TUBITAK

Consulting Eng.
& Inspection Co.

CERTIFICATE OF REGISTRATION

GUARDIAN INDEPENDENT CERTIFICATION

ISO 9001:2008

ISO 14001:2004

OHSAS 18001:2007

UKAS

JAS-ANZ

IAF

UKAS QUALITY MANAGEMENT

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IAS

iosh

iSQ instituto de soldadura e qualidade

ASNT Corporate Partner

Advanced NDT Application

Advanced NDT

- Phased Array
- TOFD
- Guided waves (LRUT)
- SRUT
- Automated Ultrasonic Testing (AUT)
- Pulsed Eddy Current (PECT)
- Magnetic Flux Leakage (MFL)
- IRIS (Internal Rotational Inspection System)Testing
- Acoustic Emission

What is Phased Array and TOFD?

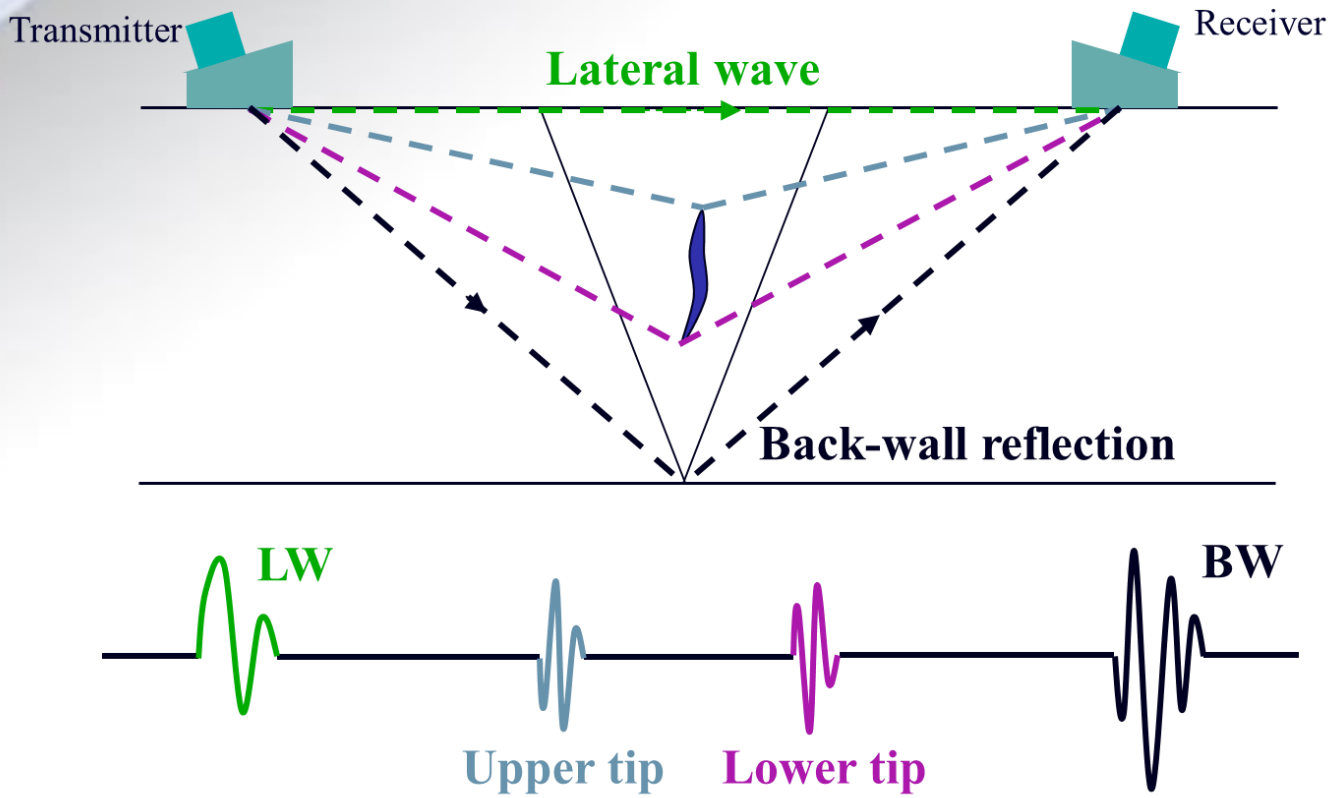
•Phase Array transducer -ultrasonic transducer that contains many individual elements (typically from 16 to 256) that can be pulsed separately in a programmed pattern.

