

Characteristics of ultrasound

low frequency high
low resolution high
strong penetration power weak

industrial use
medical use

audible sound ultrasonic

$R(\text{reflectivity}) = \frac{Z2 - Z1}{Z2 + Z1} \times 100$

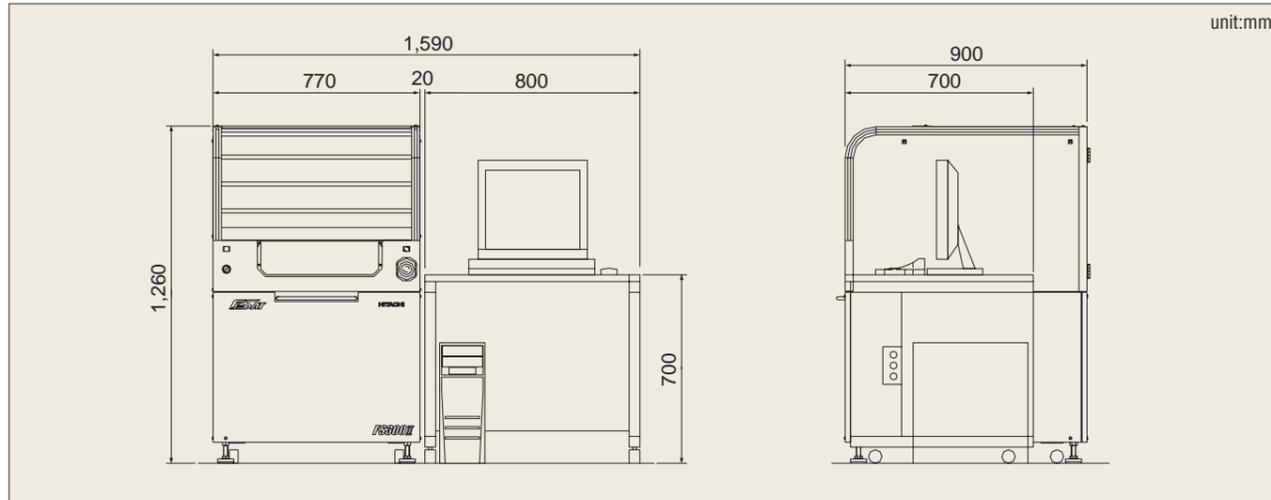
Z1: acoustic impedance of material at incident medium
Z2: acoustic impedance of material at transmitted medium

Z = density () × speed of sound (c)

Ultrasound wave impinging in a medium will reflect when it strikes to an interface with different material density. The intensity of reflected wave depends on the difference in acoustic impedances.

When the ultrasound frequency gets higher, the spatial resolution also gets better. Penetration power, however, becomes lower.

Dimensions



Related patents

- 1 S-image that is created by moving the focus step by step from the upper to the lower portion of the sample.
- 2 Image created by moving gate position with fixed focal position.
- 3 Image index function that sets measuring conditions using thumbnail images.
- 4 Polarity comparison method that can judge defects using ultrasonic waveform polarity.

As this system utilizes ultrasound output less than 1kW, industrial installation permits etc., are not typically required.
Software for local language(English,Chinese(Mandarin), Korean.)

Specifications

	FS100	FS200	FS300
Probe frequency MHz	1 ~ 75	1 ~ 140	1 ~ 300
Frequency range MHz	500		
Measurable area(X × Y × Z) mm	360 × 310 × 80		
Max. scan speed mm/s	1,000		
External dimensions(W × H × D) mm	1,570 × 1,260 × 900		
Weight kg	Approx. 340		
Electrical power	AC100V/15A 50/60Hz		

PC operating system: Windows
Windows is the trademark of Microsoft Corporation.

For more information

KF-EN001

06.12(HP/HP,MT)

Scanning Acoustic Tomograph

FSAT
FS100 /FS200 /FS300



Hitachi Kenki FineTech Co., Ltd.

