



USER'S MANUAL

Acquire 1.2 / M2M Panther/Pocket

Table des matières

PART 1: Introduction.....	7
PART 2: General information	8
1. Start-up.....	8
2. Acquire Home page tabs	10
2.1. “About this version...” tab	10
2.2. “Application” tab: supervisor/operator accounts	10
2.2.1 First launch of Acquire	10
2.2.2 Supervisor mode.....	11
2.2.3 Operator mode	15
2.2.4 Removal of all accounts	15
2.3. Topology	16
2.4. “Hardware” tab	17
2.4.1 Information and hardware tests tab.....	17
2.4.2 Options tab	18
2.5. “Options” tab.....	20
2.5.1 Files and Folder.....	20
2.5.2 Keyboard shortcuts.....	21
2.5.3 Look and feel.....	23
2.5.4 Data export	25
3. "Home", "Main toolbox" and "Exit" icons	26
3. Click on the gain button.....	29
4. Change the gain	29
1. Activate the pause mode	29
2. Click on the main toolbar.....	29
4. Backup files.....	30
4.1. Backup of a project.....	30
4.2. Backup options	31
4.3. Local backup	33
5. Inspection steps.....	34
PART 3: Configuration.....	35
PART 4: Parameters	36
1. UT setting.....	37

1.1.	Multi-Salvoes setting	37
1.1.1	Multi-Salvoes setting creation	37
1.1.2	Configuration panel	41
1.1.3	Independent parameters	41
1.1.4	Data Source.....	44
1.1.5	Acquisition parameters.....	46
2.	Display	47
2.1.	Data source.....	47
2.2.	Available graphics	50
2.3.	Selection and positioning of graphics	54
2.4.	Axes units.....	55
2.5.	Cursors.....	56
2.6.	Zoom and pan.....	60
2.7.	Graphic tools.....	61
2.7.1	Pop-up menu (right click).....	61
2.7.2	Graphic view toolbar	63
2.7.3	Export to text	69
2.7.4	Cursor parameters	73
2.7.5	Zoom, pan and reset parameters	74
2.8.	Full screen views.....	75
2.9.	Color scale	76
3.	High speed modes (Panther only)	79
1.1	Full parallel mode	81
1.2	Mixed mode.....	81
1.3	Set mixed mode and display parallel level.....	82
4.	General parameters.....	84
4.1.	Transmission.....	85
4.2.	Digitizing	86
4.3.	Display rectified signal	87
4.4.	Gains	88
4.5.	Local backup	88
5.	Detailed parameters	89
5.1.	Description of detailed parameters.....	90
5.1.1	Transmission part	90

5.1.2	Reception parameters	92
5.2.	Selection and modification of detailed parameters:	93
6.	Units.....	95
7.	Encoders	97
7.1.	Information about encoders.....	98
7.2.	Scanner/Robot definition	98
7.3.	Local backup & reload	102
8.	Gates.....	103
8.1.	Add/remove gates:	103
8.2.	Gates identity	104
8.3.	Gates acquisition/storage.....	105
8.4.	Ascan gate position, width, height and customized options	108
8.5.	Gate detection and synchronization options	113
8.6.	Local backup & reload	118
9.	TCG	119
9.1.	Analog DAC	119
9.1.1	TCG parameters	119
9.1.2	Synchronized TCG	122
9.1.3	Edit DAC parameters.....	124
9.1.4	Local backup & reload.....	126
9.2.	Digital TCG	126
9.2.1	Manual digital TCG.....	126
	Gate TCG	129
10.	Filters.....	130
1.1.	Attenuators.....	130
1.2.	FIR/IIR Filters.....	131
1.2.1	Band-Pass filter	131
1.2.2	Saving/loading of filter parameters	131
1.3.	N shots average	132
1.4.	Decimation Filters.....	132
11.	Trajectories.....	133
1.5.	Definition of trajectories	133
1.6.	Inspection cartography.....	136
12.	Alarms	143

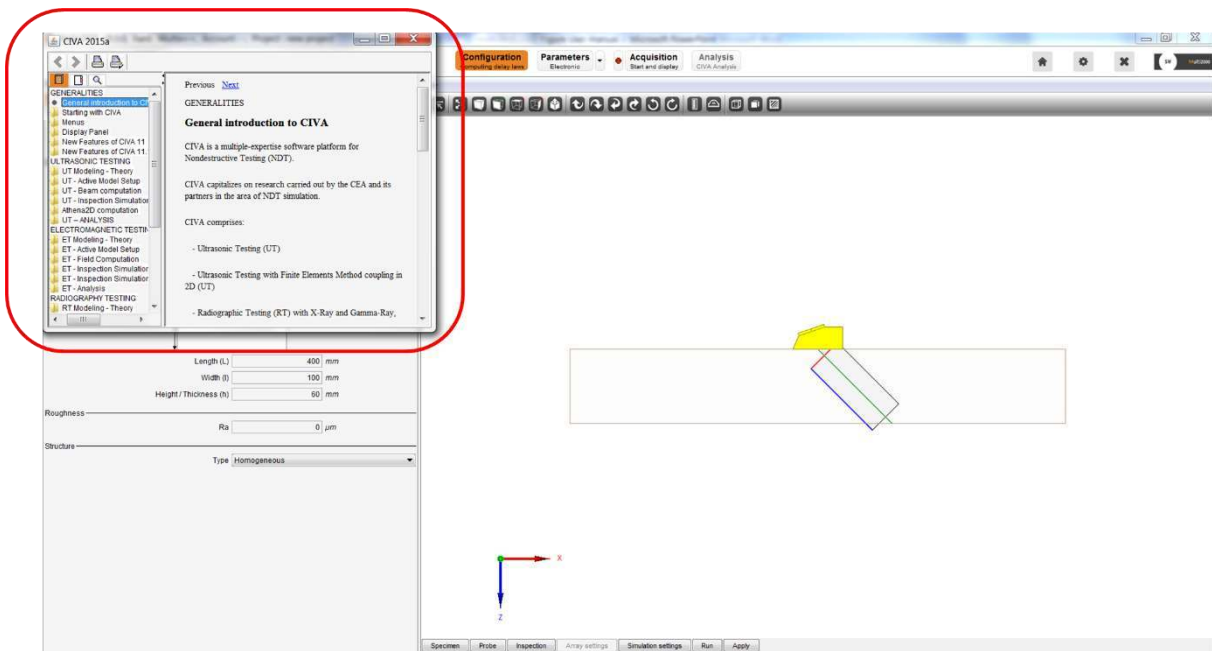
PART 5: Acquisition	145
1. Acquisition information	145
1. Display	147
1.1. Data source	147
1.2. Available Views	153
1.3. Selection and positioning of graphics	159
1.4. New screen	161
1.5. Units of axis	162
1.6. Cursors	162
1.7. Zoom and pan	165
1.8. Graphic tools	166
1.8.1 Popup menu (right click)	166
1.8.2 Graphic view toolbar	169
1.8.3 Export to text	179
1.8.4 Cursor parameters	179
1.8.5 Zoom, pan and reset parameters	180
1.9. Full screen display	181
1.10. Color scale	182
1.11. Robot position	186
2. Acquisition	187
3. Automatic report	188
3.1. HTML report with data analysis	188
3.1.1 Access	188
3.1.2 Inspection identity	190
3.1.3 Preferences: Automatic options	191
3.1.4 Conditions of discard	191
3.1.5 Options of report display	192
3.1.6 Launch of analysis and edition of HTML report	193
3.2. PDF report	195
3.2.1 Access	196
3.2.2 Selection of views to display in the report	198
3.2.3 Selection of template	198
3.2.4 Inspection identity	199
3.2.5 Definition of the parameters to be displayed in the report	200

3.2.6	Definition of the acquisition zone to display in the report.....	201
3.2.7	Report Edition.....	202
PART 6:	Remote Control	206
APPENDIX 1:	Acquire GLOSSARY and DATA ARCHITECTURE	207

PART 1: INTRODUCTION

This manual refers to “Acquire” software version 1.0.

Concerning the “Configuration” panel which refers to “CIVA” software version 2019, please see the CIVA’s help available by pressing the F1 key.



PART 2: GENERAL INFORMATION

1. Start-up

The user starts the application by double-clicking on Acquire icon.

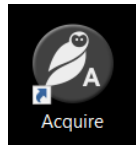


Figure 1: Acquire icon

The application starts and the following window appears:

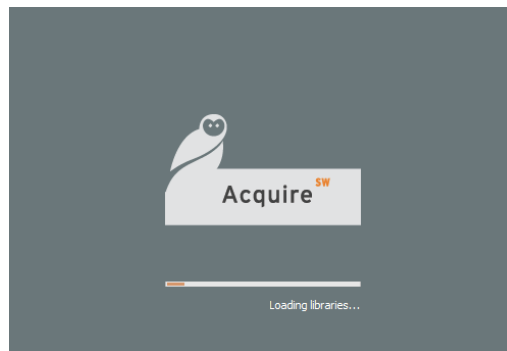


Figure 2: Acquire launching window

Acquire software can work in 2 modes: a supervisor mode (defining specific interfaces of each operator) and an operator mode.

Both can be accessed through personal accounts protected by login and password (cf. § 2.2). At the first launch of the application, you must enter the supervisor login and password.

In most of the time, no password is used. Just press "Enter" to login.

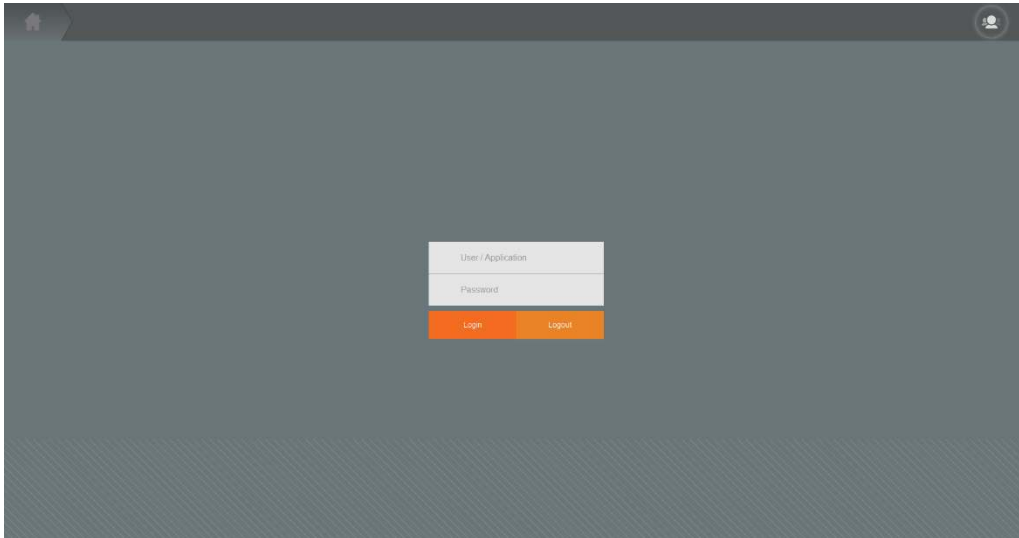


Figure 3:Acquire login window

After login, **Acquire Home page** window gives access to saved data file (cf. § 0), to different inspection steps (cf. § 5) and to "Home", "configuration", "Parameters", "Acquisition", "Accounts", "Load", "Save", "Main Tools" and "General Settings" icons (cf. § 3). These icons are accessible from all Acquire panels.

These panels are described in §2.

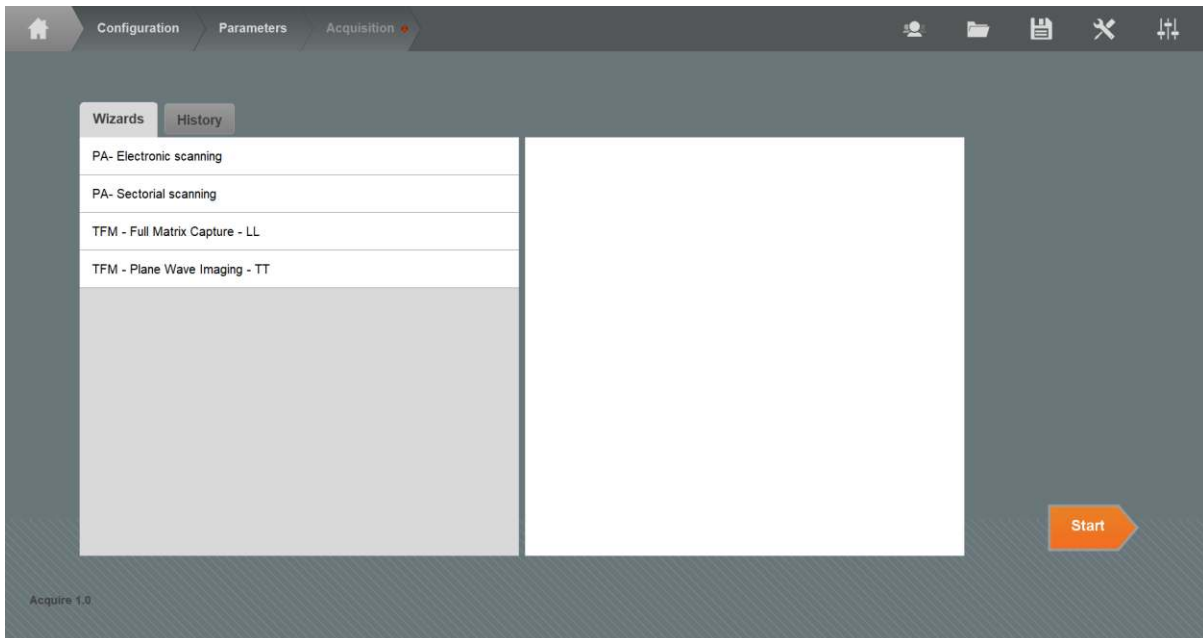


Figure 4:Acquire Home page

2. Acquire Home page tabs

2.1. “About this version...” tab

“About this version...” tab displays information about the installed Acquire software version.

2.2. “Application” tab: supervisor/operator accounts

Two user modes are available on the Acquire software: the supervisor and the operator modes. The supervisor can administrate the software. He can use all options of the software. He can create and manage operators’ accounts. These operators’ accounts are usually restricted in term of functionality to a given part of the user interface and related applications.

The supervisor can interactively create and modify the operator screen by suppressing tabs, panels or icons, he can increase (or decrease) the size of given areas of the software interface.

Operators and supervisors have access to their specific, restricted (or not) functionalities using their own account. The “**Application**” tab allows managing supervisor’s and operator’s accounts of Acquire. Only the supervisor can change operators’ names or their passwords.

2.2.1 First launch of Acquire

When first launching Acquire, no account is defined, only a supervisor account can be set using the following dialog box:

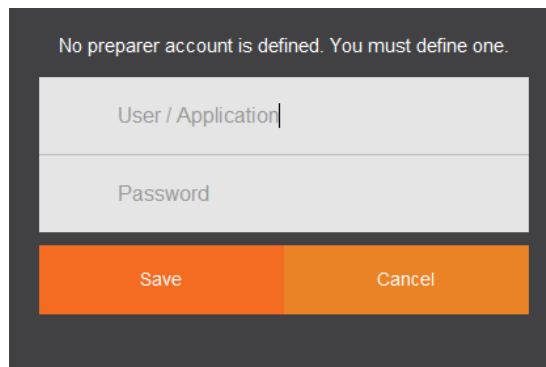


Figure 5:Supervisor account login window

Neither supervisor name nor password is required here, but from this dialog box, the user will get access to the full supervisor rights, including the management of operators’ accounts.

2.2.2 Supervisor mode

If login and password are associated to a supervisor account, Acquire allows access to all functionalities of the software, including the operator account creation that can be performed from the application tab, located in the **Home Page**.

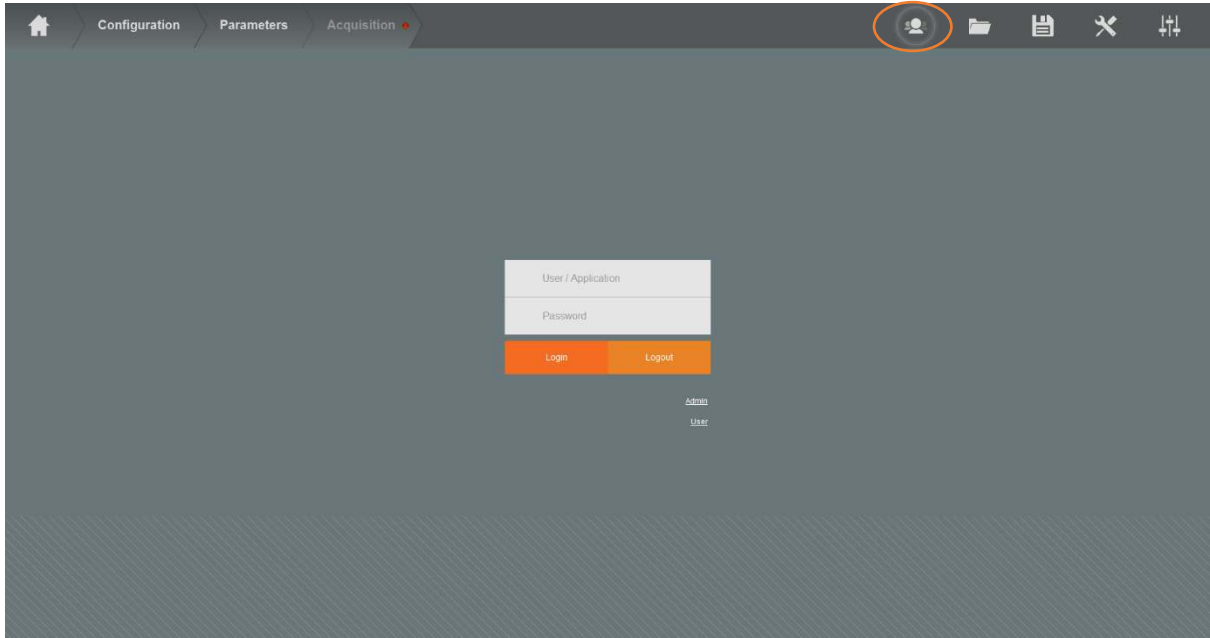


Figure 6: Supervisor management window

- **Supervisor options**

Modification of the name and password of the supervisor account

The supervisor can modify his own profile (name and password) by using the « Modify preparer account » icon.

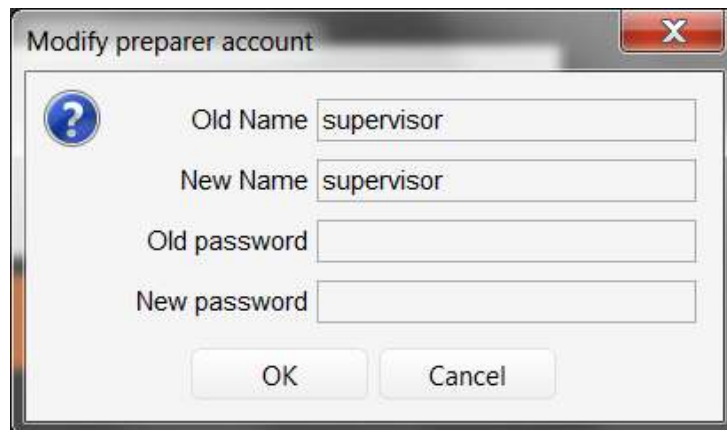


Figure 8: Supervisor account modification

- Name and password retrieval of the supervisor account

The name and password of a supervisor are stored in an encrypted file named « users.xml » located in the C:\Acquire\desk\account directory. When losing this information, a supervisor can send this file to the Acquire support team who will retrieve the lost data.

- **Operator account management**

The operators' accounts can be managed from the "Operator account table" which is available by clicking on "Operators" in the supervisor management window.

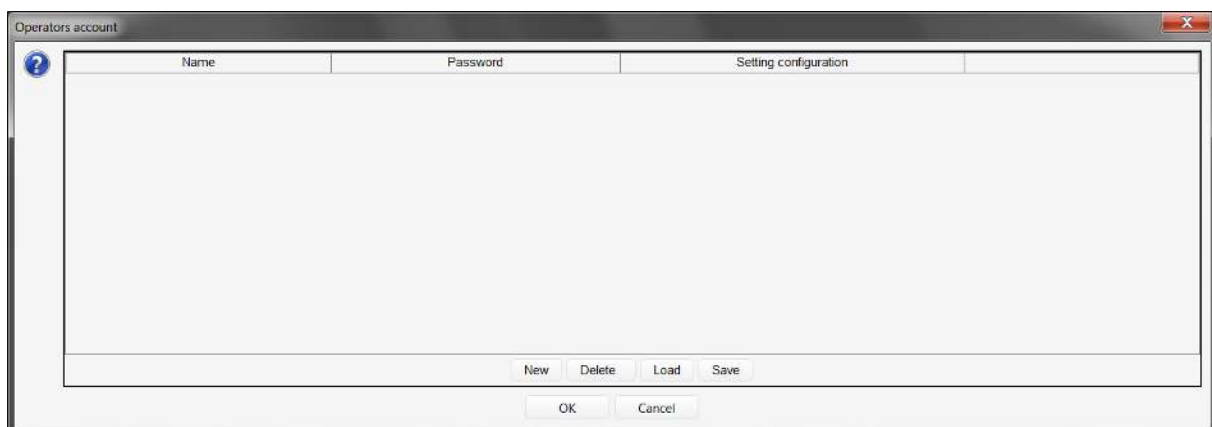


Figure 9: Operator account table

- The **'New'** icon allows the creation of a new operator in the list.
- The **'Delete'** icon deletes a selected operator in the list.
- The **'Load'** icon loads customized screens associated to an operator account.
- The **'Save'** icon allows to save the customized operator screens.

- Operator management

Once a supervisor has modified the interface, he can associate it to a given operator in the operator account table by creating a new operator account.

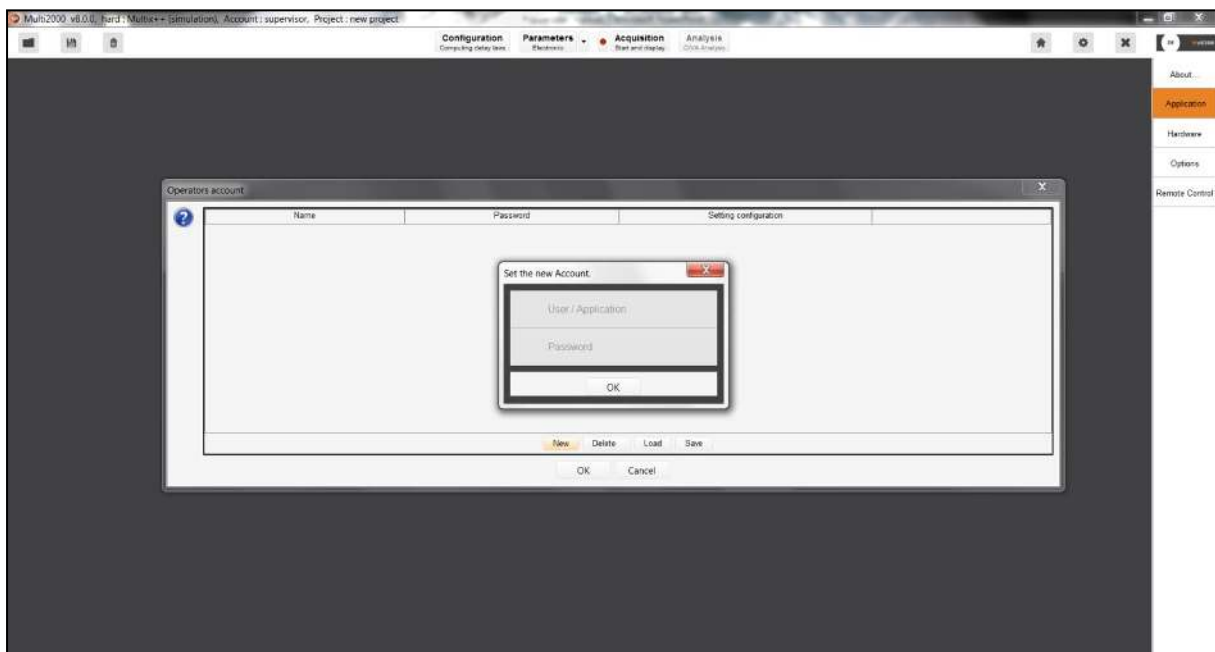


Figure 10: Operator account creation

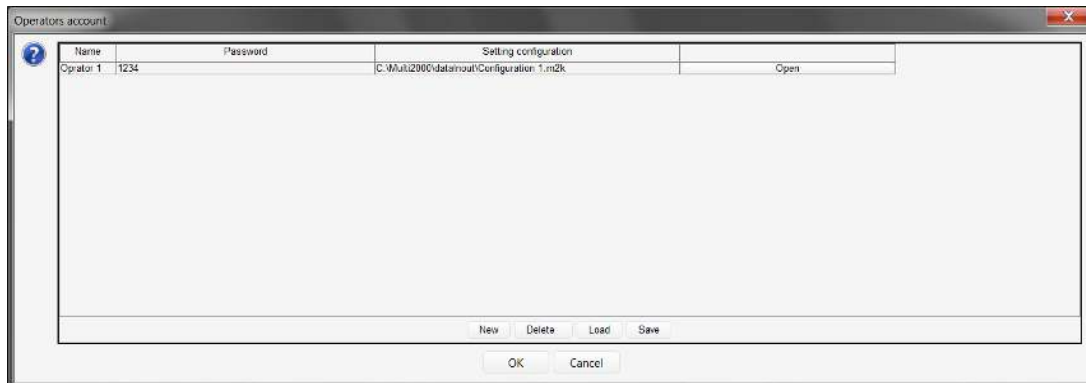


Figure 11: Operator account table

Once an operator account has been created, both corresponding login and password are displayed in the Operator account table (see example below for “operator 1”).

If the « operator1 » has already an account, the supervisor can just click on the account and then ‘save’. The customized GUI will then automatically be associated to him.

- Assignment of a configuration to an operator account

The supervisor can assign a « configuration » to an operator. Doing this, when opening the application, this configuration will be automatically loaded. It is done by using the “open” icon in the operator account window. Next figure shows the association of the configuration “Configuration1.m2k” to operator1.

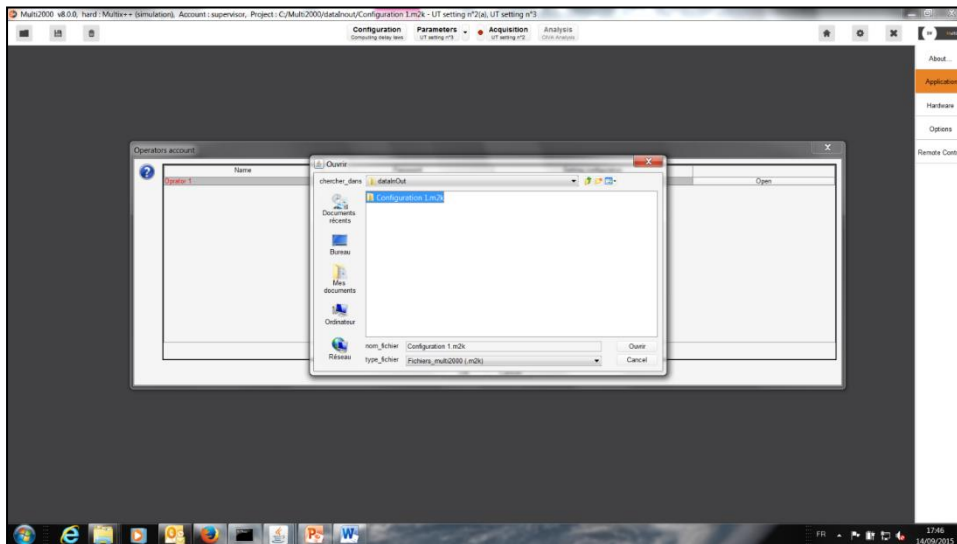


Figure 12: Assign a configuration to an operator account

This dialog box allows the selection of a file (.m2k), in this example « configuration1.m2k ». This file name is then listed in the account operator list.

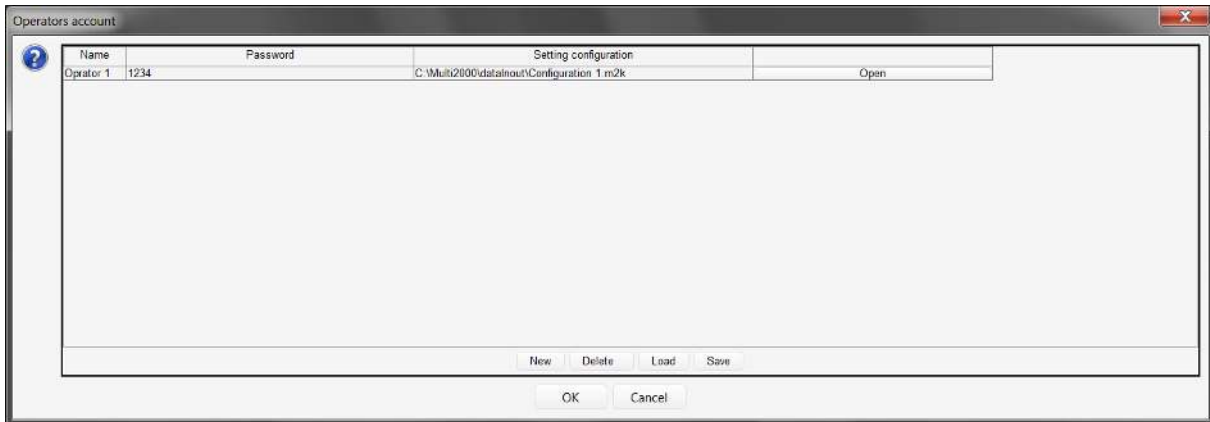


Figure 13: Operator account table after assignment of “Configuration 1” to “Operator1” account

- Changing an operator’s name and/or password

The supervisor can modify an operator’s name and/or his password in the operator account list table by double-clicking on the operator’s name or on the operator’s password.

2.2.3 Operator mode

In this mode, the user will only have access to the GUI and/or the configuration associated to his profile by the supervisor.

2.2.4 Removal of all accounts

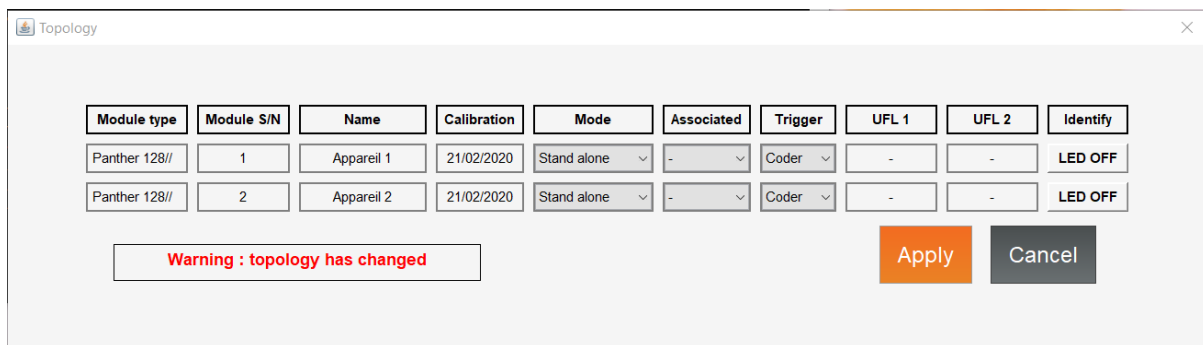
The removal of all accounts (both supervisor and operators) can be performed by deleting the users.xml file located in C:\Acquire\desk\account, as well as the sub directories located in C:\Acquire\desk\users. The next time Acquire is launched the new supervisor will be asked for a new login and a new password.

2.3. Topology

When starting the software and connect some new hardware, topology configuration menu appears.

This menu enables to describe the architecture of the hardware and how they are linked together.

For Panther electronics, “Identify” button change front led status to help to visually identify the system.



The name of the device is useful to affect the salvo on the electronics independently of the serial number.

When replacing a device for maintenance issue, the software will propose automatically to exchange the old replaced device by the new one with the same name.

Refer to specific documentation for more information if needed.

After the software has started, the “Topology” menu is accessible in the “Hardware” tab in Acquire.

2.4. “Hardware” tab

2.4.1 Information and hardware tests tab

Information tab displays the number of channels linked to the system used. This tab displays the file's name containing the channel offset calibration for the Acquire system.

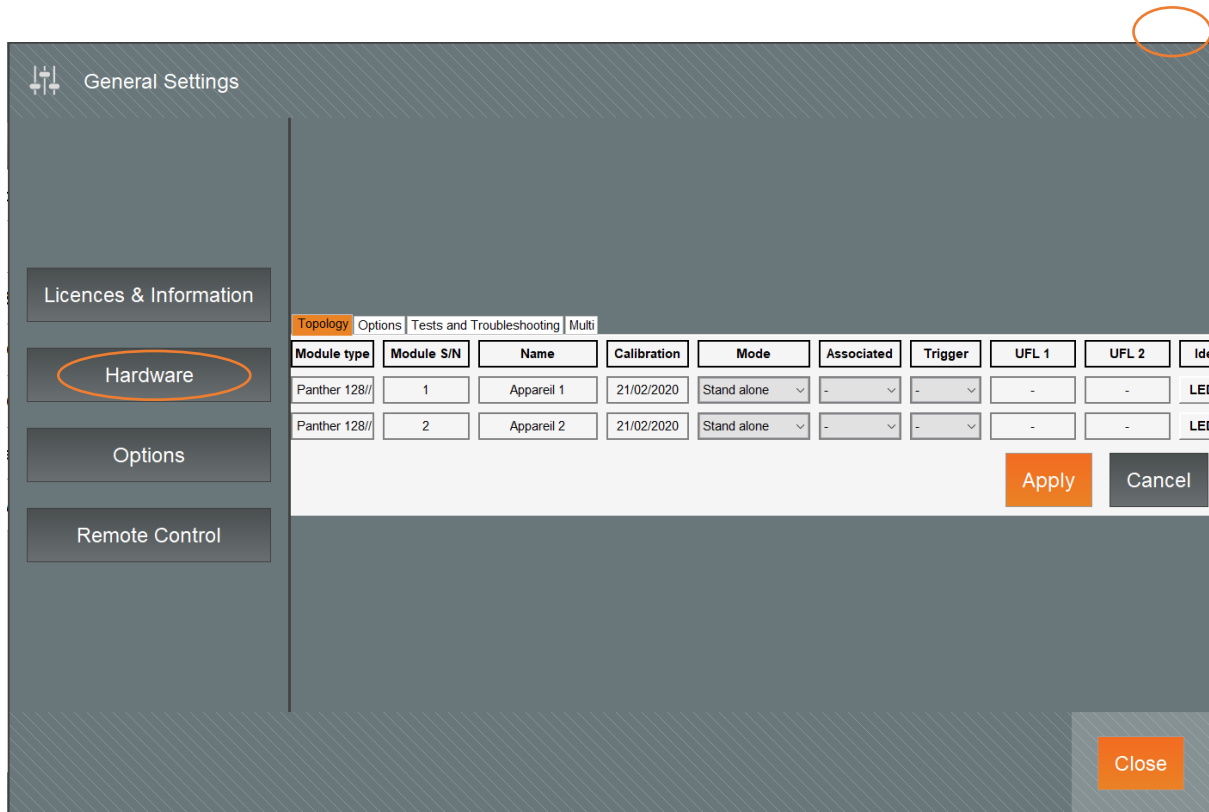


Figure 14: **Hardware** Information panel

The user can check the number of channels installed and recognized by the system, as well as the M2M electronic device number.

A USB dataflow test and a HDD writing speed test can also be performed from the “**Tests and Troubleshooting**” tab. Both tests are performed automatically at the first setup of Acquire on a computer.

2.4.2 Options tab

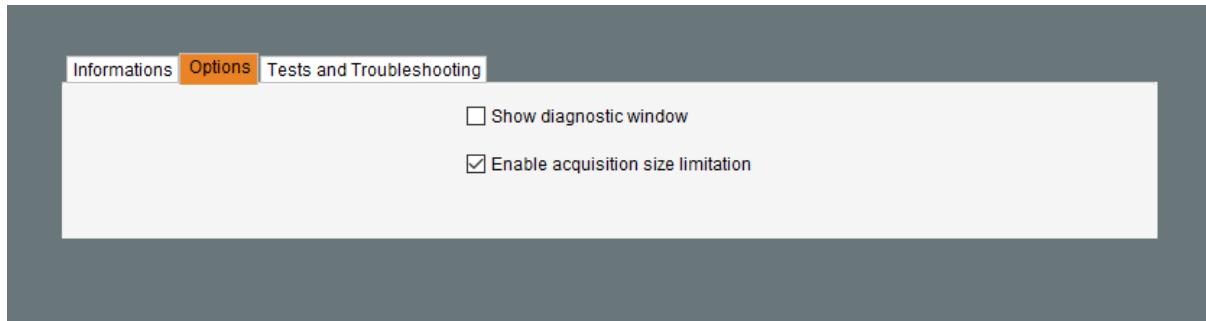
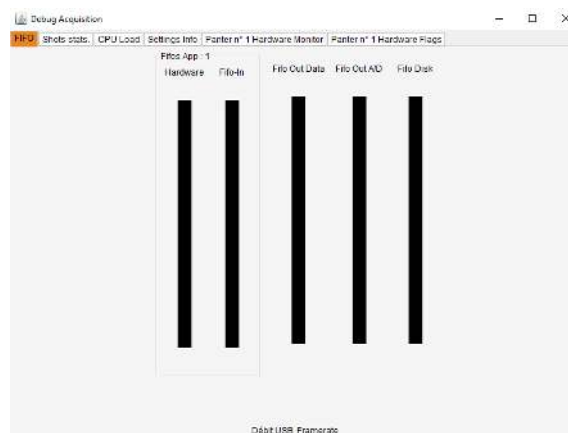


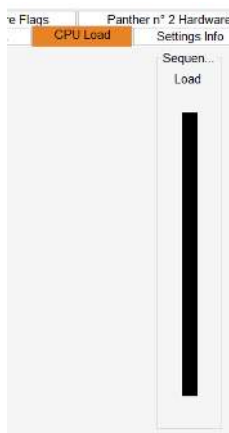
Figure 15 : 'Options' panel of the Hardware tab

- Show Diagnostic Window

Show Diagnostic Window can be activated. This option shows a debug window tools that can be used to check if there is an override of the system.



CPU Load tab give information about CPU load during acquisition



Hardware monitor TAB shows internal auto-test features inside Panther (does not exist for Pocket) for maintenance and remote diagnostics

Panther n° 1 Hardware Flags		Panther n° 2 Hardware Monitor		Panther n° 2 Hardware Flags	
FIFO	Shots stats.	CPU Load	Settings Info	Panther n° 1 Hardware Monitor	
Firmware Informations					
Beta Firmware					
COM Version					
COM Type					
ER Version					
ER Type					
Monitoring			Transmitters monitoring		
Voltage 12ER1	V		Tr[0] V+	V	
Current 12ER1	A		Tr[0] V-	V	
Voltage 12ER2	V		Tr[1] V+	V	
Current 12ER2	A		Tr[1] V-	V	
Voltage 24BT	V		Tr[2] V+	V	
Current 24BT	A		Tr[2] V-	V	
Voltage 24HT	V		Tr[3] V+	V	
Current 24HT	A		Tr[3] V-	V	
Temperature U44	°C		Tr[4] V+	V	
Temperature U30	°C		Tr[4] V-	V	
Temperature U25	°C		Tr[5] V+	V	
Temperature FP...	°C		Tr[5] V-	V	
FPGA Vcc Int	V		Tr[6] V+	V	
FPGA Vcc Aux	V		Tr[6] V-	V	
			Tr[7] V+	V	
			Tr[7] V-	V	
<input type="button" value="Send Registers"/> <input type="button" value="Developer access"/> <input type="button" value="Save Registers"/> <input type="checkbox"/> Enable monitoring					

- Enable acquisition size limitation

Enable acquisition size limitation can be activated. This option consists in limiting the size of acquisition in deleting the data when displacement between two points are smaller than the value of acquisition step defined in **trajectories** panel of **Parameters** panel.



This feature is designed for manual inspection where user can have very irregular inspection speed and stop sometimes scanning. Activate this function is not recommended in fast industrial application where inspection speed is near maximum value of the system. It can erase make acquisition step irregular.

2.5. “Options” tab

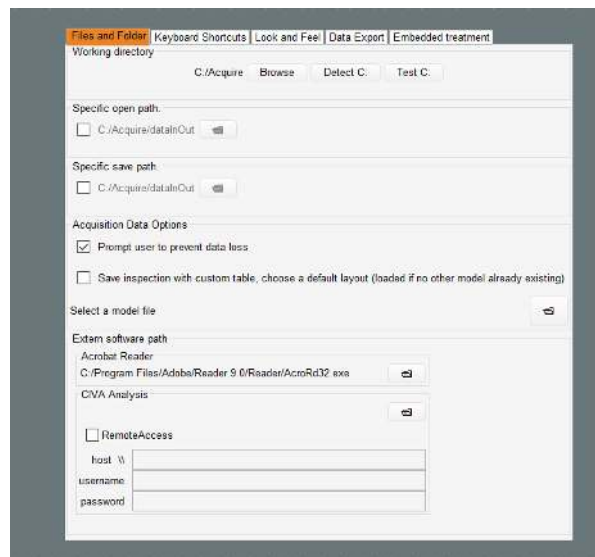


Figure 16: Options tab

2.5.1 Files and Folder

- **Working directory**

- **Browse:** Define the default directory path for saving and loading the Acquire project. The user selects the default directory thanks to the “Browse” button.
- **Detect:** Check the workspace availability.
- **Test:** This icon performs a test of the hard drive disk data flow. The resulting value is used to set the maximum acquisition speed.

- **Specific open and save paths**

These options define specific paths for opening and save files. Thanks to the “directory” icon the user can browse and select each default directory.

- **Acquisition Data Options**

- **Prompt user to prevent data loss**

When this feature is selected, a warning will pop up whenever an action leads to the loss of unsaved data.

- **Extern software path**

- **Acrobat reader**

This option defines the path of Adobe reader in order to open an automatic report in PDF format.

- **CIVA Analysis**

This option defines the path for CIVA in order to open saved Acquire data files in CIVA automatically. When this option is selected and the CIVA path correctly defined (for example C:\CIVA2019) the Analysis banner appears and automatically launch the specified CIVA version.



This function can be managed through the network when specifying the server / username and password.

2.5.2 Keyboard shortcuts

The user can customize keyboard shortcuts for several functions:

- Switch from setting to acquisition
- Switch from acquisition to setting
- Start/suspend/resume acquisition
- Stop acquisition
- Encoders Reset
- Next data source
- Update all views
- Scroll right
- Scroll left
- Zoom in
- Zoom out

The authorized shortcuts are the function keys (F1 to F12) or combinations of the ALT key and any alphabetic key.

Tick the "Enable customization" box to activate the shortcuts.

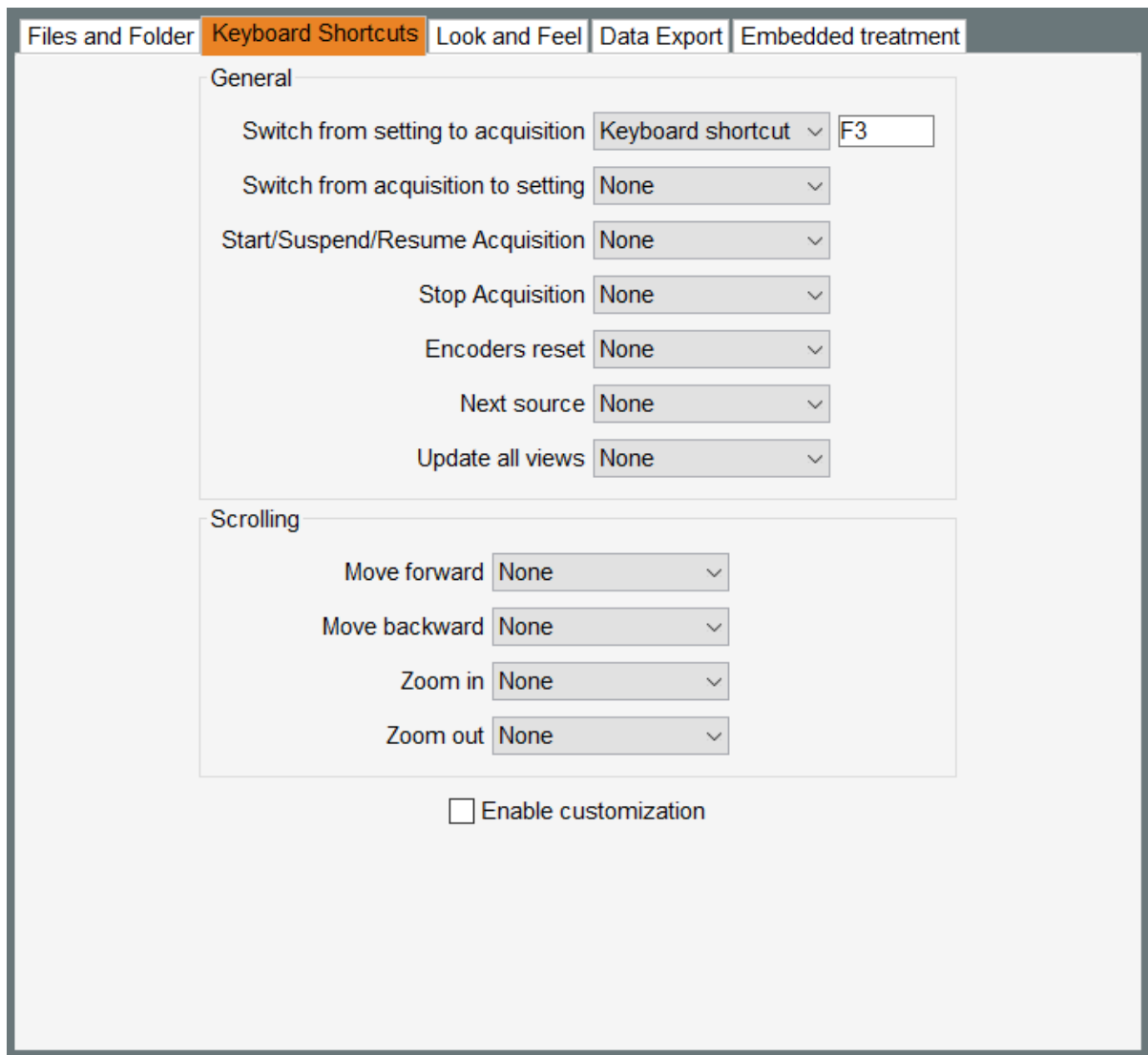


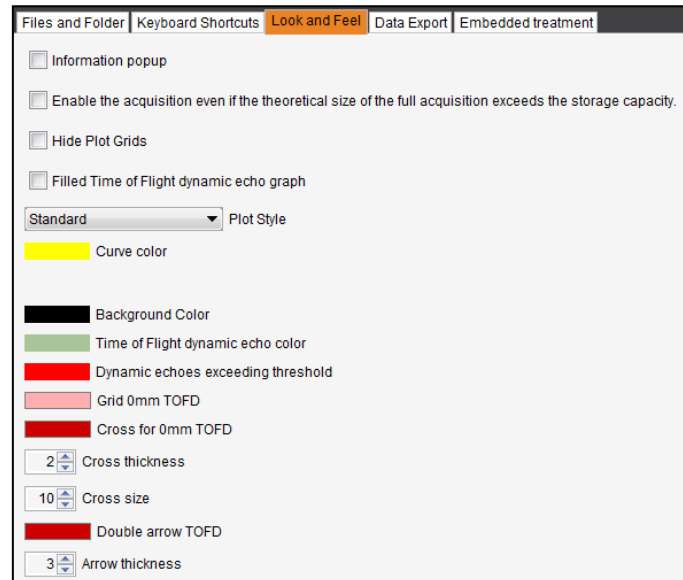
Figure 17: Keyboard Shortcuts

Start/suspend/resume acquisition:

It's possible to start acquisition thanks to a keyboard shortcut. If automated start/stop is required for the application; use Remote access TCP/IP interface.

2.5.3 Look and feel

The top hand of the panel allows to customize graphic parameters of the GUI.



The following panel that can be scrolled shows the ATFM profile drawing options and the brush options



Figure 18: Look and feel tab

- **Informative popup**

Enable/disable the help message in popup windows. The popup window appears when the mouse pointer remains during a few seconds on some fields. Example with gain:

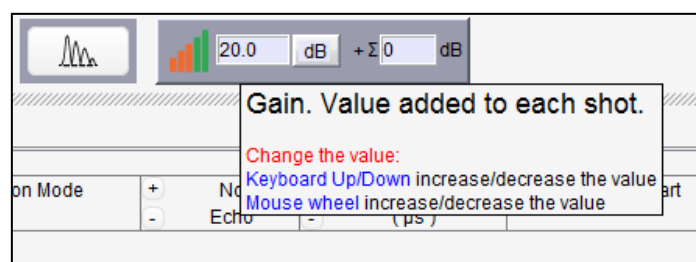


Figure 19: Example of pop-up information

- Enable the acquisition even if the theoretical size of the full acquisition exceeds the storage capacity

When selecting this option, the acquisition can be performed whatever the acquisition size value is.

- Hide plot grids

This option hides the grids of all views in **Parameters** and **Acquisition** panels.

- Filled Time of Flight dynamic echo graph

This option displays the time of flight echo dynamic view in the form of bar charts.

Several options are available in the “Look and feel” tab to customize Ascan, echo dynamic and TOFD views.

Ascan view customization options:

- Curve color
- Background color

Echo dynamic view customization options:

- Time of flight echo dynamic color
- Values exceeded the threshold color

TOFD view customization options:

- 0mm TOFD grid color
- 0 mm TOFD cross color
- Thickness of the cross
- Size of the cross
- double TOFD arrow color
- Thickness of the TOFD arrow

2.5.4 Data export

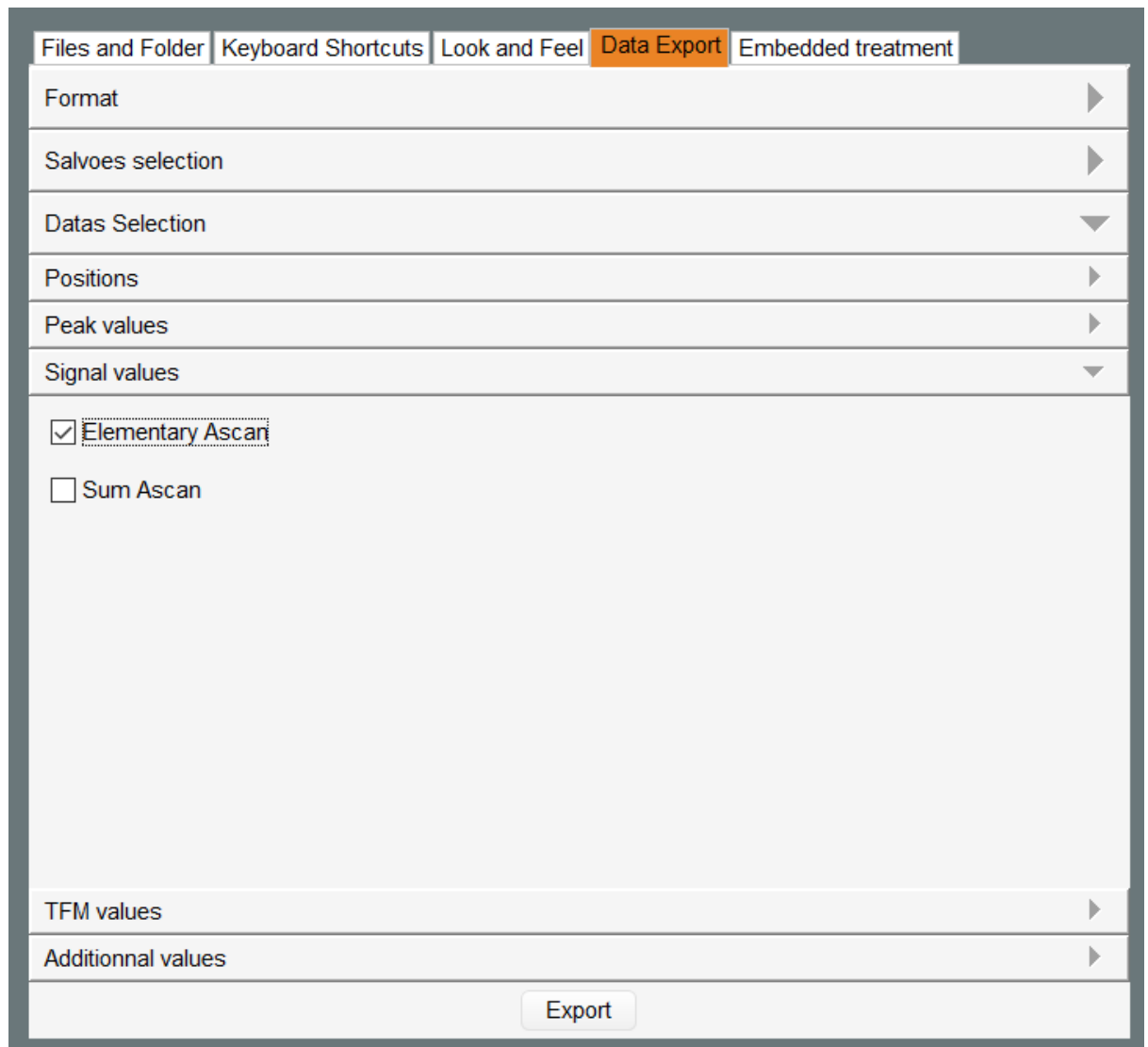


Figure 20: Export Data panel

All data from an acquisition file can be exported in .txt or .xml format through the Export Data panel.

The user may choose data to be exported and their specific structure in the export file (see figure above).

Save the acquired data before save to be able to export data.

Note: This export function exports the file coming from the selected salvoes and gates. Anyway, the export file can be complex in some cases and it is recommended to proceed step by step (very basic export first, then add more and more complexity).

3. "Home", "Main toolbox" and "Exit" icons

- **"Home" icon:** Go to the Acquire home page.



- **"Main toolbox" icon:** Display available main tools of every screen.

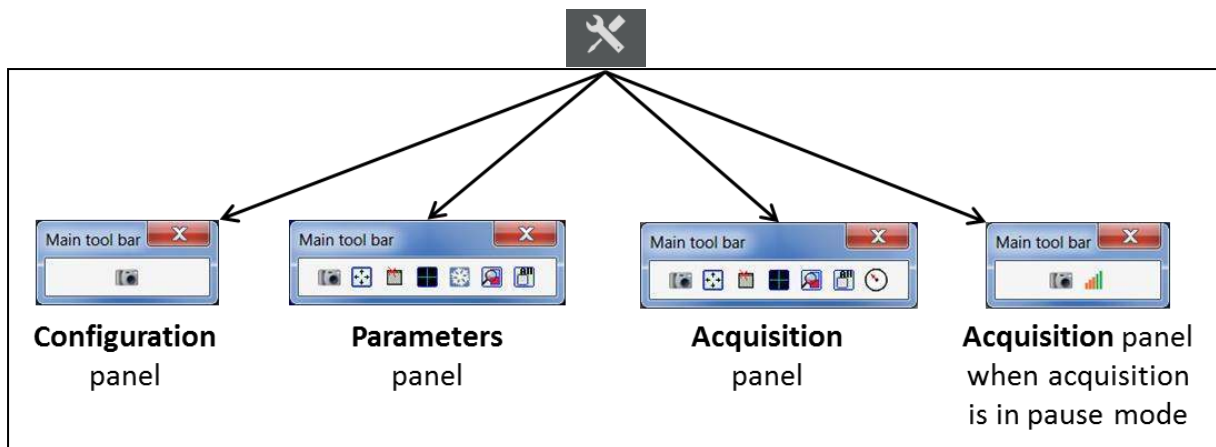


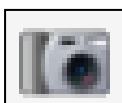
Figure 21 : Main Toolboxes

Main tools list:

- **« Screen shot » icon:** Catches a screen copy.

This screen shot is saved in the Acquire view file "C:\Acquire\desk\images\".

After the back-up, the screen shot is displayed automatically by the Windows viewer software.



- « **Full screen** » icon: Displays all views in full screen, hiding scales and titles.



- « **Hide banner** » icon: Hides titles and icons of all views in Parameters and Acquisition panels.



- « **Show/Hide Cursors of views** » icon: Click on this icon to enable /disable cursors. This icon has three states:



: Blue reference cursors for horizontal and vertical axes.



: Pink relative cursors with respect to reference cursors.



: No cursor displayed.

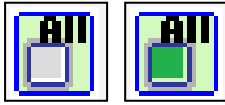
- « **Freeze** » icon: Freezes all views in Parameters Panel.



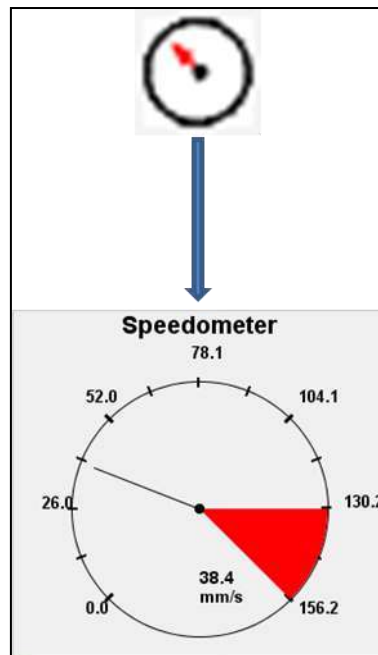
- « **Synchronize and 'unzoom' all views** » icon: synchronizes zoom of the selected view or 'unzoom' all views from one salvo. By default, zoom of all views from one salvo are synchronized. This function is not available on corrected views.



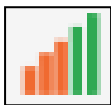
- « **Synchronize zoom of all views** » icon: synchronizes zoom of all views of all salvos. This icon has two states: enable and disable.



- « **Speedometer view** » icon: Displays a speedometer which indicates the current robot speed and the maximum authorized speed in the acquisition panel.



- « **Modification of the analogical gain during acquisition** » icon: This icon is only available in “Pause” mode. When you press this gain icon, a window is displayed to enter the new value. The new gain is applied after restarting acquisition.



