ScanMaster

Immersion Scanning Systems

LS-200x SERIES

Probe manipulator

The affordable full-featured immersion-scanning system

PRODUCT FEATURES

Features ***Applications*** ***Product Description*** ***Performance Envelope***	• All stainless steel components • Built-in ***upi-100*** ultrasonic instrument with RPP3 square wave pulser-preamlifier • Outstanding signal to noise ratio and excellent penetration • Exceptional near-surface resolution. • Precision linear scanning mechanics of the ***LS-200*** Series • Linear motion axes protected from dust and dirt • Environmentally protected, air-conditioned control cabinet • Precision turntable and B-axis manipulator, each with 0.01deg resolution • CSI production-line C-scan software installed as standard equipment

PRODUCT APPLICATIONS

Non-destructive ultrasonic inspection of

- Disks
- Shafts
- Bars
- Billets
- Plates

PRODUCT DESCRIPTION

System architecture	Integrated system architecture, with all hardware and software supplied by one certified manufacturer. Complete system control from the operator console, using the on-line screen display with the ***ScanMaster CSI*** software interface and ***ScanMaster*** 'virtual' control panel.

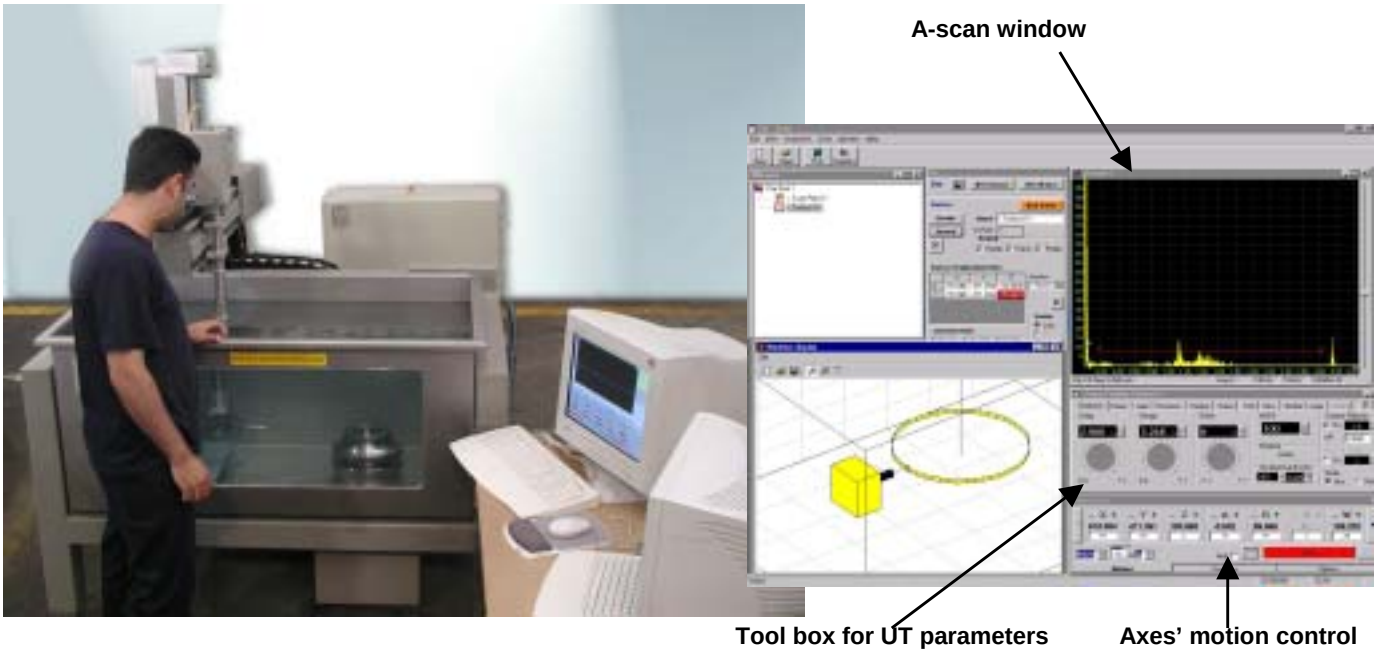
Construction	
Tank	Stainless steel construction with expansive viewing window.
Scanning robot	Rugged and stiff beam-mounted search tube design for high-speed repetitive inspection. High-precision ball screw drives on all linear axes, with closed loop servo motor control, including encoder feedback. All linear axes completely enclosed with adjustable bellows, providing a sealed atmosphere against dust, moisture and other environmental hazards.
Manipulator	ReSolve Series high-resolution, single-gimbal manipulator, including sealed direct-drive servo motor with encoder feedback. Includes manual adjustment of second gimbal axis. Optional fully motorized dual-gimbal manipulator.
Turntable	High-performance ReSolve Series turntable, 400mm diameter, with 100kg rated load capacity. Including DC servo drive with encoder feedback. Optional self-centering chucks.
Table for reference standards	Large table for reference or calibration standards (200 x 400mm).
Water circulation	Includes surface skimmer and filtering to 20 microns.

