

Eddyfi Technologies
Beyond current

Applications
Brochure

ADVANCED WELD INSPECTION FOR AUSTENITIC STEEL

The solution that's got you covered through thick or thin.

Discover the all-inclusive package delivering actionable data.

THE BEYOND CURRENT SOLUTION

Eddyfi Technologies offers a wide array of advanced weld inspection solutions tailored for phased array ultrasonic testing (PAUT) applications. These solutions are adaptable to a diverse range of component materials, geometries, and weld specifications. Designed to meet present-day demands and anticipate future challenges, our PAUT and time-of-flight diffraction weld inspection solutions empower you with enhanced capability.

- One-stop shop solutions driven by technical expertise
- Streamlined workflow for setup, acquisition, and reporting
- Full support for ultrasonic testing (UT) methods including PAUT, time-of-flight diffraction (TOFD), conventional UT, full matrix capture (FMC)/total focusing method (TFM), plane wave imaging (PWI) and phase coherance imaging(PCI)
- Standard and custom probes designed in-house by our technical experts
- The most advanced software analysis in the industry
- Cypher: The most powerful PAUT instrument on the market—complete multi-mode inspection in a single pass, no splitter required

Imagine having a toolkit that not only includes a state-of-the-art inspection instrument and scanner but also encompasses specialized probes and wedges designed for comprehensive assessment of plates, pipes, and austenitic steel. Eddyfi Technologies understands the unique demands of your role as an NDT inspector, and our complete solution is crafted to address these challenges comprehensively.

ADVANCED SOLUTIONS FOR AUSTENITIC WELD INSPECTION

When it comes to inspecting most austenitic welds, relying solely on standard (linear) phased array probe and wedge combinations may not suffice to obtain accurate results. That's why Eddyfi Technologies offers additional options to enhance flaw detection and characterization. Our team of advanced technical experts has developed specialized packages tailored for both standard industry and niche weld inspection applications. These packages ensure the delivery of highly optimized solution kits, providing an improved user experience.

Austenitic materials in stainless steel and dissimilar metal welds possess an anisotropic coarse-grain structure. This characteristic leads to specific behaviors of the ultrasonic beam as it travels through the material, including high attenuation, significant grain noise, beam redirection and distortion, and a low-pass filter effect that blocks waves at higher frequencies. These factors collectively create challenging conditions for phased array UT inspections.



Figure 1: Anisotropic coarse-grain structure in austenitic materials

ENHANCED INSPECTION TECHNIQUES FOR AUSTENITIC WELDS

Phased array inspection techniques for stainless steel and dissimilar metal welds are typically most effective with low-frequency (1.5 to 4 MHz) 2D dual matrix array (DMA) probes. These probes generate longitudinal waves that propagate well through coarse-grain austenitic weld material and its successive acoustic interfaces. The dual transmit/receive configuration enhances sensitivity and signal-to-noise ratio by combining transmitter and receiver beams, preventing "ghost echoes" from internal wedge reflections.

Linear array probes remain useful for inspecting the fine-grain base material and the heat-affected zone (HAZ). Their nominal frequency is typically selected slightly lower than for carbon steel welds.

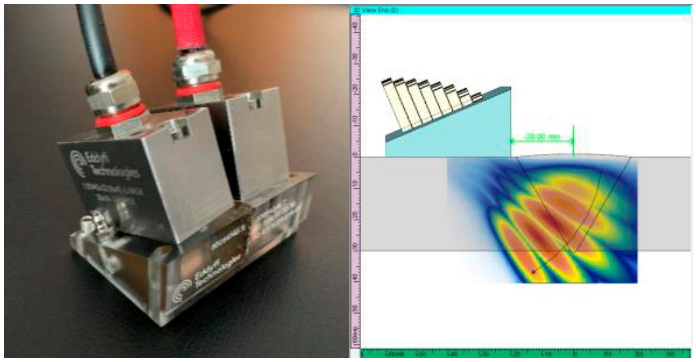

Figure 2: DMA probe assembly and acoustic beam simulation for typical longitudinal wave sweep.

Advanced focusing techniques, such as FMC and PWI firing, can be applied with DMA probes to optimize image resolution, improving flaw detection and sizing capability.

Encoded examinations, using manually encoded, semi-automated, or fully motorized (automated) scanners, ensure 100% coverage of a weld. Data storage allows for ongoing asset monitoring, and offline analysis enhances inspection reliability for challenging austenitic weld configurations.

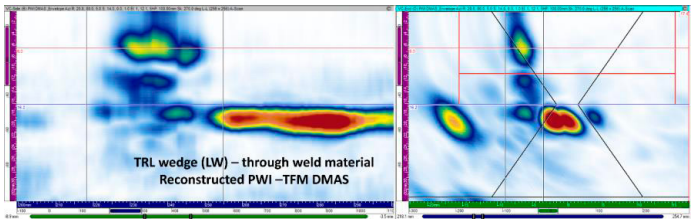

Figure 3: PWI-TFM image of thermal fatigue crack detected through stainless steel weld material using 1.5 MHz DMA probe.