<http://www.hkft.co.jp>

Head office
Itopia Yushima Bldg. 19-11 3-chome, Yushima Bunkyo-ku,
Tokyo 113-0034, Japan
Phone:+81-3-5688-5428 Fax:+81-3-5688-5429

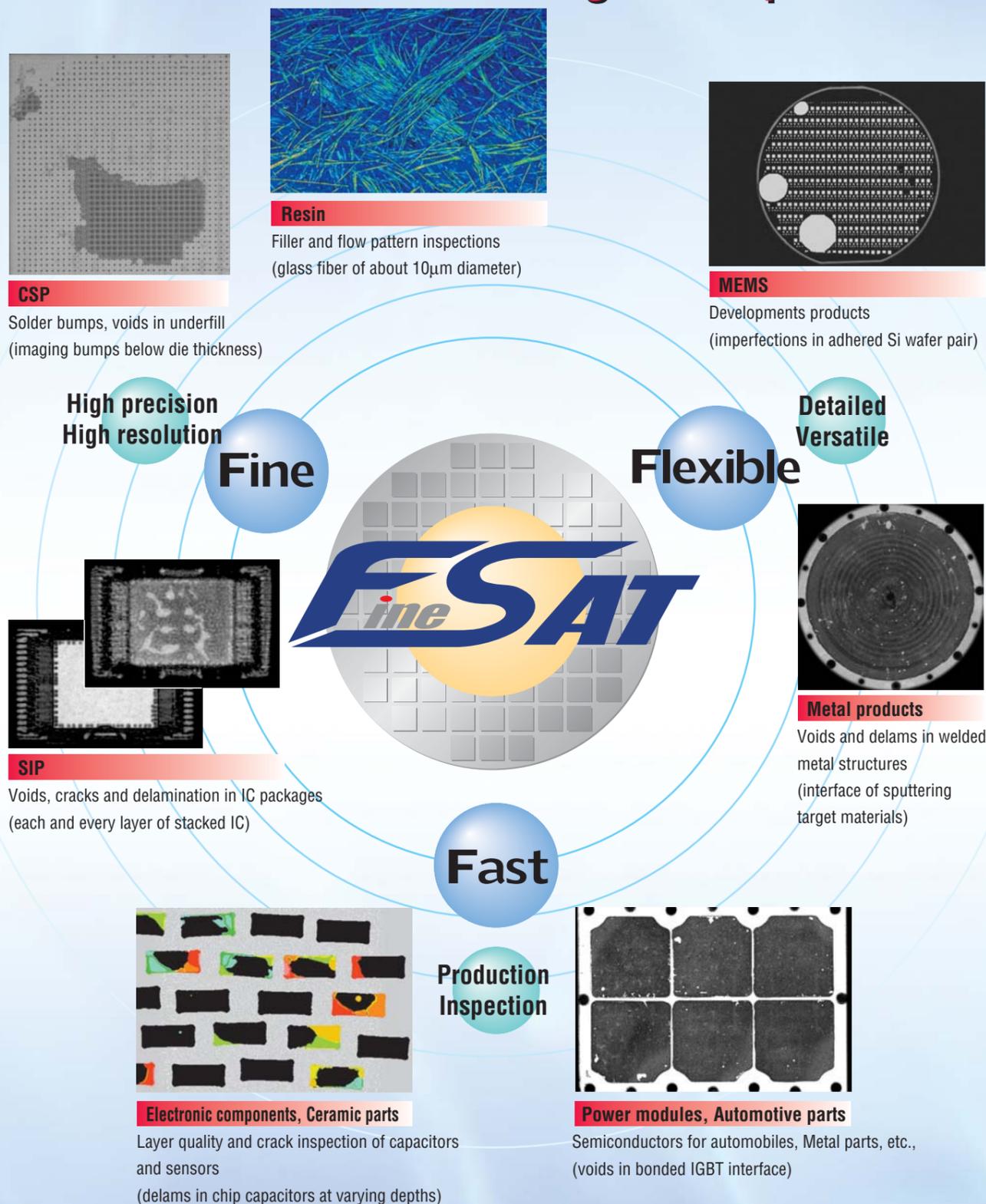
Before operating this system, operator should thoroughly read the operation manual.

Hitachi Kenki FineTech Co., Ltd.

<http://www.hkft.co.jp>

Focus on demand

Responding to all the stringent needs from R&D lab to production lines, **FineSAT** make the great leap!



Fine

Tiny but still harmful flaws can no longer hide under FineSAT system where high performance ultrasound unit and precision scanner are perfectly designed in!

Equipped with uncompromised 500MHz bandwidth electronics, high sensitivity transceiver and ultra-precise scanner mechanism, the resultant image definition can be as high as 8,192 × 8,192pixels at the finest pitch of 0.5μm.

Fast

Quick and easy acquisition with total data reproducibility!

