

Multi-Axis XYZ-TT-GS INDUSTRIAL IMMERSION SCANNING

Utilizing the very latest technologies, immersion inspection allows for internal and flaw detection. Parts are submerged in water which acts as a coupling medium for the ultrasonic probe. Internal and external inspection for defects or thickness measurement is very accurately carried out via the inspection software. Subsurface flaws, disbands, cracks and other irregularities can be analyzing for size, thickness, depth and other quantitative features.

- High speed low vibration Linear Motor
- Offline analysis for virtual re-scanning of parts that are no longer available
- Multi Axis scan options (X, Y, Z 1&2, Gimbal 1&2, Swivel 1&2 and Turntable)
- Contour following for inspection of curved parts
- Squirter transducer holder available
- Real-time A, B & C-scans
- Simultaneous Multi-zone inspection



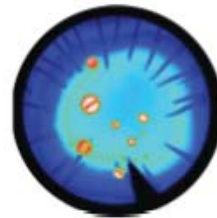
Multi-Axis XYZ-TT-GS INDUSTRIAL IMMERSION SCANNING

OKOS Digital Imaging System



ODIS Acoustic Microscopy software with rich technical content is built on industry feedback. It includes both time domain and frequency domain imaging in real-time. Advanced analysis is provided through quantitative tools for measurement and classification of parts.

The Analysis version of ODIS allows non-scanning computers to virtually re-scan, view, and analyze data.



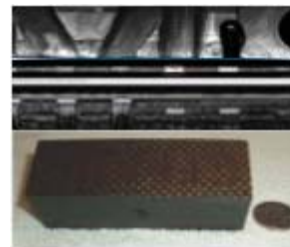
Defect Detection

Multiple Zones
Near Surface
Sub Surface
Inside Part



Feature	ODIS	Others
Ultra Large Scans (up to 40 GB)	✓	x
Ultra High Rep Rate (up to 30 KHz)	✓	x
90 Simultaneous Gates/Channel	✓	x
Multiple Gates on Multiple Channel	✓	Limited
Image Analysis	✓	✓

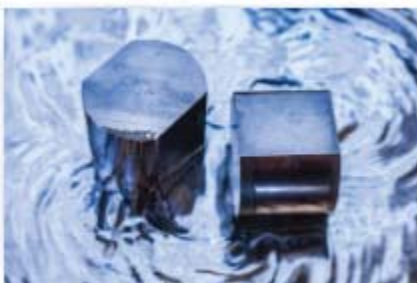
B-scan & SLICE Imaging



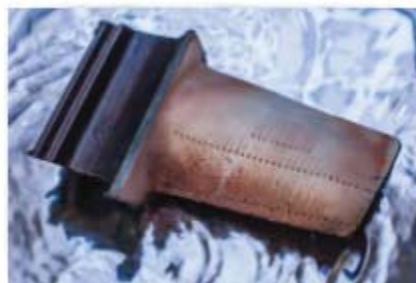
Advanced Software Controls for Engineers



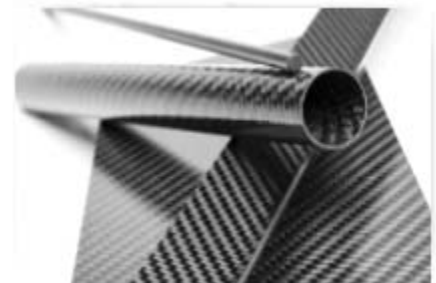
Metals & Alloys



Turbine Blades



Composites



NDT-CF 300 Multi Axes NDT Scanner Compact Footprint

Ultrasonic NDT Inspection of

- Hard-cutting materials
- Composites
- Custom alloys
- Solder joints
- Plastics
- Printed circuit boards
- Turbine blades



Gimbal



Turntable

- X, Y and Z linear axes
- Scan Envelope 300 mm x 300 mm x 150 mm
- Optional Turntable
- Optional Through Transmission Yoke
- Optional Gimbal
- 360 Degree view acrylic tank
- Optional linear servo on X axis

- 12-bit dynamic range instrumentation
- High gain Pulser/Receiver
- Hardware TGC/DAC control
- Application-specific transducers
- Full-featured NDT scanning software
- Off-line Analysis



Defect Detection

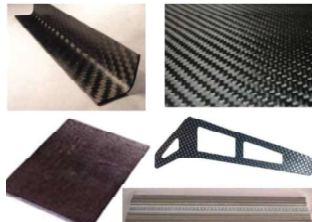
- Multiple Zones
- Near Surface
- Sub Surface
- Inside Part

ODIS WinSAM Software Acoustic Microscopy Imager



ODIS WinSAM is the latest Acoustic Microscopy software with rich technical content built on current platforms and industry feedback.

