ScanView

Software

User Manual

Saint Petersburg

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1 Introduction

This User Manual is a mandatory document for persons who operate and maintain the ScanView Software (hereinafter ScanView) and Electromagnetic Acoustic Thickness Gauge (hereinafter EMAT or Device), which includes the ScanView.

The ScanView is compatible with EM2210, EM4000 and EM5000 Devices.

This manual contains basic information about the intended use of the ScanView and instructions for using it.

Only qualified personnel who have studied the operational documentation for the following products:

- the ScanView;
- the operating system and tablet or other device intended for use with this ScanView;
- EMAT

are allowed to operate the ScanView.

IMPORTANT

Some components or images in this user manual may differ slightly from your copy of the ScanView. However, the principles remain the same.

2 Purpose and conditions of use

2.1 The ScanView implements the following functions:

- operate in real time with the Device, setting and display A-scans, B-scans and C-scans;
- use the Device as a flaw detector for searching for pitting corrosion;
- save files with measurements in tabular form in ".csv" format or as images in ".png" format;
- calibrate the transducer using a known thickness or acoustic speed.

2.2 The ScanView requires the Android operating system.

The ScanView communicates with the Device via Bluetooth.

3 Preparing for work

The ScanView comes installed on the tablet from the Device's delivery set and is ready for use.

4 Operation description

4.1 ScanView Start

4.1.1 Before starting operation, prepare the tablet for work: turn it on, wait for the operating system to load and check the battery charge level.

4.1.2 Switch the Device on.

4.1.3 Start the ScanView (the  icon).

4.1.4 When you start the ScanView, the Bluetooth module on the tablet turns on automatically. The Device connects automatically, no additional search in the Bluetooth settings is required.

4.1.5 During operation, monitor the charge level of the Device and tablet using the indicators in the upper right corner of the screen.

4.1.6 Switch between the ScanView operating modes (A-scan, B-scan, C-scan, flaw detector, calibration) using the buttons on the panel located on the left side of the screen.

4.2 “A-Scan” Window

The appearance of the A-scan window is shown in Figure 4.1

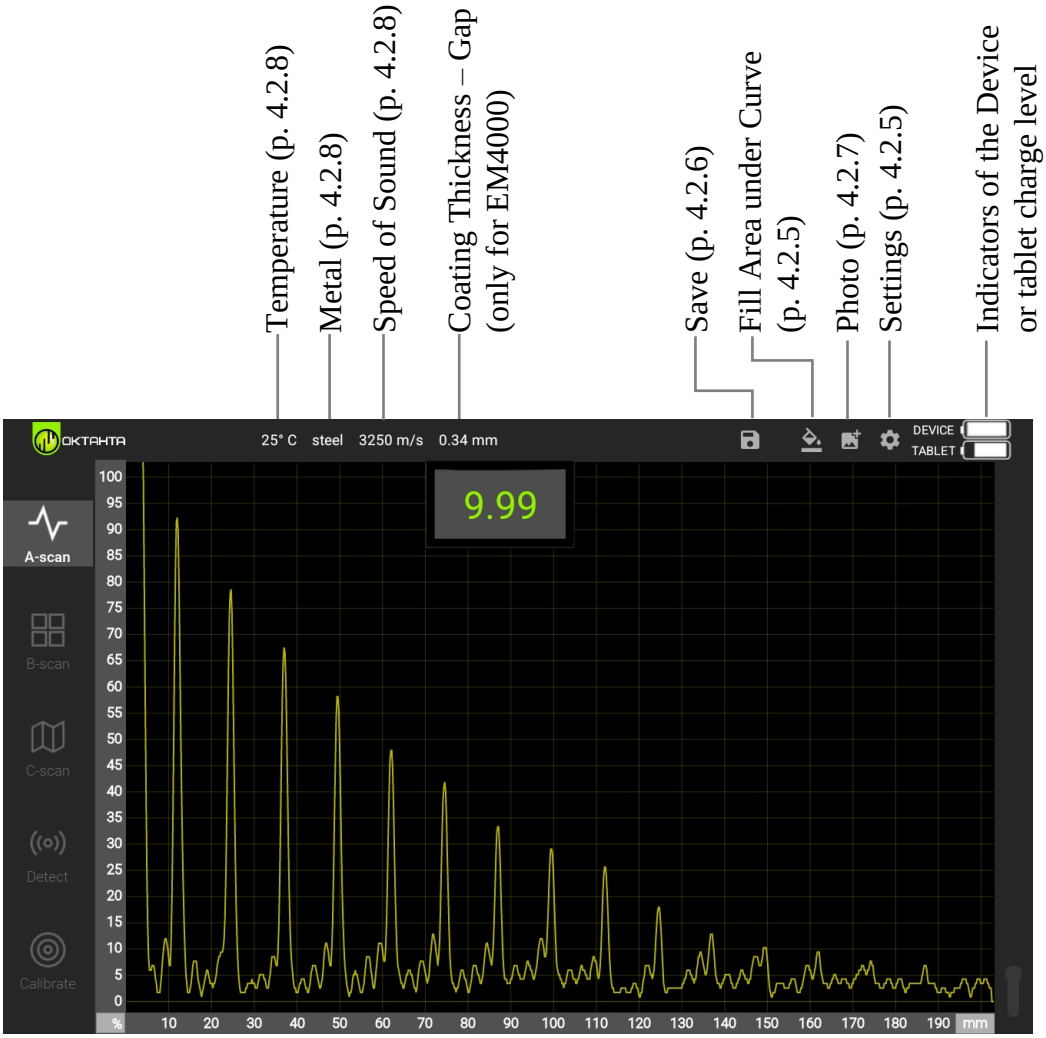


Figure 4.1 – ScanView appearance

4.2.1 Change of Size and Position of Measured Thickness Window

To change the size of the measured thickness display window, touch this window. As a result, the window shown in Figure 4.2 opens, and you can select one of two options for displaying the thickness

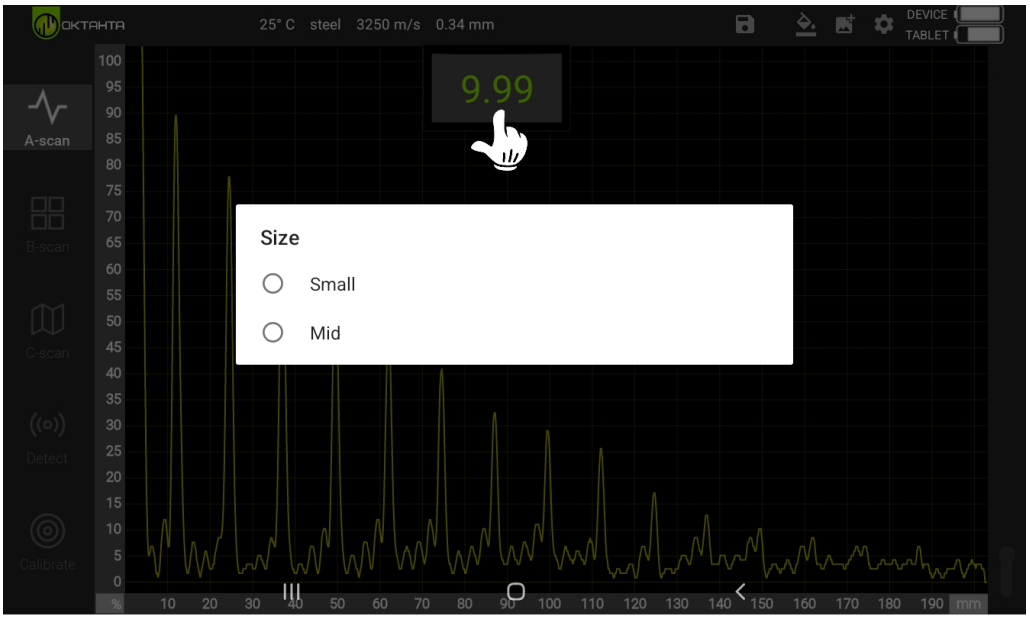


Figure 4.2 – Selection of size of measured thickness window

By default, the Small size of the window is set. Figure 4.3 shows options for the measured thickness display window.

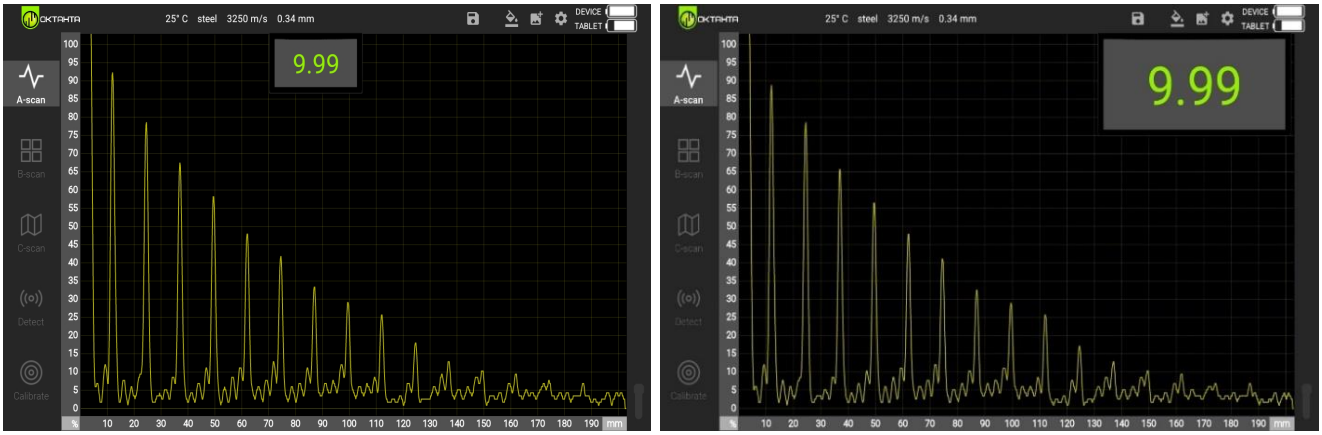


Figure 4.3 – Options for measured thickness display window

To change the position of the thickness display window, touch and hold the window to move it to any position you want.

4.2.2 Change of Units along Time and Amplitude Axes

To change the units for the time and amplitude axes, touch the desired axis to open the appropriate window and select the desired unit.

Figure 4.4 shows appearance of the windows where you can select the units.

Figure 4.4 – Units selection

The user can set the following units:

- for the horizontal axis: time in microseconds and distance in millimeters or inches;

- for the vertical axis: relative units in percentage form or decibels and absolute units in volts.

4.2.3 Adjustment of Signal Generation, Processing and Display Parameters

You can change such signal generation, processing and display parameters as:

- AGC switching on/off;
- Thickness measurement mode;
- Number of accumulations;
- Signal shape;
- 2D/3D mode.

You can change the above parameters using the settings menu. To open the menu, touch and hold the gain indicator area to drag it to the left and, thereby, to open the sliding menu (see Figure 4.5).

To close the menu, slide it to the right in the same manner.

