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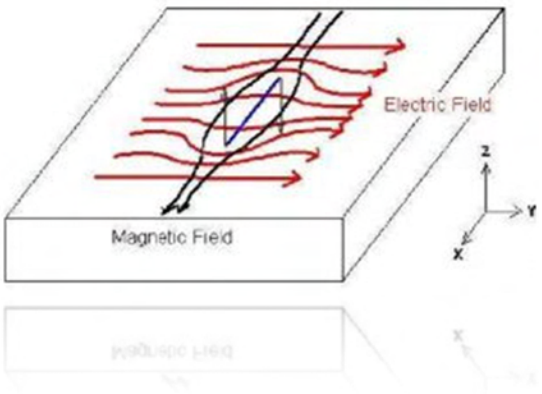
ALTERNATING CURRENT FIELD MEASUREMENT (ACFM)

ACFM is an electromagnetic technique for detecting and sizing surface breaking defects in metals. ACFM is particularly suited for inspecting painted and/or welded structures. An ACFM sensor probe is placed on the surface to be inspected and an alternating current is induced into the surface. When no defects are present the alternating current produces a uniform magnetic field above the surface. Any defect present will perturb the current forcing it to flow around and underneath the defect; this causes the magnetic field to become non uniform and sensors in the ACFM probe measure these field variations.

Two components of this magnetic field are measured - one provides information about the depth or aspect ratio of the defect(s), the other provides information on the positions of the ends of each defect. The two signals are used together to confirm the presence of a defect and, together with a sizing algorithm, measure its length and depth.



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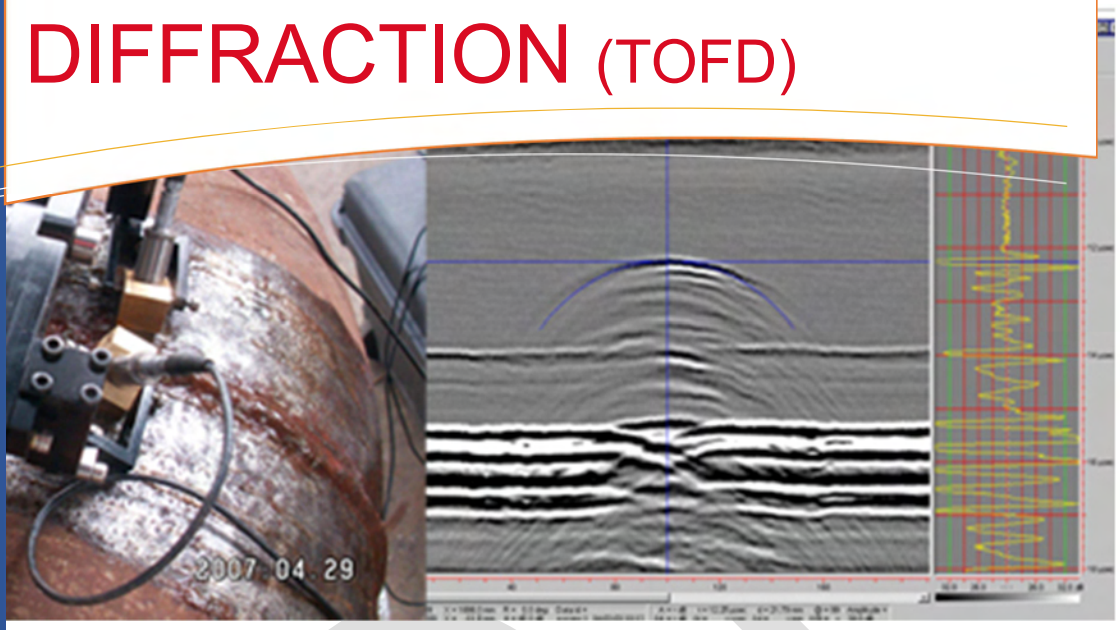
TIME OF FLIGHT DIFFRACTION (TOFD)



Time of Flight Diffraction or TOFD, is one of the most promising ultrasonic techniques for the examination of welds on pressure vessels in lieu of radiography; for pipe weld quality or crack detection and also weld root erosion. TOFD is a computerized ultrasonic system able to scan, store, and evaluate indications in terms of height (through wall thickness), length and position, with a degree of accuracy and speed never achieved with other ultrasonic techniques.