It includes **both** time and **frequency domain** Imaging **in real-time**. The software provides advanced analysis through quantitative tools for measurement and classification of parts.



Composites



Metals and Alloys



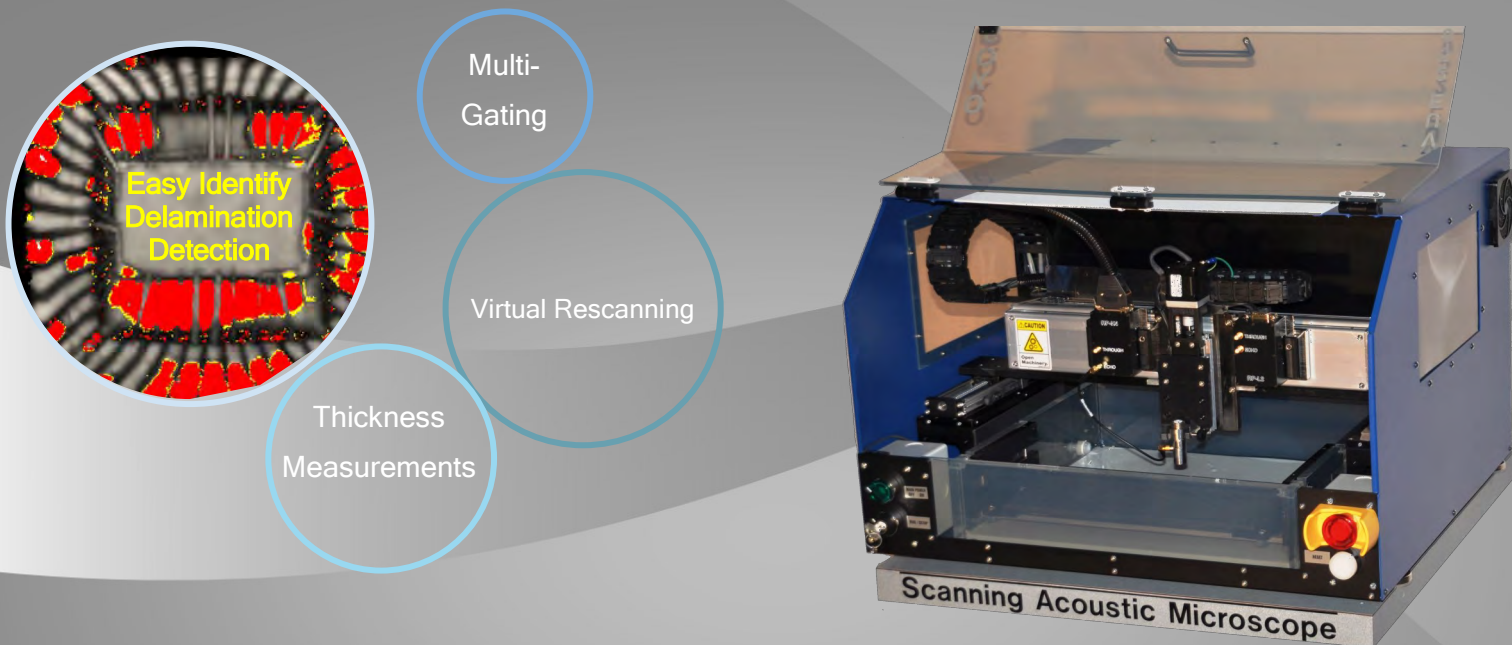
Turbine blades



- Multi Axis scan options
- Highly customizable software
- A, B and C-scans

- Contour following
- Off-line analysis
- Virtual rescanning

info@okos.com



VUE 250-P

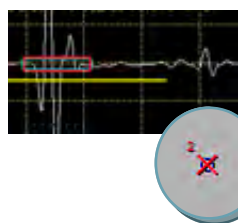
SCANNING ACOUSTIC MICROSCOPY

Semiconductor Package Failure Analysis

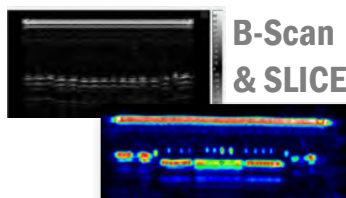
voids · disbonds · cracks · delamination · internal defects