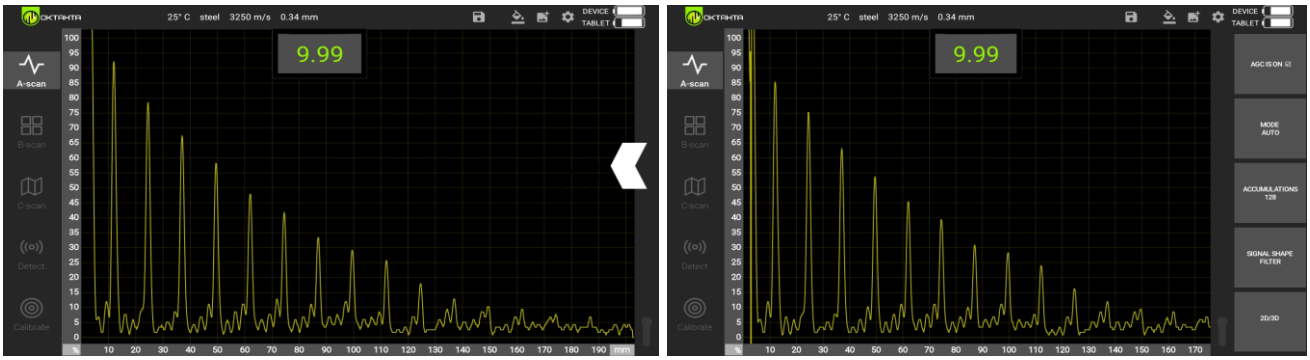


Figure 4.5 – Settings menu for signal generation, processing and display parameters

4.2.3.1 AGC switching on/off

To switch off the automatic gain control (hereinafter AGC), un-check AGC in the settings menu. When the AGC is off, the slider in the gain indication area becomes active. You can control the gain by moving the slider up and down (see Figure 4.6).

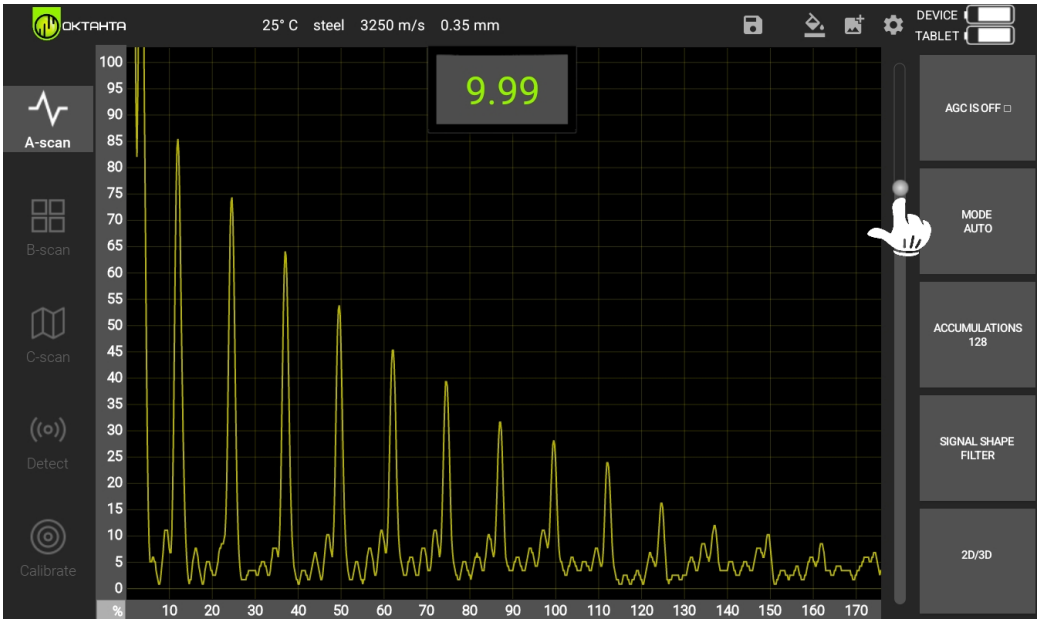


Figure 4.6 – Manual gain control

4.2.3.2 Selection of Thickness Measurement Mode and Operation with Gates

By default, the ScanView has the automatic thickness measurement mode set, i.e. the thickness is calculated according to the Oktanta-developed algorithm and is user-independent. In addition to the automatic mode, the ScanView enables you to use the manual thickness measurement mode which has two options:

- thickness measurement using one gate;
- thickness measurement using two gates.

4.2.3.3 Thickness Measurement using One Gate

In this mode, the operator can set one gate. For this gate, the maximum of the signal envelope is detected. The detected maximum is converted into the measured thickness with allowance for the set speed of sound.

To select the mode of thickness measurement using one gate, touch the Mode window located in the settings menu for signal generation, processing and display parameters. As a result, the window shown in Figure 4.7 opens, where you should select the 1 Gate mode.

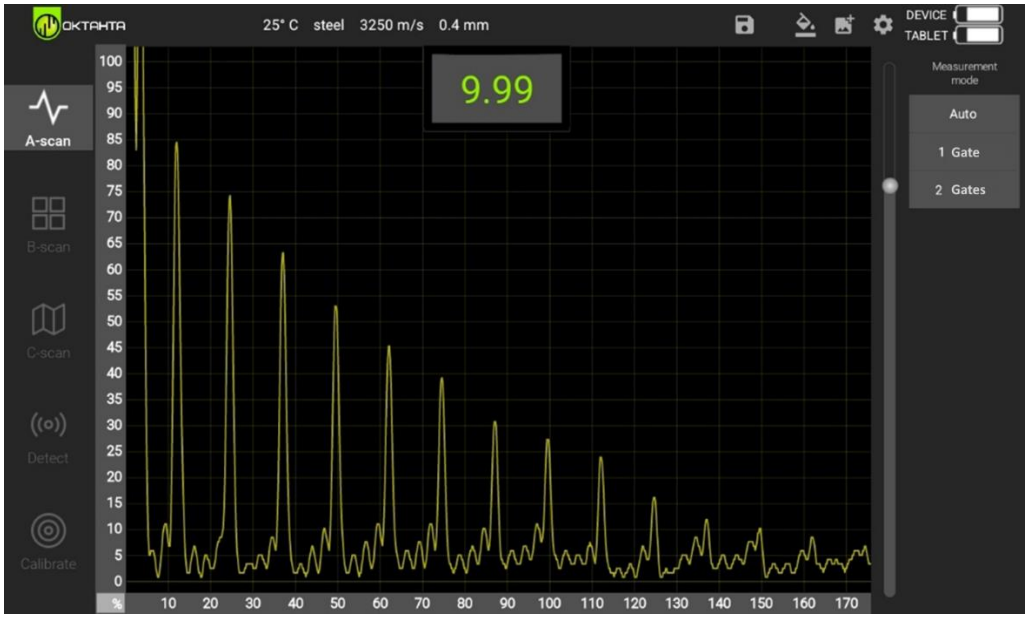


Figure 4.7 – Thickness measurement mode selection

Upon selection of this mode, the screen displays one gate. You can move this gate across the A-scan and change its length. Figure 4.8 shows the gate appearance.

To move the gate, touch and hold the gate center while moving it to the desired position. To change the gate length, hold the gate with one finger and increase/decrease the length of the gate with the other finger (see Figure 4.8).

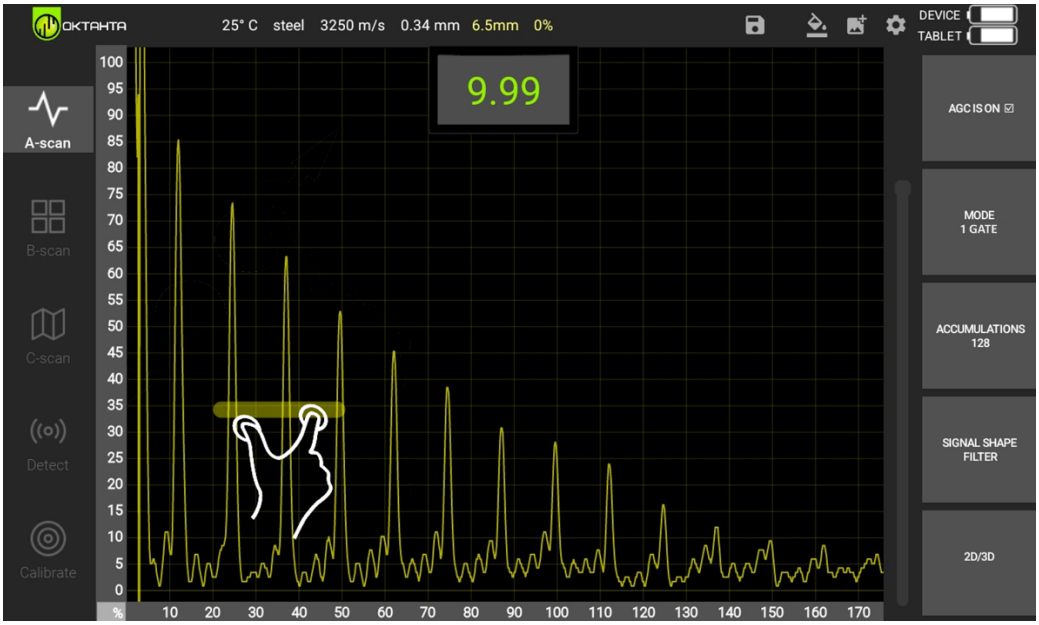


Figure 4.8 – Gate operations

The gate coordinates are displayed at the screen bottom, and the maximum detected in the gate is displayed at the screen top (see Figure 4.9).

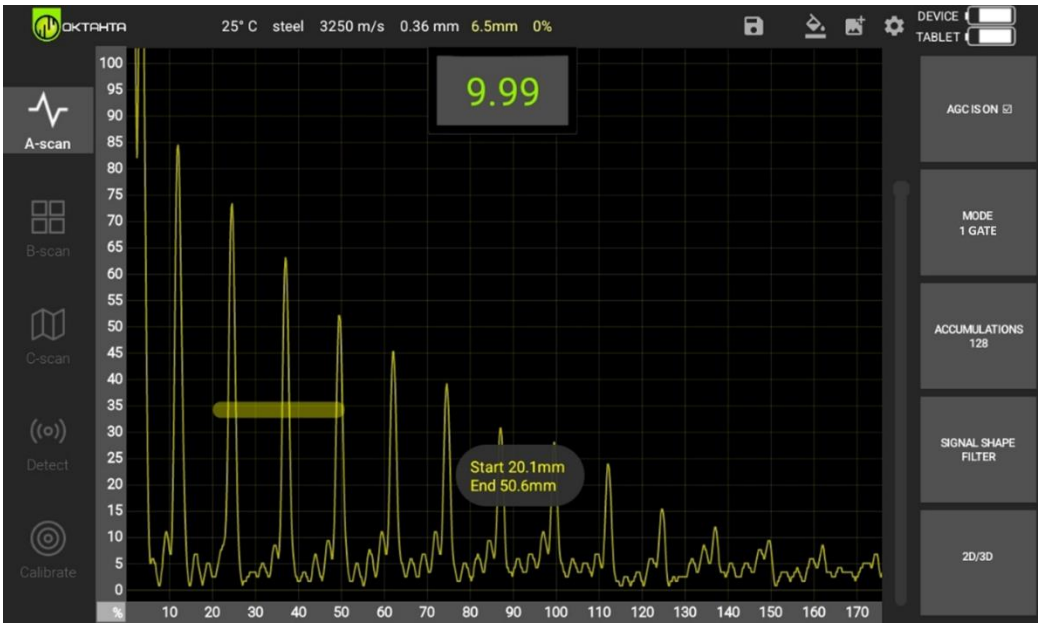


Figure 4.9 – Coordinates of maximum detected in the gate

4.2.3.4 Thickness Measurement using Two Gates

In this mode, you can operate with two gates on the A-scan. The measured thickness can be calculated by the time difference of the maximum position in gate 1 and maximum position in gate 2. The detected difference is converted into the thickness using the set speed of sound. Similar to the one gate mode, the maximum coordinates detected for each gate are displayed at the screen top. During gate movement on the screen, the time coordinates of the beginning and end are displayed for each gate. The gate operations are the same as above described.

