ZETEC
THE INSPECTION ADVANTAGE

EMER△LD

Powerful, Compact, Industrial Phased Array UT & TFM System

PERFORMANCE UNLE△SHED

Powered by

ULTR△VISION
COMPLETE UT AND PHASED ARRAY INSPECTION PACKAGE

Extremely Powerful & Intelligent

Integrated Intelligence From Zetec.

EMERALD is a compact phased array ultrasonic system that offers extreme performance for the most challenging industrial inspections and environmental conditions.

Designed with industry leading phased array ultrasound testing (PAUT), total focusing method (TFM) imaging capabilities and time of flight diffraction (TOFD), EMERALD delivers fast performance and intelligent results. Featuring exceptional signal quality, it can achieve high amplification, without signal distortion.

With real-time multi-TFM processing onboard and offline, combined with full matrix capture (FMC) and plane wave imaging (PWI) data acquisition features produce faster and more detailed inspection results than ever before.
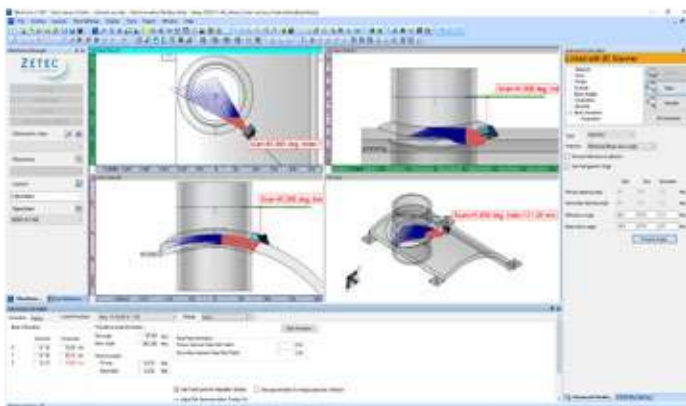
EMERALD can intelligently handle the most challenging inspections using the latest technologies including:

- **Full Matrix Capture (FMC) up to 128 elements**
- **Real-time high-speed multi-TFM onboard processing**
- **64 channel code-compliant PAUT**
- **Parallel firing and processing PA channels**
- **Time of Flight Diffraction (TOFD)**
- **Multi-channel raw FMC encoded data saving**
- **High dynamic analog signal amplification range**

With high inspection data throughput & simplified integration, EMERALD is built for the most demanding applications.

- ✓ Oil & Gas
- ✓ Power Generation
- ✓ In-Service Railway
- ✓ Manufacturing
- ✓ Heavy Industry
- ✓ Aerospace

Driven by Industrially Proven UltraVision® Software.

UltraVision is a complete PAUT and FMC/TFM inspection package that manages the entire inspection process including probe design (acoustic beam simulation), inspection technique development and validation, high-speed data acquisition, advanced data analysis and thorough reporting.

When working with FMC and PWI data, UltraVision can offer the most comprehensive set of reconstruction algorithms.

EMERALD gives access to an UltraVision Advanced license when connected to an UltraVision computer.

EMERALD is Packed With Smart Features.

- **Multiple firing modes for more detail:** Full Matrix Capture (FMC), Plane Wave Imaging (PWI) or Sparse Firing Mode (Fast TFM)* can be used to acquire data.

- **Real-time, multi-TFM processing onboard for faster results:** With an onboard processing capability of up to 1M+ points per TFM frame and up to 8 simultaneous TFM reconstructions, EMERALD offers the most versatile and powerful TFM imaging capability in its class. When processing onboard, EMERALD delivers faster, more efficient TFM reconstruction. Save on an external device for later offline reconstruction.

- **Multi-channel raw FMC encoded data saving:** Data recording up to 128-element apertures and 2 x 64 element DMA (Dual Matrix Array) probes.

- **Advanced focusing techniques:** Sectorial Total Focusing (STF) combines the advantages of the industry accepted sectorial view presentation with the focusing capabilities of TFM. Live FMC or PWI data is reconstructed generating sectorial sweep with all angles focused in each point along the sound path. The summed A-scan signals are available for each angle, similar to PAUT.

- **Superior signal quality:** With double stage analog amplification circuits and 16-bit resolution digitizing, EMERALD can deliver high amplification without signal distortion.

- **Fast, industrial-grade data throughput:** EMERALD uses a high-speed 5 Gbit/second ethernet link for data transfer with cables up to 100m/300ft long.

