FlawInspecta® by Diagnostic Sonar Ltd.

HIGH-SPEED LOW-COST ULTRASONIC INSPECTION AND IMAGING

The *FlawInspecta* was designed to address the requirement for a rapid, low-cost, ultrasonic phased array inspection system. The real-time data acquisition and processing technology used for B and C-scan imaging means that the full-waveform can be acquired without compromising inspection speed. The ***FlawInspecta*** system is capable of a pulse rate of 30kHz, corresponding to a scan rate of 10 in./second or 19.3 sq. ft./minute with a 128-element array. The actual inspection scan rate is only constrained by the acoustic properties of the material. ***FlawInspecta*** interfaces with a family of specially designed arrays and multiplexers.

At the heart of the system is Diagnostic Sonar's ***FIRE*-technology** for real-time full-waveform acquisition and B-scan imaging. A position sensor attachment to the array extends this capability to C-scans for mapping of joints, welds or corrosion. The inspection results can be transferred into reports or into analysis packages such as ANDSCAN®. This technology can now also be used directly with the ANDSCAN® system to provide seamless full-waveform coverage of large areas at speed along with a comprehensive post-processing and analysis capability.

KEY FEATURES

- **Multi-mode** — A-scans, full-waveform B-scans and C-scans acquired and displayed in real-time
- **64 channel multiplexer** — For faster scan rates at increased resolution.
- **Multiple applications** — Area flaw detection (aerospace, weld inspection, etc) Area mapping (e.g. corrosion inspection) Buried-layer crack detection using angled-beam heads
- **Flexible** — Use with arrays for real-time A, B and C-scans
Use arrays with ANDSCAN® for rapid seamless large area mapping
- **Real-time B-scans** — Rates suitable for interactive fast search (typically over 100Hz)
Ideal for inspecting complex cross-sections
- **C-scans** — Simultaneous Amplitude and Time-of-Flight displays in real-time
Re-calculate using different gates from full-waveform data
- **FRD Mode** — Full Raw Data Mode
- **Rapid area coverage** — Full-waveform at up to 1.8m²/min for 1mm² pixels (19.4sq.ft/min)
- **High performance** — State of the art Digital Flaw Detector with imaging capability
- **User friendly** — Windows XP™ operation for familiar "look-and-feel" and for easy transfer of data and setups into reports and archiving
- **Small, light and robust** — Ruggedized PXI Chassis and Laptop or Embedded PC
- **Post Processing Option** — Comprehensive full-waveform analysis package
- **Large Area Mapping** — Rapid full waveform acquisition over large areas without stitching using the ANDSCAN® System

Flaw Inspecta **Specifications**

Laptop

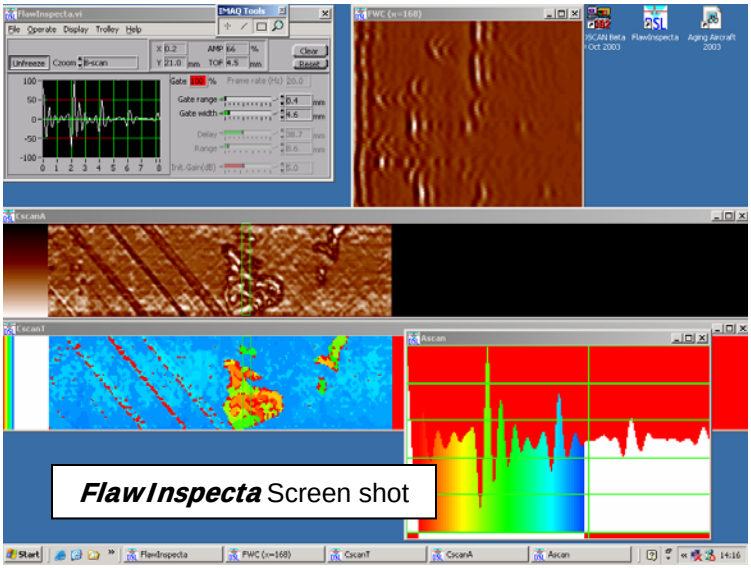
- **Intel® Core™ 2 Duo T7250 (2.00GHz 2M L2 Cache, 800MHz) Dual Core**
- **Genuine Windows® XP Professional, SP2 with Media**
- **NTFS File SystemOne 54mm Express Card slot, supporting both 54mm and 34mm I/O**
- **NVIDIA® Quadro FX 1600M 512MB TurboCache (256MB discrete)**
- **17 inch Wide Screen WXGA+ LCD Panel**
- **Standard Touchpad**
- **1.0GB, DDR2-667 SDRAM, 2 DIMMS**
- **80GB Hard Drive, 9.5MM, 5400RPM**
- **8X DVD+/-RW w/Roxio Creator™ and Cyberlink PDVD™**
- **Dell Wireless™ 1390 802.11g Mini Card**

