WeldSight Software

User's Manual

Software Version 1.13

10-027142-01EN — Rev. 4
July 2024

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

EVIDENT CANADA, INC., 3415, rue Pierre-Ardouin, Quebec (Quebec) G1P 0B3 Canada

This document was prepared with particular attention to usage to ensure the accuracy of the information contained therein, and corresponds to the version of the product manufactured prior to the date appearing on the title page. There could, however, be some differences between the manual and the product if the product was modified thereafter.

The information contained in this document is subject to change without notice.

Software version 1.13
Part number: 10-027142-01EN
Rev. 4

Printed in Canada

Table of Contents

List of Abbreviations

CPU	central processing unit
PA	phased array
RAM	random-access memory
TCG	time-corrected gain
TOFD	time-of-flight diffraction
UT	ultrasonic testing
VPA	virtual probe aperture

Important Information — Please Read Before Use

Intended Use

WeldSight software is designed to be used with the FOCUS PX acquisition unit and the OmniScan X3 flaw detector instrument in nondestructive inspection of commercial and industrial materials.

Instruction Manual

This instruction manual contains essential information on how to use this Evident product safely and effectively. Before using this product, thoroughly review this instruction manual. Use the product as instructed.

Keep this instruction manual in a safe, accessible location.

IMPORTANT

Some of the details of software images in this manual may differ from your software display. However, the principles remain the same.

Software Compatibility

WeldSight software is compatible with the FOCUS PX unit and the OmniScan X3 instrument for data collection and analysis.

Safety Symbols

The following safety symbols might appear in the instruction manual:

 General warning symbol

This symbol is used to alert the user to potential hazards. All safety messages that follow this symbol shall be obeyed to avoid possible harm or loss of data.

Safety Signal Words

The following safety signal words might appear in the documentation of the software:

 **CAUTION**

The CAUTION signal word indicates a potentially hazardous situation. It calls attention to a procedure, practice, or the like that if not correctly performed or adhered to may result in minor or moderate personal injury, material damage, particularly to the product, destruction of part or all of the product, or loss of data. Do not proceed beyond a CAUTION signal word until the indicated conditions are fully understood and met.

Note Signal Words

The following note signal words could appear in the documentation of the software:

IMPORTANT

The IMPORTANT signal word calls attention to a note that provides information that is important or essential to the completion of a task.

NOTE

The NOTE signal word calls attention to an operating procedure, practice, or the like, that requires special attention. A note also denotes related parenthetical information that is useful, but not imperative.

TIP

The TIP signal word calls attention to a type of note that helps you apply the techniques and procedures described in the manual to your specific needs, or that provides hints on how to effectively use the capabilities of the product.

Warranty Information

Evident guarantees your Evident product to be free from defects in materials and workmanship for a specific period, and in accordance with conditions specified in the *Evident Terms and Conditions* available at https://evidentscientific.com/evident-terms/.

The Evident warranty only covers equipment that has been used in a proper manner, as described in this instruction manual, and that has not been subjected to excessive abuse, attempted unauthorized repair, or modification.

Inspect materials thoroughly on receipt for evidence of external or internal damage that might have occurred during shipment. Immediately notify the carrier making the delivery of any damage, because the carrier is normally liable for damage during shipment. Retain packing materials, waybills, and other shipping documentation needed in order to file a damage claim. After notifying the carrier, contact Evident for assistance with the damage claim and equipment replacement, if necessary.

This instruction manual explains the proper operation of your Evident product. The information contained herein is intended solely as a teaching aid, and shall not be used in any particular application without independent testing and/or verification by the operator or the supervisor. Such independent verification of procedures becomes increasingly important as the criticality of the application increases. For this reason, Evident makes no warranty, expressed or implied, that the techniques, examples, or procedures described herein are consistent with industry standards, nor that they meet the requirements of any particular application.

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Technical Support

Evident is firmly committed to providing the highest level of customer service and product support. If you experience any difficulties when using our product, or if it fails to operate as described in the documentation, first consult the user's manual, and

then, if you are still in need of assistance, contact our After-Sales Service.To locate the nearest service center, visit the *Service Centers* page on the Evident Scientific Web site https://www.evidentscientific.com/service-and-support/service-centers/.

Introduction

WeldSight software is designed for the inspection and analysis of welded components and base materials. It supports the FOCUS PX unit and the OmniScan X3 instrument for data collection and analysis.

This manual contains instructions for software installation, configuration, calibration, inspection, and analysis.

For instructions on how to use the FOCUS PX unit, refer to the *FOCUS PX User's Manual*.

For instructions on how to use the OmniScan X3 flaw detector, refer to the *OmniScan X3 User's Manual*.

1. Getting Started

This chapter describes how to install, configure, and start WeldSight software.

