GEKKO
PORTABLE PHASED-ARRAY ULTRASOUND
GEKKO not only offers the features of standard phased-array portable systems (angular scanning, electronic scanning, TOFD, etc.), new advanced techniques have also been implemented such as real-time TFM (Total Focusing Method) and management of matrix arrays. These techniques offer 3D hyperfocalization, defect characterization for more precise and faster inspections dedicated to field use.

GEKKO’s user interface was developed to ease the work of operators. Thanks to wizards and a streamlined interface, reliable and precise inspections are achieved while keeping the experience easy to carry out.
GEKKO is dedicated to NDT operators from level 1 technicians to experts. Thanks to the application mode, an operator can directly access preset configurations to perform inspections. He can also choose to create a new application from scratch, guided by wizards and assistants.
A CLEAR AND LOGICAL CONFIGURATION

GEKKO is designed with several step-by-step panels. For each panel (Equipment/Settings/Configuration), the operator sets the relevant parameters. Alert-indicators tell the operator of any inconsistencies (background color).

HOW BEST TO REDUCE OPERATOR ERROR?

GEKKO provides a simple and efficient operation mode for every NDT operator levels. Application interfaces, clear buttons, step-by-step parameters, quick calibration tools are there to reduce the possibilities of error.

QUICK AND EASY CALIBRATION TOOLS

GEKKO provides fast and accurate calibration tools to set up the configuration: bilateral and wedge velocity calibrators, Amplitude balancing, TGC, ACG calibration, TOFD calibration and more.

SIMPLE AND CLEAR OPERATION MODES

GEKKO provides three module interfaces: Wizards are models of configuration files that allow the operator to create new applications with specific parameters. Applications are dedicated configuration files containing inspection data and report. Examine them further using analysis tools.

WIZARDS

Operators can select an application from a list of techniques: main array, matrix array, inspections, TOFD, PFM or a combination of them. GEKKO prepares all the panels associated to the type of the selected application. The operator just needs to specify the parameters of the inspection.

DATA ANALYSIS / REPORTING

The data analysis tool allows an operator to point out and analyze the anomalies detected during an inspection. These indications can be exported into a report, along with all the parameters of the inspection (equipment, specimen, UT parameters for example) for further analysis by experts.

MULTI-GROUP CONFIGURATION

Multi-Group with 2 phased-array and one TOFD results.

UT PARAMETER PANEL

Focal laws is one of the panels associated with an inspection. The operator can choose the type of scan, either sectorial or linear scan, and the focal depth. Thanks to the CIVA-powered delay-law calculator. GEKKO can handle a wide range of delay laws.

FULL-FEATURED SYSTEM

GEKKO is designed with several step-by-step panels. For each panel (Equipment/Settings/Configuration), the operator sets the relevant parameters. Alert-indicators tell the operator of any inconsistencies (background color).
Standard phased-array functions are natively implemented into GEKKO. Linear scan, 2D mapping, sector scan, electronic scanning, TOFD, pulse-echo, are all provided with step-by-step guidelines and assistants. The operator is helped starting with the calibration process through the data acquisition and analysis stages.
FULL-FEATURED

ADVANTAGE OF 64 PARALLEL CHANNELS

To meet numerous industrial applications, GEKKO is fueled with 64-parallel transmit/receive channels. This architecture makes some of the most advanced detection, characterization and imaging techniques possible.

HANDLING MULTIPLE SCANNING MODES

GEKKO manages various scanning methods to meet different inspection requirements. Some modes can also be used in combination, illustrated below.

PACKAGED SOLUTION

M2M works with scanner and probe manufacturers, as well as integrators, to offer packaged solutions worldwide. Most commonly-used phased-array probes and scanners in the NDT community are already preloaded in GEKKO.

SCANNERS

MagMan scanner

TOFD scanner

Tracer

C-Clamp encoder

Wittis/no

PROBES AND WEDGES

Flexible wedge

TOFD configuration

Curved wedge with linear probe

Angled wedge with matrix probe

The GEKKO takes into account the curvature for delay law calculation.
GEKKO is implemented with new advanced techniques, such as real-time TFM (Total Focusing Method) and management of matrix arrays. These techniques offer 3D hyperfocalization, defect characterization for more precise and faster inspections dedicated to field use.
ADVANCED PHASED-ARRAY FOR EASIER INSPECTION

TOTAL FOCUSING METHOD FOR UNPARALLELED RESOLUTION DETECTION & CHARACTERIZATION

Total Focusing Method (TFM) imaging is one of the main axes of research and development at M2M. This powerful technique enables full focalization in the volume of specimens undergoing inspection for accurate defect characterization & high-resolution imaging. TFM uses the Full Matrix Capture method (FMC) for data acquisition and TFM algorithm for image reconstruction. TFM can be used with complex modes such as TTV for better characterization of vertical cracks or converted mode for misoriented defects.

REAL-TIME TFM

Real-time imaging with speed of up to 30 frames per second can be achieved, for clear image and precise defect contour. The TFM image has a 205x256 pixels resolution: 1 pixel = 1 focused point.

EXTENDED TFM IMAGES

In addition to the full imaging system (A-B-S-C Scan + 3D view) GEKKO offers extended TFM images during Acquisition and Analysis: C-SCAN, Echodynamics curves, A-scan, and 3D view.

METHE PROBE

For better expertise, GEKKO handles matrix probe. Ideal for out-of-plane focusing and beam steering, the operator may choose this technique when access is limited and resolution needed in a specific area.