*(**Note**: PC specifications are upgradeable to customer requirements)*

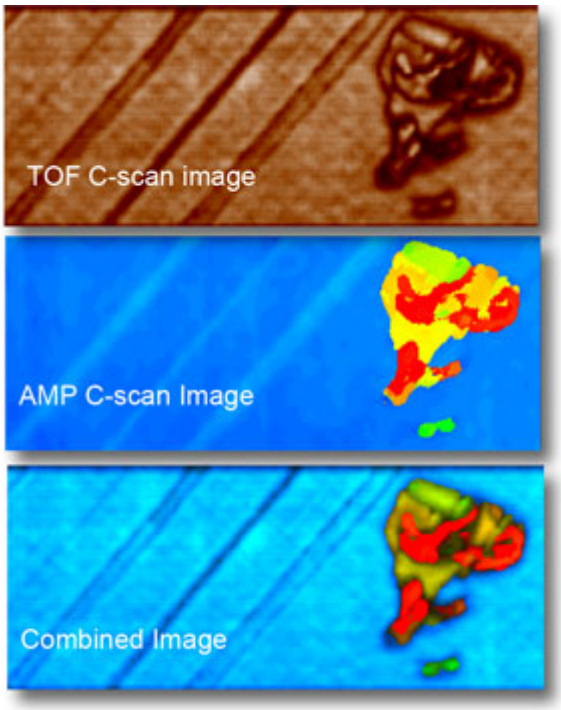
Imaging Digital Flaw Detector

- **Pulser:** 0-250V pulser with spike/square capability – programmable transmit damping values of 1000, 292, 117, 97, 72, 66, 56 & 53 ohms and selectable between pulse-echo (single probe) and pitch-catch (dual probe) modes.
- **Receiver:** low-noise wide-band receiver with switchable 50ohm impedance – signal handling of up to +/-24V before saturation.
- **DAC:** 90dB gain range – programmable control of: initial gain; delay until gain increase; rate of gain increase; maximum gain.
- **Filters:** Low-pass filter values of 1MHz, 2.25MHz, 5MHz, 10MHz & Off; band-pass filter values of 0.5MHz, 1MHz, 2.25MHz, 5MHz, 7.5MHz, 10MHz, 15MHz & Off; high-pass filter values of 1MHz, 5MHz, 10MHz & Off.
- **Rectifier Modes:** RF, half-wave +ve, half-wave –ve and full-wave (linear) – the linear rectified modes have 4 selectable post-rectification filters.
- **Display range:** standard controls of display range, display delay and material velocity**.**
- **Gate:** control over start and width – outputs are the maximum value within gate and the time-of-flight (from start of gate) to this maximum value.
- **Sampling:** 8bit A/D conversion into 16MB Image store

