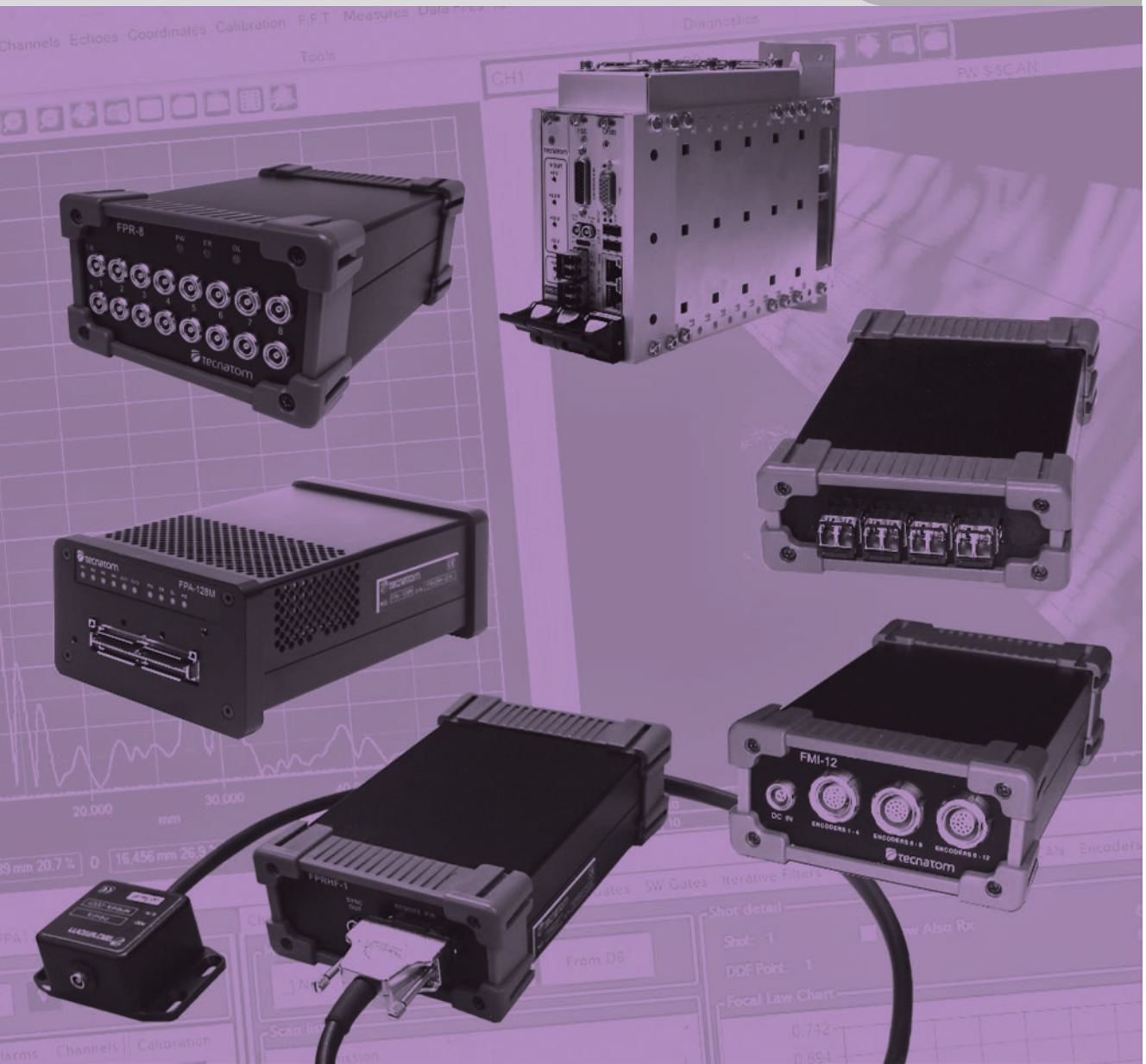
Ready for the future,
caring for the customer



