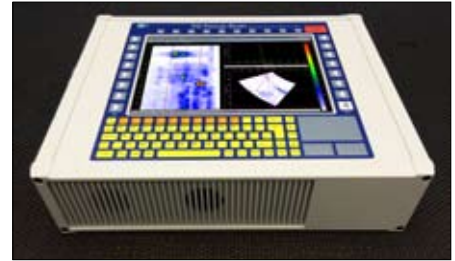# TD FOCUS-SCAN - Multi-Function Ultrasonic Inspection Systems



## Features

- Exceptional Performance & Price
- Portable yet Powerful
- High Speed Real-time Data Collection
- Fast Inspection Speed
- Extensive Analysis Tools
- Easy to Use Menus
- Powerful Reporting Functions
- On-board 2-axis Drive Control
- Includes ES BeamTool®
- Import Phased Array Setups from ES BeamTool®
- User Replaceable Batteries (hot swappable)
- Wizards;
  Phased Array:  Probe Delay (Per Focal Law) / TCG (Per Focal Law)
  ToFD Set Up

## Techniques

- Phased Array
- ToFD
- Pulse Echo
- Corrosion Mapping
- Weld Zone Discrimination

## Applications

- Pressure Vessels Welds
- Pipeline Welds
- Structural Welds
- Forgings & Castings
- Turbine Disks & Blades
- Aircraft Components
- Complex Geometries
- Hydrogen Damage Surveys
- Corrosion Surveys

## Software Options

- Phased Array/Pulse Echo
- ToFD
- Strip-Scan
- Long Range (Creep Wave & Corrosion Mapping)
- TD Super-View
- ES BeamTool® included

*E&OE - All specifications are subject to change.  It is advisable to check all information provided.*

**TECHNOLOGY DESIGN**

**NOVA INSTRUMENTS**
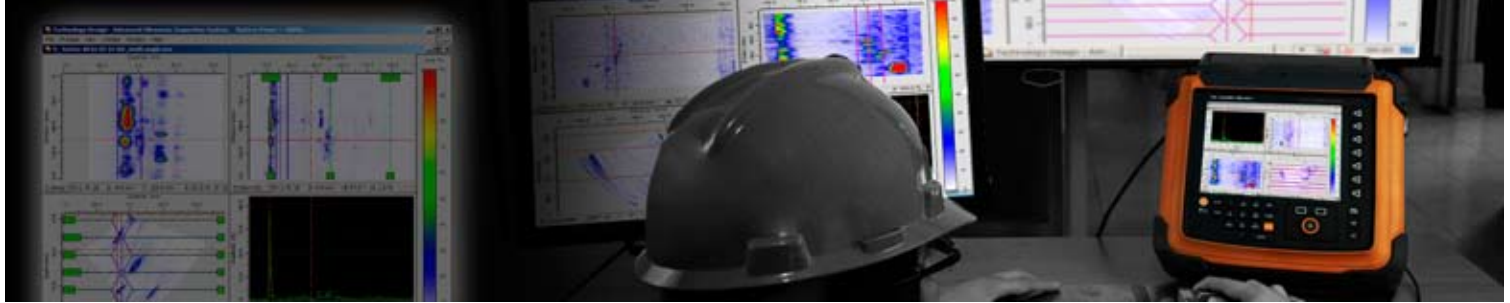
## Hardware

### System Options

| | |
|---|---|
| 64/32 | 64 Elements, 32 Active, 16 Conventional |
| 128/16/16 | 128 Elements, 16 Active, 16 Conventional |
| 128/32/16 | 128 Elements, 32 Active, 16 Conventional |
| 128/64/16 | 128 Elements, 64 Active, 16 Conventional |

### General

| | |
|---|---|
| Number Of Elements | Up to 128 Elements + 16 Conventional |
| Number Of Active Channels | Up to 128 |
| Number Of Focal Laws | 2000 |
| Dynamic Depth Focusing | Yes |

### Digitisation

| | |
|---|---|
| A/D Sampling Frequency | Phased Array = 14Bit @ 100MHz |
| | Conventional = 14Bit @ 200MHz |
| System Bandwidth | (-3dB) Phased Array = 0.25MHz to 25MHz |
| | Conventional = 0.25MHz to 50MHz |
| Pulse Repetition Frequency | Up to 10KHz |

### Pulser

| | |
|---|---|
| Number of Pulsers | 16 /32 / 64 / 128 |
| Number of Active Pulsers | 1 to 128 |
| Pulser Delays | 0us to 20us in 2.5nS steps |
| Output Impedance | 6 Ohms |
| HT Pulse Shape | Negative square wave |
| HT Pulse Voltage | Phased Array = 50 to 200V in 5V Steps |
| | Conventional = 50 to 200V in 5V steps |
| HT Pulse Width Range | 20ns to 500ns in 2.5nS steps |
| Rise/fall time | < 5nS |

### Receiver

| | |
|---|---|
| Number Of Receivers | 16 / 32 / 64 / 128 |
| Number Of Active Receivers | 1 to 128 |
| Receiver Delays | 0us to 20/40µs in 1nS steps |
| Signal Bandwidth (-3dB) | Phased Array = 0.25MHz -25MHz |
| | Conventional = 0.25MHz -50MHz |
| Gain Range | 0dB to 100dB's controllable in 0.1dB steps |
| Gain Linearity | 0.5dB (typical) |
| Input Noise Level | $2nV/(Hz)^{1/2}$ (typical) across full system band width |
| Input Impedance | 50 Ohms |