Included Software Modes:

- Basic (user friendly)
- Advanced (detailed analysis)
- Offline Analysis (virtual scanning)



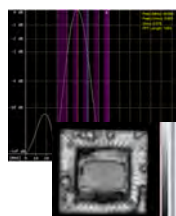
Real-time
A-Scan
&
A-Scan
Capture



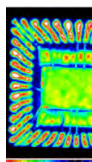
B-Scan
& SLICE



Threshold Mapping
(post processing)



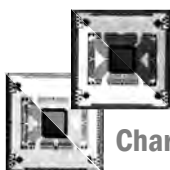
Frequency Domain
Imaging (FFT)



C-Scan with
Multi-gate, SALI,
& SALI Groups



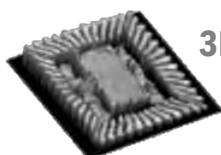
Cluster Analysis
(post processing)



Scan Math
Before and After
Reflow
Characterization



Advanced Time-of-Flight & Thickness
Measurements



3D Imaging



Void Gating
(real-time)

SPECS

Maintenance Free Scan Axis

Motor: Linear Servo
Max Velocity: 500 mm/s
Accuracy & Repeatability: +/- 1.0 micron
Scan Envelope: 250 mm

Low Maintenance Step Axis

Step Envelope 150 mm

Low Maintenance Focus Axis

Focus Envelope 35 mm

Dimensions

0.64 m x 0.61 m x 0.5 m (WDH)
52 kg

Customer Interface

Dual 22" HD LED Monitors

Fixtures

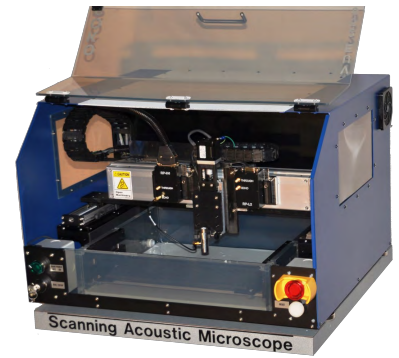
Tray Fixture
Optional Through Transmission Bracket
LED illumination

Instrumentation

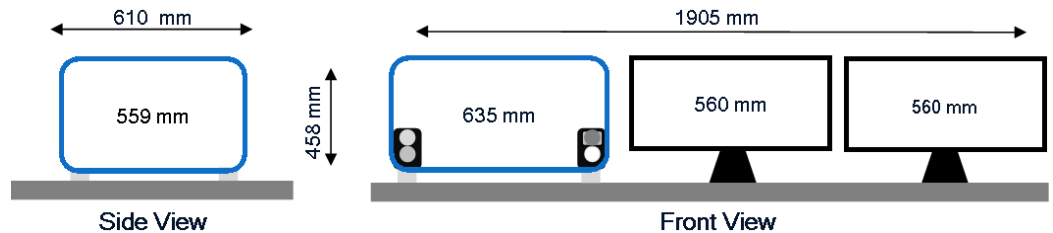
Digital Pulser Receiver
Up to 4 GHz Digitizer

Scan Area

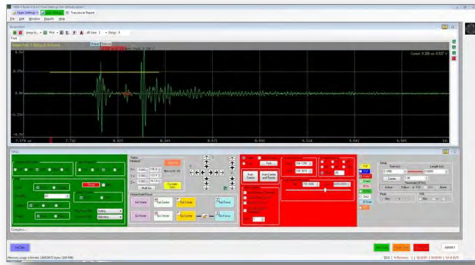
Partial JEDEC Tray



WORKSPACE



OKOS Digital Imaging System (ODIS)



ODIS is the latest Acoustic Microscopy software with rich technical content built on current platforms and industry feedback. It includes both time domain and frequency domain imaging in real-time. Advanced analysis is provided through quantitative tools for measurement and classification of parts. The Analysis version of ODIS allows non-scanning computers to

virtually scan, view, and analyze data for simultaneous real-time analysis or post collection review. Previously undetected flaws can now be imaged with poled peak analysis.

