

AUGUR ART

Flaw detector with application of PA probe technology

AUGUR ART is the flagship product of the ECHOPLUS. Having absorbed the development experience of the previous six generations, the device is successfully applies at all Russian nuclear power plants, in the oil and gas and machine-building industry. The feature of the AUGUR ART in unique technologies, using scanning antenna arrays, which allow perform non-destructive testing of complex welded joints with a thickness up to 300 mm.



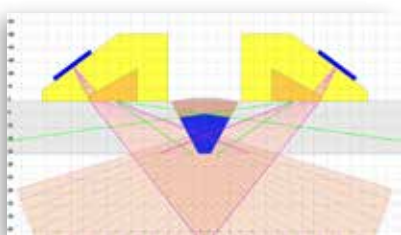
Flexible and powerful software • Work with any scanners • Multi-touch interface Integration with automated visual and measurement inspection module and video camera • Wi-Fi control • Replaceable batteries • 2 pairs of TOFD, 4 conventional probes acoustic coupling • The large and brightest screen in its class • Up to 16 groups PA probe, FMC + TFM, TOFD, contact tracking • SSD for recording data from 128 GB • IPEX – connector for connection PA probe from 32 to 128 elements

Application

Inspection of welded joints

Manual and automated inspection of welded joints using various scanning devices.

High-quality images of the object of inspection, allowing to automate the process of determining their type and size measurement of defect.



Editor of the parameters of the inspection object

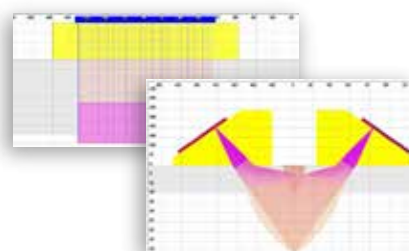
The built-in visual editor allows you to set the parameters of the inspection object (thickness and bevel of the welded joint), select piezoelectric probes, inspection schemes and determine the zone of interest.



Continuous full thickness measurement

The technology of continuous thickness measurement using phased arrays allows you to measure the wall thickness and the speed of the ultrasonic waves.

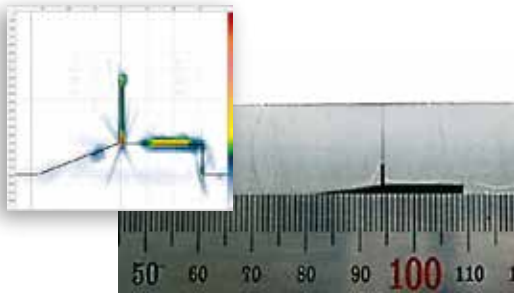
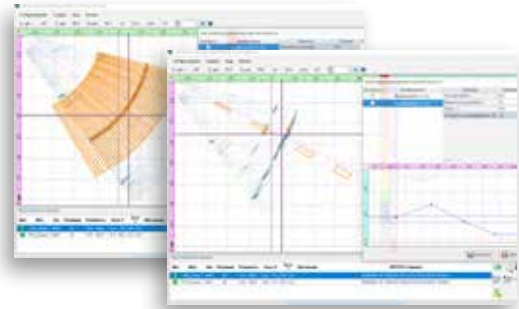
The thickness measurement error is no more than 1% in the range from 20 to 100 mm, and no more than 0.2 mm in the range from 2 to 20 mm of thickness.



Technologies

Sensitivity equalization

Alignment of sensitivity by angle and range using standard inspection reflectors: notches, flat-bottomed holes, side drilling holes in accordance with the requirements of Russian and international regulatory documentation.

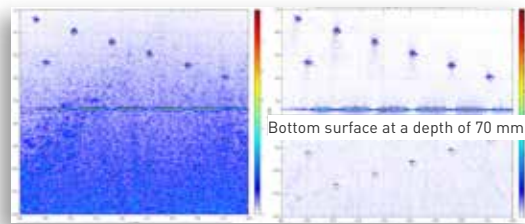


Obtaining image of defect

AUGUR ART algorithms allow you to obtain B-type images, according to different acoustic schemes, taking into account the reflection from the bottom of the inspection object. After digital processing of these images, the task of obtaining information about the shape of the defect and determining the dimensions is facilitated.

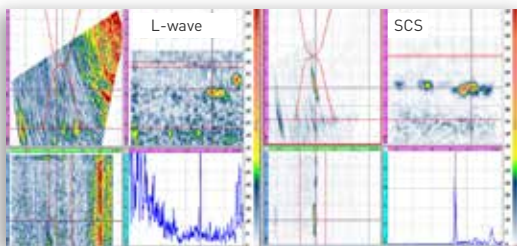
Usage of complex signals

Usage of complex phase-manipulated signals is realized through the use of a programmable sequencer and subsequent mathematical processing and allows to improve the image quality when inspection materials with high attenuation coefficients of ultrasound.



