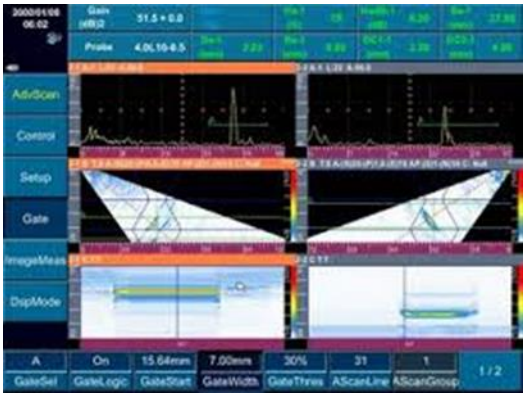
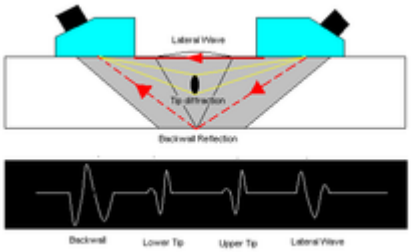
NDT-PRO Services expands service offering

NDT-PRO Services announced the formal release of two advanced NDT methods, Phased Array (including TOFD) and Eddy Current. What are they and where are the used?

Phased Array including TOFD (Time of Flight Diffraction)



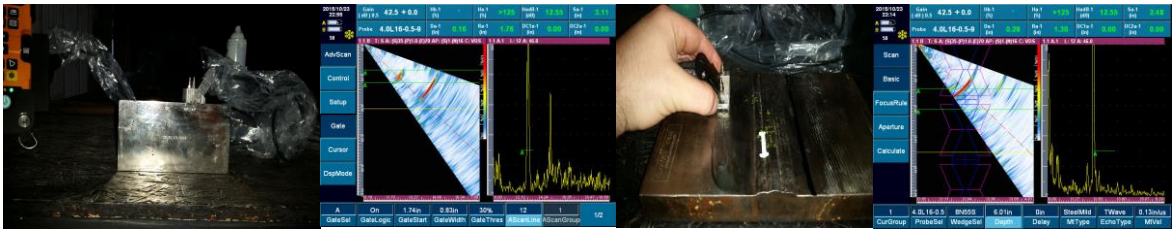


Phased array ultrasonics (PA) is an advanced method of ultrasonic testing that has applications in medical imaging and industrial nondestructive testing. Common applications are to noninvasively to find flaws in manufactured materials such as welds. Single-element (non-phased array) probes, known technically as monolithic probes, emit a beam in a fixed direction. To test or interrogate a large volume of material, a conventional probe must be physically scanned (moved or turned) to sweep the beam through the area of interest. In contrast, the beam from a phased array probe can be moved electronically, without moving the probe, and can be swept through a wide volume of material at high speed. The beam is controllable because a phased array probe is made up of multiple small elements, each of which can be pulsed individually at a computer-calculated timing. The term phased refers to the timing, and the term array refers to the multiple elements. Phased array ultrasonic testing is based on principles of wave physics, which also have applications in fields such as optics and electromagnetic antennae.

In a nutshell the basics of how phased array works are listed below:

- Ultrasonic phased arrays consist of a series of individual elements, each with its own connector, time delay circuit and A/D converter

- Elements are acoustically insulated from each other
- Elements are pulsed in groups with pre-calculated time delays for each element (i.e. phasing)
- For economic and physical size reasons, pulsers are usually multiplexed
    - i.e. instrument nomenclature such as PA 16/128 refers to an instrument with 16 pulsers that are multiplexed to yield a total of 128 ultrasonic channels



Why use Phased Array?

- High speed electronic scanning without moving parts
- Improved inspection capabilities through software control of beam characteristics
- Inspection with multiple angles with single, electronically controlled probe
- Greater flexibility for inspection of complex geometries
- Optimized Focusing and beam angle
- No radiation contamination zone
- Recordable inspection allowing for life time achieving and review

Radiography versus Phased Array

Radiography can be affected by many factors, the material thickness or characteristics can cause an issue given that this was 60mm thick. Other issues could be

1. Film batch issues
2. Chemical Issues
3. Exposure time
4. Mis-aligned exposure
5. Film movement during the exposure
6. Source movement

Phased array doesn't use any chemicals other than coupling, either water of some form of off the shelf item such as Sonagel. The equipment can be completely setup away from the job

utilizing weld simulation software already installed on the unit. The results from phased array are apparent immediately meaning that any scan issues can be rectified before leaving the job.

Phased array data can be stored on a memory stick device for easy sharing or using modern methods such as FTP storage. This means that within minutes the images can be placed online for the clients' representative to second view data.

Phased array is accepted now in most of the standards that require x-ray such as API, ASTM, ASME, AWS.

So How Accurate is Phased Array?