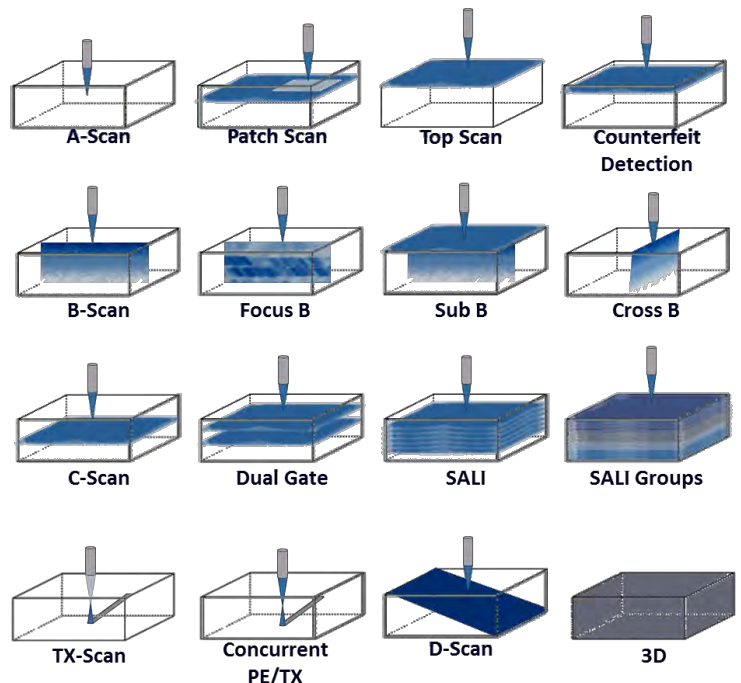
Counterfeit Detection
Product Reliability
Process Validation
Vendor Qualification

Product Inspection
Quality Control
Failure Analysis
R&D



Application Specific Transducers

for the highest quality resolution. Multiple transducer designs for enhanced scan capability.



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Virtual
Rescanning

Pass/Fail
scan sorting

Flatness
Measurements

Multi-
Gating

Easy Identify
Delamination
Detection

VUE 400-P

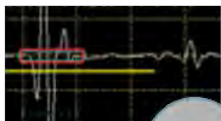
SCANNING ACOUSTIC MICROSCOPY

Semiconductor Package Failure Analysis

voids · disbonds · cracks · delamination · internal defects

Included Software Modes:

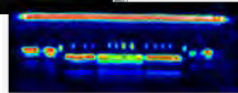
- Basic (user friendly)
- Advanced (detailed analysis)
- Production (automated scanning)
- Offline Analysis (virtual scanning)



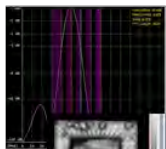
Real-time
A-Scan
&
A-Scan
Capture



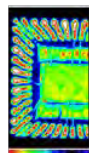
B-Scan
& SLICE



Threshold Mapping
(post processing)



Frequency Domain
Imaging (FFT)



C-Scan with
Multi-gate, SALI,
& SALI Groups

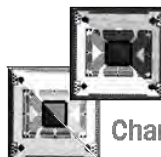


Cluster Analysis
(post processing)

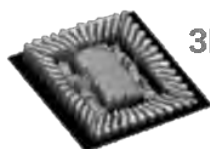
Cluster ID	Area	Bounding Box	Perimeter
1	0.0000000000000000	0.0000000000000000	0.0000000000000000
2	0.0000000000000000	0.0000000000000000	0.0000000000000000
3	0.0000000000000000	0.0000000000000000	0.0000000000000000
4	0.0000000000000000	0.0000000000000000	0.0000000000000000
5	0.0000000000000000	0.0000000000000000	0.0000000000000000
6	0.0000000000000000	0.0000000000000000	0.0000000000000000
7	0.0000000000000000	0.0000000000000000	0.0000000000000000
8	0.0000000000000000	0.0000000000000000	0.0000000000000000
9	0.0000000000000000	0.0000000000000000	0.0000000000000000
10	0.0000000000000000	0.0000000000000000	0.0000000000000000