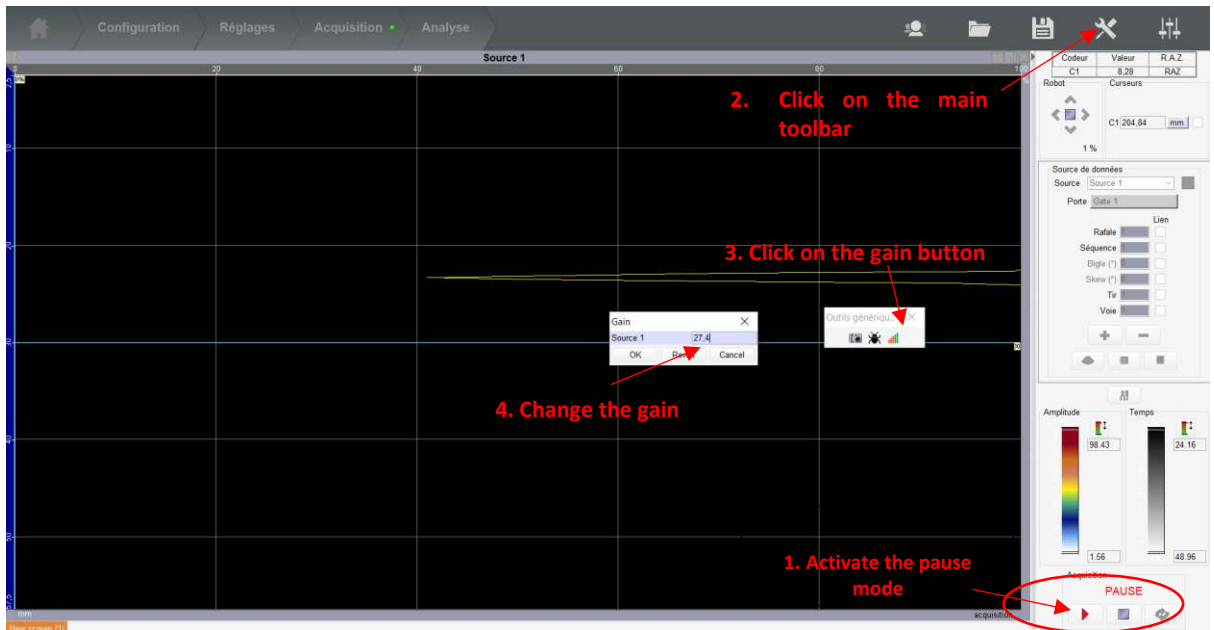


Figure 22: Gain modification during acquisition

4. Backup files

4.1. Backup of a project

A complete project generally includes one **Configuration**, one **UT Setting** and one **Acquisition**. The project backup contains all parameters necessary to create the **Acquisition** and all data recorded during the **Acquisition**.

The three icons on the top left of the window are used to save/load configuration parameters and/or data file all current configuration, parameters and acquired data.

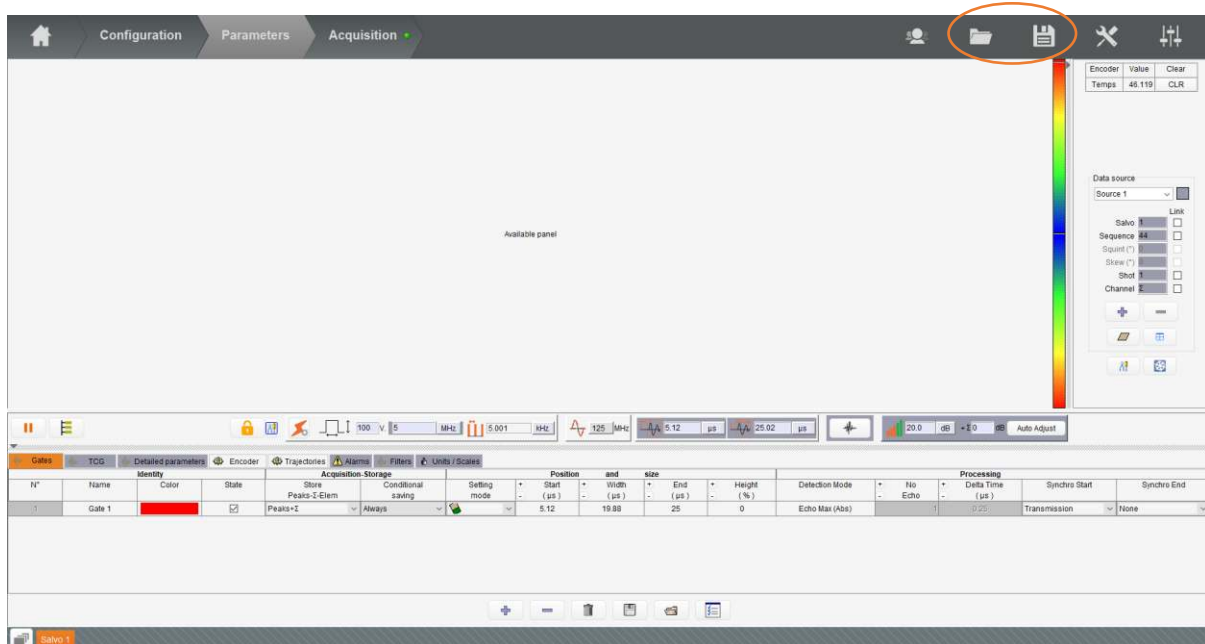
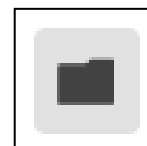


Figure 23: Save, load and trash icon

- **"Open"** icon loads all parameters and related data saved in a file.



- **"Save"** icon saves all current parameters and acquired data.



A left click on "Save" icon opens the following window:

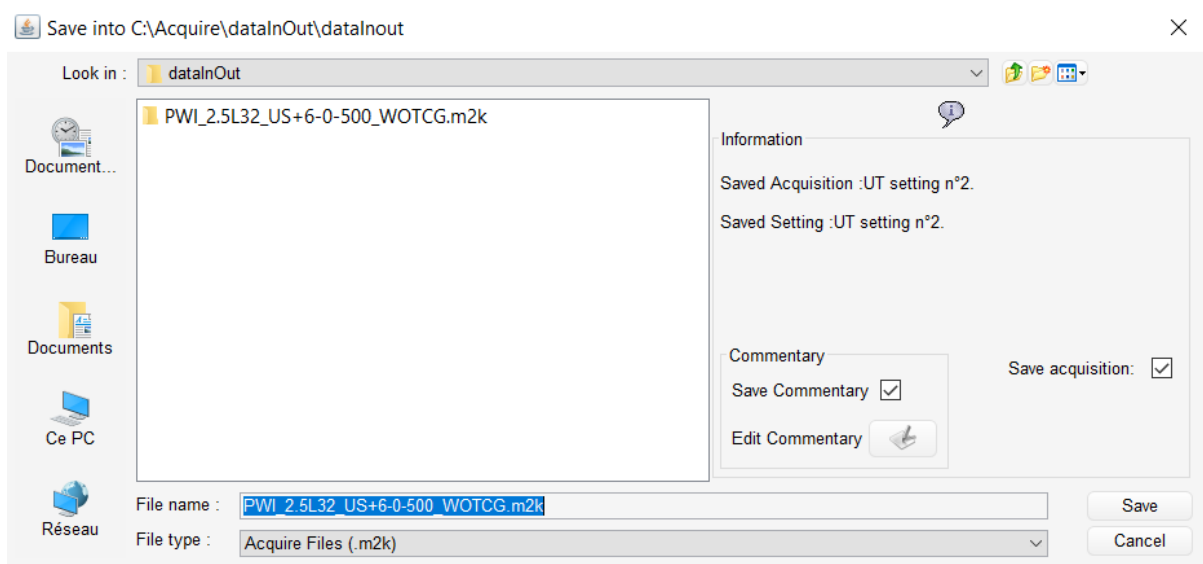


Figure 24: Project's saving window

'Information' panel shows what part of the project to save:

- **UT Setting**, identified by its name.
- **Acquisition** according to the user's choice.

In the example illustrated in the above figure, the saved project contains **UT Setting N°1, Configuration** whose **UT Setting** comes from and the **Acquisition** obtained from **UT Setting N°1**.

4.2. Backup options

Backup of **Acquisition** are optional. The user validates his choice as shown below.

By default, backup of **Acquisition** is validated.

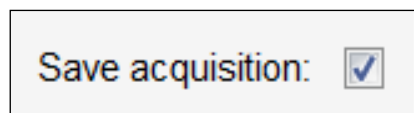


Figure 25: Saving of acquisition.

Warning! A project back-up must contain a **UT Setting** and the **Configuration** whose UT setting comes from, identified by either a name or a number: **UT Setting 1**. Moreover a project back-up allows saving only one **UT Setting**.

In the backup project, several cases may happen:

- **Case 1**

By default, after an acquisition, the saved project contains:

- Acquisition.
- UT Setting whose Acquisition comes from.
- Configuration whose UT Setting comes from (if Configuration exists).



If the project contains other *Settings* and *Configurations* before backup, they will be deleted after backup. All modifications carried out in the *Configuration* panel without creating a new *Setting* are not saved in the project. In the same way, all modifications in the *Parameters* panel carried out after Acquisition are not saved in the project. When saving an Acquisition, only the *UT Setting*, whose Acquisition comes from, are saved.

- **Case 2**

If the user does not carry out an **Acquisition**, the backup of project will contain:

- Current UT Setting.
- Configuration, whose UT Setting comes from (if Configuration exist).

In the same way as for case 1, if the project contains other **Settings** and other **Configurations** before backup, they will be deleted after backup. Only the **Configuration**, whose **UT Setting** comes from, is saved. All modifications carried out in the **Configuration** panel without creating a new **Setting** are not saved in the project.

The acquisition menu will not include the graphical view settings (dropped views).

To store the setting views, start and stop the acquisition and save with the empty acquisition.

It is also possible to save configuration views by saving “screens” (bottom left of the Acquisition menu) and then reload it later.

- **Case 3**

If only **Configurations** exist without **Settings** and without **Acquisition**, the backup of project is not possible. The backup of project must contain a **UT Setting**.

4.3. Local backup

Local backup allows the user to save specific parameters families.

In the **Configuration** part, all local backup are located in the index C:\Acquire\Civa2015aM2M_x64\DATA.

In the **Parameters** and **Acquisition** parts, all local backup are located in the index C:\Acquire\desk.

Local backup are directly available from the related parameters panel.

For example, the figure below shows how to access to the local backup of DAC parameters.

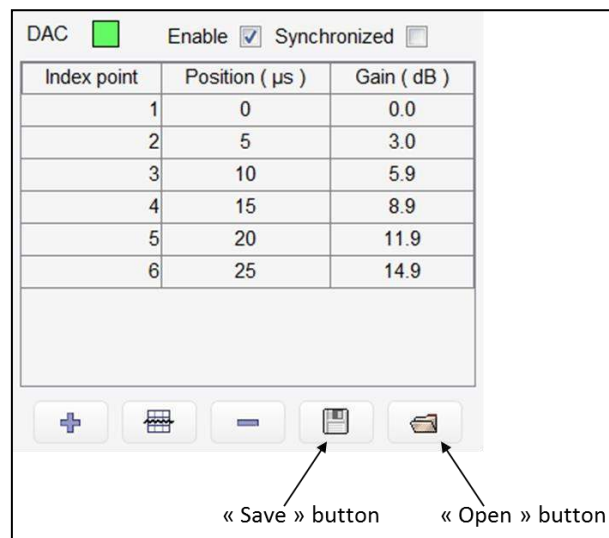


Figure 26: Local backup of DAC parameters

5. Inspection steps

Three icons give access to the main steps to define an inspection:

- **Configuration:** This step defines the inspection configuration (transducer, representative samples, calculation of focal laws...). It allows ultrasonic field computation according to the related configuration.
- **Parameters:** This step defines and adjusts UT parameters, acquisition parameters and mechanical parameters.
- **Acquisition:** This step is used to launch the acquisition, to display real-time inspection and to load and play acquired data files.



Figure 27: "**Configuration**", "**Parameters**" and "**Acquisition**" icons

PART 3: CONFIGURATION

The configuration panel is directly extracted from NDT software CIVA. Get CIVA help by pressing “F1”. Only the part “UT - Active Model Setup” is useful for Acquire user, see the picture below.

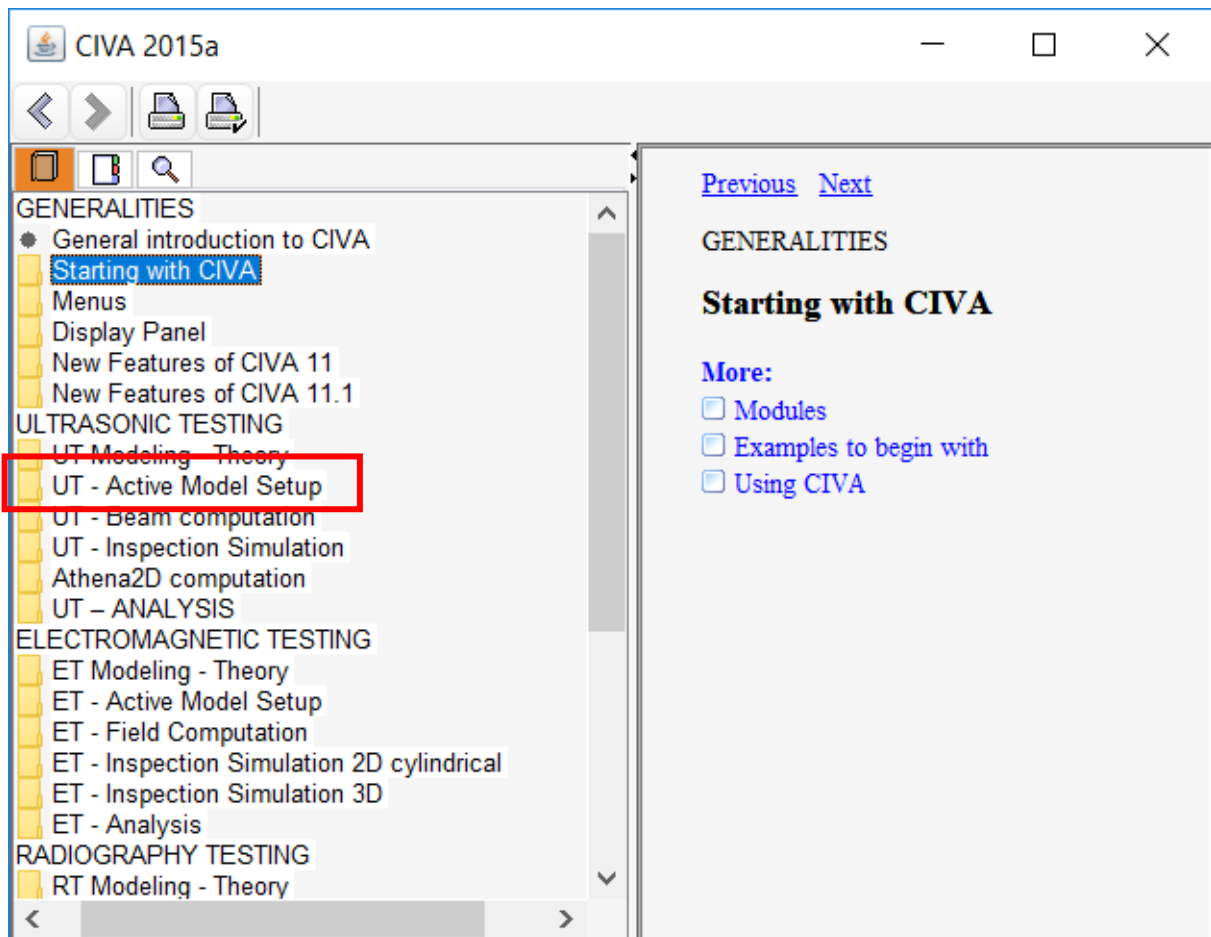


Figure 28 : CIVA help

Some parameters are not used for delay laws computation but are dedicated for simulation only.

PART 4: PARAMETERS

The **Parameters** panel defines the UT parameters, mechanical parameters and acquisition parameters.

This panel is split into three main groups: visualization, general settings and specific parameters.

By default, visualization is composed of two types of windows: A-scan and B-scan representation. These representations display, in real time, signals received according to focusing parameters.

The “General settings” relate to all active elements.

The “Specific parameters” apply to each of the channel. They allow the user to adjust elementary channel parameters, DAC, acquisition time gate, visualization of the input, coders, acquisition trajectories, filters and displayed units (Gates, DAC, Burst, Coders, Trajectories, Inputs, Alarms, Filters, Units).

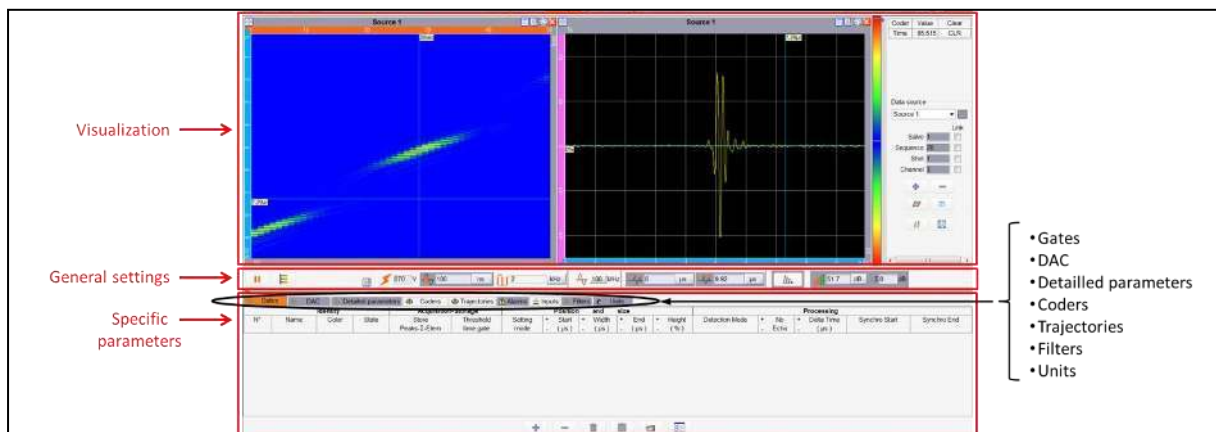


Figure 29: **Setting panel**

1. UT setting

The Setting of UT parameters in Parameters panel include:

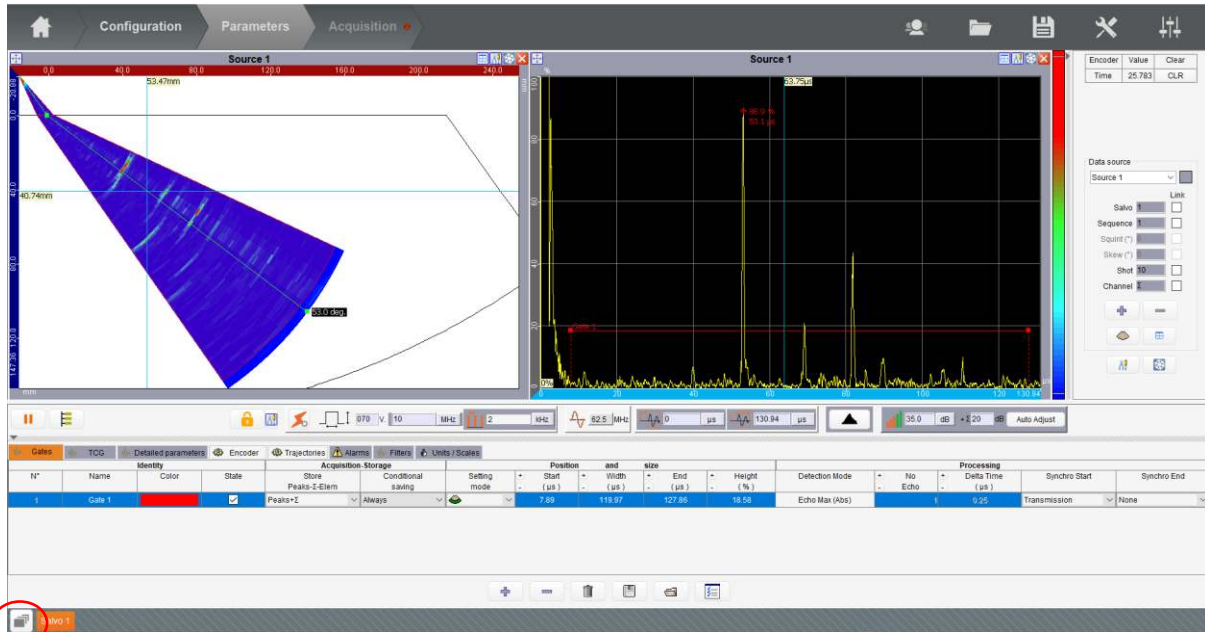
- Delay laws.
- General parameters: transmission, reception and digitizing.
- TCG (Time corrected Gain).
- Gates.
- Encoders' information.
- Trajectories and mechanical parameters.
- Digital Alarms
- Filters.
- Units (units definition used for all views).

1.1. Multi-Salvoes setting





1.1.1 Multi-Salvoes setting creation

Multi-Salvoes setting allows making a UT setting made of several Salvoes or groups, i.e. one single Acquire acquisition made of different configuration files. For example, with a matrix probe, the user can make a multi-salvoes file made of one sectorial scanning in the incident plane and of one sectorial scanning in the perpendicular plane of the probe.

Choosing this option by clicking on the button indicated below in the Parameter settings panel :



a specific file box is opened where previous m2k configuration files can be selected.

Salvoes are selected from the left table below and, using the arrow sign , can be moved to the  right list to  create the multi-salvo configuration. Salvoes can be reorganized  by using the up, down and trash icons. The creation of the multi-salvoes is validated by clicking on the “Multi-Salvoes creation” icon.

If there are several electronic devices, the salvo must be affected to one of the electronics. Each electronics will be able to run several salvoes.

The salvoes executed on several electronics will be executed at the same time.

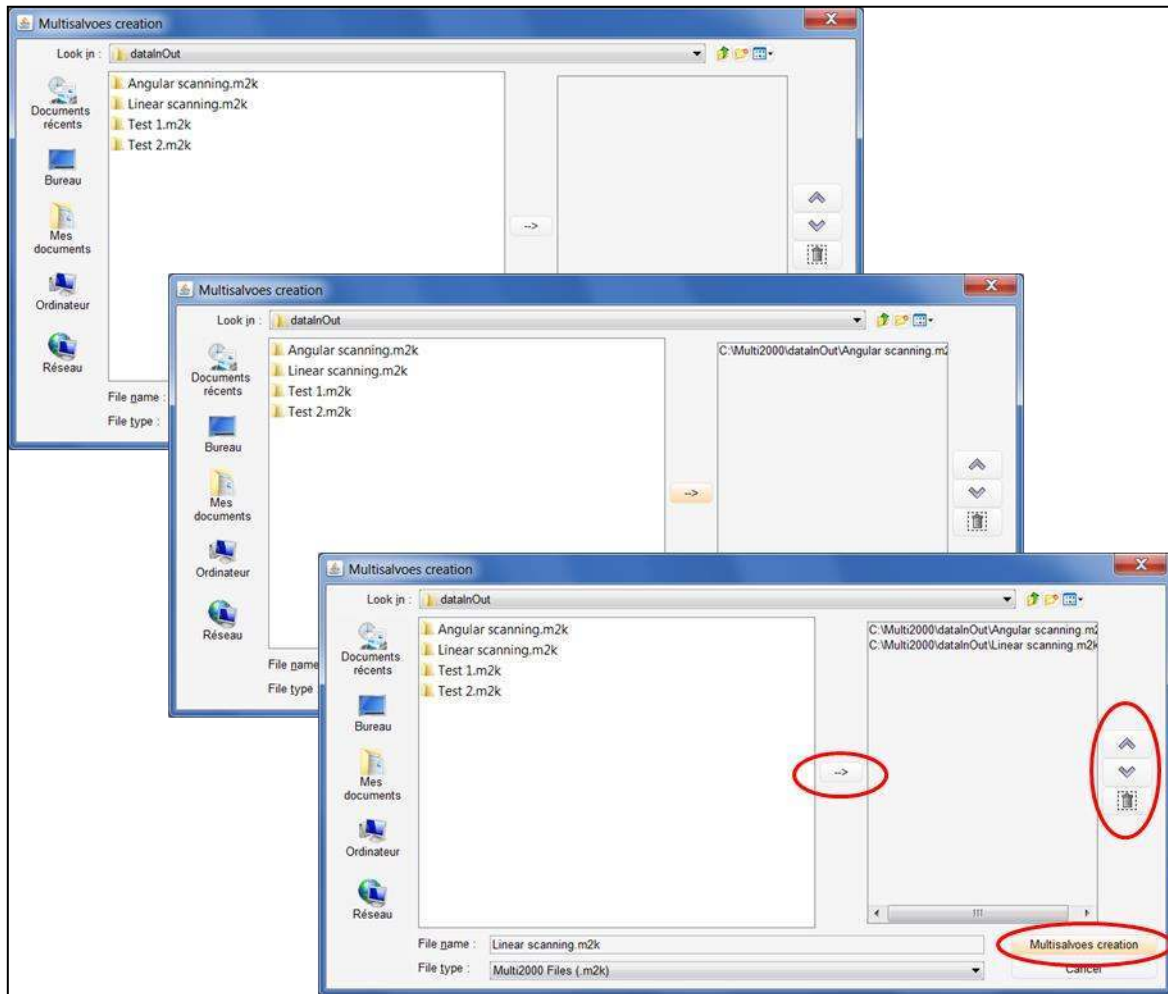


Figure 30: creation of a Multi-Salvoes

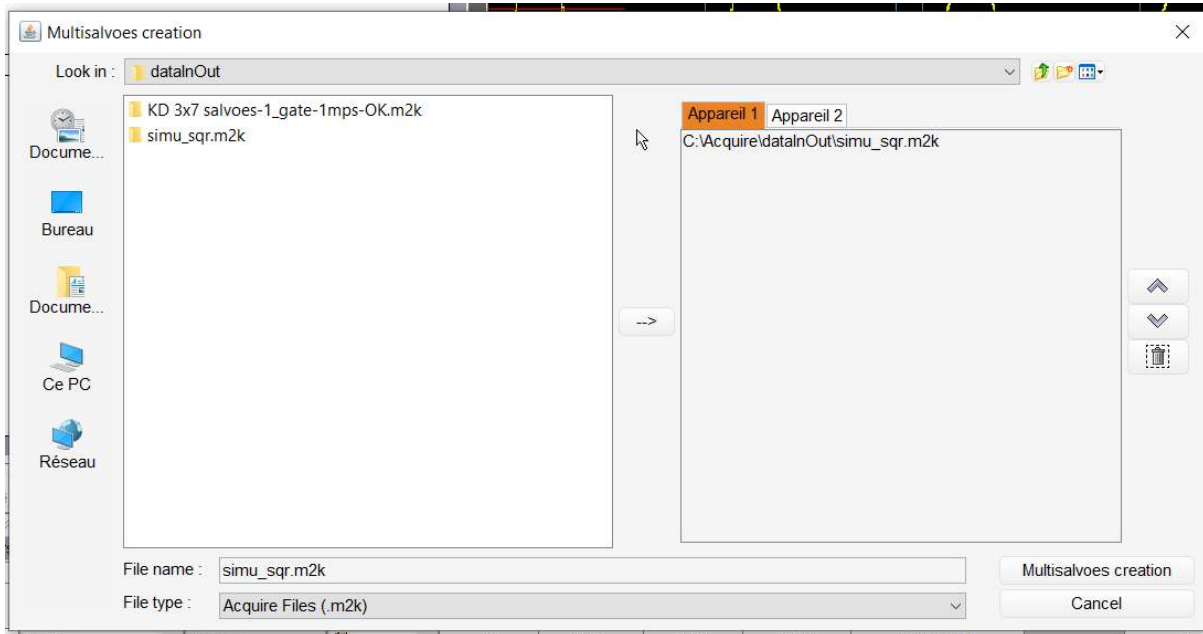


Figure 31: Multi Salvo with several electronics

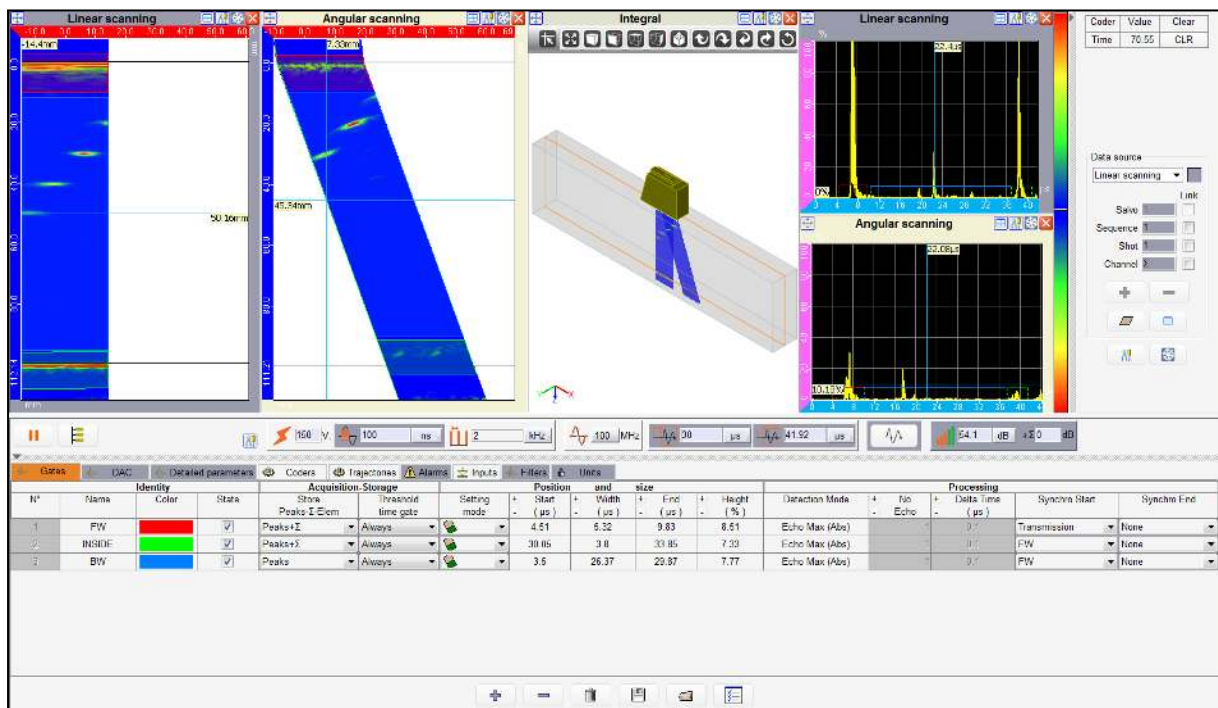


Figure 32: Multi-Salvoes « Parameters » Panel

1.1.2 Configuration panel

When creating a multi-salvo, the configuration parameters of each individual salvo are stored and can be reached by clicking on the **associated button on the bottom left hand side of the screen**.

1.1.3 Independent parameters

After a multi-salvo creation, the software switches to the **Parameters** panel. Some parameters can be adjusted salvo by salvo. These so-called “independent” parameters are the following:

- Delay before digitizing
- Depth of digitizing
- Rectified signal
- Global gain (El. Signals)
- Gain Σ
- Analog DAC
- Digital DAC
- Filters
- N shots average
- Gates
- Detailed parameters
- Display synchronized with transmission (in Units panel)
- UT speeds
- TOFD Calibration

Gates:

Gates are independent per salvo. The user can configure easier the gate in using the “apply to all salvoes” function. This function duplicates the current gate parameter to all the salvoes containing in the multi-Salvo. This function is accessible by a right mouse click on the gate.

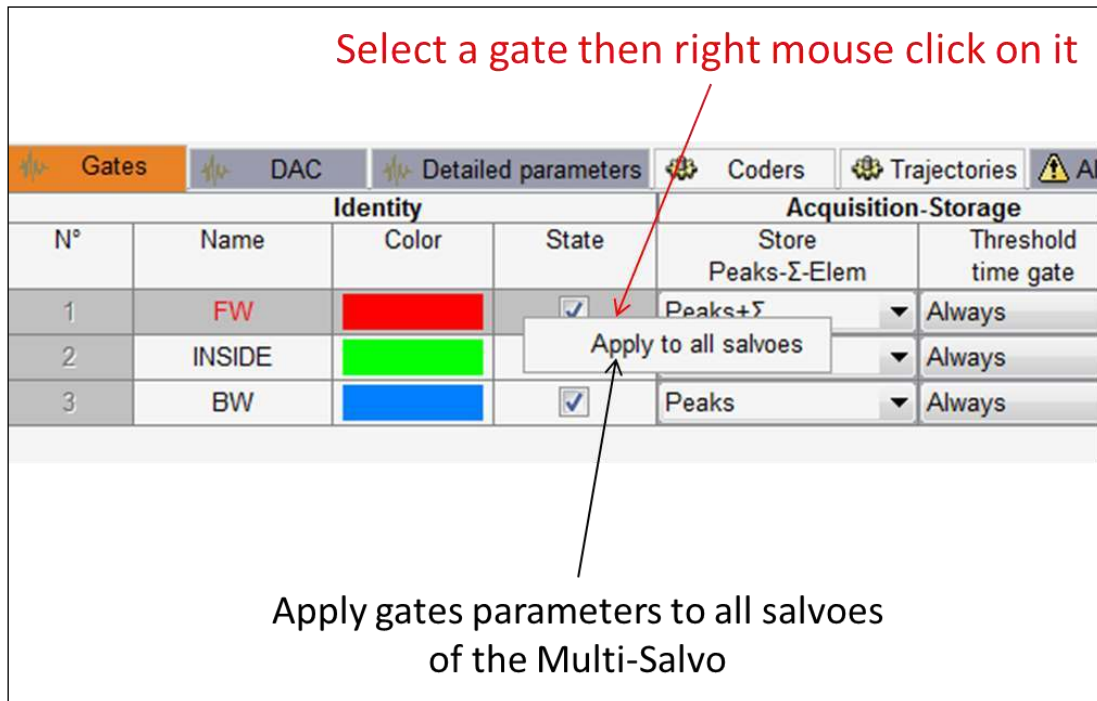


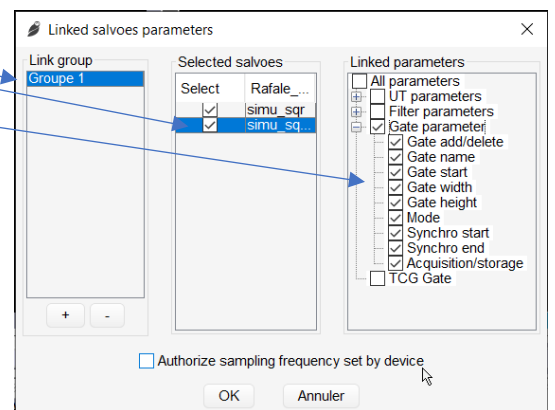
Figure 33: "Apply to all salvoes" Option

Group of parameters:

The parameters are independent per salvo. The user can create a group of salvoes in order to have a common parameters.

To create a group of salvoes (see figure below):

- Click on **tools** icon of general parameters
- Create a group by pressing "+" button.
- Select the group
- Select the salvoes you want in the group
- Select the parameters you want to group



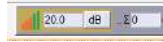
When the group is created, the parameters of the modified salvo will be copied to the linked salvoes.



The remote function are affected by linked salvoes.

The parameters which are link together will appear on a specific color.

Example: analog gain linked in a group.



Lock icon: This button enables to lock settings for a specific salvo and avoid accidental modification of the parameters.



1.1.4 Data Source

In **Parameters** panel, when creating a Multi-Salvo, one data source is automatically created for each salvo.

In **Acquisition** panel, when creating a Multi-Salvo, one data source is also automatically created for each salvo **and** each gate.

Each data source is called with the name of the associated salvo (and _number of the gate for the data source of panel) and is defined by one color. This color can be seen in the background of labels in the Data source panel and in the rectangle located near the name of data sources (cf. following figure).

The name of the salvo can be changed.

A left mouse click on this rectangle, or on one view title, changes the current Data source. When the user changes the Data source, the structure of available graphics, the set "salvo-sequence-shot-channel" value, the color scale and detailed parameters panel are updated.

Each view (Electronic B-scan, A-scan...) of the same Data source is associated to the same color.

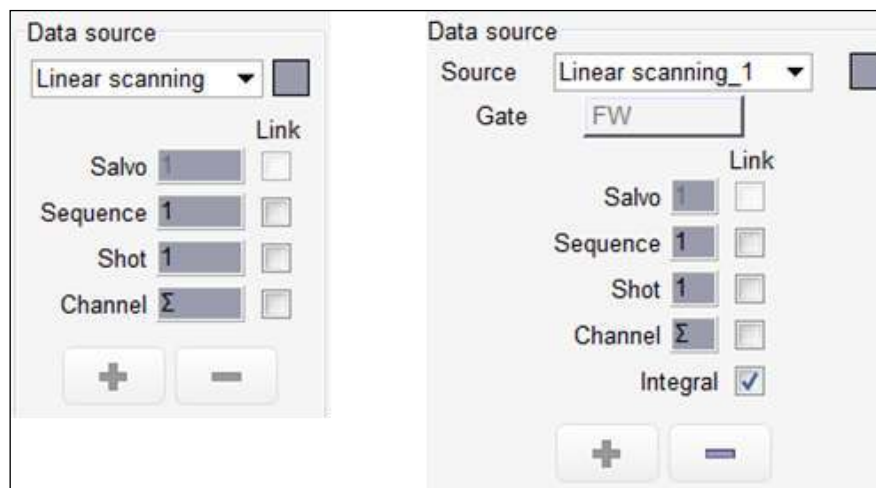


Figure 34: Multi-Salvo data source of **Parameters** and **Acquisition** panels

Moreover, the Acquire Graphic User Interface applies the same color to all independent parameters related to a same salvo (see next figure).

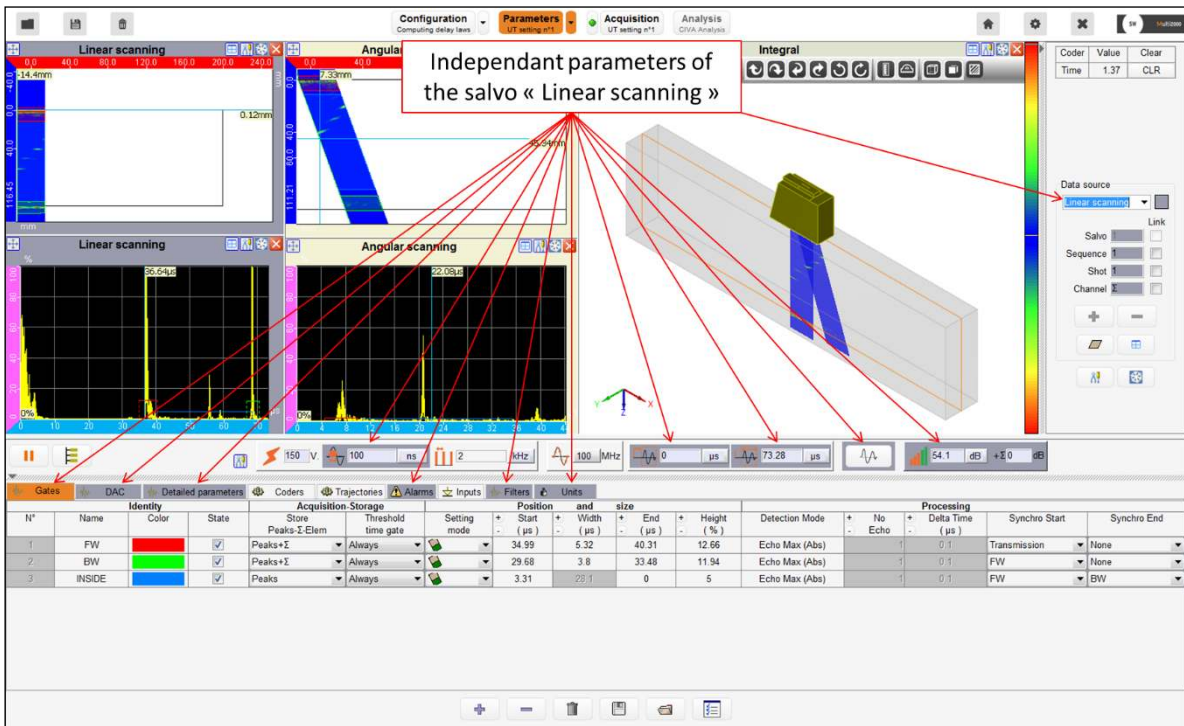


Figure 35: Independent parameters.

Integral data source:

When creating a multi-salvo, an added data source is automatically created. This data source is called “Integral data source”. The Integral data source allows displaying the data of several salvos into one view.

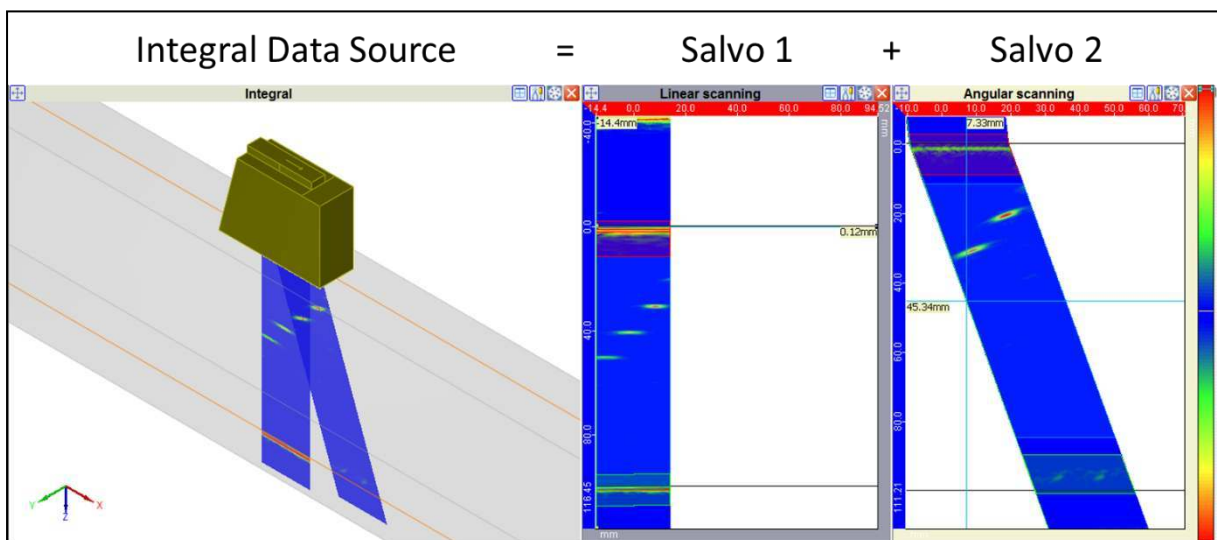


Figure 36: Example of view of the integral data source

In Parameters panel, the integral data source allows to display several salvoes' data in the B-scan 3D.

In Acquisition panel, the user can select the salvo's data to include in the integral data source by ticking the Integral box located in the data source panel (see next figure). The available views are B-scan 3D and C-scan.

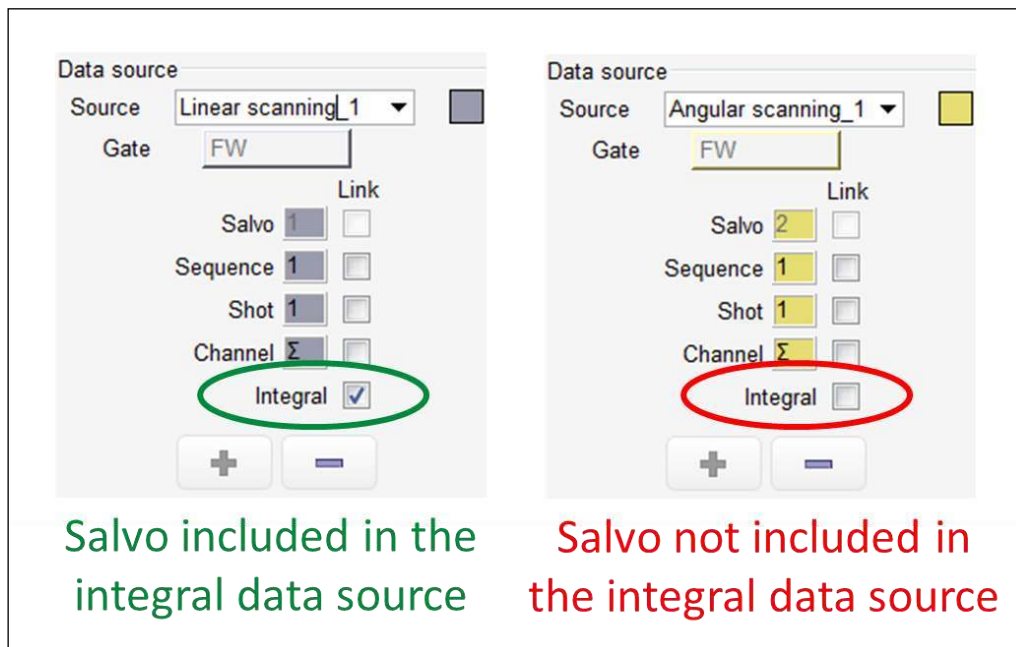


Figure 37: Selection of the salvoes participating to the integral data source.

1.1.5 Acquisition parameters

When a Multi-Salvo including salvoes with different acquisition parameters (e.g. robot, acquisition trajectories) is created, only acquisition parameters of the first salvo are saved. The user must redefine the acquisition parameters afterward for all salvoes.

2. Display

2.1. Data source

In the "Parameters" panel, real-time data to be visualized can be selected by the user, using the menu contained in the "data source" panel. Using this menu, the user can choose signals to be displayed.

- **Salvo:** set of delay-laws applied one or several apertures. One salvo may include several sequences and shots. One salvo defines one kind of control. Several salvos (or control) can be applied together (multi-salvo mode).
- **Sequence:** set of delay-laws applied for given electronic aperture. The electronic aperture is defined by both the elements used for transmission (T) and reception (R). A sequence may include several shots.
- **Shot:** A given electronic aperture corresponds to a selected delay law. One shot refers to both transmission and reception delay-laws, which can be distinct from each other.
- **Channel:** for a given electronic aperture (sequence) and for a specific delay-law (shot), corresponds to the elementary contribution of one element. The symbol Σ refers to the actual sum of each elementary contribution contained in the selected (salvo, sequence, shot) trio. The sum is the actual signal resulting from the application of the delay-law.

For a given salvo several data can be displayed. As seen earlier, for a given position, signals associated to a specific (sequence, shot, channel) trio can be visualized. The "data source" concept allows the user to define a source as a specific set of (salvo, sequence, shot, channel), to name it and to display it.

Example: Let us consider a salvo consisting in three sequences of n shots. The user can display a B-scan "sequences" and a B-scan "shots". Using either the cursor on the B-scan "sequences" view, or the "sequence" entry of the "data source" panel (see Figure 38), the user can select a different sequence (electronic aperture) to be displayed. Doing so updates automatically the display of the B-scan "shots" view, referring now the shots of the selected sequence. To simultaneously display signals associated to each of the three sequences, the user is required to add two more "data sources", one for each sequence. This feature allows the user to compare signals resulting from all sequences, in real-time. The figure below represents the entries of the "data source" panel. Changing one entry of this panel results in updating all graphic windows associated to the selected data source. All entries (salvo, sequence, shot, channel) of the same data source are linked together.

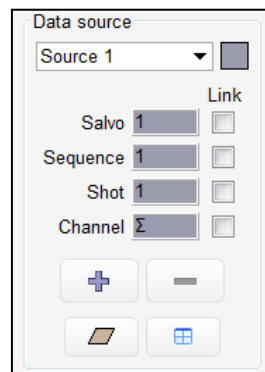


Figure 38: Entries of the "data source" panel.

- **Add Data source**

Click on the "+" icon to create/add a data source. You may edit the data source name (see below "Rename data source").

- **Delete Data source**

To suppress/delete a data source, first select the data source to be deleted and then click on the "-" icon. To erase all data sources at once, click on the "trash" icon.

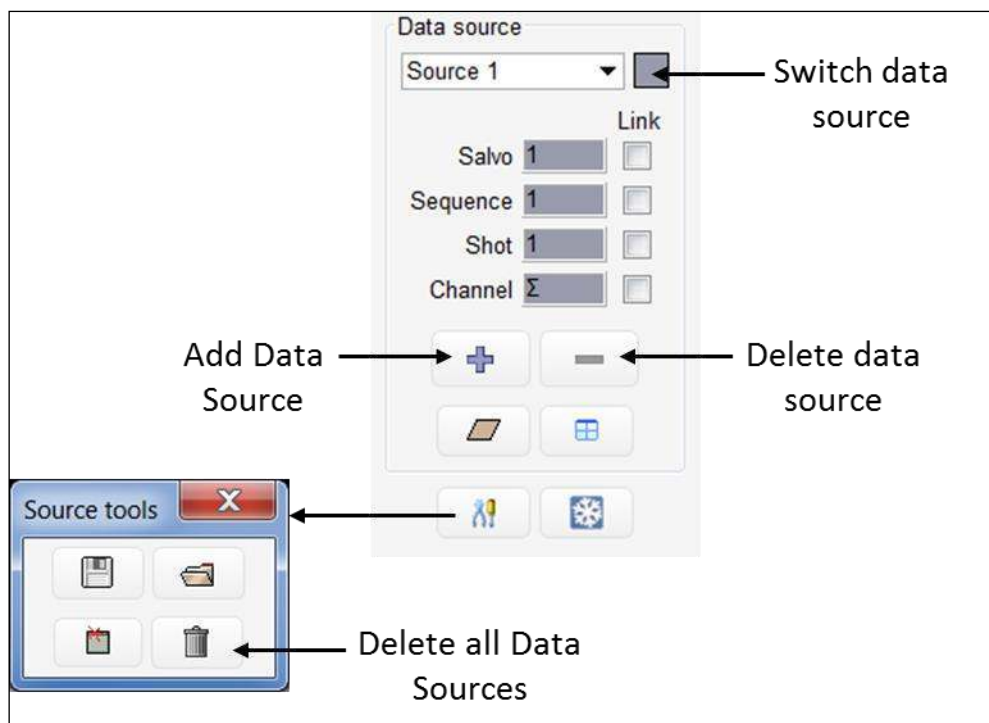


Figure 39: Add / Delete Data Source.

- Switch data source

Each data source is associated to one background color. This color is visible on the right of the data source label, in the "data source" panel (see figure above). The same color will be used as background fill for the display of all data associated to this data source.

To select/switch a data source, click on the drop-down menu (top right, see figure above) and click on the data source to be activated. Switching data source automatically updates the entries of the data source panel (salvo, sequence, shot, channel) and their background color. Left click on colored square right to data source label switch the data source.

- **Rename Data source**

To rename a data source, select the data source to be renamed (double click). When the name is highlighted, you may enter the new name.

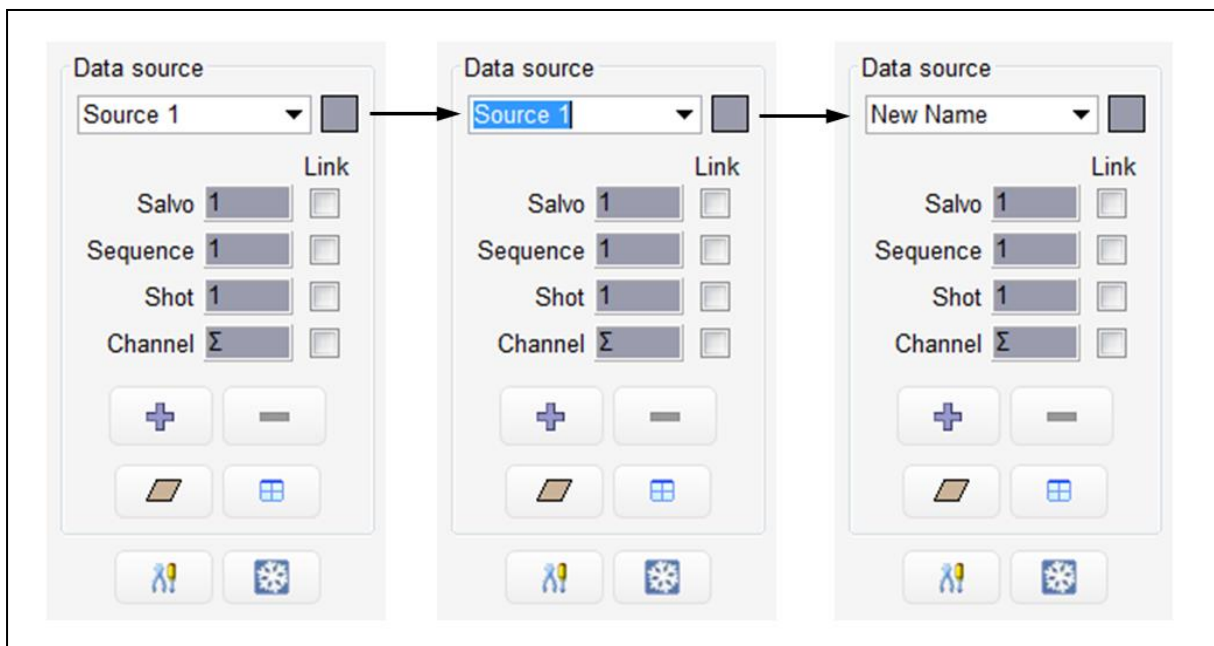


Figure 40: Rename Data Source

- **The "link" option**

The "link" option links cursors of distinct data sources. See section 2.5 for more details.

- **The data source "toolbox"**



Click on the “Tool Box” icon, four features are available:

- To save data source, selected graphics and desktop arrangement, click on the save icon.
- To open a set of data source, graphics and desktop arrangement, click on the open icon and select the file. To delete a set of data sources, graphics and desktop arrangement, click on the trash icon.
- To hide the title banner for each graphic window, click the hide icon (see next figure).

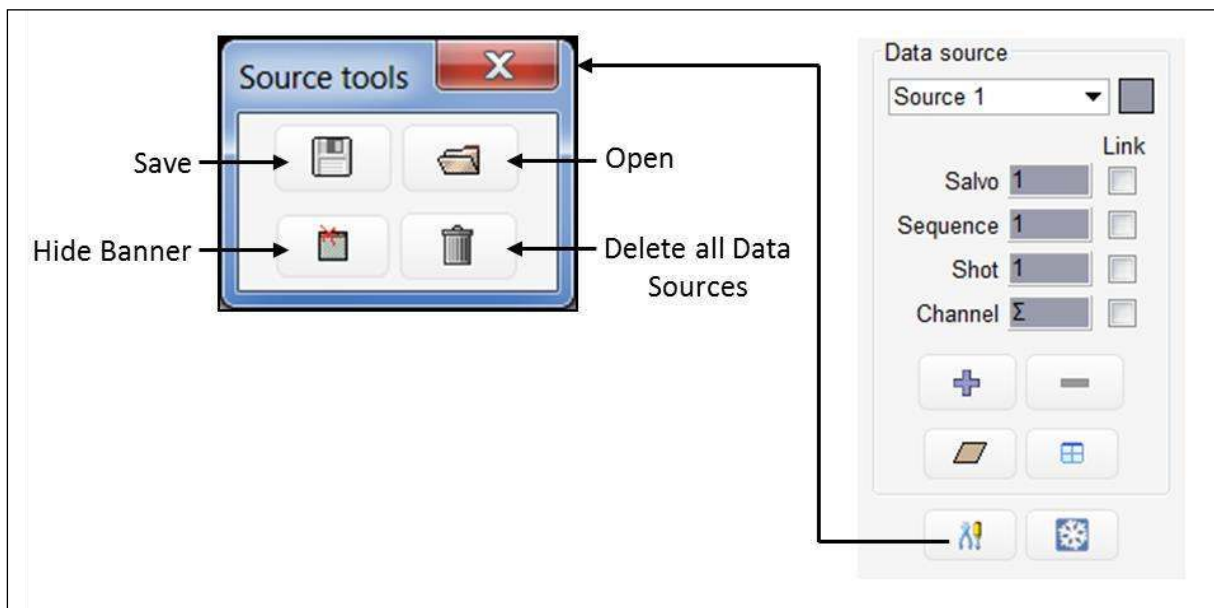


Figure 41: Data source toolbox

2.2. Available graphics

The parameters panel can contain several type of data representation like B-scan or A-scan. These views are displayed in real time.

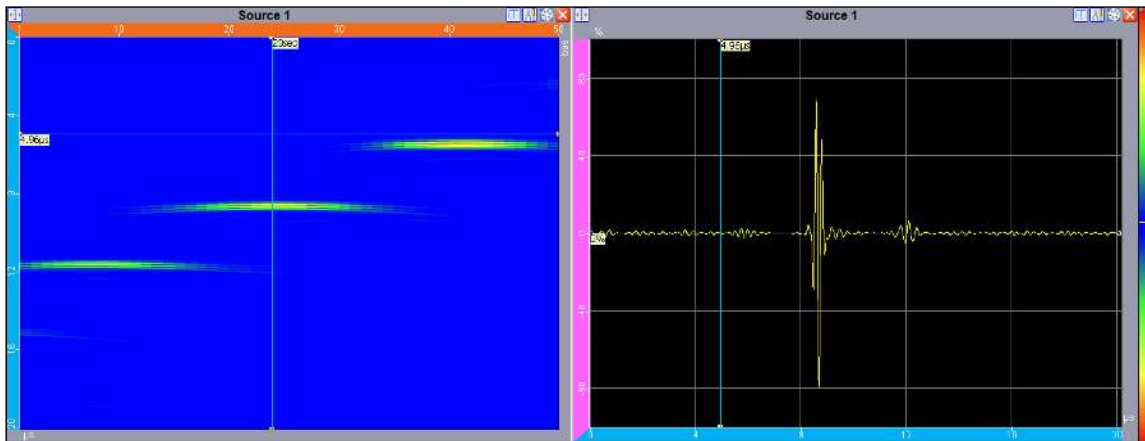



Figure 42: A-scan (right) and B-scan (left) real-time display



In the data source panel, the icon  gives access to several types of real-time data visualizations, such as A-scan, B-scan, and views. To select the type of view to be dropped in the workspace, click on the icon. A selection of available displays then pops up and the user can choose from the available menus and sub-menus (see next figure). Simply move the mouse onto an item of the list to let an eventual sub-menu pop up. When the type of display is chosen, click on the selected option, drag (keep the mouse pressed) and finally drop the view into the workspace (release the mouse). For positioning display windows with respect to one another, please refer to section 2.3.