Ultrasonic Products

SONIA®

An Advanced
Ultrasonic System

tecnatom

www.tecnatom-ndt.com

CE

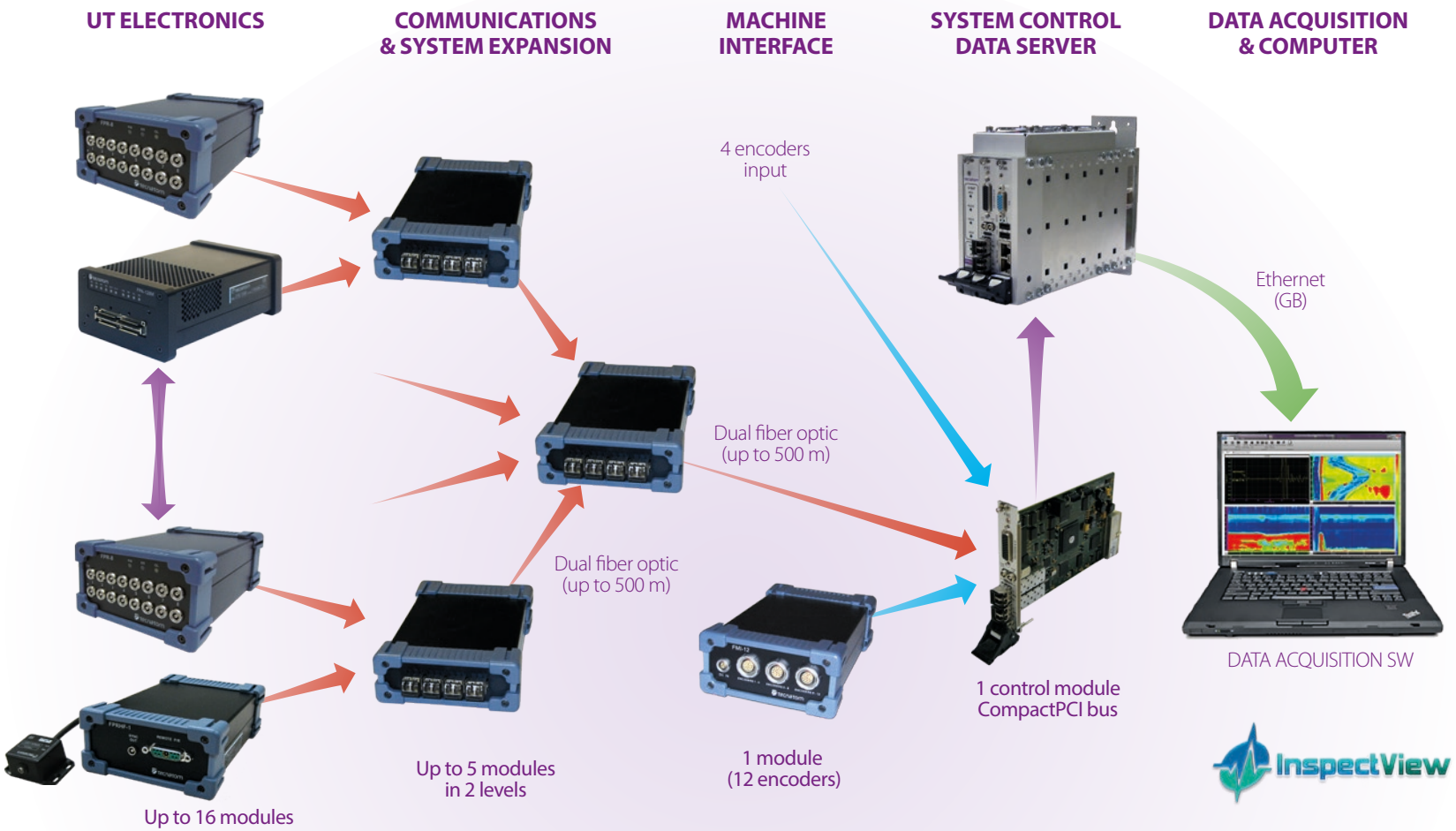
SONIA An Advanced Ultrasonic System

MAIN FEATURES

- UT Electronics for Automated Inspections: It's designed to be remotely operated.
- Conventional (pulse-echo, through-transmission and TOFD techniques) or phased-array UT.
- Conventional monochannel High Frequency electronics available.
- Fulfils the requirements of the most common UT inspection applications in the Nuclear and Aeronautic markets.
- Low-cost minimal configuration.
- Expansion in a modular way.
- Minimize the length of the transducers cables, digitizing the UT signal very close to the transducers. This implies lower UT signal distortion, attenuation and noise.
- Replace the analog communication lines by digital ones, immune to electromagnetic interferences (fiber optic), which means no signal distortion and/or noise in the transmitted signals and performance independent of installation layout.
- All electronic parts are sealed in non ventilated rugged enclosures.