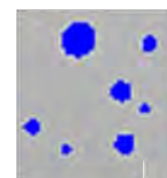
Advanced Time-of-
Flight & Thickness
Measurements



Scan Math
Before and After
Reflow
Characterization



3D Imaging



Void Gating
(real-time)



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SPECS

Maintenance Free Scan Axis

Motor: Quad Linear Servo
Max Velocity: 1500 mm/s
Accuracy & Repeatability: +/- 0.5 micron
Scan Envelope: 380 mm

Low Maintenance Step Axis

Step Envelope 350 mm

Low Maintenance Focus Axis

Focus Envelope 50 mm

Dimensions

0.9 m x 0.86 m x 1.18 m (WDH)
227 kg

Customer Interface

Dual 22" HD LED Monitors

Fixtures

Tray Fixture
Optional Through Transmission Bracket
LED illumination

Instrumentation

Digital Pulser Receiver
Optional second channel
Up to 12 GHz Digitizer

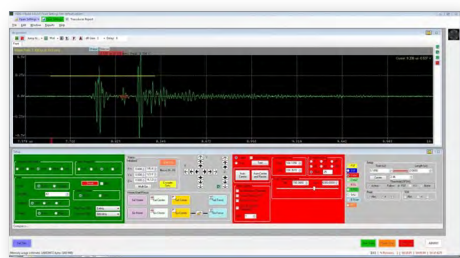
Scan Area

Dual JEDEC Trays
Up to 300 mm wafer



**Clean
Room
Ready**

OKOS Digital Imaging System (ODIS)



VUE 400-P imaging power surpasses modern standards delivering premium FA Lab features to semiconductor fabrication facilities. ODIS is the latest Acoustic Microscopy software with rich technical content built on current platforms and industry feedback. It includes

both time domain and frequency domain imaging in real-time.

Advanced analysis is provided through quantitative tools for measurement and classification of parts. The Analysis version of ODIS allows non-scanning computers to virtually scan, view, and analyze data for simultaneous real-time analysis or post collection review. Previously undetected flaws can now be imaged with poled peak analysis. Supplied with your choice of Windows 7 or 8.

Counterfeit Detection

Product Reliability

Process Validation

Vendor Qualification

Product Inspection

Quality Control

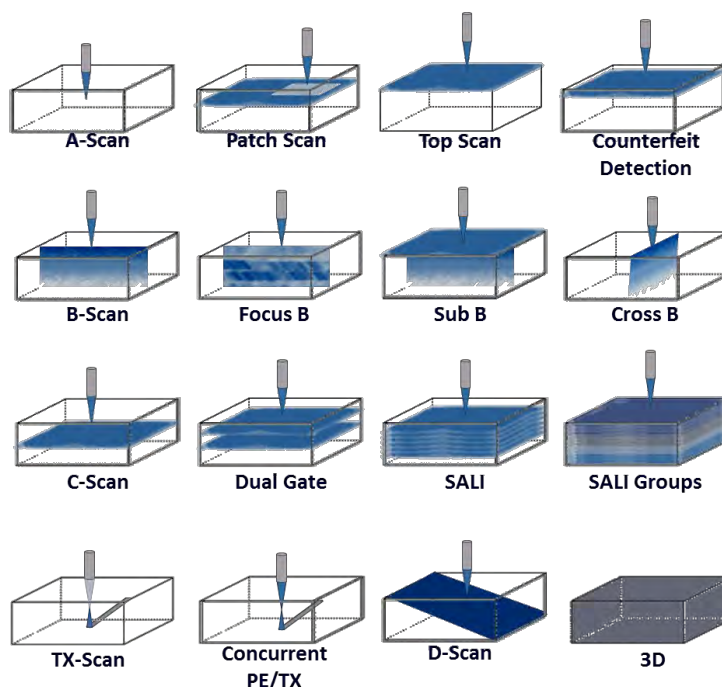
Failure Analysis

R&D



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GE
Inspection Technologies

USIP 40

Multi-Channel Ultrasonic
Inspection Instrument



The USIP40 is a precision, multi-channel inspection platform that can be configured as a remote ultrasonic unit, an integrated rack-mountable instrument, or as a portable battery-powered instrument. All USIP 40 versions take advantage of the same basic ultrasonic hardware, graphical user interface, and application specific software tools.



