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Dry-Coupled Ultrasonic Testing

Integrated Systems and In-Service Inspection Solutions

The conversion of electrical pulses to mechanical vibrations and the conversion of returned mechanical vibrations back into electrical energy is the basis for ultrasonic testing (UT). Although there are non-contact options available for some applications (e.g. EMAT), the most widely used technique involves using a piezoelectric element to generate the ultrasound. Due to the impedance mismatch between the piezoelectric transducer and the material inspected, a liquid couplant is typically used to transmit the vibrations from the transducer into the part and receive the vibrations back into the transducer. While this technique is very efficient and popular, liquid couplants used for ultrasonic inspection can be harmful to the part and environment, make some inspections cumbersome or impossible, and can be expensive to use and dispose.



To complement our line of non-contact EMAT transducers for metallic components, Innerspec Technologies has introduced a new family of piezoelectric transducers that are designed to withstand very high voltages and can be efficiently coupled through rubber with no need for liquid couplant. These Dry-Coupled UT (DCUT) transducers can be used to inspect metallic and non-metallic materials with the following advantages over more conventional options:

- **Dry-Coupling:** The inspection is cleaner, easier, and does not contaminate the material inspected.
- **Low-profile and Flexible:** DCUT transducers can be made only a few millimeters tall, and can easily bend and adapt to curved and irregular geometries.
- **Less Costly Inspections:** DCUT transducers eliminate all the costs associated with couplant; including its purchase, management, and disposal.

This proprietary sensor technology takes advantage of Innerspec's high-power UT instruments that provide the necessary energy to couple the sensors using only a thin rubber layer and very light pressure. Innerspec's PowerUT® integrated systems and PowerBox® portable instruments can deliver up to 3,000Vpp and 25kW of power for EMAT, DCUT for the most demanding ultrasonic applications.

Existing DCUT sensors include flexible and rigid contact sensors and wheel probes designed to generate L waves in normal beam mode for flaw detection, thickness measurement and weld inspection.

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DCUT Transducers

Description	Frequency	Applications
Contact DCUT	2.0, 3.0, 4.0 MHz	High resolution thickness Measurement (2.5 μ - 0.0001") and flaw detection with or without delay lines.
Flexible DCUT	3.5 MHz	Thickness measurement in tight spaces and curved or complex geometries.
Wheel DCUT	2.0, 3.0, 4.0 MHz	Linear scanning thickness measurement and flaw detection on flat or curved surfaces
Remote DCUT	3.0 MHz	Remote spot thickness measurement and flaw detection on flat or curved surfaces



Instrumentation

- Integrated Systems - PowerUT® Rackmount instruments from 1 to +100 channels. Maximum power (3,000Vpp/25kW) and performance. Custom software for seamless integration.
- Portable and In-Service Solutions - PowerBox® Instruments from 1 to 8 channels. High-power (1,200Vpp/8kW), rugged, compact devices designed for field use.

Portable Accessories

- Adapter for PowerBox® H.
- Adapter for piezoelectric transducers from other parties.
- Cables.
- Wheel scanner for flat and curved parts.
- Rod attachment for inspections at a distance.