System Architecture

SONIA shows an innovative architecture to acquire the ultrasonic signals in the proximity of the transducers and transmit them to the acquisition computer using digital communications through fiber optic.



- Distributed architecture, adaptable to big machines or compact equipments.
- Fiber optic connections.
- Plug&Playmodules.
- Mixed configurations (conventional and phased-array)
- Powerful Digital Signal Processing on FW.
- Multiplexed / Parallel / Mix firing.
- Low power design, no fans.
- Layout Independent characteristics.
- Reduced sized and weight.

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MODULES

SYSTEM CONTROL & DATA SERVER

- High performance CompactPCI CPU
- GB Ethernet connection
- Two fiber optic ports
- 4 encoder inputs and I/O

FMI-12 – Machine interface module

- 12 encoders inputs
- 16 digital & analog inputs
- 8 digital outputs

FPR-8 / FPR-8A – 8 UT channels module

- P/E, TTU, TOFD applications
- 300 V square wave pulser
- 0.4 to 30 MHz bandwidth

FDH-4 – Expansion module

- 1 fiber optic root port
- 4 fiber optic expansion ports

FPA- 128M – 32x128 phased-array module

- P/E, TTU-PA applications
- Linear / Sectorial scanning
- Up to 4096 focal laws
- 100 V square wave pulser
- 0.45 to 28 MHz bandwidth

FPRHF-1 – 1 high frequency UT channel module

- UT microscopy applications
- High energy avalanche pulser
- 4 to 200 MHz bandwidth

ACCESORIES

FPR-8 -LNR 1 channel preamplifier for FPR-8 module

- Through -Transmission, pulse-echo and TOFD applications.
- 37 dB gain
- 0.2 MHz – 40 MHz Bandwidth

IPEX-HYPER probe connector adapter for FPA-128M

- For using probes with HYPERTRONICS connector
- For probes up to 128 elements
- Low signal distortion and crosstalk.
- 4 LEMO 00 connectors for single crystal probes

Equipments

Conventional & PA Ultrasonic

SONIA COMPACT is a flexible ultrasonic equipment designed for use in hard environments, like those found in nuclear power plants and in the industry.

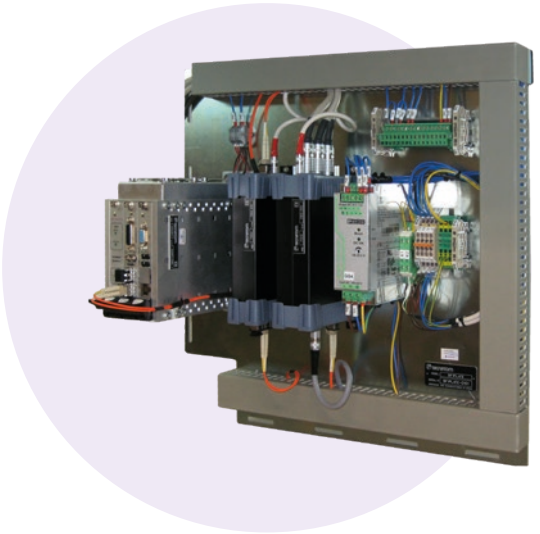
- Flexible in configuration: Conventional UT, Phased-array or a mix of them, with internal or external UT modules.
- Gigabit Ethernet for connection with external computers.
- External modules connected using fibre optic link.
- Four incremental encoders input for interfacing with mechanical equipments.
- All electronic parts are sealed in rugged enclosures.

Laboratory Control and Data server

SONIA RP42 is the control unit and data server for **laboratory** applications.

It integrates in one standard 19" rack (half width) CPU, SONIA FSC board and power supplies for configuring multi-module SONIA systems.

This equipment connects with external SONIA modules by means of 2 optical ports, and with an external computer using Gigabit Ethernet.