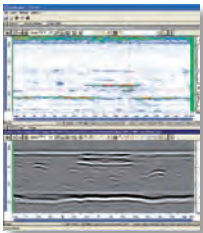
GE imagination at work

Performance and Productivity by Design.

The USIP 40 delivers precision, multi-channel ultrasonic testing performance you can rely on. It is available with up to ten ultrasonic channels and comes in three different package options – a remote ultrasonic unit, an integrated rack-mount instrument, or a fully portable, battery-powered instrument. All of these versions utilize the same core electronic hardware and Graphical User Interface. When you combine its outstanding ultrasonic performance with optional application specific imaging and analysis tools, you can see that the USIP 40 is the ultimate solution for your current and future inspection needs.

The Ultimate Inspection Confidence

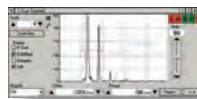
Application specific GUI



The USIP 40 takes full advantage of its Microsoft Windows™ based operating environment. Each of its instrument functions is designed as a separate plug-in. This allows the operator to set-up a customized display showing the right information for a particular application. Several levels of graphical user interface can be created with their own password protection to control access to specific functions.



EchoMAX



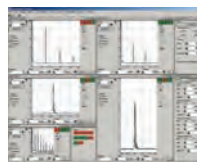
Screen update rates on digital instruments are not able to keep up with the pulse repetition frequency of high performance ultrasonic instruments. As a result, previous digital flaw detectors had difficulty displaying an alarmed defect's actual A-Scan. GE's exclusive EchoMAX technology is designed to overcome this issue and offers the ultimate in A-Scan display for reliable echo visualization by completely digitizing the A-Scan of each ultrasonic pulse. The EchoMAX uses advanced algorithms to capture and display the exact A-Scan of every alarm condition, ensuring real time visual alarm verification. The operator can be confident to never miss a shot and has the ability to pass a defect standard through at full test speed.

Multi A-Scan



With the USIP 40's Multi A-Scan feature, you can view up to ten channels of ultrasonic data on the same screen simultaneously. Each A-Scan can be controlled independently with different gain, range and delay and include up to four colored bar gates. Because each window is independent, the operator can size the A-Scan as large or small as required for easy viewing. The Multi A-Scan feature also allows you to simultaneously display two A-Scans from the same cycle using different display ranges. You can now display an overall A-Scan and zoom in to inspect details at the same time.

Multi-Cycle operation



A USIP 40 can be provided with up to 10 ultrasonic channels depending on inspection needs. In addition to this channel flexibility, the USIP 40 provides up to 20 separate ultrasonic setups (cycles) to automatically drive single or multiple channels complete with DAC or TCG compensation during an inspection sequence. As each cycle is independent, gain and gate positions can be varied between cycles. This allows the operator to carry out multiple tests using a single probe.



Feature Summary

- Up to 10 ultrasonic channels
- Up to 20 kHz PRF
- Aero version qualified to GE and RRAE specifications
- Independent pulser and receiver for each channel
- 20 Programmable cycles for multi-zone inspection
- EchoMAX A-Scan display function
- View up to 10 A-Scans at once
- Available strip chart , C-Scan imaging, and TOFD weld inspection software
- Interface gate synchronizing for surface following
- Back-wall echo attenuator
- Direct 3-axis encoder input
- Automatic Gain Control
- User configurable in English, French, German, Spanish, Japanese, Chinese

Wide Fields of Application

Aerospace

The USIP 40 Aero configuration is qualified to GE DFO P3TF22, P3TF30, P3TF35, and RRAE RPS705 specifications for jet engine component inspections. USIP 40 instruments are also extensively used for airframe composite inspection by leading aircraft manufacturers.

Automotive

Used in conjunction with Ultraproof imaging software, the USIP 40 is the perfect instrument for inspecting pistons and other safety critical parts. Configured in this way, the USIP 40 provides visualization and recording of alarm outputs as well as automatic evaluation and reporting of single flaws, interacted flaws, and total numbers of flaws per part and per batch.