Motion control subsystem	***ScanMaster SC-4M*** closed loop servo motion control hardware with Windows NT© operating system. Encoder feedback on each motion axis, including B, W (turntable), X, Y, Z,. Inspection along surfaces of arbitrary contour shape in the index direction. TCP (tool center point) control, available for normalization and teach-in requirements along part radii, with motorized A,B manipulator. Built-in noise suppression circuitry on all power amplifiers to allow inspection at high instrument gains (80dB true gain).

System computer hardware	Pentium IV, 2.8GHz, 36Gbyte hard disk, 512Mbyte RAM.

Operator console	Desktop or swivel post-mounted monitor, keyboard and mouse control device. Complete system control from 'virtual' control panel displayed on monitor screen.

Ultrasonic hardware	Includes ***UPR-100*** receiver boards installed on the system computer expansion bus, with the programmable square wave ***RPP3*** pulser-preamplifier installed on the search tube.
Specifications	Complete instrument specifications in the ***UPR-100*** and ***upi-100*** data sheets.
Data acquisition gates	Four hardware gates standard per channel. Expandable to 32.
Control	Full control accessed using the Toolbox on the screen display.
*Location of **RPP3** pulser preamplifier*	Unit installed on the search tube to ensure enhanced transducer excitation (greater sensitivity), best near-surface resolution, and minimization of ambient (RFI/EMI) noise interference.
Tunable excitation pulse	Square-wave excitation pulse tunable from 10-500nsec, thereby allowing optimization of signal strength for enhanced near-surface defect detection or maximum penetration power.
Near-surface defect resolution capability	No.1 FBH (flat-bottom hole) at a depth of 1.5mm detected with a signal-to-noise of 18dB or better, using an ***ISP2*** Series 10MHz transducer with a 75mm focal length in water.



Calibration	On-site, computerized calibration with no requirement to ship-to-factory.
Service	Simple, single-board replacement on-site, with minimal downtime.

Software	
Operating system	Windows 2000/XP©.
System access control	Password protected to five levels.
Integrated display - MMI	One integrated display for control of motion axes, ultrasonic instrument, teach-in, scan, and data processing. On-line presentation of A-scan, B and C-scans, as well as 3D display of part, and transducer advancement during scan.
Transducer data base	All relevant transducer parameters, including serial number, transducer length, focal distance in water, beam skew, stored in a database.
Teach-in interface – programming in parts or machine coordinates	All scan plans programmed in parts or machine coordinates. This permits easy portability of scan plans from one scanner to another and allows for import of part geometry from CAD software such as Autocad and Unigraphics.
Data acquisition	Up to four data acquisition gates for real-time B and C-scan display and storage of peak amplitude and time-of-flight data.
Data analysis and processing	C-scan data processing and analysis Tool Kit. Includes a library of tools for image processing, image projection, and automatic measurement of flaw size, depth, signal strength. Noise statistics according to algorithms defined by engine manufacturers.
Inspection documentation	Customer-tailored inspection reports automatically produced at the end of each inspection run, including C-scan images in standard file format.

Software productivity tools	
Automatic loading of DAC calibration	DAC files saved individually for each transducer. DAC recalibration is automatically loaded during the scan
Back-wall echo tracking	Automatic tracking of continuously varying wall thickness using dynamic back-wall gate.
Data evaluation	On or off-line.
Data base for all transducers	Automatically compensates for transducer beam skew and stores transducer geometry.
Change water path	Automatic recalculation of scan plan.
Change inspection angle	Automatic recalculation of scan plan.
Change transducer	Automatic recalculation of scan plan using transducer parameters in database.

