing.

It offers improved Probability of Detection (POD) of the smallest defects and can provide accurate reporting on the size and location of sub-surface irregularities and flaws in material or products.

In the highly specialised field of immersion ultrasonic testing, Intertek uses the latest semi-automated and fully automated inspection systems and we have 14 immersion ultrasonic tanks at our UK-based UKAS and NADCAP accredited laboratory. Our NDT inspectors are NAS410/EN4179 level 2 approved with in-house level 3 support. They are highly experienced in using this advanced non-destructive testing technique.

Intertek specialises in using immersion ultrasonic testing for the aerospace and power industries to inspect raw material and components such as rectilinear discs. However, the technique is also suitable for use in other industrial or manufacturing sectors.



Surface inspection



Crack on automotive shaft

**Magnetic Particle Inspection**

Magnetic Particle Inspection (MPI) is a non-destructive testing method that can detect surface and sub-surface flaws in ferromagnetic materials.

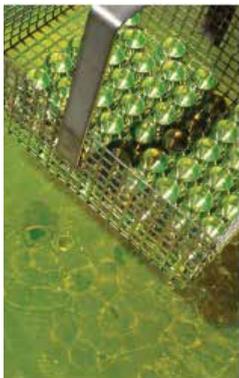
Magnetic particle inspection is often carried out to help determine an item's fitness-for-use or conformity.

This quick and relatively easy-to-apply technique is widely used in all industry sectors including aerospace, automotive, petrochemical, structural steel, and power generation to inspect a variety of products and equipment such as suspension and braking system components, castings, forgings and weldments.

The method can detect flaws such as cracks, laps, seams and inclusions in materials such as iron and steel. One of the main advantages of magnetic particle inspection is that it can give an immediate indication of defects and discontinuities.

**Dye Penetrant Inspection**

Dye Penetrant Inspection (DPI) is widely used to detect surface breaking flaws.



Batch testing of components

This non-destructive testing technique, also known as liquid penetrant inspection (LPI), is a cost-effective method used to locate surface breaking flaws such as cracks, porosity, laps, seams and other surface discontinuities.

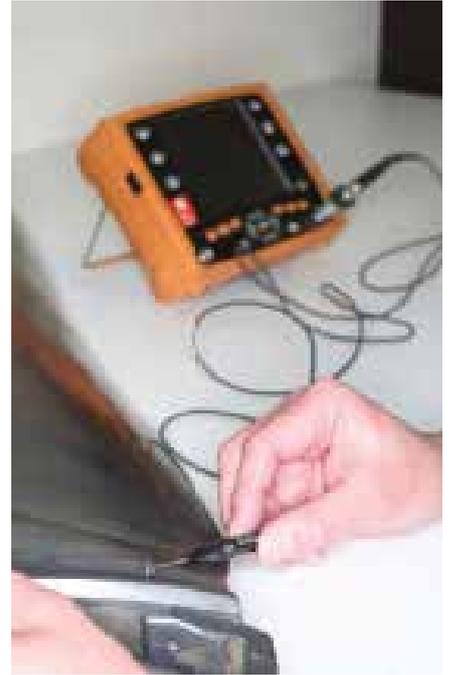
Dye penetrant inspection can be applied to both ferrous and non-ferrous metals and all non-porous materials (metals, plastics or ceramics).

It is commonly used to detect defects in castings, forgings and weldments, and we can provide inspection on-site at our customers' premises or at our accredited laboratories. In the laboratory, dye penetrant inspection is particularly suitable for the inspection of batch quantities of machined parts and components up to one tonne in weight and two metres in diameter.

**Eddy Current Testing**

Eddy current testing is used to detect surface and near-surface flaws in conductive materials. This non-destructive testing technique is non-hazardous and commonly used in industries such as aerospace, rail, automotive, marine and manufacturing. One of the major advantages of eddy current testing is that inspection requires minimum preparation as there is no need to remove surface paint or coating. This makes it suitable for inspecting painted structures, parts and components.

Eddy current testing equipment is highly portable and reliable and can detect very small cracks. Results are instant; ideal for on-site testing and plant inspections. Flaws can be reported immediately to site and operation managers, allowing for quicker decision making. In addition, the portability of equipment means that we can inspect equipment or assets that are difficult to access due to their location, and we can test complex shapes and sizes.