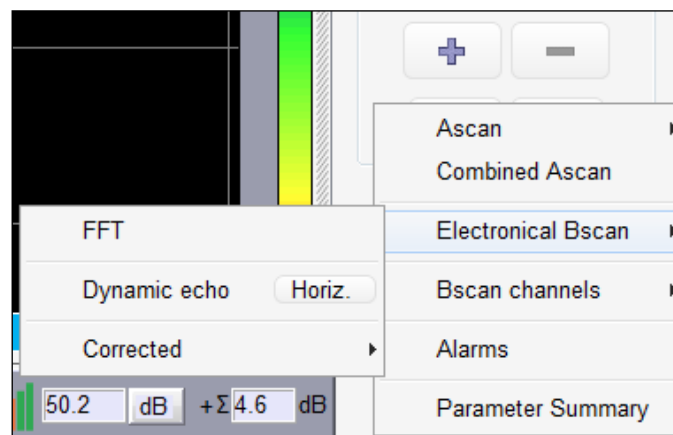


Figure 43: Access to all views. When available, submenus are indicated by the presence of an arrow

Available types of data visualization are:

- **A-scan:** Displays the waveform (signal amplitude versus time) of the selected set of (salvo, sequence, shot, channel).

- **Cumulated A-scan:** Displays A-scans (sum signal) superposition of all sequences of one salvo.
- **FFT:** Displays the fast Fourier Transform (FFT) of the selected set of (salvo, sequence, shot, channel). The user can adjust the time boundaries of the FFT computation using the two green cursors of the A-scan view.

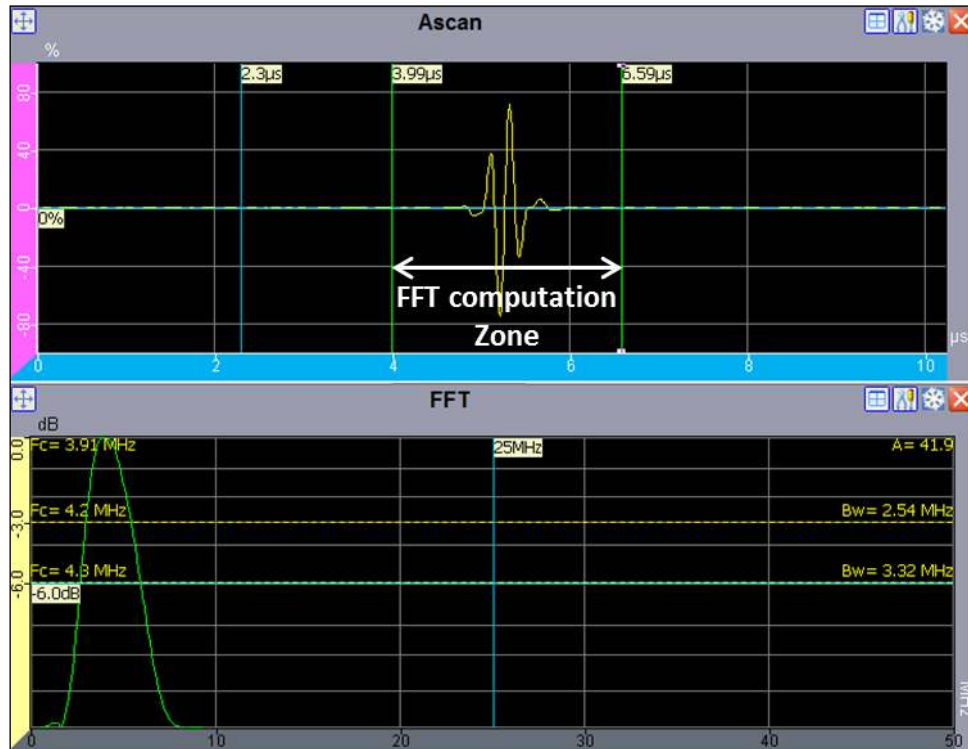


Figure 44: Zone of the FFT computation

- Electronic B-scan



Clicking on the left icon selects a linear scanning view, clicking on the right icon selects an angular scanning view. The electronic B-scan view (linear or angular) is now automatically selected when in one of the following cases:

- the angular B-scan view is selected when the number of sequences is 1 and the number of shots is >1,

- the linear B-scan view is selected when the number of shots is 1 and the number of sequences is >1,

If both numbers of sequences and shots are greater than 1, the user manually selects the type of electronic B-scan. The electronic B-scan represents sequences, shots or channels as a function of time.

- **Corrected B-scan:** This view represents sequences or shots as a function of distance (e.g. thickness). The corrected B-scan accounts for beam orientation and material velocity specified in the configuration panel. This view projects the B-scan in the specimen geometry (also defined in the configuration panel) for a more realistic display of ultrasonic data.
- **B-scan channels:** Displays all elementary channels for a given sequence and a shot according to time of flight. For a given set of (salvo, sequence, shot), the "B-scan channels" represents the signal amplitudes of each elementary channel included in the selected set, as a function of time.
- **B-scan FFT:** Corresponds to the Fast Fourier Transform of each signal of the current B-scan. This view represents the FFT of each A-scan present in the selected B-scan.
- **Horizontal Echodynamic curve:** This view represents the maximum signal amplitude as a function of time. The maximum amplitude is picked up over the number of sequences for an electronic B-scan, over the number of positions for a mechanical B-scan. More generally, the horizontal Echodynamic curve represents the maximum amplitude over the unit representing the horizontal axis, as a function of the unit representing the vertical axis.
- **Vertical Echodynamic curve:** This view represents the maximum amplitude over time. The maximum amplitude is displayed as a function sequence for an electronic B-scan, and as a function of position for a mechanical B-scan. More generally, the vertical Echodynamic curve represents the maximum amplitude over the unit representing the vertical axis, as a function of the unit representing the horizontal axis.
- **Corrected complete Salvo:** This view displays the superposition of all electronic corrected B-scans included in the selected salvo.
- **CAD + 3D:** This view displays the Corrected B-scan in 3D, along with the CAD specimen (if present).
- **CAD + 3D full salvo:** This view displays all Corrected B-scan included in the selected salvo, in 3D, along with the CAD specimen (if present).
- **Parameters summary view:** Displays the data of electronic, probe, delays laws and UT parameters used in the inspection.

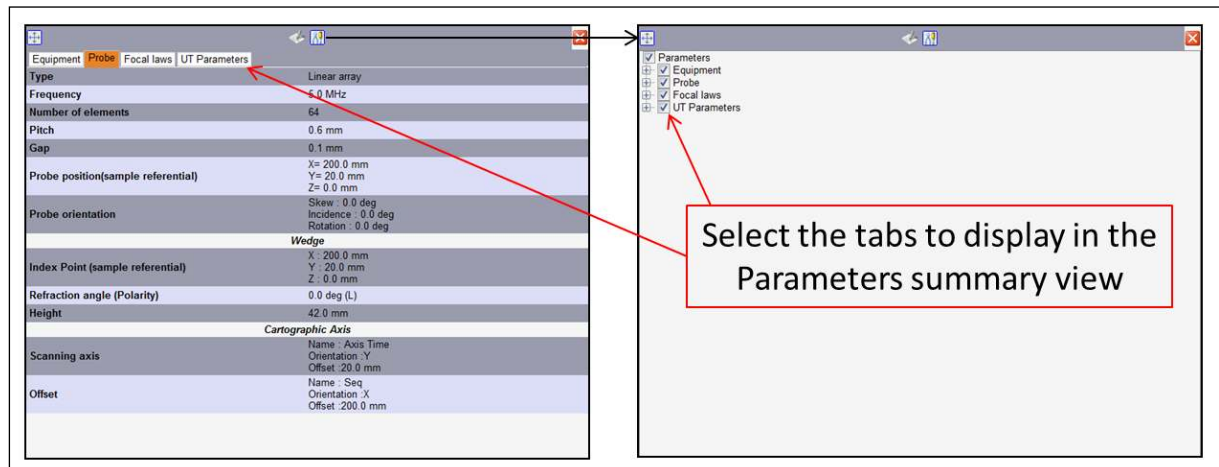


Figure 45: Parameters summary view.

2.3. Selection and positioning of graphics

To choose and organize data viewers in the workspace, the "drag and drop" process is used. To select the type of view to be dropped in the workspace, click on the "windows" icon. A selection of available displays then pops up and the user can choose from the available menus and sub-menus. Simply move the mouse onto an item of the list to let an eventual sub-menu pop up. When the type of display is chosen, click on the selected option, drag (keep the mouse pressed) and finally drop the view into the workspace (release mouse). Before dropping the chosen view in the workspace, the user can choose the position of the new display with respect to the ones already present. Before releasing the mouse click, the mouse icon changes as follows:

- « ← » (inversely « → »): The new display will be located on the left (inversely on the right) side of the existing view.
- « ↓ » (inversely « ↑ »): The new display will be located below (inversely above) the existing view.
- « + »: The new display replaces the existing view if present.
- « Ø »: The position of the new display is not allowed.

Using drag and drop, many graphic types can be displayed at the same time (e.g., A-scan, electronic B-scan, mechanical B-scan, Echodynamic curves, etc.). It is not possible however to display twice the same view of the same data source.

- **Move view**

To change the position of the display, click on the "Move" icon (see next figure), then move the mouse until the positioning icons show up (horizontal and vertical arrows), finally drop the view when satisfied with the new position.

- **Delete view**

To delete one view, click on the red cross icon (see Figure 46).

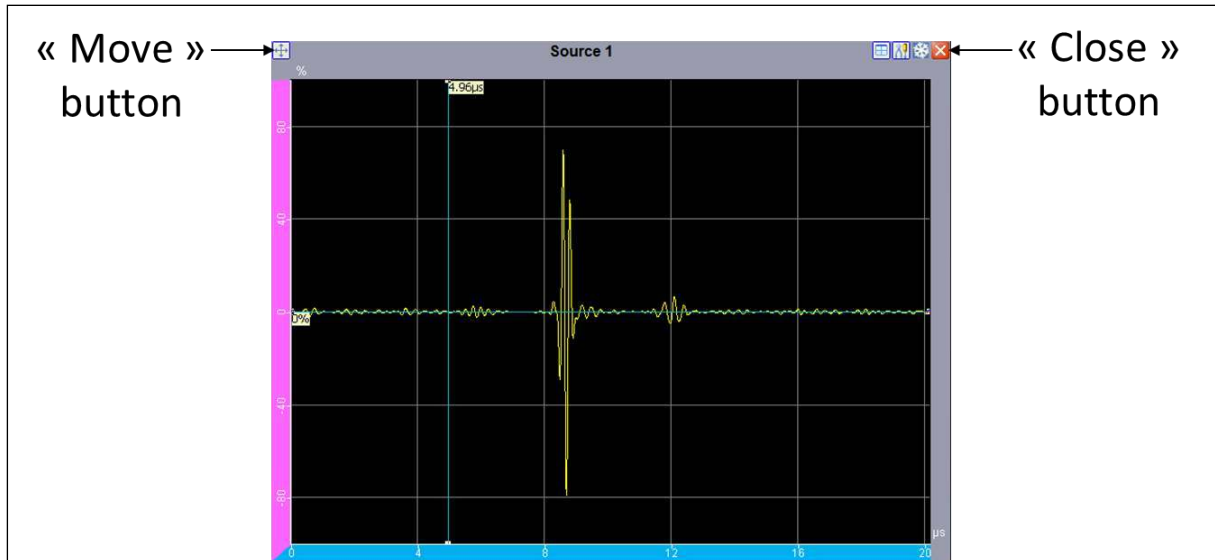


Figure 46 : Close and Move icon of graphic representation.

2.4. Axes units

The user can select/change units to be displayed for most of graphic types. To see available units, click on the unit symbol, at the end of each axis.

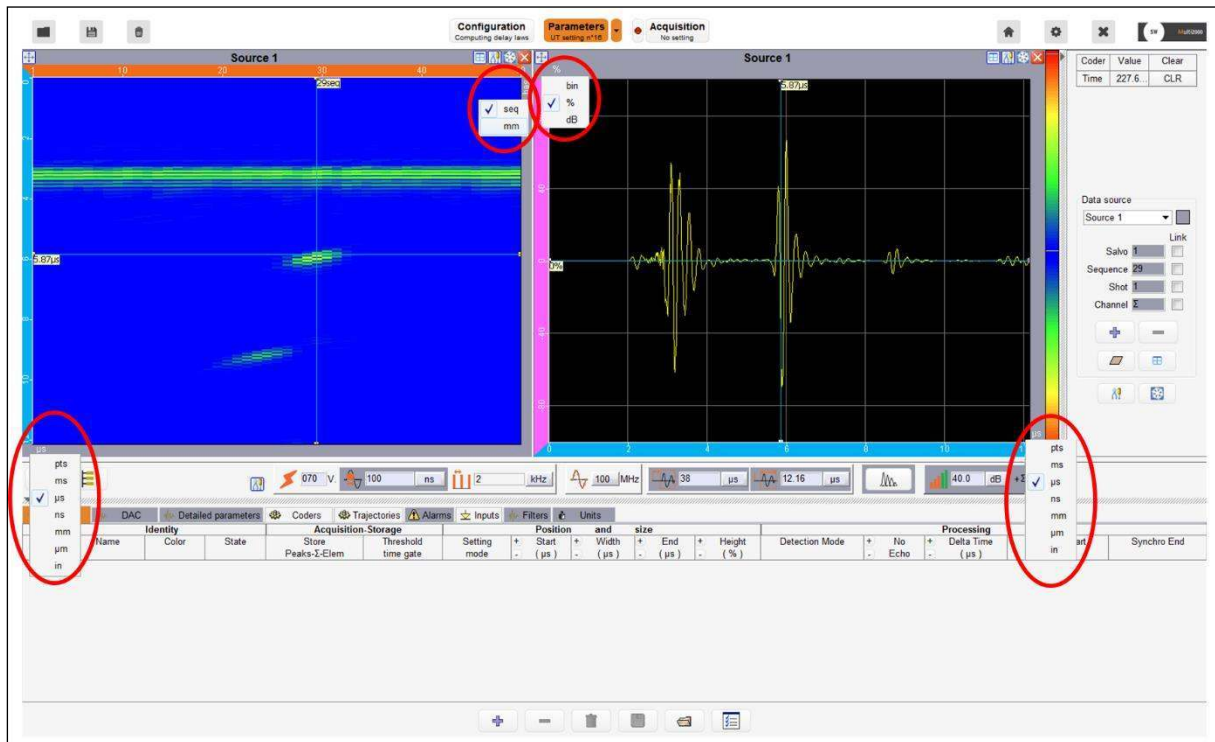


Figure 47: Selection of axes units

2.5. Cursors

Two sliding (horizontal and vertical) cursors are available for A-scan and B-scan views in the **Parameter** panel, and for all graphic types on the **Acquisition** panel. The indication is given at the extremity of each cursor. To move the two cursors simultaneously, click on the intersection of the two cursors, and maintain the mouse click while moving. For the A-scan view displayed in next figure, the vertical cursor shows the time in microseconds, and the horizontal cursor shows the amplitude in percent.

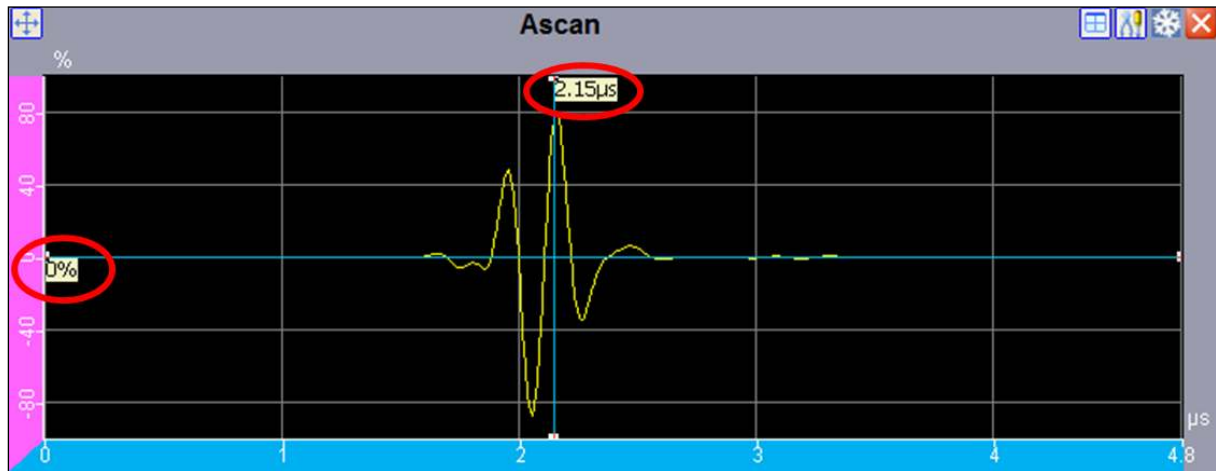


Figure 48: Indicated values on A-scan representation

A right click on the graphic area enables an option menu. The different options of this menu are presented in section 2.7.

- **Cursors format**

A right click on cursors opens a list, when selecting « format » option, the following window appears:

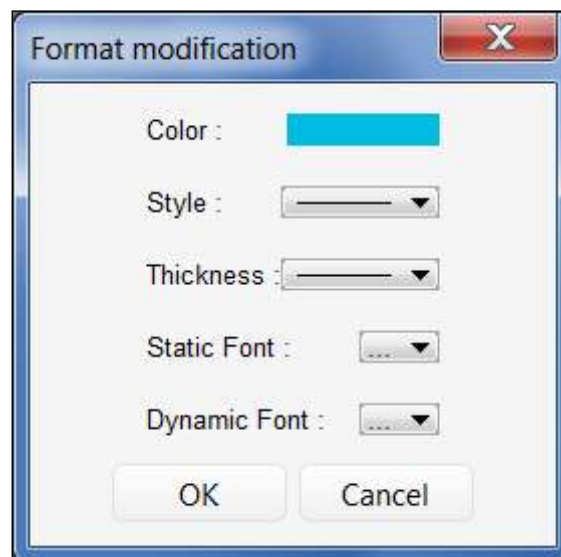


Figure 49: Format modification of cursors

The user can modify parameters. All parameters of cursors are saved with operator account.

The dynamic font is activated when the user selects cursors.

- **Hide labels**

Right mouse click on cursors opens a list, when selecting « hide labels » option, the labels of cursors are hidden.

- **Hide cursors**

A right click on cursors opens a list, when selecting « layers » option, the user can hide the cursors in selecting “cursors”.

- **Linked cursors**

For graphics associated to the same data source, all cursors are linked. It means that moving one cursor of one type of graphic will synchronize the position of cursors representing the same unit on all other graphic views of the data source. For instance, moving the time cursor of the A-scan view will automatically update the position of the time cursor on the B-scan.

To link graphic views associated to distinct data sources, tick the link box of data to be synchronized on each data source.

Example: to link the B-scan (sequence) of two data sources, tick the link box next to the sequence parameter in the data source panel. Once this done for each data source, the cursors are linked, i.e. moving one will update accordingly the other one. Cursors can be linked for sequence, shot and channel.

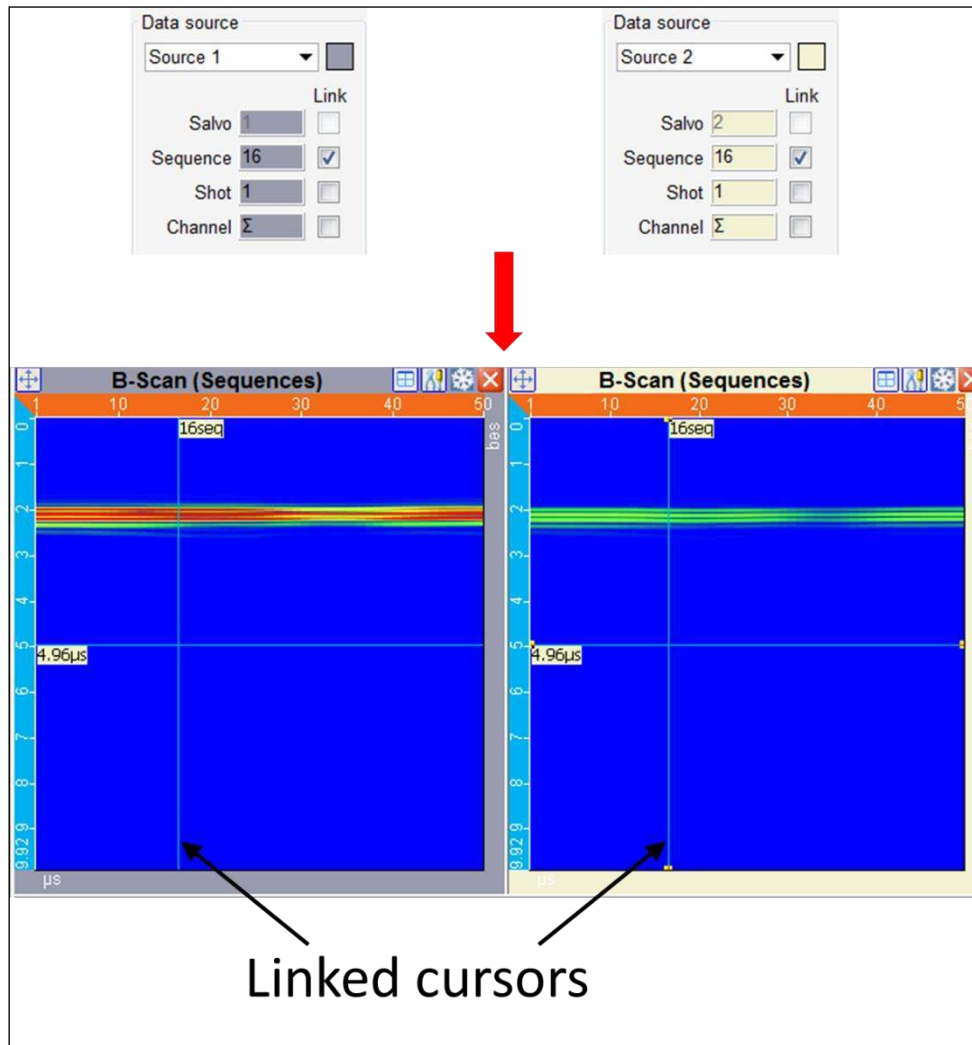


Figure 50: Linked cursors of data source 1 and 2

2.6. Zoom and pan

- **Dynamic zoom**

To enlarge a specific area of a graphic view, press the CTRL key and left click on the mouse. A green rectangle follows the motion of the mouse and shows the area that will be blown up on release.

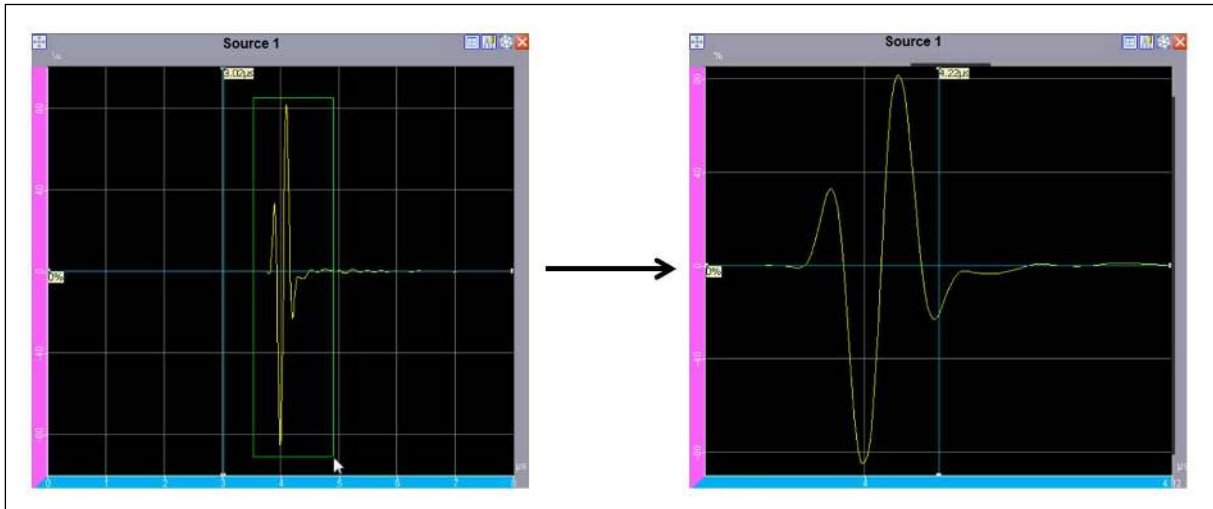


Figure 51: Dynamic zoom

- **Automatic zoom**

Right click on the background of the view, a popup menu will appear with a zoom option, under "action". See section 2.7.5 for more details.

- **Pan the zoomed area**

To pan the zoomed area, press the SHIFT key and move the mouse. Keep the key pressed while moving the mouse.

- **Resume initial view**

To reinitialize the view, double-click on the background of the graphic view.

2.7. Graphic tools

2.7.1 Pop-up menu (right click)

Right click on the background of graphic views to pop up the menu showing available graphic tools.

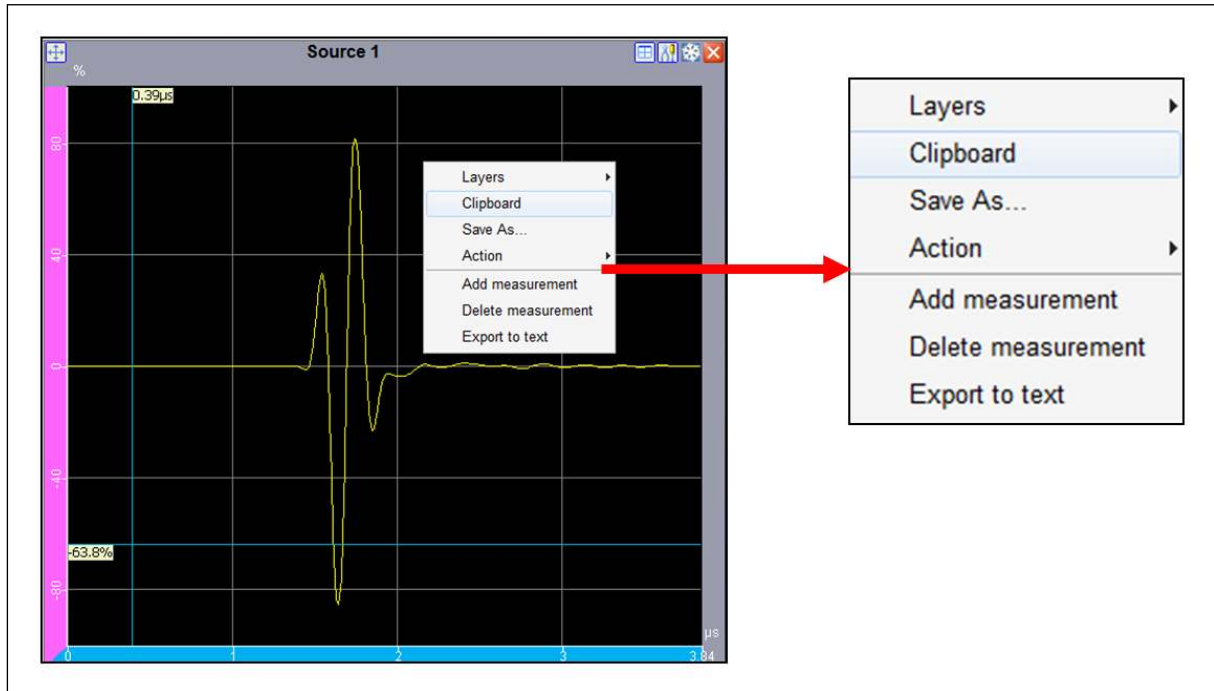
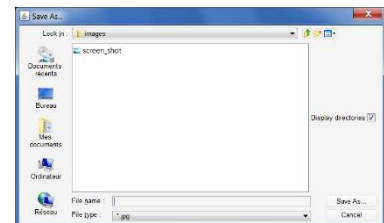


Figure 52: List box available from view panel parameter

The pop-up menu shows the following options:

- **Layers:** Displays or hides the following items: DAC, Cursors, FFT cursors and Map cursors (for A-scan view). Tick or un-tick the layers (DAC, cursors, FFT cursors, etc.) to have them superimposed on the graphic view, to make them invisible.
- **Clipboard:** Copies the graphic view to clipboard.
- **Save as:** Saves the graphic view as an image.

Figure 53: Save the view.



- **Action:** Click on the “Action” menu to show select, zoom and pan tools. See section 2.7.5 for details.

- **Add measurement:** Click on “Add measurement” to activate the measurement tool. Using the mouse, grab and stretch the measurement-box boundaries. Dimensions are shown on the graphic view, next to the measurement box.

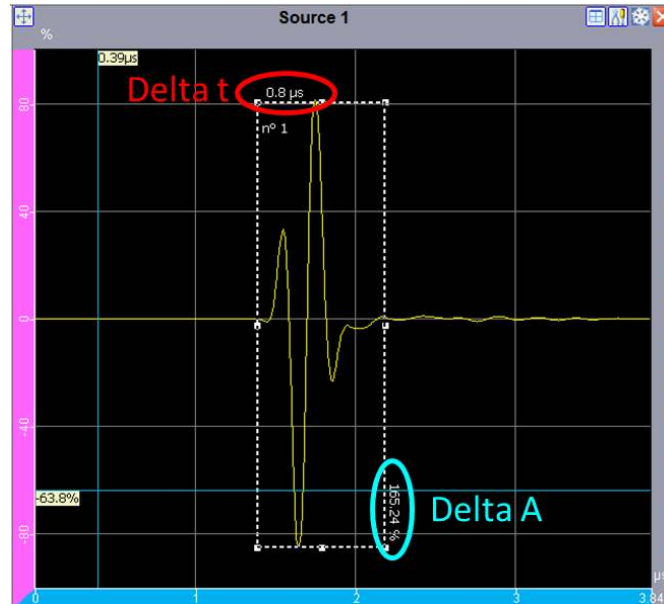


Figure 54: Measure box

- **Suppress measure:** To delete the measurement box, click on “Suppress measurement”.
- **Isometric display:** Click on "Isometric display" to display the graphic view in an orthonormal basis. Both axes of the graphic view will be represented with the same scale.
- **Export to text:** Click on “Export to text” to export the data displayed in the graphic view as text. See section 2.7.3 for more details.

2.7.2 Graphic view toolbar

On the parameters screen, in the top of views, four specific icons are available. The graphic view toolbar is located at the top right corner of each graphic view.

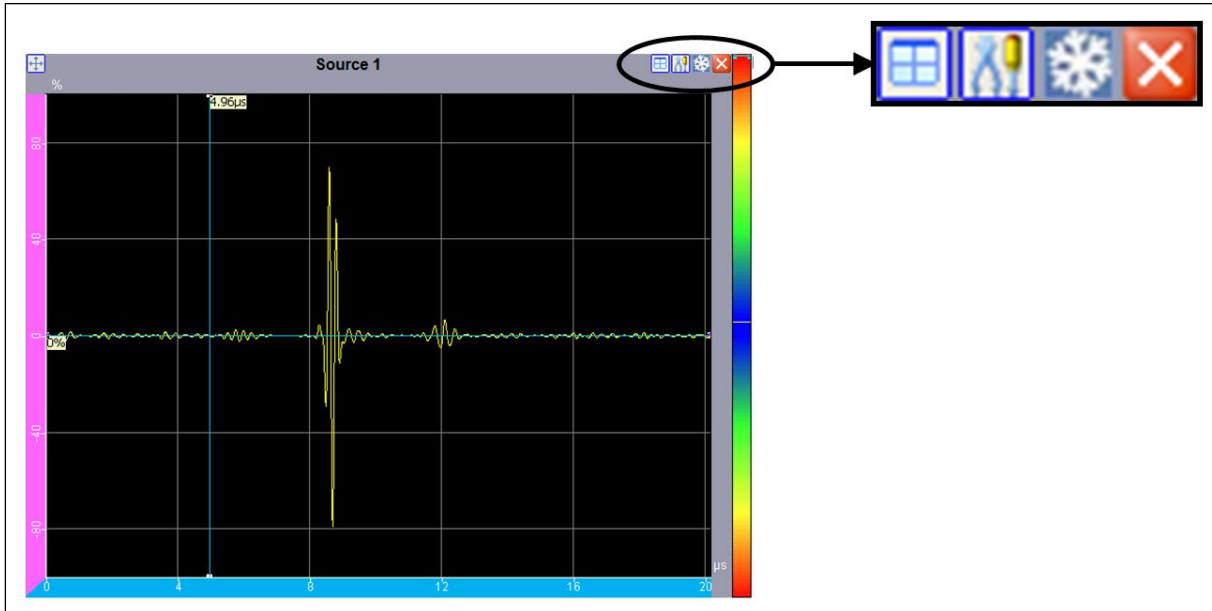
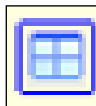


Figure 55: The graphic view toolbar

- « **Available views** » icon: Click on this icon to show related available graphic views.



- « **Freeze** » icon: Click on this icon to freeze the graphic view.



- « **Close** » icon: Click on this icon to close the graphic view.



- « **Toolbox** » icon: Click on this icon to show available display tools.

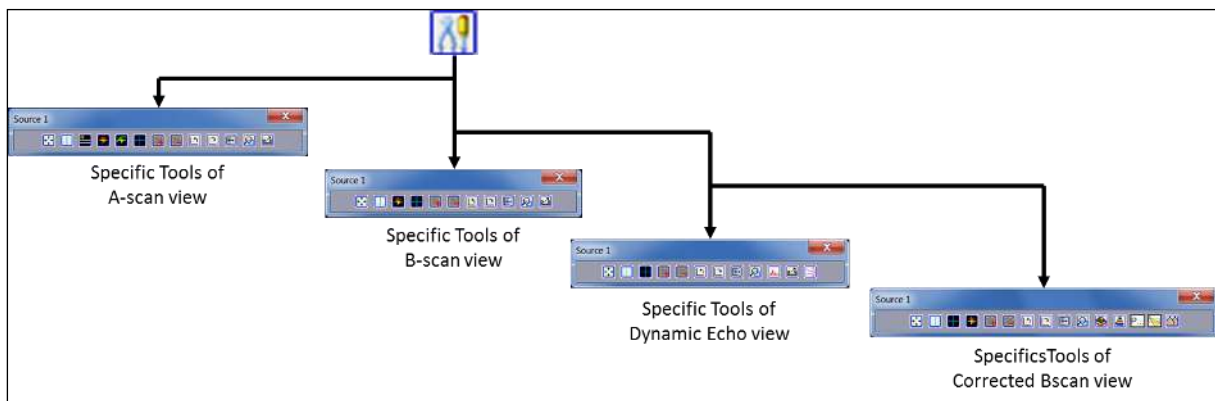
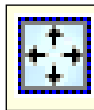


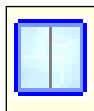
Figure 56: The display-toolbar menu depends on the graphic type

Available options list of the toolbox: Available menu of the graphic-view toolbar:

- « **Full screen** » icon: Click on this icon to display the graphic view without title and axes.

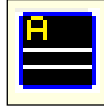


- « **Juxtaposition** » icon: Click on this icon to display side by side graphic views with a common axis.



- « **Show/Hide Amplitude Colormap cursors** » icon: Click on this icon to enable the colour bar cursors. The two white lines cursors displayed on the A-scan view are linked to the colour bar.

These cursors set minimum and maximum thresholds for the colour coding (see effects on the B-scan views).



- « **Show/Hide Cursors of views** » icon: Click on this icon to enable/disable cursors. This icon has three states:



: Blue reference cursors for horizontal and vertical axes.



: Pink relative cursors with respect to reference cursors.



: No cursors displayed.

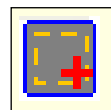
- « **Show/Hide Gate** » icon: Click on this icon to show or hide the gates on the graphic view (add or suppress the overlay).



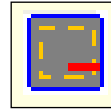
- « **Show/Hide DAC curve** » icon: Click on this icon to show or hide the damping amplitude-curve on the graphic view (add or suppress the overlay).



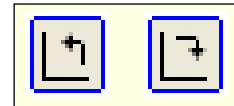
- « **Add measurement** » icon: Click on this icon to enable the measurement tool. Using the mouse, grab and stretch the measurement-box boundaries. Dimensions are shown on the graphic view, next to the measurement box.



- « **Remove all measurements** » icon: Click on this icon to disable the measurement box.



- « **Rotate** » icons: Click on these icons to rotate the graphic view 90 degrees clockwise and anti-clockwise.



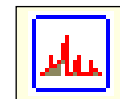
- « **Flip** » icon: Click on this icon to flip horizontally the graphic view.



- « **Desynchronize/synchronize zoom** » icon: Desynchronizes zoom of the selected view or synchronizes the zoom of the view to all views of the same salvo. This icon has two states. By default, zoom of all salvo views are synchronized. This function is not available on corrected views.



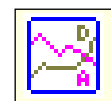
- « **Persistence** » icon: Click on this icon (available for echodynamic views only) to keep only the maximum values displayed on the graphic view, over the duration of the measurement. For instance with this option activated, if the probe is moving, the horizontal echodynamic curve will display the maximum amplitude over the probe displacement for each time of flight.



- « **Export to text** » icon: Click on this icon to export the displayed data in a text file.



- « **Amplitude and t-o-f** » icon: Click on this icon to display amplitude and time-of-flight measurements on the same vertical echodynamic curve. This icon enables the time of flight curve only, or both the time of flight and the amplitude curves.



- « **Show / Hide gate editor** » icon: Click on this icon to enable/disable the gate editor on the corrected B-scan graphic view. Grab and distort the gate-by-shot contour using the mouse. This tool simplifies the gate shot by shot settings described in section 8.4.



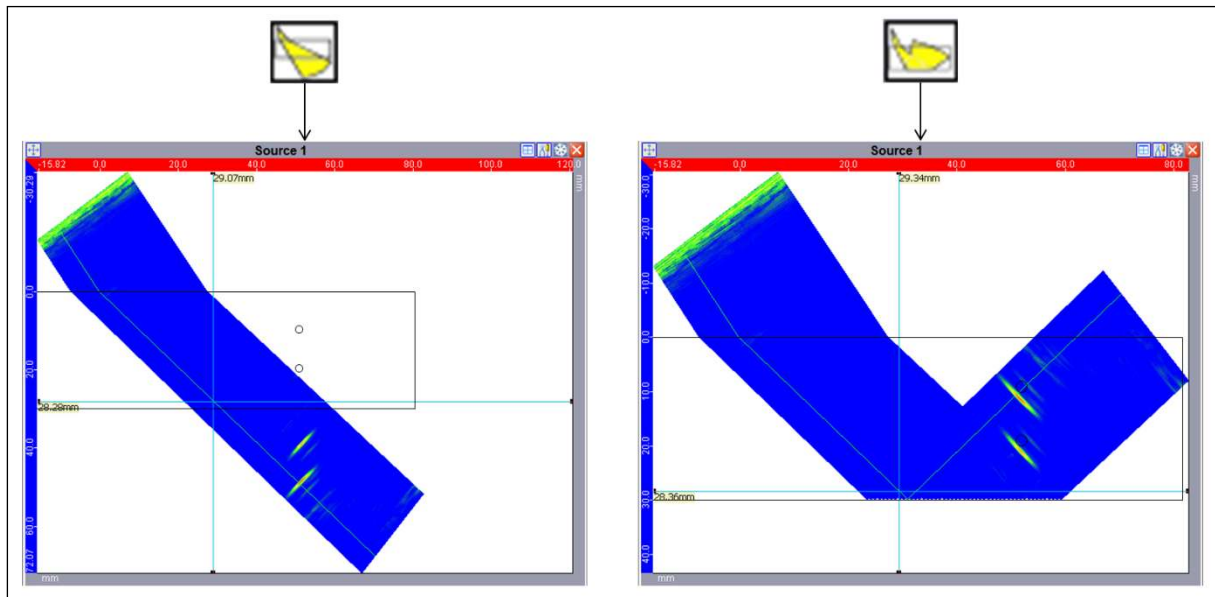
- « **Fit on screen** » icon: Click on this icon to display the full UT signal and full CAD profile in the graphic view.



- « **Shear wave and Pressure wave** » icons: Click on this icon to display B-scans accounting for pressure-wave or for shear-wave sound velocity and direction. The values of the sound speed are reminded in the "units" tab.



- « **Sound-path view** » icon: Click on this icon to display corrected B-scans including back-wall reflections due to the bottom of the inspected material.



- « **Choice of sets to display** »: Click on this icon to select the corrected B-scan you want to display on the view.



2.7.3 Export to text

The export to text function is accessible (only for some of the views):

- By a right-click on the graphic view background;
- From the "export to text" icon located in the graphic view toolbar.



Figure 57: "Export to text" icon

To enable the graphic view tool bar, click on this icon .

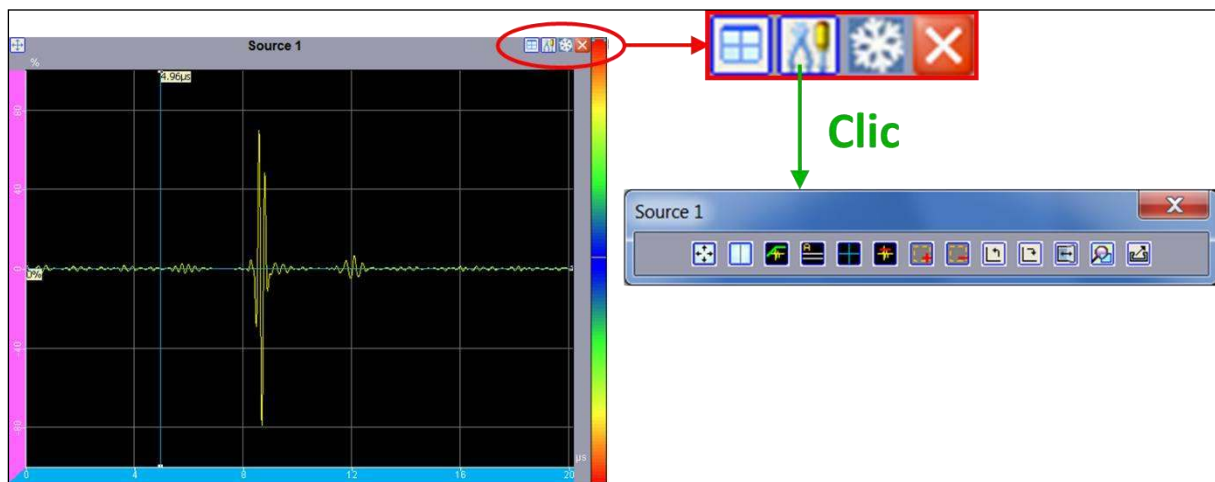


Figure 58: Graphic view toolbar

The "**export to text**" function converts data displayed in the graphic view into text format.

The "**export to text**" function is available in Parameters and Acquisition for the following graphic views:

- A-scan
- Electronic B-scan (shots and sequences)
- B-scan Channels
- All echodynamic curves

To export Cscan, use the "Export to text" feature in the home → option menu

Save as

Clicking on the **"export to text"** creates a ".txt" text file and offers a **"save as"** menu. The default name is suggested after the graphic view the signal is exported from. However, the user can edit and change the suggested name, as well as the saving location (C:/Acquire/desk/images by default).

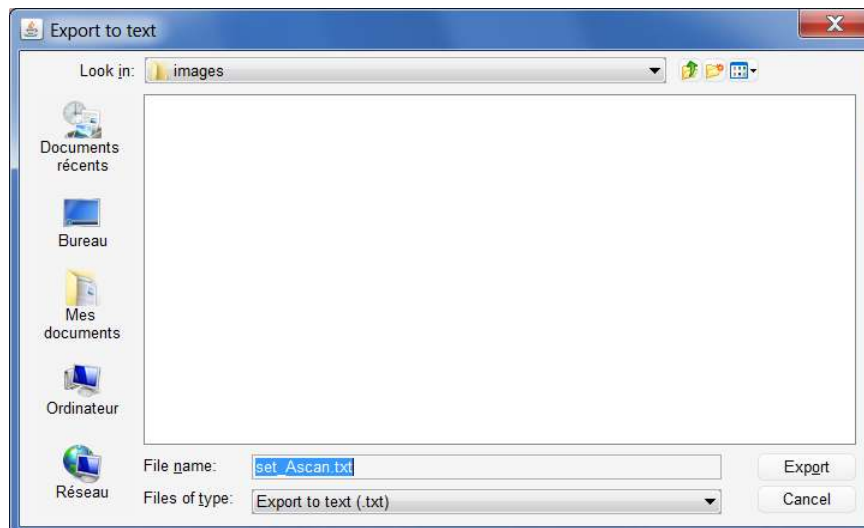


Figure 59: "Export to text" dialog box

Format of exported data

Data are exported in the form of a spreadsheet (Excel or Open Office compatible). Values are separated by a semi colon ";". In the data matrix, all columns have got the same number of lines. This function works for Ascan and Bscan only. To export other data, refer to Home → Option → Data export.

Most spreadsheet viewers have a limitation of 256 columns and 65536 lines. Hence, data are formatted so that most of information fits vertically (filling up lines). For each ".txt" text file, the data structure is as follows:

- **A-scan**
 - Data type: amplitudes
 - Columns: always 1 (1 A-scan)
 - Lines: as many lines as samples
 - File name: set/acq/_Ascan.txt
 - Lines: as many lines as samples
 - File name: set/acq/_BscanElecEchoH.txt
- EchoH:
 - Data type: amplitudes
 - Columns: always 1

- Lines: as many lines as samples
- File name: acq_DscanEchoH.txt

- EchoV:
 - Data type: amplitudes
 - Columns: always 1
 - Lines: as many lines as entries for the overlapping axis
 - File name: acq_DscanEchoV.txt

- Electrical Soundpath-C-scan, EchoH:
 - Data type: distances
 - Columns: always 1
 - Lines: as many lines as shots or sequences
 - File name: acq_CscanElecTimeEchoH.txt

- Exported values

Exported values are between [-32,768; +32,767].

During acquisition for a soundpath Cscan, exported data are the peak values taken with respect to the beginning of the acquisition gate. Exception values for a soundpath Cscan are as follows:

- 32767: No measurement
- 32766: No echo
- 32765: Loss of synchronization
- 32764: Gate out of bounds of the gate (in case of synchronized gate)
- 32763: Gate not enabled (Input TTL disabled)

During acquisition and for Amplitude views (A-, B- and C-scan), exported data are amplitude values. Exception values for Amplitude views are as follows:

- 1: No measurement
- 2: No echo
- 3: Loss of synchronization

- 4: Gate out of bounds (in case of synchronized gate)
- 5: Gate not enabled (Input TTL not enabled)

2.7.4 Cursor parameters

To make cursors visible, right-click on the display window, select cursors on the popup menu.

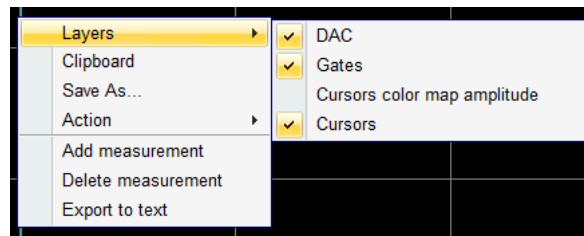


Figure 60: Opening the cursor menu

To edit cursor properties, right-click on the cursor:

- **Format:**

To modify the appearance of the cursor, right-click on the cursor and click "Format" on the popup menu. In the format dialog box, the user may edit the color, the font and the line size of the cursor.

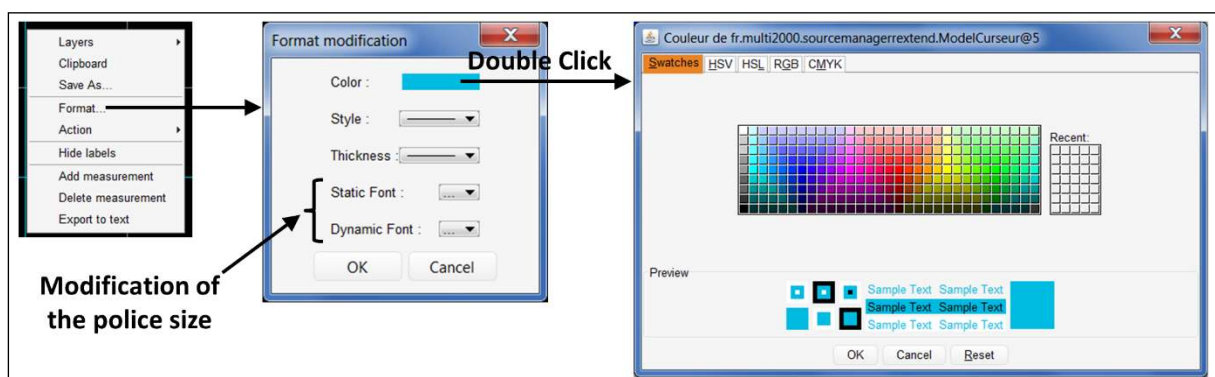


Figure 61: Dialog box of the cursor's format

- **Move labels:** To move labels of positions cursors from one end to the other, click on the "move" option of the popup menu.
- **Hide labels:** To hide the positions values of cursors, click on the "hide" option of the popup menu.

2.7.5 Zoom, pan and reset parameters

To enable the zoom function, right-click on the display window and select "zoom".

- **Action**

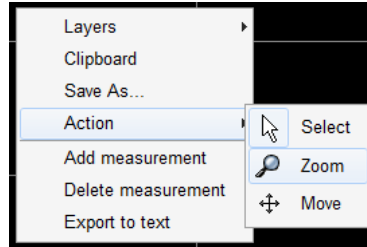


Figure 62: The zoom function

- **Zoom:** After selecting "zoom", the cursor becomes a magnifier. Simply click on the zone of interest in the display window to zoom in. Press CTRL and click at the same time to zoom out.
- **Move:** Click on "Move" to pan the display window. Keyboard shortcut equivalent: press SHIFT to enable the pan mode, and release the SHIFT key to disable it.
- **Select:** Click on "Select" to enable the select mode again and to inhibit "**Move**" and/or "**Zoom**" modes.

- **Shortcuts:**

Whenever, by pressing the Shift key and moving the mouse, the 'zoom' can be moved.

Once the Shift key released, the 'Move' mode is disabled.

Press "ESC" to enable the mouse again and escape the "Zoom" and 'Move' modes enabled from the "Action" menu.

2.8. Full screen views

The user can hide some option panels to leave more room for the graphics display. There are two textured bars on the GUI. One is located between the "data source" panel and the display workspace (vertical), and the other one (horizontal) is located between the workspace and the "parameters" panel. Click on the vertical textured bar to hide the "data source" panel. Click on the horizontal textured bar to hide the "parameters" panel. Click again on the textured bars to come back to previous display options.

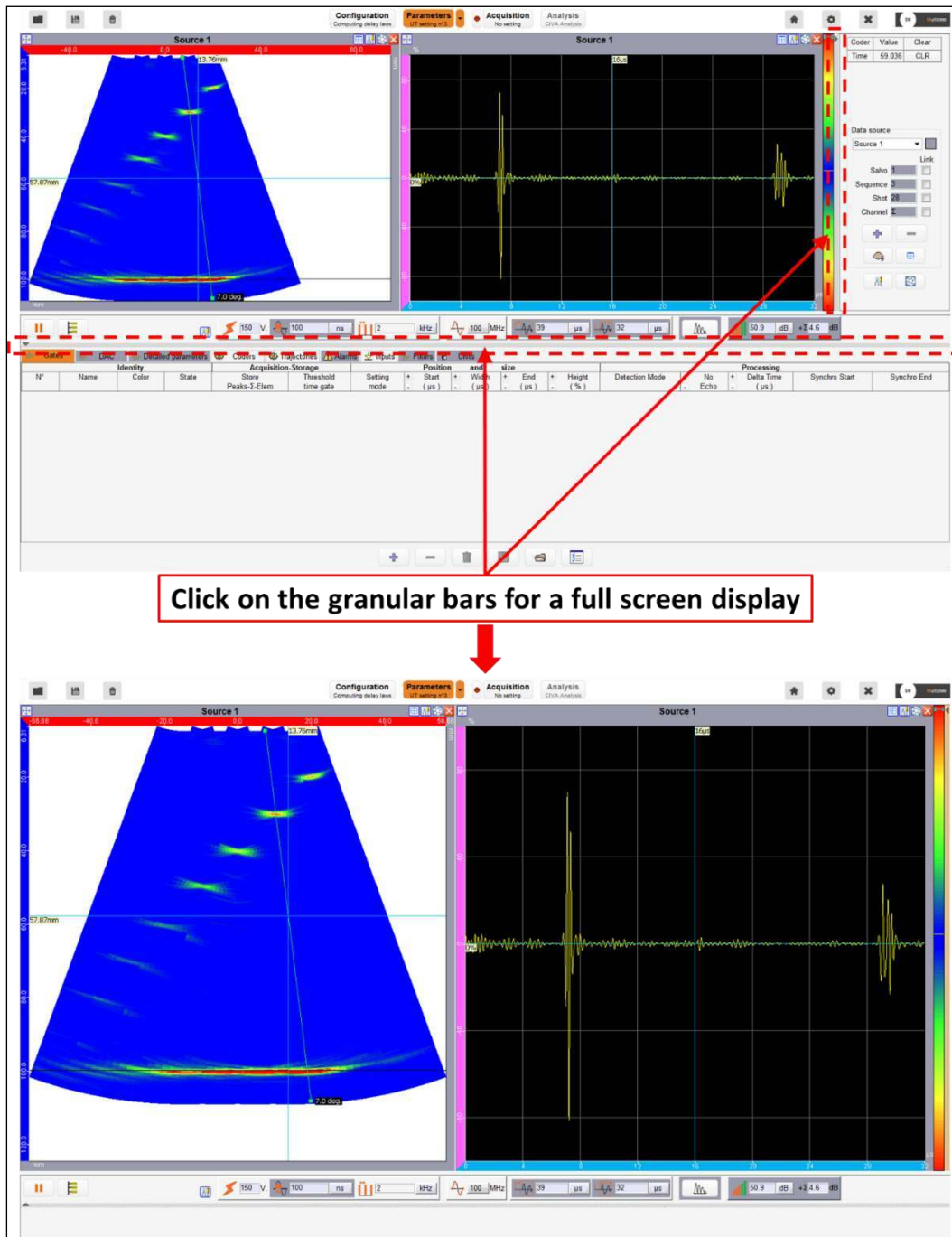


Figure 63: Full screen display

2.9. Color scale

By default, two color scales are available: a color scale and a grayscale. The threshold can be edited using the color bar cursors.

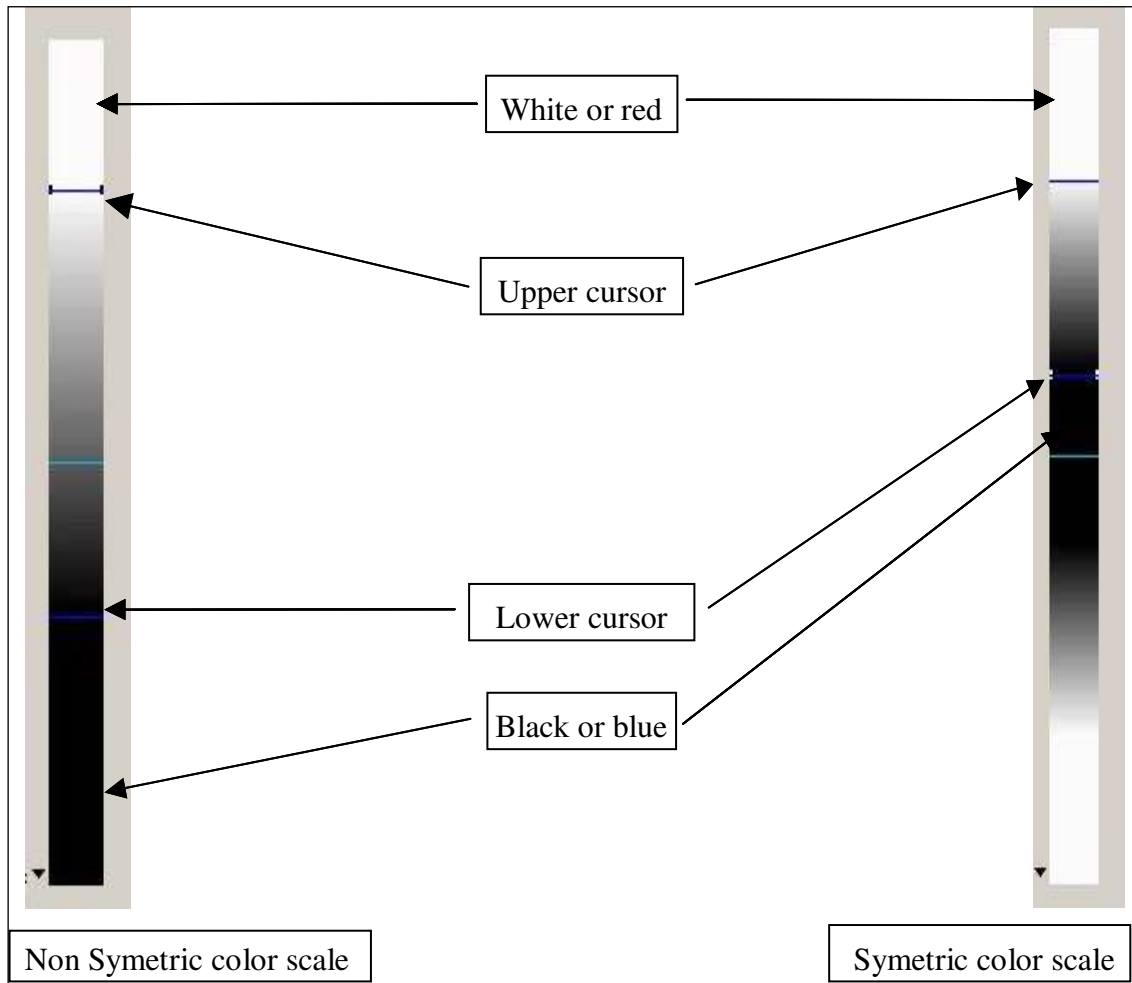


Figure 64: Adjustment of dynamic range of color scale

A right-click on the color bar enables the color bar popup menu.