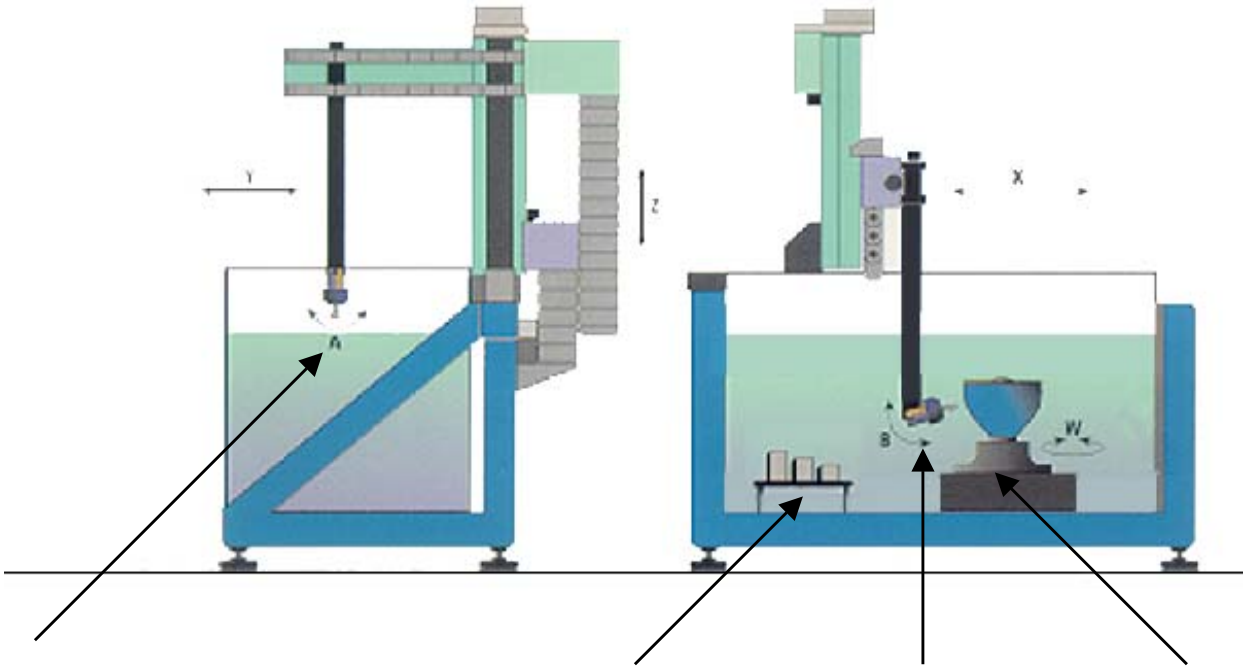
Electronic noise suppression	All RF cables are double shielded. All PWM power amplifiers include noise suppression circuitry. Operation to true gain of 80dB in harsh RFI/EMI environments.

Safety features	
Proximity limit switches	At each end of travel for B,X,Y,Z axes. Optional A-axis

Mechanical shock absorbing bumpers	At each end of travel for X,Y,Z linear axes.
Protection for manipulator and search tube,	Safeguard breakaway electro-mechanical 'fuse'
Emergency stop switches	On operator work station

Standards	Manufactured according to ISO 9002. ⊂∈ rated for safety and RFI/EMI interference.

LS-200x



Manual A-axis

Table for reference standands

Manipulator Motorized B-axis

Parts' turntable

PERFORMANCE ENVELOPE

Axis	Motion Envelope	Speed Range	Resolution	Repeatability	Accuracy	Backlash	Min. Motion	Home Repeatability
	±deg		deg	±deg	±deg/45deg	±deg	deg	±deg
A	10[i]	N/A	0.01	≤0.02	0.03	≤0.02	0.02	≤0.02
B	112	0.1-20deg/sec	0.01	≤0.02	0.03	≤0.02	0.02	≤0.02
W	360	0.1-50RPM	0.01	≤0.03	0.03	≤0.03	0.02	≤0.03
	±mm (in)	mm/sec (in/sec)	mm (in)	±mm (in)	±mm/300mm (in/12in)	±mm (in)	mm (in)	±mm (in)
X	914 (36)	0.1-100 (0.004-4)[ii]	0.01 (0.002)	≤0.05 (0.002)	0.025 (0.001)	≤0.05 (0.002)	0.03 (0.001)	≤0.025 (0.001)
Y	457 (18)	0.1-100 (0.004-4)	0.01 (0.002)	≤0.05 (0.002)	0.025 (0.001)	≤0.05 (0.002)	0.03 (0.001)	≤0.025 (0.001)
Z	457 (18)	0.1-100 (0.004-4)	0.01 (0.002)	≤0.05 (0.002)	0.025 (0.001)	≤0.05 (0.002)	0.03 (0.001)	≤0.025 (0.001)

Turntable run-out for W axis: ±0.25mm (0.01in) FIR[iii]

[i] Manual version (for transducer beam normalization). Motorized A-axis motion envelope is ± 38deg' speed range 0.1-20deg/sec.
[ii] Optional 12.0 (300) maximum speed.
[iii] Full indicated reading.

* Specifications are subject to change without notice.

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