Max scanning speed 1,000mm/s, quick acquisition tools, and continuous auto-measurement features assure the highest productivity ever! Just one-click from 'Image Index' makes each and every acquisition perfect, and then move on to the characterization and judgment stages.

Flexible

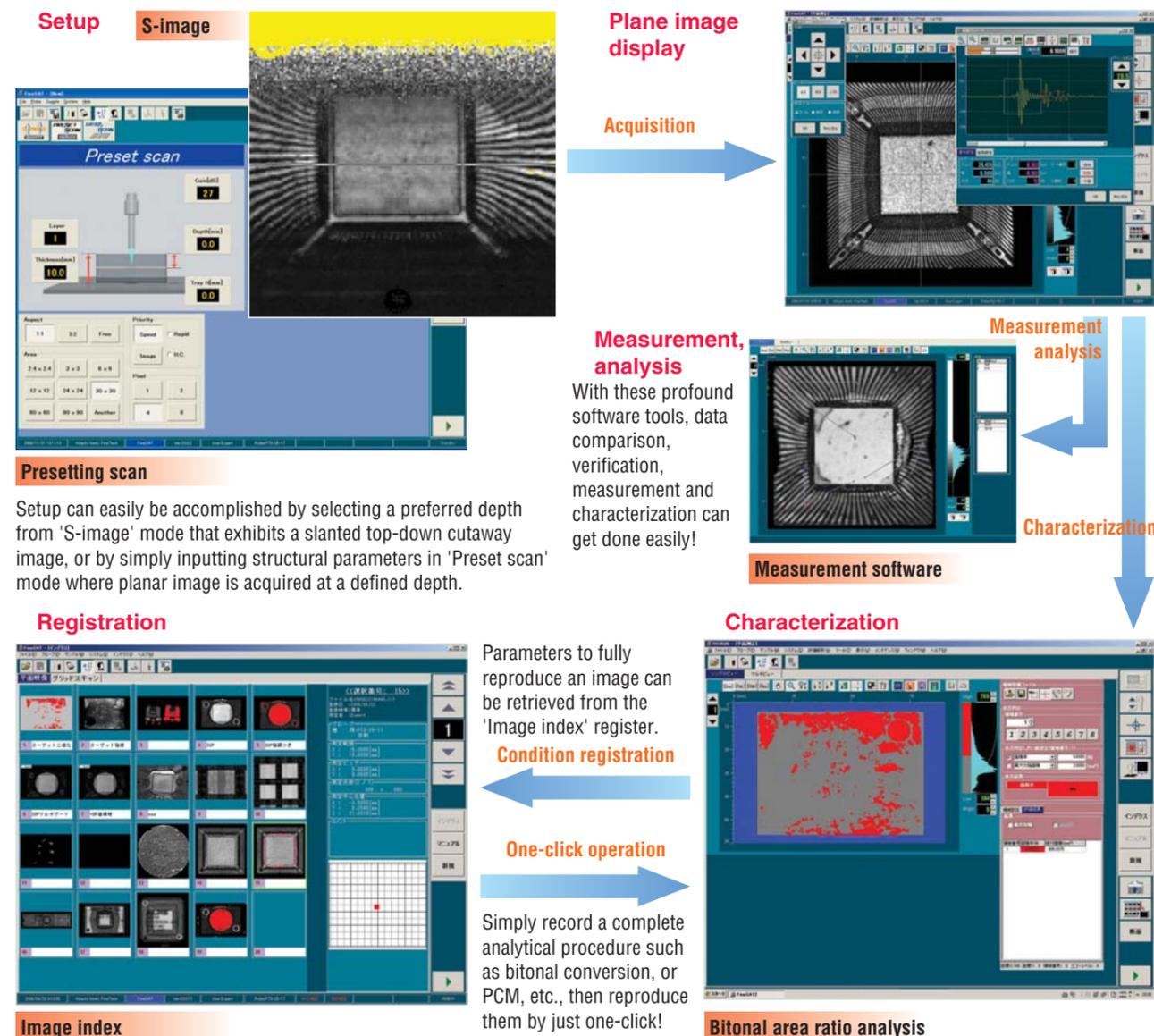
Loaded with variety of analytical software tools!

Waveform, intensity, depth, etc. acoustic wave analysis tools in the new software just get better!

Data acquisition and image processing techniques with very high frequency probes and through transmission probes are greatly enhanced!