4.2.3.5 Change of Accumulation Number

By default, the Device uses 128 accumulations of the useful signal, i.e. it calculates the thickness using the average values. During operation with a wide gap or poor surface quality, it is recommended to increase the number of accumulations and, thereby, to increase the reliability and accuracy of the measurements.

To change the number of accumulations, touch the Accumulations window. As a result, the window shown in Figure 4.10 opens, where you can select the required number of accumulations.

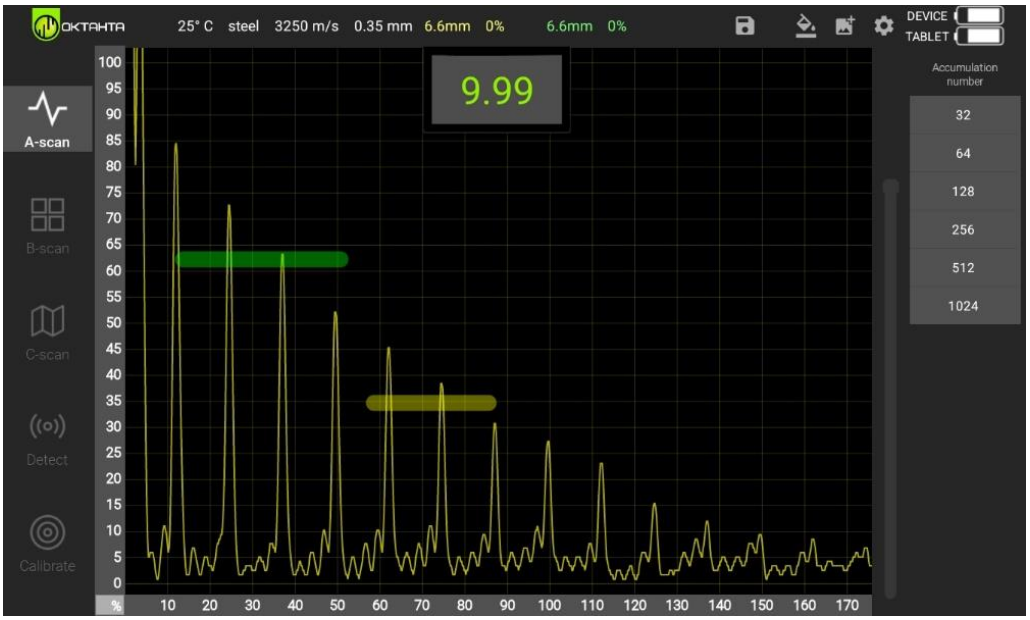


Figure 4.10 – Selection of number of accumulations

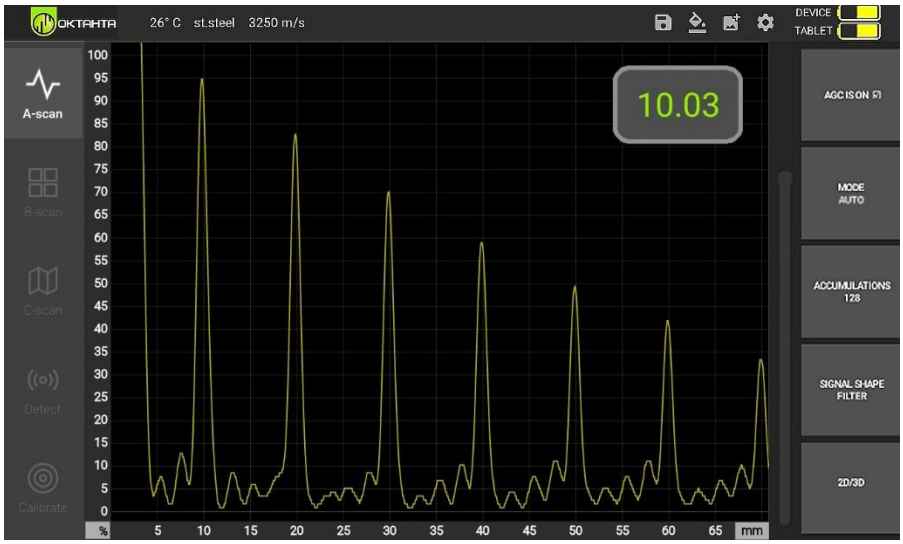
Note that increase of the number of accumulations increases the measurement time.

4.2.3.6 Selection of A-Scan View

You can display the Device time sweep in three ways: the original signal, the detected signal and the filtered signal (using matched filter). To change the A-scan view, touch the Signal Shape window. Figure 4.11 shows all three views.

Original

Filtered



Detected

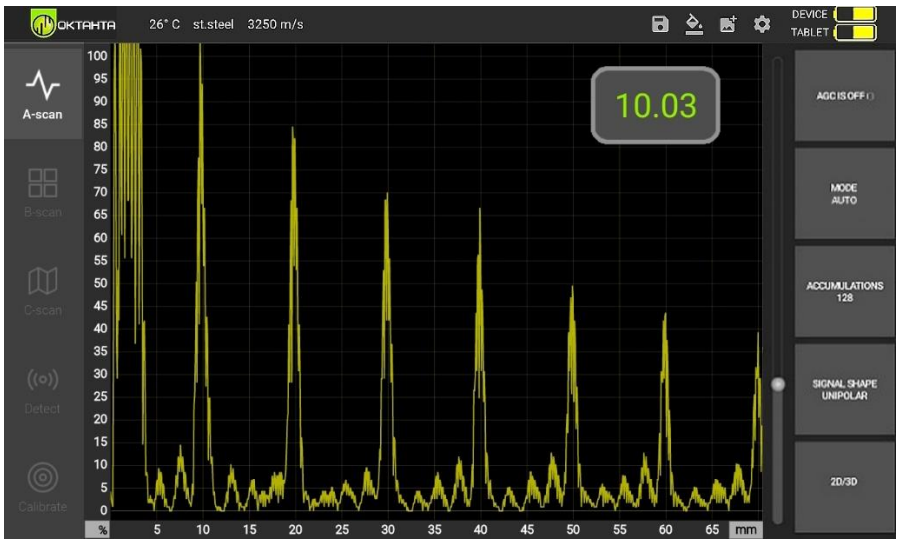


Figure 4.11 – A-scan views

4.2.3.7 2D/3D Mode

The 2D/3D mode enables displaying the measurement signal as the 3D model on the tablet screen. A curve obtained as the 3D model can be moved/rotated. Figure 4.12 shows the 3D model appearance.

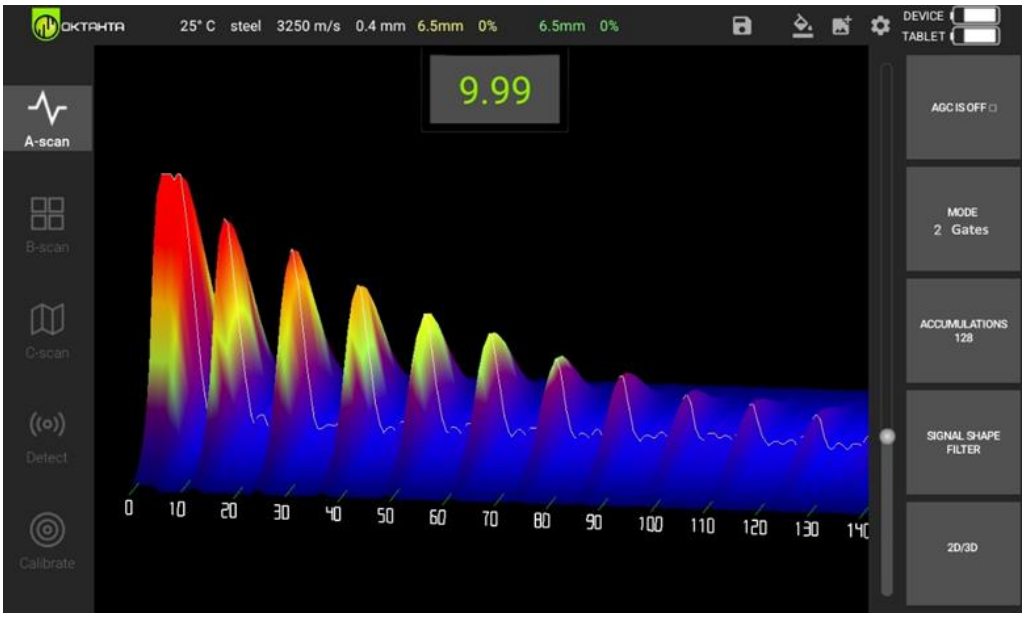


Figure 4.12 – Signal displayed as 3D model

4.2.4 A-Scan Zoom and Movement

You can easy and quickly zoom the diagrams. To zoom in any area of the screen, touch the screen with two fingers and pinch out it (see Figure 4.13).

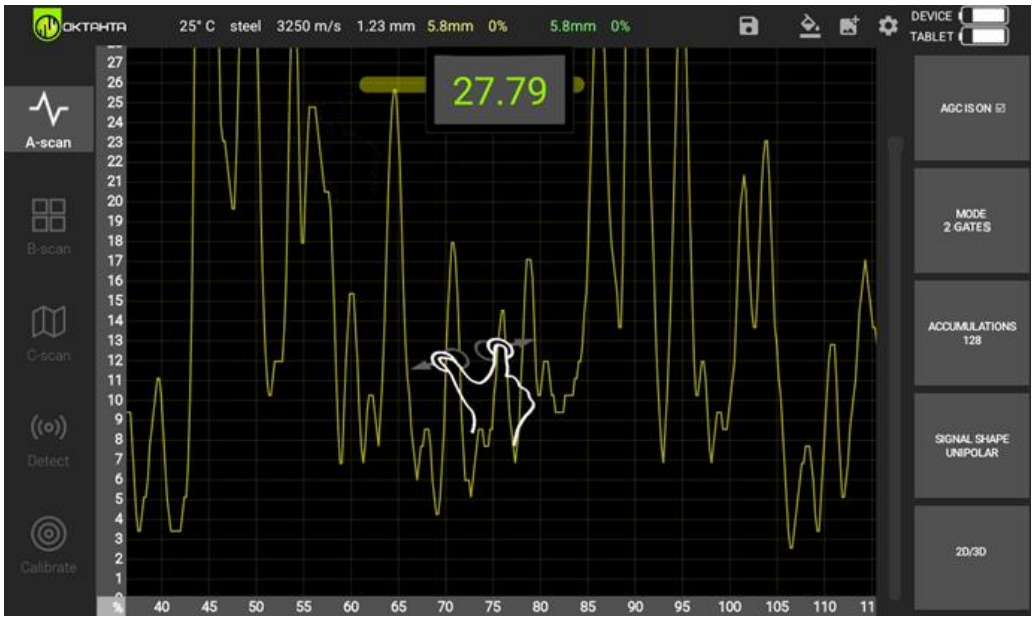


Figure 4.13 – Diagram zooming

To return the normal display, double touch any point of the screen.