1.1 Minimum Computer and Software Requirements

You must meet the following minimum computer requirements to install and run WeldSight software.

- CPU: Intel Core i7 or Xeon E3 processor.
- RAM memory: 16-32 GB (DDR3 or better).
- Data storage drive: SSD.
- Network adapter:
  - Dedicated 1 GB Ethernet card to connect to the acquisition unit.
  - A second network card is required only if simultaneous connection to LAN is required during data collection or while connected to acquisition unit.
- 1600 × 1200 on 4:3 display (1920 × 1080 on 16:9 display) or higher display adapter and monitor resolution.
- A keyboard and a pointing device.
- Operating system and software:
  - Microsoft Windows 10 and 11.
  - Eclipse Scientific BeamTool version 9 or later is required to create new beamsets only, but not required for setup configuration, data acquisition, or analysis.
  - Microsoft Excel 2016 or later is required for report creation.

1.2 Installing WeldSight Software

This section provides instructions to install WeldSight software on a computer.

To install the software

1. Run the WeldSight installer program, located on the Evident distribution disk or website, and follow the on-screen installer wizard steps.
2. Enter the software license serial number, customer information, and activate the WeldSight license via the Internet (only required if a WeldSight USB software license key is not detected) (see Figure 1-1 on page 16).

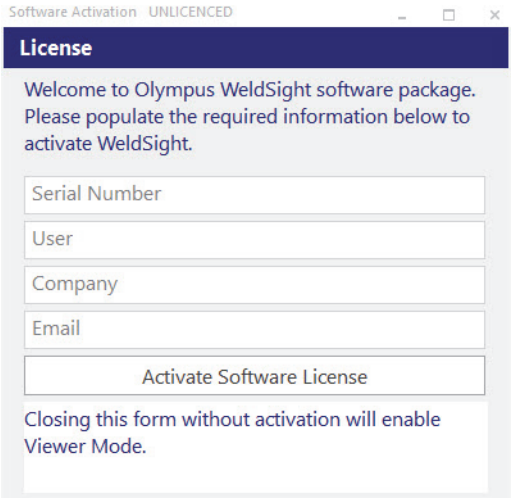


Figure 1-1 Software license activation form

3. Close the software license activation form. If the form is closed without activating the license, WeldSight is enabled in **Viewer Mode**. In this mode, data files can be opened with limited analysis capability.

1.3 Network Card Optimization

This section explains how to configure and optimize the instrument connection. To achieve optimum performance and avoid data loss, the computer network card must have jumbo packets enabled.

To optimize the network card under Windows 10

1. Open the list of network connections in the Windows Control Panel, and identify the connection used to connect to the instrument (see Figure 1-2 on page 17).

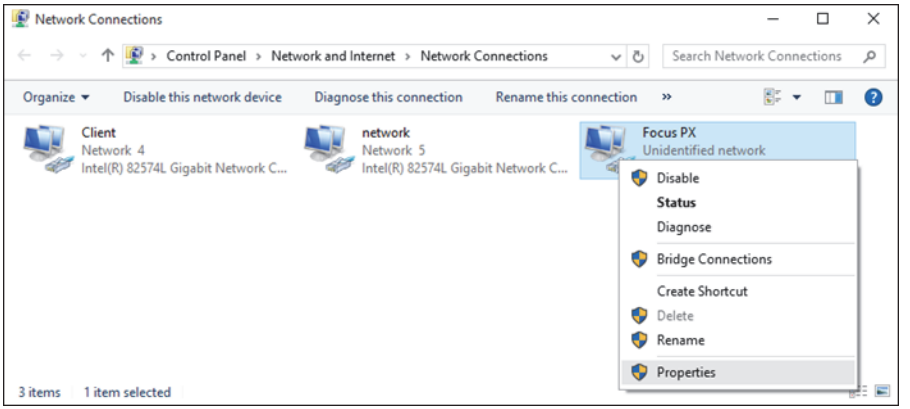


Figure 1-2 Selecting Properties

2. Right-click the network connection used to connect the instrument, and select **Properties**.
3. In the network card properties, select **Configure**, and select **Advanced**.
4. In the **Advanced** tab, under the **Property** list, browse to **Jumbo Packets** or **Jumbo Frames,** and change the value to 9014 bytes if not already set (see Figure 1-3 on page 18).