Pipe and tube

With the appropriate probe holders and imaging software, the USIP 40 is easily set up for weld inspection, multi-channel flaw detection and wall thickness measurement.

Plate and billet

Combining inspection productivity and coverage requires multiple inspection channels. The 10-Channel USIP 40 fills this need in both manual and automated inspection environments.

Roll testing

The multi-channel USIP 40 combined with C-Scan imaging provides rapid scanning of industrial rollers. GE's K-Scan software knits multiple ultrasonic channels to form one continuous C-Scan. In combination with the USIP 40's 20,000 Hz PRF, this package is perfect for high-speed defect evaluation and sizing.

Vessel weld inspection

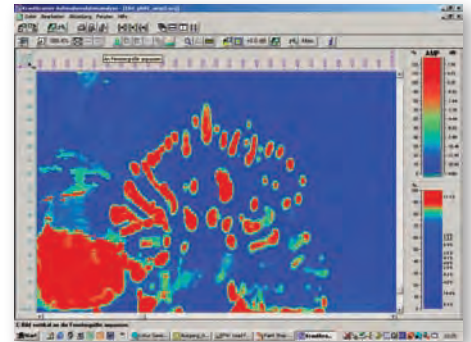
Combined with Ultramap Weld software, the USIP 40 can be configured to perform multi-channel inspections of welds on pressure vessels to ASME Case 2235 utilizing both Time of Flight Diffraction (TOFD) and pulse-echo B-Scan imaging and data archiving tools.

Technical Specifications

USIP 40	
Number of Channels	Up to 10 Channels in Maximum 20 Cycles
Pulse Repetition Freq.	4 to 20000 Hz, Proportionally Divided for Each Cycle
Pulser	Spike Pulse 100 V, 400 V / Charging Capacitor, 1 nF, 220 pF / Rise Time, 10 ns
Wide-Band Filter (-3 dB)	0.2 – 30 MHz / 10 – 30 MHz / 1 – 10 MHz
Narrow-Band Filter	1 / 2.25 / 5 / 10 / 15 MHz
Gain	0 – 110 dB, in 0.5 dB Steps
Fine Gain Setting	1 dB, Continuously Variable in 10 Steps
Rectifier	Full-Wave, Negative, Positive Half-Wave, RF Mode
Reject	Linear, 0 – 80 % Screen Height
TCG	44 dB with Maximum 12 dB/μs
DAC/TCG	DAC or TCG with up to 16 Reference Echoes per Cycle, Multiple DAC Mode with up to Four Additional Curves at Variable Spacing from the Reference Curve, Individual Curves for Each Cycle Possible
Backwall Echo Attenuation	Full Dynamic Range of 110 dB
Sound Velocity	500m/sec - 20000m/sec (0.02 inch/sec - 0.78 "/sec)
Digital Upsampling	400 MHz, 9 bits
A-Scan Display	512 or 1024 Pixels, Range: 4.5 mm - 15 m in 0.1 mm Increments (0.1" - 590" in 0.004" Increments), Pulse Delay -10 mm - 15 m in 0.1 mm Increments (-0.4" - 590" in 0.004" Increments), Display Start with Initial Pulse or Interface Echo
Evaluation Gates	Four (Interface, A, B, C) Color Coded and Independent per Cycle, Coincidence or Anticoincidence Logic Selectable, Flaw Suppression per Counter (1 – 16), Trigger: Initial Pulse or Interface, Width 0.1 mm - 15 m in 0.1 mm Increments (0.003" - 590" in 0.004" Increments), Start 0.0 mm - 15 m in 0.1 mm Increments (0" - 590" in 0.004" Increments)
Amplitude Resolution	0.5 % of Display Range
Thickness Resolution	2.5 ns Corresponding to 0.007 mm (0.000275") at Sound Velocity of Steel
Thickness Measurement Modes	Measurements Selectable between Initial Pulse or Interface Echo and Gates A, B, or C or between Gates A and B. Start/Stop at Zero Crossing, Flank or Peak Echo Including Tolerance Monitor with 4 Thickness Values Min and Max per Cycle
Data Output	Measurement Readings Output as Max Amplitude or Min/Max Thickness Value. Alarm Output Amplitude Threshold or Min/Max Thickness Value.
Analog Outputs	10 User-Programmable for Measurement Readings (Active/Min/Max), Wall Thickness/Echo Amplitude 0 to 10 V, 12 Bit Resolution.
Alarm Outputs	16 User-Programmable for Cycle and Threshold, for Flaw Threshold via TTL (Coincidence/Anticoincidence), for Thickness Tolerance Monitor via TTL with Range Overflow and Underflow.
Test Data Release	4 User-Programmable Inputs for Each Test Channel.
Encoder Inputs	3 Inputs for Quadrature or Pulse/Direction Encoders, Compression of Ultrasonic Data on Path Grid.
Units	mm, inch, μs
Operator Interface Languages	User Configurable in English, German, French, Spanish, Chinese and Japanese
Interconnects	Probes: Lemo 00 or BNC; RF Output: Lemo 00; I/O: 25-pin Sub D; 37-pin Sub D; Sync: 9-pin Sub D; Video: VGA Out 15-pin Sub D Rack and Portable Configuration also Include - Mouse and Keyboard: PS2 (Rack only); Serial Interface: 9-pin Sub D; 2 x USB
Network	Box with Ethernet - TCP/IP, 100 MB/s
Mains Operation	Rack and Box via Internal Power Supply (85 – 265 VAC); Power Consumption 40 W (Rack), 24 W (Box). Portable Version via External Power Supply (85 – 265 VAC), Battery Operation: Two Li-Ion Battery Packs (Hot Swap), 10.8 V, 7.2 Ah ea, 3.25 h Operation. 70 W During Charging
Operating Temperature	0 - 40° C (32 F - 104 F)
Size (HxWxD) and Weight	Rack: 310 mm x 450 mm x 375 mm (12.2" x 17.7" x 14.75") (7U), 16.5 kg (36.36 lb) Box: 125 mm x 450 mm x 430 mm (4.9" x 17.7" x 16.9") (3U), 7 kg (15.4 lb) Portable: 390 mm x 374 mm x 150 mm (15.3" x 14.7" x 5.9"), 8.2 kg (18.1lb) Incl. 2 Li-Ion Batteries