4.2.5 Setting up ScanView and Appearance of A-Scan

You can fill in the area under the A-scan curve. To do this, touch the  button (see Figure 4.14). To return to displaying the A-scan without filling, touch the  button again.

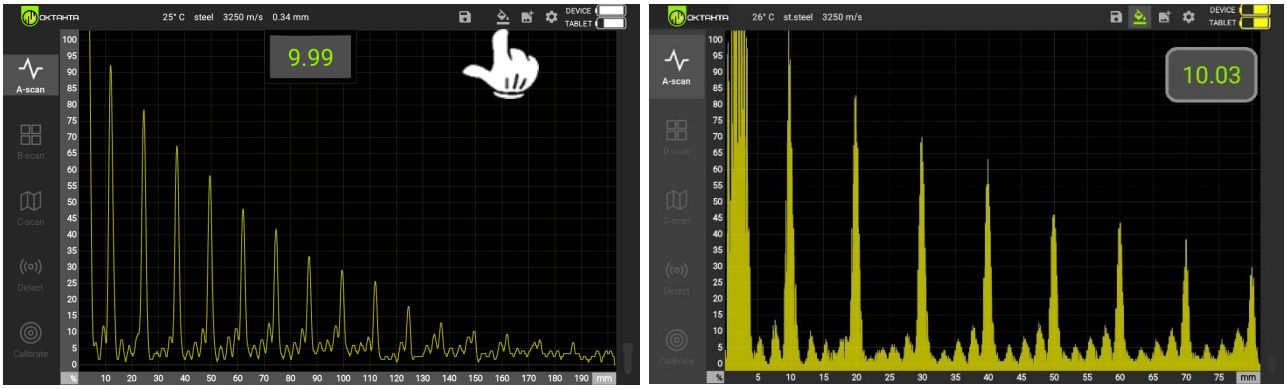


Figure 4.14 – Filling the area under the A-scan curve

You can customize the ScanView and the appearance of the A-scan. To do this, touch the  button. As a result, the window shown in Figure 4.15 opens, where you can make the following settings:

- path to save the result;
- color of the A-scan, 1st and 2nd gates;
- A-scan length (in percent);
- enable/disable gap measurement (gap measurement is available when operating with EM4000 EMAT).

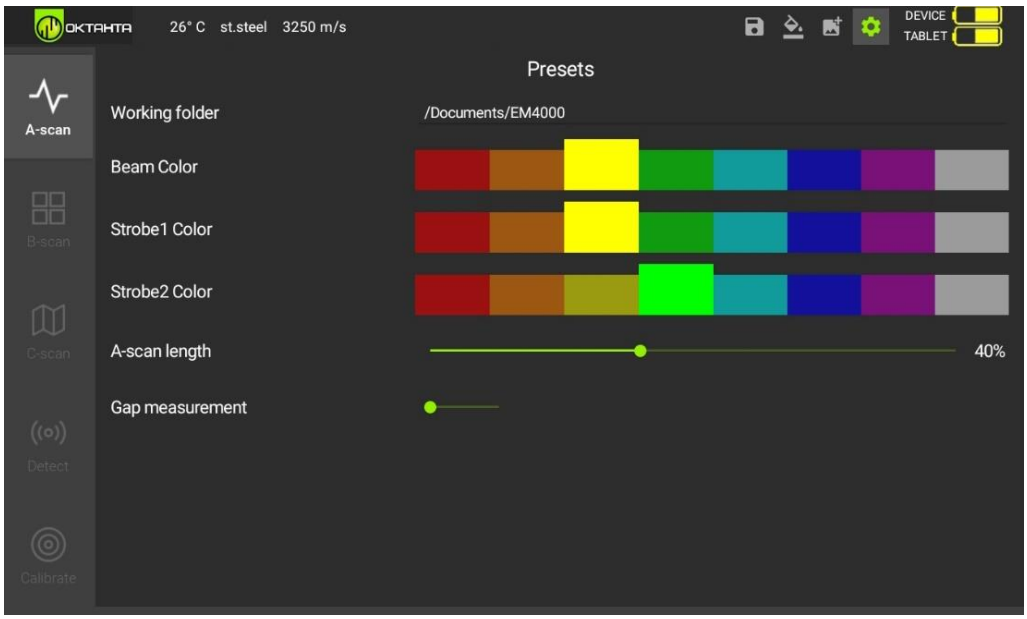


Figure 4.15 – Setting up the ScanViewand the appearance of the A-scan

To close the settings window, touch the  button again.

4.2.6 Results Saving

You can save the A-scan and thickness window as an image and as a data text file at any time of operation. To save the data, touch the Save button (see Figure 4.16).

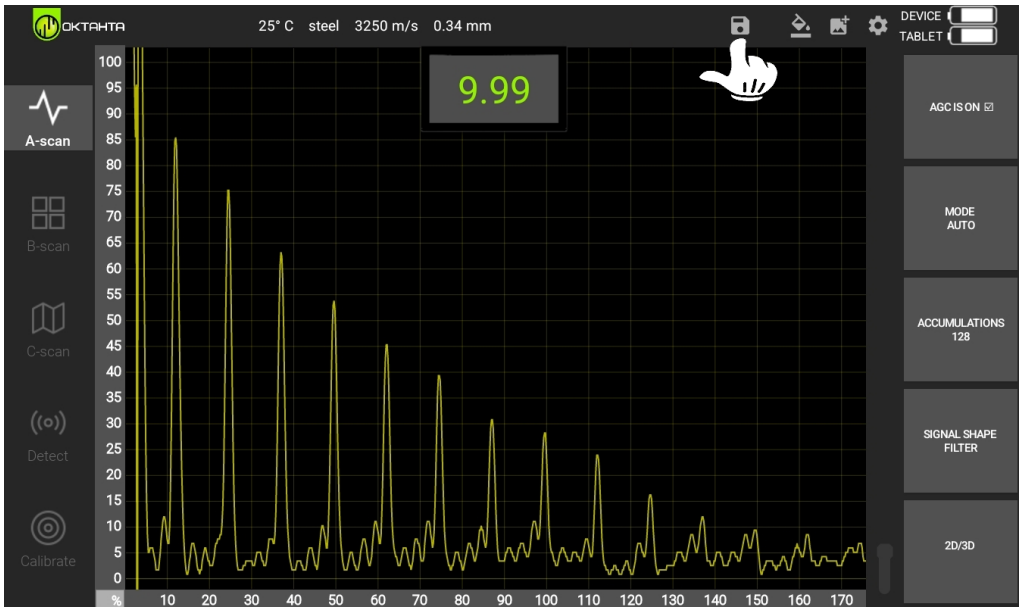


Figure 4.16 – Data saving

As a result, the window shown in Figure 4.17 opens, where you should enter the name and format of the file to be saved (text file “*.csv”, image “*.png” or both options). To select the file format, check the appropriate box.

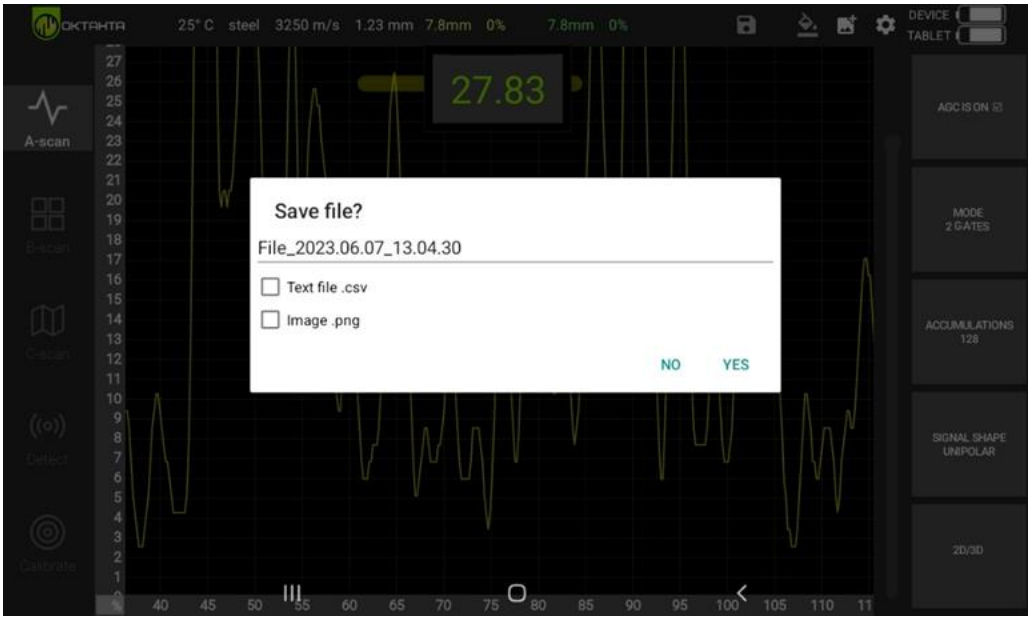


Figure 4.17 – Data saving

The files will be saved in the “Documents/EM4000” or “Documents/ScanView” folder (depending on the ScanView version). The working folder can be changed in the ScanView settings (p. 4.2.5).

4.2.7 Camera Mode

You can switch to camera mode at any time of operation. To do this, touch the  button (see Figure 4.18).

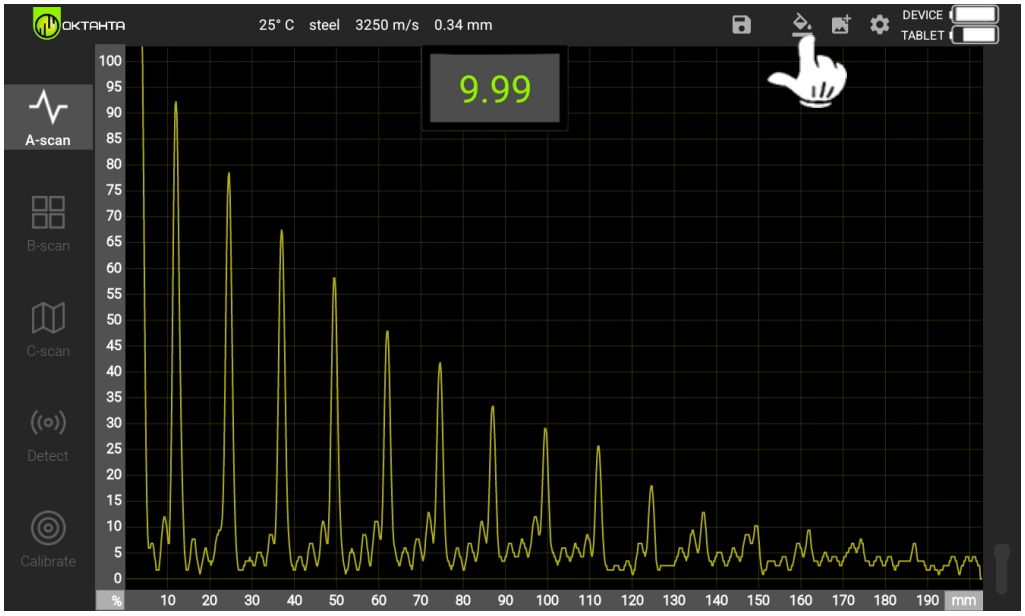


Figure 4.18 – Switch to the camera mode

As a result, the window shown in Figure 4.19 opens. To photograph the test object, touch the  button. As a result, the “Change photo name” window opens, where you can enter the name of the photo (if necessary). Touch the  button to save the photo in the “Documents/EM4000” or “Documents/ScanView” folder (depending on the ScanView version). The working folder can be changed in the ScanView settings (p. 4.2.5)..

