

# Specialized Non-Destructive Testing

Integral to our range of services, FCI offers Specialized Non-Destructive Testing (NDT) and inspection to complement our other traditional Quality Assurance and Quality Control Services. These services help our clients to improve plant reliability, reduce operational and maintenance costs, enhance safety, extend plant life and meet regulatory requirements.

We believe our personnel are our greatest assets. Besides state of the art equipment for best results, we have highly trained and certified inspectors to perform your inspection. Our inspectors are experienced and have technical expertise to conduct the inspection surveys in accordance with the international standards. Our reputation within all industries is not only known for our quality of personnel and equipment but equally our professionalism and knowledge.

FCI's comprehensive range of inspection techniques ensures that we remain at the forefront of Specialized Non-Destructive Testing. Our services include:



## Advanced UT (manual and automated)

### Corrosion Mapping

Ultrasonic imaging of complex geometries, pipes, plates and curved surface for remaining wall thickness measurement with different sectional viewing; side, plan and end view.

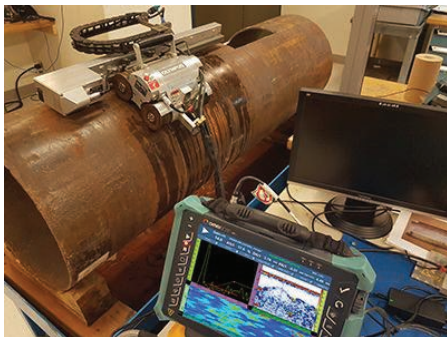


### Time of Flight Diffraction (TOFD)

An ultrasonic technique that can be used to examine high wall thickness welds in pressure vessels and pipes.

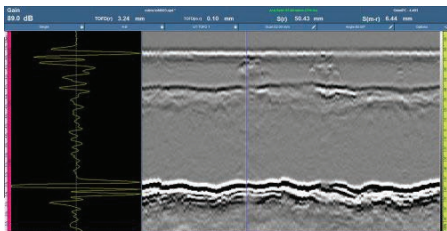
### A & B Scan Enhancement Imaging (ABI Scan)

ABI scan imaging technique provides inspection of welds located in difficult access areas and complicated geometries. Graphical records are kept for hard copy evidence and post processing.



### Automated Ultrasonic Testing / Corrosion mapping System:

Mechanized scanners that are computer controlled to move transducers over the surface of the material being inspected. As the transducer moves, the computerized system acquires ultrasonic inspection data on a predefined grid, often acquiring data from a number of different transducers at one time. The data is then displayed within the computerized interface, allowing the operator to manipulate it to provide the data displays that show the areas of interest within the inspection volume. AUT system can utilize ultrasonic transducer or technique that is in operation, examples of which are conventional ultrasonic transducers, TOFD, phased array transducers, or any combination of these. AUT inspection can be used for inspection of newly fabricated welds in lieu of radiography, and also for in-service inspection to detect and trend flaws.



## Advanced Radiography Techniques:

### Computed Radiography (CR):

CR uses an imaging plate (IP) to create the image, which contains critical and precise details far greater than film. The digital image can then be viewed and enhanced using software that has functions very similar to other conventional digital image-processing software, such as contrast, brightness, filtration and zoom. CR is capable of measuring thickness and lengths of parts and defects accurately electronically.

### Digital Radiography (DR):

DR – the application of radiography where the radiographic film is replaced by a sensor that provides an immediate digital image of the radiograph. However, DR is also sometimes used as a more generic term which relates to the use of digital technology in radiography inspection. In such instances, it can refer to both the use of digital sensors and the scanning, ie digitization, of radiographic film.

### Real Time Radiography (RTR):

The RTR process begins by emitting radiation at the object to be tested. The rays then pass through the object. On the other side of the object, there is either a phosphor screen or a flat panel with microelectronic sensors. The rays hit that screen which then gives off light. It's this light which creates a digital image of the part in real time, including the internals of the part.

## Phased Array:

Ultrasonic phased array systems can potentially be employed in almost any test where conventional ultrasonic flaw detectors have traditionally been used. Weld inspection and crack detection are the most important applications. Phased array produces accurate, detailed cross-sectional pictures of internal structures at fast inspection speeds. The benefits of phased array technology over conventional UT come from its ability to use multiple elements and electronic time delays to create beams that can be steered, scanned, swept, and focused electronically for fast inspection, full data storage, and multiple angle inspections.

## Tube Inspection Services:

There is no single non-destructive testing (NDT) technique that can be applied to inspect all of the tube materials. Selection of an NDT technique depends on the tube material and on defect types expected.

The Tube Inspection techniques we offer for inspection include Eddy Current Testing (ECT), Remote Field Testing (RFT), ultrasonic IRIS and Magnetic Flux Leakage (MFL) as well as laser optics. Each of the NDT techniques has its advantages and limitations. For example, conventional eddy current is very sensitive to pits and cracks, but it is mostly limited to non-ferromagnetic materials. IRIS is accurate in measuring wall thickness, but it will miss small defects such as pinholes and cracks. Optical techniques are limited to 10 defects. Proper selection of the NDT techniques is therefore a key to inspection of heat exchangers.

## Electro Magnetic Acoustic Testing (EMAT):

The big advantage of EMAT testing is the ability to produce accurate readings on scaled surfaces. This is because the probes induce ultrasound in the steel itself rather than by transmitting it via a coupling medium. In fact the probes will work at a small distance from the material surface. This allows the probe to function when the test surface is heavily corroded, has a large oxide scale build up or during high temperature operation. A major cost benefit of these probes is that expensive and time-consuming cleaning and surface preparation is no longer necessary.

## Long Range UT Guided Wave Inspection:

Long-Range Guided Wave UT pipe screening system is used for testing long lengths of pipe to rapidly identify areas of internal/external corrosion and other defects. With minimal surface preparation and only removing a small section of insulation, the transducer collar placed around the pipe have a typical test range of up to 50 meters in each direction along the pipe.

Guided wave technology is now widely accepted and used to inspect pipes in inaccessible areas such as road and river crossings, power plant tubing, risers, offshore topside pipework, jetty lines and refinery pipework.

## Remote Visual Inspection Services (CCTV):

Visual Inspection with the use of hi-tech video camera systems, of confined spaces or hazardous locations where human entry is impractical, physically impossible or unsafe. Remote visual inspection has a lot of applications and is ideal for preventive maintenance checks.