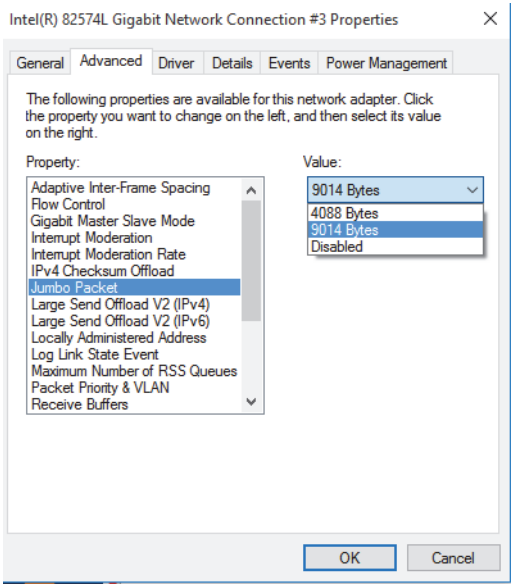


Figure 1-3 Configuring Jumbo Packets

1.4 Starting WeldSight Software for Offline Analysis

NOTE

WeldSight software can operate with or without a connected instrument. When not connected to an instrument, it operates solely in offline data analysis mode.

See “Offline Data Analysis” on page 157.

1.5 Preparing the OmniScan X3 Instrument for Data Collection

To prepare the OmniScan X3 instrument for data collection

1. Go to the **Software Downloads** section of our website, and navigate to the WeldSight section (see Figure 1-4 on page 19.

2. Download the WeldSight **Remote Connect** .wrp file to your computer, and copy it to a USB memory stick (see Figure 1-4 on page 19).

Figure 1-4 WeldSight Remote Connect software download

3. Insert the memory stick into one of the USB ports on the OmniScan X3 instrument (see Figure 1-5 on page 19).

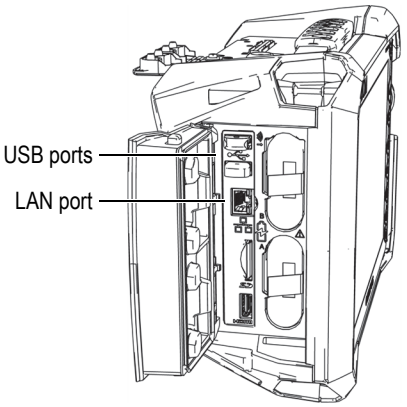


Figure 1-5 USB and LAN ports on the OmniScan X3 instrument

4. Connect the Ethernet cable between the LAN port on the OmniScan X3 instrument and the LAN port on the system computer, and start up the OmniScan X3 (see Figure 1-5 on page 19).

5. In the **OmniScan Launcher**, select **REMOVABLE DRIVE**, and choose WeldSight **Remote Connect** to install this system on the OmniScan X3 instrument (see Figure 1-6 on page 20).

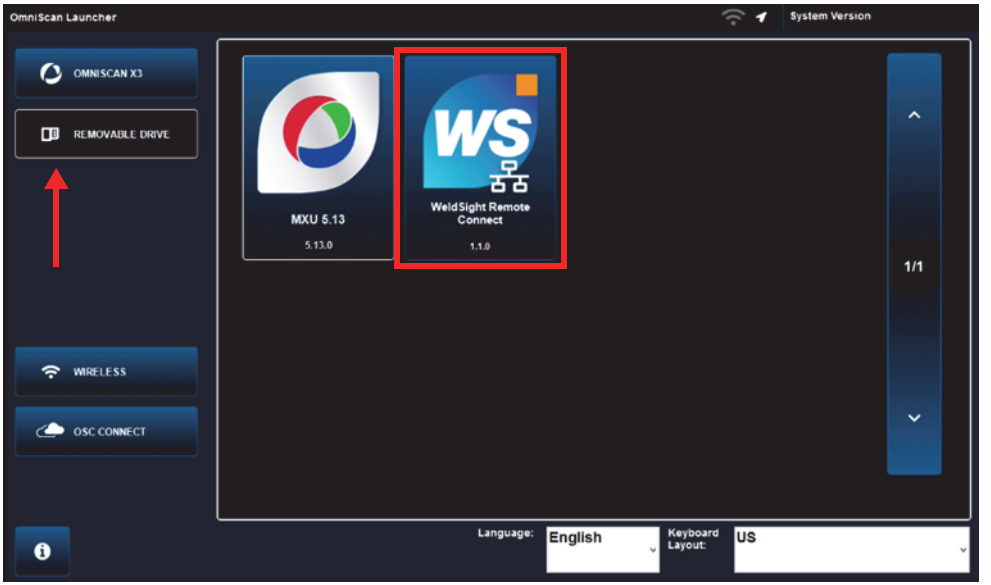


Figure 1-6 Removable drive in OmniScan Launcher

6. Once installed, the WeldSight **Remote Connect** system will be added next to the existing systems available in the launcher.
7. Select the **OMNISCAN X3** drive location in the launcher, and select WeldSight **Remote Connect** to start up this system (see Figure 1-7 on page 21).

