Who we are

Conventional and Advanced NDT and Inspection Services

Oil and Gas, Refinery, Petrochemical, Heavy Industry, Mining

Over 400 personnel including more than 300 inspectors

Thailand headquarters with International expertise since 1979
Advanced Ultrasonic Inspection PAUT

• PAUT = Phased Array Ultrasonic Testing
• Computerized application of ultrasonics in which high speed electronics, real time imaging. With today's advanced technology, special probes are utilized for inspection.
• There is no physical difference between conventional UT and PAUT. Both use the same basics and theory
• The main difference between conventional UT and PAUT is within the probe.
• A mosaic of transducer elements
• Basically PAUT probe is a conventional probe cut into many elements

• Elements' excitation can be individually controlled
• Certain desired effects can be produced by timing the elements excitation
  ▪ steering the beam axis
  ▪ focusing the beam.
Advanced Ultrasonic Inspection PAUT

How does it work

• Elements are acoustically insulated from each other
• Elements are pulsed in groups with pre calculated time delay for each element
• Focal law: defines the elements to be fired, time delays, and voltages for both the transmitter and receiver functions.
Beam Forming

- No time delay applied
- PAUT probe becomes like a conventional UT probe
Beam Steering

- Provides capability to modify refracted angle
- Allows for multiple angle inspection using a single probe
- Applies a linear focal law (delays)
Beam Steering

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Beam Focusing and Steering at the same time

- Provides capability to Focus at a certain depths and at a chosen range of different angles
- Applies a focal law (delays) as in below figure
Electronic scanning

• The ability to move the beam along one axis of an array without any mechanical movement
• The movement is performed only by time multiplexing the active element group
• The beam movement depends on the probe geometry and could be:
  ▪ linear scanning
  ▪ sectorial scanning
  ▪ lateral scanning
  ▪ combination
Linear electronic scan

- The beam will move along the length of the probe
- Can be straight beam or a beam at a fixed angle
- This type of scan is often used for corrosion mapping applications
**Sectorial scan**

- The ability to scan a complete sector or volume without any probe movement
- Useful for inspection of complex geometries
- This is the most typical scan which distinguishes phased array from other techniques
Applications

• New construction weld inspection
• In-service weld inspection including Stress Corrosion Cracking
• Complex Geometries – Nozzles, Flanges, Shafts, bolts
• C-Scan mapping
• AUT is also commonly used, accepted, and code compliant with phased array ultrasonics
Weld inspection

- A scan plan to make sure the weld is covered completely is made first
- The scan plan will assist in setting up equipment and focal laws
Weld inspection

- **Equipment calibration**
  - Velocity
  - Wedge delay for all angles
  - Sensitivity for all angles
  - Time Corrected Gain (TCG)

- **Weld scanning**
  - Manually
  - Semi-automated, using an encoder and fixed distance to weld center line
  - Using a semi-automated or completely automated scanner
Inspection Results

- Signal interpretation
  - On Omni scan
  - Using Tomo view

Interpretation can be performed in the field “real time” and also reviewed post inspection.

Permanent data files can be saved for future resource. Commonly used for monitoring and also auditing inspection results.
Advantages

- Gives information about lateral position of defect in weld (depth and height)
- Gives a permanent record
- Repeatability, good for monitoring
- No radiation involved
- Can be used for several applications
- Can find defect at surface and in volume of weld (no dead zone)
- Interpretation simplified

Disadvantages

- Higher cost equipment required
- Requires experienced and trained technician for interpretation
- Angle of incidence is not always optimal when using S-scan
How Can We Help?

Contact

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