Hitachi's technology advances lead "SAT" community to assume their true status!

From setup to acquisition, as well as from analysis to characterization, user friendly features always guarantee high quality data for production line inspection.



User friendliness delivered!

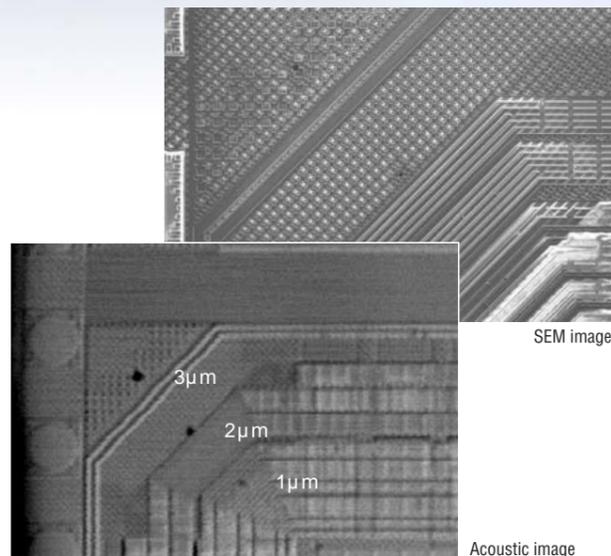
Faster acquisition, higher precision, and analysis methods, all just get easier!



High resolution SAT delivered to the quest for quality information!

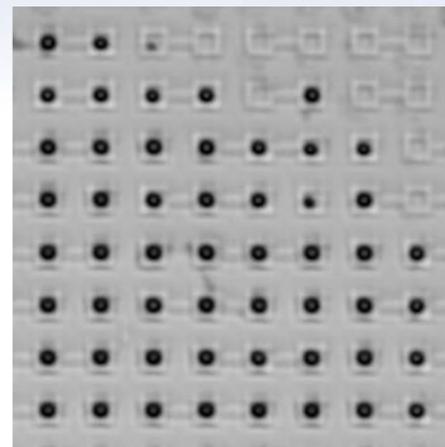
High performance ultrasonic transceiver is capable of signal integration virtually free from all distortions and detection errors anywhere in the 500MHz frequency spectrum. By combining

Image example by utilizing high resolution probe
Very small 1 μ m defect can easily be seen!



precision scanner with high resolution probes developed at Hitachi, very small cracks or flaws now become evident.

Image example utilizing bare die imaging probe
Bumps under die thickness of 725 μ m

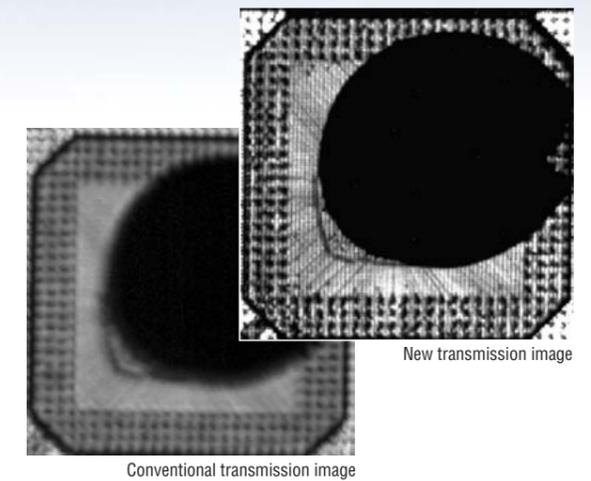
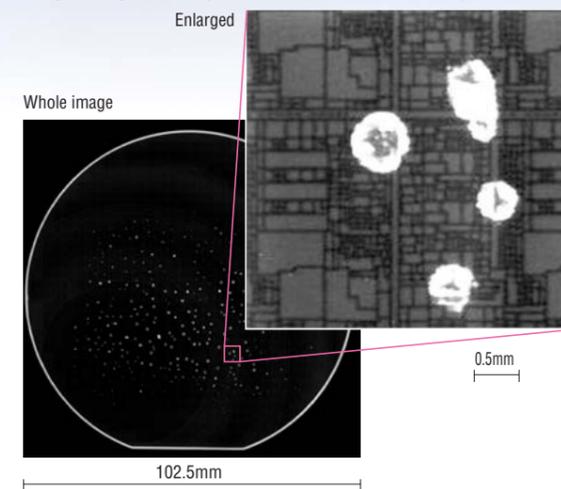


Cover all samples sizes from tiny to large

To make 'one pass' measurement feasible without losing fine details inside wide area images as seen in 12inches product wafers or JEDEC trays, scan pitch can be as fine as 0.5 μ m and maximum acquired data points can be as large as 8,192 \times 8,192pixel.