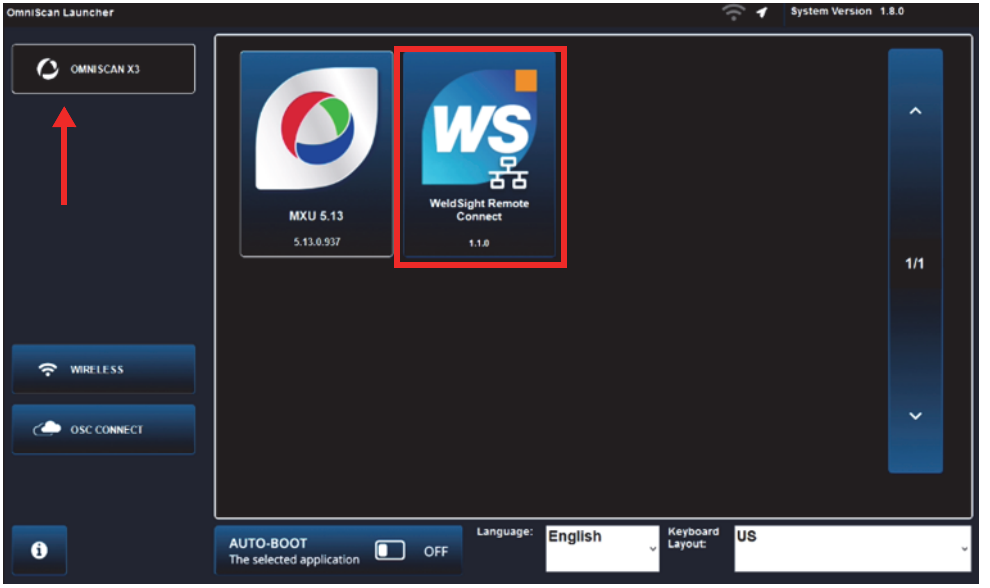


Figure 1-7 OmniScan Launcher

8. When the start-up is complete, the OmniScan X3 instrument serial number and model are displayed, and the default IP address, 192.168.0.2 is assigned (see Figure 1-8 on page 22).

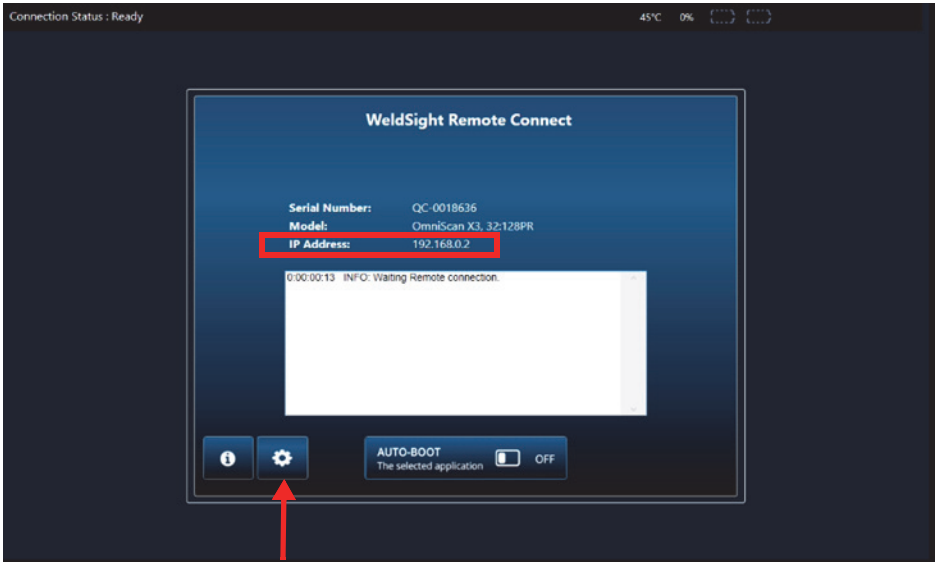


Figure 1-8 WeldSight Remote Connect IP address

9. If an alternative IP address is required select the  button, and enter the address using the touch pad.

TIP

The OmniScan X3 instrument's IP address must be on the same subnet as the system computer (by default, 192.168.0.1). If an alternative IP address is used, you must update the address in the WeldSight software.

The OmniScan X3 instrument is now ready to connect with WeldSight software.

1.6 Configuring the Network Connection to the OmniScan X3 Instrument

To configure the network connection between the OmniScan X3 instrument and WeldSight computer

1. On the system computer, select **Apps & Features** and ensure **Olympus NDT OpenView** is installed. OpenView is installed during the WeldSight installation process, and it enables communication with the instrument (see Figure 1-9 on page 23).