Industrial Control and Data server

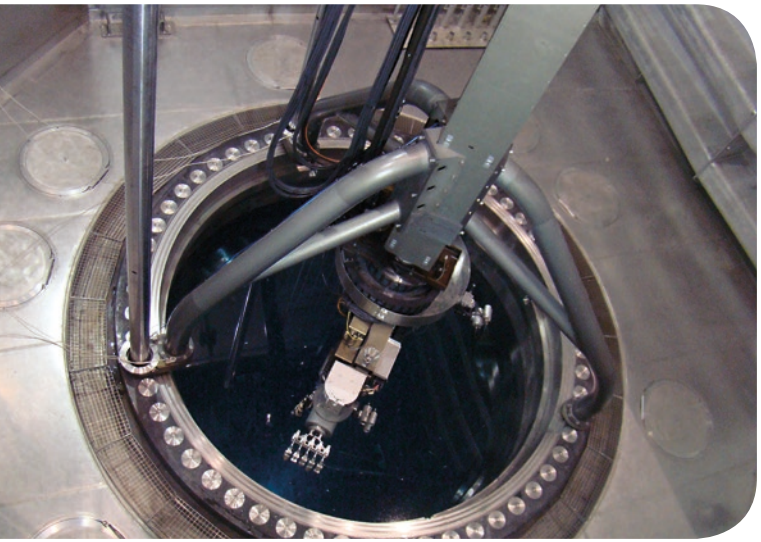
SONIA PLATE is the control unit and data server for **aeronautic** and **industrial** applications.

It integrates on a mounting plate a CPCI chassis, power supplies and additional modules configuring multi-module SONIA systems for use with big machines like gantry systems, robotic inspection cells, immersion tanks, etc….

This equipment connects with remote SONIA modules by means of 2 optical ports, and with an external computer using Gigabit Ethernet.

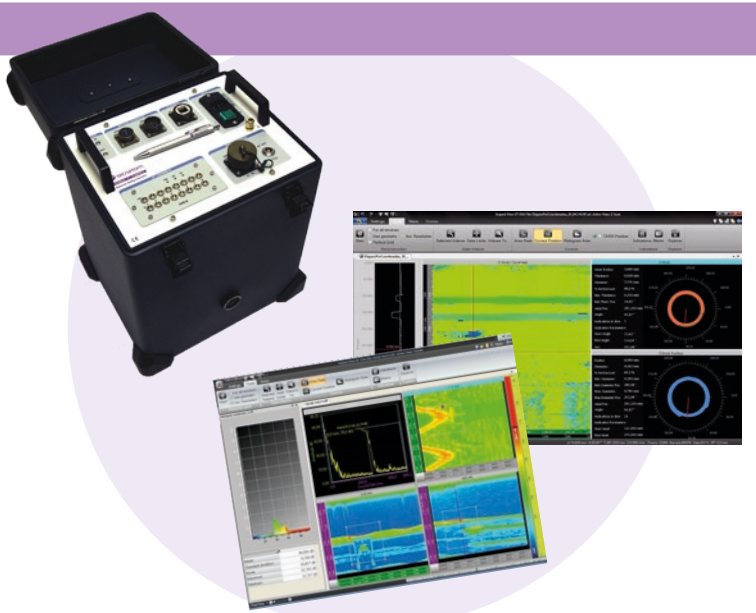
SONIA An Advanced Ultrasonic System

APPLICATION FIELDS



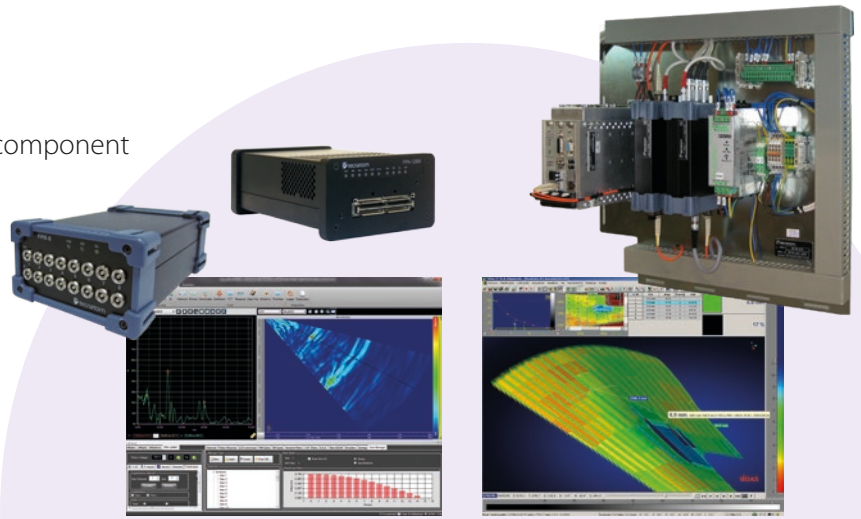
POWER GENERATION (NUCLEAR & OTHERS)