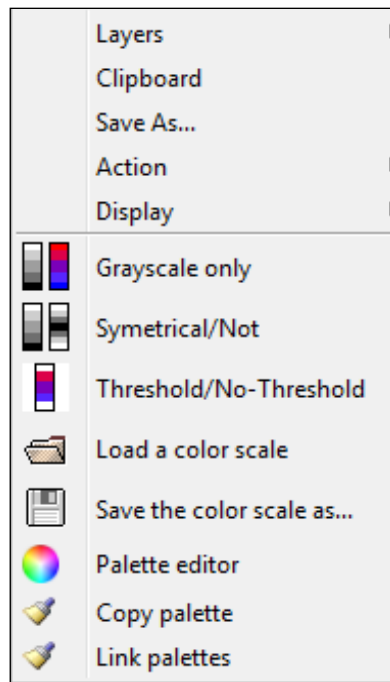


Figure 65: Color scale menu

- **Grayscale only:** Change the current color scale to grayscale.
- **Symmetrical / Not:** Enable/disable the symmetry of the color bar.
- **Threshold / No-Threshold:** Maintain / not maintain the last color of the scale when the signal is over the threshold.
- **Load a color scale:** Select this option to load a color scale (.xml file).
- **Save the color scale as...:** Select this option to save the current color scale.
- **Copy palette:** Select this option to copy the current color scale to the other data source.

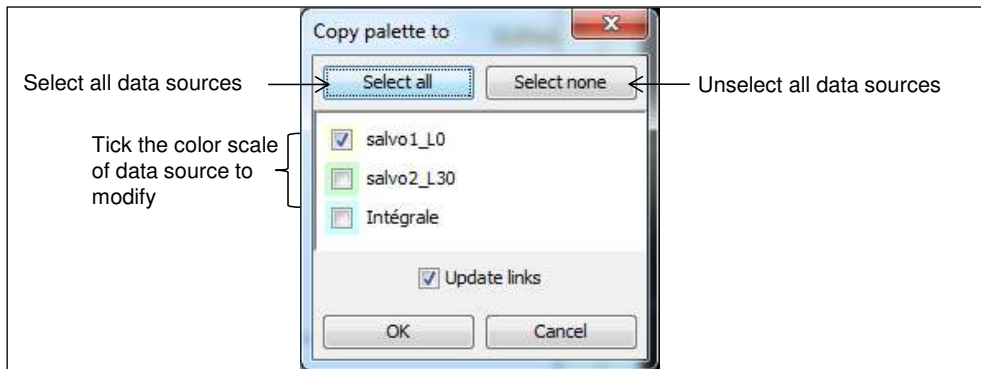


Figure 66: Copy palette

- **Link palette:** Select this option to link the current color scale with other color scale of the other data sources. If any modification in one of linked color scale occurs, it will automatically be applied to other linked color scales.

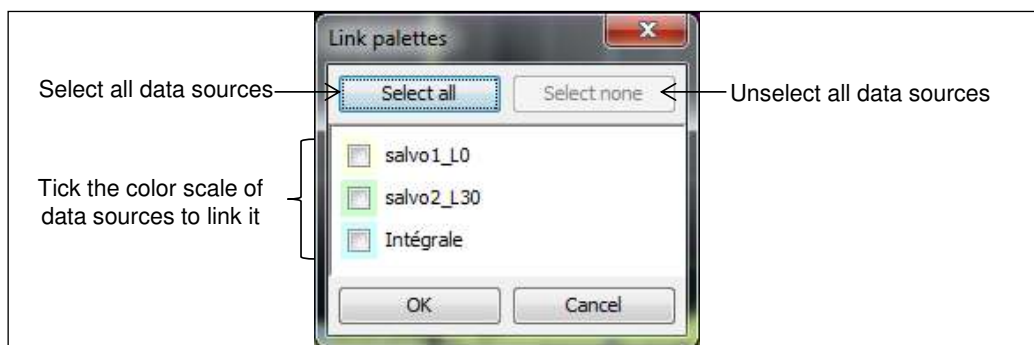


Figure 67: Link palettes

- **Palette editor:** Select this option to create your own color bar.

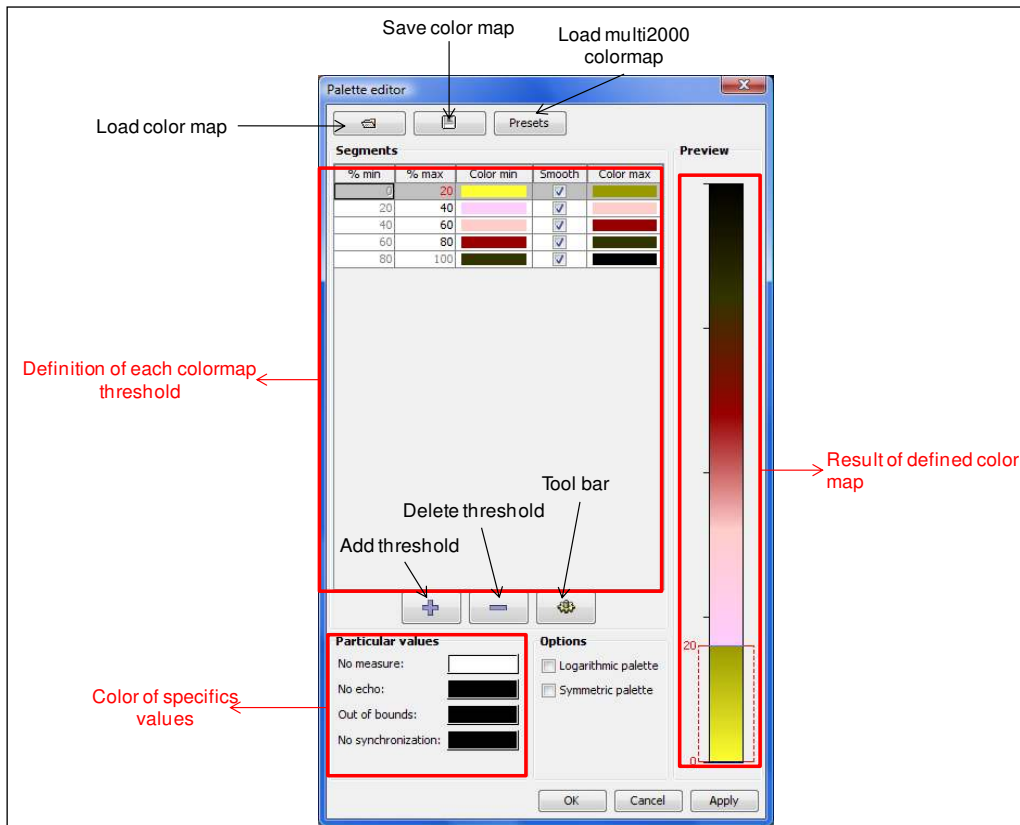


Figure 68: Palette editor

3. High speed modes (Panther only)

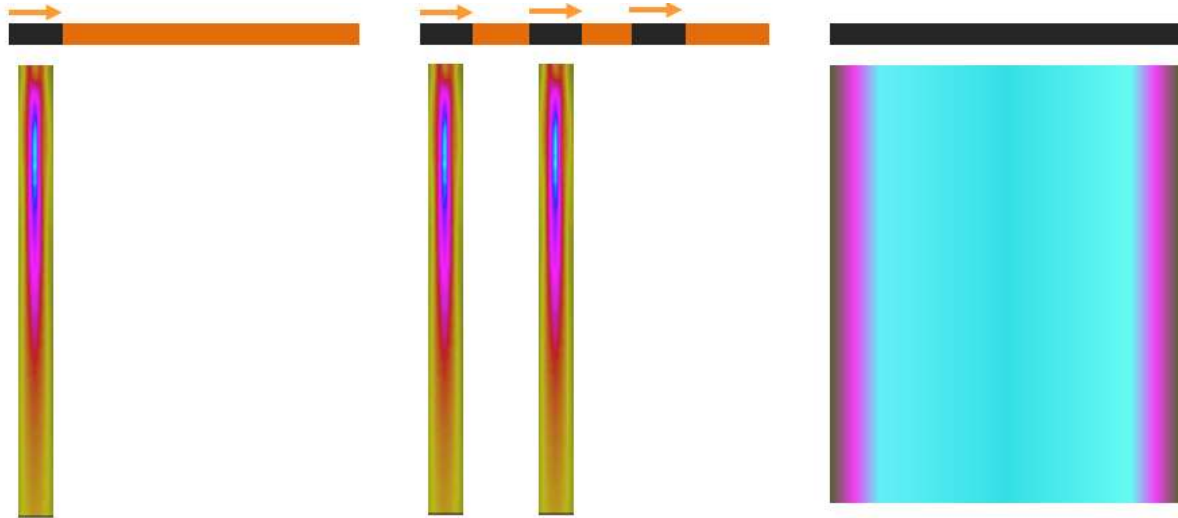
For Panther, two types of high-speed modes are available

- Full Parallel mode (single shot, multiple reconstruction)
- Mixed mode (multiple beams in parallel)

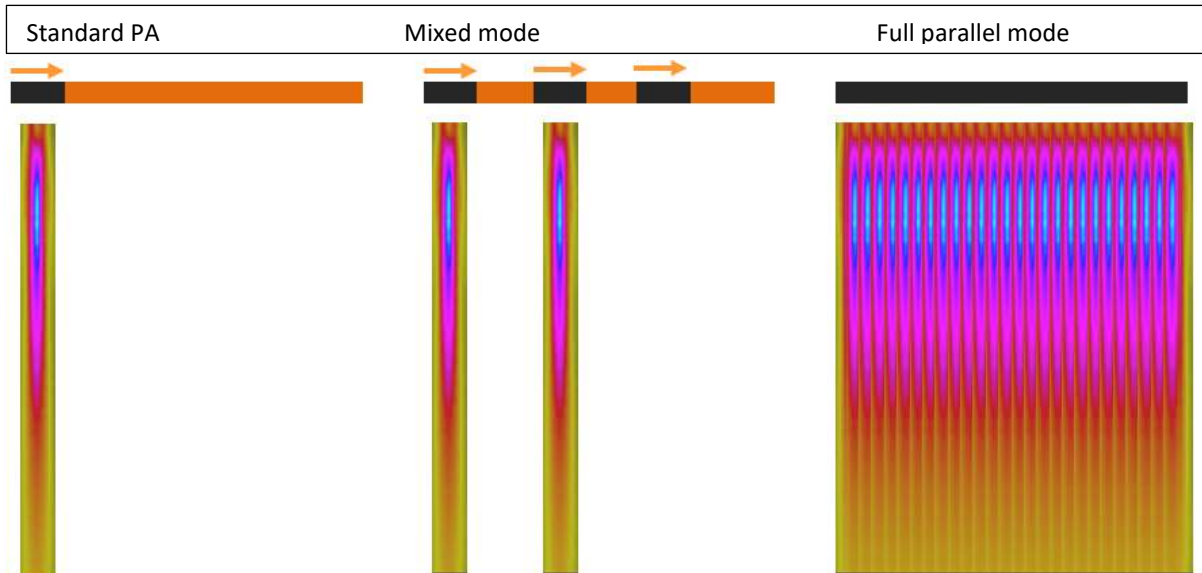
The limitation of available modes depends on the Panther model you have (number of multiplexed channels or full parallel).

Emission

Standard PA	Mixed mode	Full parallel mode
-------------	------------	--------------------



Reception



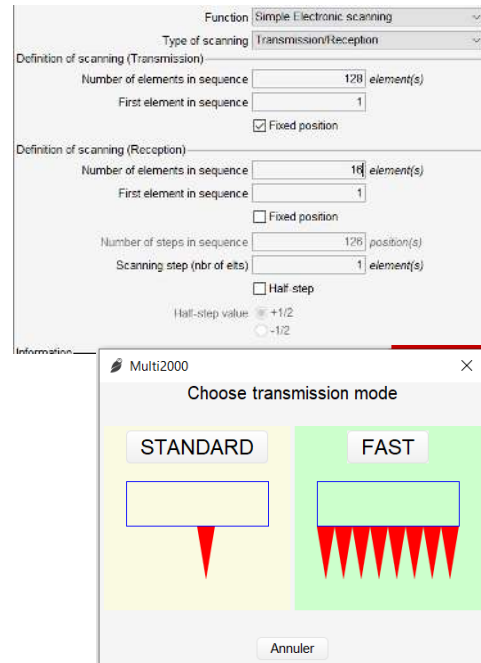
1.1 Full parallel mode

To set full parallel mode, in Civa, select transmission/reception.

Set the emission as full aperture, and tick “Fixed Position”

Select your aperture and step in reception.

When applying, select “Fast”



1.2 Mixed mode

To set mixed mode, define the scanning as normal PA mode in CIVA.

1.3 Set mixed mode and display parallel level

To display the level of parallelism and change a setting to mixed mode, select



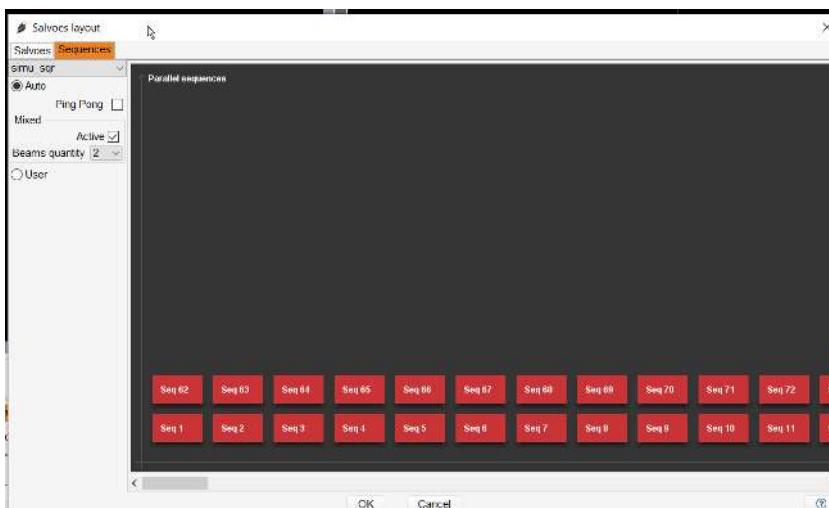
This menu appears. In Salvoes tab, the temporal unfolding of salvoes is displayed. Two salvoes executed in parallel are displayed one above the other.



For Panther only:

In the sequences tab, the user must select the salvo. The sequences of each salvo is displayed. Two sequences executed in parallel are displayed one above the other.

When ticking Active in the Mixed mode area and choose the number of beams in parallel, the Acquire software will select the sequences to be executed in parallel.

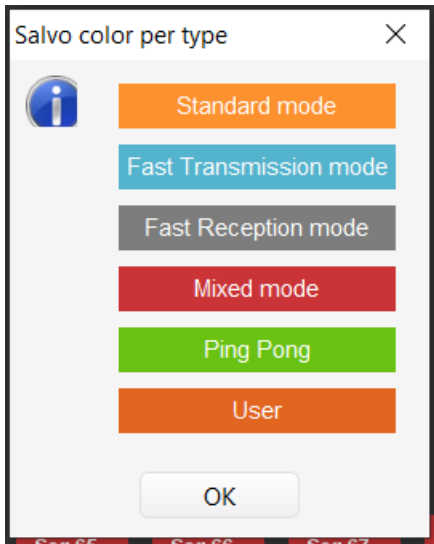


When ticking “Ping Pong”, the sequences will be mixed to try to reduce the phantom echoes.

When ticking the “User” mode, the user will be able to move the sequence position using the mouse.

Two sequences executed at the same time must not use common sequences. Acquire will refuse the setting when trying to apply the setting if it is the case.

The question mark will show the color code for the salvos/sequences.



To check if parallel modes/ mixed mode are taken in account, it can be useful to see performance menu and check maximum inspection speed computed by Acquire.



Fast modes have direct incidence on ultrasonic physics, can modify acoustic performances (beam shape, acoustic artifacts...) and be incompatible with some NDT standards. Check if your application is possible when these modes activated.

4. General parameters

These applied parameters are identical on all channels. Limits of settings variation are summarized at the end of the user's manual in "**Specifications**".

General parameters are:

- Transmission
- Digitizing
- Displayed signal
- Gains

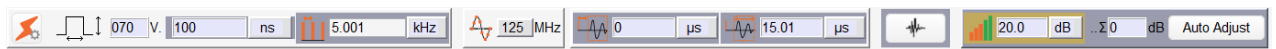


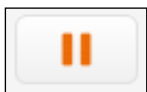
Figure 69: General settings panel

Adjustable parameters (Voltage, pulse width, PRF, Delay, Depth and Gain) can be modified by clicking on the area by:

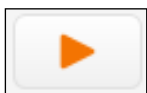
- Directly typing the required value with the keyboard.
- Moving the mouse roll.
- Using the up and down keyboard arrows
- Type a formula (example: $5+3*0.75$)

Limit values depends on the electronics connected and can depends on other parameters.

The user can stop the transmission pulse on the electronic system with the display icon in the figure below:



: Transmission pulse enabled / sequencer paused. Click to disable.



: Transmission pulse disabled / sequencer restart. Click to enable.

4.1. Transmission

- **Voltage**

This command adjusts transmission voltage applied to all channels.

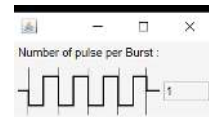


Figure 70: Voltage setting

- **Burst**

Let access to number of burst parameters.

Only possible to go from 1 to 10 on the Panther.



- **Pulse width**

This command adjusts the pulse width applied to transducer elements. Various units are available.

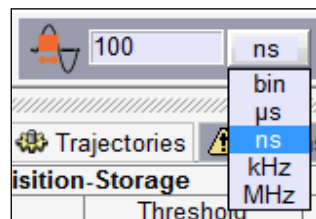


Figure 71: Pulse width setting

Note: From **Detailed Parameters** panel, the pulse width can be adjusted on each channel.

- **PRF**

Adjust the **Pulse Rate Frequency** (inverse of delay between two excitations of a group of elements). Several units are available.

For example, considering one salvo of 2 sequences, 5 shots and a 8 elements aperture (8 active elements) with a 10 KHz PRF: 8 channels are excited at 10 KHz and the salvo repeats at a 1 KHz PRF.

The PRF is calculated by the system after each modification of the parameters (change of digitizing depth for example). The PRF is automatically limited by the testing configuration.

PRF is selectable by Salvo on the Panther.

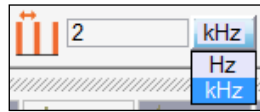


Figure 72: PRF setting

4.2. Digitizing

- **Sampling**

Define the sampling frequency of signals. The unit used is the MHz.

Sampling rate is selectable by Salvo on the Panther.

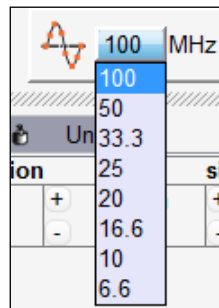


Figure 73: Sampling frequency setting

- **Delay**

This command adjusts the delay before starting digitizing the signal. Various units are available.

Note: Time axis scales always start from ultrasonic shot (A-scan, B-scan...).

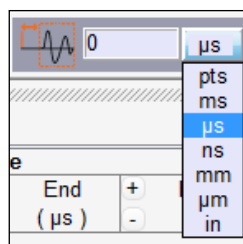


Figure 74: Delay adjustment

- **Digitizing depth**

This command defines the digitizing depth, the number of sample of the signal. Several units are available.

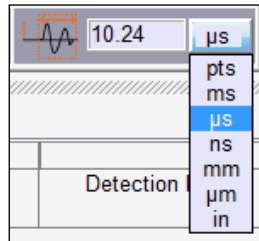


Figure 75: Digitizing depth adjustment

Note: The digitizing depth is limited by the electronic of the system. Limited values are available at the end of the user's manual in "**Specifications**".

4.3. Display rectified signal

The user can display the rectified signal (all amplitude values becomes positive) and save it when this option is validated for Acquisition.



: The displayed signal is unrectified, the user must click on this icon to have the rectified signal.



: The displayed signal is rectified, the user must click on this icon to have the unrectified signal.



////: True envelope; the Hilberg true envelope is only available on the Panther (computed in real time in the Hardware).

4.4. Gains

Two kinds of gain are available:

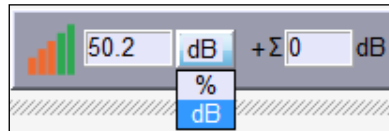


Figure 76: Gains

- **Elementary gain**

This **analog gain** is applied to all elementary channels on the hardware before digitizing (and also before the sum producing the focused signal). Several units are available: % or dB.

- **Σ gain**

This gain is a **digital coefficient** applied to the digitized summed signal (Σ). It is mainly used to improve the signal representation (but not the signal to noise ratio).

4.5. Local backup

The user can save General Parameters files thanks to '**Save**' icon located on the left side of **General Parameters** panel.

The user loads a **General Parameters** file when clicking on '**Open**' icon.

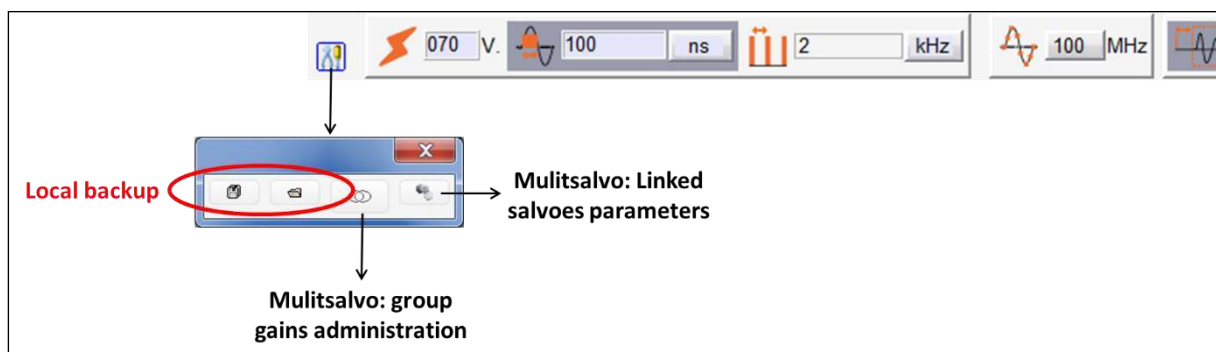


Figure 77: 'Save' and 'Open' icons of General parameters

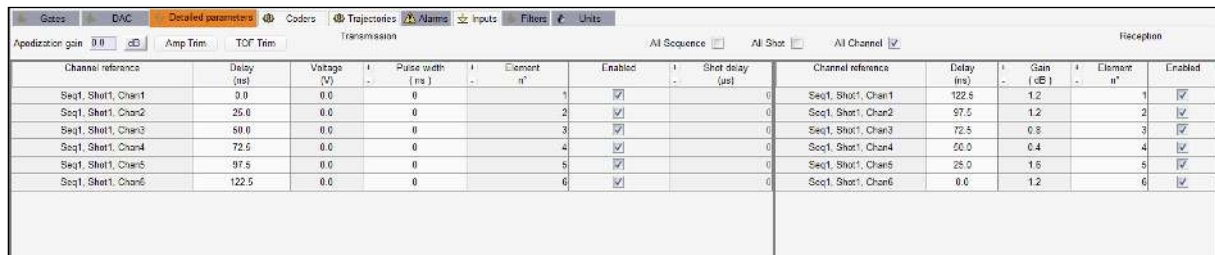
5. Detailed parameters

From the **Detailed Parameters** panel, the user can adjust independently specific parameters on each elementary channel. Some parameters are common with **General Parameters** such as reception delay, transmission delay, pulse width and gain. Other parameters are specific to **Detailed Parameters**.

All the values captured in the detailed parameters table are added to the related general parameters (elementary gain and pulse width).

The detailed parameters panel is separated in two parts. The left part describes transmission parameters and the right part describes reception parameters.

Delay laws computed in the **Configuration** panel and applied in the **Parameters** panel define the default values for transmission delay, reception delay, transmission element and reception element.



Transmission										Reception				
Channel reference	Delay (ns)	Voltage (V)	Pulse width (ns)	Element n°	Enabled	Shot delay (µs)	Channel reference	Delay (ns)	Gain (dB)	Element n°	Enabled			
Seq1_Shot1_Channel1	0.0	0.0	0	1	<input checked="" type="checkbox"/>	0	Seq1_Shot1_Channel1	122.5	1.2	1	<input checked="" type="checkbox"/>			
Seq1_Shot1_Channel2	25.0	0.0	0	2	<input checked="" type="checkbox"/>	0	Seq1_Shot1_Channel2	97.5	1.2	2	<input checked="" type="checkbox"/>			
Seq1_Shot1_Channel3	50.0	0.0	0	3	<input checked="" type="checkbox"/>	0	Seq1_Shot1_Channel3	72.5	0.8	3	<input checked="" type="checkbox"/>			
Seq1_Shot1_Channel4	72.5	0.0	0	4	<input checked="" type="checkbox"/>	0	Seq1_Shot1_Channel4	50.0	0.4	4	<input checked="" type="checkbox"/>			
Seq1_Shot1_Channel5	97.5	0.0	0	5	<input checked="" type="checkbox"/>	0	Seq1_Shot1_Channel5	25.0	1.6	5	<input checked="" type="checkbox"/>			
Seq1_Shot1_Channel6	122.5	0.0	0	6	<input checked="" type="checkbox"/>	0	Seq1_Shot1_Channel6	0.0	1.2	6	<input checked="" type="checkbox"/>			

Figure 78: Detailed parameters panel.

Detailed parameters of elementary channels are displayed in a table. Thanks to parameters (Sequence, Shot and channel) in the current Salvo, user defines selected channels.

Other functions are available for all channels: Apodization Gain, Amp Trim, TOF Trim.

These functions are applied to all channels in a Salvo. Trim function aim at balancing summed signals in a same salvo.



Figure 79: Parameters to select the channels.

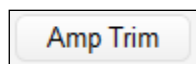
The option **"All"** displays all elements of the related icon (Salvo, Sequence, Shot and Channel). Example: Salvo 1, Sequence 1, shot 1 and **"All"** channels will display all channels of the shot 1 of the sequence 1 of the salvo 1.

5.1. Description of detailed parameters

- **Amplitude Trim**

This is an automatic function to have the same amplitude on all summed signals (shot) of the current salvo. A gates and a reference echo are needed. The Trim function defines for each channel the complementary gain to obtain the same amplitude on the reference echo for the entire current Salvo.

The selected reference echo must not be saturated. "Max echo" or "First echo" must be used for detection in the gate.

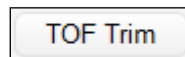


- **TOF Trim**

This is an automatic function to have the same time of flight for a reference echo on all summed signals of the current salvo. A gates and a reference echo are needed.

The Trim function defines for each channel the complementary delay at transmission.

The echo selected as a reference must not be saturated. "Max echo" or "First echo" must be used for detection in the gate.



To cancel AMP/TOF Trim, click on the button and select "Cancel TRIM"

5.1.1 Transmission part

- **Channel reference**

Display the Salvo, Sequence, Shot and channel numbers that define a selected channel.

Channel reference
Seq1, Shot1, Chan1
Seq1, Shot1, Chan2

- **Transmission delay**

Define the delay at transmission in the focal law.

Delay (ns)
0.0
25.0

- **Voltage**

Display the voltage for each transmission channel which is defined on probe calibration. As individual channel voltage is not possible, this function is unavailable.

- **Pulse width**

Define the width of the exciting rectangular pulse.

+ Pulse width - (ns)
0
0

- **Transmission element number**

Define the element number used for transmission (Position on the transducer array).

+ Element - n°
1
2

- **Enable transmission element**

Enable/disable transmission element.

Enabled
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>

- **Shot delay**

Define an additional delay at transmission for fast configuration only.

+ Shot delay - (µs)
0
0

5.1.2 Reception parameters

- **Channel reference**

Display the Salvo, Sequence, Shot and channel numbers that define a selected channel.

Channel reference
Seq1, Shot1, Chan1
Seq1, Shot1, Chan2

- **Reception delay**

Define the delay at reception in the focal law.

Delay (ns)
122.5
97.5

- **Gain**

Defines elementary gain applied on the analog signal (elementary signal before digitizing).

+ Gain (dB)
1.2
1.2

- **Reception element number**

Defines the elements number used for reception.

+ Element n°
1
2

- **Enable reception element**

Enable/disable reception.

Enabled
<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>

5.2. Selection and modification of detailed parameters:

The user can select a group of parameters and modify their values with specific tools.

- **Parameters selection**

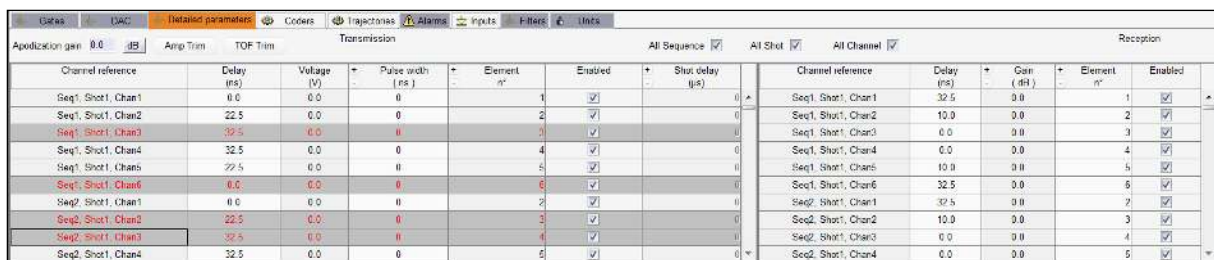
By pressing on "**Shift + left-click icon**", the user selects a compact group of cells. Selected cells are colored in gray.



Transmission										Reception				
Channel reference	Delay (ns)	Voltage (V)	Pulse width (ns)	Element n°	Enabled	Shot delay (µs)	Channel reference	Delay (ns)	Gain (dB)	Element n°	Enabled			
Seq1_Shot1_Chan1	0.0	0.0	0	1	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan1	32.5	0.0	1	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan2	22.5	0.0	0	2	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan2	10.0	0.0	2	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan3	32.5	0.0	0	3	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan3	0.0	0.0	3	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan4	32.5	0.0	0	4	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan4	0.0	0.0	4	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan5	22.5	0.0	0	5	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan5	10.0	0.0	5	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan6	0.0	0.0	0	6	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan6	32.5	0.0	6	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan1	0.0	0.0	0	2	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan1	32.5	0.0	2	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan2	22.5	0.0	0	3	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan2	10.0	0.0	3	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan3	32.5	0.0	0	4	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan3	0.0	0.0	4	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan4	32.5	0.0	0	5	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan4	0.0	0.0	5	<input checked="" type="checkbox"/>			

Figure 80: Selection of cell's group

By pressing on "**Ctrl + left-click icon**", the user can select one cell at a time. This cell is then added to the current selection.



Transmission										Reception				
Channel reference	Delay (ns)	Voltage (V)	Pulse width (ns)	Element n°	Enabled	Shot delay (µs)	Channel reference	Delay (ns)	Gain (dB)	Element n°	Enabled			
Seq1_Shot1_Chan1	0.0	0.0	0	1	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan1	32.5	0.0	1	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan2	22.5	0.0	0	2	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan2	10.0	0.0	2	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan3	32.5	0.0	0	3	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan3	0.0	0.0	3	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan4	32.5	0.0	0	4	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan4	0.0	0.0	4	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan5	22.5	0.0	0	5	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan5	10.0	0.0	5	<input checked="" type="checkbox"/>			
Seq1_Shot1_Chan6	0.0	0.0	0	6	<input checked="" type="checkbox"/>		Seq1_Shot1_Chan6	32.5	0.0	6	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan1	0.0	0.0	0	2	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan1	32.5	0.0	2	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan2	22.5	0.0	0	3	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan2	10.0	0.0	3	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan3	32.5	0.0	0	4	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan3	0.0	0.0	4	<input checked="" type="checkbox"/>			
Seq2_Shot1_Chan4	32.5	0.0	0	5	<input checked="" type="checkbox"/>		Seq2_Shot1_Chan4	0.0	0.0	5	<input checked="" type="checkbox"/>			

Figure 81: Addition to a selection

Note: Selection from 'Channel reference' column is recommended.

- **Modification of values**

After selecting a group of cells, a right-click in the requested column opens an operating panel (see below).

Example: "Right mouse icon" on 'Gain' column opens Gain operating panel.

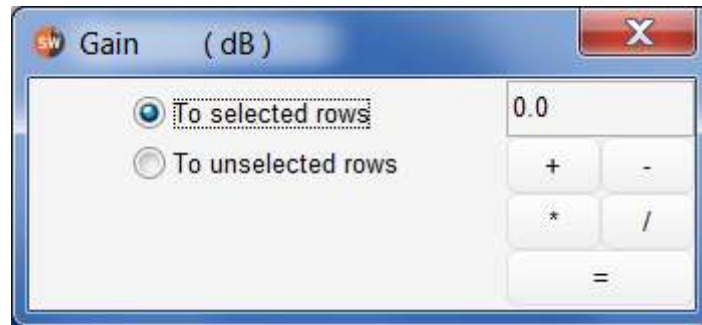


Figure 82: Modification of gain values.

Thanks to this panel, the user can select the type of operation and apply it to selected cells. These operations are: Sum, subtraction, multiplication, division or input.

6. Units

Units panel defines all the units used in all the windows of the “Setting” panel.

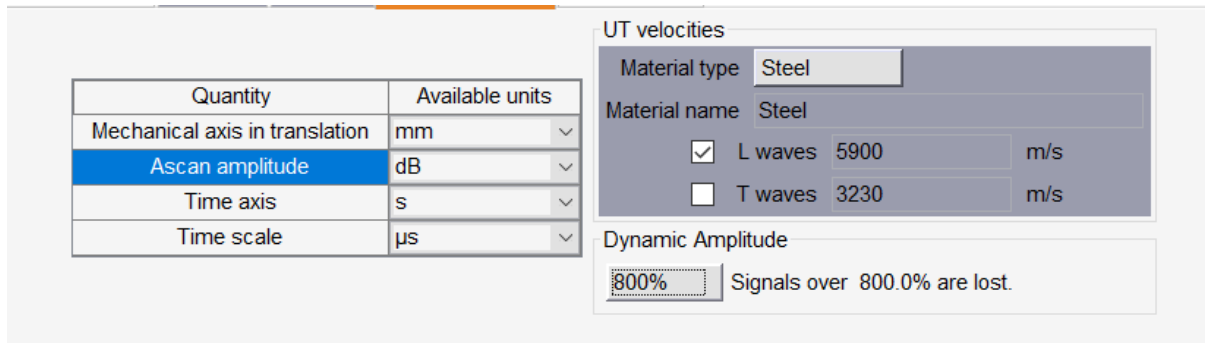


Figure 83: Units panel

- **Dynamic Amplitude**

Define the digitizing dynamic on the A-scan amplitude scale. The default value is 800%. Possible values are 100, 200, 400, 800%.

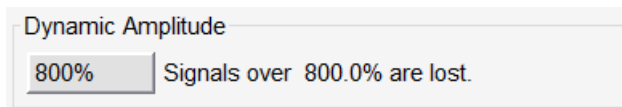


Figure 84: Dynamic amplitude setting

When setting 800% dynamic amplitude, only a 1/8 of the digitizing dynamic is displayed as 100% of the Amplitude on the Ascan. The advantage is that after acquisition, if the recorded signal is over 100%, you will be able to do an amplitude measure.



For small defects detection needs high gain, Amplitude dynamic of 200 % is recommended to improve signal/noise ratio.

- **UT velocity**

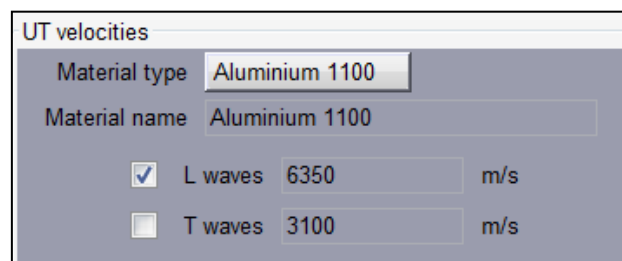


Figure 85: Wave Velocity Interface

The user defines the ultrasonic wave velocity (Longitudinal or Transversal) in the related medium in order to convert the time axis into distance axis inside the view panels.

The user selects one material in the list box ("**Material type**"). This library is defined from the **Configuration/Components/Material** panel.

A new velocity not available in the library can be defined by selecting "**New material**", but it can't be saved from the **Parameters** panel. It will be saved at the general saving with the name of "**New Material**" and available once loaded again.

This new velocity will be available from another configuration.

In order to enlarge the material library, the user must define a new material with the related waves velocity in the **Material** section of the "**Configuration**" panel.

When the user applies focal laws calculated in the "**Configuration**" panel, the UT velocity is automatically registered in the **Units** window of the **Parameters** panel.

By default, the velocity in the Units window matches the longitudinal waves velocity.

7. Encoders

This panel is used to define encoder's parameters to be used for **Acquisition**. Two types of encoder can be selected:

Internal encoder: time trigger

External encoder:

- Mechanical encoder
 - Acquire, Panther : 3 encoder inputs
 - Acquire pocket 16x64 and 8x32 pocket: 3 encoder inputs
- External trigger
 - Acquire Pocket 16x64 with box: 1 external trigger
 - No external trigger for Panther
- Automatic overlapping encoder

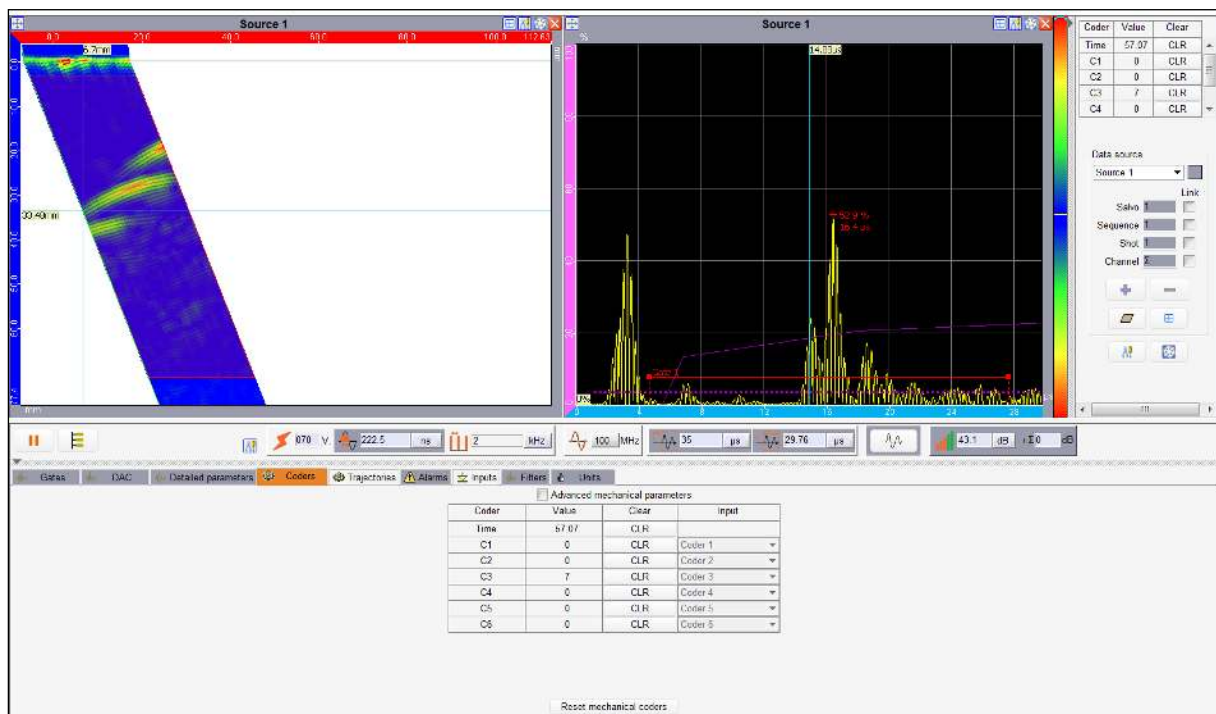


Figure 86: Encoders panel

7.1. Information about encoders

When opening encoders' panel, a reduced panel appears containing the following information:

- **Encoder :**

Display the encoder name according to the selected encoder axis.

- **Position (Value)**

Display the current encoder position according to encoder parameters.

- **Clear**

Reset the encoder value.

The reduced panel is also available above **Data source** panel (see figure below).

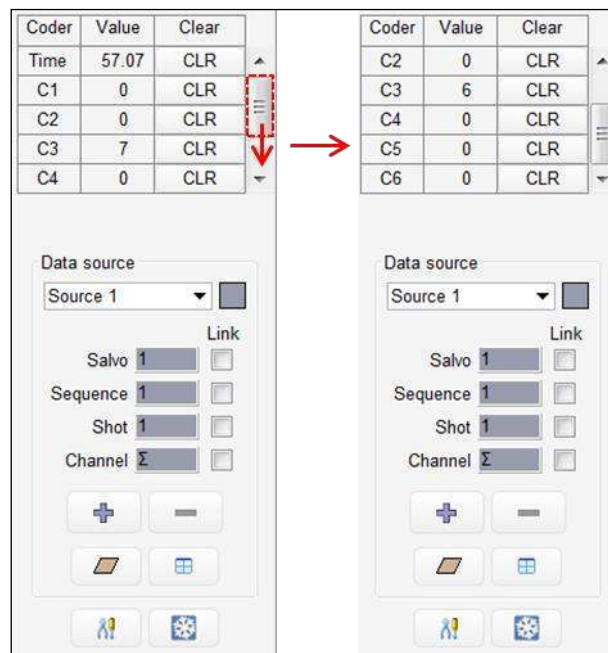


Figure 87: Reduced encoder panel

7.2. Scanner/Robot definition

To define a robot, the user must enable advanced mechanical parameters. The full encoder panel appears to adjust parameters defining external encoders.

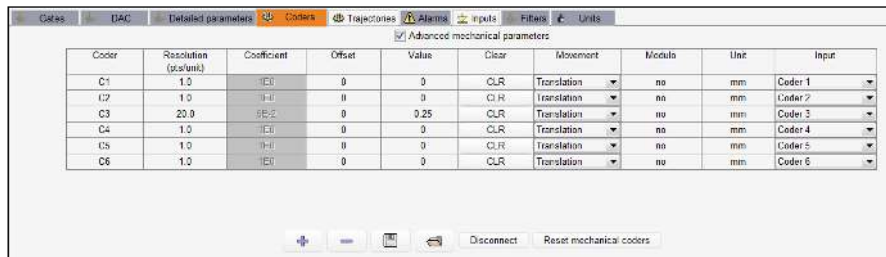


Figure 88: Advanced mechanical parameters

Advanced mechanical parameters are:

- **Encoder**

Coder
X axis
C2
C3

Name the encoder axis.

- **Resolution**

The user must fill in this field with the encoder resolution value which allows conversion between the encoder position in points and the desired unit on the mechanical axis. The resolution is equal to the necessary number of points used to carry out a chosen reference unit (length or rotation).

- **Coefficient**

Coefficient shows a mechanical scale coefficient (for example: 0.1 in the case of 1/10 points per unit resolution). This value is calculated from the resolution and the reference unit.

- **Offset**

Defines a start value for the encoder position during an acquisition process triggered on the encoder position. Reset action will set the Offset value to the selected encoder.

- **Value**

Displays the current encoder position.

- **Movement**

Defines the mechanical axis movement as translation or rotation.

- **Modulo**

A “modulo” function can be applied on a given value in degree or in mm.

If “modulo” is not requested, the value “no” must be input.

- **Unit**

Displays the unit of the mechanical axis.

- **Input**

Defines the type of encoder to be used for the mechanical axis (encoder input, external trigger or automatic overlapping trigger).

- **Add an encoder**

Adds an encoder thanks to the "+" icon (cf. Figure 89).

- **Delete encoder**

Deletes the selected encoder thanks to "-" icon. Selected encoders are colored in gray. The user can select several encoders by clicking **left mouse icon + CTRL** key. The "-" icon delete all selection.



Figure 89: "**Add**" and "**Delete**" encoder icons

- **Reset mechanical encoders**

Resets all mechanical encoders to the Offset value.

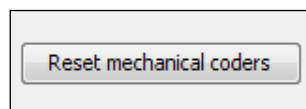


Figure 90: Reset encoders icon

- **Disconnect**

Deletes the content of the robot panel, all mechanical encoders and mechanical axes vanish.

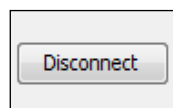


Figure 91: Disconnect encoders icon

- **Configuration**

Encoders configuration:

According to the technical specification of the electronic system, the user can define the mode of encoder working. Two modes are available: quadrature mode and unidirectional mode.



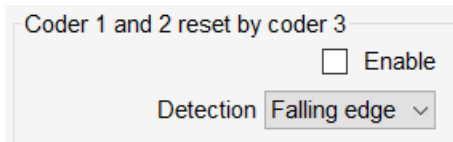
Figure 92: Encoders configuration

Coder 1 and 2 reset by coder 3 (Panther only):

Activate this option will make the Panther #1 encoder reset by input A of encoder #3 and encoder #2 reset by input B of encoder #3.

This option is useful for rotating axis or other industrial applications.

Reading the encoder #3 value will send back information about actual input A and B state coded in binary.



7.3. Local backup & reload

"**Save**" icon saves Coders parameters in a robot dedicated library.

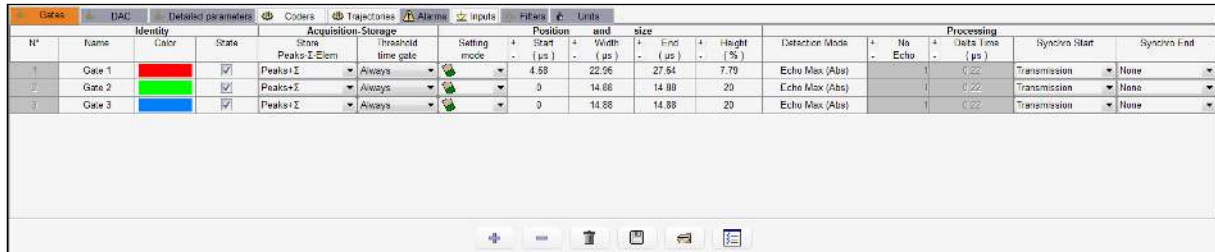
"**Open**" icon loads a robot parameters file.



Figure 93: "Save" and "Open" icons of encoder parameters

8. Gates

The Gates panel is available by clicking on the "Gates" tab, located under the workspace signal display.



N°	Name	Identity	Color	State	Acquisition-Storage	Threshold	Setting mode	Position and size				Detection Mode	No Echo	Gate Time (µs)	Synchron Start	Synchron End
								Start (µs)	Width (µs)	End (µs)	Height (%)					
1	Gate 1		Red	<input checked="" type="checkbox"/>	Peaks+Σ	Always		4.88	22.96	27.64	7.79	Echo Max (Abs)	1	0.22	Transmission	None
2	Gate 2		Green	<input checked="" type="checkbox"/>	Peaks+Σ	Always		0	14.88	14.88	20	Echo Max (Abs)	1	0.22	Transmission	None
3	Gate 3		Blue	<input checked="" type="checkbox"/>	Peaks+Σ	Always		0	14.88	14.88	20	Echo Max (Abs)	1	0.22	Transmission	None

Figure 94: Gates panel

The "gate" tab gathers all information about user-created gate(s). In this tab, the user can specify/edit all the gate parameters described in sections 8.2 to 8.5. When the gate overlay is selected, the gates also appear on the display windows as overlays (available for A- and B-scans). Basic parameters of the gates, such as beginning, end, length and threshold can be modified using the mouse directly on the signal display.

When gates are present and the overlay is selected, the detected echo is shown on the A-scan display. Please note that gates can only be defined on summed signals.

8.1. Add/remove gates:

Click on the "+" icon at the bottom of the "Gate" tab to add a gate. To remove a gate, first select the gate by clicking on its name or using the graphic display, then click on the "-" icon in the Gate" tab.

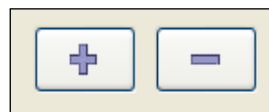


Figure 95: "Add" and "Delete" gate icon

To remove all gates in the same time, click on "Trash" icon.



Figure 96: "Trash" icon of Gates panel

8.2. Gates identity

Each gate is identified by:

- **Name**

Name of the selected gates, also displayed on the A-scan display. Click on the name to edit it (e.g. front-wall, back-wall, inside, etc...)

Name
Gate 1
Gate 2
Gate 3

Figure 97: Name of the gate

- **Color**

Each gates is attributed a different color. To edit the color of a gates, click on the color of the selected gate. The color menu pops up and the user can pick a color for the gate.

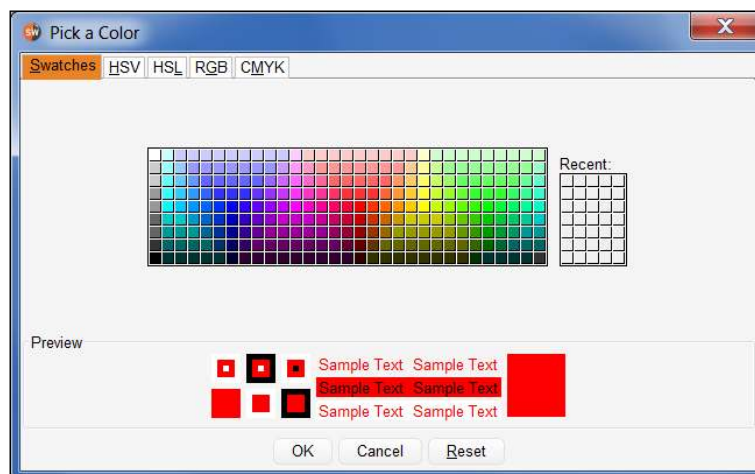


Figure 98: Selection of gate color

- **State**

To enable/disable a gates, simply tick/untick the checkbox in the "State" section of the selected gates.

State
<input checked="" type="checkbox"/>

Figure 99: State of gate

8.3. Gates acquisition/storage

With this option, the user specifies the type of data to be recorded for the selected gate during acquisition. In a gate, the following types of data can be saved:

- **Peak:** With this option, only peak values are saved. The amplitude/time-of-flight couples of selected echoes (see threshold type in the next section) are stored during acquisition.
- **Peak + Σ :** With this option, peak values are saved along with the summed signals. With this option, the user doesn't have access to the B-scan Channel.
- **Peak + channels:** With this option, peak values are saved along with all elementary- channel signals.
- **Peak + Σ + channels:** With this option, peak values are saved along with all elementary-channel signals and summed signals (all UT data contained in the gates are recorded).
- **Display Σ :** This option does not save any data, but allows A-scan and electronic B-scan to be displayed during acquisition.

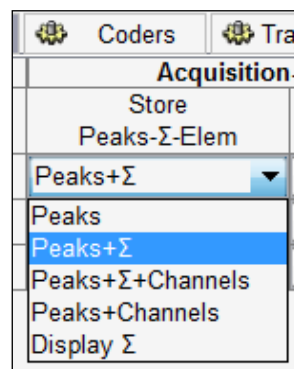


Figure 100: Data storage options

Note: available graphic options might differ with respect of the "Acquisition-storage" option selected. To refresh the display menu in the acquisition panel, click on the "Refresh" icon.

- **Threshold of the Ascan gate**

This option specifies the threshold trigger to record data. The user can specify the following rules:

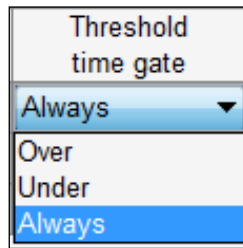


Figure 101: Options of threshold time gate

- **Over:** With this rule, A-scans will be saved when a peak is detected above the gates threshold.
- **Under:** With this rule, A-scans will be saved when a peak is detected under the gates threshold.
- **Always:** With this rule, A-scans will be saved whenever a peak is detected.

Warning! Gates only consider summed signals. For better results, it is important to adjust the threshold on the summed signal, not on elementary signals.

Example below shows results of A-scan storage according to different conditions and threshold values.

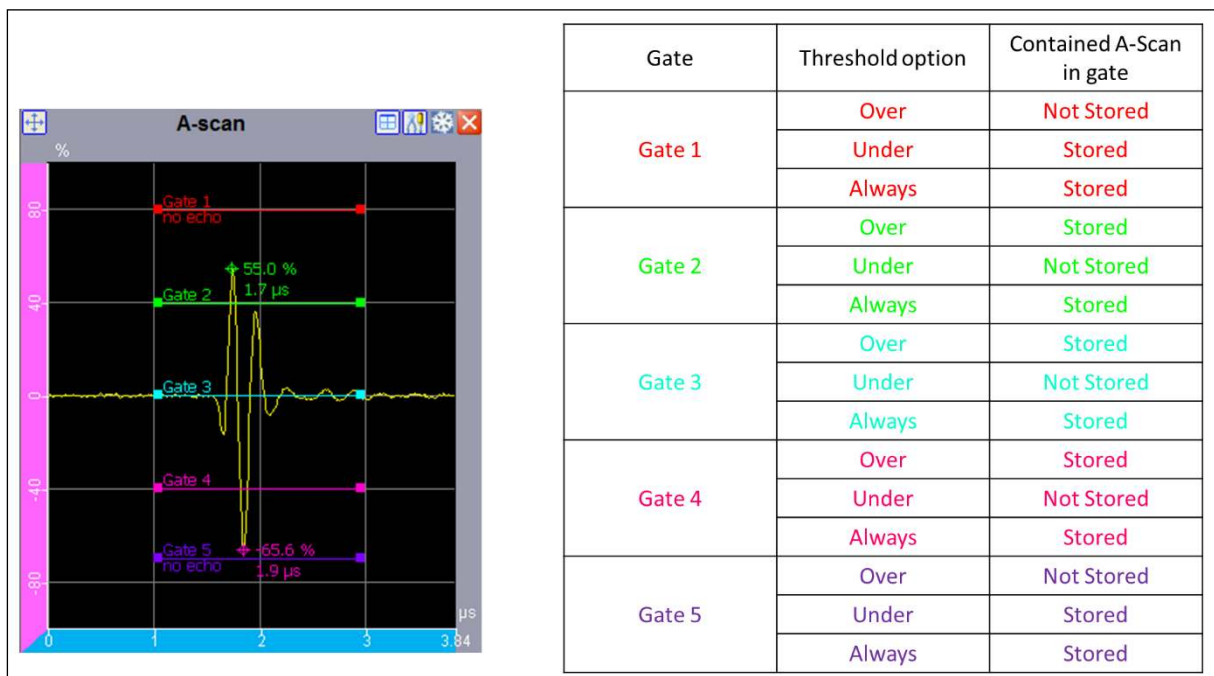
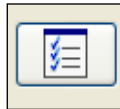


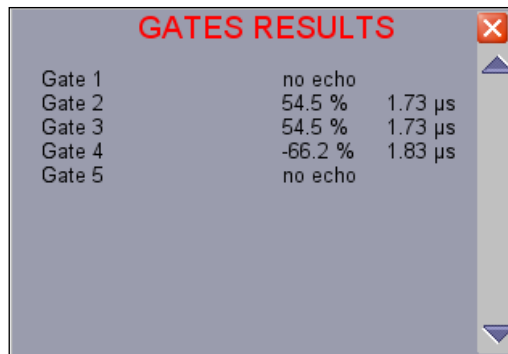
Figure 102: Examples of threshold time gate

- **Ascan gate information in the *Parameters* panel**

In the Parameters panel, current information of gates (amplitude, time of flight of the current summed signal) is displayed thanks to the following icon:



When clicking on this icon, a window appears displaying the amplitude and time-of-flight of current signal for each gate.



GATES RESULTS		
Gate 1	no echo	
Gate 2	54.5 %	1.73 μ s
Gate 3	54.5 %	1.73 μ s
Gate 4	-66.2 %	1.83 μ s
Gate 5	no echo	

Figure 103: Information gates window

- **Ascan gate information in the *Acquisition* panel**

In the Acquisition panel, information about the gates content (detected/non detected echo, synchronization, loss of synchronization) is provided. This information is located at the top right side of A-scan and C-scan views and at the bottom-right side of B-scan views.

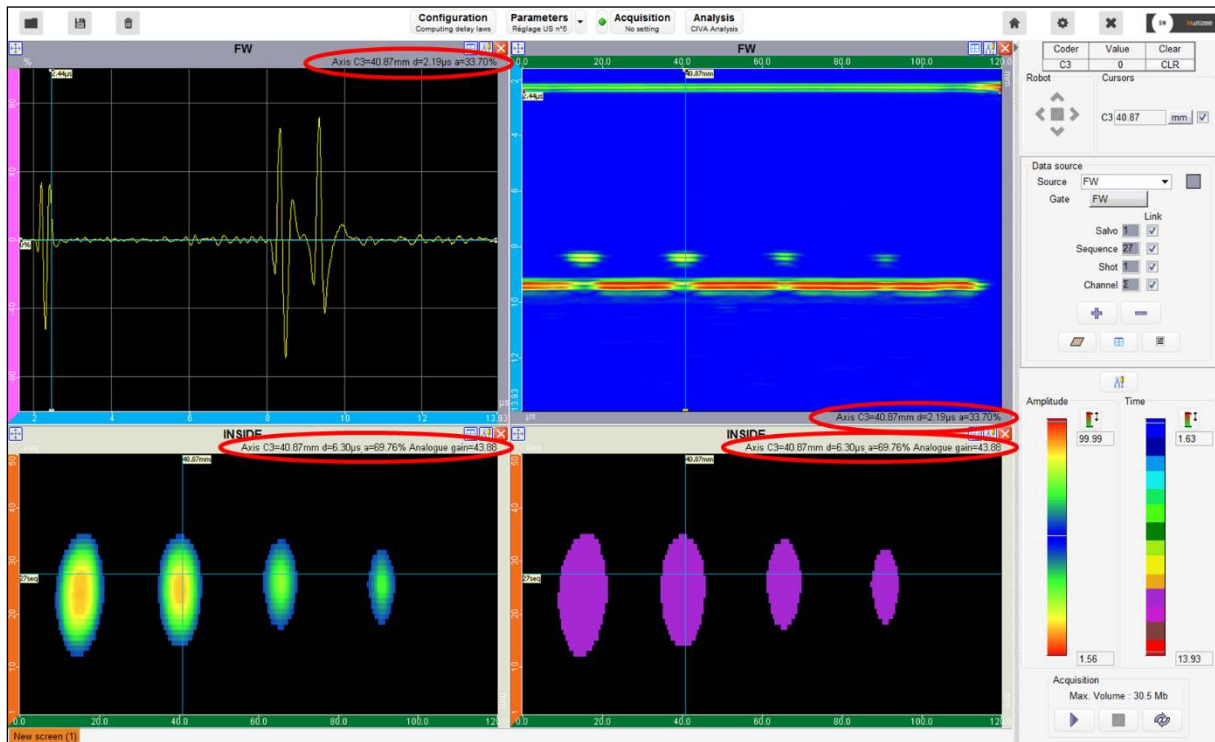


Figure 104: Gate information in the Acquisition panel

8.4. Ascan gate position, width, height and customized options

The user can specify the following properties for each Ascan gate:

- Start

The "Start" parameter defines the beginning time of the gate with respect to the pulse time. This value can be edited via the "Start" field or using the graphic overlay available on the A-scan view (grab and stretch mouse functions).