- **Compact, rugged & scalable:** With an IP65 enclosure, EMERALD can work in almost any industrial environment without external protection. Multiple instruments connected in parallel to the same UltraVision session offer limitless capability for complex inspection configurations.

- **Bipolar pulsers can penetrate through thick components:** Bipolar pulsers can deliver up to 40% more acoustic energy for the same gain settings.
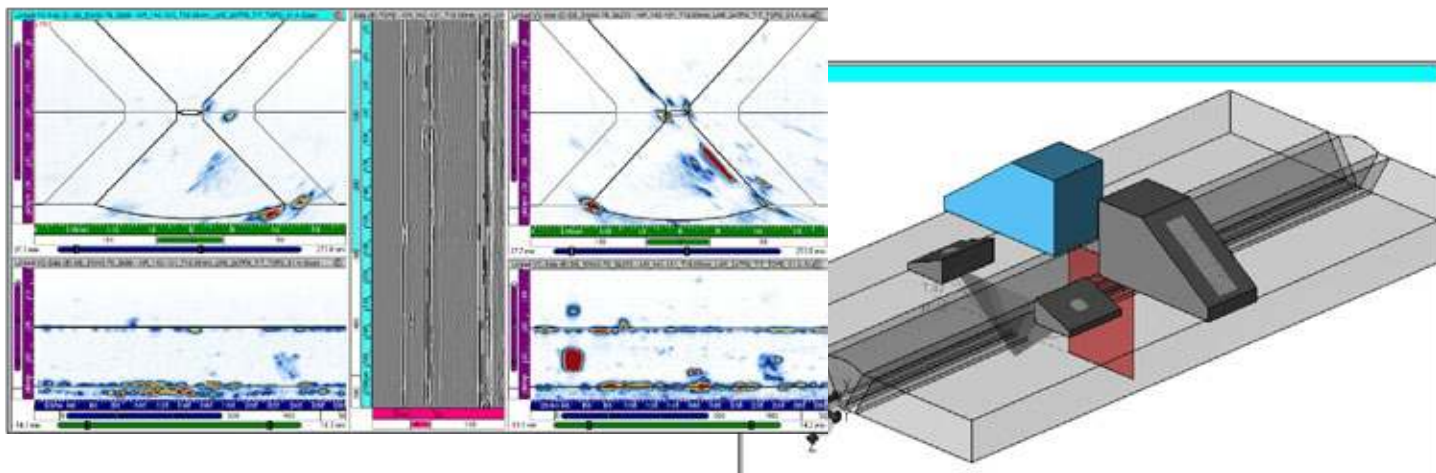
Adaptable to Meet Your Needs

Simple to Integrate.

A single UltraVision session can connect multiple units in parallel for demanding high-speed inspections. One EMERALD unit can fire up to 2 parallel 32 element apertures. *

The external I/O is designed to simplify EMERALD's integration in multi-instrument configurations. Encoder and critical I/O signals can be daisy chained between the instruments simplifying cable requirements (no need for encoder splitters).

For added flexibility, **UltraVision's software development kit (SDK)** allows users to integrate their own development inside UltraVision (Classic and Touch). It is the same tool used by Zetec for UltraVision component development and can be used to create custom solutions such as specific UI, processing and analysis tools, custom processed data, remote interaction with an inspection management system and real-time streaming of data to another software platform.

PROBE SPLITTER MODULE ACCESSORY

With a dedicated probe splitter module, EMERALD can connect two 64 element probes simultaneously. The probe splitter module also gives access to 8 additional conventional UT channels. It is available with IPEX and ZPAC connectors.

Specifications

PULSERS	
Channel configuration	64/128 PR
Maximum applied voltage (50 Ω load)	PA: 150Vpp (Bipolar) / 75V (Unipolar) UT: 200V
Maximum PRF	≤ 30 kHz
Max focal laws	2048

ACQUISITION	
Acquisition	A-Scan/Peak/Conditional data recording
Acquisition triggered on	Free running, encoder position, external signal
Digitizing range	800%
Max data file size	Limited by hard drive

FMC/TFM	
Maximum number of reconstruction channels	128
Firing modes	FMC, PWI, Sparse*
TFM frame size (on board)	1M points
TFM frame size (off line)	Unlimited
Simultaneous FMC channels	2
Max simultaneous TFM frames (on board)	2 (up to 1M points per frame) 8 (up to 256k points per frame)