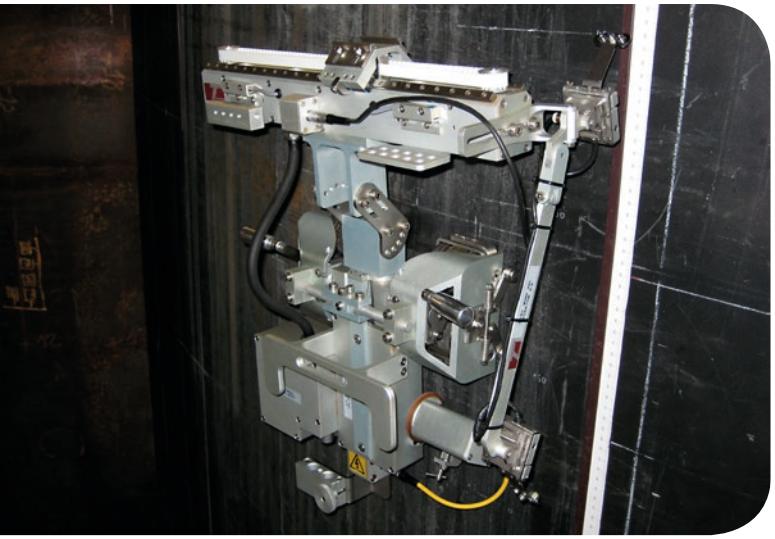
In-service inspection of components: pressure vessels, steam generators, collectors, turbines, nozzles, piping, ...



AERONAUTIC

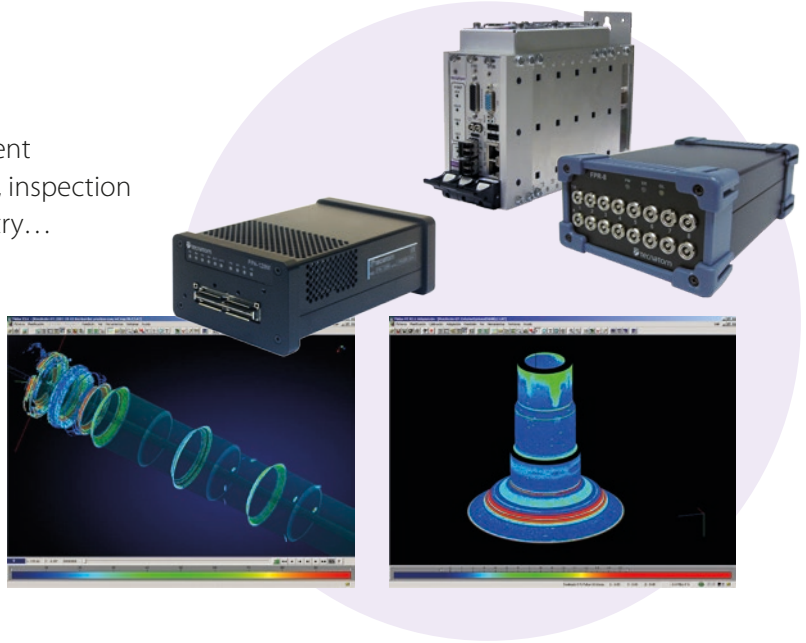
Quality control of aeronautic component manufacturing (composites)