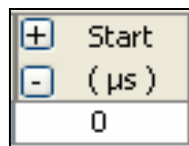


Figure 105: Start position of gate

- Width

The "width" of a gate defines its duration. This parameter can be edited via the "width" field or using the graphic overlay available on the A-scan view (grab and stretch mouse functions). Editing this parameter affects the "end" parameter (see below).

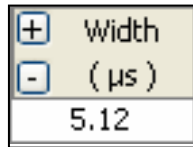


Figure 106: Gate width

- **End**

The "End" parameter of a gates defines the time at which it stops recording. This parameter can be edited via the "end" field or using the graphic overlay available on the A-scan view (grab and stretch mouse functions). Editing this parameter affects the "width" parameter (see below).

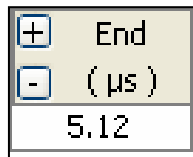


Figure 107: End position of gate

- **Height**

The "height" parameter defines the amplitude-threshold of a gates. This parameter can be edited via the "height" field or using the graphic overlay available on the A-scan view (grab and stretch mouse functions).

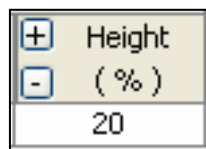
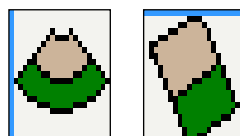


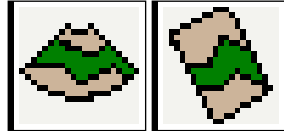
Figure 108: Height of gate, threshold value

- **Customized options**

Classic mode: This mode is the default mode for all gates. It applies the same gates parameters for all shots and/or sequences.



Shot by shot setting mode: The advanced user may use this mode to specify gates properties that vary with the shot/sequence number.



The user can specify the gate properties using the gate panel for each shot or use the graphic tool of the B-scan view described below. To edit gate properties for each shot/sequence via the gate panel, first select the shot/sequence number of interest then edit the gate properties (A-scan graphic tool or gate panel). This operation will refresh the gate overlay on the B-scan view and show the results of the gates edits.

To use the graphic tool available on the B-scan view, first click on the toolbar icon (top-right menu of the corrected B-scan view (see Figure 109)). When the toolbar pops up, click on the following icon:



A four-point shape is now overlaid on the B-scan view. The extremities of this shape can be grabbed with a left click and stretched in moving the mouse. Release the left-click when satisfied with the gate settings. Repeat this operation for all extremities until satisfied with the gate settings. Finally click "apply" on the "gate edition by shot" popup window to validate your settings.

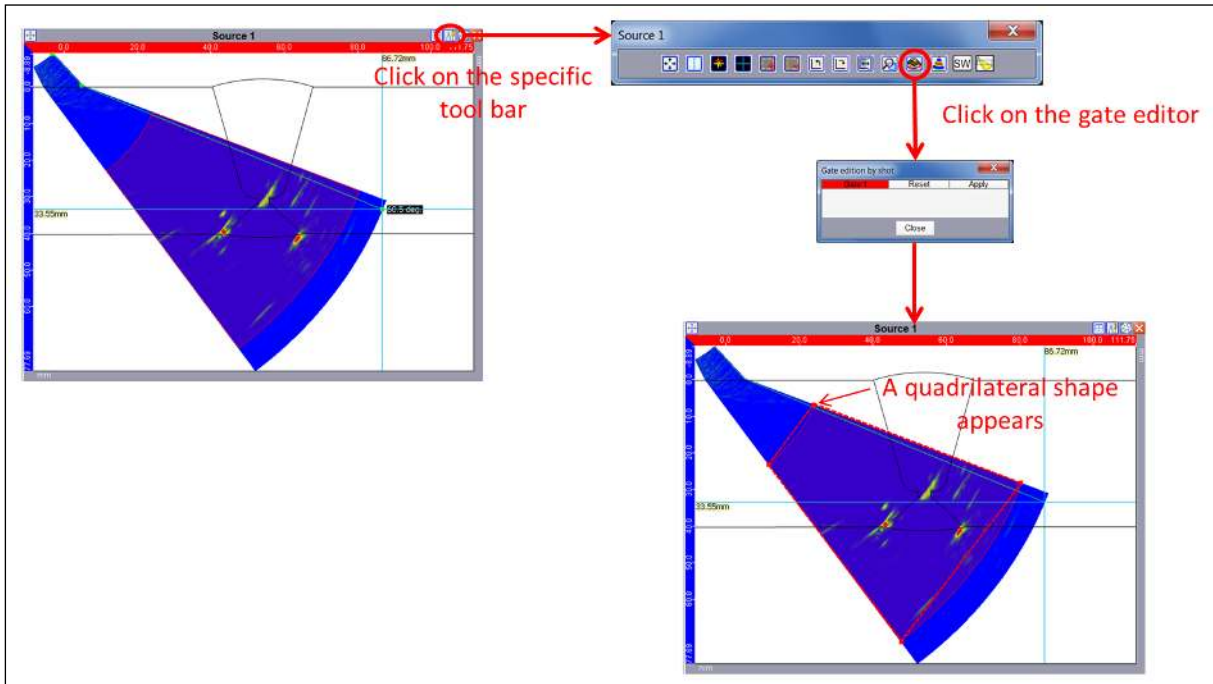


Figure 109: Shot by shot gate editor

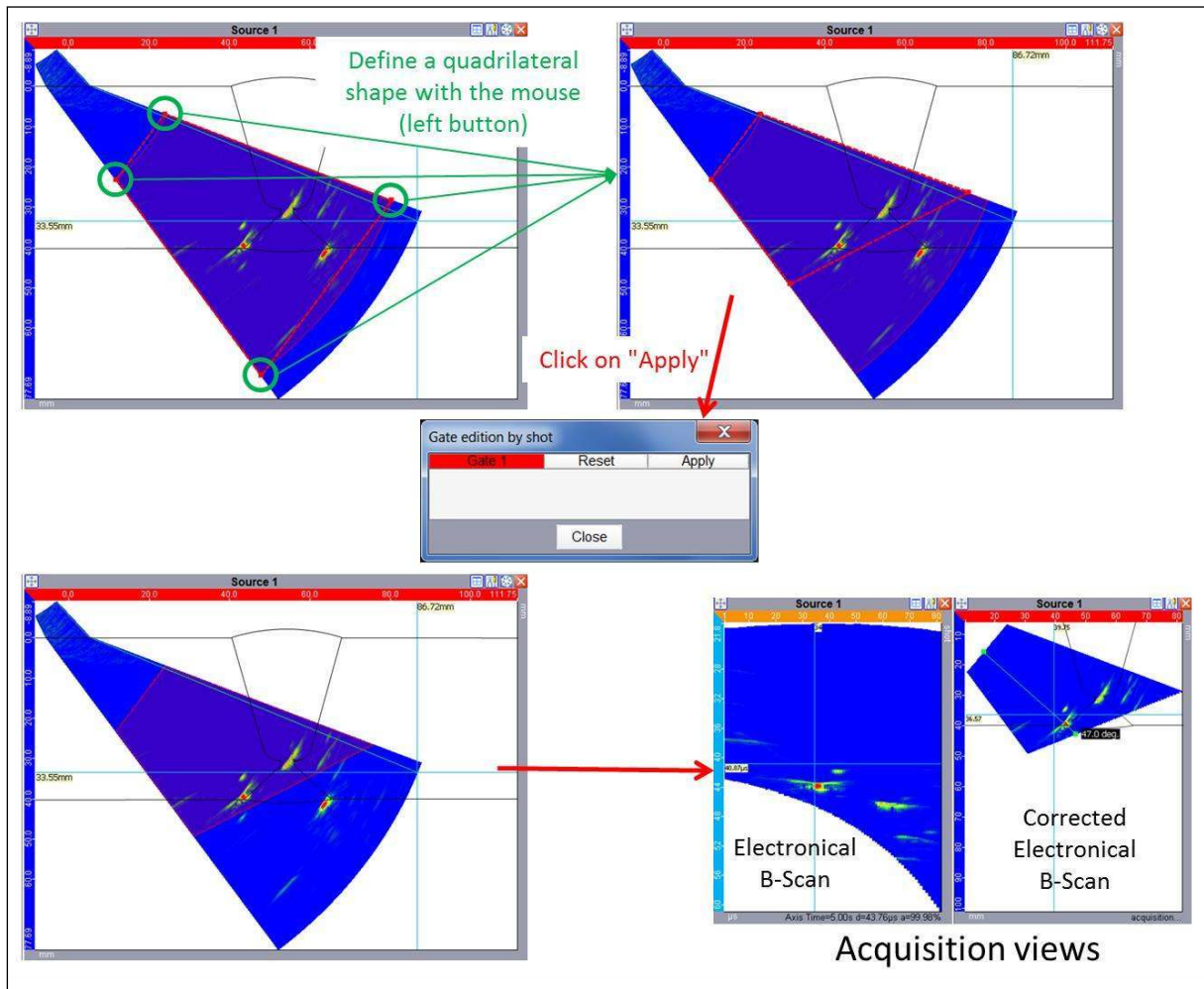


Figure 110: Advanced mode for gate settings using the graphic tool

8.5. Gate detection and synchronization options

- **Detection mode**

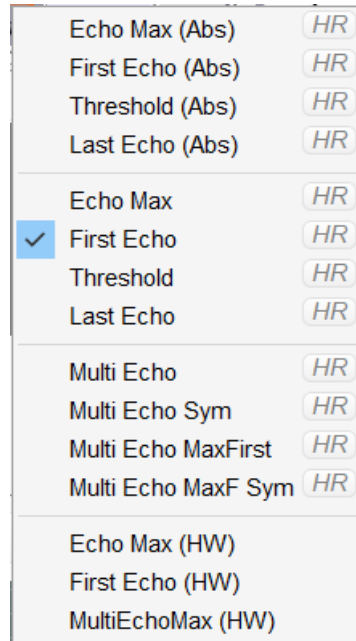


Figure 111: Detection modes

The user can choose from a list of detection modes. To trigger data recording in a gates, the user can specify the type of detection algorithm to be used. One echo is defined either as a global or local extremum (maximum or minimum) of the summed-signal under consideration. It is defined by a couple (amplitude, time-of-flight) also called a peak. The different available detection options are as follows:

- **Echo max abs:** This option triggers data recording if the absolute (positive or negative) maximum peak detected within the gate width is above the gate threshold. The returned value is the maximum peak.
- **First echo abs:** This option triggers data recording if one absolute (positive or negative) local extremum detected within the gate width is above the gate threshold. The returned value is the first peak in the gate. This option uses the "delta" parameter described later in this section.
- **Threshold abs:** This option triggers data recording if the absolute (positive or negative) value of one point detected within the gate width is above the gate threshold. The returned value is the first point above threshold in the gate.
- **Last echo abs:** This option triggers data recording if one absolute (positive or negative) local extremum detected within the gate width is above the gate threshold. The returned value is the last peak in the gate. This option uses the "delta" parameter described later in this section.
- **Echo max:** This option triggers data recording if one detected extremum peak within the gate width is above the gate threshold. If the threshold is positive the extremum is searched among positive values. If the threshold is negative, the extremum is searched among negative values. The returned value is the extremum peak.

- **First echo:** This option triggers data recording if one local extremum detected within the gate width is above the gate threshold. If the threshold is positive the first local extremum is searched among positive values. If the threshold is negative, the first local extremum is searched amongst negative values. The returned value is the first peak in the gate. This option uses the "delta" parameter described later in this section.
- **Threshold:** This option triggers data recording for the first point within the gate width above the gate threshold. The returned value is the first point above the threshold.
- **Last echo:** This option triggers data recording if one local extremum detected within the gate width is above the gate threshold. If the threshold is positive the last local extremum is searched among positive values. If the threshold is negative, the last local extremum is searched amongst negative values. The returned value is the last peak in the gate. This option uses the "delta" parameter described later in this section.
- **Multi echo:** This option triggers data recording if a specified number of local extrema detected within the gate width is above the gate threshold. If the threshold is positive, local extrema are searched among positive values. If the threshold is negative, local extrema are searched amongst negative values. The returned values are the specified number of local peaks in the gate. This option uses the "delta" parameter described later in this section.
- **Multi echo Sym:** This option triggers data recording if a specified number of local extrema detected within the gate width is above the gate threshold. The gate threshold is symmetric with respect to zero amplitude. The returned values are the specified number of local peaks in the gate regardless of their sign. This option uses the "delta" parameter described later in this section.
- **Multi echo MaxFirst:** This reproduces Multi echo and sorts the local extrema. The first returned value is the global extremum detected within the gate width.
- **Multi echo MaxF Sym:** This reproduces Multi echo Sym and sorts the local extrema. The first returned value is the global extremum detected within the gate width.

Several Hardware gates are also available depending on the plugged hardware. These gates are applied at the hardware level (inside the electronics). The interest of the hardware gates is to dramatically reduce the amount of data to transfer from the electronics to the SW.

The Panther includes new generation hardware gates. These hardware gates are a massive Ascan compression retrieving the “**n**” **higher amplitude echoes** of the Ascan. These echoes are then selected in the software in function of the requirement of the user (first echo or higher amplitude echo)

- **Hard echo max:** This option triggers data recording if one detected extremum peak within the gate width ~~is above the gate threshold~~. If the threshold is positive the extremum is searched among positive values. If the threshold is negative, the extremum is searched amongst negative values. The returned value is the extremum peak. This gate is applied at the hardware level.
- **Hard first echo:** This option triggers data recording if one local extremum detected within the gate width is above the gate threshold. If the threshold is positive the first local extremum is searched among positive values. If the threshold is negative, the first local extremum is searched amongst negative values. The returned value is the first peak in the gate. This option uses the "delta" parameter described later in this section. This gate is applied at the hardware level.
- **Multi echo Max:** This reproduces Multi echo and sorts the local extrema. The gates return all pics within the gate width. This gate is applied at the hardware level.

The default gate option is the absolute maximum echo detection “**Echo max (abs)**”.



As a security, if no echo with an amplitude lower than the threshold of the gate is detected, an amplitude of 100% and TOF of 0 is returned.

In the A-scan display of the summed signal, returned values of the gate settings are displayed (when the gate overlay is activated). Please bear in mind that returned values are not displayed for A-scan of elementary channels.

- **HR icon:** The HR icon enables High Resolution measurement of time .When HR signal processing is enabled, the time measurement is enhanced a thousand times. The HR extraction mode is performed in real time by the software. It allows extremely precise thickness measurement.

The HR extraction is enabled by clicking on the HR icon located in the gate detection mode options. It is only available for software gates detection modes and not for hardware gates detection modes.

- **Number of echoes**

This parameter specifies the number of local extrema to be searched within the gate width. The user can specify up to 20 echoes to be searched.

For the hardware gates, the number of echoes depends on the FW revision (48 or 64 peaks).

- **Delta time**

The "delta" parameter consists in a sliding window in which local extreme values are discarded. The width of this sliding window is user-specified. Local extreme values will be considered valid only if the time between two peaks is larger than the Delta parameter. This parameter is enabled with "**First echo**", "**Last echo**" and "**Multi echo**" detection.

The default value of the Delta time parameter is half of the signal period.

This parameter is critical for multi-peak gates because it helps to reduce the number of echoes in the A-scan and do not saturate the maximum number of echoes.

Delta time is independent of gate and of salvo (except Pocket 8x32).

- **Synchronization start**

The user can select from two synchronization modes to specify the beginning time of gate. When clicking on the “synchro start” tab, the user can pick from:

- **Transmission:** The gates is synchronized with respect to the transmission signal.
- **Time gate:** The selected gates is synchronized with respect to another user-specified gate.
- **Synchro DAC num:** The selected Hardware gate is synchronized with respect to the numerical DAC curve. This option is available only for Hardware gates on MultiX and Acquire systems.

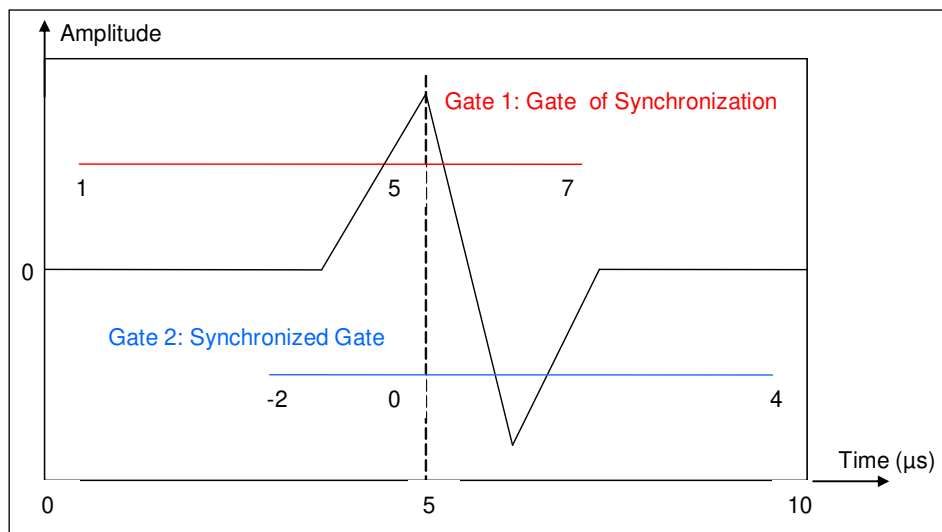


Figure 112: Example of synchronization start

Please be aware when using hardware gates:

- The only gate that can be synchronized is a “hard first echo” gate and the position of this gate must be the first in the gate panel.
- This “hard first echo” gate and only this gate can be define out of the digitizing signal when the user checks the option “synchronized with transmission pulse” available in the **Units** panel.
- Synchronization end:

The user can also synchronize the end of a gate (variable-width gate). This feature is accessed from the “synchro end” list box. Using this option, the user can specify the ending of gate to be synchronized with respect to another user-specified gate. If both the start and the end of a gate are synchronized with respect to other gates, the duration (width) of the selected gate is variable.



Only peak data can be stored a gate synchronized on end (due to gate width changing). Please be aware that, at this time, the variable-width gates can only store peak data (no waveforms).

In the example below, Gate 1 is start-synchronized with respect to the transmission pulse (fixed width). Gate 2 is start-synchronized with respect to the transmission pulse and is also end-synchronized with respect to Gate 1, using the Max echo option. When the time of flight of the maximum echo varies within Gate 1, Gate 2 is accordingly stretched (see Figure 113).

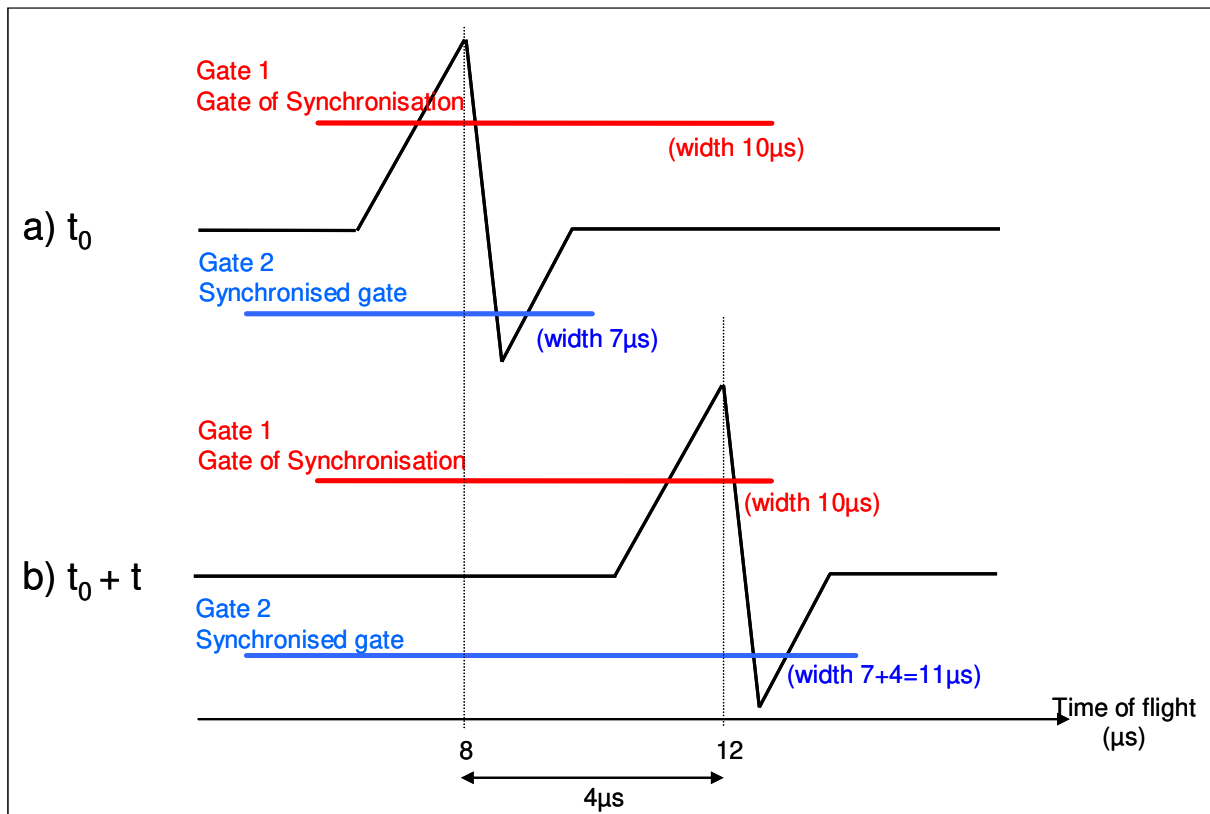
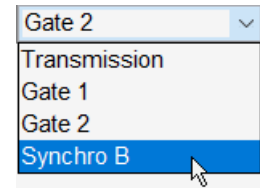


Figure 113: Example of synchronization end

- Synchro B function

When selecting the synchronization, Synchro B menu is available.



The Synchro B function give possibility to synchronize the gate of all the salvo on another salvo/gate.

This function is useful for angle SW inspection to synchronize SW gate on a different shot measured in 0° LW.

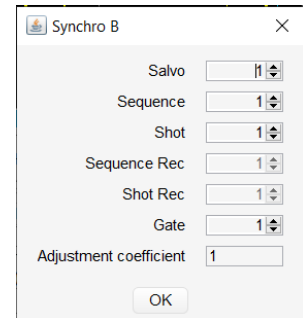


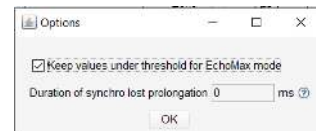
Figure 114: Synchro B menu



New: Synchronization persistence:

When synchronization echo is lost, the synchronized gate stays active for a specified time or indefinitely at the last measured TOF.

This parameter is possible to set in the toolbox on the bottom of the gate menu.



8.6. Local backup & reload

Press the "Save" icon to save **Gates** parameters as a file.

Press the "Open" icon to load a **Gates** parameters file.



Figure 115: Save and open icon of Gates parameters

9. TCG

The user can specify the Time Corrected Gain (analog and digital) in the TCG tab of the Acquire.

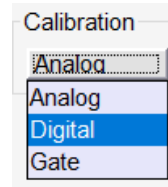


Figure 116: DAC list box

9.1. Analog DAC

When the analog DAC option is selected, the DAC curve is applied to all elementary analog signals (before digitization).

Remark 1:

For all M2M systems, the DAC curve can only be used to amplify the signal. In Pocket 8x32 systems, the DAC curve can also be used as an attenuator.

Remark 2:

In Panther electronic, you can define a DAC curve per salvo in multi-Salvo configuration.

Index point	Position (μ s)	Gain (dB)
1	0	0.0
2	12.56	6.4

Figure 117: Analog DAC panel

9.1.1 TCG parameters

To enable the TCG, tick the “enable” checkbox under the TCG tab. The default TCG curve is a straight segment made of two points. The user can edit these points, add and suppress segments to the TCG

curve. Editing the TCG points can be done by typing in the (time, gain) values for each point or using the mouse. To edit TCG points with the mouse, simply left click on a TCG point, maintain the click and drag the point where needed, and then release the click. The initial point of the TCG is at the bottom-left of the A-scan at -100% of Amplitude.

Analog TCG explanation:

The M2M TCG name refers to international term which is TCG (Time Corrected Gain).

The TCG segments are linear in dBs

The limitation for Pocket M2M electronics is 16 different TCG for all the salvoes. The Salvoes over 16th position will have the same TCG curve than the 16th salvo.

For Panther there is no limitation.

To specify the TCG curve, the following parameters are available:

- **Color**

To change the TCG plot color, click on the green square located next the TCG label. The following popup window will appear.

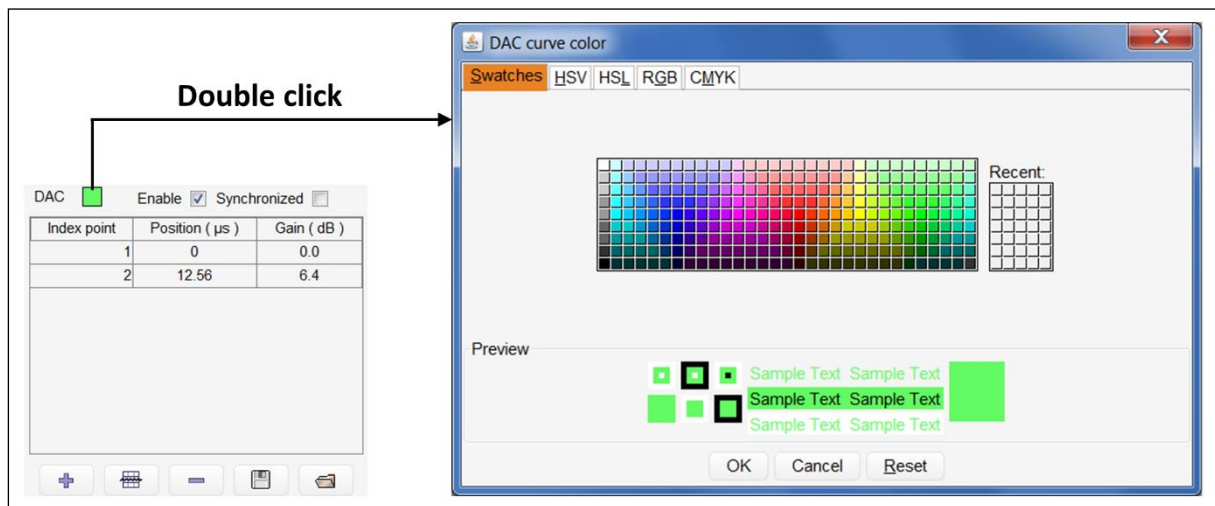


Figure 118: TCG color modification

- **Index point**

The TCG curve is created using segments. The extremities of each segment are numbered in the “index point” column.

Index point
1
2

Figure 119: Index point

- **Position**

The user can specify each TCG point coordinates (time, gain). Using the column labeled “Position”, the user can edit the position in time to be associated with the gain value specified in the “gain” column (see below). This parameter can also be edited using the graphic tool available on the A-scan window. Simply drag and drop the DAC curve to edit its parameters.

Position (μ s)
0
5.12

Figure 120: Position of DAC points

- **Gain**

The user can specify each TCG point coordinates (time, gain). The user can edit the gain in dB to be associated with the position in time specified in the “position” column using the column labeled “Gain” (see below). This parameter can also be edited using the graphic tool available on the A-scan window. Simply drag and drop the DAC curve to edit its parameters.

Gain (dB)
0.0
10.4

Figure 121: Gain of DAC points

- **Add point**

To add a point to the TCG curve, simply click on the “+” sign located under the DAC curve table.



Figure 122: Add DAC point

- **Insert point**

To insert a point to the TCG curve, simply click on the sign below. This function offers the choice to insert a point before or after the selected point of the DAC curve.

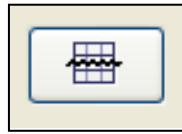


Figure 123: Insertion of a TCG point

- **Delete points**

To suppress TCG points, first select the points to be deleted. If only 1 point is to be deleted, simply click on the point. To select several points, maintain the CTRL key and press while clicking on the points to delete. To remove the selected point(s), click on the “-” icon.

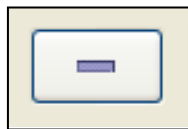


Figure 124: Delete DAC points

9.1.2 Synchronized TCG

The TCG curve can be synchronized with respect to **an elementary signal threshold**. To enable the synchronization of a TCG curve, tick the “synchronized” checkbox. The user specifies the amplitude threshold in the “synchronized TCG” tab, the position in time it should start searching for values exceeding the threshold. If the user synchronizes with elementary channel, the user can finally choose the channel(s) number as a reference for the TCG parameters. The synchronization is achieved using the detection channel(s) specified in the “detection channel id” column. When the signal amplitude of the detection channel exceeds the threshold, the TCG curve is enabled using this point as the beginning of the DAC.

DAC Enable Synchronized DAC: common ▼ DAC synchronized on: Elementary channel Sum channel

Index point	Position (μ s)	Gain (dB)
1	0	0.0
2	12.56	6.4

Shot reference	+ - Begin (μ s)	+ - Amplitude threshold (%)	+ - Detection channel id
All shots/sequences	4	25	1

Buttons: +, [Grid], -, [Print], [Save]

Figure 125: Synchronized DAC panel

Several synchronization options are available:

- **Common DAC:** The same synchronization parameters are used for all shots of all sequences. The TCG curve can be synchronized to an elementary channel only.

DAC synchronized on : Elementary channel Sum channel

Shot reference	+ -	Begin (μ s)	+ -	Amplitude threshold (%)	+ -	Detection channel id
All shots/sequences		4		25		1

Figure 126: DAC common panel

- **TCG by shots:** Use this option to specify shot-dependent TCG parameters.

DAC **by shot** DAC synchronized on : Elementary channel Sum channel Shot 0 All

Shot reference	+ -	Begin (μ s)	+ -	Amplitude threshold (%)	+ -	Detection channel id
Shot0, all sequences		4		25		1
Shot1, all sequences		4		25		1
Shot2, all sequences		4		25		1
Shot3, all sequences		4		25		1
Shot4, all sequences		4		25		1
Shot5, all sequences		4		25		1
Shot6, all sequences		4		25		1
Shot7, all sequences		4		25		1

Figure 127: DAC by shots panel

- **Advanced TCG:** use this option to specify sequence AND shot-dependent TCG parameters.

DAC **advanced** DAC synchronized on : Elementary channel Sum channel Seq: 0 All Shot 0 All

Shot reference	+ -	Begin (μ s)	+ -	Amplitude threshold (%)	+ -	Detection channel id
Seq0, Shot0		4		25		1
Seq0, Shot1		4		25		1
Seq0, Shot2		4		25		1
Seq0, Shot3		4		25		1
Seq0, Shot4		4		25		1
Seq0, Shot5		4		25		1
Seq0, Shot6		4		25		1
Seq0, Shot7		4		25		1

Figure 128: DAC advanced panel

Note: Switching back and forth between synchronization modes (common, by shot, advanced) will reset your DAC synchronization parameters.

By default, the elementary channel used for the DAC synchronization is taken at the middle of the related active aperture (or sequence). The user may select another channel. For each synchronization mode, the DAC parameters are as follows:

- **Shot reference**

This parameter identifies the current shot and sequence.

- **Begin**

This parameter defines the position in time the synchronization process should start searching for values exceeding the threshold. The user can edit this value in the “Begin” column or using the graphic tool (drag and drop) available on the A-scan display.

- **Amplitude threshold**

This parameter defines the amplitude threshold value. This threshold is the synchronization condition. When the elementary or summed signal amplitude exceeds the threshold value, the DAC is applied. The value can be modified directly from the A-scan view panel using the left mouse icon or edited in the “Amplitude threshold” column.

- **Detection channel identity**

Using this parameter, the user specifies the reference elementary channel used for DAC synchronization.

9.1.3 Edit DAC parameters

- **Selection tools**

To select a group of consecutive lines, press the SHIFT key along with the left-click selection of the lines. The selected lines are colored.

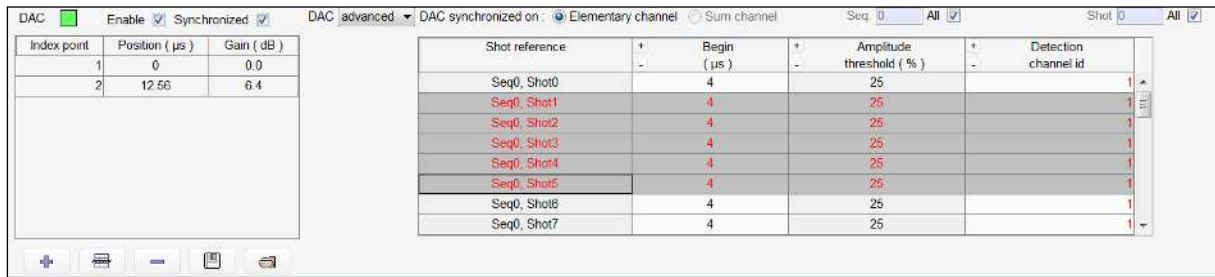


Figure 129: Selection of cell's group in DAC panel

To select a group of non-consecutive lines, press the CTRL key when selecting (with a left-click) the lines under interest.



Figure 130: Addition to a selection in DAC panel

- **Edition of selected parameters**

To edit the selected line or group of lines, right click on the selected zone. A specific window will pop up. Clicking on a specific column will open the associated menu.

For example: A right-click on the '**Detection channel Id**' column opens the "Detection channel id" popup menu.

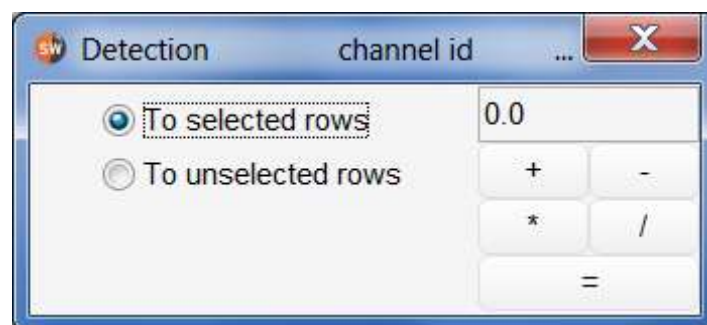


Figure 131: Modification of detection channel id

Using this panel, the user can achieve basic calculator operations on the selected parameter and then apply the modification to the selected or unselected rows.

9.1.4 Local backup & reload

Press the "**Save**" icon to save DAC-parameters as a file.

Press the "**Open**" icon to load a DAC-parameters file.

Note: Only the DAC points are saved with this backup. DAC synchronization parameters are not saved.



Figure 132: Save and open icon of DAC parameters

9.2. Digital TCG

The digital TCG is applied to the summed signal.

9.2.1 Manual digital TCG

To enable the manual digital TCG, tick the "enable" checkbox under the TCG tab. The default TCG curve is a straight segment made of two points. The user can edit these points, add and suppress segments to the TCG curve. Editing the TCG points can be done by typing in the (time, gain) values for each point or using the mouse. To edit TCG points with the mouse, simply left click on a DAC point, maintain the click and drag the point where needed, and then release the click.

To specify the DAC curve, the following parameters are available:

- **Color**

To change the TCG plot color, click on the purple square located next the TCG label. The following popup window will appear.

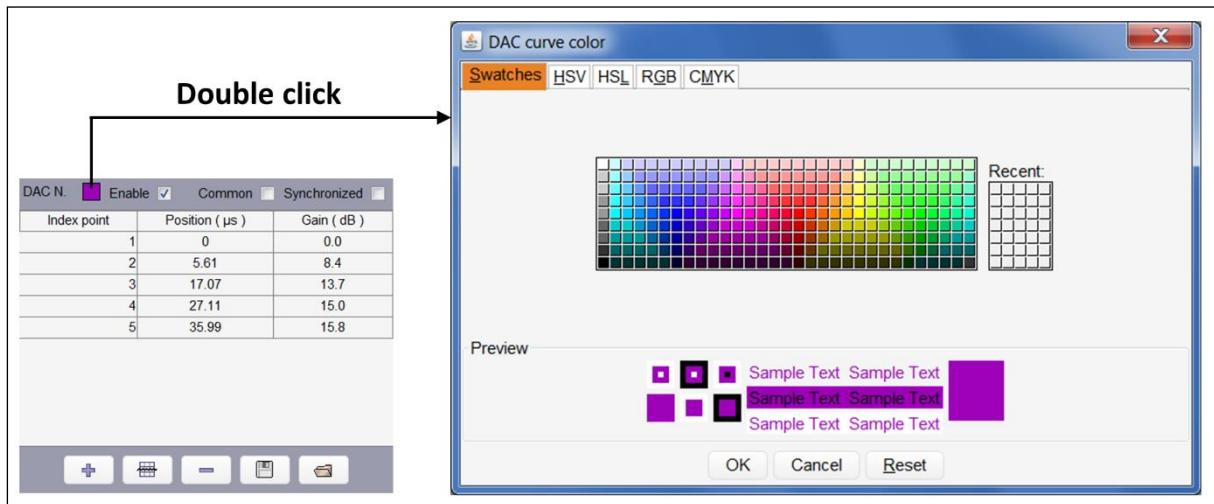


Figure 133: Digital DAC color modification

- **Index point**

The TCG curve is created using segments. The extremities of each segment are numbered in the “index point” column.

Index point	
	1
	2

Figure 134: Index point

- **Position and Gain**

The user can specify each TCG point coordinates (time, gain). Using the column labeled “Position”, the user can edit the position in time to be associated with the gain value specified in the “gain” column (see below). These parameters can also be edited using the graphic tool available on the A-scan window. Simply drag and drop the TCG curve to edit its parameters.

Position (μ s)
0
5.12

Figure 135: Position of TCG points

Amplitude (dB)
0
10
0

Figure 136: Gain of TCG points

- **Add point**

To add a point to the TCG curve, simply click on the “+” sign located under the TCG curve table.



Figure 137: Add point of DAC

- **Insert point**

To insert a point to the TCG curve, simply click on the sign below. This function offers a choice to insert a point before or after the selected point of the TCG curve.

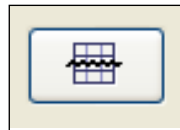


Figure 138: Insertion of a DAC point

- **Delete points**

To delete TCG points, first select the point(s) to be deleted. If only one point is to be deleted, simply click on the point. To select several points, maintain the CTRL key pressed while clicking on the points to delete. To remove the selected point(s), click on the “-” icon.

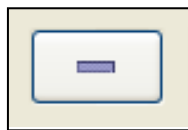


Figure 139: DAC points deletion

- **Synchronized**

The manual digital TCG curve can be synchronized with respect to the summed signal threshold. To enable the synchronization of a TCG curve, tick the “synchronized” checkbox. The user specifies the amplitude threshold in the “synchronized TCG” tab or moves the amplitude threshold in the A-scan view, the position in time it should start searching for values exceeding the threshold.

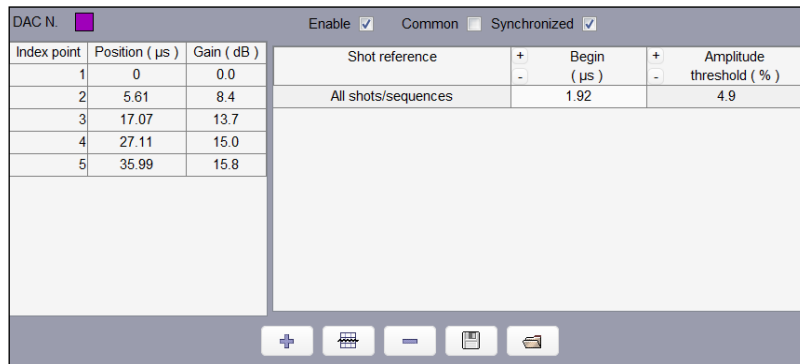


Figure 140: Manual digital DAC panel

Gate TCG

The TCG gate is a software computed TCG.

To work, this TCG requires to the Ascan to be retrieved in the PC; It means that a SW gate must be set on the Ascan (see Gates tab).

The user must select the gate where the TCG will be applied.

This TCG is only applied inside the Ascan gate area. It means that if the beginning and/or the end is synchronized, the start of the TCG will be applied at the start of the gate and at the end of the gate, the TCG will be stopped. After the gate, the “Gain after” value will be applied.

The main goal of this gate is to do “Backwall monitoring” when thickness is not constant.

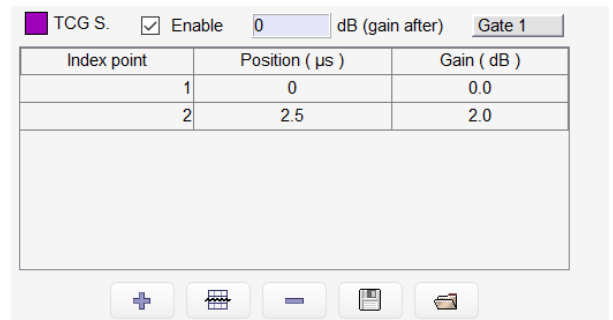


Figure 141: Gate TCG Menu



The TCG Gate will be active only for gates after the TCG gate (including the TCG gate himself).

HW gates are not affected by Gate TCG. TCG Gate have incidence on CPU load.

10. Filters

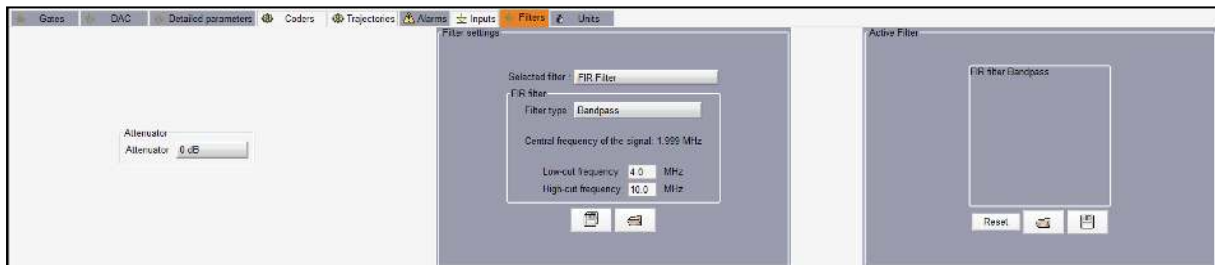


Figure 142: Filters panel

The following Signal processing tools are available from the “**Filter**” panel:

- Attenuators (available on MultiX system)
- FIR (Finite Impulse Response) filters
- Subtraction
- N shots average
- Decimation Filter

The filter panel is also available in the “**calibration**” panels (Probe and wedge).

1.1. Attenuators

The attenuator function is only available for MultiX generation. This analog attenuator directly applies the gain on the channel-boards.

Two states are available:

- 0 dB (disabled attenuators),
- -12 dB (enabled attenuators).



Figure 143: Attenuator state

1.2. FIR/IIR Filters

Digital hardware FIR/IIR filters are available for all systems but implementation can be different in function of the HW (FIR or IIR and number of coefficients). FIR/IIR filters are applied on the summed signal after digitizing. The filter template is associated from 16 to 64 weighting coefficients adapted to raw data signal only depending of the device performance.

1.2.1 Band-Pass filter

Two parameters are editable for this filter: the lower and higher limits of the band-pass.

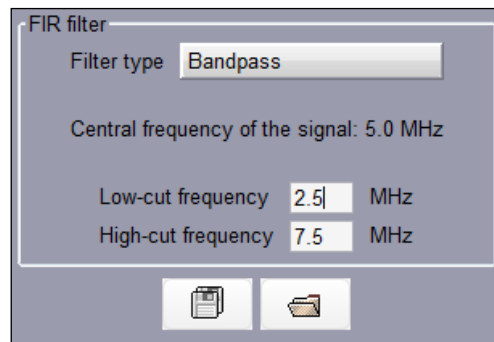


Figure 144: Band pass filter

All frequency components outside the editable frequency bracket will be decreased.

1.2.2 Saving/loading of filter parameters

To save or load a filter, press the “save” or “load” icons located under the FIR filter tab. The default saving location is the C:\Acquire\desk\fir_filters directory.

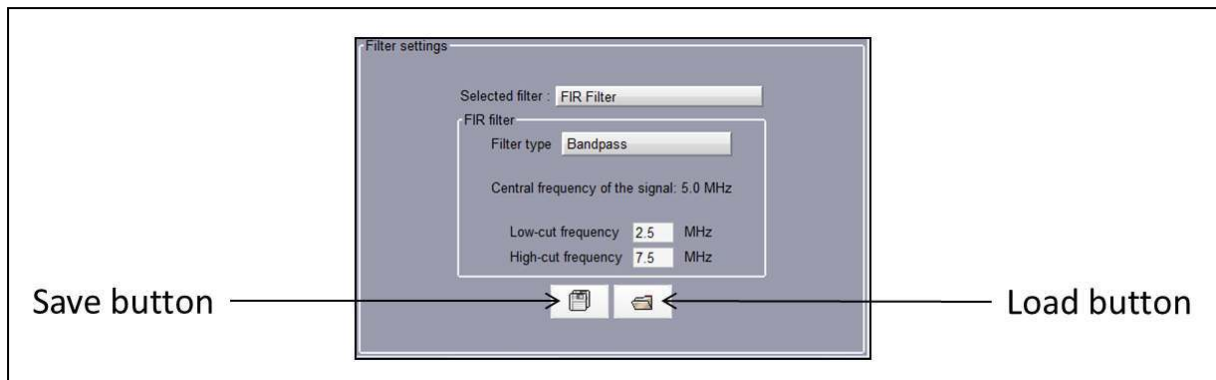


Figure 145: Filters save/load icons

1.3. N shots average

The N shots average option is used to reduce the digital noise on the signal applying averaged values on several shots (up to 64).

On Panther, average is computed at the elementary channel level, enabling faster inspection for parallel modes.

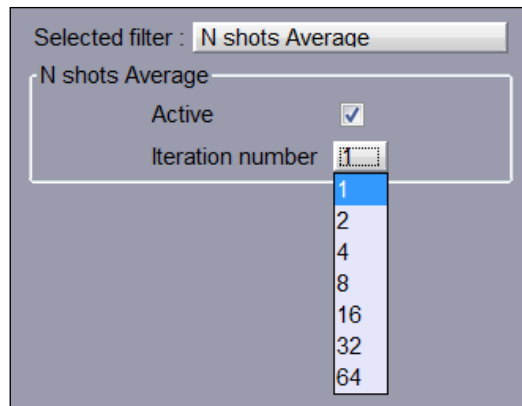


Figure 146: N shots average panel

1.4. Decimation Filters

Decimation is a data compression algorithm used to reduce the number of sample in the A-scan. Some samples are vanished but an algorithm keeps maximum and minimum. The number of vanished samples depends of decimation factor.

Example:

Decimation factor = 1/4. For each group of 8 samples, the minimum and maximum are extracted.

Decimation factor = 1/8. For each group of 16 samples, the minimum and maximum are extracted.

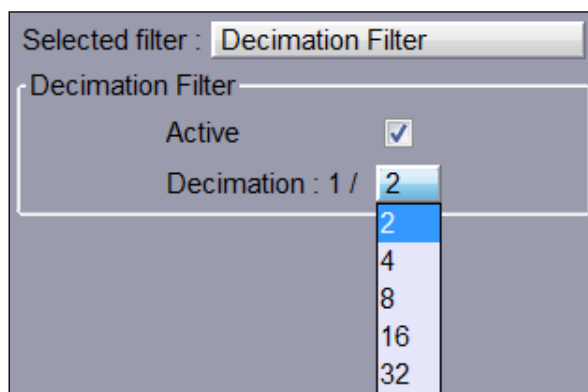


Figure 147: Decimation filter panel

11. Trajectories

This panel defines the transducer trajectories for an acquisition according to available encoders.

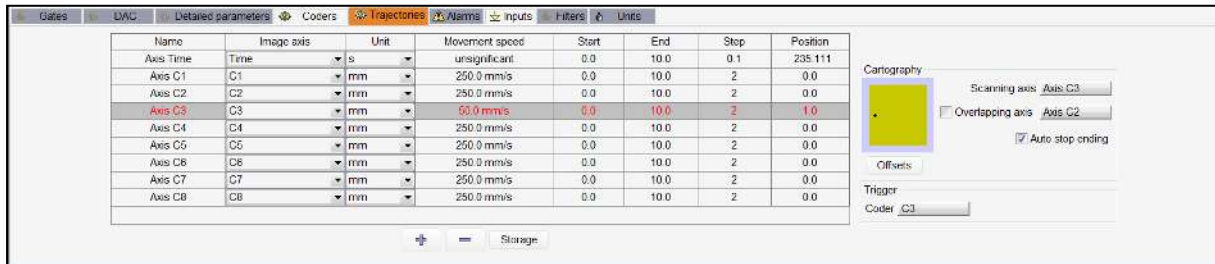


Figure 148: Trajectories panel

1.5. Definition of trajectories

A trajectory is defined by a name, an encoder, a start position, an end position and an acquisition step. Default trajectories are time axis, with encoder axis defined in the **Encoders** panel. These trajectories cannot be deleted. Name, image axis and unit of the time axis cannot be modified.

- **Name**

Define a trajectory name.

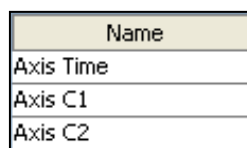


Figure 149: Names of the Trajectories

- **Image axis**

Select encoder axis associated to the trajectory axis.

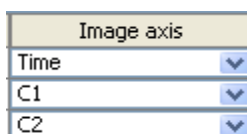


Figure 150: Coder Axis of the Trajectories

- **Unit**

Define the unit of the trajectory.

Unit	
s	▼
mm	▼
mm	▼

Figure 151: Unit of the Trajectories

- **Movement speed**

Indicate the transducer displacement speed. This speed value is used to evaluate the system load according to the data flow during **Acquisition**.

Movement speed	
unsignifiant	
250.0 mm/s	
250.0 mm/s	

Figure 152: Movement speed of Trajectories

- **Start**

Define the start position of the trajectory.

Start	
0.0	
0.0	
0.0	

Figure 153: Start of the Trajectories

- **End**

Define the end of the trajectory. This value is proportional to the step value.

End	
10.0	
10.0	
10.0	

Figure 154: End of the Trajectories

- **Step**

Define the acquisition step on the current trajectory.

Step
0.1
0.2
0.2

Figure 155: Step of the Trajectories

- **Position**

Display the current encoder position.

Position
152,635
2184.0
2184.0

Figure 156: Current coder position

- **Add and delete a trajectory**

The user can add and delete a trajectory thanks to the two icons shown below:

A click on the "+" icon adds a trajectory.

A click on the "-" icon deletes the selected trajectory.



Figure 157: "Add" and "Delete" icons of trajectory

By clicking on "**Shift + left click**", the user can select a group of cells. Selected cells are colored in blue.

Name	Image axis	Unit	Movement speed	Start	End	Step	Position
Axis Time	Time	s	unsignificant	0.0	10.0	0.1	469.405
Axis C1	C1	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C2	C2	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C3	C3	mm	50.0 mm/s	0.0	10.0	2	-127.25
Axis C4	C4	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C5	C5	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C6	C6	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C7	C7	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C8	C8	mm	250.0 mm/s	0.0	10.0	2	0.0

Cartography

Scanning axis:

Overlapping axis:

Auto stop ending

Offsets

Trigger

Coder:

Figure 158: Selection of cell's group in Trajectories panel

By clicking on "**Ctrl + left click**", the user can select new cells and adds them to the current selection.

Name	Image axis	Unit	Movement speed	Start	End	Step	Position
Axis Time	Time	s	unsignifiant	0.0	10.0	0.1	547.002
Axis C1	C1	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C2	C2	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C3	C3	mm	50.0 mm/s	0.0	10.0	2	-127.3
Axis C4	C4	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C5	C5	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C6	C6	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C7	C7	mm	250.0 mm/s	0.0	10.0	2	0.0
Axis C8	C8	mm	250.0 mm/s	0.0	10.0	2	0.0

Cartography

Scanning axis:

Overlapping axis:

Auto stop ending

Offsets

Trigger

Coder:

Figure 159: Addition of a selection in Trajectories panel

1.6. Inspection cartography

Inspection cartography panel defines the UT data storage and the mechanical axis used for **Acquisition** in case of a motorized scanning.

- **Mechanical parameters**

Mechanical parameters define acquisition axis, like scanning axis and eventually index (or overlapping) axis.

- Scanning Axis:

The user selects a scanning axis from a list box. Available scanning axes are trajectories defined by the user in the **Trajectories** panel.

Cartography

Scanning axis:

Overlapping axis

Auto stop ending

Offsets

Trigger

Coder:

- Axis C1
- Axis C2
- Axis C3
- Axis C4
- Axis C5
- Axis C6
- Axis C7
- Axis C8

Figure 160: Scanning axis selection.

- Overlapping axis:

The user selects an overlapping axis thanks to the box below:

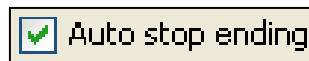
The available overlapping axes are trajectories defined in the **Trajectories** panel.



Note: the acquisition with an overlapping axis will be possible if only the 'overlapping axis' option is validated.

- Auto stop ending:

This option must be validated to automatically stop an acquisition triggered on mechanical encoder. This option is automatically validated in case of time encoder.

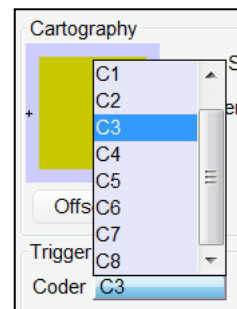


- Trigger Coder:

The user selects which encoder will be used as a trigger for acquisition amongst time and mechanical encoder.



Trigger selection at this level define trigger source but not trigger method. To select trigger method, refers to Home → Hardware section.



- **Storage**

The "**Storage**" icon indicates mechanical positions stored during the **Acquisition**. User can select other axes to be stored during **Acquisition**.

Storage can be mandatory for some application like using "Sinus Arm" scanner.

A left click on the "**Storage**" icon opens the box below.

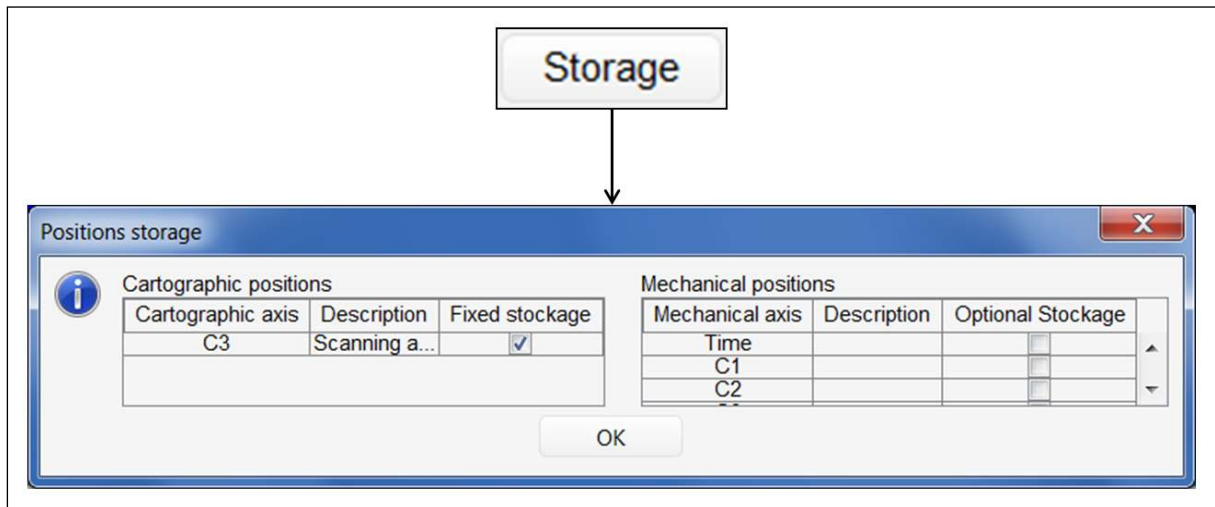


Figure 161: Information about data storage

- **Cartographic Offsets**

A left click on the « Offsets » icon opens a window. This window contains the parameters of a mechanical general offset for the scanning axis and the overlapping axis. This offset will be used into the representation of B-scan or C-scan of the acquisition.

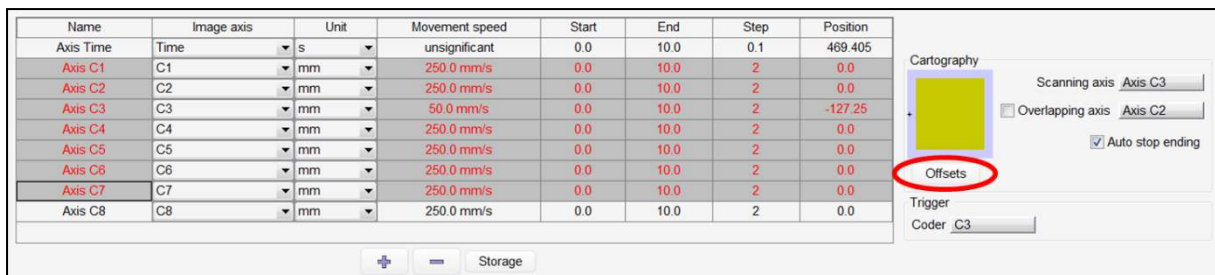


Figure 162: Cartographic Offset's Icon

In the case of Multi-Salvoes using several probes, the mechanical offsets between the positions of various probes will be used into the B-scan and C-scan representations of the **Acquisition** panel. These mechanical offsets are calculated from the initial position of probes defined into the **Configuration** panel.

The cartographic offsets panel allows to define:

- The offsets linked at the cartographic axis (acquisition axis),
- And the offsets linked at the probe positioning.

