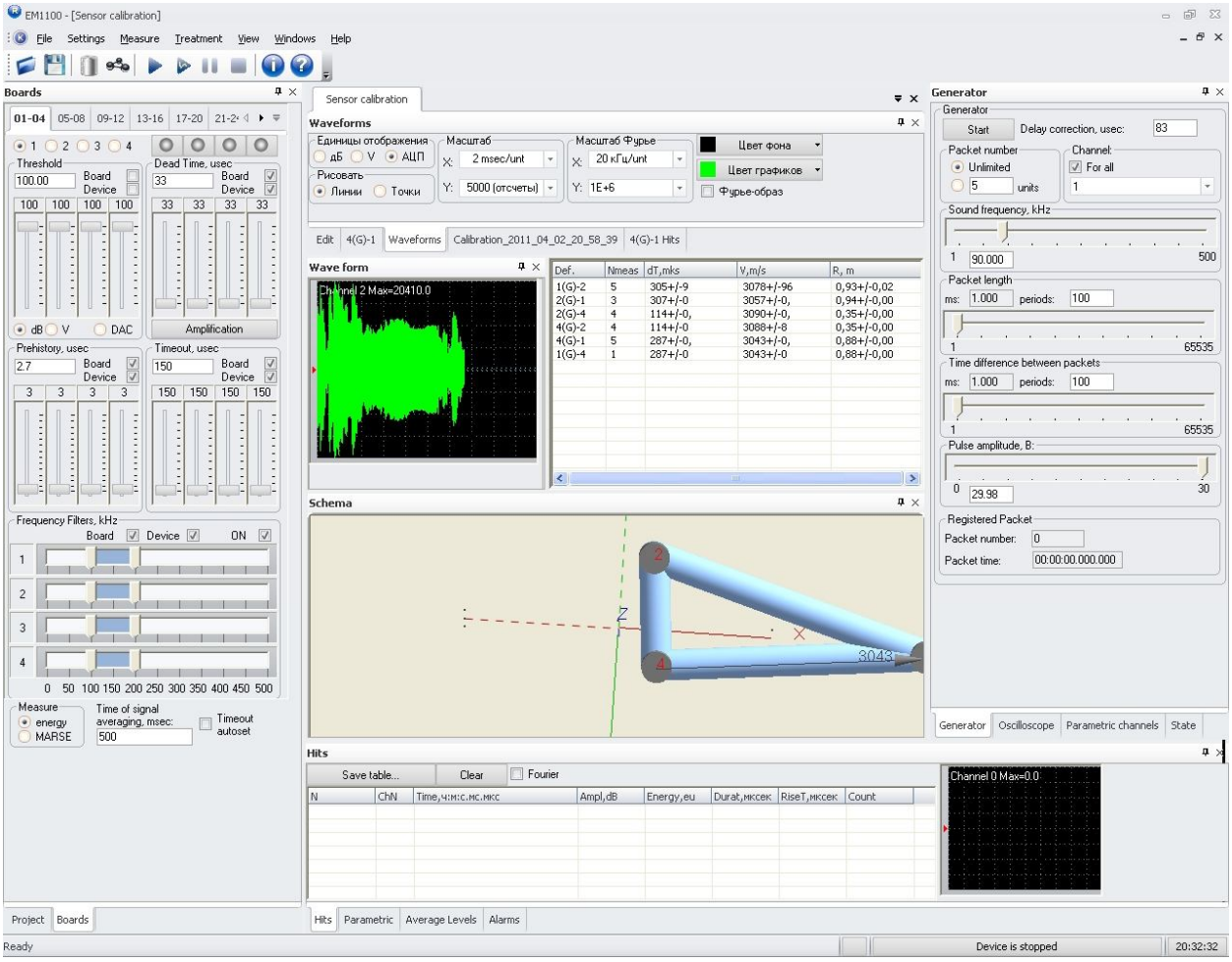
Software for RANIS acoustic-emission system



The software was developed to support all features of RANIS hardware. The software is based on many years experience in the field of practical acoustic-emission testing.