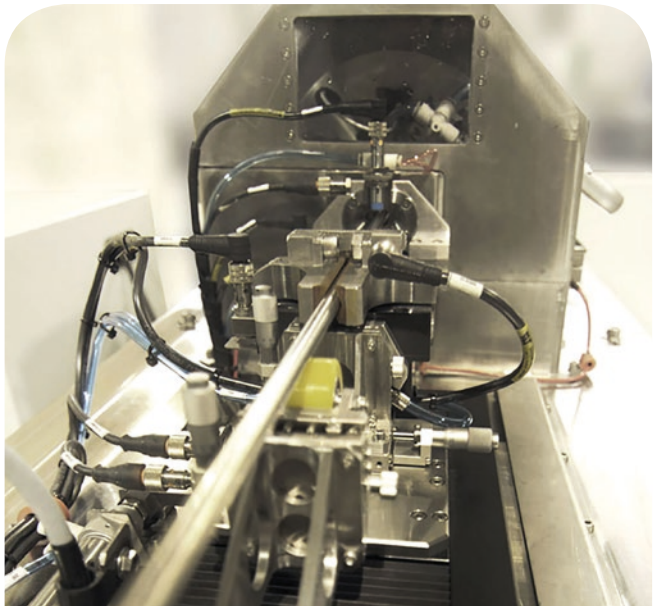




INDUSTRY

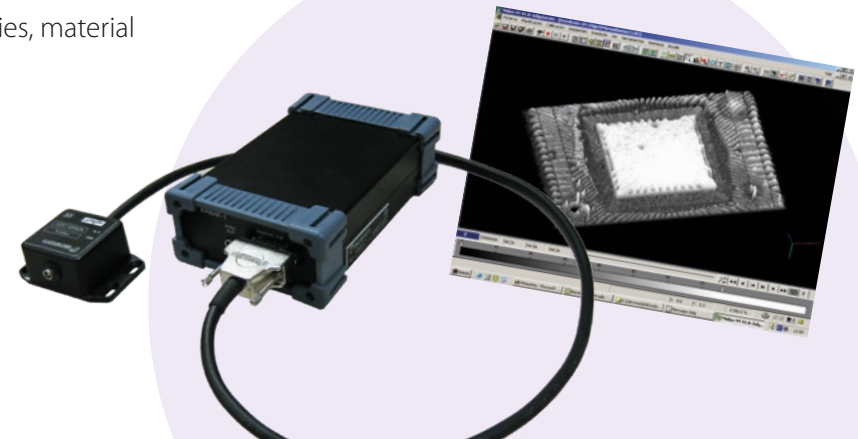
Online and offline quality control of component manufacturing in heavy industry, rail industry, inspection of components in the chemical and oil industry…





OTHERS

Material testing in laboratories, material characterization…



SONIA An Advanced Ultrasonic System

INSPECTVIEW

InspectView® is the software tool for UT acquisition with SONIA system.

It is a software suite covering the whole NDT inspection process: definition and planning, trajectory calculation, machine control, calibration, acquisition, evaluation, and report generation.

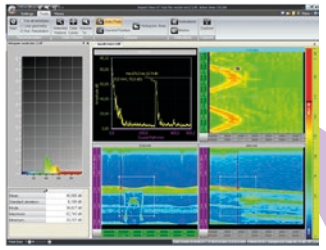
MAIN FEATURES

- Unified operation: All applications share information and allow for a seamless process flow
- Integrated machine control. All components of the system are managed from a single application.
- Customizable Word, PDF automatic report generation
- Automatic step-by-step execution of inspection plans with multiple phases
- Focal law calculation for array probes. Multiple geometries, probe designs and inspection techniques
- Simultaneous synchronized evaluation of several files
- Specialized evaluation tools: TOFD (Time-Of-Flight-Diffraction), FFT

Non-Destructive Testing Software Suite for SONIA

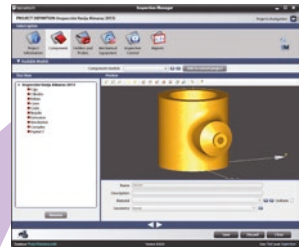
InspectView

Evaluation



IV-UT-EVA

Planning & Control

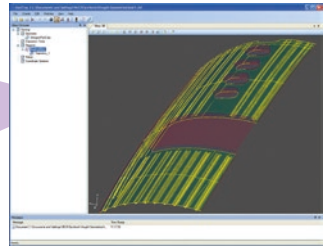


Inspection Manager

Acquisition

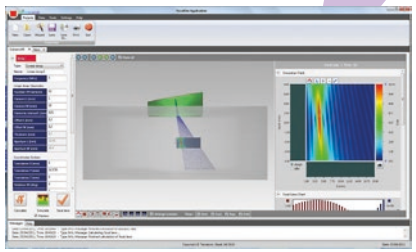
IV-UT-ACQ

Trajectories



GENTRAY-3

Focal law calculation



FOCALSIM

Controller

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SONIA

Ultrasonic Modules

Detailed characteristics

FPR-8 / FPR-8A 8 conventional UT channels module

FPR-8 (FPR-8A) is a conventional ultrasonic module compatible with SONIA architecture. This module has 8 UT channels with high performance in analog electronics and in digital signal processing.