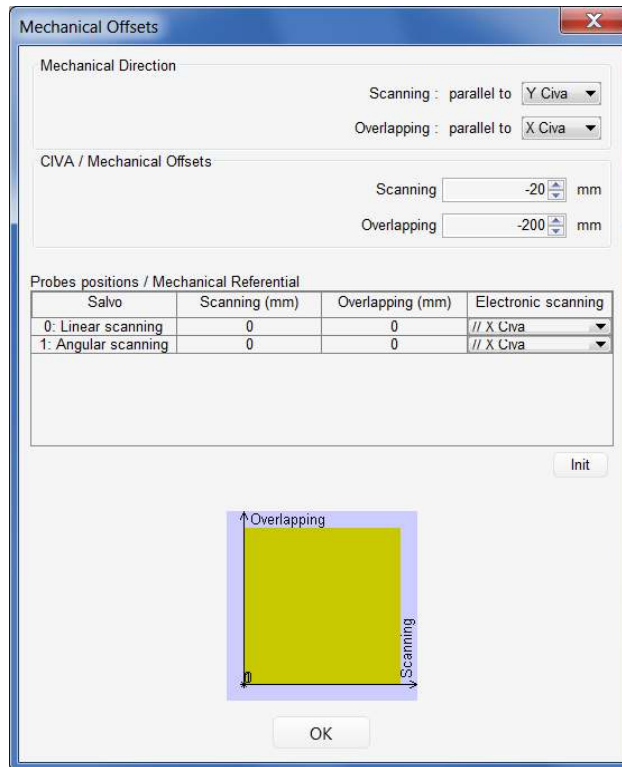


Figure 163: Cartographic Offsets panel.

- Mechanical direction:



Figure 164: Scanning axis

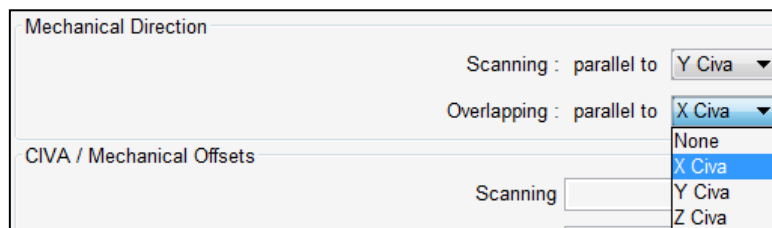


Figure 165: Overlapping axis

The drop-down menu allows to define the scanning axis and the overlapping axis among the 3 cartographic axis of **Configuration** panel (X, Y, Z), defining the initial position of probe.

- CIVA/Mechanical offset:

Allows to define one general offset for all salvoes, which will be applied in the scanning axis and the overlapping axis.

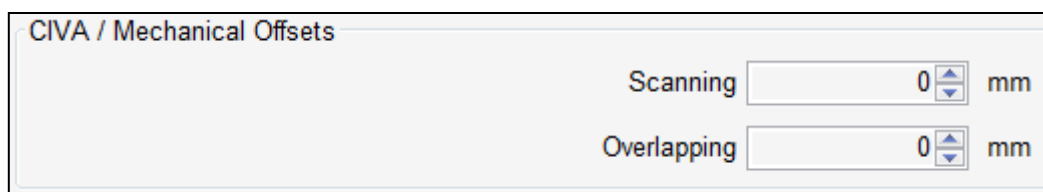


Figure 166: CIVA/Mechanical offsets panel

- Init icon

“**Init**” icon reinitializes the cartographic offsets according to probes positioning defined in the **Configuration** panel.

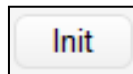


Figure 167: "Init" icon

- Example of cartographic offsets in case of multi-salvos:

Salvo 1

The positions of probe defined in the **Configuration** panel are the following:

X = 10mm

Y = 50 mm

Salvo 2

The positions of probe defined in the **Configuration** panel are the following:

X = 50mm

Y = 100 mm

This following picture shows the relative position of both probes, the wished scanning axis and the wished overlapping axis in C-scan view of **Acquisition** panel with the same origin between mechanical reference frame and reference frame of the **Configuration** panel.

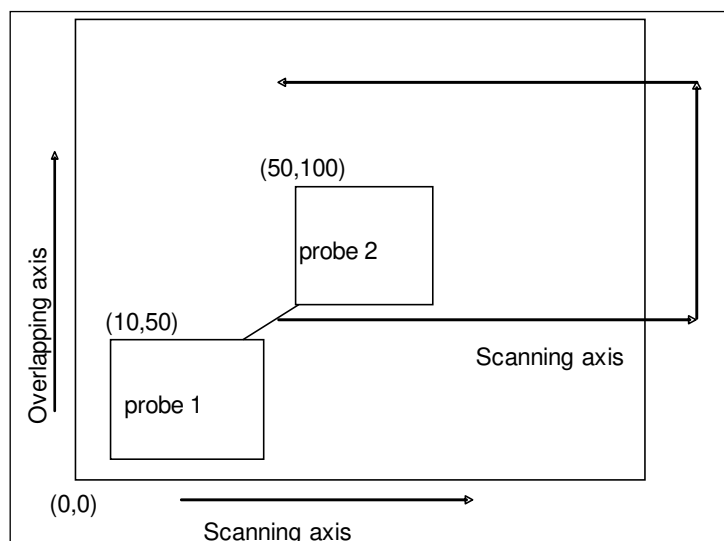


Figure 168: Probes positions

For the consideration of these different parameters in the **Acquisition** panel displays, the user must define the cartographic offsets in the following way:

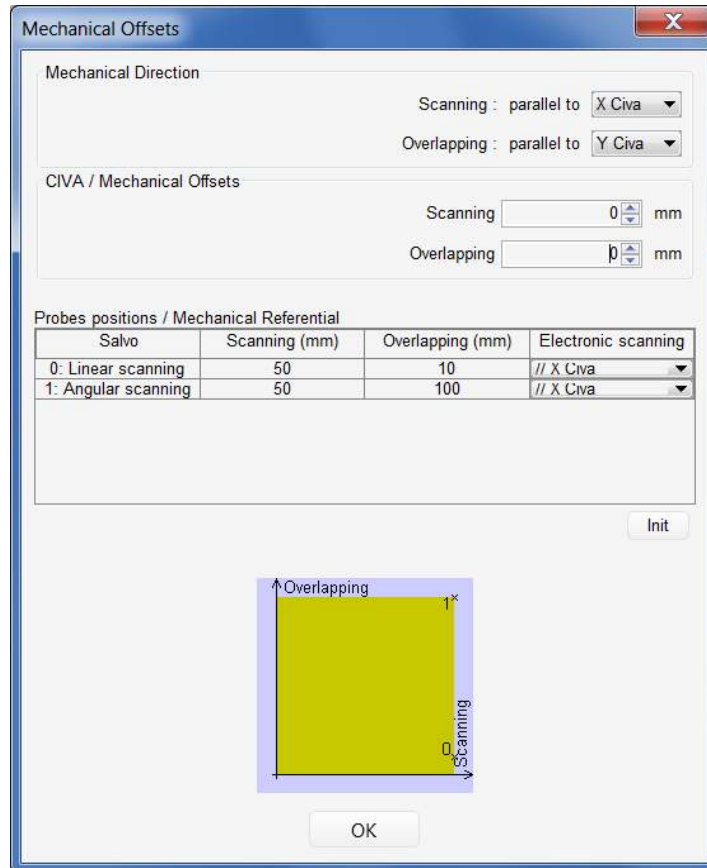



Figure 169: Cartographic offsets of the multi-salvoes example

12. Alarms

The TAB alarms is dedicated to define alarms parameters.

These alarms are computed by the software in function of the gate results and some user's defined parameters like counts before alarm to reduce false alarm.

The alarm array is associated to a Salvo. Before set an alarm, user must select the salvo.



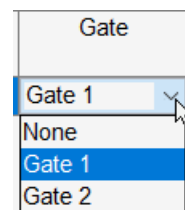
Definition			Data filtering				Validation				
Name	Gate	Mode	Threshold (dB)	Low Count	High Count	Proximity	Sound alarm	Detection Mode	Screen alarm (s)	Sound alarm (s)	Specific area activation
Alarm 1	Gate 1	Echo Max (Abs)	-6	0	0	Trigger	Off	Echo in	2.0	2	<input type="checkbox"/>

To define an alarm, press the “+” button. To delete an alarm, select it and press “-” button.

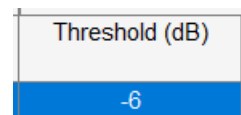


When alarm is added, define its name.

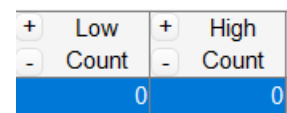
Then to be active, gate source must be selected.



The base threshold of the alarm is the threshold of the gate. A second threshold can be set with a relative value of the gate threshold.

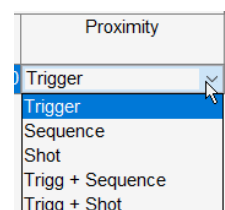


Then user must define how much count for an echo over the threshold will set the alarm.



To be set, the amplitude of the signal must be “low count” over low threshold and “high count” over high threshold.

This feature is useful to differentiate a defects where amplitude is increasing gradually from an electric spike which appear and disappear from one shot to another one.

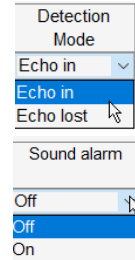


The proximity setting will define the sequence where the count will be taken in account. With trigger, the alarm will be set if consecutive triggers on the same

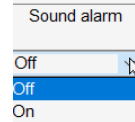
salvo/sequence/shot detect a defect. With sequence, the alarm will be set if consecutive sequences on the same trigger detect a defects...

Other settings available in the same logic (shot, trigg+sequence, trigg+shot).

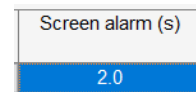
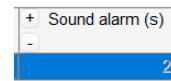
Detection mode setting to choose if alarm is set when echo appear or disappear.



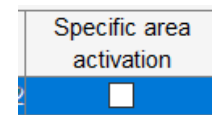
Sound alarm will generate sound on the PC when alarm is set



Screen and sound alarm will extend the display and sound of alarms to be visible even very short.

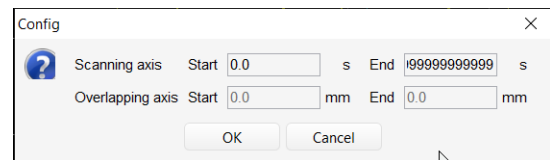
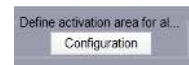


Specific area activation is useful to disable the alarms when the probe is outside of the inspected area.



The Acquire software compute if the probe in inside or outside of the inspected area in function of the probe offset (see "trajectory" tab) and alarm area configuration.

By selecting the "Configuration", the user can set the inspection area which is different from the begin/end of trajectory because one is the encoder area, other is individual probe area.



The alarms can be displayed on the screen by dropping the view on parameter tab or on Acquisition tab.

It can also be read dynamically in real time by an external PC or PLC using remote interface to sort or to mark the part. See remote documentation.

PART 5: ACQUISITION

The **Acquisition** panel allows to define acquisition view panels and to display acquired data in real time.

The user can customize the **Acquisition** panel thanks to different available views (*A-scan*, *B-scan*, *C-scan*, *D-scan*...). Data displayed in each view come from several sources, defined by the user. One acquisition can produce various sources equivalent to several acquisitions.

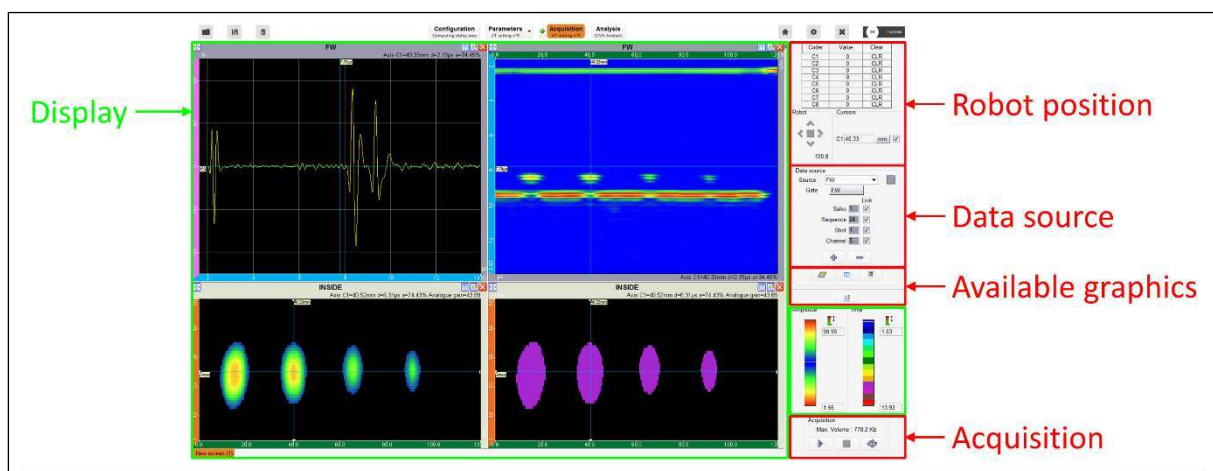


Figure 170: Acquisition panel

1. Acquisition information

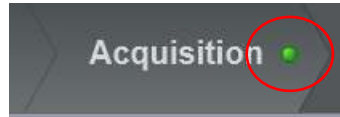
"**Acquisition**" icon gives access to **Acquisition** panel.

Colored icons placed on the left of the "**Acquisition**" icon display the different steps in order to perform an acquisition according to current parameters:

- **Green:** the acquisition is possible.
- **Orange:** the acquisition is possible, but close to the limit: problem can occur.
- **Red:** The acquisition is not allowed: the system is overload.

A click on colored icon displays information about the system workload for the acquisition process (Cf. next figure). The workload depends on electronic device and computer capacities. Another limit comes from the maximum time of flight of ultrasonic signals to limit signal overlap. If the system is overloaded

(Red icon) some parameters must be modified (P.R.F, time gate length, step...) to reduce the load. The user knows what parameter must be changed to reduce the load thanks to information contained in the **Storage** panel.



Configuration related parameters				Adjustable parameters			
Property	Current val.	Limit val.	Status	Property	Current val.	Limit val.	Status
Hardware Data Throughput, Device...	9.21 MB/s	315 MB/s	●	P.R.F.	5001 Hz	2420 Hz	●
Hardware Data Throughput, Device...	0 MB/s	315 MB/s	●	Step	0.05 s	0.024 s	●
Hard disk R/W speed	0.18 MB/s	498.3 MB/s	●	CPU/GPU load	7.87 %	100 %	●
Expected file size	1.76 MB	164.49 GB (H...	●				
SAUL datas	0	1	●				

Figure 171: Information about system load for acquisition

“Limit val.” Display the value can be achieved with current parameters or the minimum value needs to achieve the required performances.

Examples:

- 2420 Hz is the minimum PRF to achieve the 0,05 S step required.
- 0.024 S is the minimum step possible with actual parameters

Several parameters can influence the performance. Minimum step will depends on PRF but also number of sequences, maximum data throughput...

Ask for specific procedure for more information.

1. Display

Acquisition display is similar to **Parameters** display: same views are proposed and same tools are used to select and arrange the views.

1.1. Data source

Data acquired in gates by multi channels phased array system are identified thanks to focalization parameters and acquisition gates:

- Acquisition gates: The UT data are included in the time zone defined by the gate and depend on the type of the gate.
- Data produced by phased array techniques are organized with the structure and the quantities below:
 - *Salvo*: Set of delay-laws applied for one or several apertures. One salvo may include several sequences and shots. One salvo defines one kind of control. Several salvos (or control) can be applied together (multi-salvoes mode).
 - *Sequence*: Set of delay-laws applied for given electronic aperture. The electronic aperture is defined by both the elements used for transmission (T) and reception (R). A sequence may include several shots.
 - *Shot*: For a given electronic aperture, corresponds to the selected delay-law. One shot refers to both transmission and reception delay-laws, which can be distinct from each other.
 - *Channel*: For a given electronic aperture (sequence) and for a specific delay-law (shot); corresponds to the elementary contribution of one element. The symbol Σ refers to the actual sum of each elementary contribution contained in the selected trio (i.e. salvo, sequence, shot). The sum is the actual signal resulting from the application of the delay-law.

Thus, UT data resulting from one setting (salvo) can correspond to several testing methods. Data sources allow to define and to display testing methods separately. Different data representations, related to defined methods and time gates, can be associated to each Data source.

Example 1: We consider a salvo made of three sequences of n shots. With one data source, the user can display one *B-scan sequences* and one *B-scan shots*. The *B-scan shots* update carries out automatically as soon as sequence is modified with cursor or in the **Data source** panel. It isn't possible to display three *B-scans shots* of three different sequences in the same screen with only one data source. In adding two data sources, one sequence is defined on each data source. It is also possible to display three *B-scan shots* of three different sequences in the same screen (one *B-scan shot* is displayed by one data source). So, user can see evolution of three sequences in only one screen and in real time.

Example 2: Acquisition containing three time gates and one **Configuration** of one sequence of n shots is considered. With one data source, the user can display one *B-scan shots* of one gate. *B-scan shots* updates by changing gate index. So, it's not possible to display three *B-scans shots* of the three time gates in the same screen with only one data source, but it's possible by adding two other data source. With this two other data sources, each gate is attributed to one data source. So, user can see evolutions of three time gates content with the three *B-scan shots* in the same screen.

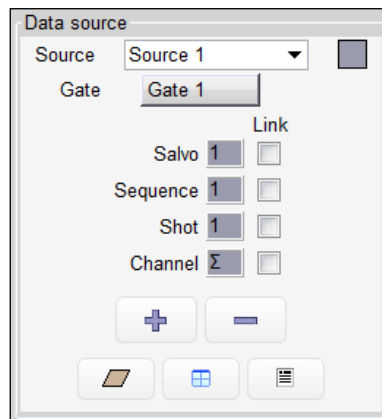


Figure 172: Selection of current focusing parameters in **Acquisition** panel

When modifying one of these parameters such as gate, salvo, sequence, shot, or channel, all graphics views resulting from the same data source are automatically updated. Furthermore, cursors and "salvo-sequence-shot-channel" parameters are linked in all graphics of the same data source.

Note: In Multi-salvoes configuration, one data source per salvo and per gate is automatically created. In multi-salvoes, the user can't add or delete data source.

- **Add Data source**

Add Data source by clicking on the "+" icon (cf. next figure). Addition of data source makes easier the display of all UT data.

- **Delete Data source**

Delete Data source by clicking on the "-" icon.

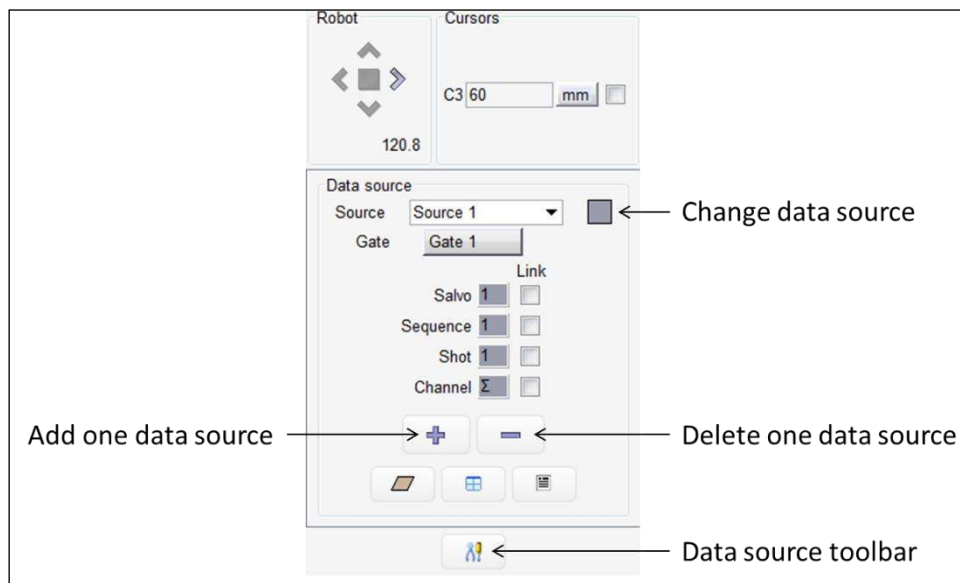


Figure 173: Add or remove data sources in **Acquisition** panel

- **Change Data source**

Each data source is associated to a color. This color fills the background of labels in the **Data source** panel and the rectangle located near the name of data sources (cf. figure above). When user changes the Data source, the tree structure of available graphics, the set "sequence-shot-channel" value, the gates and the color map are updated.

To change the current data source, user can:

- Click on the rectangle beside the source drop down icon. The next source in the list will be selected.
- Select another source from the source drop down icon.
- Click on the title of a view; the related source will be selected.

The frame of all views wears color of the related Data source.

- **Rename Data source**

Select data source text with a click in the source box. The selected text is colored in blue and the user can enter the new name.

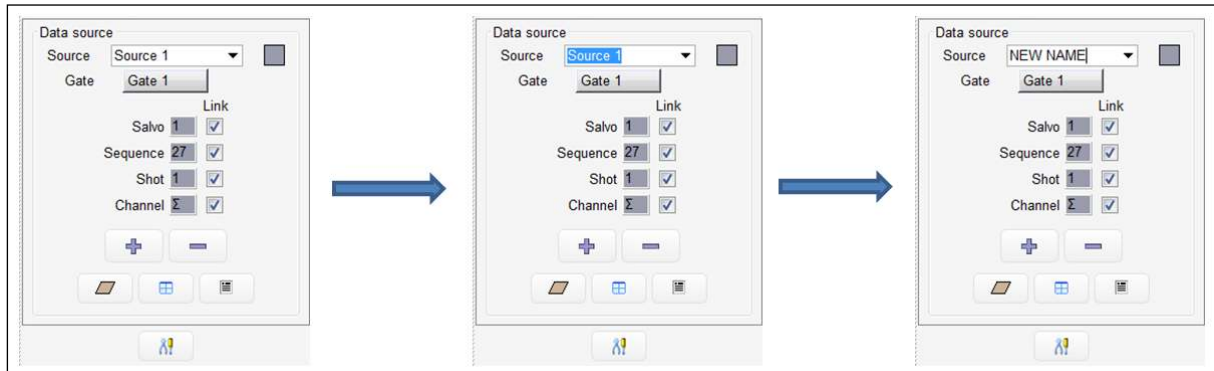


Figure 174: Rename Data source

- **“Link” option**

“**Link**” option links cursors of different data sources. Each parameter of each source must be validated to be linked. This option is explained in the 2.5 Cursors paragraph.

- **The data source "toolbox"**



The “Tool Box” icon gives access to the several features:

- To save data source, selected graphics and desktop arrangement, click on the save icon.
- To open a set of (data source, graphics and desktop arrangement), click on the open icon and select the file.
- To delete a set of (data sources, graphics and desktop arrangement), click on the trash icon.
- To hide the title banner for each graphic window, click the hide icon
- To regenerate the data source (copy the data source from parameters panel to acquisition panel, in multi-salvoes configuration), click the refresh icon.
- To modify the cartographic offsets after acquisition, click the cartographic offsets icon.

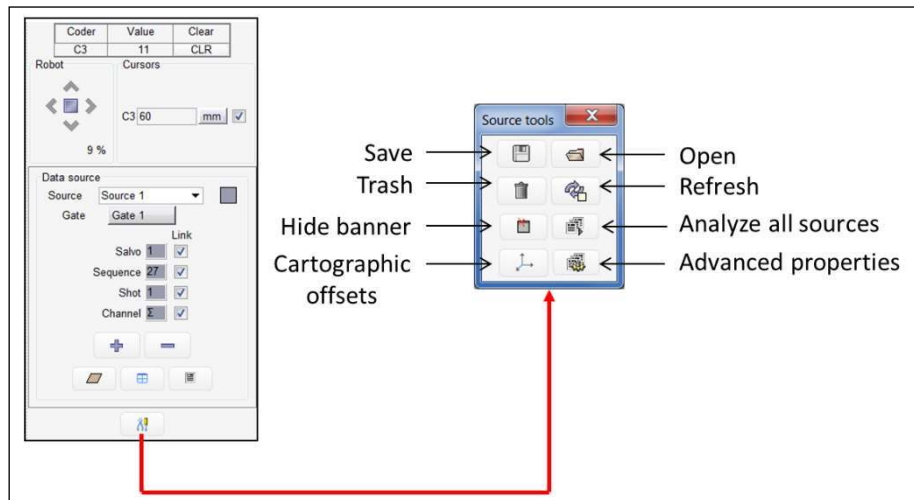


Figure 175: Data source toolbox

- “Advanced properties” icon

This option consists in selecting UT data displayed on A-scan and B-scan when there are several data at the same probe position (cumulated data coming from several going past).

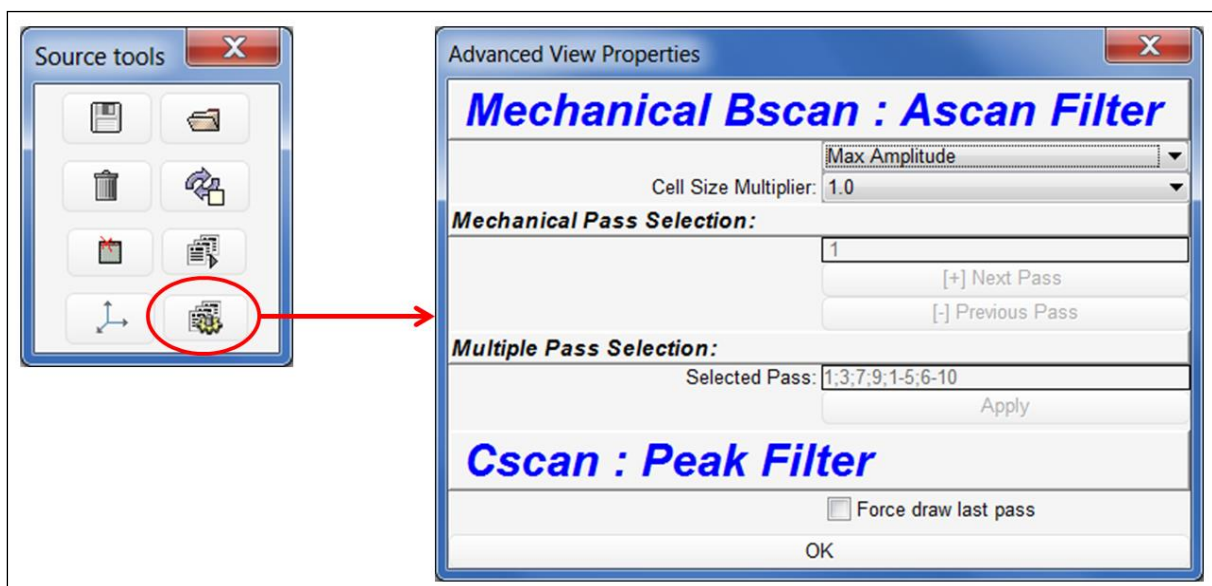


Figure 176: Advanced properties window

Several criteria of mechanical B-scan display are available:

- Max amplitude (default criteria): all UT data are considered and the maximum value of data is displayed.
- First/last pass per cell: for each step, the data of the first/last pass is displayed.
- First/last pass: in all the views, data of the first/last pass are displayed.
- Single pass: the user selects the pass to display on the Mechanical Pass selection panel.

Mechanical Pass Selection:	
	1
[+] Next Pass	
[-] Previous Pass	

Figure 177: Single pass selection

- Multipass: Using print syntax, the user can select several pass to display on the multiple pass selection panel:
 - o 1-3: display the pass 1, 2 and 3.
 - o 1; 3; 7: display the pass 1, 3 and 7.
 - o 1-3; 5-6; 8: display the pass from 1 to 3, from 5 to 6 and the pass 8.

Multiple Pass Selection:	
Selected Pass:	1;3;7;9;1-5;6-10
Apply	

Figure 178: Multi pass selectio

- About C-scan view, it is possible to display the last pass in ticking the corresponding option (see next figure).

Cscan : Peak Filter	
	<input type="checkbox"/> Force draw last pass

Figure 179: C-scan display criteria

1.2. Available Views

Acquisition panel contains 4 basic types of representations: A-scan, B-scan, C-scan and D-scan.

The available view depends on acquired data and acquisition mode. For example, A-scan/B-scan are only available when A-scan are stored in a gate; concatenated C-scan is only available when incremental Axis exists.



When data is already acquired and some modification are done in the settings (adding a gate, adding incremental axis...), the available views will remain the views for existing acquired data. To activate a new view, reset the data or redo an acquisition before.

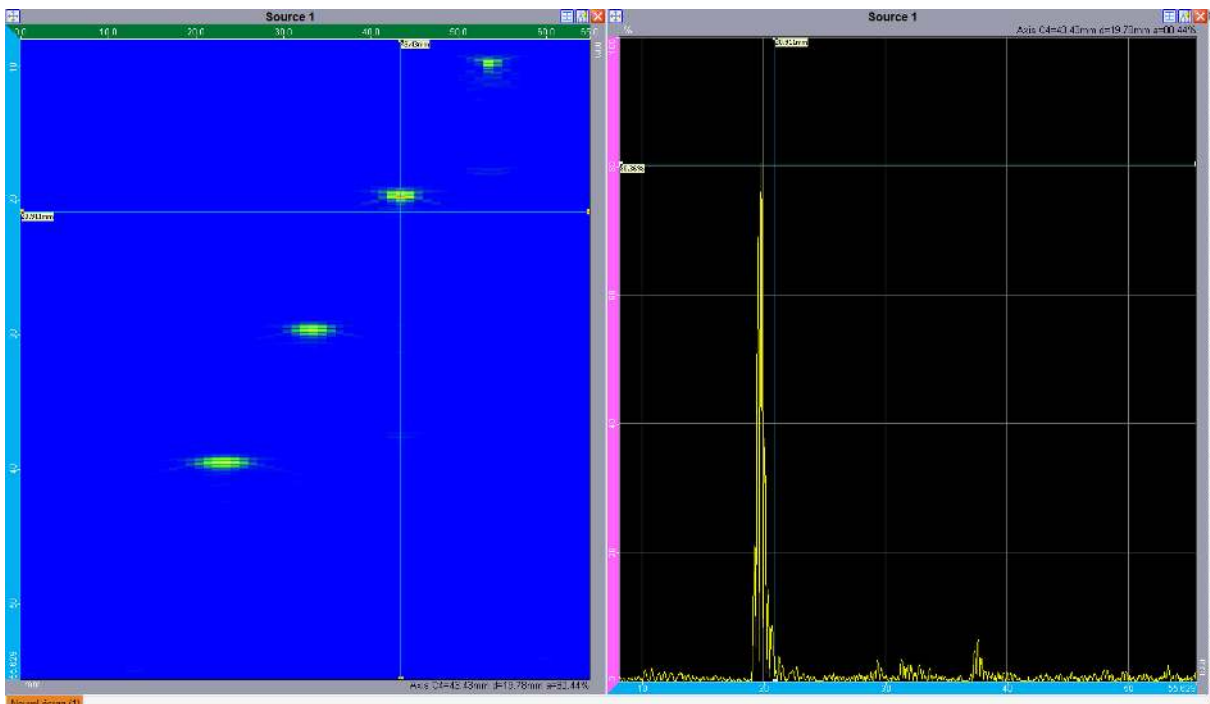


Figure 180: B-scan (left) and A-scan (right) representations

The Data source panel displays all views available in the **Acquisition** panel according to the data source parameters. Views are presented with a dynamic tree structure form (cf. next figure). To select

the type of view to be dropped in the workspace, click on the icon:



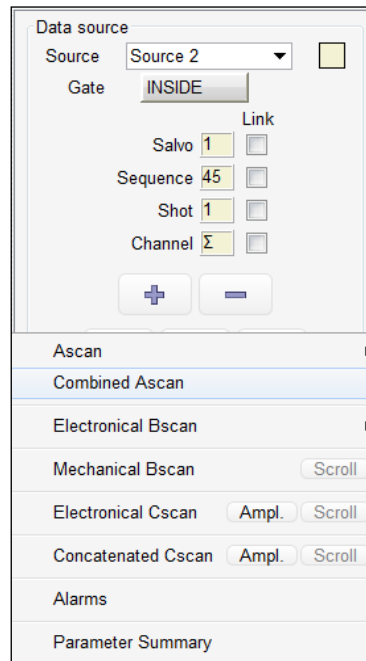


Figure 181: Representations of available Views in **Acquisition** panel

Views are proposed according to acquisition Trajectories and type of data. For each source, various views can be available:

- **A-scan:** display the amplitude of current signal versus time of flight.
- **FFT:** frequency representation (Fast Fourier Transform - FFT) of the current A-scan. Two green cursors limit the FFT computation area on the A-scan.

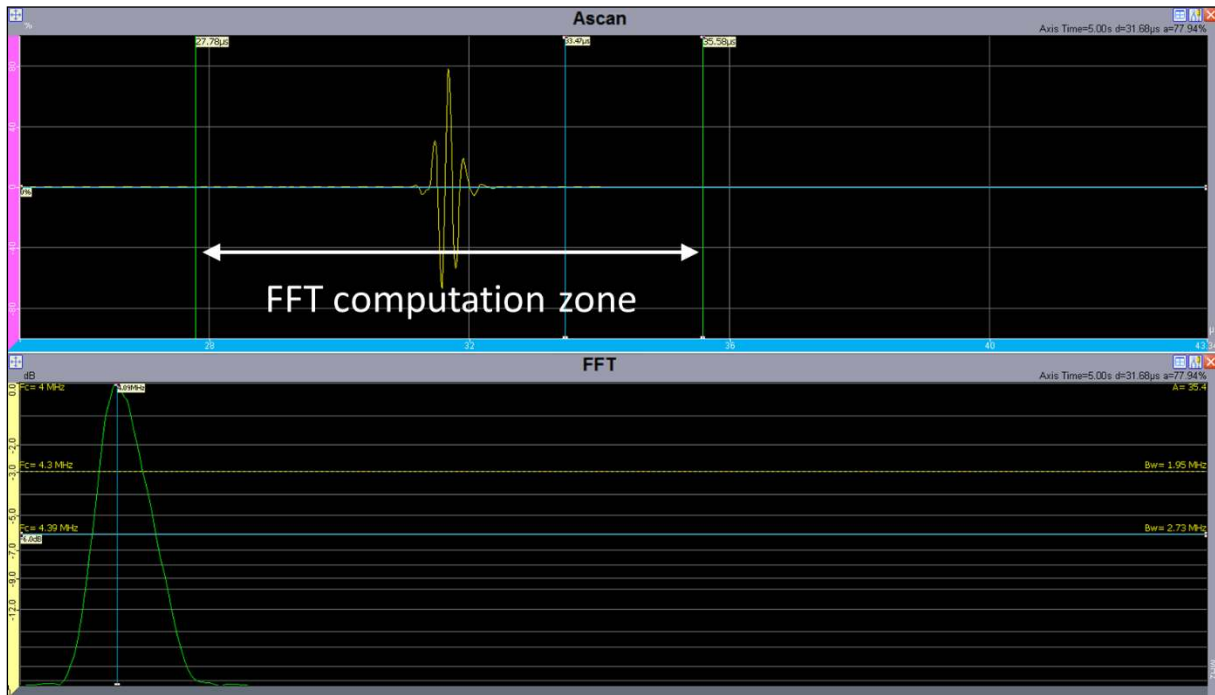


Figure 182: Zone of the FFT computation

- **Electronic B-scan:**



Clicking on the left icon selects a linear scanning view, clicking on the right icon selects an angular scanning view. The electronic B-scan view (linear or angular) is now automatically selected when in one of the following cases:

- The angular B-scan view is selected when the number of sequences is 1 and the number of shots is >1.
- The linear B-scan view is selected when the number of shots is 1 and the number of sequences is >1.

If both numbers of sequences and shots are greater than 1, the user manually selects the type of electronic B-scan. The electronic B-scan represents sequences, shots or channels as a function of time.

- **Corrected B-scan:** This view represents sequences or shots as a function of distance (e.g. thickness). The corrected B-scan accounts for beam orientation and material velocity specified in the configuration panel. This view projects the B-scan in the specimen geometry (also defined in the configuration panel) for a more realistic display of ultrasonic data.

- **B-scan channels:** Displays all elementary channels for a given sequence and a shot according to time of flight. For a given set of (salvo, sequence, shot), the "B-scan channels" represents the signal amplitudes of each elementary channel included in the selected set, as a function of time.
- **B-scan FFT:** Correspond to the Fourier Transform of each signal of the current B-scan. This view represents the FFT of each A-scan present in the selected B-scan.
- **CAD + 3D B-scan:** This view displays the Corrected B-scan in 3D, along with the CAD specimen (if present).
- **Combined corrected B-scan:** Displays the corrected B-scan containing all cumulated data of all scanning positions. This view is available if the scanning axis is perpendicular to the probe electronic axis.
- **Mechanical B-scan:** Displays signals versus scanning axis, for fixed value of sequence, shot and channel.
- **D-scan:** Displays signals versus overlapping axis, for fixed value of sequence, shot and channel.
- **Horizontal Echodynamic curve:** This view represents the maximum signal amplitude as a function of time. The maximum amplitude is picked up over the number of sequences for an electronic B-scan, over the number of positions for a mechanical B-scan. More generally, the horizontal Echodynamic curve represents the maximum amplitude over the unit representing the horizontal axis, as a function of the unit representing the vertical axis.
- **Vertical Echodynamic curve:** This view represents the maximum amplitude over time. The maximum amplitude is displayed as a function sequence for an electronic B-scan, and as a function of position for a mechanical B-scan. More generally, the vertical Echodynamic curve represents the maximum amplitude over the unit representing the vertical axis, as a function of the unit representing the horizontal axis.
- **Scrolling view:** During acquisition this view represents a part of the original view (mechanical B-scan or Mechanical C-scan). Data scroll with the encoder position.
- **Electronical C-scan (Ampl):** Displays the amplitude of the echo detected in the selected gate versus scanning axis and electronic scanning. The scanning axis depends on the selection of linear (sequence) or angular (shot) scanning.



- **Electronical C-scan (Time):** Displays the time of flight of the echo detected in the selected gate versus scanning axis and electronic scanning.

- **Corrected C-scan:** The corrected C-scan accounts for beam orientation and material velocity specified in the configuration panel. This view projects the electrical C-scan in the specimen geometry (also defined in the configuration panel) for a more realistic display of ultrasonic data. Corrected Cscan can be unavailable for some scanning modes where CIVA is not able to compute UT path.
- **Mechanical C-scan (Ampl):** Displays the amplitude of the echo detected in the selected gate versus the position (X, Y) of the transducer, for given sequence and shot.
- **Mechanical C-scan (Time):** Displays the time of flight of the detected echo versus the position (X, Y) of the transducer, for given sequence and shot.
- **C-scan concatenated (Ampl):** Displays several corrected **C-scan** (in amplitude) versus the position (X, Y) of the transducer. (cf. next figure). **To be available, incremental axis is mandatory.**
- **C-scan concatenated (Time):** Displays several corrected **C-scan** (in time) versus the position (X, Y) of the transducer. (cf. next figure). **To be available, incremental axis is mandatory.**

Note: In case of overlap, concatenated **C-scan** displays maximum of amplitude of superimposed signals.

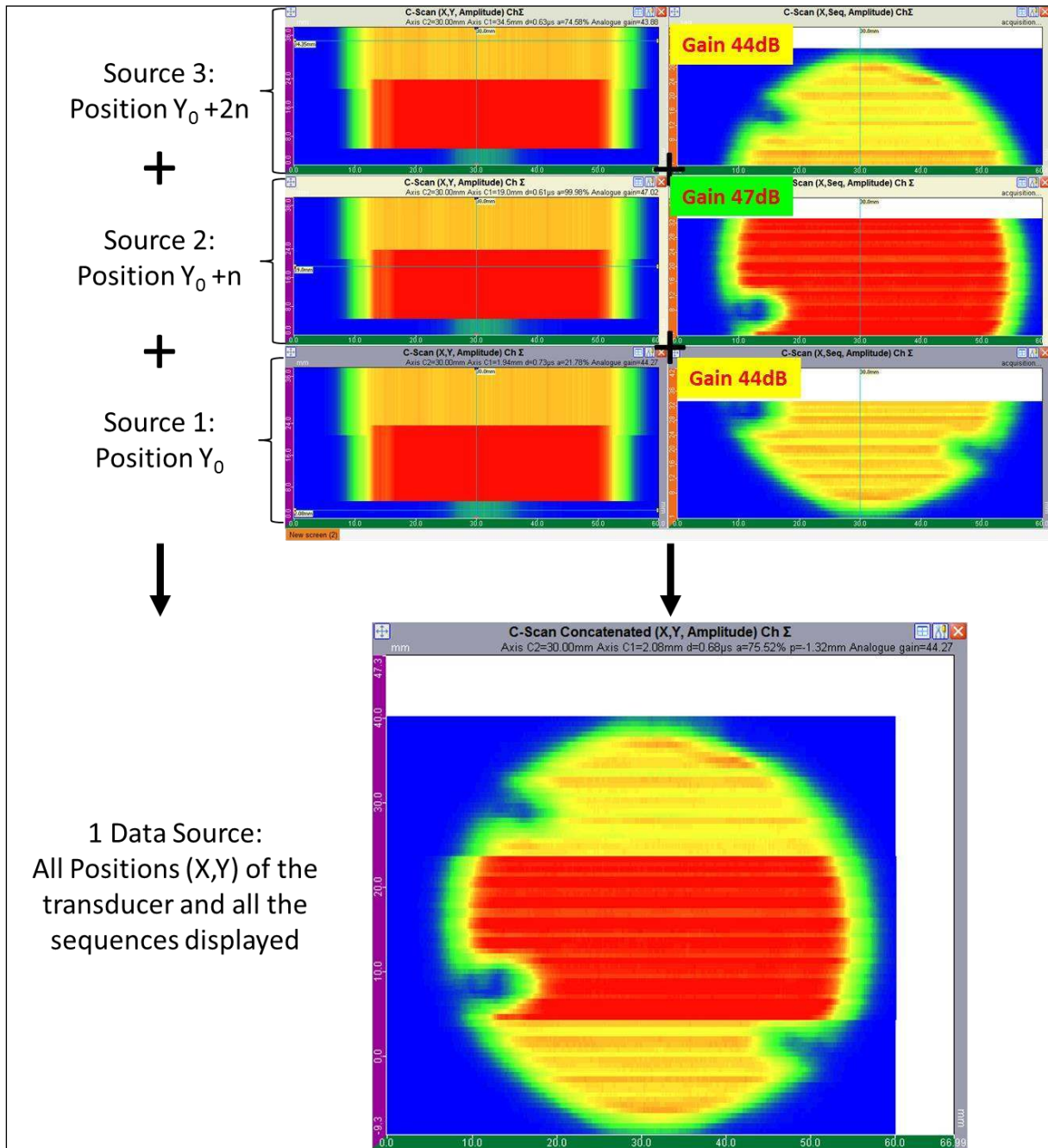


Figure 183: Concatenated C-scan

- **Parameters summary view:** displays the data of electronic, probe, delays laws and UT parameters used in the inspection.

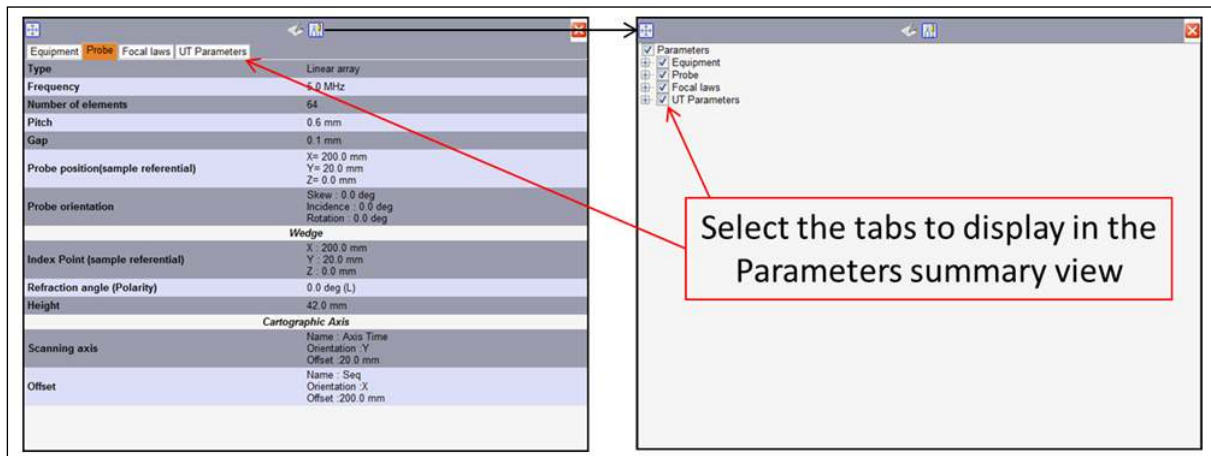


Figure 184: Parameters summary view

1.3. Selection and positioning of graphics

The representation display uses a "Drag and drop" system as for **Parameters** panel.

The user selects one view in the tree structure of available graphics and slides it by pressing a left click up to the requested place. During the displacement, icons indicate to the user the position view:

- « ← » (and at opposite « → »): The view comes in the left side of the screen (and at opposite in the right side) cutting the screen vertically.
- « ↓ » (and at opposite « ↑ »): The view comes in the underside of the screen (and at opposite in the top side) cutting the screen horizontally.
- « + »: The view replaces an existing view or an empty site.
- « ∅ »: The position is not allowed.

With the "Drag and Drop" process, it is possible to display as many graphic representations as the user wants, but it is not possible to display twice the same view of the same data source. For example, it is not allowed to display two *A-scans* of the same data source but it is possible to display the *A-scan* of a first data source and the *A-scan* of a second data source.

- **Move view**

"**Move**" icon allows to move the view to a new site (cf. next figure).

- **Delete view**

"**Close**" icon deletes the view (cf. next figure).

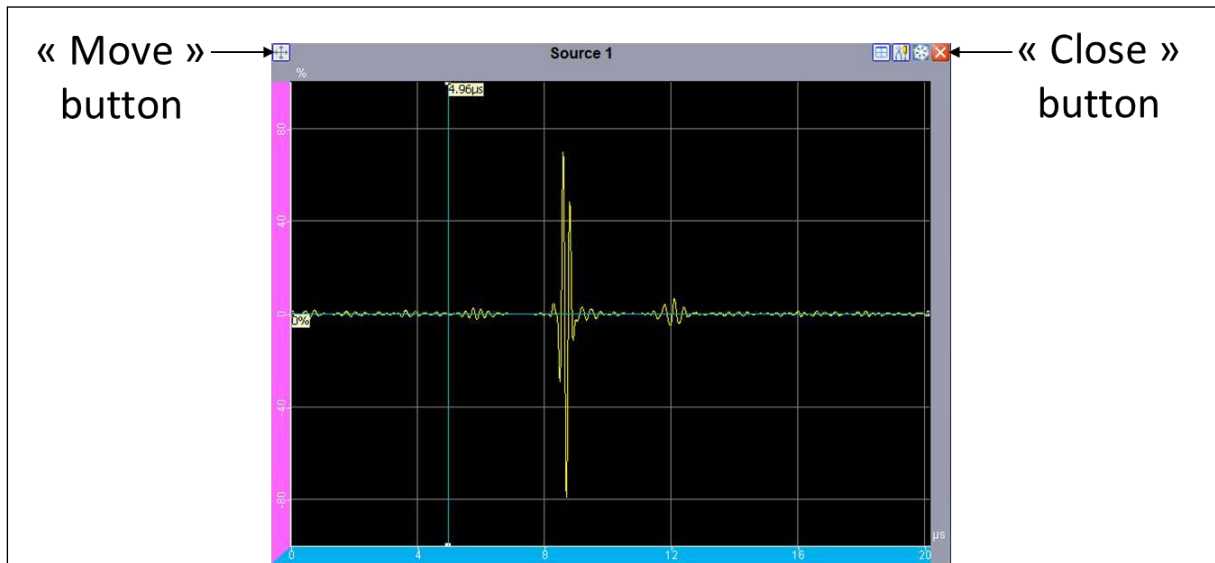


Figure 185: "Close" and "Move" icons of graphic representation in Acquisition panel

- **Change Data source**

The frame of all views matches color of the related Data source. By clicking on the name of the view, Data source panel is updated.

- **Information on Acquisition gate content**

In the **Acquisition** panel, information about the gates content (detected echo or not, synchronization, no synchronization) are provided. This information is located on the top right side of *A-scan* and *C-scan* views and at the bottom of *B-scan* views.

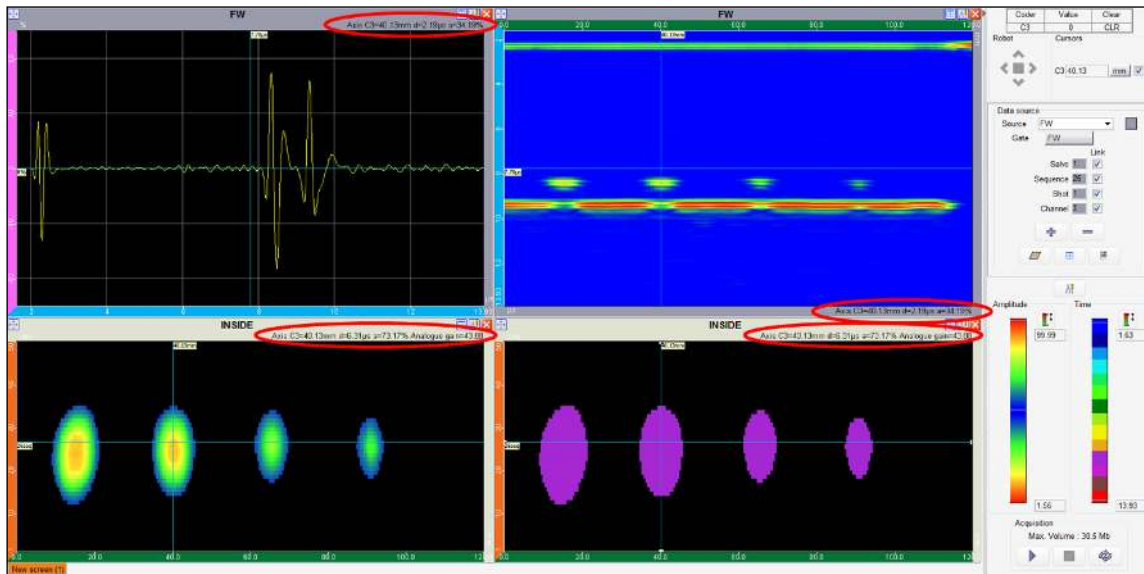


Figure 186: Information about gates in the Acquisition panel

1.4. New screen

Below view panels, a tab "new screen" opens a list box to manage screens.

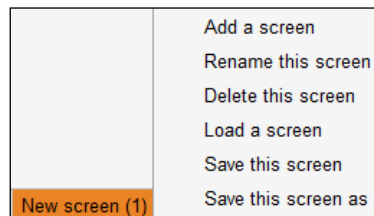


Figure 187: New screen menu

Thanks to this list box the following tasks are possible:

- Add a new screen in the panel.
- Rename the current screen.
- Delete the current screen.
- Load a screen saved.
- Save the current screen.
- Save the current screen with a new name.

1.5. Units of axis

Different X-axis and Y-axis units can be selected from list boxes. These list boxes are located at the end of X-axis and Y-axis.

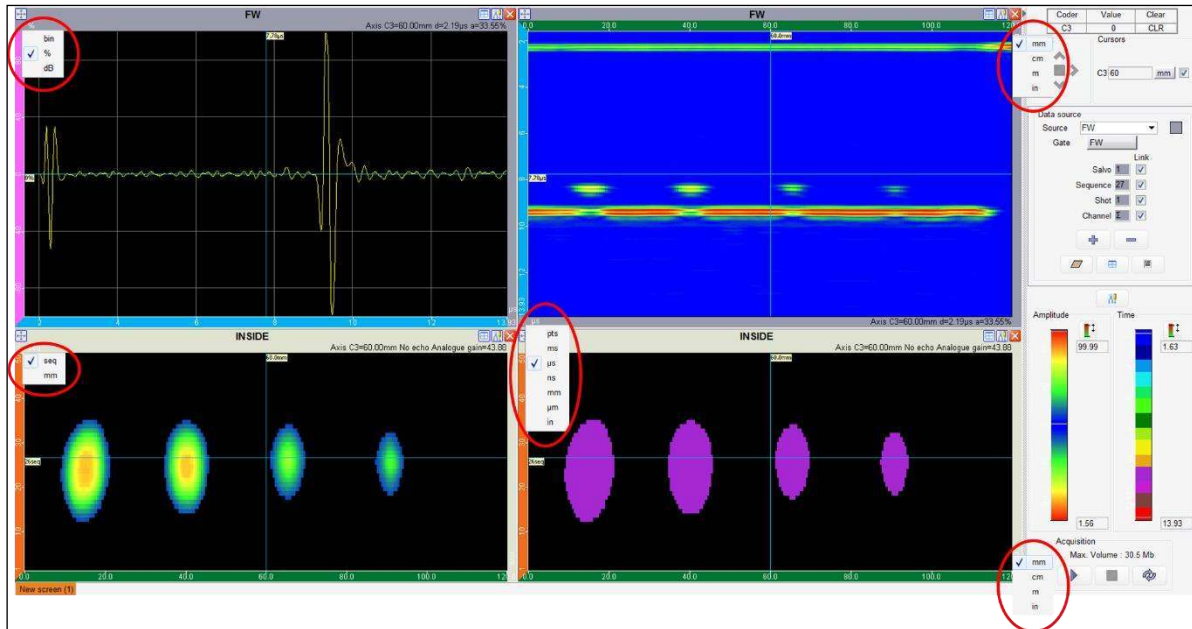


Figure 188: Selection of axis units in **Acquisition** panel

1.6. Cursors

Two cursors allow measurements on views.

Measured values are displayed at the bottom of cursors in same units as the axis units.

By left clicking close to the cursors intersection, it is possible to move both cursors together.

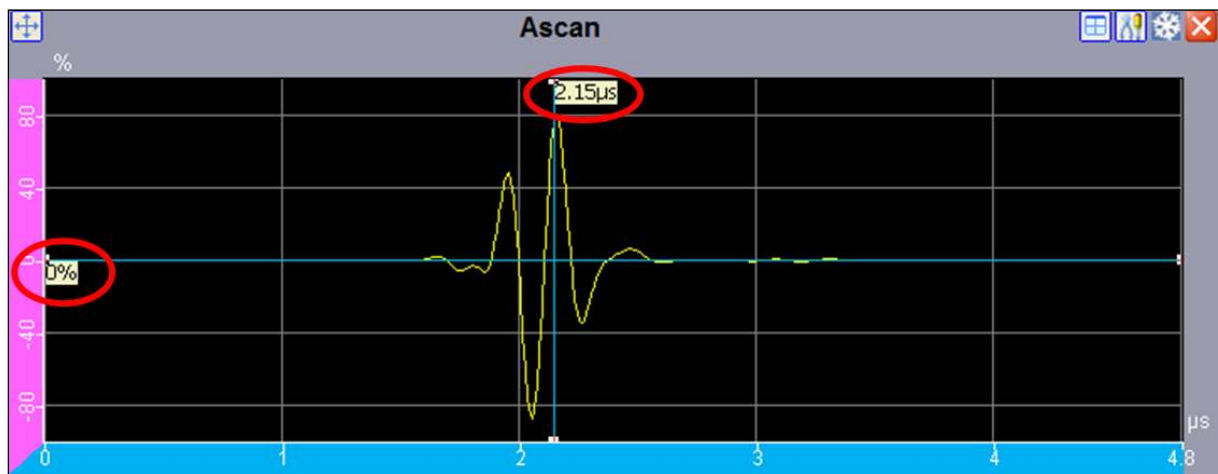


Figure 189: The measured values by two cursors on Ascan representation

A right click on cursors opens a list box. Different options of this list box are detailed in paragraph 1.8.1.

- **Amplitude and depth:**

The A-scan view panel displays amplitude and depth values on the cursor as shown on the above figure.

- **Cursors format:**

Right clicking on a cursor opens an action list. Selecting the “format” option opens the window below.

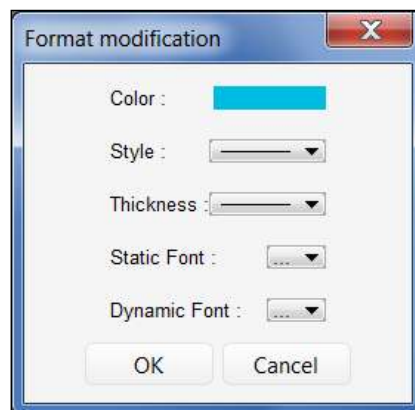


Figure 190: Modification of cursors format

All listed parameters can be adjusted from this table and saved with a User mode.

Dynamic font is enabled only when selecting a cursor: the related cursors will take the predefined font size.

- **Hiding cursors:**

By right clicking on a cursor opens an action list. Selecting the “Layers” option allows to hide the cursors by validating “cursors” option.

- **“Link” option:**

Link or synchronize cursors of different data sources.