Theory

TOFD consists of a separate ultrasonic transmitter & receiver. The probes are aimed at the same point in the weld volume. The entire weld is then flooded with ultrasound allowing inspection of the weld. After emission of a compressional wave from the transmitter, the first signal to arrive at the receiver is the lateral wave or OD wave which represents the outer surface or OD. In the absence of defects, the second signal to arrive at the receiver is the L-wave back wall echo which represents the inner surface or ID. When a flaw is present, a diffracted signal is generated at the upper tip of a defect and will arrive before the signal generated at the lower tip of a defect. With a time of flight of each flight path, ultrasonic velocity and the spatial relationship of the two probes, the location and height of the defects can be accurately calculated. Gray scale imaging techniques are applied to the RF (AC) signal phase and enables weld integrity to be observed in real time.

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SCAR / GAMMASAFE
(CLOSE PROXIMITY RAGIOGRAPHY)

Designed for unparalleled handiness, the Gamma Mat SE gamma projector offers unique and unrivalled portability not found in other systems.
This rugged, light-weight and easy-to-use gamma projector uses Selenium-75 (Se-75) as its radiation source. Se-75 provides greatly improved image quality over other isotopes commonly used, a longer half-life and simplified radiation protection due to its lower gamma energy. Compared to projectors that use higher energy gamma sources, the Gamma Mat SE loaded with a Se-75 radiation source can be safely used in smaller controlled test areas. All of these features result in substantial cost savings to the user.

Higher Image Quality using Selenium-75

Se-75 provides significantly higher image quality than Ir-192 imaging systems. The gamma ray spectrum of Se-75 ranges from 66 keV to 401 keV, with two lines of high intensity at 136 keV and 265 keV dominating this spectrum. These radiation characteristics are between Yb-169 towards the lower energies and Ir-192 towards the higher energies. The wide gamma spectrum of Se-75 makes it an ideal choice for gamma radiography, especially for a steel wall thickness in the range of 5 mm to 30 mm (0.2 in to 1.18 in).

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REMOTE VISUAL INSPECTION (RVI)

Our Video-probe is equipped with the latest technology in borescopes. A long fiber-optic cable illuminates the inspection area with light generated by a new state-of-the-art lamp in the Light Box. A miniature camera assembly in the viewing tip of the probe then converts the optical image into an electronic image. This image is carried back through the probe cable and displayed in the LCD color monitor. It allows the inspection of surfaces inside narrow tubes or difficult-to-reach chambers.

Combining the fully-featured flexi probe controller with high performance durable cameras with and a full range of rods and accessories, flexi probe push camera systems are designed for a wide range of video inspection situations; from residential and small commercial uses to specialist plant and municipal applications.

At the heart of each system is the advanced flexi probe controller, which displays video footage in digital quality full color VGA on an ultra-bright 8" (200mm) industrial TFT screen. Digital technology means accessing the advanced features of the controller is simplicity itself, putting you in complete control via an intuitive user interface and tough keypad, operable even when using gloves.

Key Features

- High quality digital video with digital pan and zoom
- One-touch recording to durable Compact Flash cards up to 8Gb
- Quick transfer of video and still pictures via USB and Bluetooth wireless technology
- Inspection reports produced on-site with integrated Easy-Report-Writer
- Weather Proof, robust and truly portable

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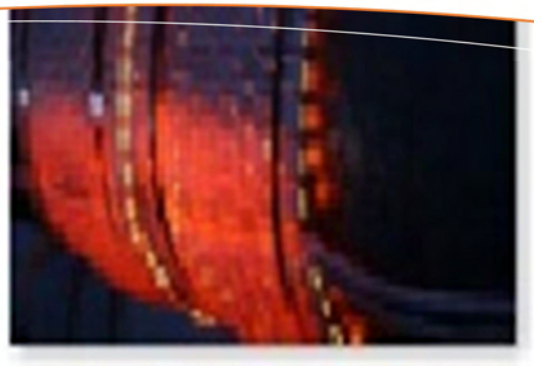
PRE / POST WELD HEAT TREATMENT SERVICES (PWHT)