To exit the camera mode, touch the  button again.

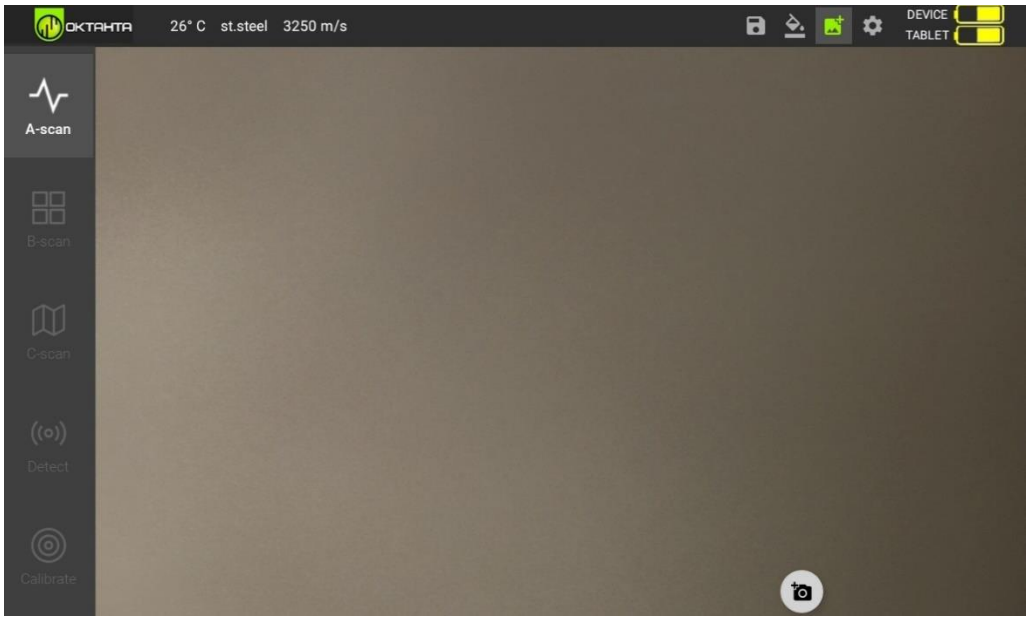


Figure 4.19 – Camera mode

4.2.8 Temperature, Metal and Speed of Sound windows

By touching the Temperature window at the screen top, you can enter the temperature value (see Figure 4.20).

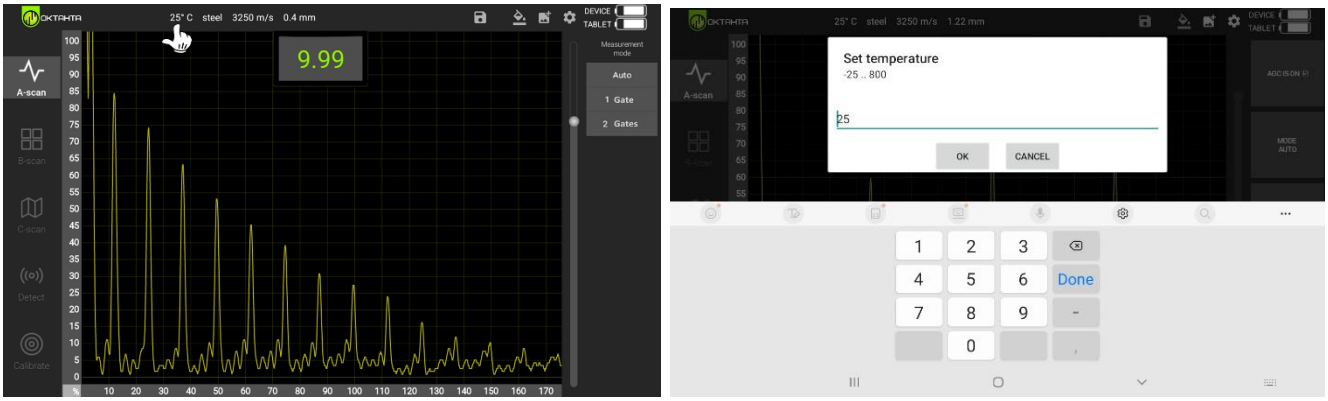


Figure 4.20 – Temperature setting

By touching the Metal window at the tablet screen top, you can select the metal type in the drop-down list (see Figure 4.21).

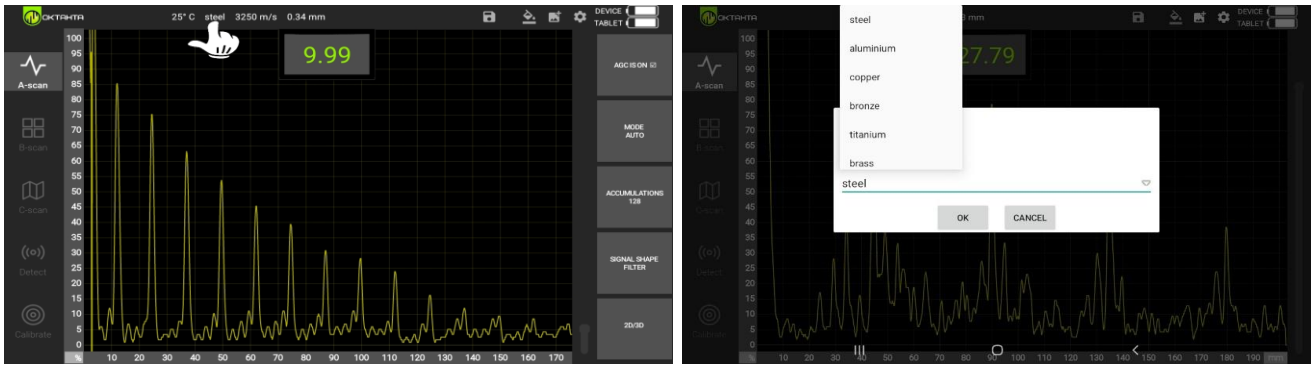


Figure 4.21 – Metal selection

To change the Speed of Sound, you should touch the respective window and enter the desired value of the speed of sound in the window that opens (see Figure 4.22).

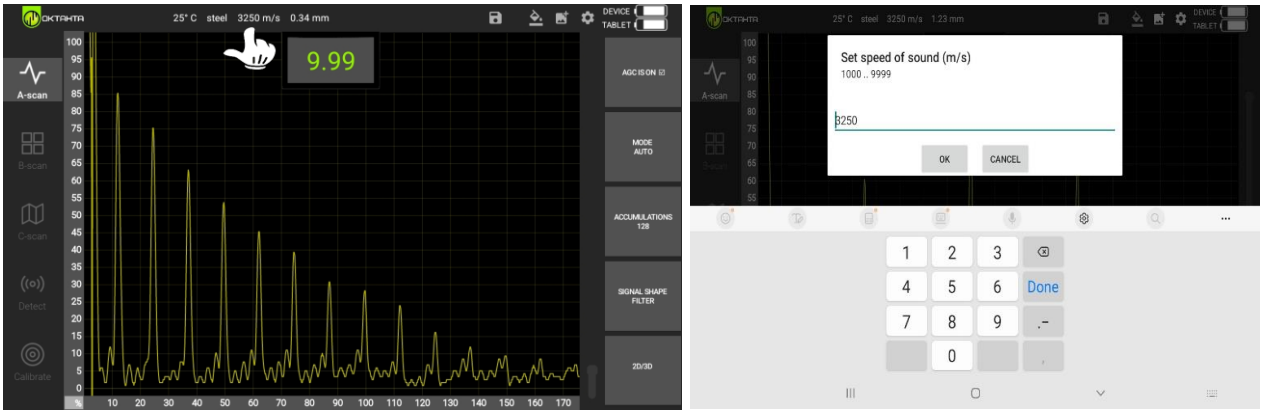


Figure 4.22 – Speed of Sound window operation

4.3 “B-Scan” Window

The B-scan window appearance is shown in Figure 4.23.

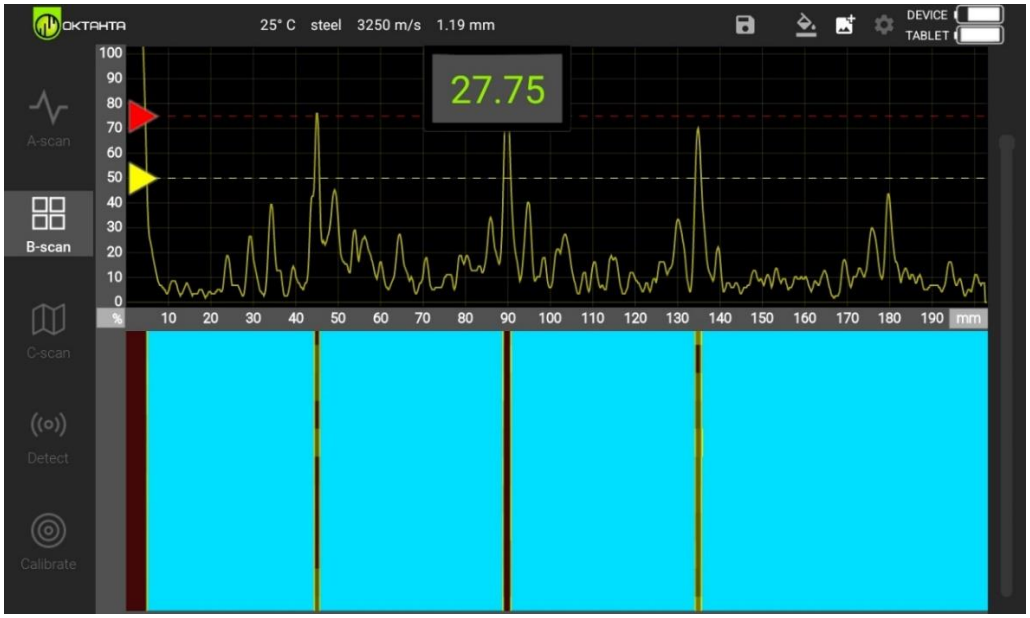


Figure 4.23 – B-scan window appearance

At the top of this window, the A-scan with two thresholds (blue and red) is displayed. At the bottom, the B-scan is displayed. All A-scan points which values are lower than the blue threshold position are displayed on the B-scan in light-blue. All A-scan points which values are higher than the red threshold position are displayed on the B-scan in black. All A-scan points which values are between two thresholds are displayed with gradient. You can change the thresholds position, zoom in or out, speed up or slow down filling of the B-scan, select appearance (view) of the B-scan window as well as select the B-scan filling mode between the continuous and single-time.

For zooming, touch the screen with two fingers and pinch out the image (see Figure 4.24).