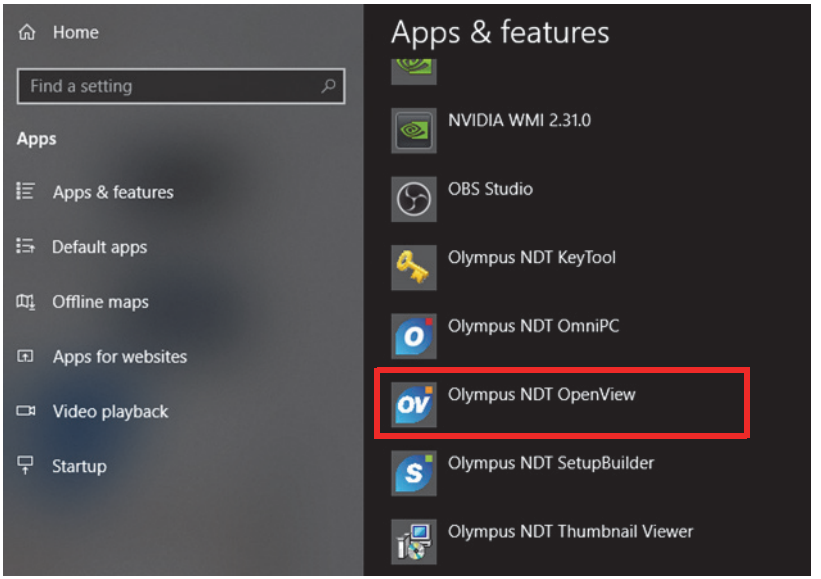


Figure 1-9 Confirm OpenView installation

2. Open the WeldSight software and double-click the display indicator icon in the lower-right corner to open the **Equipment** form (see Figure 1-14 on page 28). The **Equipment** form can also be opened from the **File > Equipment** icon on the command bar.

3. Select **Launch Configuration Tool**. The configuration tool interfaces with the Windows network settings. It requires administrative permissions on the computer (see Figure 1-10 on page 24).

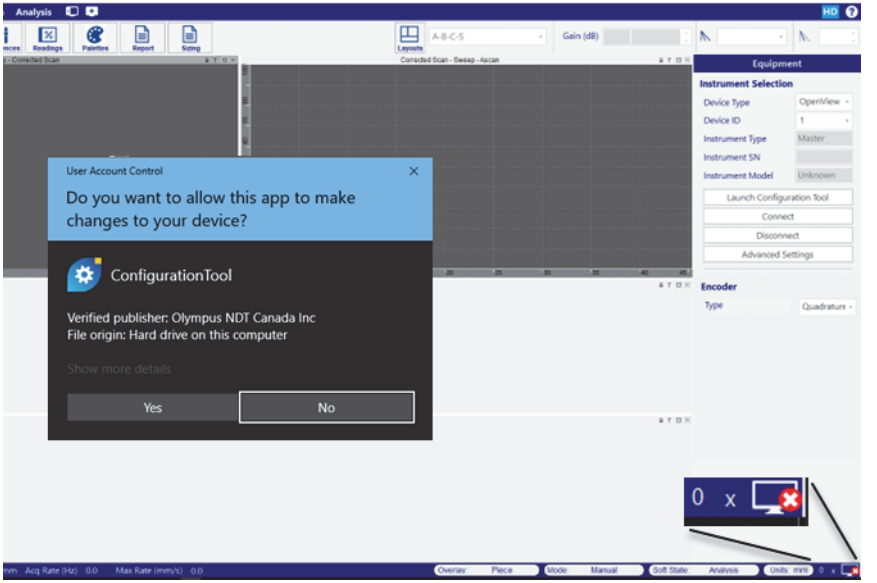


Figure 1-10 Configuration Tool launch

4. Select the Ethernet adapter that is connected to the OmniScan X3 instrument. Selecting the wrong Ethernet adapter will result in a fixed IP address. Ensure the desired Ethernet adapter is selected.

   The current IP address for the selected adapter is displayed, and the red box indicates that it is assigned by DHCP.