•range from 1 to 10 MHz.
•to test welds with multiple angles from a single probe
•The ability to focus at multiple depths
•Higher Speed

•TOFD : Time of flight diffraction

TOFD
Time of Flight Diffraction

A-Scan Signals



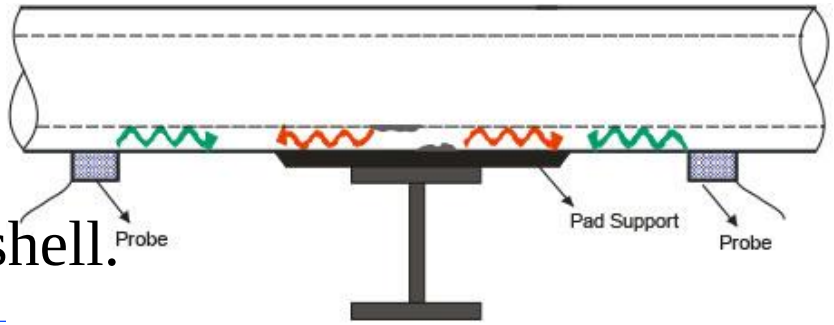
LRUT and SRUT

- LRUT: Long Range Ultrasonic Test

is an advanced nondestructive examination technique that was developed for testing large volumes of material from a single test point. What differentiates this from more traditional methods of ultrasonic testing is that, with LRUT, a liquid couplant between transducers and the surface is not required.

- SRUT: Short Range Ultrasonic Test

is a test method to detect corrosion on the pipe wall or plates concealed under support structures or structural shell.



Eddy Current and Pulsed Eddy Current

- Eddy Current:

The saturation probes contain conventional eddy current coils and magnets. This inspection is used on partially ferromagnetic materials such as nickel alloys, duplex alloys, and thin-ferromagnetic materials such as ferritic chromium molybdenum stainless steel.