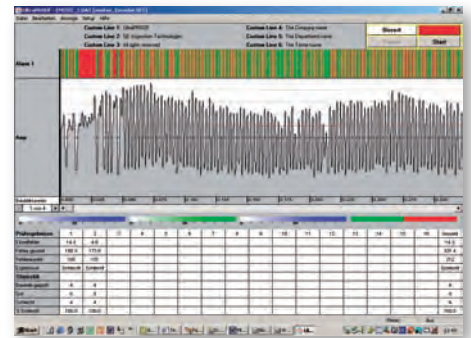
K-Scan

Multi-featured C-Scan imaging option that, when combined with the USIP 40, provides a powerful inspection tool for immersion tank, roller and other applications.



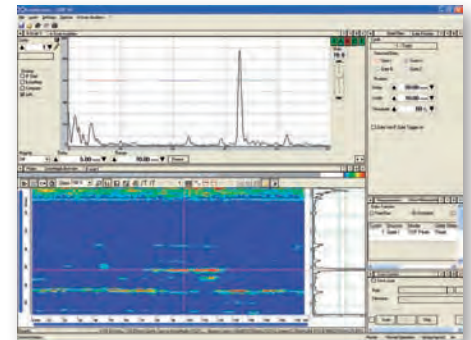
Ultraproof

Strip chart data recording, imaging and analysis option for the USIP 40 provides a series of tools for applications requiring linear scans.



Ultramap weld

Multi-channel imaging option for the USIP 40 providing TOFD and pulse echo tools for weld inspection.



GE Inspection Technologies: productivity through inspection solutions

GE Inspection Technologies provides technology-driven inspection solutions that deliver productivity, quality and safety. We design, manufacture and service Ultrasonic, Remote Visual, Radiographic and Eddy Current equipment and systems. Offering specialized solutions that will help you improve productivity in your applications in the Aerospace, Power Generation, Oil & Gas, Automotive or Metals Industries.

Visit www.ge.com/inspectiontechnologies for more information.