### Dynamic Depth Focussing

| | |
|---|---|
| Operation | Dynamically optimises receive focus delays |
| Range Of Operation | User specified depth/range in mm or us |
| Performance | 100MHz real time |

### Time Corrected Gain (TCG)

| | |
|---|---|
| Number Of Curves | 1 to 8 Per Focal Law |
| Gain Range | 0 to 80dB in 0.1dB steps |
| Rate Of Gain Change | Up to 40dB/µs |

### Analogue Signal Filtering

| | |
|---|---|
| High Pass Filters | (-3dB) 0.25, 0.5, 0.75,1.0, 2.5, 5, 10 |
| Low Pass Filters | (-3dB) 1, 2.5, 5.0, 7.5, 10, 15, 20, 25, 30,35,40,50 |
| Post Rectification Filters | (-3dB) No filter, 1, 2, 3, 4, 5, 6, 7MHz |

### A-Scan Digitisation

| | |
|---|---|
| A-Scan Points Per Channel | 8000 |
| Sampling delay | 0 -10ms, in 10ns steps @ 100MHz sampling rate |
| Number Of Gates Per Channel | 3 Hardware Gates |
| Gate Start/Width | User definable |
| Gate Reference Points | Transmit Pulse or Material Interface Echo |
| Storage Modes Per Gate | A-Scans, Peak Depth and Amplitude |
| Data Storage Rates | 6MByte/sec |

### Signal Averaging

| | |
|---|---|
| Number Of Channels | All |
| Averaging Performance | 100 million points per second |
| Averaging Rates | Real-time averaging 1-256, user definable |

### Peak Processing

| | |
|---|---|
| Peak Storage Modes | All Peaks, First Peak, Largest Peak/s, Loss Of Signal |
| Thickness Measurement Modes | Thinnest/Thickest/Between Peaks |
| Threshold Setup | 5 to 100% in 1% steps per hardware Gate |
| Number Of Peaks Per Gate | 16 |

### Scanner Interface Ports

| | |
|---|---|
| Input Type | Encoder, Potentiometer, Video Camera |
| Number Of Axis | 2 TTL compatible |
| Number Of Limit Inputs | 4, TTL compatible |
| Encoder Interface | TTL compatible, 5V @ 1A, 12V @ 0.4A |
| Potentiometer Interface | 0 to 2.5V, sampled at 100Hz |
| Video Input | 1Vpp Composite |

### Motor Drive (Internal)

| | |
|---|---|
| Motor Types | DC Servo, 12Volts or 24Volts |
| Current Drive | 4 Amps Continuous; 5 Amps Peak |
| Current Limit | Software definable |

### PC (Internal)

| | |
|---|---|
| Operating System | Windows 7 |
| Processor | Intel Atom |
| Memory | 2GByte |
| Display Colour | TFT (Industrial type) |
| TFT Display Resolution | 1024 x 768 |
| Storage SSD | 120GBytes |
| Ports | 4 x USB, 1 x 10/100 Ethernet, 1 x Video |

### Size, Weight & Environmental

| | |
|---|---|
| Unit Dimensions | 360mm x 300mm x 86mm |
| Weight | 7Kg |
| Rating | IP54 |
| Temperature | 0ºC to 40ºC operating, -25ºC to 85ºC storage |
| Colour | Unit supplied in white as standard |

### Power Requirements

| | |
|---|---|
| DC Input | 24VDC @ 10 Amps |
| AC Input | 90 to 260VAC @ 40 to 60Hz |
| Batteries | 2 x Hot Swappable |

### 3rd Party Software

AVG
ESBeamTool® (Eclipse Scientific)

## Software

### General Features

- Simultaneous Phased Array, ToFD &/or Pulse Echo data collection
- Operator definable weld geometry overlays
- Real-time A, B, C and D-Scan images, with user defined display modes
- Multiple TCG curves Per Focal Law
- Internal report generation including interactive print-preview & user-definable report fields
- Full cursor analysis indicating peak depth, amplitude and x,y position
- Supports single, dual, & encoder/motor drive
- Export Bitmap images to any Windows application
- 8 or 14 bit Data collection (Phased array/Pulse Echo/ToFD)

### Phased Array

- User configurable control of beam angle, focal distance and spot size
- Fixed-angle electronic or sectorial scans
- Dynamic Depth Focusing (DDF) provides a user-definable focal range
- 2000 Focal laws
- Supports linear probe/wedge geometry
- Normalisation of amplitude across sectorial scan angles or fixed angle focal laws
- Beam Apodization
- Skip Correction provides correct depth/range relationship for multiple legs
- Import ESBeamTool® setups

### Pulse Echo

- Independent control of transmit and receive parameters
- C-scan with end views for corrosion mapping
- Trigger reference modes including Interface Echo or Tx Pulse
- Multiple peak data storage modes, including full/selective A-Scan storage

### ToFD

- Very fast inspection rates up to 400mm /sec
- Perform multi-channel TOFD and Pulse Echo inspections simultaneously
- Full suite of image analysis tools for defect/crack sizing
- Real-time multi-channel averaging significantly improves signal quality
- Linearization, Straightening, Synthetic-Aperture-Focusing-Technique (SAFT)
- File utilities include file join, split, reverse, save partial, output data to text file etc.

### Weld Zone Discrimination

- Fast, accurate inspection at up to 200mm/sec
- Combined TOFD, Time/Amplitude view, Map view, Couplant Check & Go/No-Go in a single pass
- Inspection data displayed as strips indicating weld zones
- Integrated TOFD analysis
- Supports internal fixed or rotating head scans using Phased Array or conventional probes
- Perform inspections over km's of pipeline
- Automated report generator

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