ASME steel block inspection, using 5 MHz 12° phased-array probe with 64 elements

GEKKO is the only system on the market combining phased-array techniques with high-end 3D imaging techniques. This type of display helps the operator locate the sector-scan within the specimen undergoing inspection in 3D.

GEKKO is fueled by CIVA, the leading simulation software on the NDT market. The operator can customize its interface. With the CIVA engine inside, GEKKO can be used to compute most focusing laws specified by the operator. GEKKO data files can be read and analyzed further in any CIVA packages.

The GEKKO handles two-axis mapping.
Intended for industries such as aerospace, metallurgy, oil & gas, power generation and automotive, GEKKO covers a wide range of applications from corrosion mapping to crack detection and characterization in welded pipes and plates. Thanks to its advanced features, GEKKO can handle thick components, detect and characterize misoriented defects. Superimposition of CAD files to ultrasonic data helps the operators interpret measurements and lowers the rate of false alarms.
IMPROVE DETECTION

HIGH TEMPERATURE HYDROGEN ATTACK (HTHA) DETECTION
Carbon steel specimen inspection with TFM technique.

EXTENDED VISUALISATION AREA
Inconel weld inspection with TFM technique. Defects are detected close to the top and bottom surfaces.

CYLINDRICAL RECONSTRUCTION
DEFECT SIZING
Small diameter pipe inspection using slanting with corner effect mode (TTT). Both TFM technique and sectorial scan are illustrated. For outside diameter defects, both modes account for the rebound off the inner curved surface to display a scaled image.

S-scan for a 2 mm defect
TFM reconstruction for a 1mm defect

CORROSION
NAPPING IMPROVEMENT WITH TFM
Reduced dead zone: corrosion detection till 1mm under the surface. Full description of the corroded profile for more accurate measurements.

Detection of inclined area

INSPECTION OF THICK COMPONENT
SUBSTANTIAL IMPROVEMENT WITH 64-ELEMENT APERTURE
100 mm thick stainless steel weld inspection with a 64-element aperture shows better spatial resolution compared to 16 and 32-element apertures
Probe: 3.5 MHz, 64 elements
Pitch: 0.6 mm
Wedge: 1.
DEFECT CHARACTERIZATION

CHARACTERIZATION OF MISORIENTED DEFECT
Tilted defect reconstruction with TFM technique and mode conversion.
Probe: 5 MHz, 64 elements
Wedge: S

SKewed DEFECT DETECTION
Use of matrix probe with sectorial scanning along various planes perfect for the detection of skewed defects.

BLADE INSPECTION WITH HALF-SKIP TFM
TFM and superimposition of a CAD file to ease the inspection diagnostic.
Probe: 5 MHz, 64 elements
Pitch: 0.6 mm
Wedge: 55° shear waves

SCREW THREAD INSPECTION
27-mm long screw thread inspection with TFM technique. Optimal resolution is obtained along the thread.
Probe: PA, 5 MHz, 64 elements
Pitch: 1.8 mm

Wedge: S

10 mm-misoriented notch

Courtesy of Karl Deutsch

DEFECT CHARACTERIZATION

2-MM ELLIPTICAL CRACK
Characterization of the defect possible, even without a diffraction signal. The full shape of the defect is reconstructed with TFM technique.

Half skip reconstruction (TFM)
Superimposition of the true profile of the crack with the DSCAN

Sectro scan

D-scan

D-scan
Software
All-level operations, application wizards, analysis, reporting
Real-time imaging, A-Scan, B-Scan, S-Scan, C-Scan
Total Focusing Methods (TFM), images & 3D display
Inspection modes: pulse-echo, TOFD
CIVA fueled phased-array calculator, compatibility with CIVA

Phased-array
Matrix and linear arrays
Linear scanning, sectorial scanning
Up to 1000 delay-lines – Up to 8 salvoes

Pulsers
64 phased array channels:
Negative square pulse, width: 30ns to 1250ns
12V to 100V with 1V step
Max. PRF: 1kHz

4 conventional UT channels:
Negative square pulse, width: 30ns to 1250ns
12V to 200V with 1V step
Max. PRF: 1kHz

Receivers
64 phased array channels:
Input impedance: 50 Ω
Frequency range: 0.4 to 25MHz
Max. input signal: 1.4 Vpp
Gain: up to 120 dB (0.1dB step)
Cross-talk between two channels: < 50 dB

4 conventional UT channels:
Input impedance: 50 Ω
Frequency range: 0.4 to 25MHz
Max. input signal: 1.4 Vpp
TCG – DAC calibration wizard
Gain: up to 120 dB (0.1dB step)

Digitizer
Digitizing and real-time summation on 64 channels
PRF: Max
Averaging up to 1:32
Resolution: 12bit, processing: 16bit
Max. sample frequency: 100 MHz
Digitizing depth up to 65000 samples

Acquisitions
Hardware acquisition gates, synchronization of gates
Maximum number of acquisition gates: 6
A-Scans/Pics data recording
Max. data flow 50 MBytes on a 125Hz SSD (maximal up to 1 TBytes)
Inspection data files size: up to 10 GBytes
Acquisition trigger on event (encoder)

Hardware
FPGA and CPU boards
3.5h batteries, hot swap
10.4" touch screen – Resolution 1024x768
I/O
1 IPEX connector for phased array
3 encoders input
1 VGA output
3 LEMO 00 connectors for conventional UT
1 external trigger* - 8 channels – 16 analog input*

General
L x W x H: 410mm x 268mm x 124mm
Operating temperature range: from 0 to 40°C
Storage temperature range: -10 to 60°C with battery
Weight: 6.5 kg (without battery); 0.480g /battery
IP54

*(indicated) values may change without notice. “* as defined by the standard.}