Many modern technologies were used in the software development. It includes

OpenGL,

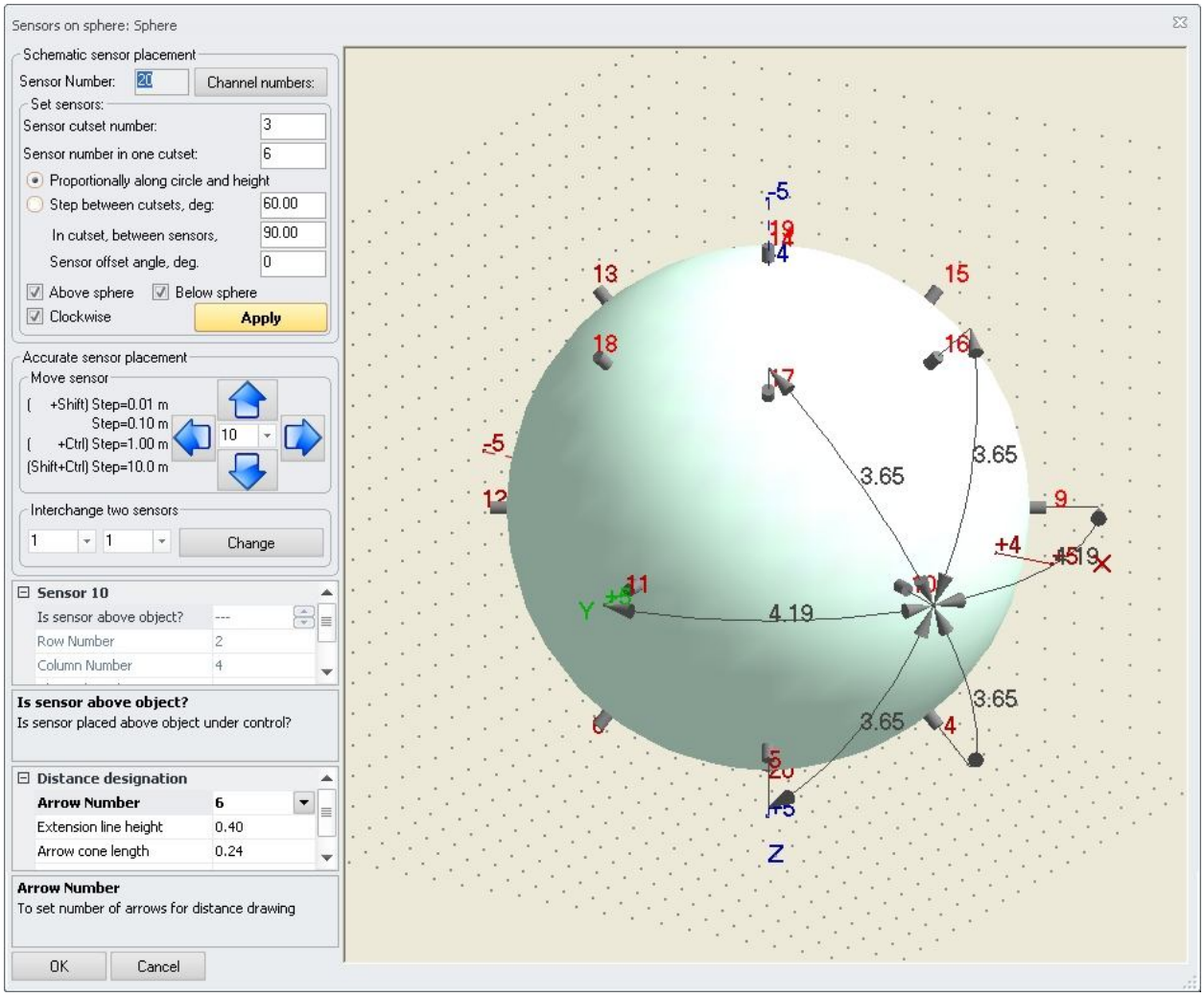
multithread programming,

multiprocessor support.