Various probes in both low and high frequency regimes are available in different focal lengths. Imaging small packages with transmission probe gets easier and sharper than ever before.

Image enlarged from a part of wide area adhered wafer pair.



Faster and easier acquisition for higher reliability data

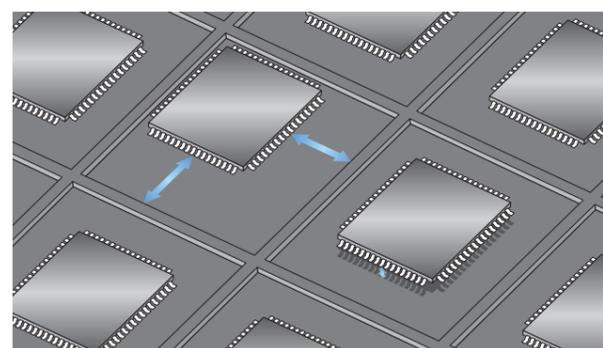
High speed & ultra-precision scanner enables totally reproducible data in a short time.

Image reproducibility is extremely high for employing excellent features like 'Image index' that retrieves all acquisition parameters from a register, and 'Grid scan' that step and repeat image acquisition for sample arrays while lifted-part heights are dynamically normalized and shifted-part locations are auto-centered.

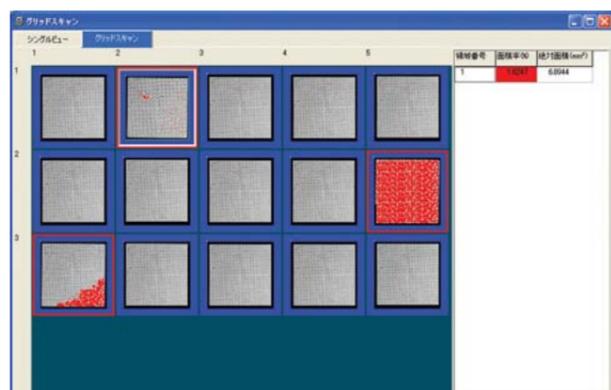
Wide open front access door and optional water tank auto-lifting mechanism allow quick and effortless sample changes.



Grid scan of parts arrays in a tray



Sample position automatic centering



Grid scan image

Enhanced software tools for detail characterization and analysis

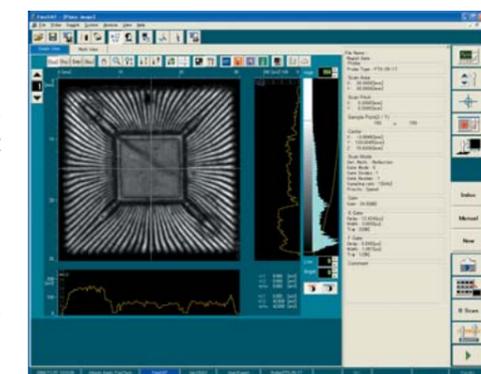
Analytical software tools have been greatly enhanced in all aspects essential for characterizing tomography data: waveform analysis, dimensional measurement, delamination judgment, intensity profile information, and so on.

+/- phase shifts, absolute intensity, depth information can also be compared in real-time. Even waveforms in several different time windows can be automatically interlaced to analyze and save.

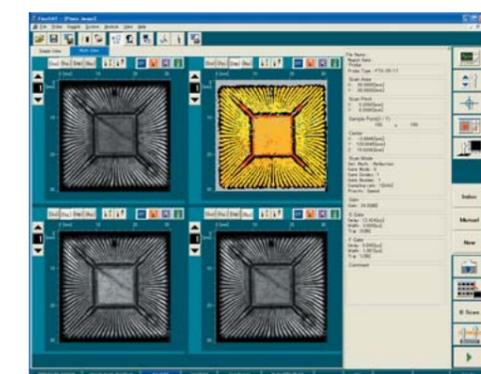
Automatic contrast adjustment and our newly developed technique for interpolating image pixel data affirm the crystal clearer images without hurdle. In addition, yet another powerful analytical tool known as "Volumetric scan" is introduced to construct real-time 3D image by recording all waveforms at each point.