Operation modes



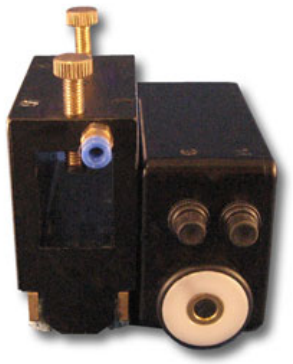
- **A-scan:** Operation and display is similar to a standard digital flaw detector. Each individual beam of the array can be displayed as an A scan. (This can be accomplished during post processing using the Full Waveform capture function)
- **Real-time B-scans:** A B-scan image can be built up from a sequence of A-scans while the beams are scanned through the material under investigation. Arrays offer very rapid electronic scanning and so the cross-sectional images are shown as real-time B-scans, allowing the operator to respond to the on-screen data and hence search a large area very rapidly. The resolution of the B-scan is dependent on the array geometry, frequency and electronic signal processing (aperture and focusing). The user is able to adjust the beam start and finish points and the step size so as to optimise the coverage and frame rate. The B-scan display update rate depends on ultrasonic factors such as the number of beams scanned and the PRF (up to 30KHz) but this may be constrained by the material properties. Frame rates of over 100Hz are typical with 64 to 128 beams.



- **Real-time C-scans:** A C-scan map of sub-surface structures is made by recording the value of a parameter (such as peak echo or time-of-flight) as an image pixel for each point on the surface. An array can be translated across the surface, at a right-angle to the electronic scan, to provide a very rapid C-scan map. The C-scan resolution and maximum sweep speed are dependent on the array type and the material properties. However, a typical set-up of a 64 mm long array producing simultaneous C-scan images (peak amplitude and time-of-flight) with 1mm x 1mm pixel resolution can be translated at around 110mm/s. Thus a 1m long x 64mm wide swathe can be acquired in less than 10 seconds.
- **C-scan stitching:** Stitching of adjacent C-scan sweeps into large area matrix.
- **Freeze mode:** Images can be saved in standard formats (BMP, TIFF, JPEG and PNG) along with the acquisition set-up for archiving or for integrating into reports. Images can also be recalled for reviewing and/or performing measurements. Full-waveform data can be saved in the industry standard AVI format for easy review in most media players.
- **Seamless large area mapping:** The *FIRE*-technology that provides the capability for real-time B-scan imaging can now be used to provide rapid full-waveform acquisition over large areas using the ANDSCAN® system.

Position sensor

- **Trolley:** Rigid axle trolley with attachment for array head assembly with optical encoder for sensing wheel position – 2 buttons allowing local control of modes during scanning. Optional sprung cable-extension transducer.
- **Detector interface:** Interface connector on ruggedized laptop (8 pin DIN + shield) for optical encoder and buttons.
- **Scanning jigs:** A variety of scanning jigs are available for assisting with rapid coverage of large areas and generating stitched images – contact NDT Solutions, Inc. for details.



Standard Array Interface

- **MLZ generic array interface:** Most piezo-composite and piezo-ceramic arrays can be used with the Flaw Imager by means of the internal MLZ array interface unit. This has a 156-way Zero-Insertion Force (ZIF) connector for handling arrays with up to 128 elements - all Flaw Imager Mk1 probes can be used with this MLZ interface.

Array Interface options

- **IMX multiplexed arrays:** The IMX multiplexer is an integrated controller for interfacing small linear arrays to Flaw Detectors and Imagers. A single multi-way cable between the 24W7 connector on the PC and the IMX is all that is needed to send the digital beam number to the array and to route the RF signal back to the Imaging Digital Flaw Detector.
- **MLA integrated arrays:** These are a part of a family of wideband, highly integrated arrays, which includes pulser-receivers for each element, an integrated beamformer and an overall controller. They have a single flying lead, with 24W7 plug, which connects direct to the array interface in the PC for imaging.

OEM Version Available

- The FlawInspecta array technology is available in an OEM version that allows the integration of our array technology into your large area scanning system. A software development kit (SDK) and interface document is available upon request.

Notes:

1. Diagnostic Sonar and NDTS reserve the right to modify or change the specifications of any of its products without notice and without incurring any responsibility for modifying previously manufactured products.
2. ANDSCAN® is a registered trademark of QinetiQ Ltd.
3. NDT Solutions, Inc. is the North American Distributor of the FlawInspecta and all of the Industrial DSL technology

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