WELD INSPECTION SOLUTIONS

Our instruments offer inspection techniques that can be implemented using manual encoded, semi-automated, or motorized (automated) scanners, ensuring 100% coverage of a weld.

SEMI-AUTOMATED SOLUTION

A range of semi-automated scanner options are available to suit your requirements, offering a truly advanced, robust and versatile platform.

- From 100mm (4in) OD to flat
- Up to 4 PAUT/TOFD probes
- Easy operation and versatile
- Quick-release brakes
- Lightweight
- Option for high temperature operation up to 350°C (662°F)



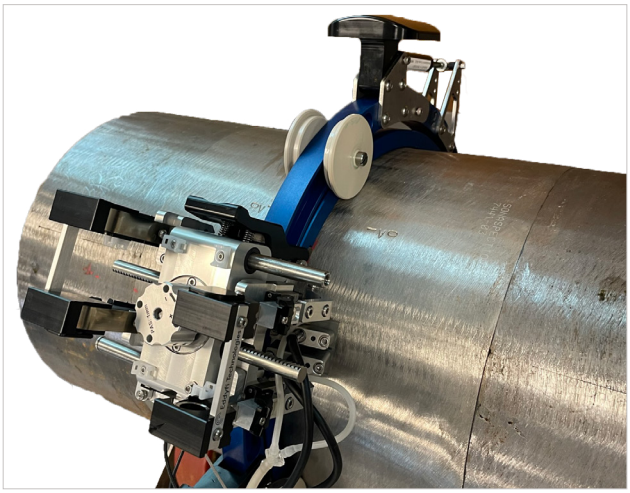

Figure 4 and Figure 5: Variety of chain scanner options available.

AUTOMATED SOLUTION

The automated, robust, field-proven MOTIX robotic scanner has been successfully deployed on various assets such as storage tanks, pressure vessels, pipelines, and other critical infrastructure.

- From 152mm (6in) to 1067mm (42in) OD
- Up to 4 PAUT/TOFD probes
- Battery operated & remote controlled
- Circumferential & longitudinal
- Max speed 142mm (5.6in)/sec
- Surface temperatures up to 50°C (122°F)

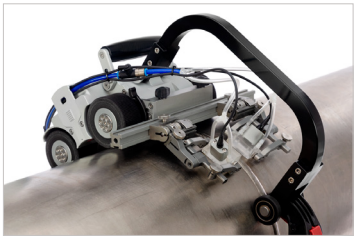



Figure 6 and Figure 7: Automated chain scanner for non-ferrous & ferrous pipe inspection.

PHASED ARRAY PROBES AND WEDGES

Discover a new era of precision with Eddyfi Technologies' high-quality NDT probes and transducers, offering a diverse range of frequencies, configurations, and connection styles: View PAUT Probe Catalog

Linear array probes and wedges for inspection of fine-grain austenitic base material and weld bevel:

- **Thin welds - T < 10mm (0.4in):** Small footprint phased array probe, typically 5 MHz, to get close to the weld cap
- **Medium welds -10mm (0.4in) ≤ T < 30mm (1.2in):** Small footprint 5 MHz probe, or larger active aperture phased array probe at 2.25 MHz
- **Thick welds - T ≥ 30mm (1.2in):** Large active aperture phased array probe at 2.25 MHz



Figure 8: A10 linear array probe.



Figure 9: Dual matrix array probe.

DMA probes and wedges for inspection through coarse-grain weld material:

- **Thin welds - T < 10mm (0.4in):** Small footprint DLA probe (3.5 MHz), to get close to the weld cap
- **Medium welds -10mm (0.4in) ≤ T < 30mm (1.2in):** Medium footprint DMA probes, with nominal frequencies of 4 MHz (mildly attenuating materials) to 2.25 MHz (more challenging materials)
- **Thick welds - T ≥ 30mm (1.2in):** Large footprint DMA probes, with nominal frequencies of 1.5 MHz

Wedges with a flat footprint are proposed in the recommended kits below, but AOD and COD contoured wedges are preferred for piping welds and can be manufactured on request.