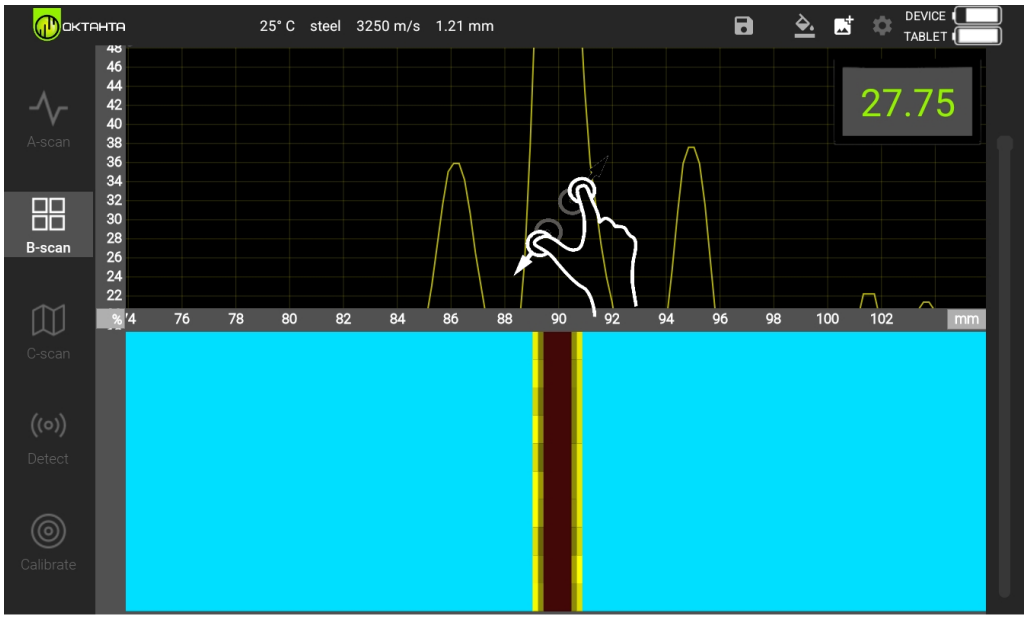


Figure 4.24 – B-scan zooming mode

You can set the parameters of the B-scan using the settings menu. To open the menu, touch and hold the right active part of the tablet screen to the left, thereby pushing out the settings menu (see Figure 4.25).

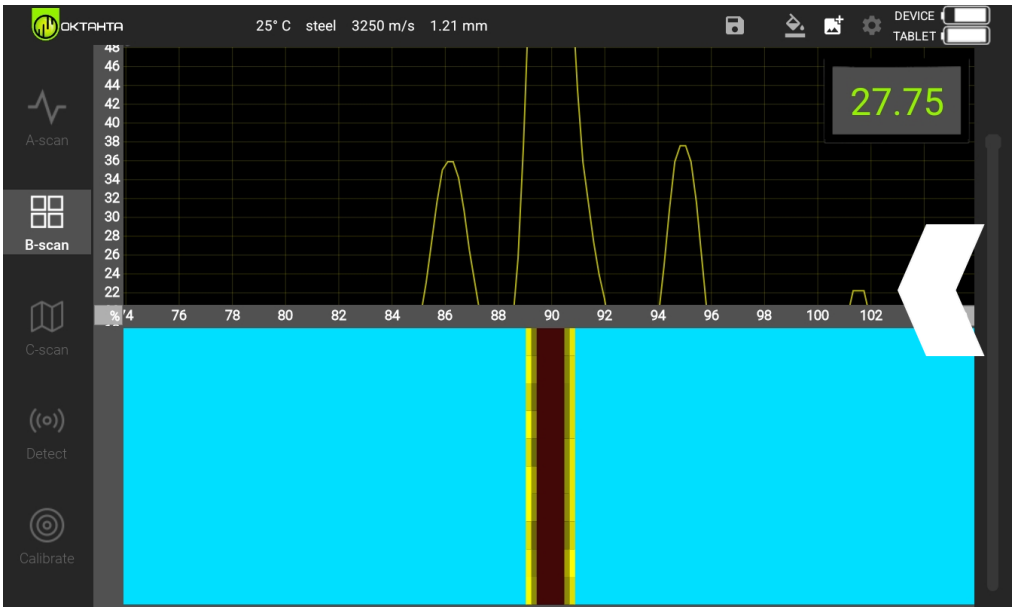


Figure 4.25 – Open of B-scan settings menu

Figure 4.26 shows the context menu as bookmarks: Continuously/Deceleration/Color Scheme.

Figure 4.26 – B-scan settings menu appearance

In the Continuously bookmark, you can select one of two options: the stand-by mode (un-check Continuously) and the continuous mode. If you select the stand-by mode, the B-scan will not be updated. If you select the continuous mode of B-scan filling (check Continuously), the B-scan will be filled and updated continuously.

The Deceleration bookmark enables changing the screen filling time. To select the B-scan filling time, select value from 1 (quick filling) to 5 (slow filling).

The Color Scheme bookmark shall be used to select a color for displaying the B-scan filled.

4.4 “C-Scan” Window

The ScanView can save data as the C-scan. The C-scan window is shown in Figure 4.27.

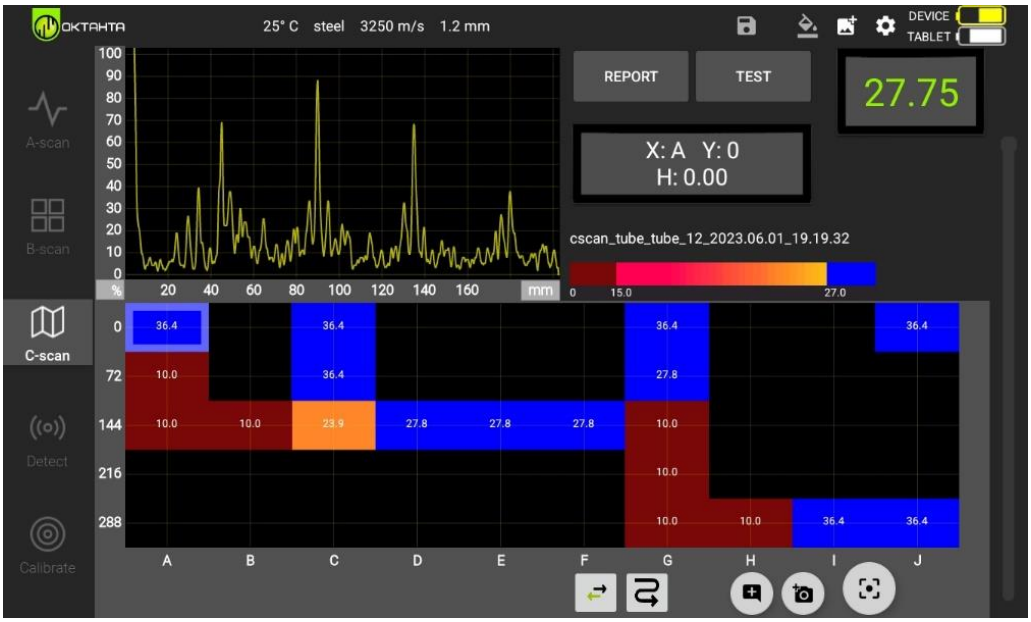


Figure 4.27 – C-scan window

This window consists of the following:

- A-scan window;
- C-scan window;
- Service information window:
    - Report is used to create a report file (Word or PDF);
    - Test is used for inspection operations;
    - Actual thickness measurement data window;
    - Window with X-axis and Y-axis coordinates, thickness measurement data for a specified point. The current position is highlighted with a gray rectangular cursor on the C-scan. Prior to the inspection start, this cursor is at the point with coordinate (0.0);

- Color bar with the specified minimum and nominal thicknesses, the color enables visual assessment of the permissible measurement limits for any object selected.

- The active  button enables you to select measurement direction along X-axis and Y-axis;

- The active  and  buttons enable you to select measurement direction along Y-axis;

- The  button enables you to add any comment for the selected point;

- The  button enables you to add any photo for the selected point;

- The  button enables you to save the current readings of the Device in the C-scan area.

4.4.1 Settings

When you touch  , the Settings window opens. The window appearance is shown in Figure 4.28, Figure 4.29.

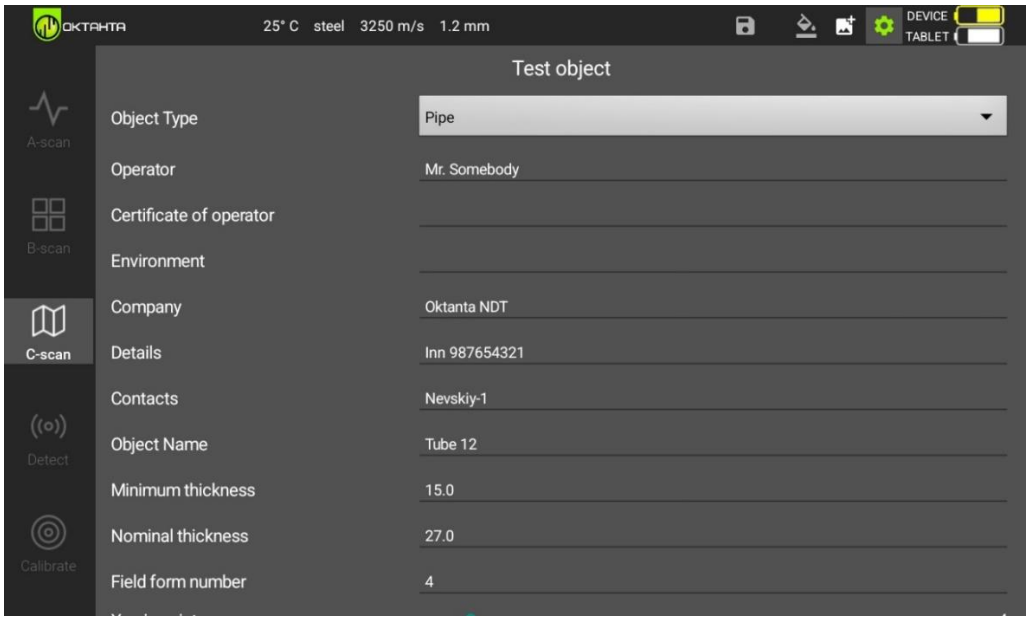


Figure 4.28 – Settings

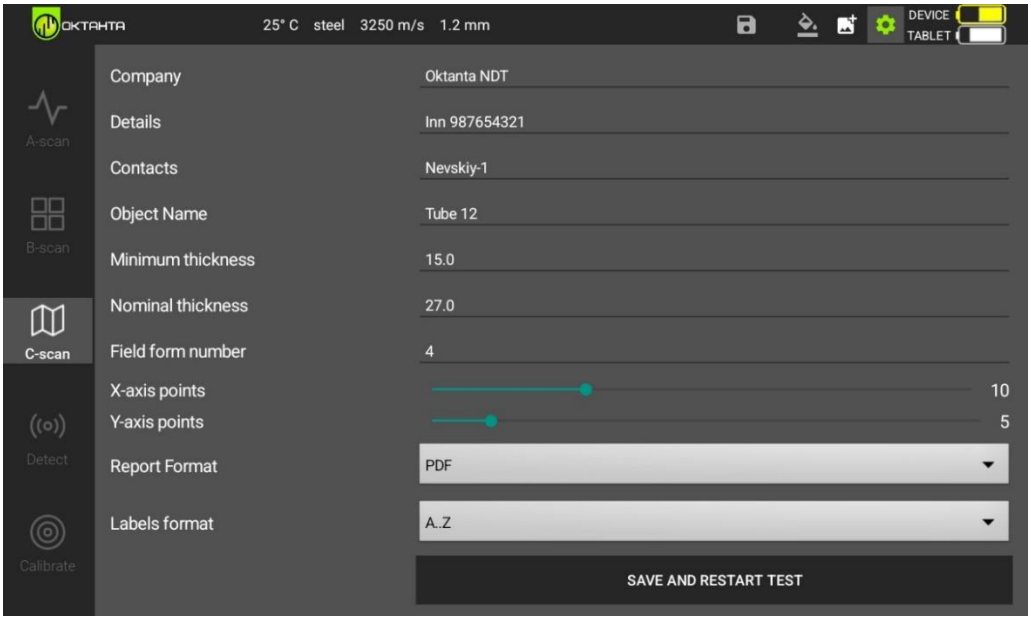


Figure 4.29 – Settings

In this window, you can:

4.4.1.1 Set the object type: Pipe or Matrix:

- for the pipe-type object, set the necessary number of the measured points in one ring as well as number of rings along the pipe;

- for the matrix-type object, set the number of the measured points in horizontal plane and the same in the vertical plane.