Advantage post weld heat treatment

Post Weld Heat Treatment Services (PWHT) is defined as one of heat treatments done after welding/machining to improve the Chemical mechanical properties of the weldment / machined surfaces. In concept, PWHT covers many different potential treatments. However, in steel fabrication, most common procedure used is Stress Relieving.

Stress induced by welding:

As a result of welding process used to join metals together. The base material near the weld metal and the heat-affected zones transform through various metallurgical phases. Depending upon the chemistry of the metals in their areas. Hardening occurs in various degrees, depending mainly upon the carbon content. This is particularly very true in the heat - affected zone adjacent to the weld metal deposit. The resultant stresses are highest due to melting and solidification. Stress, due to welding is of magnitude roughly equal to the yield strength of the base material.

HARDNESS TESTING

There are three types of tests used with accuracy by the metals industry; they are the Brinell hardness test, the Rockwell hardness test, and the Vickers hardness test. Since the definitions of metallurgic ultimate strength and hardness are rather similar, it can generally be assumed that a strong metal is also a hard metal. The way the three of these hardness tests measure a metal's hardness is to determine the metal's resistance to the penetration of a non-deformable ball or cone. The tests determine the depth which such a ball or cone will sink into the metal, under a given load, within a specific period of time.

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PHASEDARRAY ULTRASONICTESTING (PAUT)

Ultrasonic phased array testing is a powerful NDT technology and one whose use is growing rapidly, however it can seem complex to a person who has not worked with it. This self-guided tutorial is a basic introduction to ultrasonic phased array testing, both for newcomers and for more experienced users who want a review of basic principles. It begins with what phased array testing is and how it works, then outlines some considerations for selecting probes and instruments, and ends with links to phased array application notes and a phased array glossary. In addition to text and illustrations it includes a series of interactive Flash files as learning tools.

The benefits of phased array technology over conventional UT come from its ability to use multiple elements to steer, focus and scan beams with a single transducer assembly.

Beam steering, commonly referred to sectorial scanning, can be used for mapping components at appropriate angles. This can greatly simplify the inspection of components with complex geometry. The small footprint of the transducer and the ability to sweep the beam without moving the probe also aids inspection of such components in situations where there is limited access for mechanical scanning. Sectorial scanning is also typically used for weld inspection. The ability to test welds with multiple angles from a single probe greatly increases the probability of detection of anomalies. Electronic focusing permits optimizing the beam shape and size at the expected defect location, as well as further optimizing probability of detection. The ability to focus at multiple depths also improves the ability for sizing critical defects for volumetric inspections. Focusing can significantly improve signal-to-noise ratio in challenging applications, and electronic scanning across many groups of elements allows for C-Scan images to be produced very rapidly.

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OTHER SERVICES (PMI, DFT, FT, HD)

Positive Material Identification (PMI)

With the emphasis on reliability, safety and accident prevention never being greater, this means that positive material identification (PMI) in alloys used throughout the construction process and physical plant is no longer a choice, but a necessity.

Ferrite Measurement

The Ferrite Indicator is a simple, rugged, non-destructive inspection instrument developed for laboratory, shop and field use. The GO, NO-GO feature permits instant acceptance testing of austenitic stainless weld metals.

Holiday Inspection

Portable holiday detectors are designed for various pipeline, plant, and other surface applications where the inspection surface remains stationary and the detector is moved over the inspection surface. High voltage detectors are used for thicker surface coatings, such as those used on pipelines and other industrial applications. Low voltage, wet sponge detectors are used for thin film applications.

Paint / Coating Thickness Measurement

Dry Film Thickness is a critical measurement in the coating application process. It provides vital information as to the expected life of the substrate, the product's fitness for purpose, its appearance and ensures compliance with a host of International Standards.