MAIN FEATURES

- 8 UT channels, single or dual crystal probes.
- Conventional applications (pulse-echo, through-transmission and TOFD techniques).
- Linear and logarithmic amplifiers, with high dynamic range (>90 dB).
- Bandwidth from 0.4 to 30 MHz (probes from 0.5 to 20 MHz).
- Negative square wave pulser, up to -300 V.
- High digital signal processing capabilities (digital filters, gates, signal types, etc…)
- Small size that permits to minimize the length of the transducers cables, digitizing the UT signal very close to the transducers. This implies lower UT signal distortion, attenuation and noise.
- Replace the analog communication lines by digital ones, immune to electromagnetic interferences (fiber optic), which means no signal distortion and/or noise in the transmitted signals and performance independent of installation layout.
- Low power consumption. The electronic boards are sealed in non ventilated rugged enclosure

FPR-8 / FPR-8A TECHNICAL SPECIFICATION

PULSER (FPR-8 module)

Type	Negative square wave
Voltage	-100 to -300 V, 5V steps
Width	40 to 500 ns, 1.0 ns steps
Maximum PRF	20 KHz
Fall time	<5 ns
Impedance	<10 Ω
Internal damping	150 Ω

PULSER (FPR-8A module)

Type	Negative square wave
Voltage	-20 to -300 V, 1V steps.
Width	15 to 1000 ns, 1.0 ns steps
Maximum PRF	20 KHz
Fall time	<7 ns
Impedance	<4 Ω
Internal damping	470 Ω

RECEIVER

Amplifier type	Linear & Logarithmic
Input range	2.1 Vpp
Bandwidth	0.4 to 30 MHz @-3dB
Gain range	0 to 120 dB, 0.1 dB steps (80 dB analog + 40 dB digital)
DAC curve	80 dB maximum range, 16 points, 16 ms, 32 ns resolution, 40dB/us slope.
Dynamic range	90dB (in logarithmic mode)

DIGITAL FUNCTIONS

A/D sampling rate	125 MSPS, 14 bits Sampling decimation factor: 1 to 16
Gates	8 gates, max + 8 first echoes per gate. 1 gate for interface echo synchronization.
Signal modes	RF, True Envelope, Rectified (full, +/-), Logarithmic (analog), Logarithmic (digital)
Frequency Filters	Digital programmable IIR type, low-pass, high-pass, band-pass.
Noise reduction filters	Averaging Anti-impulsive noise
Post-Rectsmoothing filter	0 to 100% smoothing level control
Other digital functions	Real time alarms associated to echoes in gates. Signal inversion. Signal compression factor up to 64.

OTHERS

UT connectors	16 x LEMO 00 coaxial connectors (8 T/R + 8 R connectors)
General I/O	4 digital inputs, 2 digital output (up to 24 V) optocoupled.
Fiberoptic port	LC-Duplex optical connector (1 Gbitfull-duplex)
Dimensions	175 x 115 x 64 mm (DxWxH).
Power	24 Vdc, 0.5 A max

FPRHF-1 1 High Frequency UT channel module

FPRHF-1 is a ultrasonic module compatible with SONIA architecture designed to drive high frequency probes. This module has 1 UT channel with high bandwidth, intended for applications in the field of inspection of thin components, ultrasonic microscopy, materials characterization, etc…

MAIN FEATURES

- 1 UT channel, single crystal probe.
- Pulse-echo technique.
- Bandwidth from 4 to 200 MHz (probes from 10 to 150 MHz).
- High speed negative spike pulser with two energy levels (low & high).
- High digital signal processing capabilities (filters, gates, signal types, etc…).
- 2 different electronic units: main unit and remote pulser-preamplifer, able to work underwater. The maximum cable length is 3 meters.
- Small size that permits to minimize the length of the transducers cables, digitizing the UT signal very close to the transducer. This implies lower UT signal distortion, attenuation and noise.
- Replace the analog communication lines by digital ones, immune to electromagnetic interferences (fiber optic), which means no signal distortion and/or noise in the transmitted signals and performance independent of installation layout.
- Low power consumption. The electronic boards are sealed in non ventilated rugged enclosure.

