

Tube & Tank Inspection

MRUT (Medium Range UT)

Equipment Highlights

- Permits inspection of pipes from 25 mm to 3,000 mm ahead of sensor using guided waves and bulk waves.
- Uses Electro Magnetic Acoustic Transducer technology for non-contact ultrasonic inspection on metallic components.
- Easy and fast to deploy, permits covering the near-field of Long Range UT inspections.
- Applicable to a full range of applications including pipes, tank walls, rail heads, thin laminated composites, and surface inspections.
- Requires VOLTA instrument plus the appropriate sensors and accessories for each application from Innerspec's catalog.

MRUT (Medium Range UT) describes a suite of techniques that permit covering an area between approximately 25 mm to 3,000 mm from the location where the inspection is performed. MRUT uses guided wave and/or bulk wave techniques and complements LRUT (Long Range UT) by covering the near field area where LRUT cannot be used.

All MRUT techniques use Electro Magnetic Acoustic Transducer (EMAT) technology and different types of sensors and wave-modes (Lamb, SH, Shear Vertical) to adapt to the requirements of the application.

The most common applications include:

- Inspection of light-coated free-standing pipes. The system provides fast scanning on pipes with none or light coatings (3-4 mm) for fast and accurate defect detection around the circumference of the pipe.
- Inspection of pipe supports from top. Uses axial scanning to find corrosion under supports.
- Inspection of inaccessible areas from side. Side (circumferential) scanning is used for detection of defects on inaccessible areas of pipe up to approximately 3 m (~10 ft.) from the inspection point.
- Plate and tank volumetric inspection. Provides fast inspection of walls or bottom covering up to 1 m (3 ft.) per pass.
- Rail head inspection. Guided wave technique to inspect the top (head) of a common rail.
- Inspection of thin materials. Guided wave technique used to inspect thin materials such as aircraft skin and thin laminated metallic composites from 0.5 mm to 6 mm.
- Surface inspection. Fast inspection of detection of surface defects.

All these applications can be performed using Innerspec's VOLTA instrument and the appropriate accessories, sensors, and software.



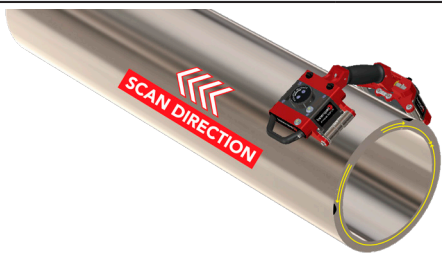
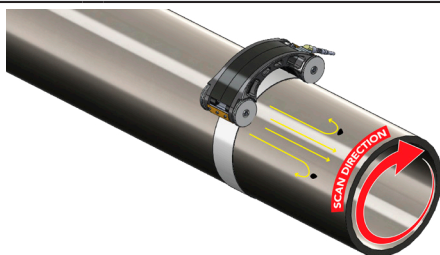



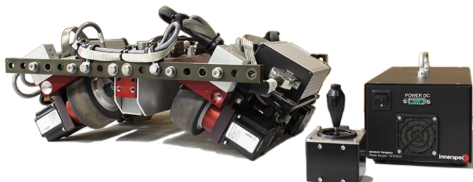
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MRUT - Specifications

Materials Inspected	• Metallic (magnetic and non-magnetic) materials, including carbon steel, stainless steel, and Inconel		
Inspection Technique			
Defect Detection	Axial Scanning - Lamb/SH (Through Transmission): <ul style="list-style-type: none">• 1" (25 mm) x 20% wall smooth corrosion, 10% for perpendicular cracks• Cross-sectional area: 1.4% of 14 in. (355 mm) pipe / 3.3% of 4in. (101 mm)• 0.005" (0.125 mm) surface defect detection		Circumferential Scanning - Lamb/SH (Reflection): <ul style="list-style-type: none">• 1" (25 mm) x 30% wall smooth corrosion, 0.3 to ~10 ft. (0.1 to 3 m) coverage• MRUT-SH scanner permits inspection of pipes with heavy coatings (e.g. Tapecoat or tar coat)
Hand-Held Scanning			
Equipment	Instrument: <ul style="list-style-type: none">• VOLTA (2-channel portable EMAT)		Probes and Accessories: <ul style="list-style-type: none">• Permanent magnet sensors• MRUT-Lamb scanner (PMX and PML)• MRUT-SH scanner (with magnetostrictive strip)• Cables (12 ft., with available longer custom length)
Scanners	MRUT PML Scanner	MRUT PMX Scanner	MRUT MS Scanner
	 <ul style="list-style-type: none">• Wave Modes: Lamb, Shear Vertical• 3.93 W x 1.83 H x 1.65 D (in.)• 100 W x 46.5 H x 42 D (mm)• Minimum OD: 1in. (25 mm)• Maximum Thickness: 0.5 in. (13 mm)	 <ul style="list-style-type: none">• Wave Modes: Lamb, Shear Vertical• 7.25 W x 2.71 H x 8.66 D (in.)• 184 W x 69 H x 220 D (mm)• Minimum OD: 4 in. (101 mm)• Maximum Thickness: 0.5 in. (13 mm)	 <ul style="list-style-type: none">• Wave Modes: Shear Horizontal• 8.25 W x 3.5 H x 3.25 D (in.)• 210 W x 89 H x 83 D (mm)• Minimum OD: 4 in. (101 mm)• Maximum Thickness: 1 in. (25 mm)
Applications	<ul style="list-style-type: none">• Axial and circumferential inspection of pipes, including light-coated free-standing pipes and corrosion under non-welded pipe supports (CUPS)• Plate and tank volumetric inspection• Rail head inspection• Inspection of thin materials• Surface inspection		<ul style="list-style-type: none">• Inspection of pipes from inaccessible areas, including corrosion under welded pipe supports (CUPS) and corrosion under pipe insulation (CUI)• Plate and tank volumetric inspection
Characteristics	<ul style="list-style-type: none">• Inspection Speed: Approx. 1 in./s (25 mm/s)• Max. Temperature: 200 °C• Rechargeable Battery: 4-8 hours, hot-swappable		
Automated Scanning			
Equipment	Instrument: <ul style="list-style-type: none">• VOLTA (2-channel portable EMAT)• PowerBox MP		Probes and Accessories: <ul style="list-style-type: none">• Pulsed or permanent magnet sensors• Navigator scanner• Cables (with available custom length)
Characteristics	Navigator Scanner: <ul style="list-style-type: none">• Wave Modes: Lamb, Shear Vertical• 31.5 W x 23 H x 19 D (in.)• 800 W x 581 H x 483 D (mm)• Minimum OD: 4 in. (101 mm)• Inspection Speed: 10 in./s (250 mm/s)• Max. Temperature: 200 °C		
Applications	<ul style="list-style-type: none">• Axial and circumferential inspection of pipes, including corrosion under pipe supports (CUPS)• Plate and tank volumetric inspection		

MRUT_A21