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PROVISION OF SPECIALIST MANPOWER

We provide professional manpower to our clients through our worldwide manpower resource base. All personnel in our custom designed database are pre-screened, thus providing our clients with reliable personnel who will perform satisfactorily.

Our database includes the following categories:

- Quality Assurance personnel
- Quality Control personnel
- Inspection personnel (welding inspectors, piping, structural, mechanical, electrical & instrumentation, commissioning and outfitting)
- NDT personnel in various disciplines
- Operations and Process Specialists
- Project personnel
- Drilling and well site personnel
- Health, Safety and Environmental personnel

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LONG RANGE GUIDED WAVE ULTARSONIC TESTING (LRUT)

LRUT is used to detect corrosion, erosion in pipe work. An array of transducers is clamped around the pipe and ultrasound is transmitted simultaneously along the pipe in both directions. The return signal is received by the same transducers, and the data are analyzed using the system's calibrated software.

The technique's principal advantage is that it provides 100% initial screening coverage, and only requires local access to the pipe surface where the transducer array is to be attached. The technique has the ability to inspect inaccessible areas such as clamps and cased or buried pipes. It works without the need to remove insulation or coating.

C- Scan Advantages:

- The technology can inspect up to 150m pipe from single location and Provides 100% direct assessments of pipe lengths.
- Rapid Screening for in service degradation.
- Cost reduction in gaining access to the pipes for inspection

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EDDY CURRENT INSPECTION (ECT/ IRIS / MFL / RFT / NFT)

- **Eddy current testing** is a noncontact method used to inspect non ferromagnetic tubing. This technique is suitable for detecting and sizing metal discontinuities such as corrosion, erosion, wear, pitting, baffle cuts, wall loss, and cracks in nonferrous materials.
  The **ultrasonic IRIS** option is used to inspect a wide range of materials including ferrous, nonferrous, and nonmetallic tubing. This technique detects and sizes wall loss resulting from corrosion, erosion, wear, pitting, cracking, and baffle cuts.
- **Remote field testing (RFT)** is being used to successfully inspect ferromagnetic tubing such as carbon steel or ferritic stainless steel. This technology offers good sensitivity when detecting and measuring volumetric defects resulting from erosion, corrosion, wear, and baffle cuts. Olympus remote field probes and the Multi Scan™ MS 5800 are used to successfully inspect heat exchangers, feed water heaters, and boiler tubes, around the world.
- The **near field testing (NFT)** technology is a rapid and inexpensive solution intended specifically for fin-fan carbon-steel tubing inspection.
- **NFT** is specifically suited for the detection of internal corrosion, erosion, or pitting on the inside of carbon steel tubing. The NFT probes measure lift-off or “fill factor” and convert it to amplitude-based signals (no phase analysis). Because the eddy current penetration is limited to the inner surface of the tube.
- **Magnetic flux leakage (MFL)** is a fast inspection technique, suitable for measuring wall loss and detecting sharp defects such as pitting, grooving, and circumferential cracks. MFL is effective for aluminum-finned carbon steel tubes because the magnetic field is almost completely unaffected by the presence of such fins.

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PIPELINE CRAWLER X-RAY

The X-Ray Crawler is similar to conventional radiography however an x-ray source tube on a crawler device is run inside the pipe to each weld. Film is wrapped around the welds and the source tube is excited. The film is then developed in a mobile dark-room on location. The technique is quick and can inspect on average 150 welds per day. The advantages of X-ray crawlers are their speed and the short exposure time. The film is also crisper and much less grainy when compared to conventional radiography using Iridium type sources.

The crawler is essentially a battery powered, remotely controlled mobile radiographic machine designed to produce single wall, single image (SWSI) radiographs of circumferential welds in pipelines

Pipeline crawlers follow the concept of modular construction to provide safe, efficient, and cost effective field units, easy to operate and maintain.

Modules are quickly and easily interchanged. All crawlers are constructed using the highest grade materials to provide good finish, easy servicing, and extended service life. Electronics utilize military specification components, thus ensuring reliability in the harsh environments encountered in service.