Eddy current testing of a turbine blade

**Radiographic Testing**

Radiographic testing is one of the most widely used techniques of volumetric non-destructive testing and is often used to reveal internal, surface and sub-surface irregularities.

Radiographic testing is widely used in a variety of industry sectors including aerospace, power generation, construction, petroleum, chemical and automotive, and for all types of components and parts.

The technique is commonly used on welded parts, castings, forgings, composites and is also used for corrosion mapping and the measurement of wall thickness.

It is a versatile method which can be performed in the laboratory or on-site on parts and components of varying dimensions. The radiographic technique uses X-rays or gamma rays to penetrate the tested component. The radiation is passed through the part and captured on radiographic film.

The benefit of using radiography is that it requires minimum surface preparation and provides a permanent record of testing.

Our highly experienced and trained radiographic staff are Level 2 or 3 qualified PCN and NAS410/EN4179.



X-ray and gamma facility

**Digital Radiographic Testing**

Advances in digital technology mean digital radiography is becoming more widely used for detecting defects, cracks, corrosion, erosion and loss of wall thickness.

Digital radiography is used in all industry sectors and, in particular, in assessing piping, pressure vessels and valves.

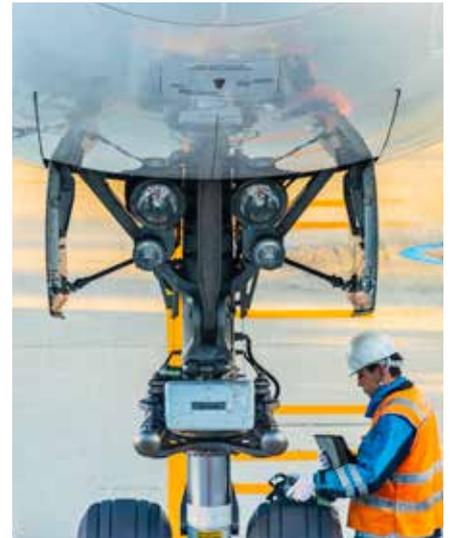
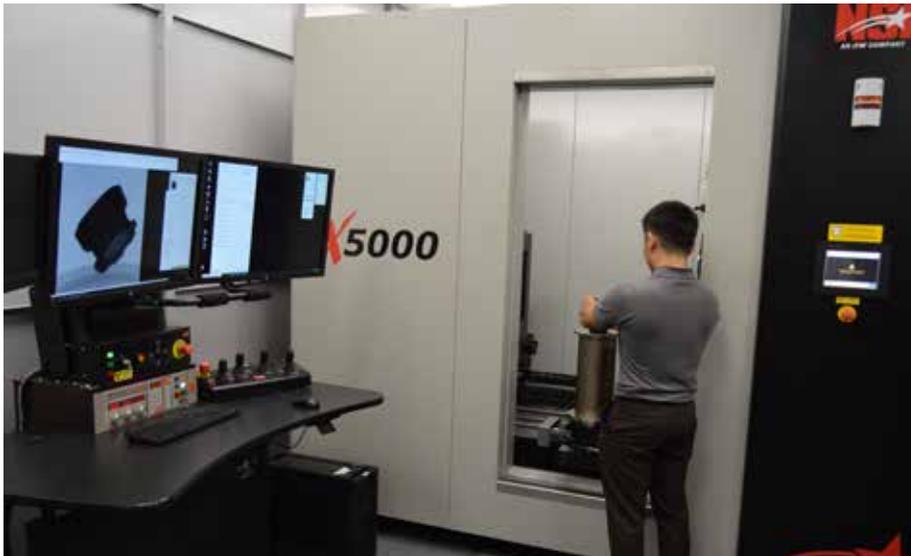


Digital radiographic image of a cylinder block

The technique can detect discontinuities in a range of materials including aluminium, steel, plastics and composites.

The method is similar to conventional radiography, but images are not captured on film. Instead, images are captured using phosphor-coated imaging plates. Digital radiography has several important benefits as images can be enhanced and magnified for viewing and interpretation of findings.

Our inspectors can provide instant reporting and digital images allowing for easy data sharing. Images can be emailed so that work can continue across time zones or they can be sent to off-site experts for simultaneous evaluation. In addition, digital images can be archived electronically so they are easier to store, trace and view. Because there are no radiographic films to store, digital radiography can also save on the physical storage space that would normally be required for conventional film. Another advantage is that costs can be controlled because digital radiography, unlike conventional radiographic testing, is not subject to fluctuating film costs.