4.4.1.2 Set the operator’s name.

4.4.1.3 Set the Company name, details and contacts.

4.4.1.4 Set the test object name.

4.4.1.5 Set the nominal and minimum thicknesses of the test object. The operator should enter the nominal thickness of the test object and the minimum permissible thickness of the test object. In the course of the C-scan filling, all points with thicknesses less than the minimum permissible thickness will be displayed in dark-red. Such points are visible very well on the background. The points with thicknesses larger that the nominal thickness will be displayed in blue. The points with thicknesses between the minimum and nominal values are displayed on the C-scan with gradient.

4.4.1.6 Set the field form number.

4.4.1.7 Set the number of X-axis and Y-axis points (C-scan).

4.4.1.8 Set the format of the future report (Word or PDF).

4.4.1.9 Select the axes labels option.

4.4.2 Test

Figure 4.30 shows the drop-down bookmark appearance.

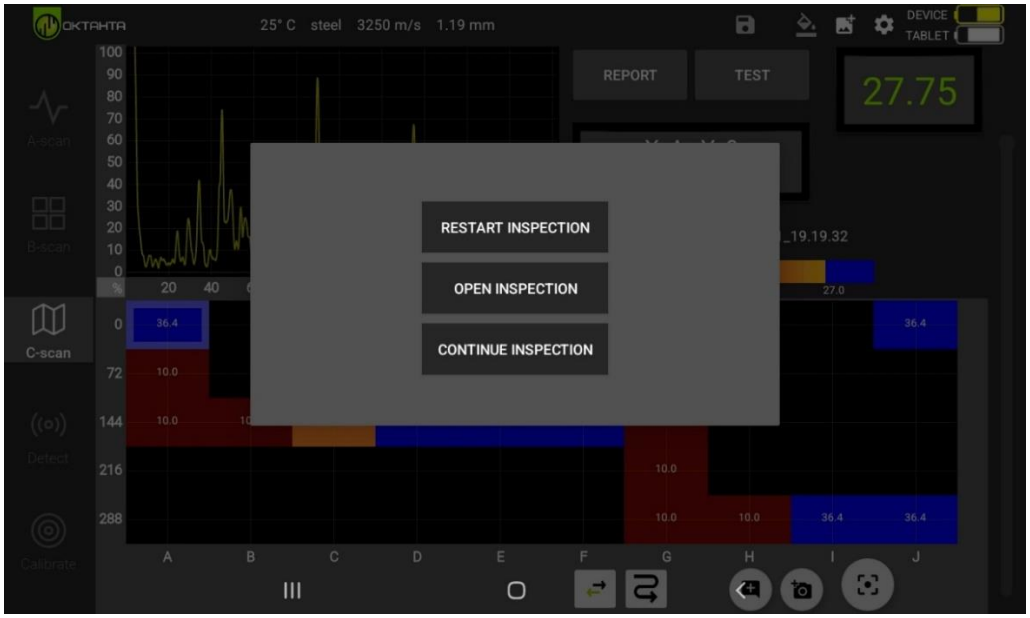


Figure 4.30 – Test

- Restart Inspection: this menu item becomes active when the user has started the inspection earlier and has terminated it by switching to the other windows of the ScanView. When this item is selected, the Device returns to the previously started inspection. The thickness measurement mode is set by default and is designed for measuring thickness of the test object.

- Open Inspection: this item enables you to open the previously saved inspection results. If necessary, the user can repeat measurements for any point in the previously saved archive.

- Continue Inspection: this menu item becomes active when the user has started the inspection earlier and has terminated it by switching to the other windows of the ScanView. When this item is selected, the Device returns to the previously started inspection.

4.4.3 C-Scan Start

Upon entering all parameters, select the Start Inspection item in the Test window to start the C-scan filling.

To fill the C-scan, install the Device transducer in the required point and touch the  button; the cursor coordinate increases by one increment and the procedure repeats.

This window (Figure 4.31) shows the A-scan, C-scan, current coordinate, value of the measured thickness at the point with current coordinates as well as the minimum thickness which was detected during the whole time of C-scan filling.

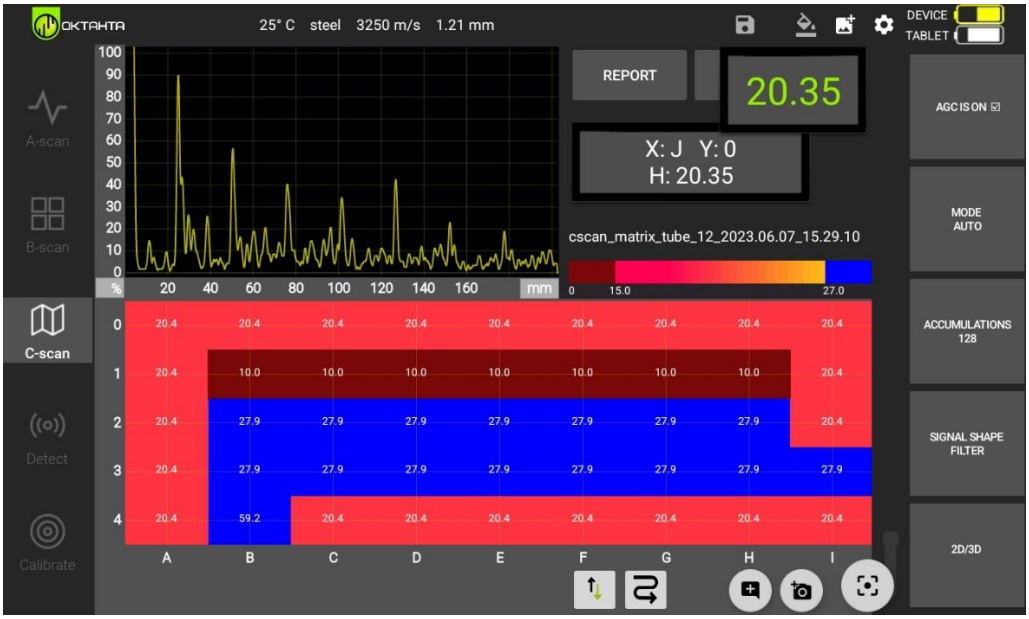


Figure 4.31 – C-scan filling mode

4.4.4 2D/3D Mode

For the matrix-type object, the 3D mode enables visualization of the thickness measurements performed (see Figure 4.32).

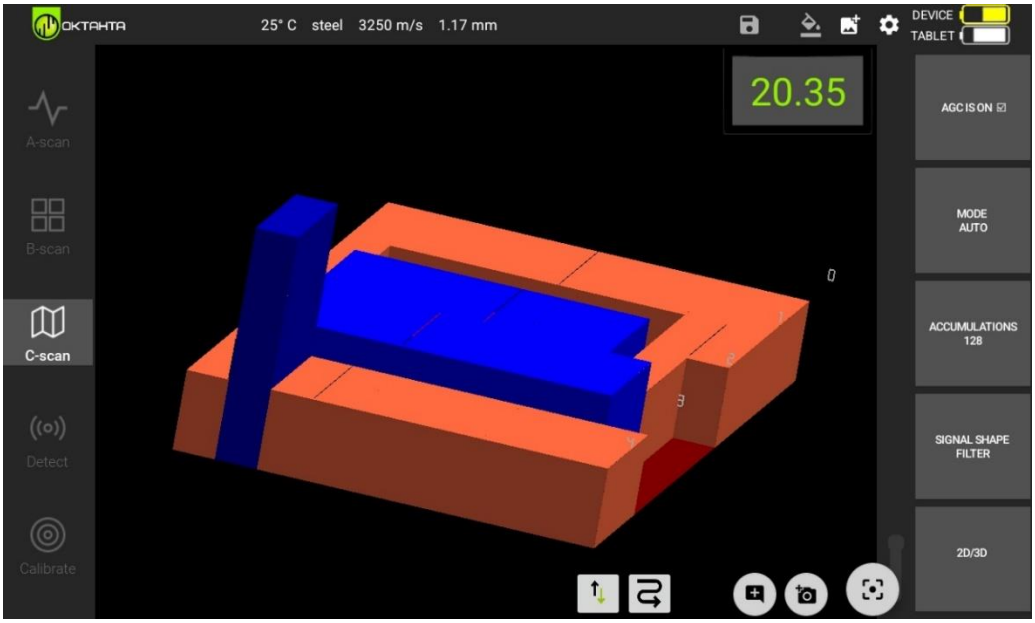


Figure 4.32 – 3D mode

When you change over from the 2D mode to the 3D mode for the pipe-type object, you can obtain the pipe model with the areas where measurements have been performed and see the areas with deviation from normal values (see Figure 4.33).

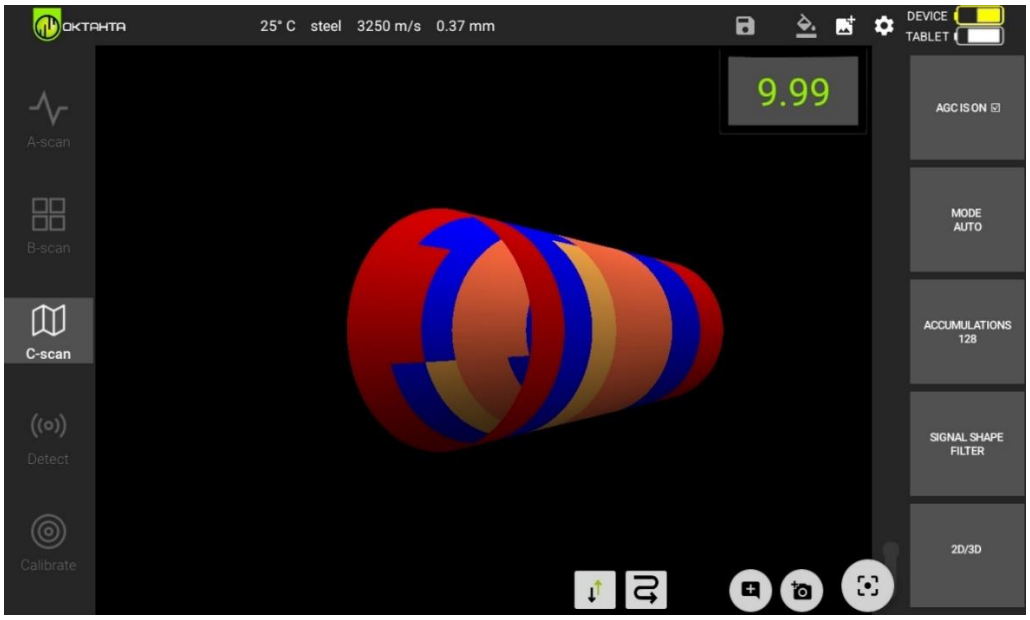


Figure 4.33 – 3D mode

4.5 Flaw Detector Mode

You can use the Device as a flaw detector to search for pitting corrosion.