Although these crawlers are a product of the latest microprocessor technology, they are extremely simple to operate and maintain in the field. Crawler functions may be preset to suit each particular pipeline, with full remote control being achieved from the outside of the pipeline by means of a low powered (usually 20 millicuries Caesium) signalling isotope.

The crawlers are adjustable throughout their recommended size range by means of wheel spacers specifically designed for use with each crawler type.

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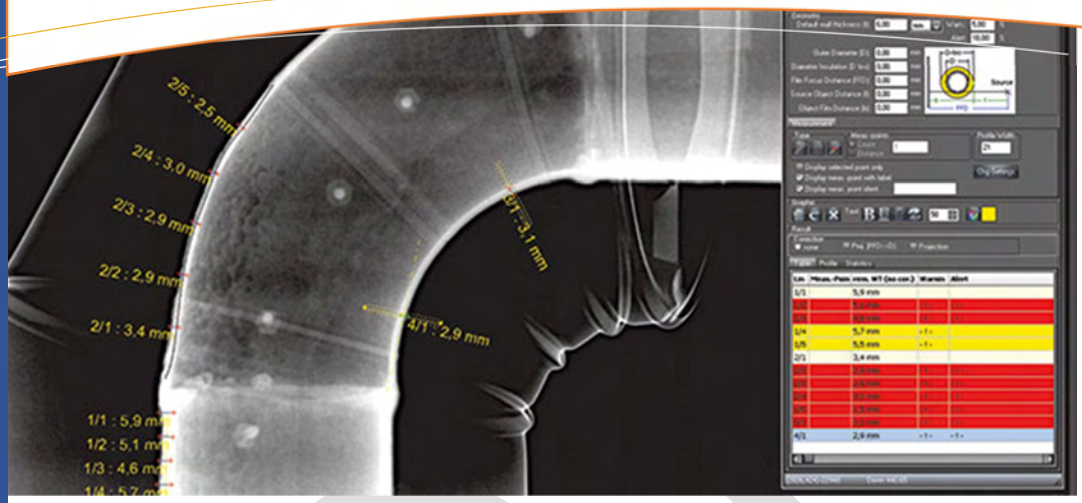
COMPUTERISED RADIOGRAPHY (CR)



Computed Radiography (CR) is the production of a digital image by using a Phosphor Imaging Plate (IIP) in place of a conventional film.

Key advantages of CR include:

- IP's are re-usable
- No dark room or chemicals required
- Exposure and process time reduced
- Easy workflow and image optimization with D-Tect software
- Simple to share digital information and archive

The CR technology consists of a 3-step process.

1. The Image (storage) Plate (IP) is exposed with X-ray or Gamma radiation, which causes the IP Phosphor layer in the plate to store the X-ray image.
   During the reading process of the plate scanner, a focused laser beam triggers the release of the stored image data in the form of visible light.
2. The emitted light is detected, captured, and converted into electrical signals which are digitized and finally displayed as a digital image on the PC monitor.
3. The internal in-line eraser purges the residual data from the IIP, which is then ready for the next exposure.

With film radiography the only variable is the film, with CR we have different IP's and the ability to adjust up to 4 parameter's within the scanner to optimize the image quality to suit the required inspection task.

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CONVENTIONAL NDT

(UT, PT, MT, RT, VT, X-RAY)

Ultrasonic Testing (UT)

Thickness measurements and wall mapping for corrosion, flaw detection of piping, pressure vessels & structural parts.

Penetrant Testing (PT)

Surface breaking discontinuity inspection of welding, casting, Members etc.

Magnetic particle Testing (MT)

Surface and near surface inspection on welding joints.

Gamma Radiography Testing (RT)

Gamma ray inspection piping, pressure vessels, castings with Iridium 192, Cobalt 60 & Selenium 75.

Visual and Optical Testing (VT)

Remote camera and video inspection of difficult access areas like And pressure vessel internals.

X-ray Radiography Testing (RT)

X-ray inspection systems are required to provide faster throughput and continuously demand for larger field of view.

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