### Computerised Tomography

This advanced X-ray technique produces 3D images to identify internal component features and potential defects.

New designs and technology are increasingly incorporating complex components and many of these are now made using additive manufacturing techniques, which can reduce cost, weight, size and increase performance.

X-ray Computerised Tomography (XCT or CT) is a particularly useful technique to inspect these type of components as it can provide clear internal images which would not be possible using conventional X-ray or other non-destructive techniques.

CT scanning combines multiple X-ray images taken from different angles as the component or object is slowly rotated between the X-ray source and the detector plate. Specialised software combines these images to create a 3-Dimensional image that can then be viewed by slicing it to identify internal features and potential defects. The technique can also be used to provide accurate measurements between features in all 3 axes.

CT provides greater resolution than conventional X-ray and has the capability to identify the location of features or discontinuities in 3D. The associated software creates a 3D model of the component that can be analysed slice by slice.

The models are similar to a CAD model and can be compared with the original model.

Additive manufacture components are often complex shapes and can be prone to delamination between layers. CT scanning is therefore particularly well suited to the inspection of these components. The power of the X-ray source can be varied. Higher powers penetrate denser materials whilst lower powers deliver higher resolution.

CT is a useful non-destructive tool for failure investigations and research and development as it provides the capability to investigate features that would be not accessible to conventional X-ray or other non-destructive methods.



### Auditing and System Certification Services

Intertek is a trusted provider of comprehensive auditing and certification services that give you the tools you need to evaluate and continually improve your business processes. Your product or service is only as good as the management system that supports it. With a high level of technical expertise and a customer-focused approach, we look beyond the standards to provide audits that add strategic value to your business.

Our global network of over 1,000 expert auditors is dedicated to helping you meet any auditing or certification challenge you may face. From sharing best practices and new industry requirements, to assessing your performance against your own objectives, our team gives you the means to evaluate and enhance your business while meeting both external and internal customer expectations.

As a UKAS\* accredited third-party registrar, we provide independent verification that your management system is effective in achieving your business objectives, while also certifying that it meets internationally recognised standards such as ISO 9001, ISO 14001, ISO 45001, and much more.

\*For details of auditing and system certification services covered by our UKAS accreditations please visit the UKAS website and search for Intertek Certification Limited.

### Testing and inspection

Ageing facilities and equipment can cause unexpected failures which negatively affect your bottom line and productivity. Having a knowledgeable service partner that can help you mitigate your risk and reliably support you at a moment's notice brings peace of mind and keeps your operations running efficiently.

For organisations that operate power plants, refineries, chemical plants, utilities, civil infrastructure and manufacturing sites, maintaining and protecting the operational integrity of their facilities and equipment is a high priority in delivering their product to consumers and clients. We help you to effectively manage your assets in order to gain maximum value, profitability and returns while safeguarding personnel, the community, and the environment.

Applications include:

- Air conditioning units
- Heat exchangers
- Condensing tubes
- Heating boilers
- Pressure pipework
- Storage tanks
- Turbine components
- Raw material verification
- Gas cylinders
- Components
- Sub-assemblies

### Materials Testing

#### Supporting you throughout the manufacturing process with materials testing and metallurgical analysis.

Developers, operators and manufacturers across many global industries need to know that key materials are not only fit-for-purpose and ready to be utilised, but also that they will perform to the end of their design life with maximised mechanical strength and performance, minimal maintenance and failure mitigation.

The increasing complexity of your operations can contribute to unprecedented levels of supply chain risk.

To mitigate these challenges, you will need to source specialist expertise that offers tailor-made assurance solutions which go beyond merely quality control.

With Intertek as your trusted third-party Total Quality Assurance solutions provider our services help you to identify and mitigate the intrinsic risks in your operations, supply chains, products and processes.

Our materials testing services support you at any stage of production, from assisting in the research and development phase of product development/innovation, resolving quality issues in the manufacturing process to failure analysis, expert witness services and regulatory compliance. We ensure you are compliant in accordance with national, international and industry standards and regulations, or client specifications.



Our independent accredited materials testing laboratories are supported by well-equipped in-house machine shops that can provide quick and accurate specimen preparations for laboratory testing and the mechanical testing facility. We also offer a regional collection and delivery service.