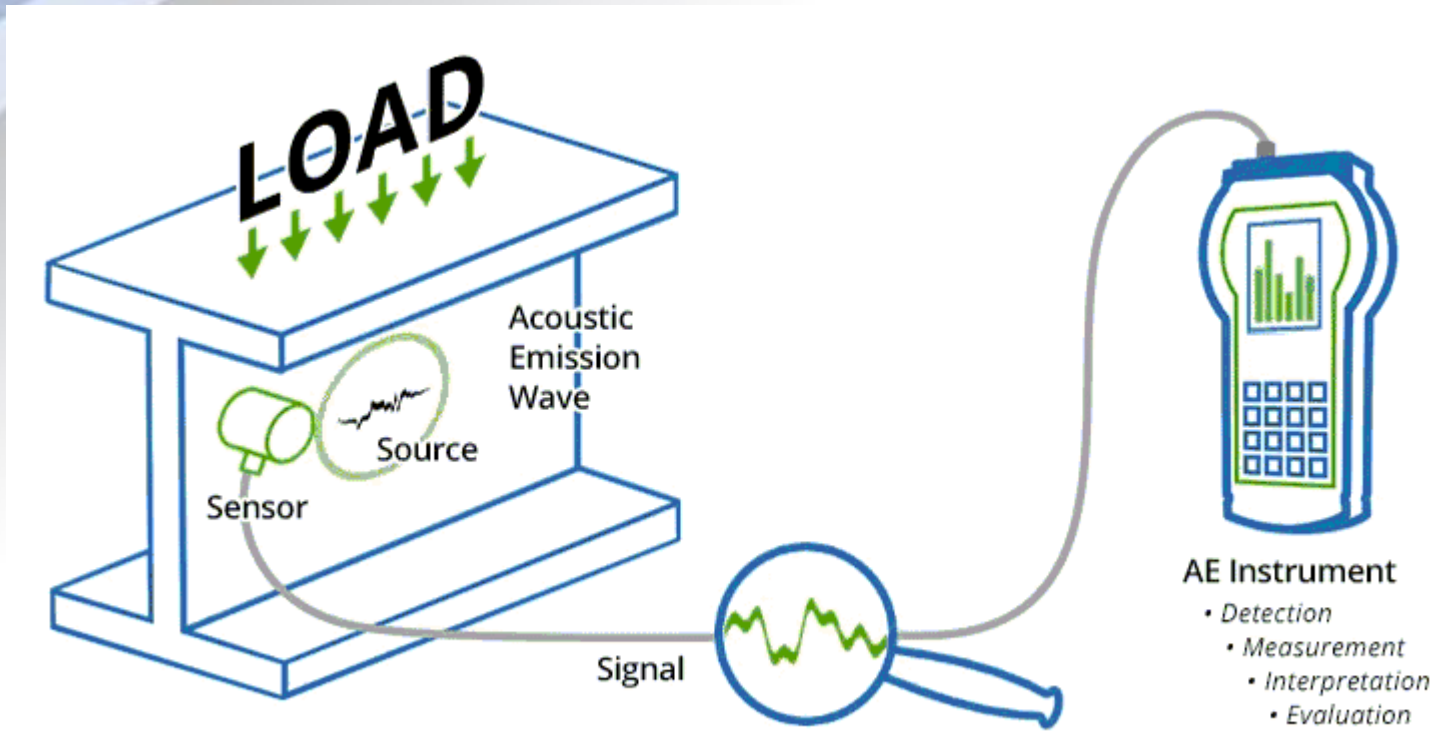
- Pulsed Eddy Current

is an inspection technique used for corrosion under insulation (CUI) screening on carbon steel structures as pipes, vessels, tanks and spherical tank legs without the need of contact with the steel surface.

Acoustic emission

- **Acoustic emission:** is the transient elastic waves within a material, caused by the rapid release of localized stress energy. An event source is the phenomenon which releases elastic energy into the material, which then propagates as an elastic wave.

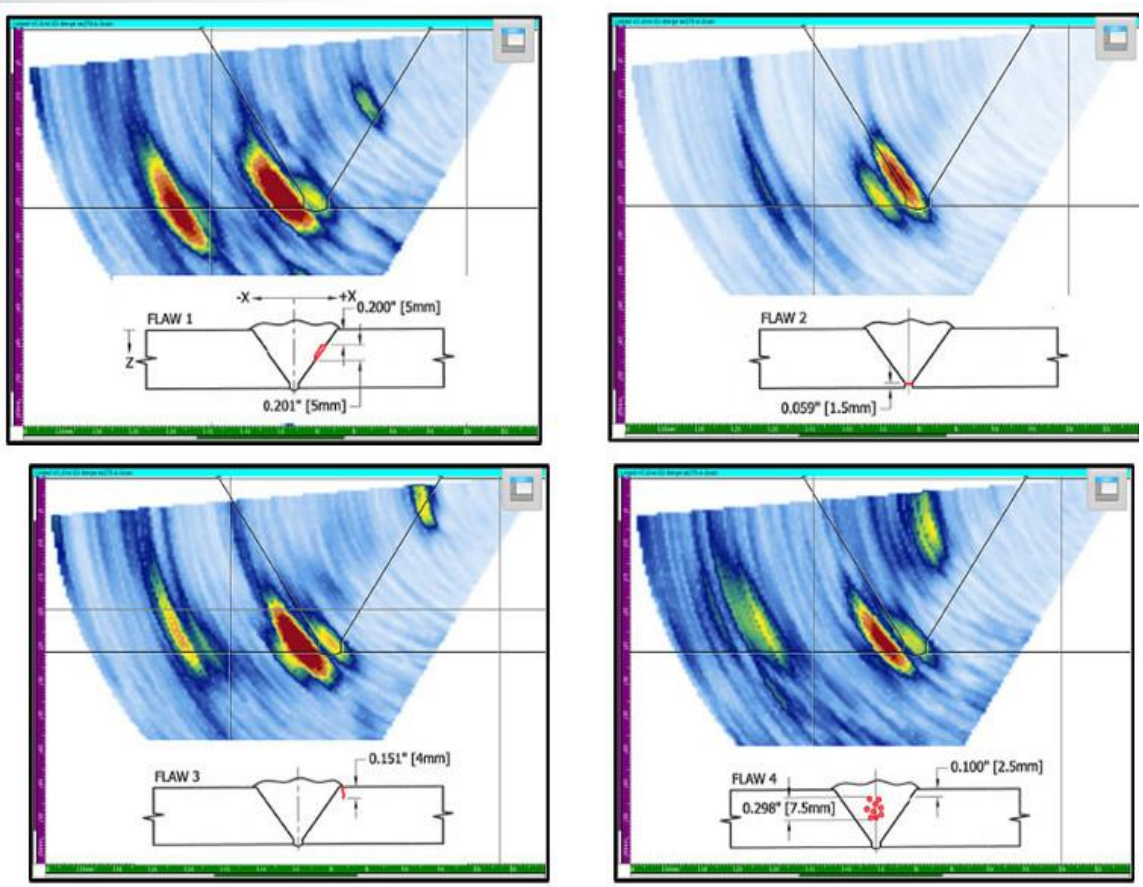
Acoustic emissions can be detected in frequency ranges under 1 kHz, and have been reported at frequencies up to 100 MHz, but most of the released energy is within the 1 kHz to 1 MHz range. Rapid stress-releasing events generate a spectrum of stress waves starting at 0 Hz, and typically falling off at several MHz.



