Innerspec

HIGH-PERFORMANCE NDT SOLUTIONS

MRUT (Medium Range Ultrasonic Testing)

Ultrasonic Inspection with High-Frequency Guided Waves

Equipment Highlights

MRUT is a suite of advanced nondestructive testing techniques that use guided waves to inspect structural components at distances ranging from 25 mm to 3,000 mm from the sensor.

Qualitative and Quantitative Results

Detects pinholes and small localized corrosion where access is limited. Patented MRUT SIZING technique can also estimate remaining wall thickness on pipe supports and similar components.

Fast, Couplant-Free Ultrasonic Inspection

Proprietary scanners with EMAT technology provide inspections without couplant, reducing the need for surface preparation and providing faster inspections and qualification.

Suited for a Wide Range of Components

Multiple scanners, wave modes, and techniques for inspection of pipelines, boiler tubes, tanks, light posts, beams, railroad wheels, and other structural components.

Cost-Effective, Field-Ready Solution

One instrument for all applications. Scanners with built-in encoders and interchangeable EMAT sensors. Web-based software allows full control from any device.

Remote Training and Support

NDT-LINK portal with online, around-the-clock services such as user access, asset management, technical support, documentation, training, spares, and remote data analysis.

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Innerspec's MRUT techniques utilize high-frequency guided waves for superior detection in hard-to-access areas on a wide range of structural components. MRUT complements LRUT with higher sensitivity and defect quantification near the sensor.

MRUT uses EMAT technology with various wave modes (Lamb, SH, SV), adapting to the inspection needs of different applications. Medium-range guided waves typically cover up to 3 meters with high resolution and sensitivity. The applications include:

- **Axial Scanning on Free-Standing Pipes:**

  Quick and accurate detection of circumferential defects on exposed pipes with light or no coatings (<3–4mm). Fast axial scanning at speeds up to 150mm/s (6 in/s).

- **Corrosion Under Pipe Supports (CUPS):**

  Manual axial and circumferential scanning for CUPS. The SIZING technique provides actual measurements of remaining wall thickness.

- **Circumferential Scanning of Buried/Hidden Interfaces:**

  Inspects inaccessible areas of structures (e.g., lamp posts) from the exposed side. Can penetrate up to 3 meters (10 ft) to detect corrosion or other damage.

- **Railroad Wheel Tread Inspection:**

  Penetrates up to 10 mm (0.4 in) into the tread to detect surface and internal flaws.

- **Single Point Inspection:**

  Ideal for localized assessments on boilers, tanks, and other structures where scanning is not feasible.

All MRUT applications are available on VOLTA 2, a single, cost-effective, and flexible platform that can cover all your guided wave inspection needs.

Patented and Patent-Pending Equipment and Techniques

US 11,123,766	US 12,372,382	US 11,448,620
US 10,119,942	US 12,184,258	US 17,965,574

One Instrument - All EMAT

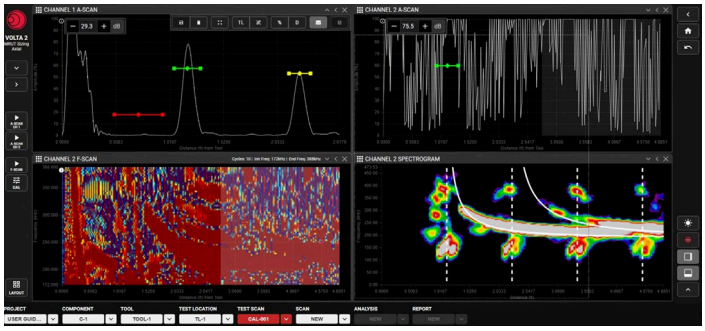
VOLTA 2 is a high-power, 2-channel portable ultrasonic instrument purpose-built for Electro Magnetic Acoustic Transducer (EMAT) applications. The patented pulser is capable of generating 1 to 10 cycles at up to 1,000 Vpp. Combined with a built-in programmable tuning circuit, VOLTA 2 supports the most demanding EMAT inspections across a wide frequency range (20 kHz to 8 MHz).

VOLTA 2 supports a comprehensive range of applications, including MRUT, LRUT, Weld Inspection, Surface Waves, Normal Beam, Non-Linear UT, and an EXPERT mode tailored for NDT researchers requiring full control over inspection parameters and algorithms.

Software

All applications are based on Innerspec's NDT-WEB platform that enables full instrument control through a web browser. VOLTA 2 creates a private Wi-Fi that permits operation from the VOLTA tablet or any device, regardless of the Operating System (no additional software required).

An intuitive Navigation Wizard guides users through each inspection step. The software generates both standard and customized reports, supports CSV export, and full project sharing via an included viewer. Inspection data can be uploaded directly to OneDrive, Google Drive, or Innerspec's NDT-LINK platform.



Scanner/Sensor	Specifications	Applications
 **MRUT PML & PMX Scanner**	• Wave Modes: Lamb, Shear Vertical • PML 100 W x 46.5 H x 42 D (mm) • PMX 184 W x 69 H x 220 D (mm) • Minimum OD. PMX 1" (25mm), PML 4" (100mm) • Maximum Thickness: 0.5 in. (13mm) • Thickness Range: 1-13mm (0.040"-0.5")	• Axial and circumferential inspection of pipes, including light-coated freestanding pipes • Plate and tank volumetric inspection • Rail head inspection (PMX) • Detect defects ≥10% of wall thickness and as small as 1mm in diameter (qualitative assessment)
 **MRUT CIRC Scanner**	• Wave modes: Shear Horizontal (magnetostrictive) • 3.60 W x 3.30 H x 8.25 D (in.) • 91.4 W x 84 H x 209.6 D (mm) • Minimum OD 4" • Thickness Range: 1-25mm	• Circumferential inspection on pipes • Inspection of pipe supports, air-to-soil interfaces, and other inaccessible areas • Detect defects ≥10% of wavelength and as small as 1mm in diameter (qualitative assessment)
 **MRUT SIZING Scanner**	• Wave modes: Shear Horizontal (magnetostrictive) • 4.51 W x 3.70 H x 12.79 D (in.) • 114.6 W x 94 H x 324.9 D (mm) • Minimum OD 4" • Thickness Range: 1-25mm	• Axial and circumferential inspection on pipes. Longitudinal inspection on tanks • Inspection of pipe supports, air-to-soil interfaces, and other inaccessible areas • Provides an estimate of remaining wall (quantitative assessment)
 **MRUT POINT Sensor**	• Wave Modes: Shear Horizontal (magnetostrictive) • 5 W x 3.4 H x 7.6 D (in.) • 126.8 W x 86.1 H x 194.2 D (mm) • Thickness Range: 1-25mm	• Single point inspections on Railroad Wheel Treads, and other flat and curved components • Detect defects ≥10% of wavelength, and as small as 1mm in diameter. Actual detection depends on geometry and inspection conditions (qualitative assessment)