Link is available for the following parameters:

- Scanning axis
- Overlapping axis
- Salvo
- Sequence
- Shot
- Channel

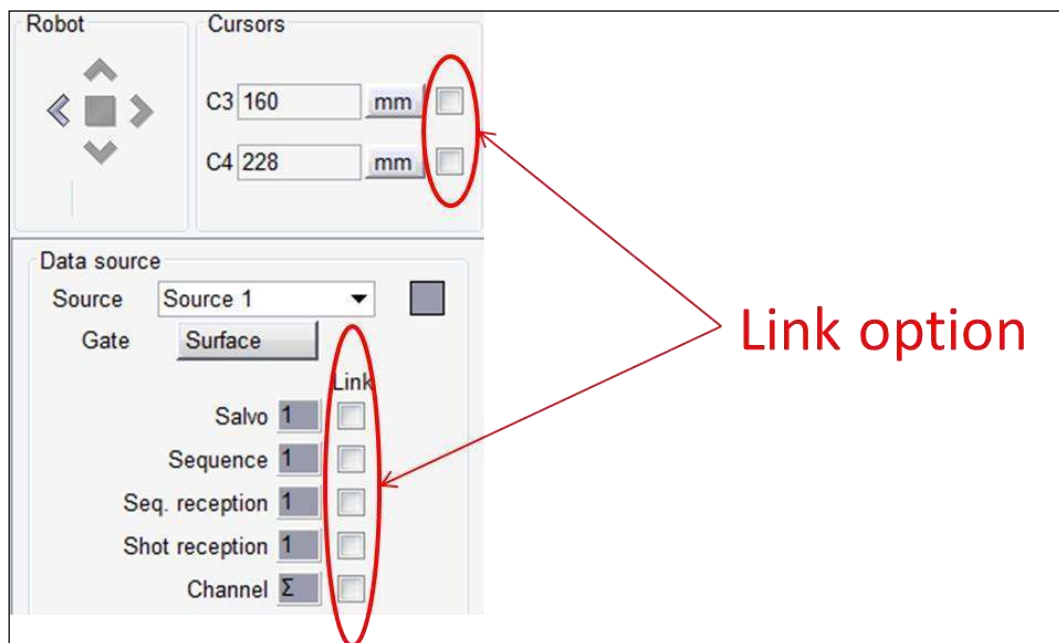


Figure 191: Link option

Cursors are linked for all views of a same data source. By default, cursors of different data sources are not linked.

For example, to link sequence cursors of data source 1 and data source 2, the user must validate “Link” box located on the right side of sequence label of data source 1 and data source 2 (cf. next figure). Similarly, if the user validates “Link” box located on the right side of shot label in the data source 2 and 3, shots cursors will be linked in views of data source 2 and 3.

Warning! In order to link cursors of two different data sources, the “Link” box must be validated in both options of the two data sources.

It is possible to link scanning axis, overlapping axis, salvo, sequences, shots and channels of different data sources. The “Link” option is available in the **Parameters** panel too.

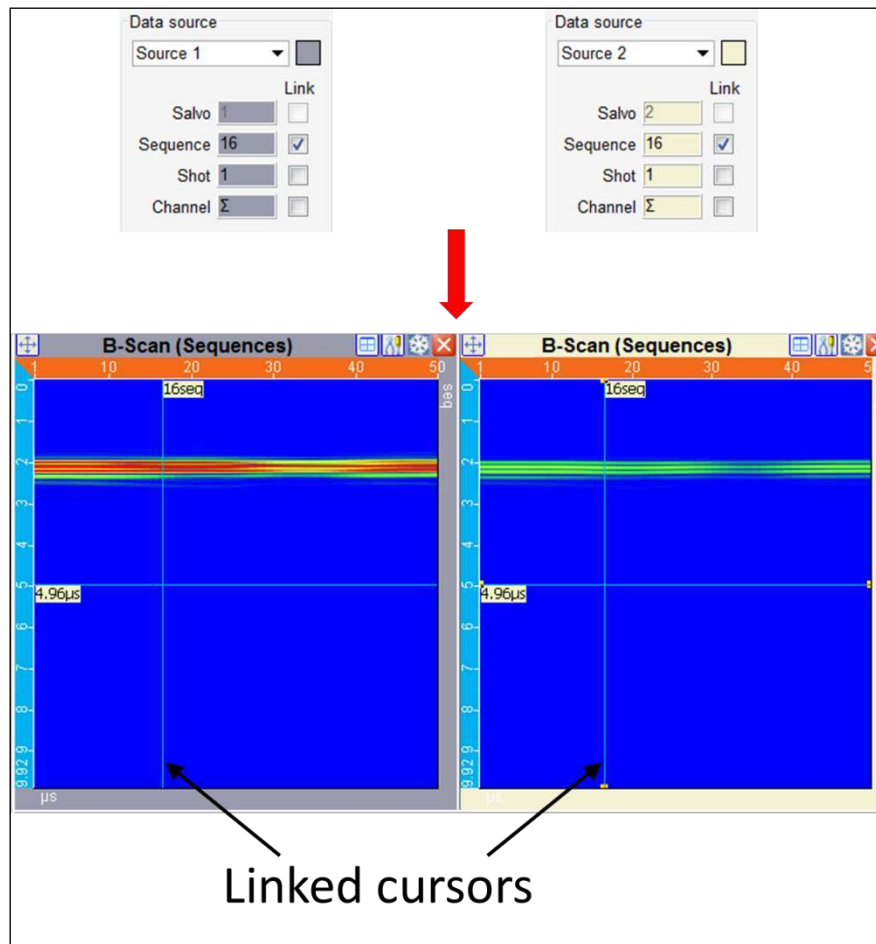


Figure 192: Linked sequences cursors of the data source 1 and data source 2

1.7. Zoom and pan

- **Dynamic zoom**

To enlarge a specific area of a graphic view, press the CTRL key and left click. A green rectangle follows the motion of the mouse and shows the area that will be blown up on release.

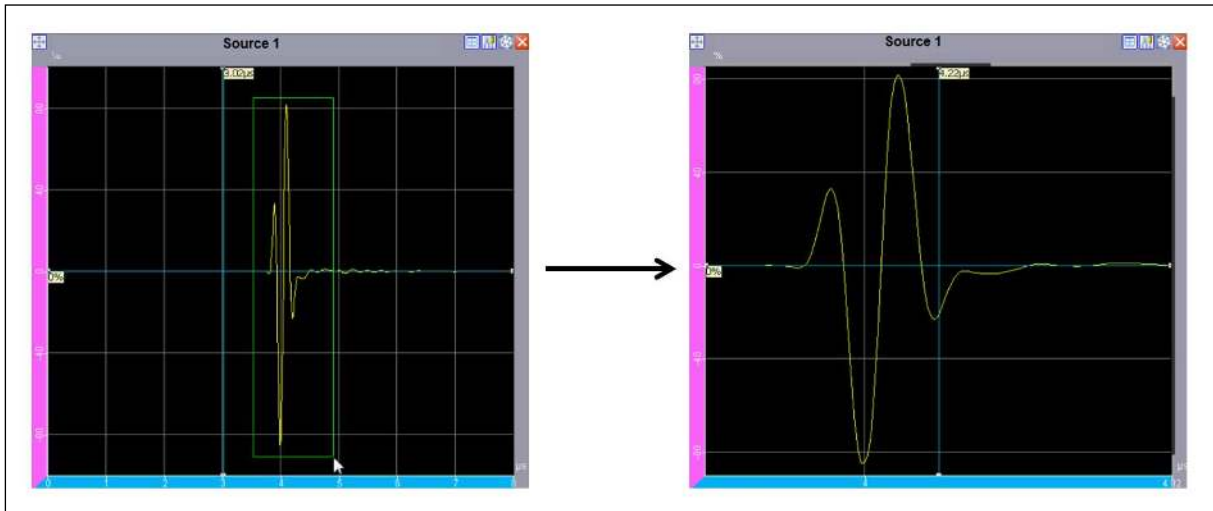


Figure 193: Dynamic zoom

- **Automatic zoom**

Right click on the background of the view, a popup menu will appear with a zoom option, under "action". See section 2.7.5 for more details.

- **Pan the zoomed area**

To pan the zoomed area, press the SHIFT key and move the mouse. Keep the key pressed while moving the mouse.

- **Resume initial view**

To reinitialize the view, double-click on the background of the graphic view.

1.8. Graphic tools

By right clicking on views (or on cursors) specific list opens box for views, cursors and zooms.

1.8.1 Popup menu (right click)

By right clicking on the graphic views' background, a menu showing available graphic tools pops up.

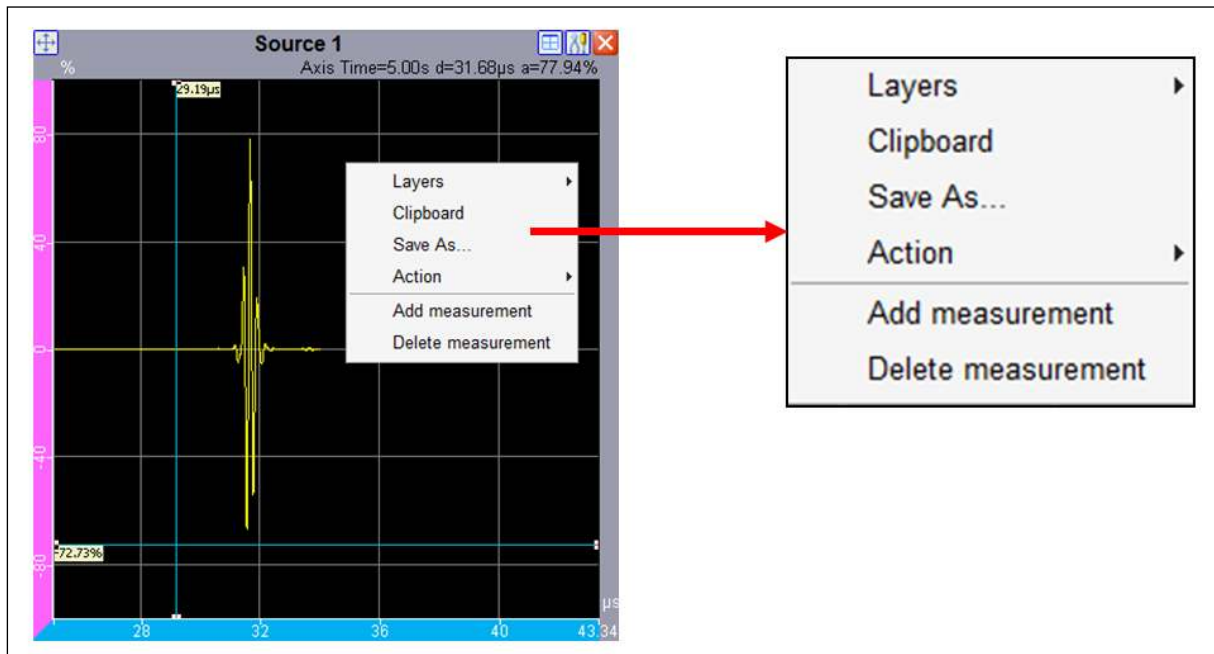


Figure 194: List box available from view panel parameters

The popup menu shows the following options:

- **Layers:** Displays or hides, the following items: DAC, Cursors, FFT cursors and Map cursors (for A-scan)
- **Tick / un-tick** the layers (DAC, cursors, FFT cursors, etc.) to have them superimposed on the graphic view / to make them invisible.
- **Clipboard:** Copy the graphic view to clipboard.
- **Save as:** Save the graphic view as an image.

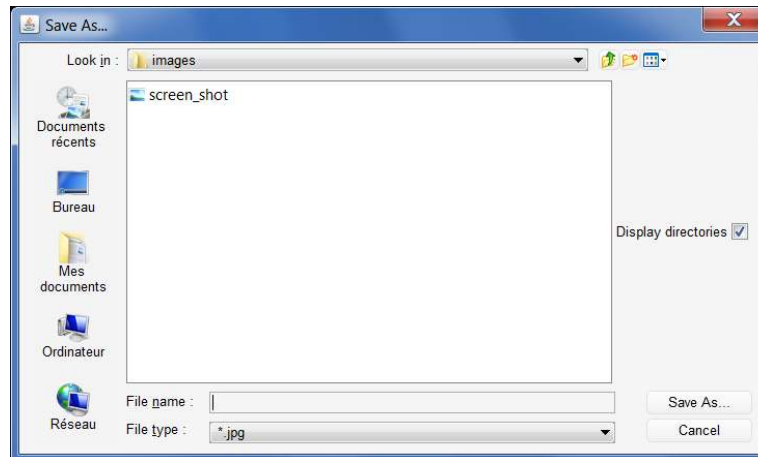


Figure 195: Save the view

- **Action:** Click on the action menu to show select, zoom and pan tools. See section 1.8.5 for details.
- **Add measurement:** Click on Add measure to enable the measurement tool. Using the mouse, grab and stretch the measurement-box boundaries. Dimensions are shown on the graphic view, next to the measurement box.

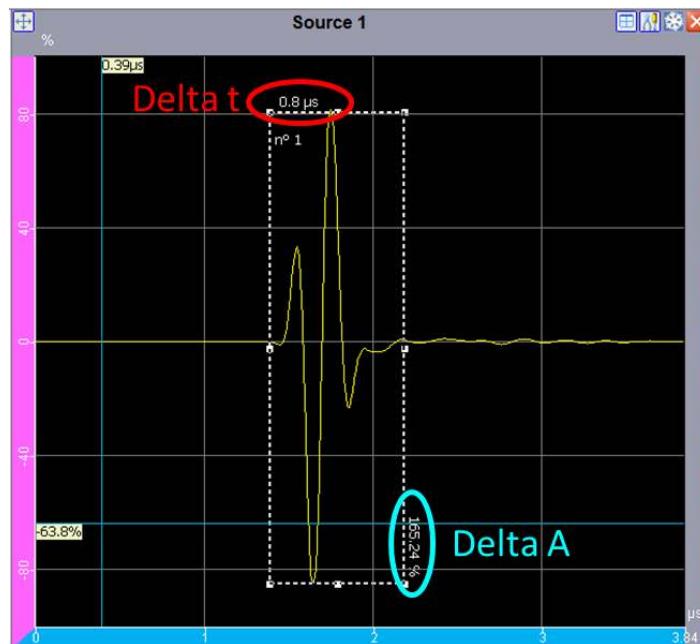


Figure 196: Measurement box

- **Suppress measure:** To delete the measurement box, click on suppress measurement.

- **Isometric display:** Click on "isometric display" to display the graphic view in an orthonormal basis. Both axes of the graphic view will be represented with the same scale.
- **Display:** This option is only available in the C-scan box menu.
 - **Fit:** Same scales are applied on both X and Y axis when validated.
 - **Real:** Displays a "real C-scan". Scale on X and Y axis show realistic dimensions: scale 1:1. In the other case, X and Y axis scales can be different producing a non-proportional display.

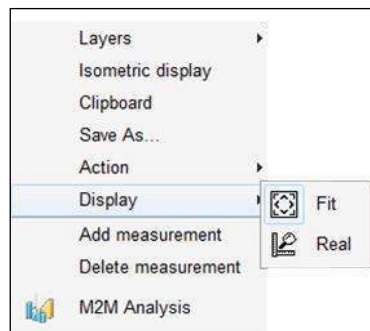


Figure 197: Display options of C-scan

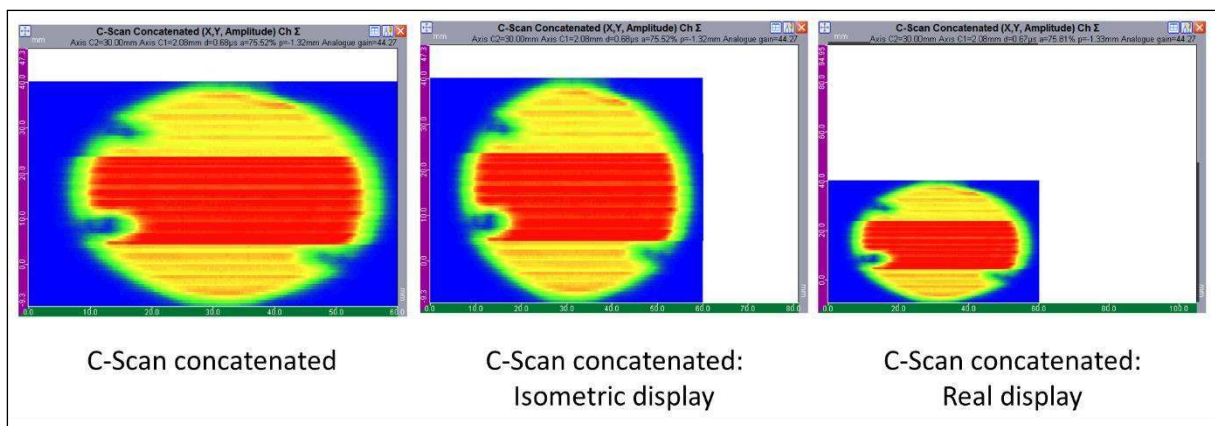


Figure 198: Examples of different display

1.8.2 Graphic view toolbar

On the parameters screen, in the top of views, four specific icons are available.

The graphic view toolbar is located at the top right corner of each graphic view.

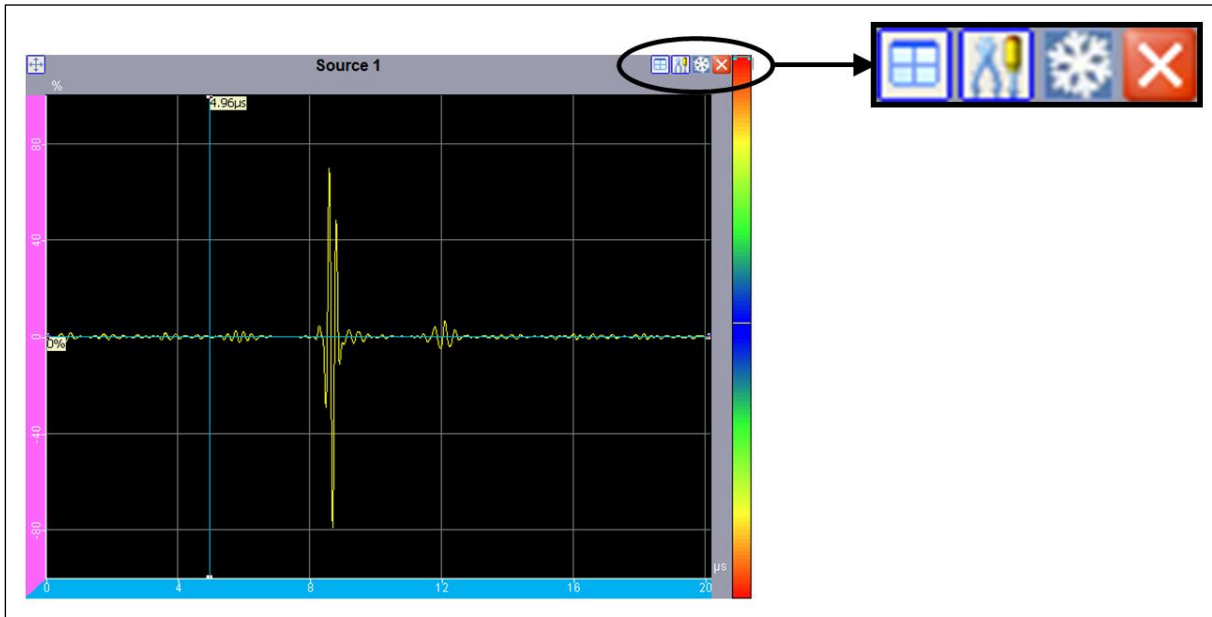
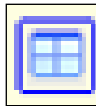


Figure 199: the graphic view toolbar

- « **Available views** » icon: Click on this icon to show related available graphic views.



- « **Freeze** » icon: Click on this icon to freeze the graphic view.



- « **Close** » icon: Click on this icon to close the graphic view.



- « **Toolbox** » icon: Click on this icon to show available display tools.

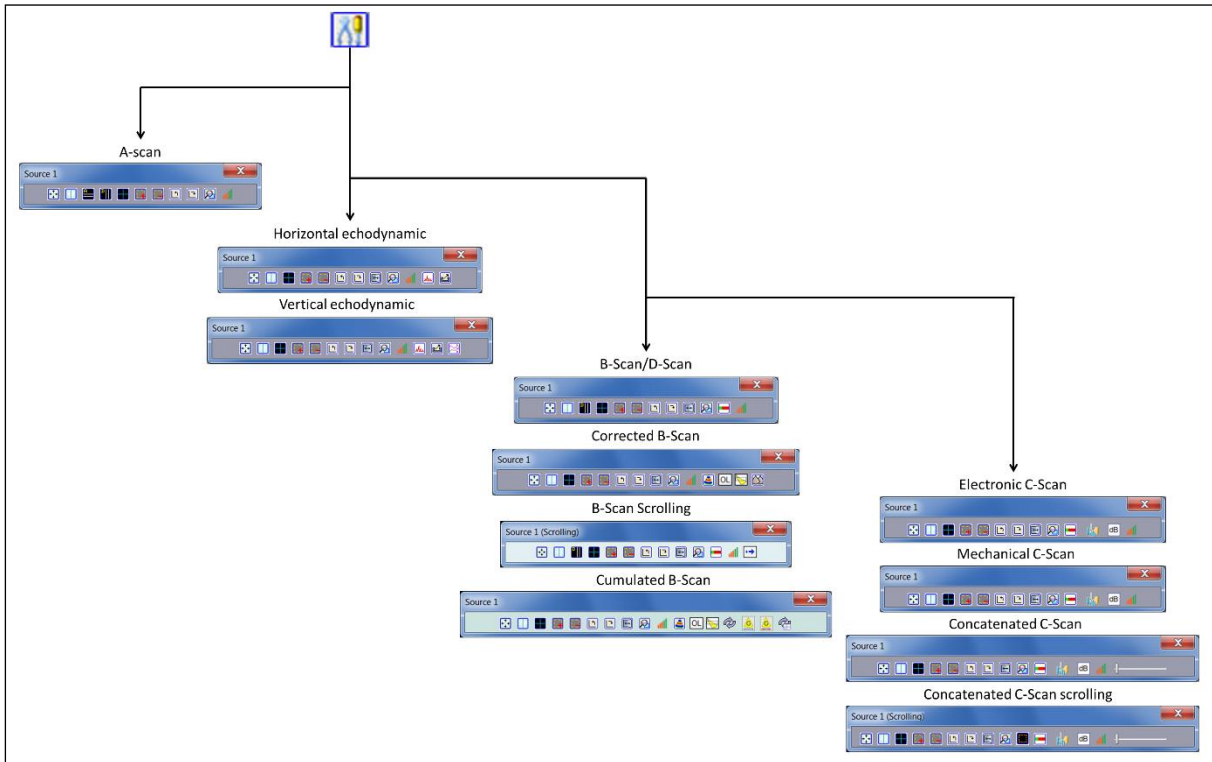


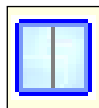
Figure 200: The display-toolbar menu depends on the graphic type

Available menu of the graphic-view toolbar:

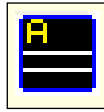
- « **Full screen** » icon: Click on this icon to display the graphic view without title and axes.



- « **Juxtaposition** » icon: Join views along a common axis.



- « **Show/Hide Amplitude Colormap cursors** » icon: Click on this icon to enable the color bar cursors. The two white lines cursors displayed on the A-scan view are linked to the color bar. These cursors set minimum and maximum thresholds for the color coding (see effects on the B-scan views).



- « **Show/Hide Cursors of views** » icon: Click on this icon to enable/disable cursors. This icon has three states:



: Blue reference cursors for horizontal and vertical axes.



: Pink relative cursors with respect to reference cursors.

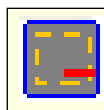


: No cursors displayed.

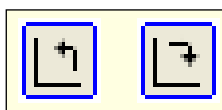
- « **Add measure** » icon: Click on this icon to enable the measurement tool. Using the mouse, grab and stretch the measurement-box boundaries. Dimensions are shown on the graphic view, next to the measurement box.



- « **Remove all measures** » icon: Click on this icon to disable the measurement tool (suppress all measurements displayed on the graphic view).



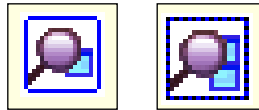
- « **Rotate** » icons: Click on these icons to rotate the graphic view 90 degrees clockwise and anti-clockwise.



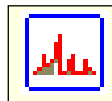
- « **Flip** » icon: Click on this icon to flip horizontally the graphic view.



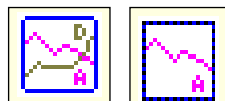
- « **Desynchronize/synchronize zoom** » icon: desynchronize zoom of the selected view or synchronize the zoom of the view with all the views of the same salvo. This icon has two states. By default, zoom of all salvo views are synchronized



- « **Persistence** » icon: Click on this icon (available for echodynamic views only) to keep only the maximum values displayed on the graphic view, over the duration of the measurement. For instance with this option activated, if the probe is moving, the horizontal echodynamic curve will display the maximum amplitude over the probe displacement for each time of flight.



- « **Amplitude and t-o-f** » icon: Click on this icon to activate amplitude and time-of-flight measurements on the vertical echodynamic curve. "Strip-chart" like view of a waveform. This icon activates the time of flight curve only, or both the time of flight and the amplitude curves.



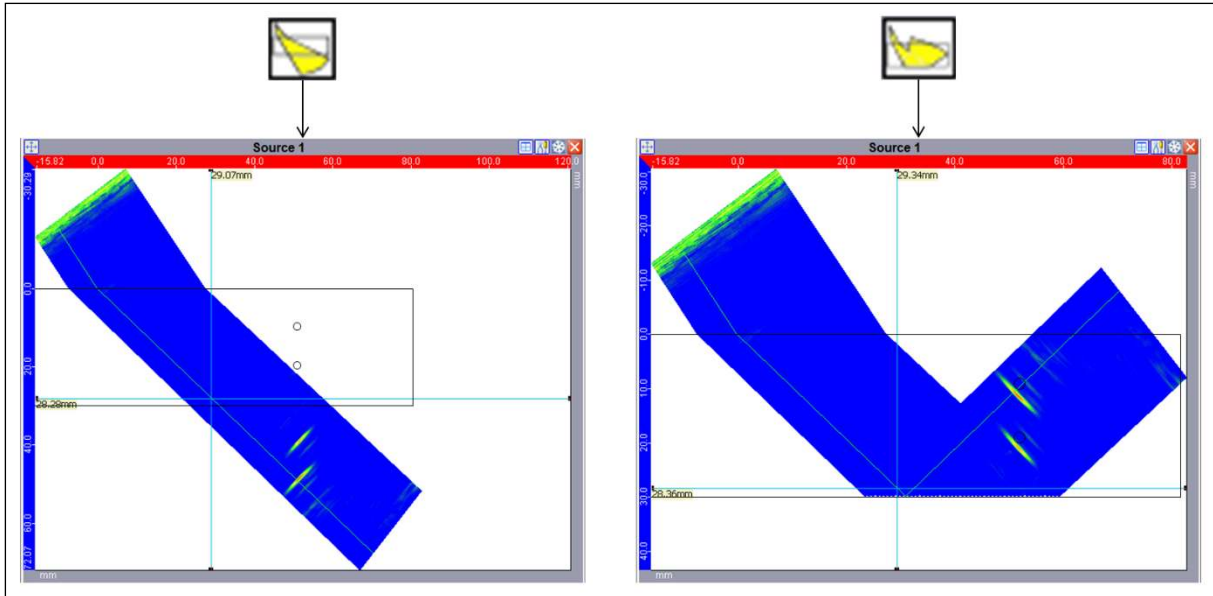
- « **Fit on screen** » icon: Click on this icon to display the full UT signal and full CAD profile in the graphic view.



- « **Shear wave and Pressure wave** » icons: Click on this icon to display B-scans accounting for pressure-wave or for shear-wave sound velocity. The values of the sound speed are recalled in the "units" tab.



- « **Sound-path view** » icon: Click on this icon to display the sound path accounting for back-wall reflections. Valid for corrected B-scans.



- « **Choice of sets to display** »: Click on this icon to select the corrected B-scan you want to display on the view.



- « **Combined B-scan** » icons:



: Refresh the combine B-scan view.



: Displays the full combine view.



: Displays the combine B-scan view corresponding to the current scrolling area.



: Refresh all the view displayed on the screen (Combine Bscan, mechanical C-scan, concatenated C-scan...)

- « **Add gain on data** »: Click on this icon to add a numerical gain to the UT acquired data of the selected view.



- « **Show/hide attenuation mode** »: Click on this icon to apply a gain attenuation value on the selected C-scan.

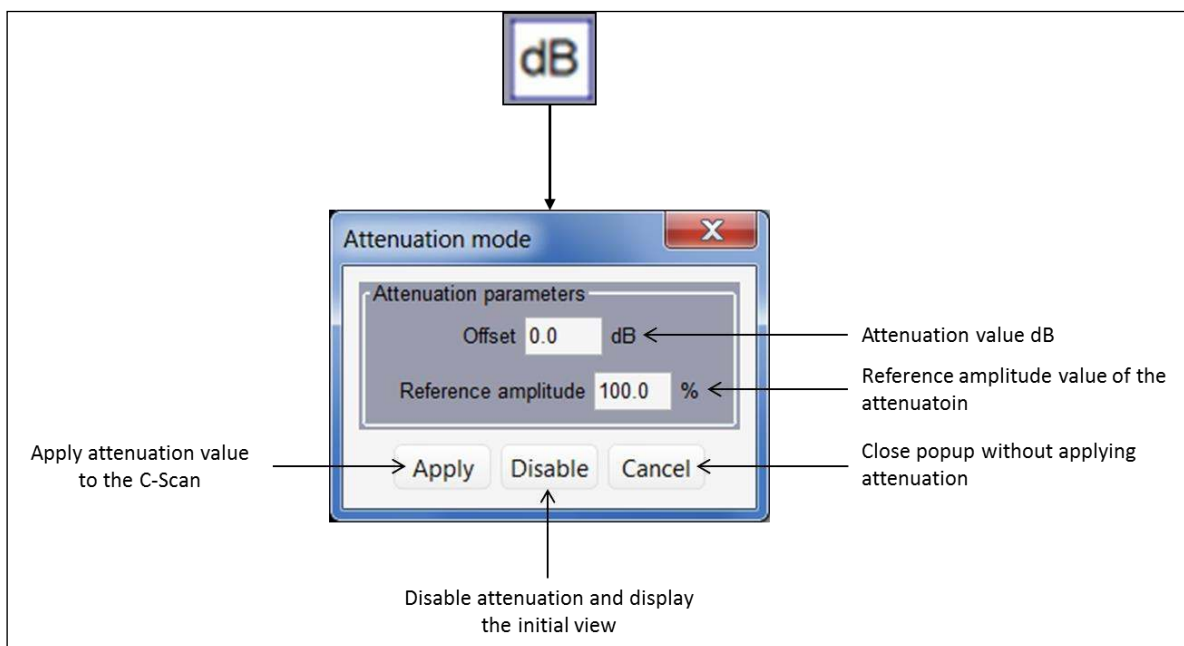


Figure 201: Attenuation mode of C-scan view

The attenuated C-scan view has a specific and independent color scale.

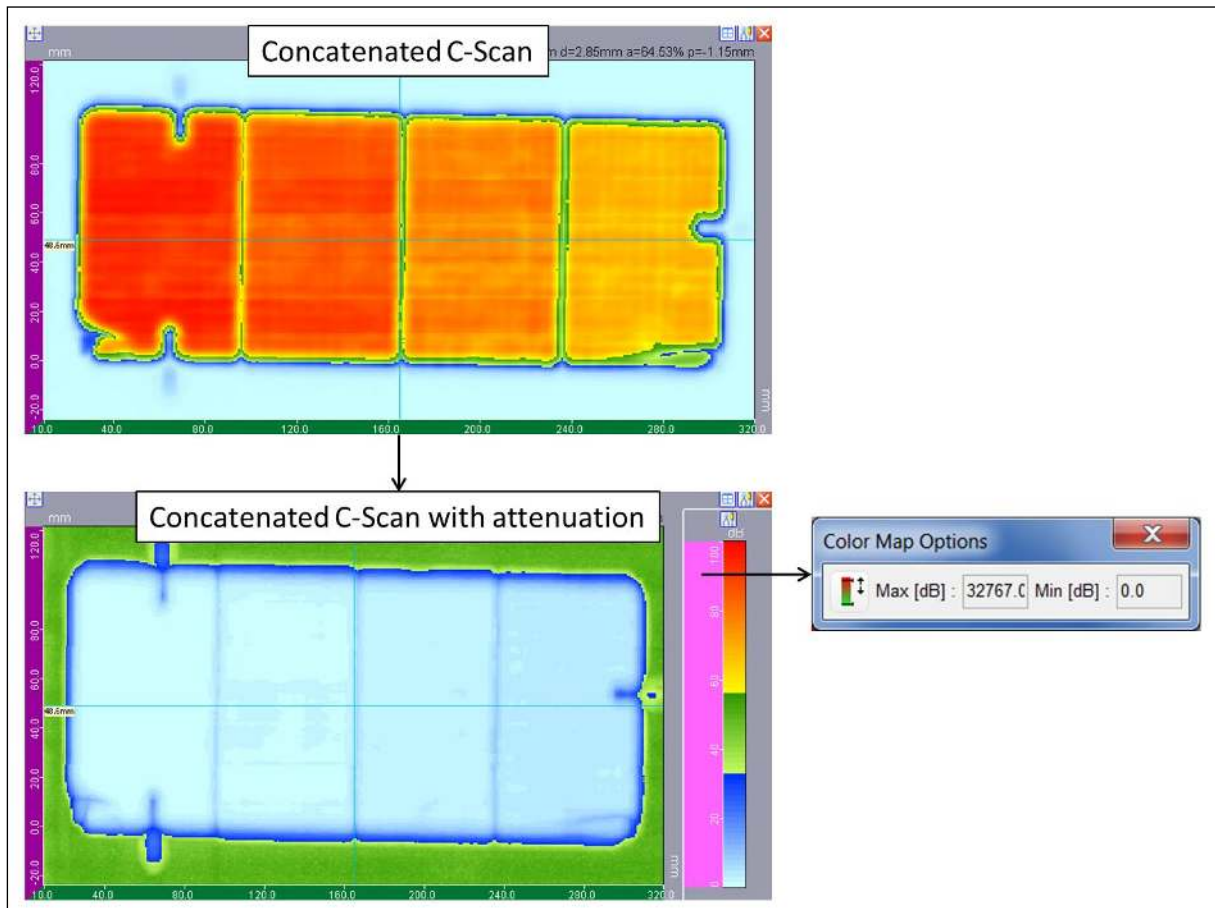


Figure 202: Attenuated C-scan view

- « **M2M analysis** »: Displays a histogram view. This view counts the data of the selected view.



The following figure describes the M2M analysis tool:

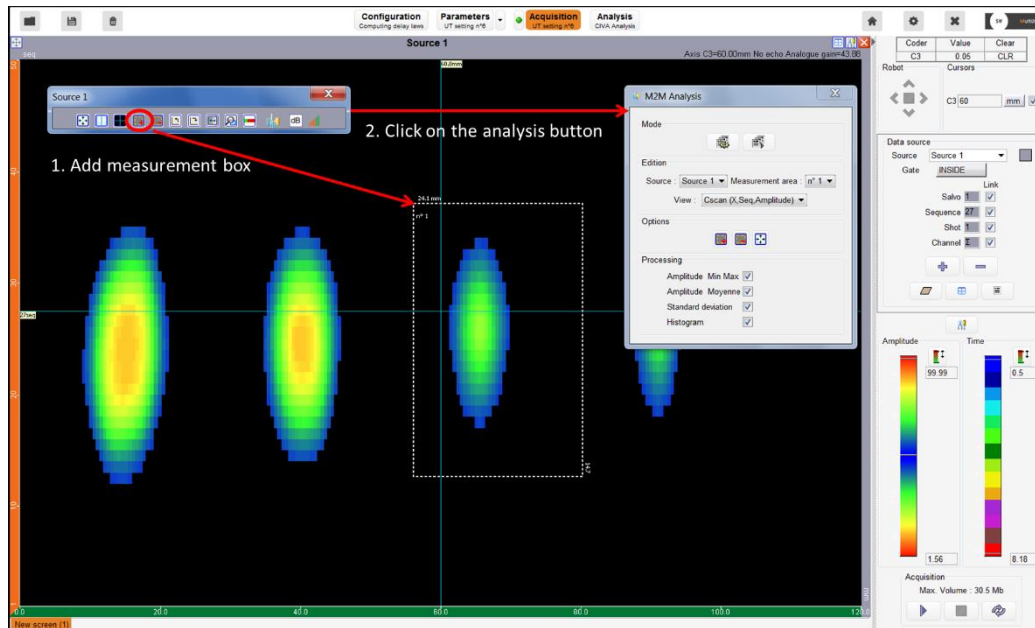


Figure 203: Analysis window access

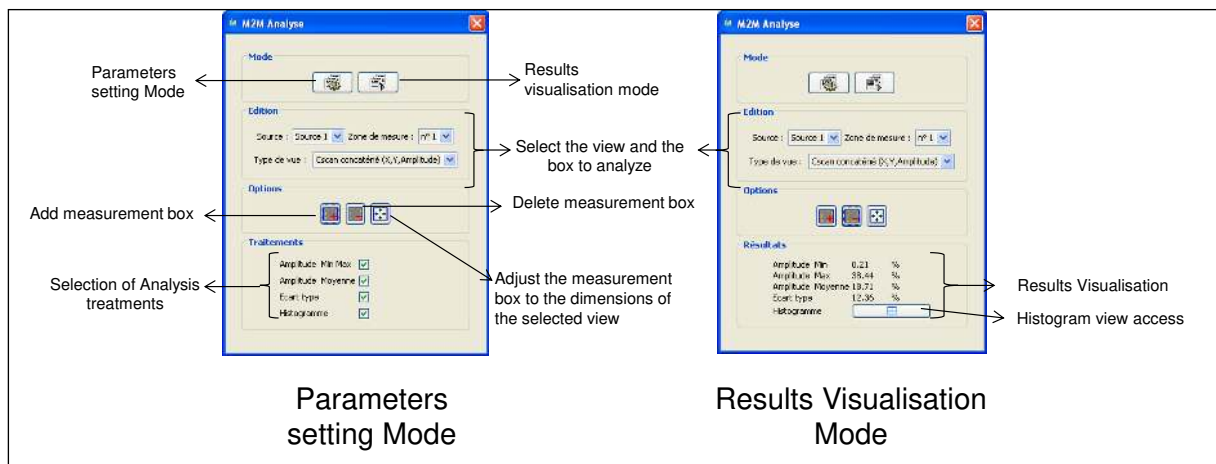
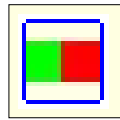


Figure 204: Analysis parameters panel

- « **Data loss view** » icon: Click on this icon to display the Data loss view. During the acquisition, this view indicates the eventual loss of data.



- « **Peak thickness** »: Adjust the thickness of the displayed data in the corrected C-scan.



- « **Modification of the scrolling window** »: Opens windows to define the dimension of the scrolling area of Mechanical B-scan scrolling view, electronic C-scan scrolling view. The dimension can also be defined directly on the Mechanical B-scan view and electronic C-scan view thanks to the magenta cursors positioning. During acquisition the data is displayed in real time and the view is scrolled according to the scanning displacement.

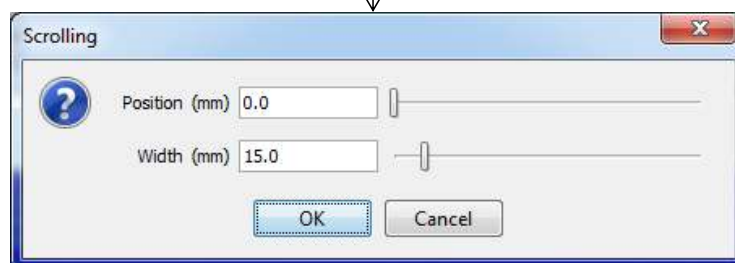
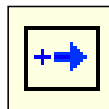


Figure 205: Definition of the scrolling view dimensions

- « **Zoom glissant or scrolling 2D** »: Opens windows to define the dimension of the scrolling area of concatenated C-scan scrolling view. The dimension can also be defined directly on the concatenated C-scan view thanks to the magenta cursors positioning. During acquisition the data is displayed in real time and the view is scrolled according to the scanning and overlapping displacement.

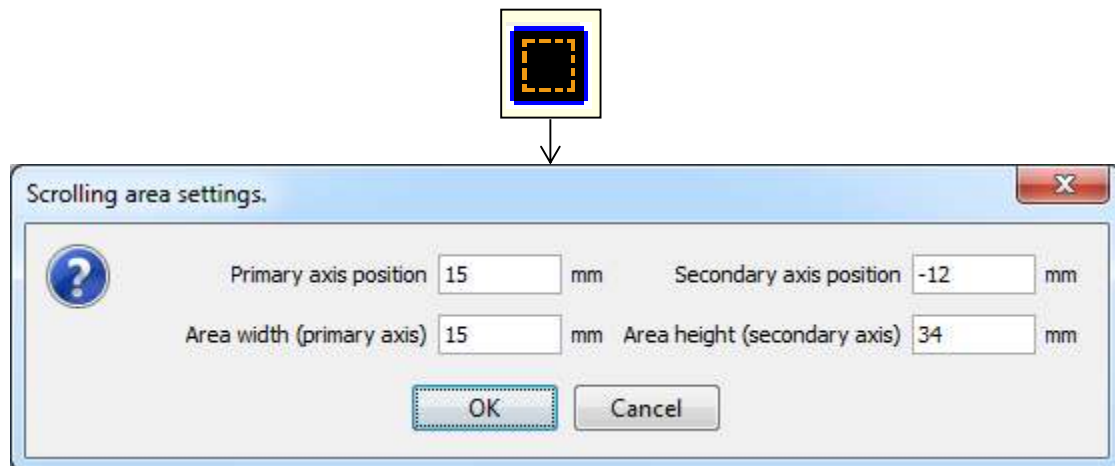


Figure 206: Definition of the scrolling 2D view

1.8.3 Export to text

In the 6.9.X and the next versions, a new data export function was developed to replace the images export function in the 6.7.15 version and the previous ones. The new function exports all the data from a Acquire file (.m2k). You can find out more by referring to the Data export notice explanatory note¹.

1.8.4 Cursor parameters

When right-clicking on cursors, the user opens a list box specific to views and cursors.

Cursors options are the following:

- **Format**

To modify the appearance of the cursor, right-click on the cursor and click on "Format" in the popup menu. In the format dialog box, the user may edit the color, the font and the line size of the cursor.

¹ Contact M2M technical support team (support@m2m-ndt.com) to get this document.

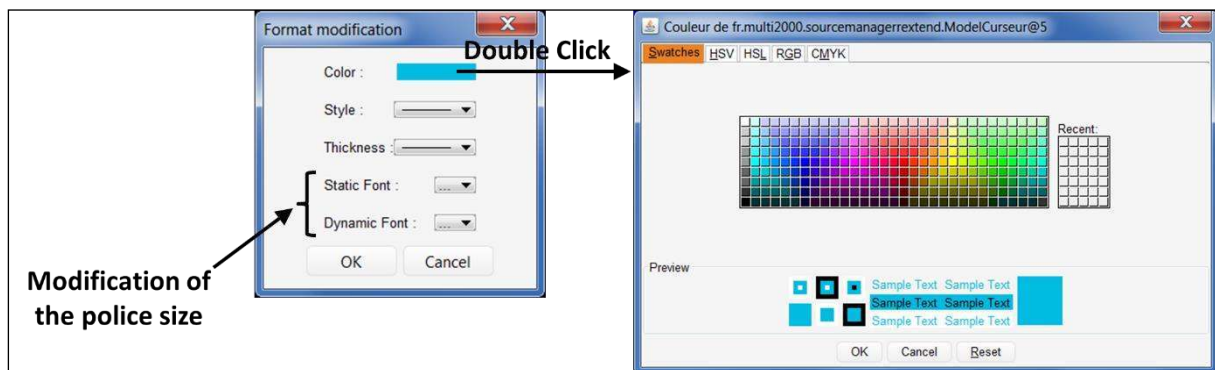


Figure 207: Dialog box of cursor format

- **Move labels:** Moves the labels to the cursors extremities
- **Hide labels:** Hides the labels

1.8.5 Zoom, pan and reset parameters

Zoom, pan and reset parameters are available via the “Action” submenu of the “Available graphic tools” menu.

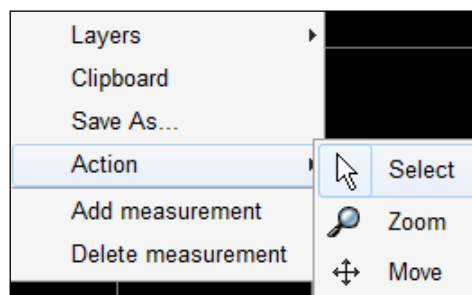


Figure 208: Zoom function

First, right click on the background or on the cursors of a view to access the “Available graphic tools” menu. Then move the mouse over the “Action” item. A submenu appears giving access to the following actions:

- **Zoom:** Enables an automatic zoom in. The view is zoomed at each click. When the user keeps pressing the **CTRL** key, the automatic zoom in becomes an automatic zoom out.
- **Move:** Click on "move" to pan the display window. Keyboard shortcut equivalent: press **SHIFT** to enable the pan mode, and release the **SHIFT** key to disable it.

- **Select:** Reactivates the select mode and inhibits '**Move**' and '**Zoom**' modes.
- **Shortcuts:**

Press "ESC" to escape zoom and pan modes.

Double-click on the display window to reset default parameters.

1.9. Full screen display

By clicking on granular bars located near data source panel, data source menu and **Acquisition** icons are hidden in order to display views in full screen.

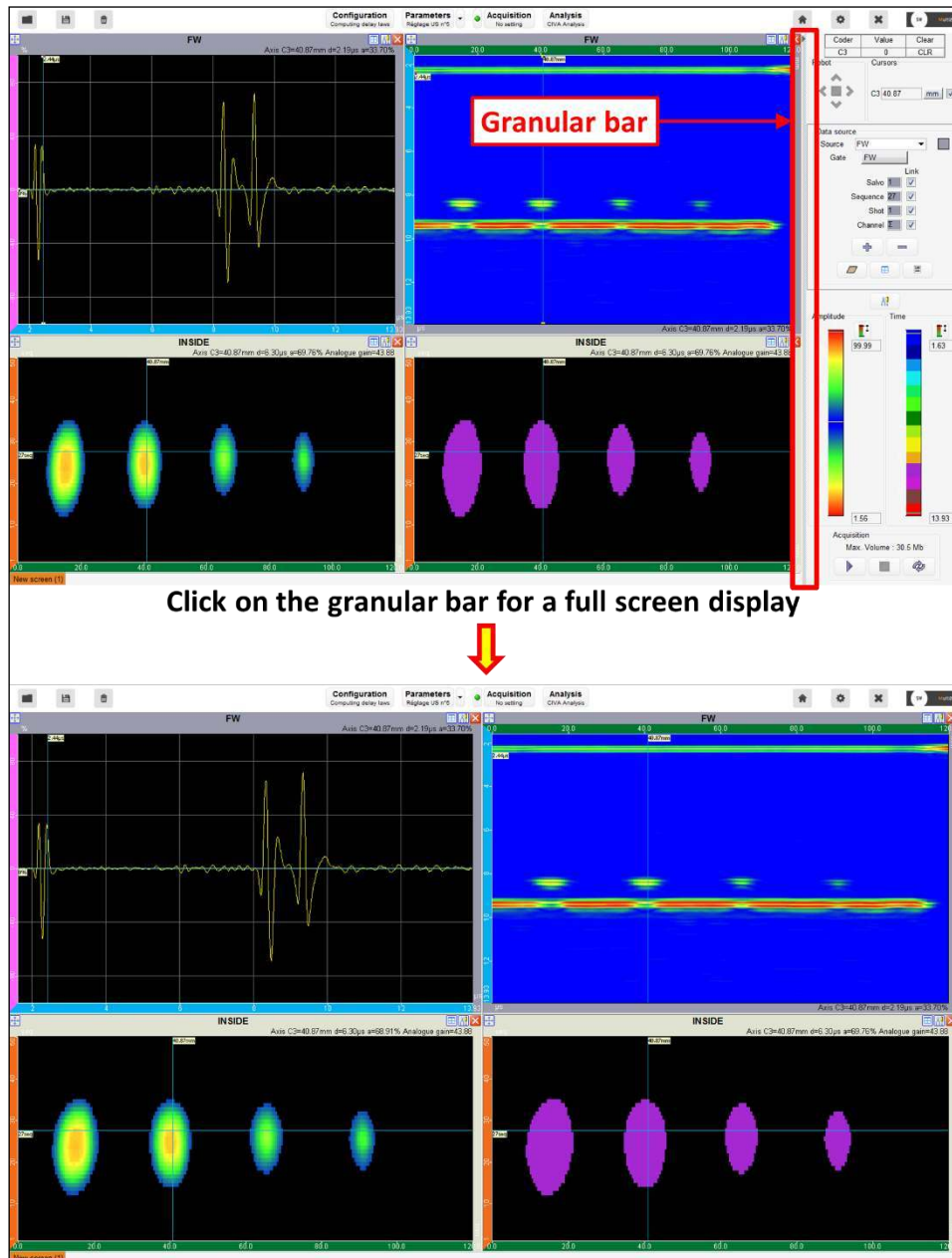


Figure 209: Full screen display in *Acquisition* panel

1.10. Color scale

By default, two color scales are available: Color scale and grey scale. The user can change the range of the color scale thanks to two horizontal cursors representing minimum and maximum thresholds.

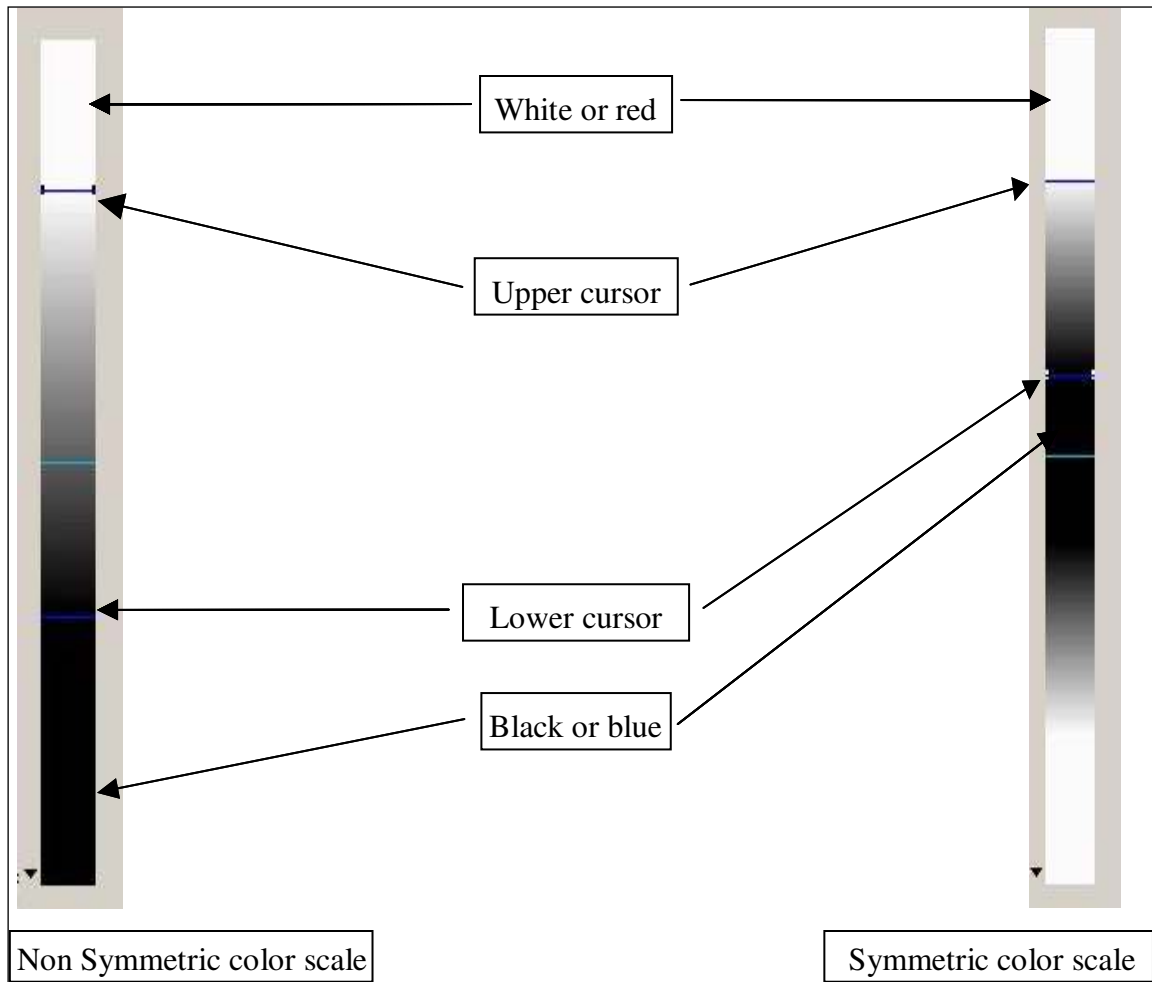
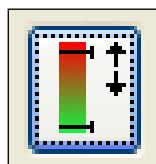


Figure 210: Adjustment of dynamic range of color scale

Lower cursor and upper cursor can be adjusted automatically at 0% level and 100% level for amplitude scale and at minimum time of flight value and maximum time of flight value for time scale thanks to the following icon:



The dropdown Color scale menu is available by right clicking on the Color scale.

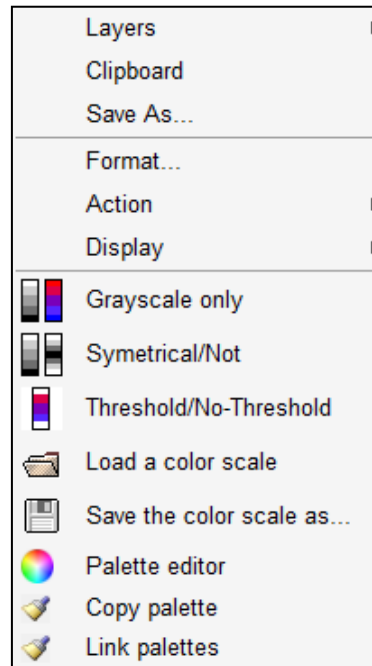


Figure 211: Color scale menu

Several options are available in the scale menu:

- **Greyscale scale only:** Change the current color scale to gray scale.
- **Symmetric / not:** Enable/disable the symmetry of the color bar.
- **Threshold / no-threshold:** Maintain / not maintain the last color of the scale when the signal is over the threshold.
- **Load a color scale:** Select this option to load a color scale (.xml file).
- **Save the color scale as...:** Saves the current color scale.
- **Copy palette:** Select this option to copy the current color scale to the other data source.

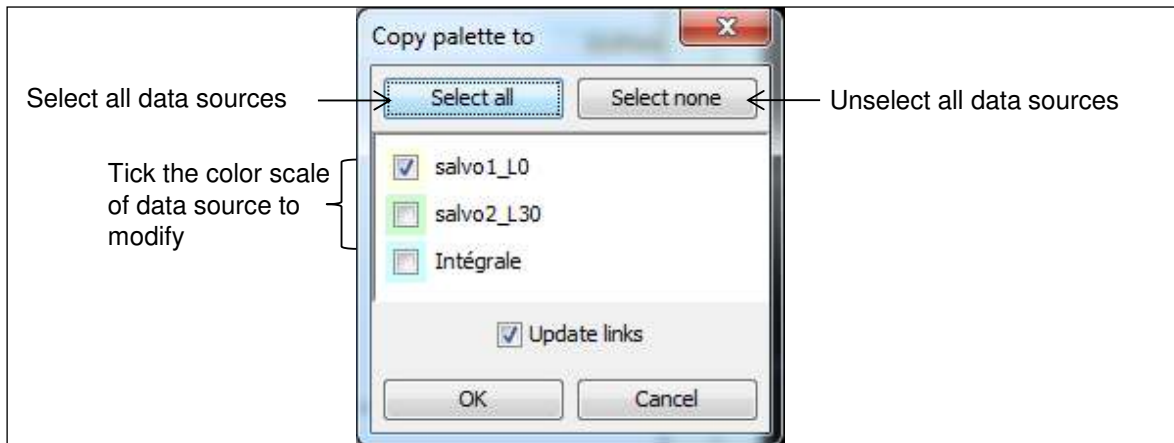


Figure 212: Copy palette

- **Link palette:** Select this option to link the current color scale with other color scales of the other data sources. Modification in one of linked color scales is applied to other linked color scales.

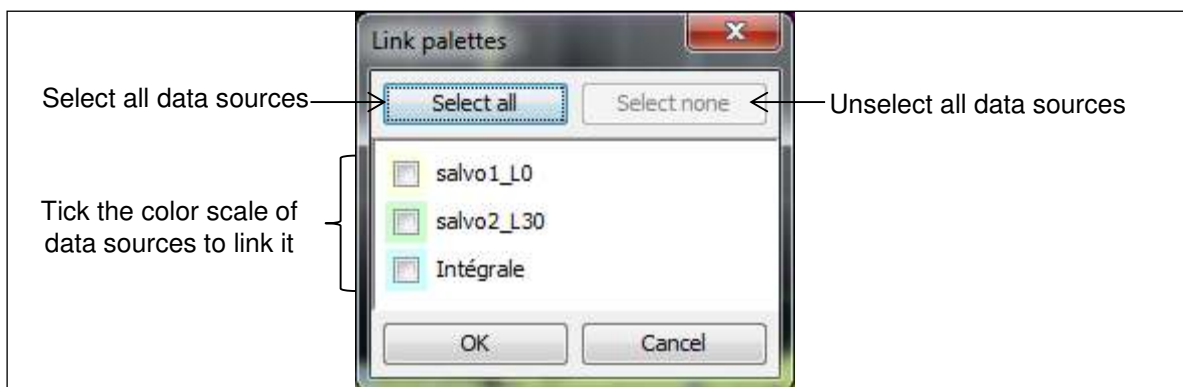


Figure 213: Link palettes

- **Palette editor:** Select this option to create your own color bar.