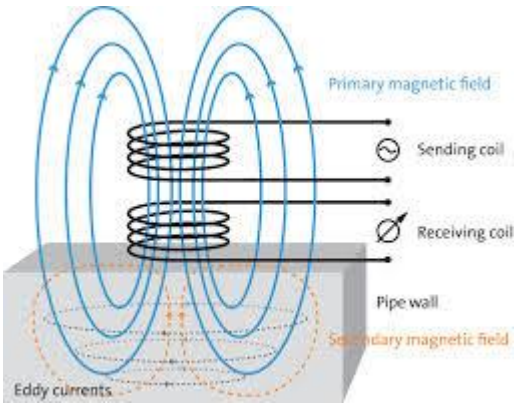
If you take x-ray again it is though that the probability of detection for discontinuities is in the region of 80 to 90%. X-ray produces a density image that will show you the length and position of an indication.

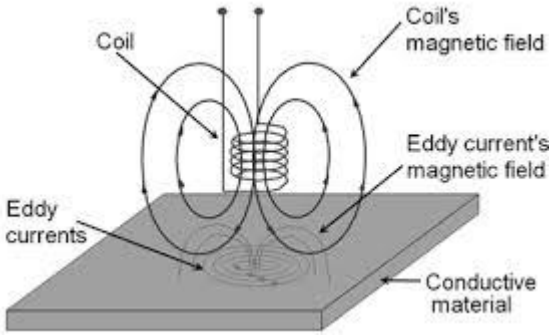
Phased Array however is a view-able ultrasonic inspection that has different possible views on screen in real time. Sectoral scans, C Scans, B Scans, Conventional A scans can all be viewed and manipulated for best interpretation. This gives you an image from the top and also the side. This reveals the length, height, and depth of a flaw.

Phased Array UT has a detection probability of 95 – 97%. Couple this will conventional UT probes and Time of Flight Diffraction (TOFD) this is in the high nineties.

Phased Array sizing has now been carried out down to 0.5mm. This is beyond almost all codes / standards.

Eddy Current





In its most basic form — the single-element ECT probe — a coil of conductive wire is excited with an alternating electrical current. This wire coil produces an alternating magnetic field around itself in the direction ascertained by the right-hand rule. The magnetic field oscillates at the same frequency as the current running through the coil. When the coil approaches a conductive material, currents opposed to the ones in the coil are induced in the material — eddy currents.

Variations in the electrical conductivity and magnetic permeability of the test object, and the presence of defects causes a change in eddy current and a corresponding change in phase and amplitude that can be detected by measuring the impedance changes in the coil, which is a telltale sign of the presence of defects. This is the basis of standard (pancake coil) ECT.

ECT has a very wide range of applications. Because ECT is electrical in nature, it is limited to conductive material. There are also physical limits to generating eddy currents and depth of penetration (skin depth).

Eddy-current testing (ECT) uses electromagnetic induction to detect flaws in conductive materials. There are several limitations, among them: only conductive materials can be tested, the surface of the material must be accessible, the finish of the material may cause bad readings, the depth of penetration into the material is limited by the materials' conductivity, and flaws that lie parallel to the probe may be undetectable.

In a standard eddy current testing a circular coil carrying current is placed in proximity to the test specimen (which must be electrically conductive).The alternating current in the coil generates changing magnetic field which interacts with test specimen and generates eddy current. Variations in the phase and magnitude of these eddy currents can be monitored using a second 'receiver' coil, or by measuring changes to the current flowing in the primary 'excitation' coil. Variations in the electrical conductivity or magnetic permeability of the test object, or the presence of any flaws, will cause a change in eddy current and a corresponding change in the phase and amplitude of the measured current. This is the basis of standard (flat coil) eddy current inspection, the most widely used eddy current technique.

Why Use Eddy Current?

- Eddy-current testing can detect very small cracks in or near the surface of the material
- Surfaces need minimal preparation
- Physically complex geometries can be investigated
- Useful for making electrical conductivity and coating thickness measurements.
- Can be used to detect flaws under coating

- The testing devices are portable, provide immediate feedback, and do not need to contact the item under examination.

Pulsed Eddy Current

Another eddy-current testing technique is pulsed eddy-current testing. A major advantage of this type of testing is that there is no need for direct contact with the tested object. The measurement can be performed through coatings, weather sheeting, corrosion products and insulation materials. This way even high temperature inspections are possible. Compared to the conventional eddy-current testing, pulsed eddy-current testing allows multi-frequency operation. This method is an optimal solution for in-process inspection or sorting.

For any additional information on either the methods mentioned or any other NDT method please contact us at www.ndtproservices.com or call us at 832.243.1821 we will be glad to assist you.

About NDT-PRO Services, LLC.

Established in the early part of the new Millennium, NDT-PRO Services (ISO 9001 Registered), is a recognized leader in Non-Destructive Testing (NDT) and inspection activities. With Global Head Quarters in Houston, Texas USA, we provide quality services for Engineering, Transport, Petro-chemical, Gas, Nuclear, Manufacturing and Aerospace Market segments. When lives depend on the professional expertise of a Certified Technician discovering imperfections, avoiding a potential catastrophic situation, the industry turns to NDT-PRO Services, LLC head quartered in the beautiful Gulf Region. Industries leading On-Time delivery performance, 15,000 Sq Ft. enclosed, weatherproof facility and superior operations flexibility are only a few of the benefits received with the "NDT-PRO Experience". For more information on how you too can have the unique NDT-PRO experience of superior service and quality performance, please visit www.ndtproservices.com or send us your contact information and/or request for quotation to rfq@ndtproservices.com