Weld Scan

Phased Array:

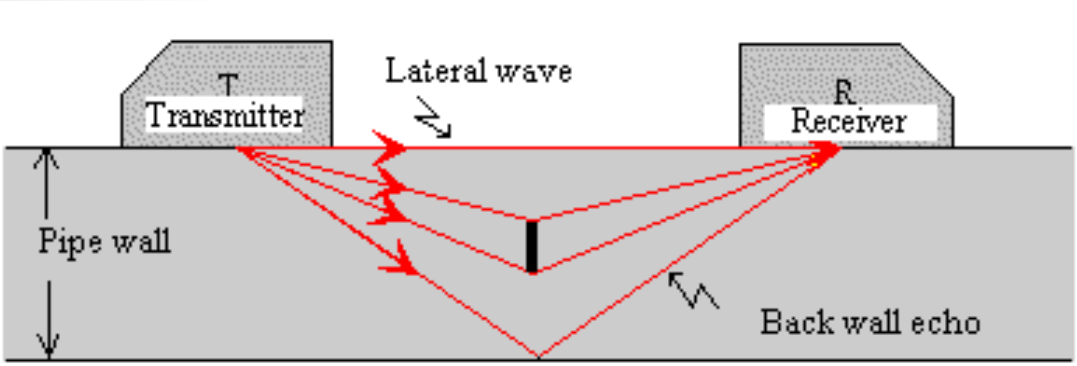
- No safety hazards
- Inspection as soon as weld is cool
- Better defect detection and sizing
- Able to penetrate thick sections



Weld Scan

TOFD

- The best way for crack detection
- In-service defect monitoring.
- TOFD saves costs
- The inspection results are immediately available



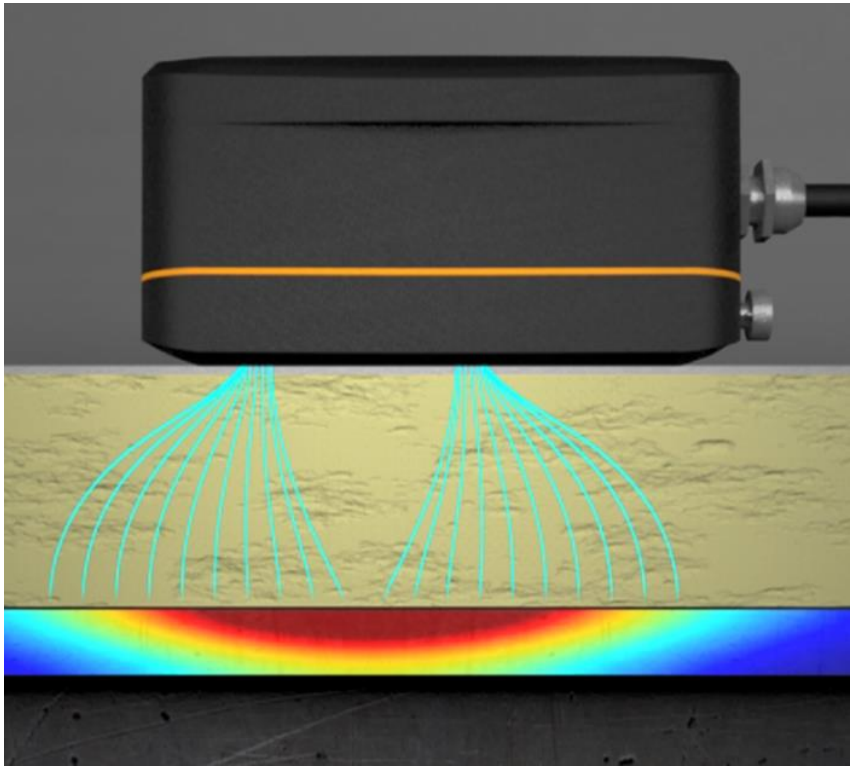
Corrosion Mapping (pipe and pressure vessel)

- Phased Array :introduced in the pervious section

- Pulsed Eddy Current:

In-service insulation removal is often not possible: high temperature and process stability

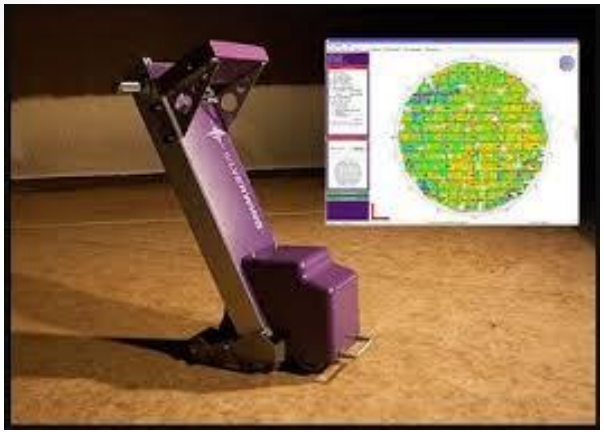
This method is the best way to corrosion under insulation detection.