5. Note the suggested IP address, and select **Apply** (see Figure 1-11 on page 25).

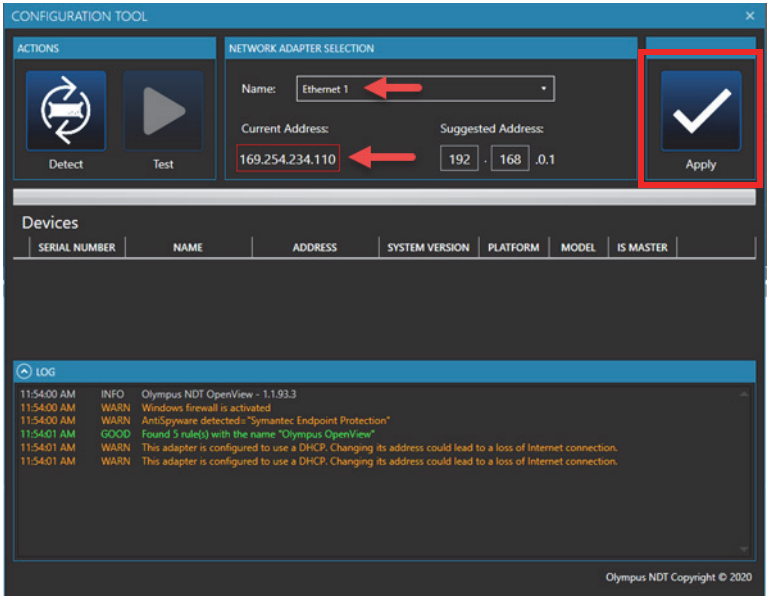


Figure 1-11 Configuration Tool IP address

6. If the default IP address (192.168.0.1) is already used on another adapter, the configuration tool suggests an alternate IP address (172.16.0.1). If this is the case, you must update WeldSight software to use this alternate IP address.
7. If an alternate IP address is used on the system computer (172.16.0.1), you must enter an IP address on the same subnet (172.16.0.2) in the WeldSight Remote Connect interface of the OmniScan X3 instrument.
8. Select **Apply** to update to the alternate IP address (see Figure 1-12 on page 26).

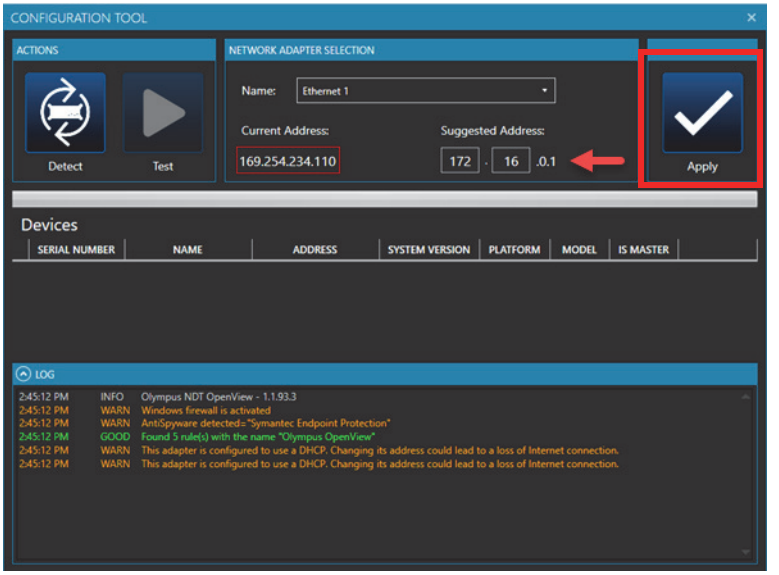


Figure 1-12 Configuration Tool alternate IP address

The **Devices** list will update after setting the fixed IP address, and the OmniScan X3 instrument will be detected as a device able to connect to WeldSight software.

9. Select **Test** to verify the connection to the device (see Figure 1-13 on page 27).
10. Close the **Configuration Tool**.

NOTE

The **Configuration Tool** window must be closed to successfully connect WeldSight software to the OmniScan X3 instrument. Ensure that the window is not minimized or hidden behind another window.

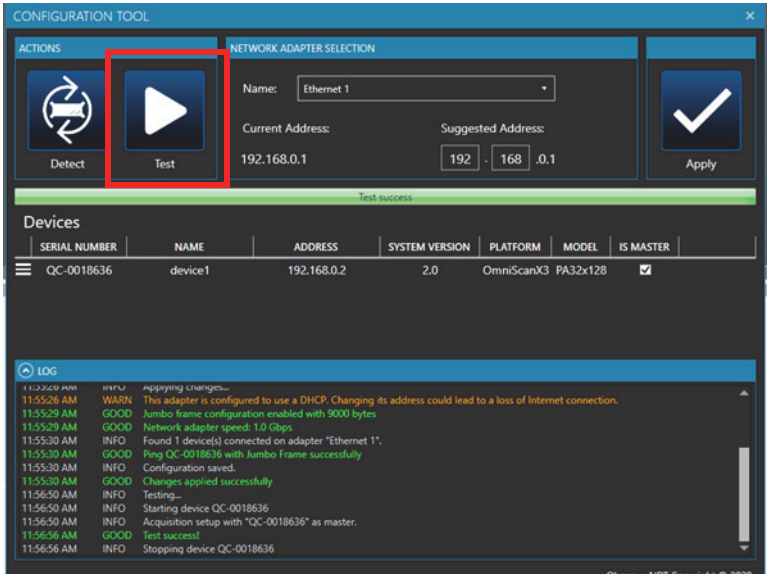


Figure 1-13 Configuration Tool connection test

11. In WeldSight software, select **Connect** in the Equipment form.

    The display indicator shows a check mark in a green circle when the connection is successful, which means that WeldSight software is ready for data collection (see Figure 1-14 on page 28).