I/O	
PA connector	1 IPEX type (2 IPEX with splitter module)
UT connectors	4 x LEMO® 00 (8 additional LEMO® 00 with splitter module)
Data connectivity	Ethernet 5 GBit/second
Encoder interfaces	3 quadrature-type
I/O capability	12 inputs, 9 outputs
Automated probe detection	Yes (with Zetec probe ID chip)
Automated scanner detection	Yes (with Zetec probe ID chip)
I/O and encoder daisy chaining for multi-instrument configurations	

RECEIVERS	
Gain	Up to 124 dB (0.1 dB step), 76 dB Analog / 48 dB Digital
Input impedance	50 Ω
Bandwidth (-3 dB)	PA: 0.5 to 18 MHz, UT: 0.5 to 22.5 MHz
Data compression	1, 2, 4, 8, 16
Amplitude resolution	14-bit elementary A-Scan, 16-bit PA
Max number of samples	16k
Max A-scan range	65k samples
Measurement gates	6 + 1 synchronization gate (peak, crossing, auto-crossing, homing)*
Parallel PA channels processing	Up to 2 channels *
Rectification	Digital
Filtering	Analog / Digital (FIR)
Digitizing frequency	100 MHz
TCG dynamic range	40 dB

A-Scan, B-Scan, C-Scan, D-Scan, Echodynamic, Top - Side - End, Strip views

Post-processing of TFM reconstruction of recorded elementary A-Scans (FMC/PWI/Sparse): Phase Coherence Factor (PCF), Envelope, Delay Multiply and Sum (DMAS)

Assisted Analysis (advanced automatic sizing) and Data compare tools

Volumetric Merge with interpolation and smoothing options. C-Scan processing (smoothing, 3D data rendering)

General Specifications

Size (H x W x D)	162 x 294 x 373 mm (6.4" x 11.5" x 14.7")
Air Intake	No
Environmental rating	IP65 DESIGN **
Operating temperature range	-10°C TO 45°C (14°F TO 113°F) **
Storage temperature range	-40°C to 70°C (-40°F to 158°F) **
Voltage	100 to 240 VAC
Frequency	50 or 60 Hz
Instrument calibration	Compliant with ISO 18563-1 / ISO 22232-1

* To be available in a future software update

** Certification test not completed

Specifications included in this document are subject to change.

Ordering Information

10061543 - ZPA-RDT-EMERALD-64/128PR-TFM
Phased array system featuring up to 64 active channels on up to 128-element probe. Can use the same 64 transmitters and receivers or can be operated in PR mode using up to 64 channels as transmitters and 64 others as receivers, bipolar pulsers, FMC/TFM capability. The kit includes EMERALD unit, 1 AC adapter, 1 carrying case, 1 power cable (North America), 1 adapter cable for DE15 type I/O, 1 power cable (Europe), 1 Ethernet cable, 1 user manual.

Accessories Ordering Information

10061273 - ZPA-ACC-SPLTBOX64-EMERALD-IPEX-2IPEX+8UT
IPEX type SPLITTER for EMERALD with fast easy attachment system including a solid security latch. It includes 8 Lemo connectors (individually isolated with switches) to convert 8 phased array channels into 8 pulse-echo conventional UT channels, or 4 TOFD pairs.

10061484 - ZPA-ACC-SPLTBOX64-EMERALD-IPEX-2ZPAC+8UT
ZPAC SPLITTER for EMERALD with fast easy attachment system including a solid security latch. It includes 8 Lemo connectors (individually isolated with switches) to convert 8 phased array channels into 8 pulse-echo conventional UT channels, or 4 TOFD pairs.

10061276 - ZPA-ACC-CBL-EMERALD-MULTISYSTEM-SYNC-1M
External synchronization cable for multi instrument configuration. Allows the synchronization of firing sequences.

10061261 - ZUT-ZGN-ADAP_ENC_CBL_TOPAZ_EMERALD-1FT
I/O conversion cable from DE15 to EMERALD standard (one included in basic EMERALD kit).

Zetec holds ISO 9001 and ISO/IEC 17025 certifications

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FOR MORE INFORMATION ABOUT EMERALD OR OTHER ZETEC PRODUCTS CONTACT US AT info@zetec.com OR VISIT www.zetec.com.

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