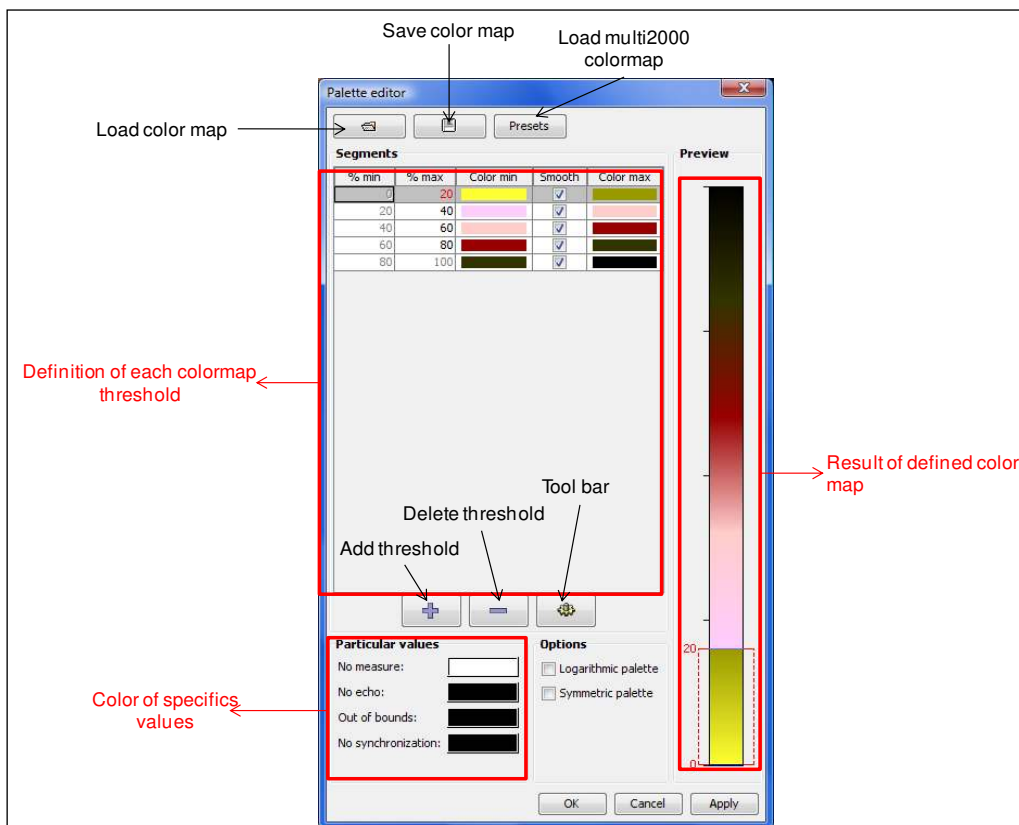


Figure 214: Palette editor

1.11. Robot position

A figure displays the transducer position versus inspected area. Inspected area is defined by trajectories limits. Four arrows indicate when the transducer is out of the inspected area. The rectangular shows that the transducer is inside the inspected area.

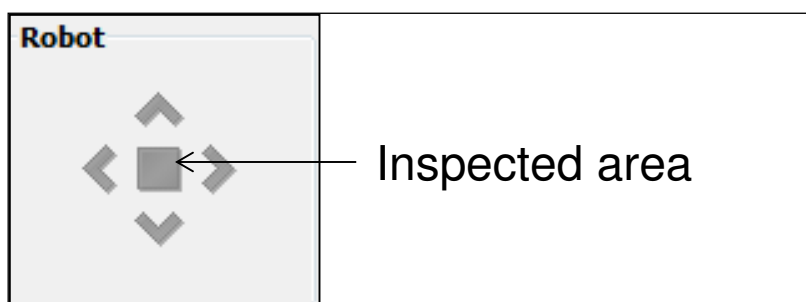


Figure 215: Position of the robot during acquisition

2. Acquisition

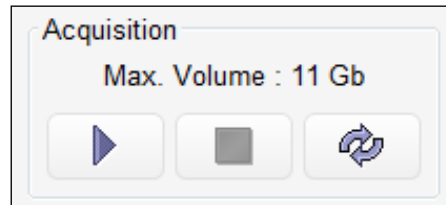




Figure 216: Acquisition control icons

Three icons control the acquisition:

- **Start**

- Launch the acquisition 

- Enable the suspend mode 

- Enable the restart of acquisition 

- **Stop**

- Stop the acquisition 

An acquisition can be stopped and saved before the end (Considering the mechanical displacement).

Acquisition on mechanical displacement must be stopped by user once the displacement is over and if the option “automatic ending” was not validated.

Acquisition triggered on time stops automatically.

- **Refresh Acquisition panel**

This command cancels the last acquisition, refreshes acquisition views and updates acquisition parameters.

It is important to refresh the Acquisition panel after a round trip in **Parameters** panel in order to consider the last modifications (UT parameters). By refreshing **Acquisition** panel, all **Acquisition** data are suppressed. If needed, the user must save data before refreshing the panel.



3. Automatic report

In Acquire software, two types of automatic reports are available:

- HTML report with data analysis.
- PDF report

3.1. HTML report with data analysis

Acquired data are analyzed in order to diagnose the inspected specimen using criteria defined by the user. The results of this analysis are displayed on a HTML report.

3.1.1 Access

In the Acquisition panel, the icon report gives access to two types of reports: HTML and PDF. The icon "Treatments and report preferences" gives access to the HTML report (see next figure).

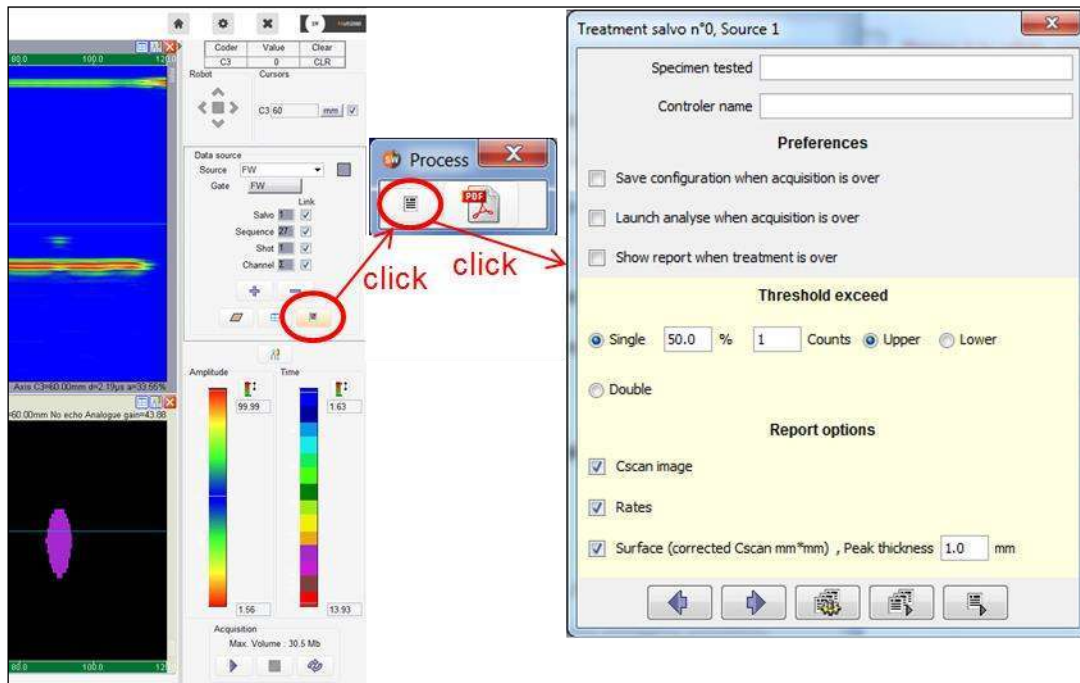


Figure 217: “Treatments and HTML report preferences” access

To generate an HTML report, the following steps must be completed:

1. Load a UT data file (.m2k) or wait for the end of acquisition.
2. Click on “treatments and report preferences”.
3. Enter the identity of the inspection (controller name, specimen reference).
4. Choose the condition to start analysis and report edition.
5. Define the sorting parameters.
6. Start analysis and report edition.

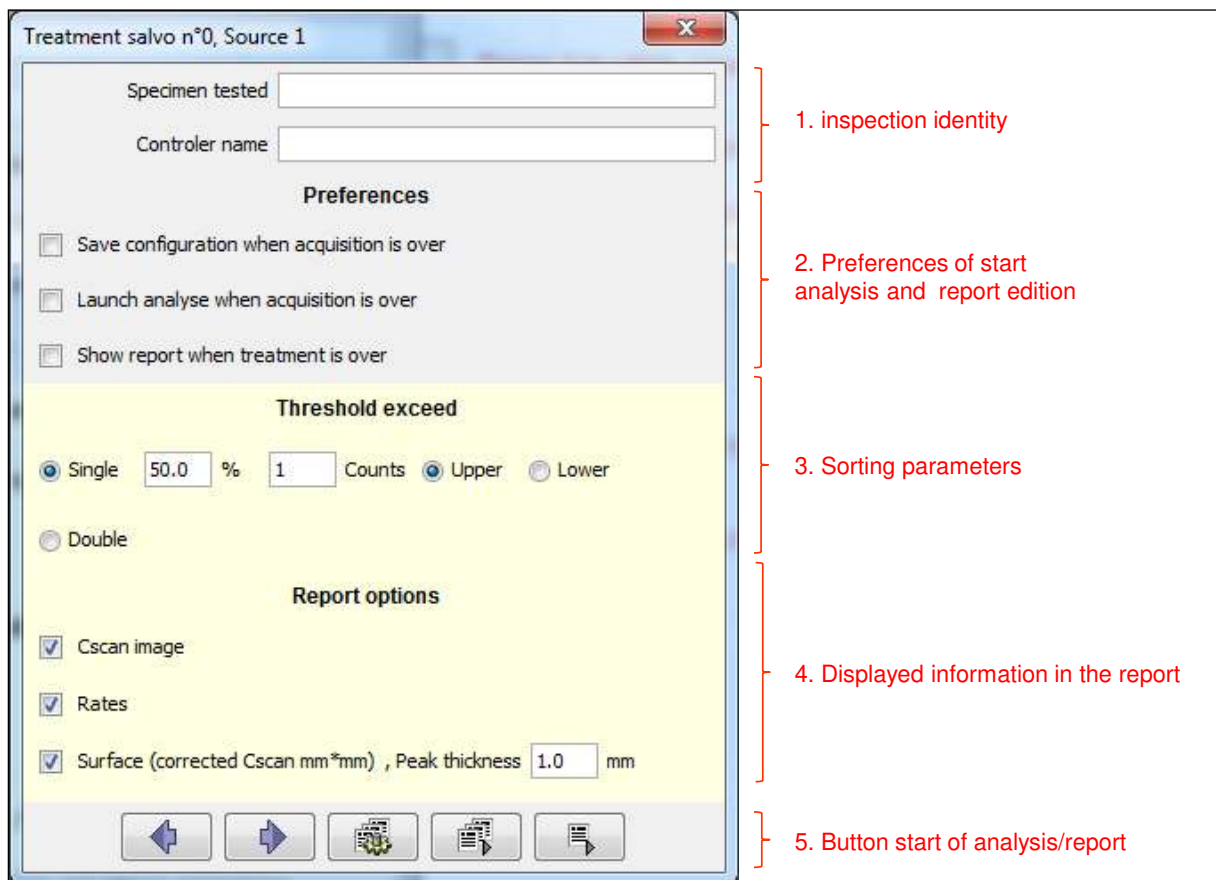


Figure 218: Parameters panel of analysis and report edition

3.1.2 Inspection identity

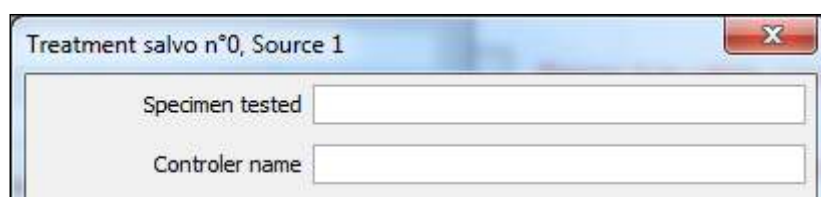


Figure 219: Identity of HTML report

The heading of HTML report contains the following information:

- Name of the inspected specimen or reference.

- Name of the operator.

3.1.3 Preferences: Automatic options

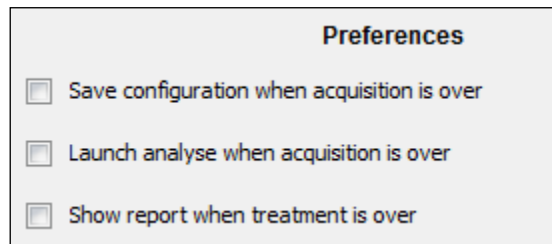


Figure 220: Automatic option of HTML report

Preferences panel allows validating several automatic options:

- Automatic saving of acquisition UT data (.m2k file) at the end of the acquisition.
- Automatic start of analysis at the end of the acquisition.
- Automatic display of the report at the end of the analysis.

3.1.4 Conditions of discard

UT acquired data are analyzed. The result of this analysis is the diagnosis of the inspected specimen. The sorting is achieved using a threshold value defined by the user.

With the “**Threshold exceed**” panel; the user may define the value of the threshold. This threshold can be single or double.

In single mode, the acquired data is considered as a defect indication if the amplitude value is over (or under) the threshold with respect of the condition of the count number. The count number is the number of time that the amplitude value is over (or under) the threshold value.

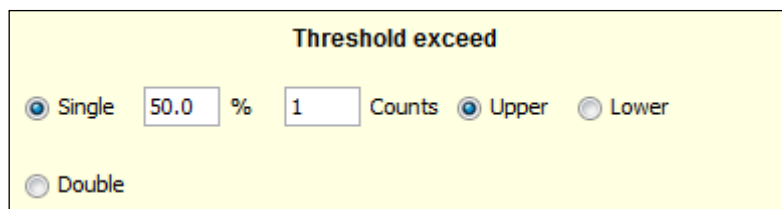


Figure 221: Definition of the simple threshold mode

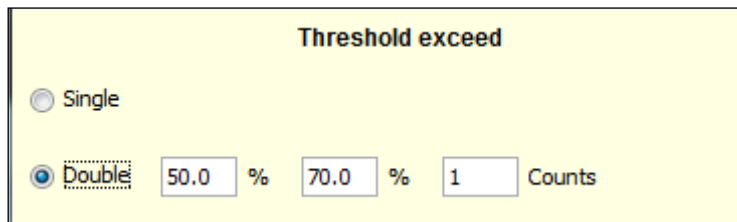
In double mode, the user defines two thresholds:

- Threshold 1: Warning threshold.
- Threshold 2: Threshold of discard.

A specimen is discarded if one acquired data is over the discard threshold ($X > \text{threshold } 2$).

If acquired data is over the warning threshold and under the discard threshold, data is considered as potential defect but the specimen isn't discarded.

When data is over (or under) the threshold 1 or 2, the number of count is a condition to validate this data as a potential defect.



Threshold exceed

Single

Double

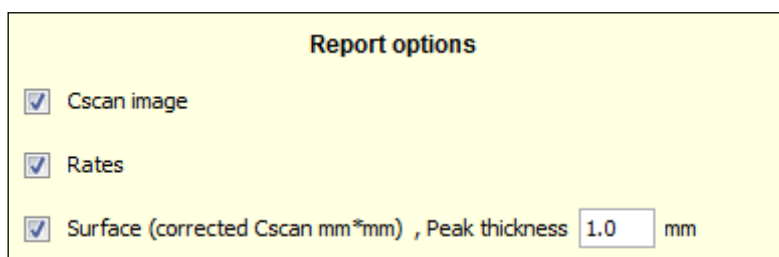
50.0 % 70.0 % 1 Counts

Figure 222: Definition of double threshold mode

3.1.5 Options of report display

Several information can be displayed in the report:

- Electronical C-scan view. To be displayed in the report, the C-scan view must be dropped in back-left position in Acquisition panel.
- Value of data (%) < discard threshold, Value of data (%) > discard threshold.
- Total surface of defects indications (data > discard threshold).



Report options

Cscan image

Rates

Surface (corrected Cscan mm*mm) , Peak thickness 1.0 mm

Figure 223: Options of report display

3.1.6 Launch of analysis and edition of HTML report

In case of Multi-salvoes configuration, the analysis parameters can be independent per salvo or can be applied to all salvoes.

The analysis can be launched on the current salvo or on all salvoes.

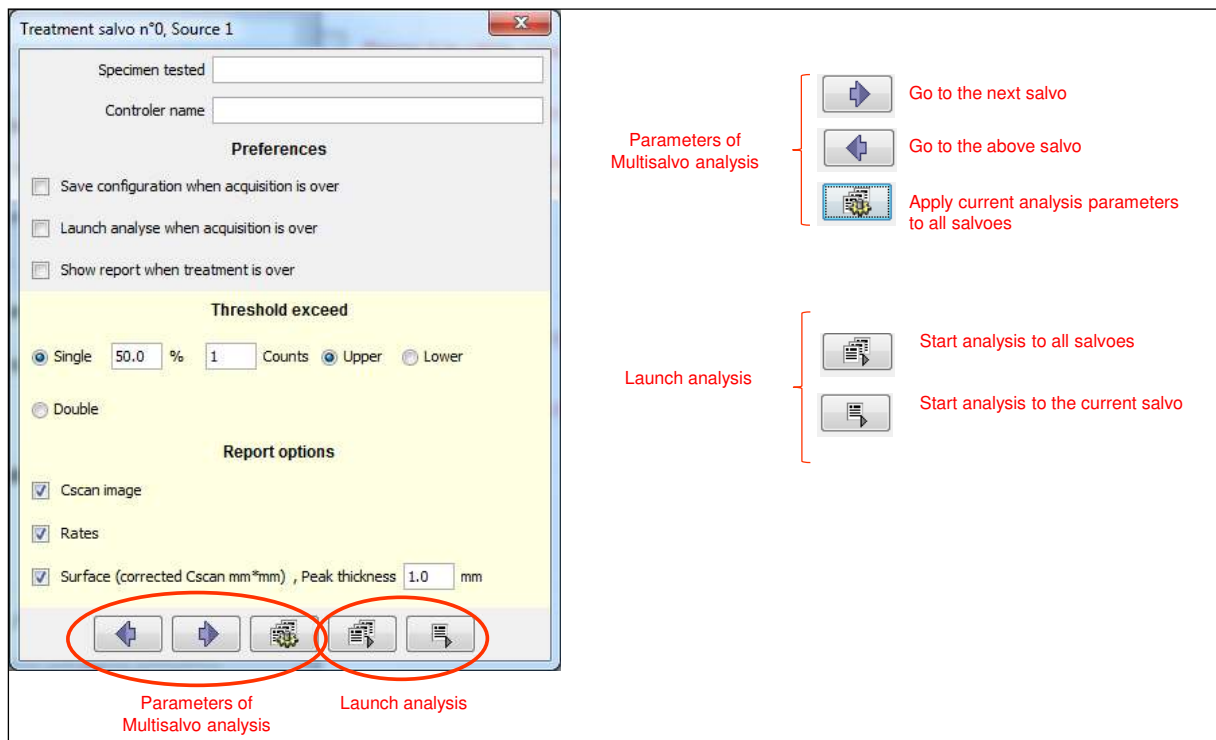
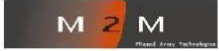
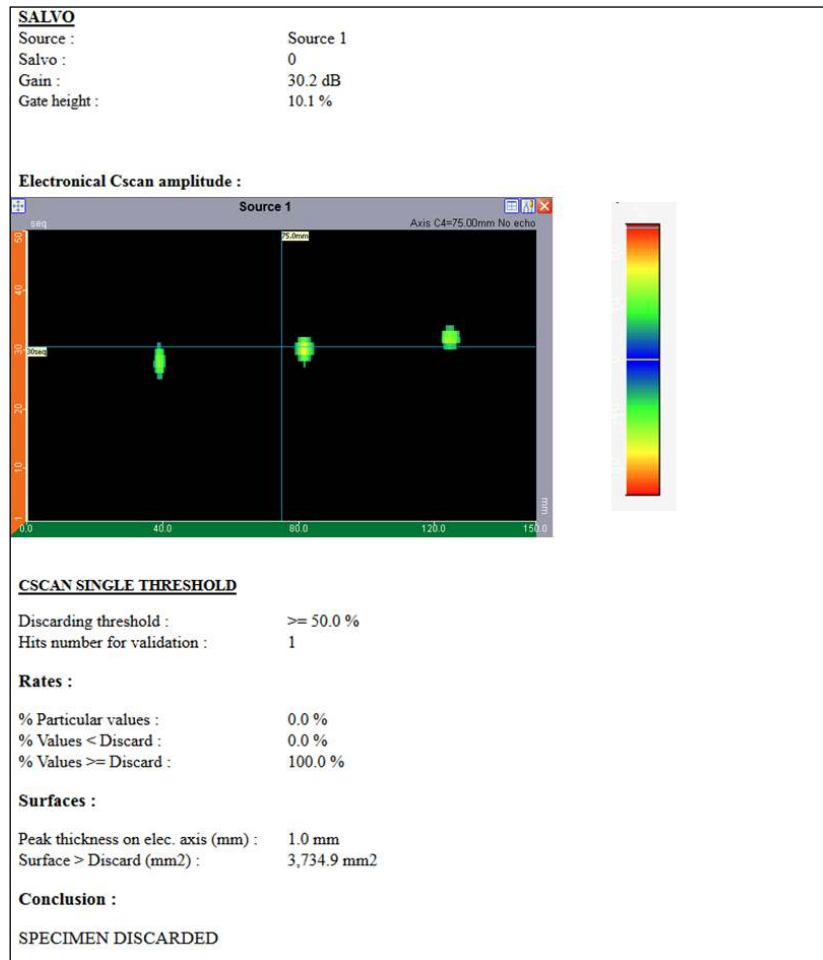


Figure 224: Launch of analysis icons

- **Example of HTML report**

The created HTML report has the following form:

		ULTRASONIC TESTING REPORT
Non Destructive Testing Phased array		
Specimen tested :	component s/n : XXXX	
Test date :	Feb 21, 2013 4:32:55 PM	
Controler name :	M2M controler	
Configuration settings :		
M2K config :	C:/Users/dlandois/Desktop/nouvelle_imagerie/faisabilité_7MHz.m2k	
Controler visa :	<input type="text"/>	
Moving on 1 mechanical axis		



3.2. PDF report

The PDF report function automatically creates a report of acquisition with screenshots displaying one or several parts of this acquisition. No data analysis is included.

The PDF report can be customized. The user may specify:

- Specimen reference
- Name of operator
- Company logo
- Acquisition views
- UT parameters...

3.2.1 Access

The first step to create a PDF report is to specify the path of Acrobat reader access (see next figure) in the “**options**” panel

Note: PDF report is compatible with Acrobat reader v9.0 and later.

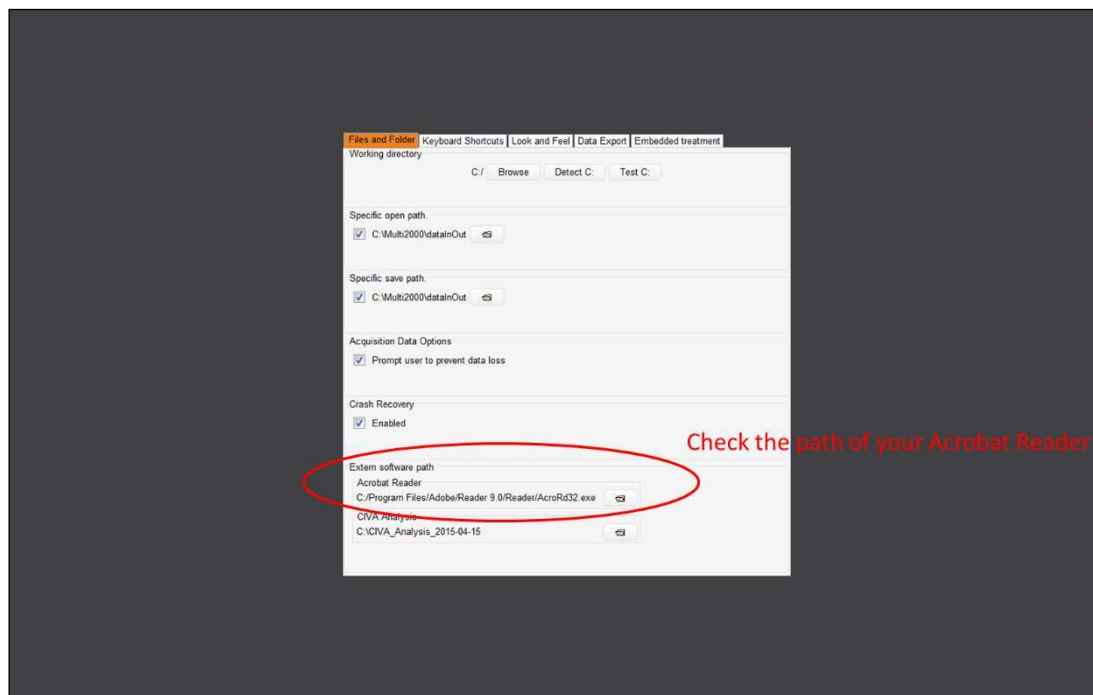


Figure 225: Definition of the Acrobat reader path

In Acquisition panel, the icon report gives access to two types of report HTML and PDF. The icon « PDF report » gives access to the PDF report (see next figure).

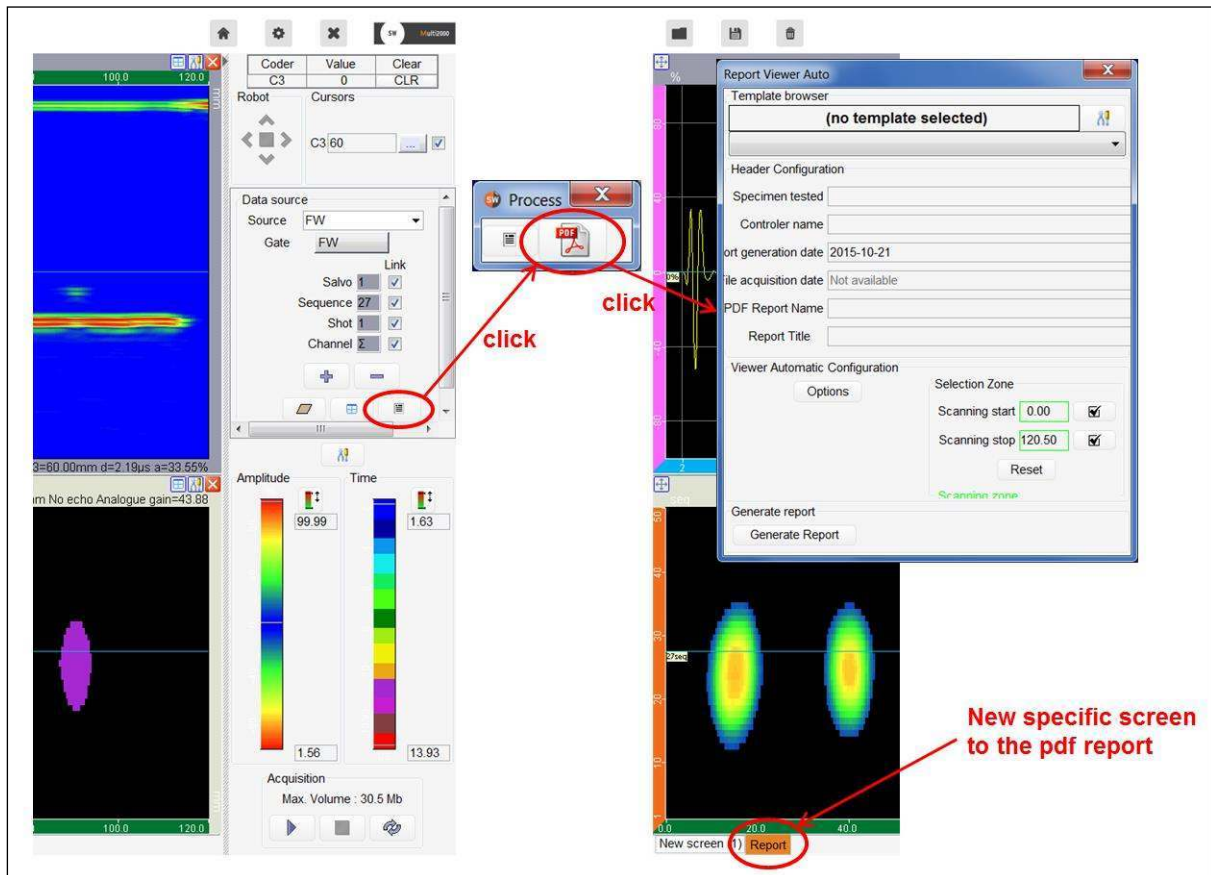


Figure 226: Access of the PDF report

To generate a PDF report, the following steps must be completed:

1. Load a UT data file (.m2k) or wait for the end of acquisition
2. Click on « PDF report ».
3. Select views to be displayed in the report
4. Select a template
5. Enter the identity of the inspection (operator name, specimen reference, title of the report...) to be displayed in the report header
6. Specify the parameters to be displayed in the report (UT parameters, company logo...)
7. Specify the acquisition area to be displayed in the report
8. Start report edition

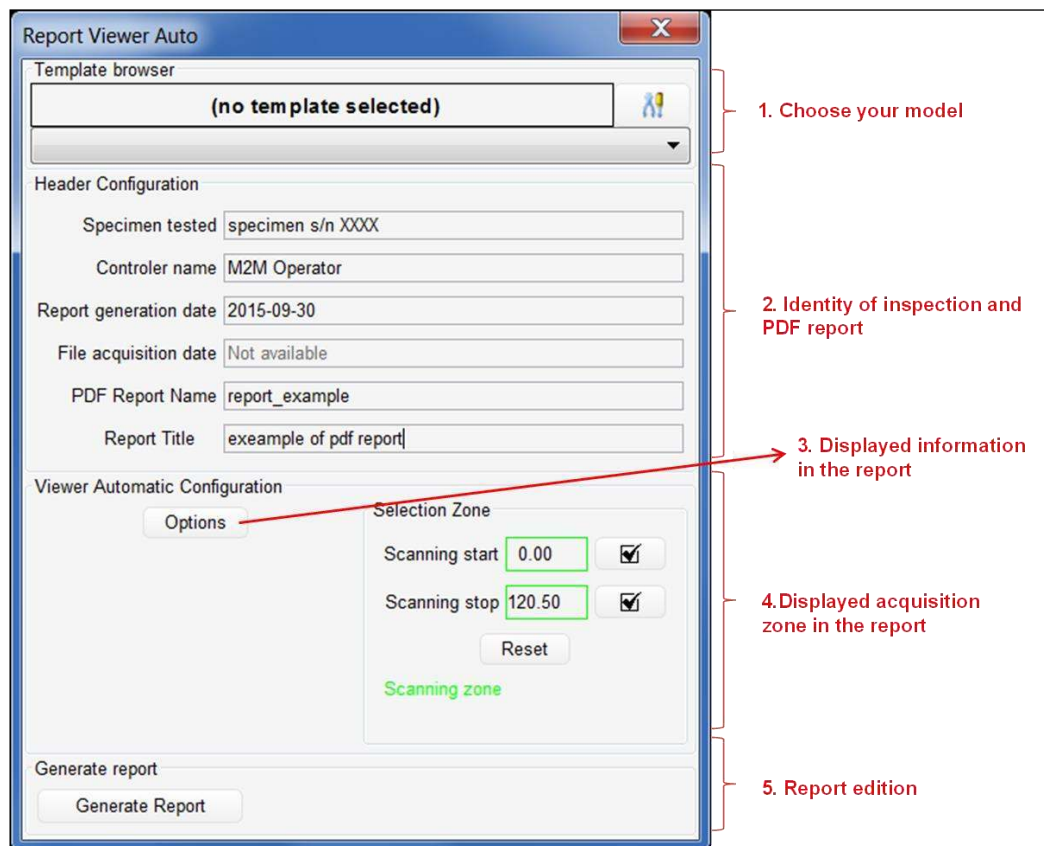


Figure 227: Parameters panel of pdf report

3.2.2 Selection of views to display in the report

After clicking on «PDF report », a specific screen pops up in the Acquisition panel: the report screen. The user may drop in this screen all the views to be displayed in the report.

By default, the 'report' screen contains all views of the last current screen.

3.2.3 Selection of template

The template allows saving in a file the specific parameters of the user report:

- Parameters selected via a click on "option".
- The dimension of the acquisition area to be displayed in the report.
- The report screen (all views to be displayed in the report).

Several types of template are available:

- Configuration: this option saves the template in the .m2k file (xxx.m2k/reportpdf).

- Application: this option save the template in Acquire directory (c:/Acquire/reportingCatalogModel/reportpdf).
- Windows: this option save the template on the hard disk (C:/m2m/reportM2M).

It's possible to create several templates and to save them under specific names.

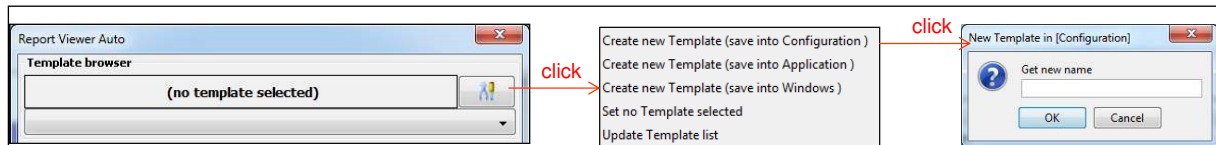


Figure 228: Template creation

The saved template may be opened from a drop -down menu (see next figure).

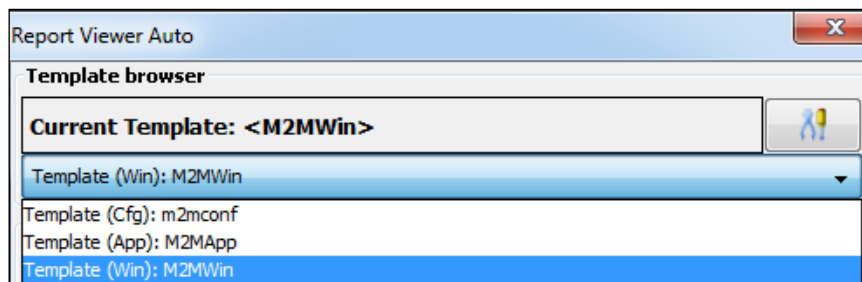


Figure 229: Selection of existing template

3.2.4 Inspection identity

The header of PDF report contains the following information:

- Name of the inspected specimen or reference
- Name of the operator
- Date of the report edition
- Date of the acquisition if existing (this date is automatically read in the .m2k file, it's not possible to modify it)
- Title of the report

In the inspection identity panel, the user may also specify the name of the PDF report file.

Header Configuration

Specimen tested:

Controler name:

Report generation date:

File acquisition date:

PDF Report Name:

Report Title:

Figure 230: Configuration of the report's header

3.2.5 Definition of the parameters to be displayed in the report

« Options » icon gives access to the following parameters:

- Definition of the saving report path.
- Selection of the company logo.
- Selection of UT parameters display: probe, wedge, focal laws, gain, voltage, PRF...).
- In Multi-Salvoes configuration, selection of the Integral data source display.
- Selection of several options concerning the scrolling views.

Viewer Automatic Configuration

Options

Options:

PDF output path
C:/Multi2000 📁

Icon path
C:/Multi2000/constant/reportModel/logo.jpg 📁

Module: CivaParameters

- Report
- Probe
- Wedge
- Focal laws
- UT Parameters

Module: SourcesInformations

Display Integral Source

Module: ScrollViews

90° rotation of the screen

Show cursors

Adjust last scroll on scanning zone defined

0 Rounded values

OK

→ Select the default path to save the .pdf file

→ Customize the company logo

→ Select the displayed configuration parameters in the report

→ Display or not the data source in the pdf report

→ Rotate the print screen in the pdf

→ Show or not the cursors in the print screen

→ Adjust the dimensions of the last scrolling according to the selected zone

click

Adjust the number of decimal value of scrolling zone dimensions

Figure 231: Options panel

3.2.6 Definition of the acquisition zone to display in the report

The user may display a part of the acquisition in the report (for inspection with a large robot displacement for example); this is the selection zone option.

If the report screen contains “scrolling” views, acquisition is scrolled automatically according to the dimension of the “scrolling” view from the initial position of the selection zone (scanning start) to the final position of the selection zone (scanning stop). For each scrolling, screen shot of the report screen is displayed automatically in the PDF report.

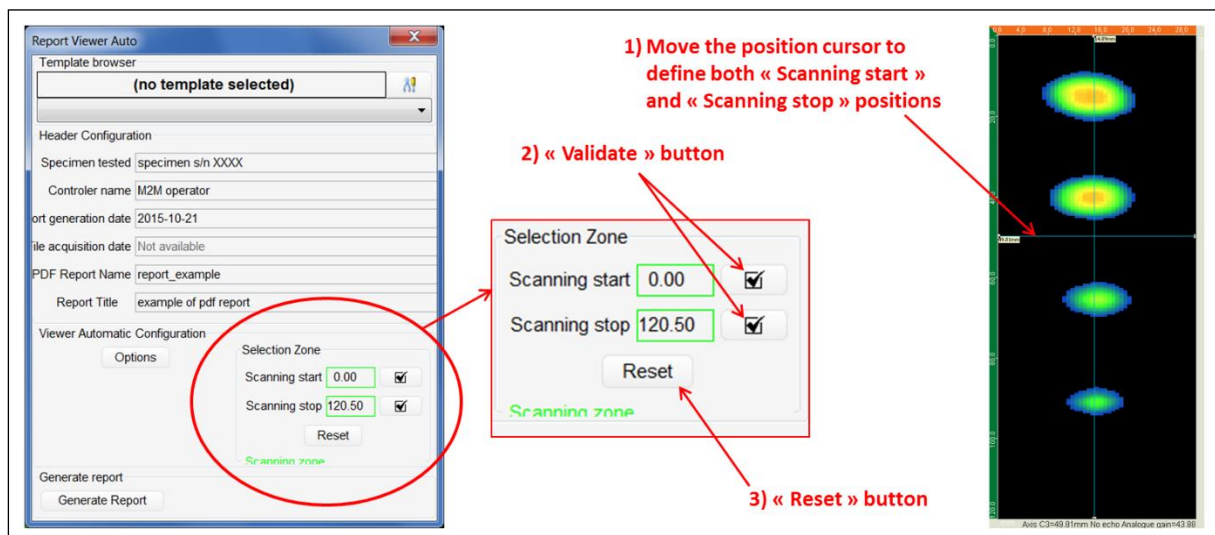


Figure 232: Definition of the selection zone

There are two possibilities to specify the selection zone:

- **1st solution: With cursors (see figure above).**

- 1) Put the positioning blue cursor to the initial position (scanning start).
 - 2) Then, validate this position by clicking on the « validate » icon (see figure above).
- Make the step 1 and 2 to specify the final position of the selection zone (scanning stop)

- **2e solution: With fix values of position**

- 1) Enter the value of the initial position (scanning start) and press “enter”.
- 2) Enter the value of the final position (scanning stop) and press “enter”.

By clicking on «Reset» icon, the dimension of the selection area is adjusted to the dimension of the acquisition.

3.2.7 Report Edition

Click on « Generate report » icon to create the PDF report. After the creation, the PDF report will be opened automatically with Acrobat program.

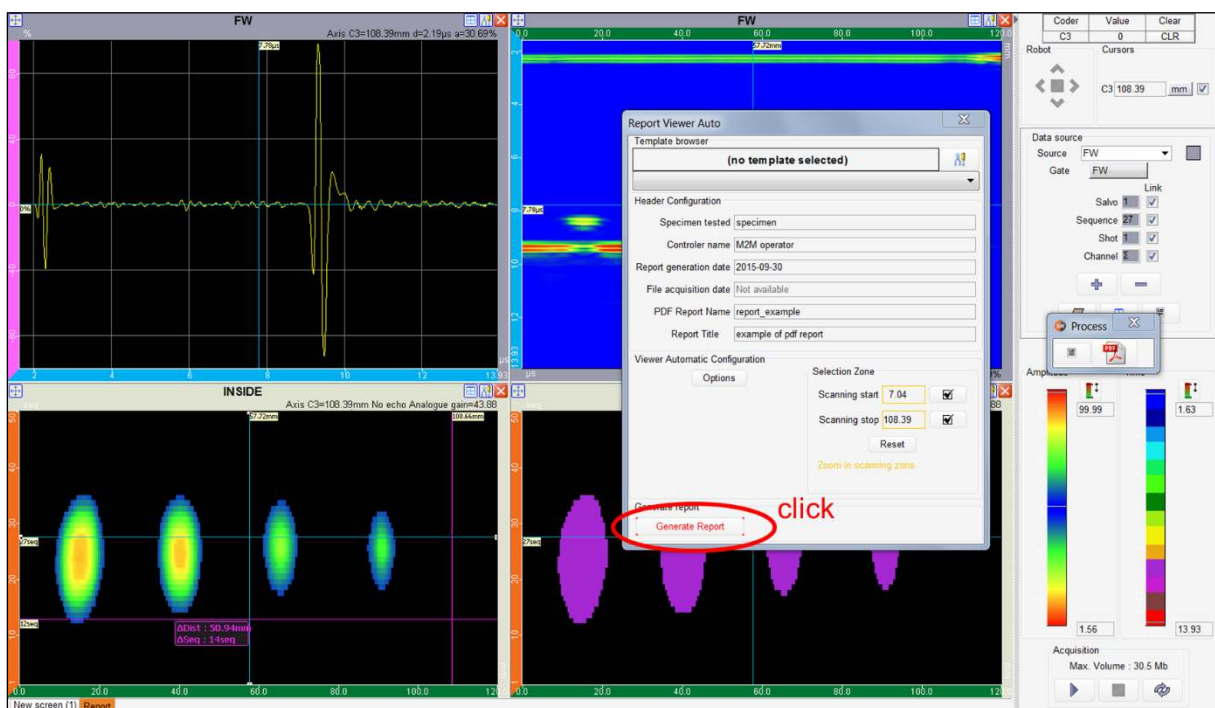



Figure 233: PDF report edition

- **Example of PDF report:**

The created PDF report has the following form:

Controler name : M2M operator	example of pdf report	
Report generation date : 2015-10-21	Specimen tested : specimen s/n XXXX	
File acquisition date : Not available	File : 201509291745_Composite.m2k	

example of pdf report

Brand and Model: MultiX++

Serial Number: 50

Version: 8.0.0

Salvo N°0

Probe

Type	Frequency	Probe Bandwidth	Number of elements	Pitch	Gap	Elevation	Probe position (sample referential)
Linear array	5.0 MHz		64	0.6 mm	0.1 mm	5.0 mm	X= 200.0 mm Y= 50.0 mm Z= 0.0 mm

Wedge

Index Point (sample referential)	Refraction angle (Polarity)	Height
X : 200.0 mm Y : 50.0 mm Z : 0.0 mm	0.0 deg (L)	19.0 mm

Focal laws

Active aperture	Number of sequence	First element	Focal law in transmission	Transmission details	Focal law in reception	Reception details
16	49	1	Null delay law		Transmission = Reception	Transmission = Reception

UT Parameters


Gain	Voltage	PRF	Sampling frequency	Delay before digitizing	Digitizing depth	FIR Filter	Averaging	Data Compression	TOFD Parameters
43.9 decibel	55.0 V	2994.0 Hz	100.0 MHz	12.0 µs	14.4 µs	None	false	false	false

Page 1 / 3

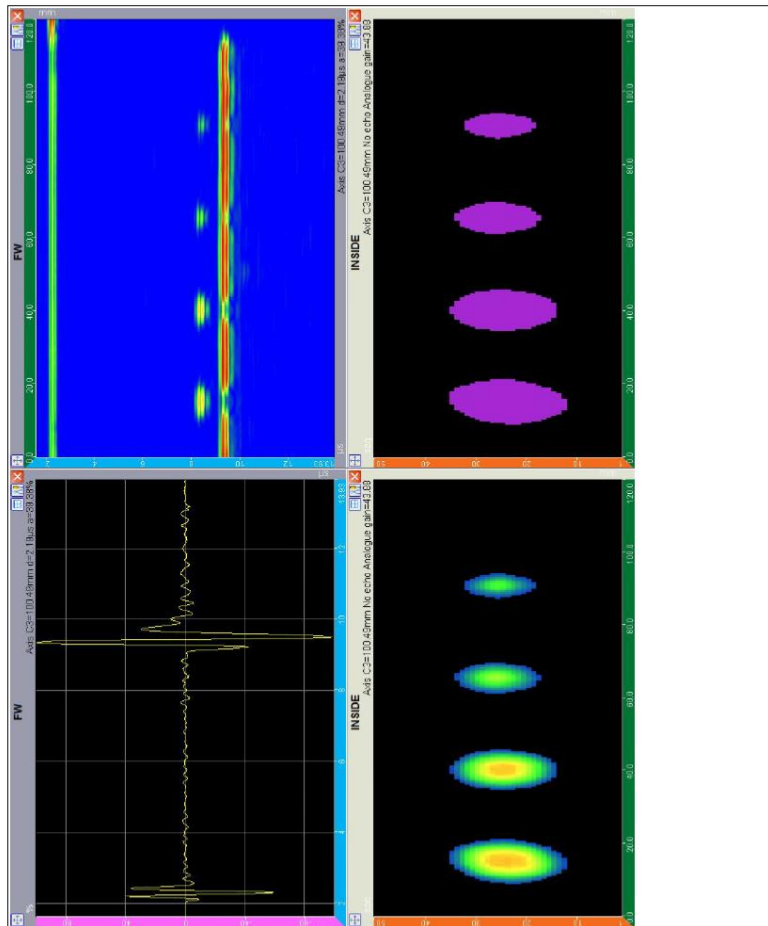
Controler name : M2M operator	example of pdf report	
Report generation date : 2015-10-21	Specimen tested : specimen s/n XXXX	
File acquisition date : Not available	File : 201509291745_Composite.m2k	

Data Source

Data Source	FW	BW
Gate	FW	BW
Salvo	Salvo N°0	Salvo N°0

Controller name : M2M operator Report generation date : 2015-10-21 File acquisition date : Not available	example of pdf report Specimen tested : specimen s/n XXXX File : 201509291745_Composite.m2k	
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Step 1/1 | 7 mm : 100 mm]



PART 6: REMOTE CONTROL

Remote Control documentation is found inside the Acquire installation folder here :
C:\Acquire\plugins\fr.Acquire.plugins.acquisition_server_socket_1.0.0\Doc

APPENDIX 1: Acquire GLOSSARY and DATA ARCHITECTURE

Eddyfi/M2M vocabulary is mainly based on the norm NF EN 16018.

Shot:

Single excitation of transmitting element(s) and acquisition of the signal(s)

Sequence:

Series of shots carried out in one acquisition cycle with the same active aperture (group of active elements when transmitting and/or receiving)

Salvo:

Series of acquisition sequences carried out with the array in one position dedicated to one application

Trigger:

Event (internal time event, encoder input, input signal) that causes the beginning of the first salvo firing

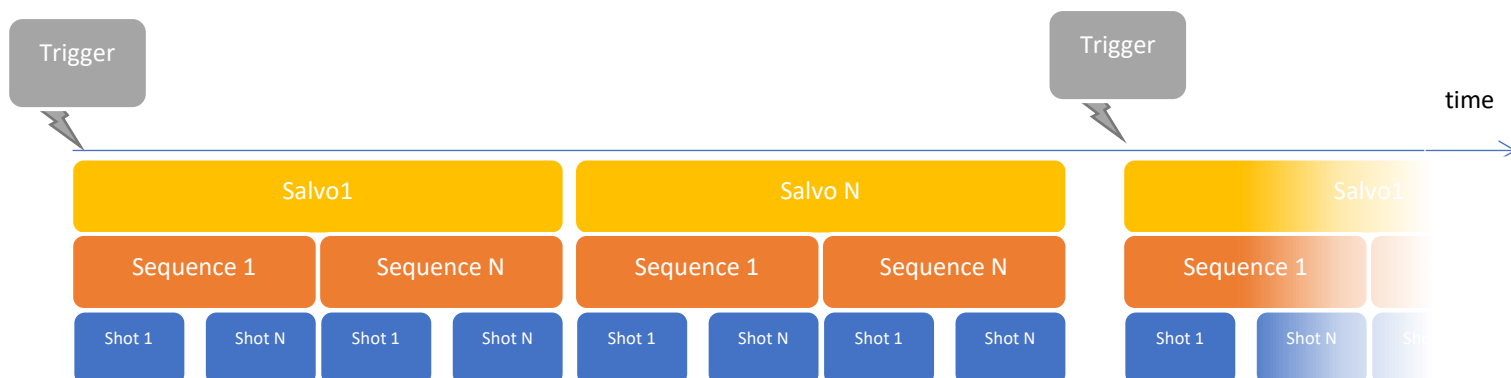


Figure 234 : Data structure

Example: 32 elements probe; 5 sequences; 3 shots for each sequence; aperture of 4 elements; scanning step : 6 elements.

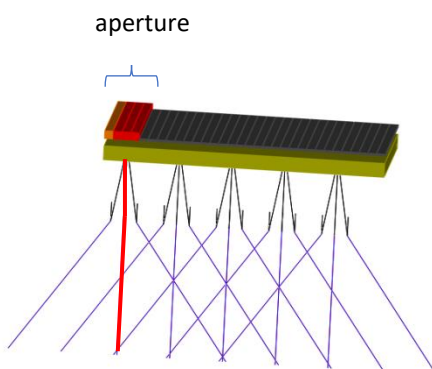
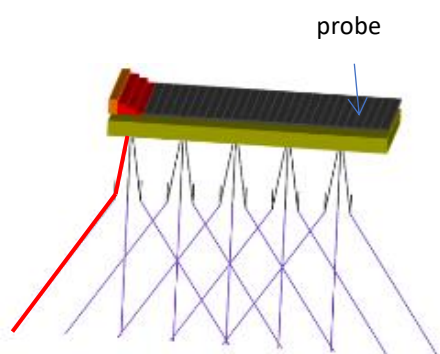


Figure 235 : sequence 1, shot 2

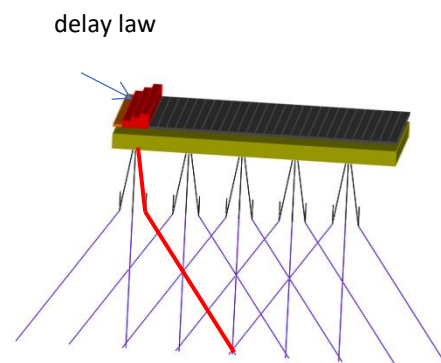


Figure 236 : sequence 1, shot 3

Figure 237 : sequence 1, shot 1

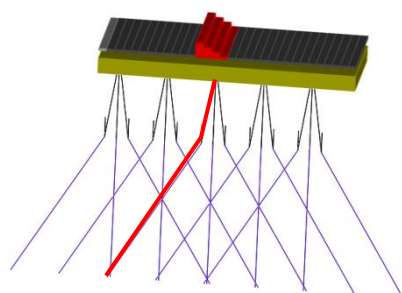


Figure 239 : sequence 3, shot 1

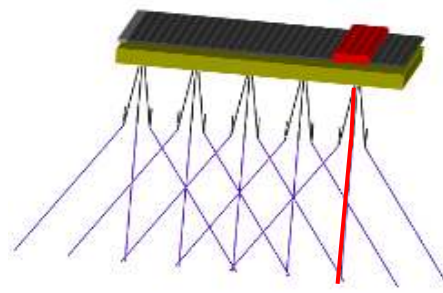


Figure 238: sequence 5, shot 2

Channel:

Electronic device of the test instrument for transmitting (transmitting channel) and/or receiving a signal (receiving channel)

Elementary signal / channel signal A-scan:

A-scan presentation of the ultrasonic signal received by one element:

- x-axis corresponds to the digitalization time expressed in points or time unit. The step between two points depends on the digitalization frequency. At 100MHz, the time duration between two points is 0.01 μ s.
- y-axis corresponds to the amplitude of the signal expressed in bin or %. The relation between bin and percent is given below:
 - o -100% \rightarrow -32768 bin
 - o +100% \rightarrow +32767 bin

Through the Remote Control API, Ascans are retrieved as a short array (little endian format).

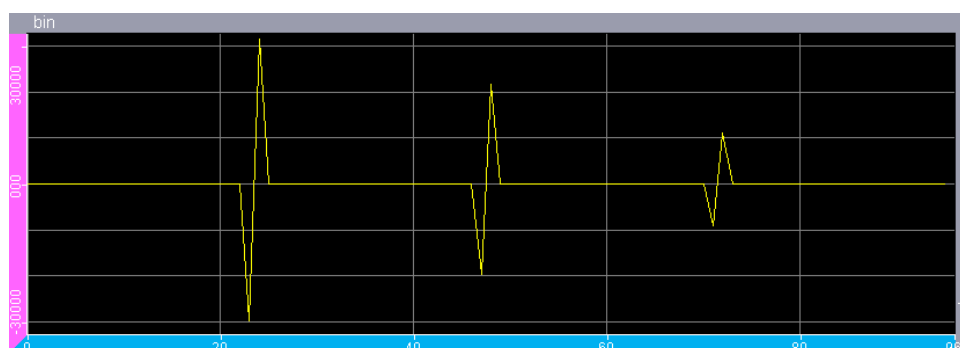


Figure 240 : A-scan in bin / pts

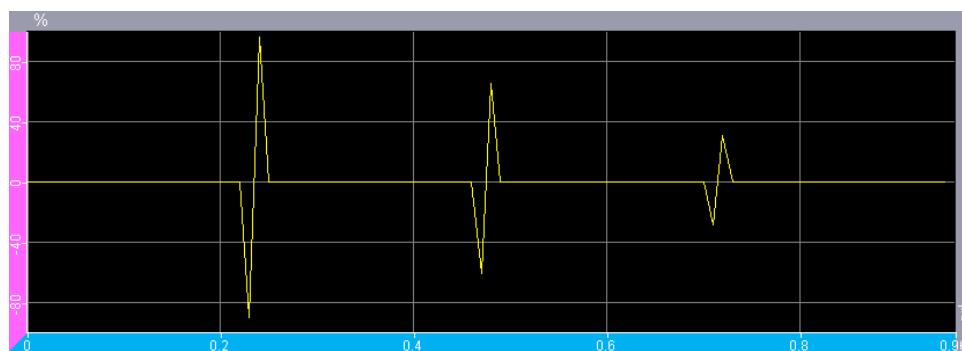


Figure 241 : Ascan in % / μ s

Sum of signals:

Result of the operation of summing the received signals of the elements after applying a delay law

Summed A-scan:

A-scan presentation of the sum of ultrasonic signals received by an aperture.

Multiple reconstruction of the received signals:

Technique used to control an ultrasonic beam by combining each elementary signal several times to get several reconstructions or summations

Delay law:

Set of settings used to control the set of delays for transmission and/or reception to shape the beam

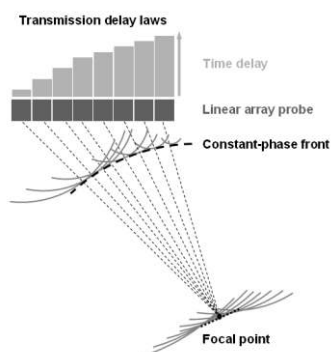


Figure 242 : example of delay law utilisation

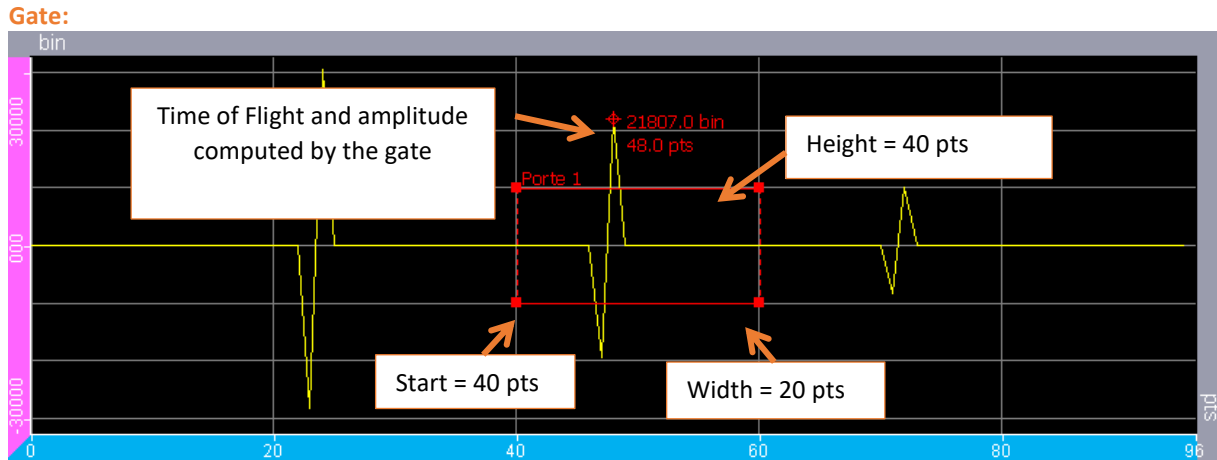


Figure 243: gate

Portion of the digitalized area where the Time of Flight and the Amplitude of a detected echo are extracted. A gate is defined by :

- Index (identification of the gate)
- Start position (relative or not to the result of another gate with a lower index)
- Width
- Threshold height
- Detection type (please refer to the Multi2000_USER_MANUAL for more information)

Several gates could be set for one shot.

A gate is applied for all the sequence but the configuration (threshold) could be different for each shot.

TCG (Time Corrected Gain)

A TCG Curve represents the variation of the gain along the time of the digitalization. The TCG can be applied to the analog and/or the digital gain.

Usually, this functionality is used to provide equal amplitude from equal reflectors at different depths.

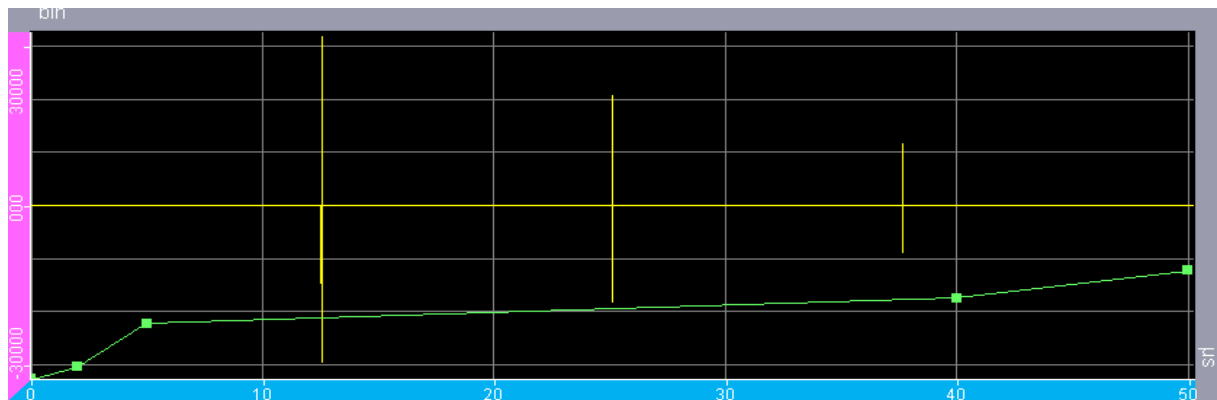


Figure 244 : Analog DAC