ORDERING INFORMATION

Austenitic Welds - T < 10mm (0.4in)

TYPE	ITEM	DESCRIPTION
	Solution kit is compatible with the following instruments: Mantis™, Cypher®, Emerald, Panther™	
Linear Array Probe for SW Examination (Pulse-Echo)	5L16-A10-9.6X10-5-IPEX	16-element linear array probe - 5MHz - Active aperture of 9.6mm x 10mm - Pitch: 0.60mm - Elevation: 10mm - A10 casing - 5m cable - IPEX connector
	WSA10-55S-FLAT-IHC	Standard wedge for A10 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using SW - 55deg SW nominal angle - Irrigation, probe holder fixtures & carbides
	WSA10-55S-KIT-AOD4.5-12.75-IHC	Standard wedge kit for A10 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using SW - 55deg SW nominal angle – Includes one flat wedge + 6 curved wedges contoured for 4.5" to 12.75" - Irrigation, probe holder fixtures & carbides. Full range of radius wedges available.
DLA Probe for LW Examination (Pitch & Catch)	3.5DL16-A25-12X5-5-IPEX	2x16-element dual linear array probe – 3.5MHz – For weld thickness up to 10mm – Active aperture of 12mm x 5mm – Pitch: 0.75mm – Elevation: 5mm – A25 casing – 5m cable – IPEX connector
	WSA25-TRL-FLAT-IH-22.0W-3.8R	Wedge assembly for TRL inspection using A25 probes - Irrigation channels and probe holder fixtures - 22.0° wedge angle / 3.8° roof angle - Flat
	WSA25-TRL-KIT-IH	Wedge kit for TRL inspection using A25 probes - Irrigation channels and probe holder fixtures - flat wedge plus 10 curved wedges NPS 0.5 (0.840") to NPS 4.0 (4.500") - Circumferential flaw detection
Scanner	SCAN-ROTIX-2PA-38-REDU-LE	Semi-automated weld inspection reduced width chain scanner (4.9"-38"). Includes rail, 2 x vertical toolposts - 8mm mounting pins, 5m Lemo Encoder cable
	SCAN-TP-ARMS-A15-A25	Probe holder arm set - for A15/A25 Probe/Wedge. Compatible with Vertical and slip joint probe holders
	SCAN-PIVOT-BTN-KIT	Probe Holder Pivot Button kit to accommodate wedges with 3mm / 5mm / 8mm holes & 5mm Pin (QTY 2 of each)
Accessories	COUPLANT-GLYCERIN-90ML	Couplant, liquid. Blue color. No air bubble. Quantity: 90ml - bottle.
	SCAN-MANUAL-PUMP-7.9L	Manual water pump - 7.9 L - Includes SCAN-IRRIG-KIT-4MM for ROTIX, STIX or LYNCS scanners. Includes 5m - 4mm ID hose with quick connect and shutoff valve, 2m 1/8in tube, 2m 1/16 tube & 1/8 to 1/16 T adapters

NOTE: For alternative manual encoded, semi-automated or automated options please contact us.

ORDERING INFORMATION

Austenitic Welds - 10mm (0.4in) ≤ T < 30mm (1.2in)

TYPE	ITEM	DESCRIPTION
Solution kit is compatible with the following instruments: Cypher®, Emerald, Panther™		
Linear Array Probe for SW Examination (Pulse-Echo)	5L16-A10-9.6X10-5-IPEX	16-element linear array probe - 5MHz - Active aperture of 9.6mm x 10mm - Pitch: 0.60mm - Elevation: 10mm - A10 casing - 5m cable - IPEX connector
	WSA10-55S-FLAT-IHC	Standard wedge for A10 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using SW - 55deg SW nominal angle - Irrigation, probe holder fixtures & carbides
	WSA10-55S-KIT-AOD4.5-12.75-IHC	Standard wedge kit for A10 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using SW - 55deg SW nominal angle – Includes one flat wedge + 6 curved wedges contoured for 4.5" to 12.75" - Irrigation, probe holder fixtures & carbides. Full range of radius wedges available.
	2.25L32-A11-19.2X10-5-IPEX	32-element linear array probe – 2.25MHz – Active aperture of 19.2mm x 10mm – Pitch: 0.6mm – Elevation:10mm – A11 casing – 5m cable – IPEX connector
	WSA11-55S-FLAT-IHC	Standard wedge for A11 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using SW - 55deg SW nominal angle - Irrigation, probe holder fixtures. Full range of radius wedges available.
DMA Probe for LW Examination (Pitch & Catch)	4DM16x2-A27-16X6-5-IPEX	2x32-element dual matrix array probe – 4MHz – For weld thickness up to 35mm – Active aperture of 16mm x 6mm – Pitch A:1mm – Pitch B:2mm – A27 casing – 5m cable – IPEX connecto
	WSA27-TRL-23W-4R-IHC	Wedge assembly for A27 dual matrix array probe – Irrigation, probe holder fixtures & carbides – For azimuthal scanning from 30 to 85 degrees using LW - Flat. Full range of radius wedges available.
	2.25DM10x3-MED-20x12-5-IPEX	2x30-element dual matrix array probe – 2.25MHz – For weld thickness up to 35mm – Active aperture of 20mm x 12mm – Pitch A:2mm – Pitch B: 4mm – Medium casing – 5m cable – IPEX connector
	WSMED10x3-DN75L-23W-4R-IHC-FLAT	Wedge assembly for DM10x3-MED-20x12 dual matrix array probe in MED casing, 75° Nominal Refracted Angle in SS (23.0° wedge angle), Longitudinal Wave, Roof Angle 4.0°, with IHC option (irrigation, Ø5mm external holder fixtures and carbide wear pins) - Flat footprint
Scanner	SCAN-ROTIX-2PA-38-REDU-LE	Semi-automated weld inspection reduced width chain scanner (4.9"-38"). Includes rail, 2 x vertical toolposts - 8mm mounting pins, 5m Lemo Encoder cable
	SCAN-PIVOT-BTN-KIT	Probe Holder Pivot Button kit to accommodate wedges with 3mm/5mm/8mm holes & 5mm Pin (QTY 2 of each)
Accessories	COUPLANT-GLYCERIN-90ML	Couplant, liquid. Blue color. No air bubble. Quantity: 90ml - bottle.
	SCAN-MANUAL-PUMP-7.9L	Manual water pump - 7.9 L - Compatible with SCAN-IRRIG-KIT-4MM & SCAN-IRRIG-KIT-6MM. Supplied as a Pump only. STIX, ROTIX and MICROBE scanners supplied with Irrigation.