Conventional PA probe signals
5 MHz, 32 elements

The complex PA probe signals
5 MHz, 32 elements

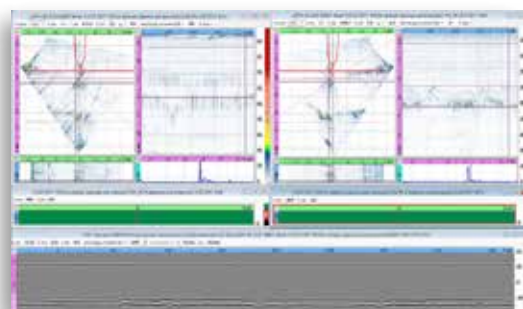


Support for matrices and pitch and catch schemes

To ensure the beam changes in an additional plane and when inspection materials with a granular structure, it is advisable to use phased arrays and phased arrays connected according to a separate-combined scheme. The number of elements in the matrix is determined by the configuration of the flaw detector – from 32 to 128 elements.

AUGUR Analysis

Visualization and processing in the modes PA probe, SAFT, FMC + TFM, TOFD, linear scanning • Contrast change and cut-off • Sensitivity alignment • Measuring cursors • Centralized database of inspection results and objects • Reports with inspection parameters and information about defects



Technical specifications

Module specifications

Number of channels PA probe	64; 128 pc
Number of independent channels PA probe	32; 64 pc
Range of setting the amplitudes of the excitation pulses PA probe	from 30 up to 100 V
Range of setting the amplitudes of the excitation pulses TOFD	from 50 up to 400 V
Range of setting the duration of the excitation pulses	from 50 up to 400 Nsec
Permissible deviation of the setting of the duration of the excitation pulses	±10 %
Range of adjustment of the gain	from 0 up to 80 dB
Gain coefficient adjustment step	no more 0.1 dB
Limits of the permissible absolute error of measuring the ratio amplitudes of signals at the receiver input	±1 dB
Operating frequency	from 0.4 up to 25 MHz
Range of adjustment of the duration of the scan	from 1 up to 600 μs
Customizable filters	For each channel
Maximum number of focus groups / focusing laws	16 / 2048
Maximum frequency of sending excitation pulses	20 kHz
Data collection and recording speed	up to 200 Mb/s

Accuracy specifications

Range of measuring the depth of the defect	from 1 up to 200 mm
Limits of the permissible absolute error of measuring the depth of occurrence defect, provided that the value of the aperture angle* α , related to the length ultrasonic wave λ is <u>at least 5 deg/mm</u> , mm	±0.8 mm
Limits of the permissible absolute error of measuring the depth of occurrence defect, provided that the deviation of the aperture angle* α , related to the length ultrasonic wave λ is less than 5 deg/mm	±(0,3+0,03*z), where z - depth value, mm
Measuring range of the distance from the input point of ultrasonic vibrations up to the projection of the defect on the surface	from 1 up to 120 mm
Absolute error in measuring the distance from the point of entry of ultrasonic fluctuations before the projection of the defect on the surface, provided that the value the aperture angle*, related to the wavelength of the ultrasonic wave λ is <u>at least 5 deg/mm</u>	±1.0 mm
Absolute error in measuring the distance from the point of entry of ultrasonic fluctuations before the projection of the defect on the surface, provided that the value aperture angle*, related to the wavelength of the ultrasonic wave λ is <u>less than 5 degrees/mm</u>	±(0.3+0.03*z), where z - distance from the entry point to projection of defect, mm

Measurement range of the distance traveled by the path sensor	from 1 up to 20000 mm
The relative error of measuring the distance traveled by the path sensor in the range from 1 to 100 mm	±0.5%
Relative error of measuring the distance traveled by the path sensor in the range from 100 to 20000 mm	±0.5%
Other specifications	
Display Parameters	13.3", 1920x1280, contrast 1000:1, touch
Overall dimensions of the flaw detector	no more 400 x 300 x120 mm
Weight of the system unit	no more 7 kg
Degree of protection with connected connectors	IP65
Average service life	at least 10 years
Power is supplied from an external DC power supply (from a rechargeable battery or a power supply connected to the mains AC) with rated voltage	12 V
Battery life	4 h + hot swap