- Micro examination
- Macro examination
- Scanning Electron Microscopy (SEM)
- Alicona non-contact surface roughness
- X-ray fluorescence spectrometry (XRF)
- Corrosion testing
- Chemical analysis
- Failure investigations
- Reverse engineering
- Positive materials identification (PMI)

### Mechanical Testing

Mechanical testing provides information about material properties such as strength, hardness, toughness and ductility. We also perform all mechanical tests to qualify welding procedures and welders as per ASME, AWS and BS EN ISO standards.

- Bend test
- Tensile test
- Elevated tensile test
- Impact test - Charpy (ambient temp to -196°C)  
— Izod
- Load test
- Rockwell hardness test
- Brinell hardness test
- Vickers hardness test

### Welding Quality Services

Intertek offers a complete welding support service from weld procedure writing and welder training to welder qualification (welder coding), third party welder witnessing and mechanical (destructive) testing.

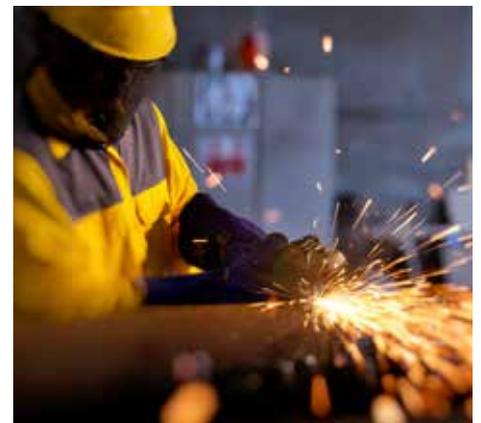
Our experienced welding personnel aid you in your production processes, quality control, welder training and welder certification to British, European and American standards. Welding quality services are provided by CSWIP (Certification Scheme for Welding Inspection Personnel), AWS (American Welding Society), (EWS) European Welding Specialist, PCN (Personnel Certification in Non-Destructive Testing) and ISO 9712 Level 3 qualified inspectors; both on-site, within our customers' premises, and from our UK-based welding facility.

We work with you to help ensure your welding processes meet the requirements necessary to consistently manufacture products of a high quality.

Training welders to national and international standards also enables you to seek new markets for your products and to operate within a global marketplace.

Our services include:

- Welder Qualification and Coding
- Third party witnessing of welder qualification and welding procedure qualification
- Post weld heat treatment (PWHT) of test pieces
- Responsible Welding Coordinator (RWC) and Visual Inspection of Welds Training
- Services of CSWIP (Certification Scheme for Welding Inspection Personnel), EWS (European Welding Specialist), and AWS (American Welding Society)
- Materials testing including tensile, hardness and impact testing, chemical analysis and metallurgy



## On-Site Services Technical Staffing

Peaks in demand can leave you short of essential expertise. As part of our NDT offering we operate a technical staffing service, allowing you to cost-effectively manage skills gaps as they occur, and with a global reach we can provide technical staff for short or long-term projects wherever you need them.

We work to find you the best candidates, provide logistical support at every stage of recruitment and employment, and work to nurture positive long-term relationships between our customers and our talent.

Your company or project can benefit from the expertise and years of experience that our level 2 and 3 NDT inspectors bring with them, as well as benefiting from the potential cost savings of outsourcing your non-destructive testing requirements only as and when you need them.

### PCN Level 2 and 3 Personnel

#### PCN (Personnel Certification in Non-Destructive Testing) Level 2 and 3 Technical and Consulting Services in compliance with ISO 9712.

Our NDT inspectors hold industry recognised PCN (Personnel Certification in Non-Destructive Testing) Level 2 certification as a minimum and a significant proportion of the management team is qualified to Level 3 certification in PCN or NAS410/EN4179 (National Aerospace Standard).

PCN Level 2 and 3 certification enables us to offer the following technical and consulting services:

- Interpretation of codes, standards and other contractual documents that control the non-destructive testing method(s) as utilised by your company or project
- Guidance in selecting the method and technique required for a specific inspection

- Preparation and verification of the adequacy of procedures in the method certified
- Approval of non-destructive testing procedures and other NDT related work instructions for technical adequacy
- Training, examination and certification of NDT personnel

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**Our Level 2 and 3 qualification and expertise help you ensure compliance with industry and manufacturing standards, improve production times, control costs and deliver problem solving solutions.**

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