FPRHF-1 TECHNICAL SPECIFICATION

GENERAL

Electronics	Compatible with SONIA architecture
UT channels	1High Frequency channel, single crystal probe
UT techniques	Pulse-echo (immersion)

PULSER

Type	Negative spike
Voltage	Two levels: -60V (low energy), -210 V (high energy)
Width	7 ns ±2ns (LE) 10 ns ±2ns (HE)
Maximum PRF	10 KHz
Fall time	5 ns ±2ns (LE), 4 ns ±2ns (HE)
Rise time	<3 ns (LE), 6 ns ±2ns (HE)
Impedance	<25 Ω

RECEIVER

Amplifier type	Linear
Input range	240 mVpp
Bandwidth	4 to 200 MHz @-3dB
Gain range	0 to 80 dB, 0.1 dB steps

DIGITAL FUNCTIONS

A/D sampling rate	2 GSPS, 8 bits Sampling decimation factor: 1 to 16
Gates	8 gates, max + 8 first echoes per gate. 1 gate for interface echo synchronization.
Signal modes	RF, Rectified (full, +/-)
A-scan length	32 Ksamples
Noise reduction filters	Averaging Anti-impulsive noise
Post-Rectsmoothing filter	0 to 100% smoothing level control
Other digital functions	Real time alarms associated to echoes in gates. Signal inversion. Signal compression factor up to 64.

OTHERS

UT connectors	1 x LEMO 00 coaxial connector
General I/O	4 digital inputs, 2 digital output (up to 24 V) optocoupled.
Fiberoptic port	LC-Duplex optical connector (1 Gbit full-duplex)
Dimensions (DxWxH)	Remote P/R: 50 x 50 x 32 mm (weight 150g) Main unit: 175 x 115 x 64 mm.mm (weight 950 g)
Power	24 Vdc, 1 A max (11W typ)

FPA-128M 32x128 channels UT phased-array module

FPA-128M is a phased-array ultrasonic module compatible with SONIA architecture. This module has 32x128 (multiplexed) UT channels with high performance in analog electronics and in digital signal processing.

MAIN FEATURES

- 32x128 UT channels, multiplexed (32 receivers, 128 pulsers).
- Separated TX/RX for pulse-echo, through-transmission and tandem applications.
- Apertures from 1 to 32 elements.
- Bandwidth from 0.45 to 28MHz (probes from 0.5 to 20MHz).
- Negative square wave pulser, up to -100 V.
- High digital signal processing capabilities (DDF, digital filters, gates, signal types, etc…).
- Small size that permits to minimize the length of the transducers cables, digitizing the UT signal very close to the transducers. This implies lower UT signal distortion, attenuation and noise.
- Replace the analog communication lines by digital ones, immune to electromagnetic interferences (fiber optic), which means no signal distortion and/or noise in the transmitted signals and performance independent of installation layout.
- Low power consumption.
- Rugged enclosure , protection degree IP54.

FPA-128M TECHNICAL SPECIFICATION

GENERAL

Electronics	Compatible with SONIA architecture
UT channels	32x128 multiplexed channels (TX/RX separated)
UT techniques	Pulse-echo, through-transmission, tandem

PULSER

Type	Negative square wave
Voltage	-15 to -100 V, 1V steps.
Width	20 to 500 ns, 2.0 ns steps
Maximum PRF	20 KHz
Fall time	<6 ns
Impedance	<15 Ω

RECEIVER

Input range	0.8 Vpp
Bandwidth	0.45 to 28MHz @-3dB
Gain range	0 to 80dB, 0.1 dB steps (analog gain) 0 to 40dB, 0.1 dB steps (digital gain)
TGC	60 dB maximum range, 16 points, 16 ms extent, 32 ns resolution, 40dB/us slope.

BEAM FORMER

Focal laws	Up to 4096, 128 scans.
Electronic Scan types	Linear, sectorial, complex
Focusing	Dynamic Depth Focusing (DDF)

DIGITAL FUNCTIONS

A/D sampling rate	125 MSPS, 12 bits (internal processing @18 bits) Sampling decimation factor: 1 to 16
Gates	4 gates, max + 8 first echoes per gate. 1 gate for interface echo synchronization.
Signal modes	RF, True Envelope, Rectified (full, +/-), Logarithmic (digital)
Frequency Filters	Digital programmable IIR type, low-pass, high-pass, band-pass.
Noise reduction filters	Averaging Anti-impulsive noise
Post-Rectsmoothing filter	0 to 100% smoothing level control
Other digital functions	Real time alarms associated to echoes in gates. Signal inversion. Signal compression factor up to 64.

OTHERS

UT connectors	I-PEX Minidock
General I/O	4 digital inputs, 2 digital output (up to 24 V) optocoupled.
Fiberoptic port	LC-Duplex optical connector (1 Gbitfull-duplex)
Dimensions	166x 111x 64 mm (DxWxH).
Power	24 Vdc, 25W typ.
Accessories	IPEX to Hypertronics connectors converter IPEX splitter (2x64 channels) for dual probe applications

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