The software supports joining of several separated RANIS acoustic-emission systems into united acoustic-emission system, where total number of channels is equal to the sum of separate system channel numbers. Not only a single, but several computers may control this united net. All acoustic-emission data, which are collected by this net, have the same time scale.

The software have professional user interface with support of dynamically theme changes in style of Microsoft Office 2010/2007/2003/XP/2000 and Microsoft Visual Studio 2010/2005, animated menu, window tabs, docking bars and other modern interface features. The software shall be executed in Microsoft Windows XP, Vista, Windows 7 operating systems environment. User interface gives possibilities to open unlimited number of windows for data presentation. It is possible to show different data presentation within the one window. Data presentation types include two- and three-dimensional graphs, text tables. Objects under testing are presented by 3D objects, visualized by OpenGL platform.

Size and placement of windows controlled both user and automatically. Number of data presentation types is near hundred.



The software can be described as one executable file, which control both data collection processes and treatment of preliminary collected data. Collected data treatment is executed in real time also. Treatment of preliminary collected data can be produced on any modern computer also.

"Project" term is used for designation of data logical unit for description of object under testing. This set of files contains all necessary information for data collection and data treatment. New data can be added to project at any time. Number of projects is unlimited. Project files contain all collected data, registered by hardware. Project files include:

1. Hit descriptions (Amplitude, MARSE, true energy(quadratic dependence),duration, rise time, counts)
2. Hit form description (digitization – 3MHz)
3. Parametric data
4. Average amplitudes
5. Records indicating the change of hardware setting during the experiment.

There are three data registration modes: 1) Hit registration 2) Hit waveform registration (oscilloscope) 3) Hit and hit waveform simultaneous registration. Hit waveforms can be collected for every hardware channel. Setting of data units, scale, zero adjustment, real time fast Fourier transform helps for user to estimate presence of noise and its frequency. Parametric data are collected with equal

interval, controlled by user. Hand parametric data input can be used, when it is impossible to connect parametric inputs with electrical signal sources. There is both hand and automatical sensor calibration for object under testing.

The software calculates placement of possible defects and its different parameters, waveform spectrums, sound velocities, sensor calibration parameters in real time.

Collected data and results of calculations can be presented both in graphical and in text form. There are a lot of graphical forms for data visualization. Both one graph for many channels and separate graph for every channel can be opened.

Software features include:

logarithmic data presentation,

data accumulation,

drawing data by points, lines, and histogram ,

auto scaling

versatile data coordination system

enclosed lens for data graph

The software uses fast algorithms for calculation of defect location. It can use both isotropic and anisotropic medium description. Following objects are supported in the software:

1. Single linear pipe
2. Arbitrary set of linear pipes, joined as ring
3. Arbitrary set of linear pipes, placed horizontally
4. Arbitrary set of linear pipes, placed vertically
5. Arbitrary set of linear pipes, joined as chain in 3D volume
6. Planar rectangular box
7. Cylinder developed views
8. Flat round bottom
9. 3D-cylinder surface
10. 3D-sphere surface
11. 3D-sphere surface segment

A sensor can be placed in any order on the surface of object under testing. Arbitrary triangles are used for defect calculations for all types of supported objects, excluding linear.

A lot of filters for all data types are used for data treatment. Every hit parameter or event parameter can be used for data filtering. Both index and time range can be used for filtering also. Complex filters with logical “AND” function can be built.

The software supports saving of graphs in various data formats, like JPG, GIF, TIFF, BMP. Windows clipboard can be used for this purpose also. Any table can be saved in Microsoft Excel format.

Help subsystem exists in standard <chm>-file form. Help file can be opened both inside and outside the software.