NOTE

For WeldSight software to automatically connect with the OmniScan X3 at start-up, begin by starting up the OmniScan X3 instrument with a network cable connection, then launch WeldSight software on the PC. Additionally, all configured IP addresses must remain unchanged.

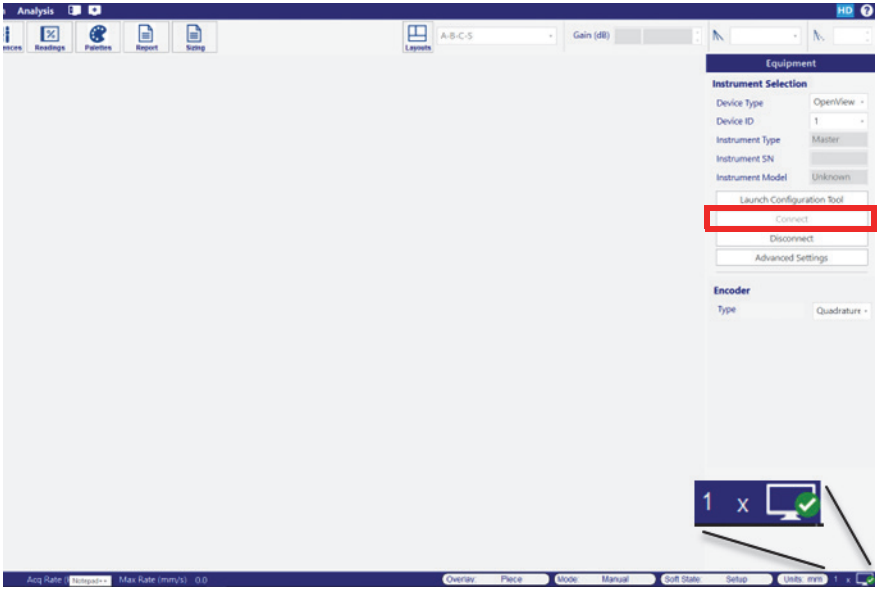


Figure 1-14 Equipment Connected

12. If an alternate IP address is used in the configuration tool (172.16.0.1) it must be entered manually in **Advanced Settings** (see Figure 1-15 on page 29).
13. Close the **Advanced Settings** form, and select **Connect** (see Figure 1-14 on page 28).

    The display indicator shows a check mark in a green circle when the connection is successful, which means that WeldSight software is ready for data collection (see Figure 1-14 on page 28).