Waveform analysis to extract the distances, time intervals, and intensities, etc., plus waveform superimposition can be carried out easily.



Simultaneous monitoring of reflected intensities and depth profile images strengthen the capability of characterization techniques to a new level.



Images of +/- phase shifts, absolute intensity, depth and polarity emphasis, etc. can be displayed in real-time so that user can see them all and compare.

Hitachi delivers entire hardware and software solutions to all user needs.

With unparalleled technical support, sustainable maintenance for highest uptime, and future expandability, all these included in our total customer satisfaction strategy assuring 'peace of mind' to all our users worldwide!



Excellent in expendability!

Technologies innovated at Hitachi Kenki FineTech

'DC method' for measurement without dipping the sample, 'Spectroscopy' for analyzing the data in frequency domain, and 'DH lens' technique for high resolution analysis at low frequency region, and so on. All these new technologies expand the conventional wisdoms of acoustical imaging!
Water tank lifting system keeps the operator hands dry during sample changes!

Superimposing acoustic and X-ray images

Combined with Hitachi Micro Focus X-ray inspection system MF100C, acoustical and x-ray images are easily superimposed to extract maximum information embedded in these images!

Full lineup of probes

In the 1-300MHz frequency spectrum, more than 70 different types of probes are readily available to fit into all your applications.

Offering solutions to diverse sample specs

Temperature controller unit to increase sensitivity in high frequency measurements and several variations of through transmission probes are available to best fit your particular application!

Peripherals

Available functional options include dual monitor, color printer, filtration pump pack, etc.



Superimposing acoustic image and X-ray image

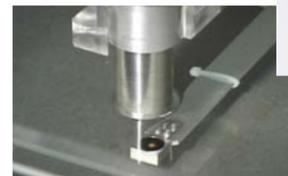
MF100C



High resolution probes



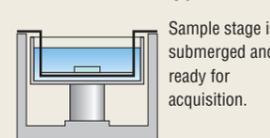
General purpose probes



Transmission probes

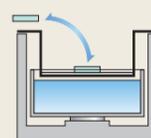
Lifter structure

Lifted tank at test ready position

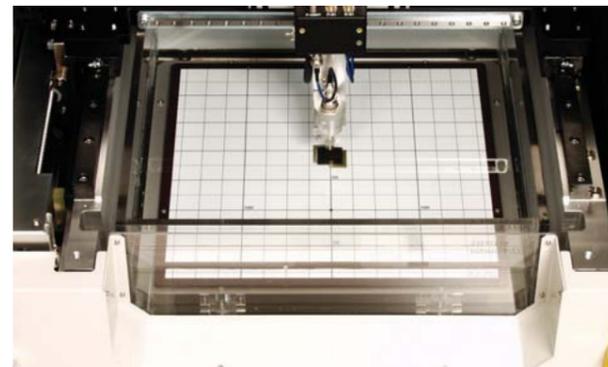


Sample stage is submerged and ready for acquisition.

Lowered tank at loading position



Water tank lowered down and thus samples can be changed without dipping hands.



Lifter function

Loading form wide open front door, Safety considered first

Keeping in mind for easy sample change, the front door is designed wide open till the top roof cover. Optical area sensors detect any intrusion across the entry region. Safety features such as emergency Off (EMO) button, Water leakage sensors, Door interlocks and key switch, etc., are fully inherited. For FS200 and FS300 systems, probe type auto recognition function is also embedded.



Probe type auto recognition

Area sensor

Key switch

Magnetic mat

EMO

FS300II

Fine details rendered for all operation preferences

Magnetic mat for quick sample mounting, standard sample block for regular check-up, etc., Hitachi's unique accessories are included. Needless to mention that handy tools such as maintenance kit, water container, pump, etc., are standard accessories.

In the control software, HELP is always available to assist whenever the user seeks.



Dual monitor (optional)

Water temperature controller (optional)

Acoustic imaging/Acoustic inspection systems: FS series

Ask about the FS series systems readily available for imaging the huge samples and production line use systems with automatic sample handling capability.

FS200W



High frequency large size scanner

FS LINE / ES LINE



Large sample inspection system for sputtering target inspection

Wafer LINE



In-line inspection equipment with automatic wafer handler