NOTE: For alternative manual encoded, semi-automated or automated options please contact us.

ORDERING INFORMATION

Austenitic Welds - T ≥ 30mm (1.2in)

TYPE	ITEM	DESCRIPTION
	Solution kit is compatible with the following instruments: Cypher®, Emerald, Panther™	
Linear Array Probe for SW Examination (Pulse-Echo)	2.25L32-A5-24X24-5-IPEX	32-element linear array probe – 2.25MHz - Active aperture of 24mm x 24mm - Pitch: 0.75mm - Elevation: 24mm – A5 casing – 5m cable - IPEX connector
	WSA5-55S-FLAT-IHC	Standard wedge for A5 phased array probe - Designed for azimuthal scanning from 40 to 70 degree using SW - 55deg SW nominal angle
DMA Probe for LW Examination (Pitch & Catch)	1.5DM8x4-LARGE-28x16-2.5-IPEX	2x32-element dual matrix array probe – 1.5MHz – For weld thickness up to 65mm – Active aperture of 28mm x 16mm – Pitch A:3.5mm – Pitch B:4mm – Large casing – 5m cable – IPEX connector
	WSLARGE-TRL-FLAT-IH-23.0W-4.0R	Wedge assembly for 1.5MHz dual matrix array probe in Large casing – Irrigation, probe holder fixtures & carbides – For azimuthal scanning from 30 to 85 degrees using LW - Flat
	1.5DM12x5-XLARGE-40x20-5-IPEX*	(12x5)-element DUAL matrix array probe – 1.5MHz – For weld thickness up to 65mm – Active aperture of 40mm x 20mm – Pitch A:3.3mm – Pitch B:4mm – X-Large casing – 2.5m cable – IPEX connector
	WSXLARGE-TRL-FLAT-IH-19.3W-1.5R	Wedge assembly for 1.5MHz dual matrix array probe in X-Large casing – Irrigation, probe holder fixtures & carbides – For azimuthal scanning from 30 to 85 degrees using LW - Flat
Scanner	SCAN-ROTIX-2PA-38-REDU-LE	Semi-Automated weld inspection reduced width chain scanner (4.9"-38"). Includes rail, 2 x vertical toolposts - 8mm mounting pins, 5m Lemo16 Encoder cable
	SCAN-PIVOT-BTN-KIT	Probe Holder Pivot Button kit to accommodate wedges with 3mm/5mm/8mm holes & 5mm Pin (QTY 2 of each)
Accessories	COUPLANT-GLYCERIN-90ML	Couplant, liquid. Blue color. No air bubble. Quantity: 90ml - bottle.
	SCAN-MANUAL-PUMP-7.9L	Manual water pump - 7.9 L - Compatible with SCAN-IRRIG-KIT-4MM & SCAN-IRRIG-KIT-6MM. Supplied as a Pump only. STIX, ROTIX and MICROBE scanners supplied with Irrigation.
	SCAN-ODI-1PA-LE	ODI scanner - 1 probe - LEMO 16 Encoder connector - Cable length 2.5 m - Max Clamp Width: 55 mm - Encoder Resolution: 16.0 counts/mm

NOTE: For alternative manual encoded, semi-automated or automated options please contact us.

*Standard toolpost not compatible with XLARGE casing, please contact us for semi-automated mounting. Alternatively, this combination can be paired with manual encoded SCAN-ODI-1PA and SCAN-ACC-ODI-90MM.

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