The ScanView appearance in the flaw detector mode is shown in Figure 4.34.

Figure 4.34 – Flaw detector mode

In this mode, the ScanView screen is divided into two windows located one below the other:

- the top window includes images of the A-scan and two gates;
- the bottom window displays the P-parameter.

The pitting corrosion test is performed on the test object with fixed thickness. The first gate shall be located so that it captures the first bottom signal. The second gate shall be located between the first and the second bottom signals so that it does not overlap them.

The P-parameter is the ratio of the amplitude of maximum in gate 2 to the amplitude of maximum in gate 1. Without defects, this ration is close to “0” as there are no echoes between bottom signals. With the pitting corrosion defects, the amplitude of the first bottom signal drops and, at the same time, weak signals appear between the bottom signals due to reflection from the defect. In this case, the value of the P-parameter increases.

In the lower window. there are two thresholds that can be set by the user (red and yellow triangle). Exceeding the threshold due to the defect presence is accompanied by a sound signal.

The sound signals for two thresholds can be set in the ScanView settings (the  button).

4.6 Calibration Mode

The ScanView appearance in the calibration mode is shown in Figure 4.35.

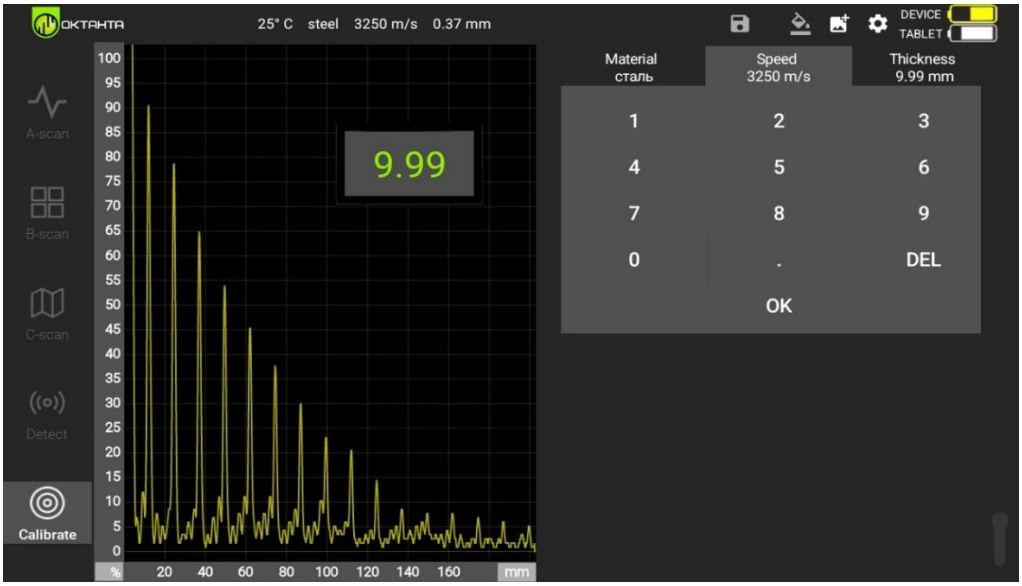


Figure 4.35 – Calibration mode

The ScanView has three calibration modes:

- Test object material selection from the list;
- Calibration with entering known thickness of the test object;
- Calibration with entering speed of sound.

4.6.1 Material Selection from List

To select the test object material from the list, touch the Material header (see Figure 4.35). As a result, the window shown in Figure 4.36 opens, where you can select the material from the list

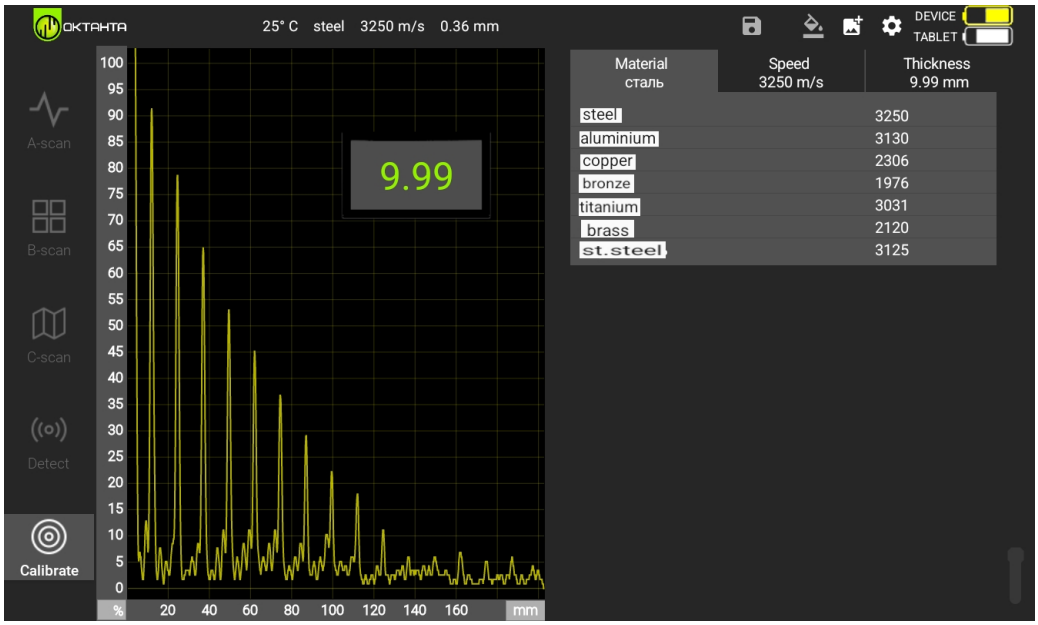


Figure 4.36 – Test object material selection

4.6.2 Calibration with Entering Known Thickness of Test Object

To calibrate the speed of sound according to the known thickness of the test object, install the Device on the test sample with the known thickness. Then, touch the Thickness header in the window shown in Figure 4.35. As a result, the window shown in Figure 4.37 opens.

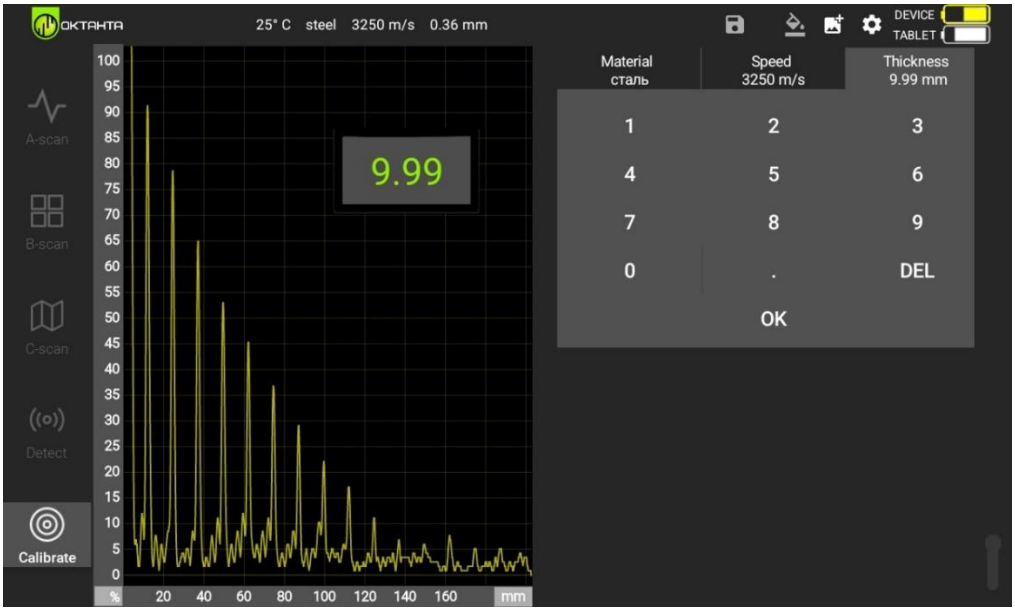


Figure 4.37 – Calibration with entering known thickness of test object

In this window, use the on-screen numeric keypad to enter the known thickness of the test object and touch the OK button. Then, the ScanView calculates the speed of sound in the material and write it into the Device memory.

4.6.3 Calibration with Entering Speed of Sound

To calibrate the Device according to the known speed of sound, touch the Speed header in the window shown in Figure 4.35. As a result, the window shown in Figure 4.38 opens.

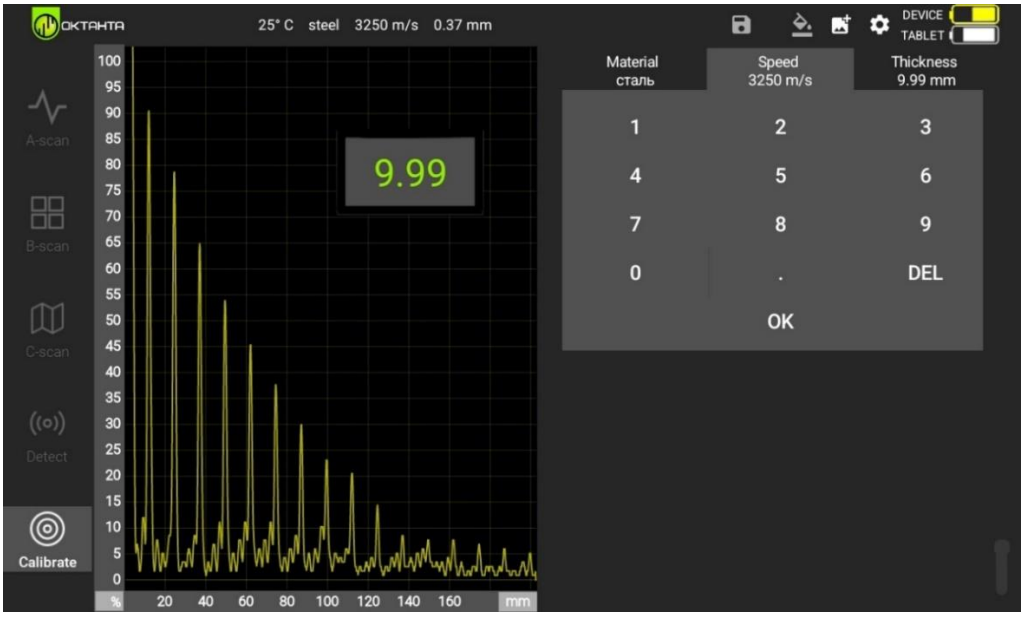


Figure 4.38 – Calibration with entering speed of sound

In this window, use the on-screen numeric keypad to enter the known speed of sound for the test object material and touch the OK button. The ScanView writes the obtained value into the Device memory.

WARNING!

The Device uses a transverse wave, not a longitudinal one. The average speed of the transverse wave propagation in steel is 3250 m/s.