Storage Tank Bottom Inspection

- Magnetic Flux Leakage (MFL)

The magnetic flux leakage (MFL) approach is extensively used for the non-destructive testing of large steel structures such as aboveground storage tank



Storage Tank Bottom Inspection

- Magnetic Eddy Current (MEC) Inspection Technique- Next Generation SLOFEC

- coating thickness up to 8mm
- experience with temperatures up to 170 deg C
- High inspection speed of approx. 20m/min
- Ability to inspect different steel materials (carbon, stainless, duplex and super duplex)
- Ability to detect pitting, cracks and various types of corrosion like CO2, microbiological and ammonium chloride

Pipe lines Inspection

- LRUT: metal loss detection in the pipe body
- SRUT: For corrosion under support detection
- PAUT/TOFD:(weld and body)

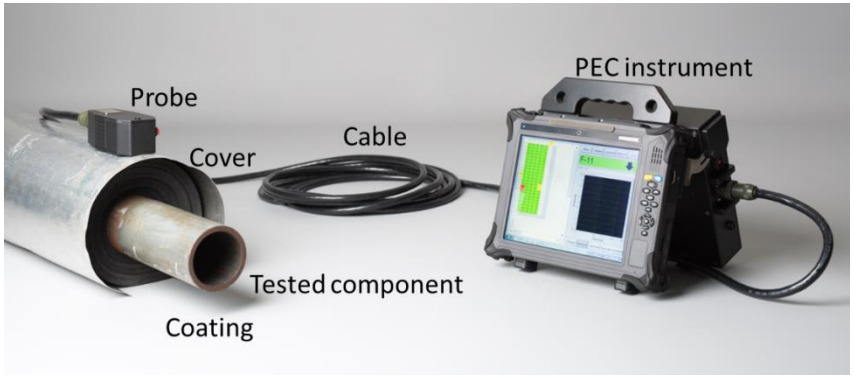
Pipe lines Inspection

- Magnetic Eddy Current (MEC) Inspection Technique- Next Generation SLOFEC

- High defect detection sensitivity in pipes
- with diameter ranging from 1” and above to flat surfaces
- coating thickness up to 8mm
- experience with temperatures up to 170 deg C
- High inspection speed of approx. 20m/min

Corrosion Under Insulation

- **Pulsed Eddy Current** (PEC) is a nondestructive examination technique used for detecting flaws or corrosion in ferrous materials or measuring the thickness of objects.



Tube inspection

- Non Ferrous material:
  - ✓ Eddy current is the best approach
- Ferrous material :
  - ✓ RFT (remote field test)
  - ✓ MFL
  - ✓ IRIS

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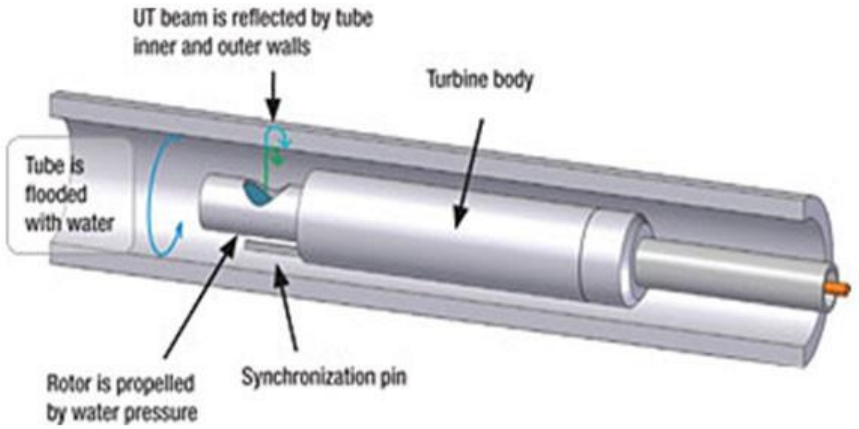
Tube inspection

- **IRIS**: is an ultrasonic method for the nondestructive testing of tubes. The IRIS probe is inserted into a tube that is flooded with water, and the probe is pulled out slowly as the data is displayed and recorded. The ultrasonic beam allows detection of metal loss from the inside and outside of the tube wall.



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