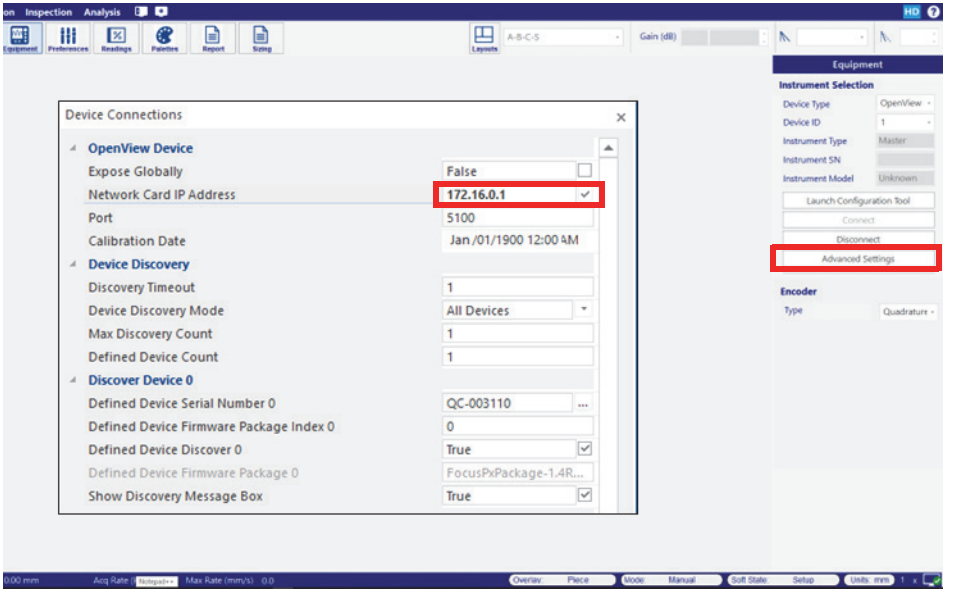


Figure 1-15 Equipment Advanced Settings

1.7 Configuring the Network Connection to the FOCUS PX unit

To configure the connection to the FOCUS PX unit

1. In WeldSight software, double-click the connection icon  in the footer.
2. Select **Launch Configuration Tool**.

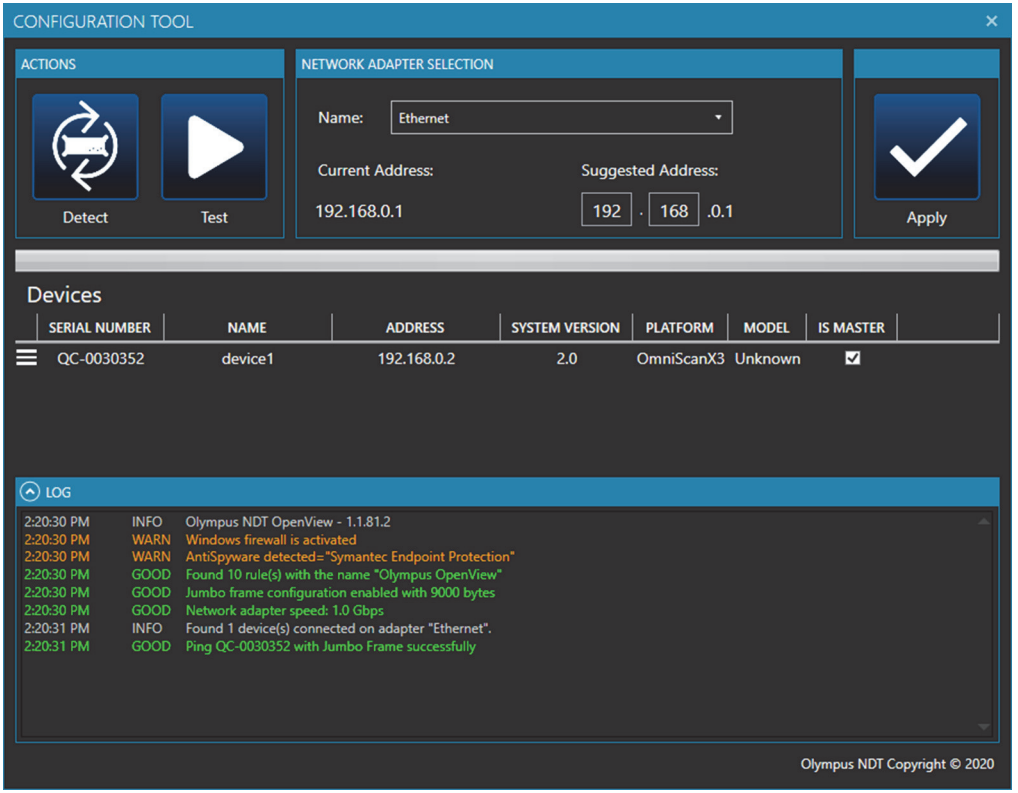


Figure 1-16 Launch Configuration Tool

3. Select the network adapter from the drop-down list to connect to the instrument. The current network IP address for the selected network card is displayed with the suggested default computer IP address to be used 198.168.0.1.
4. Select **Apply** to change the current IP address to the suggested IP address (see Figure 1-16 on page 30).

NOTE

If not already done, start up the FOCUS PX unit. If using an OmniScan X3, see “Configuring the Network Connection to the OmniScan X3 Instrument” on page 23.

5. Select **Detect** if the instrument is not automatically detected. Upon successful connection to the instrument, a self-test is available to troubleshoot common problems. During the installation process, an exception is added to the Windows Firewall for WeldSight and OpenView software. This exception must be active to connect to the instrument.
6. Close the Configuration Tool and select **Connect** on the WeldSight Equipment form. After initial connection, the FOCUS PX unit will connect to the network card automatically when the WeldSight software is launched if the instrument is detected.

   The connection icon with a green check mark  indicates success.

1.8 Starting WeldSight with the FOCUS PX Unit

To launch WeldSight software with a FOCUS PX unit

1. Turn on the system computer, and wait for Windows to complete the start-up process.
2. Connect the FOCUS PX unit to the appropriate network adapter of the computer, and turn on the instrument by pressing the power button (refer to the *FOCUS PX Unit User's Manual*).
3. Select the WeldSight icon from the desktop or browse to WeldSight from the Windows Start menu.

1.9 Completing the Start-Up

After WeldSight software starts up, ensure that the instrument icon has a check mark in a green circle in the footer, indicating an active connection to the acquisition unit.

NOTE

You do not need to be connected to the instrument to perform offline data analysis.

2. User Interface Reference

The WeldSight user interface is divided into several zones. Each zone regroups related settings, controls, readings, and views. The main zones of the user interface are described in Figure 2-1 on page 33 and detailed in the following sections.

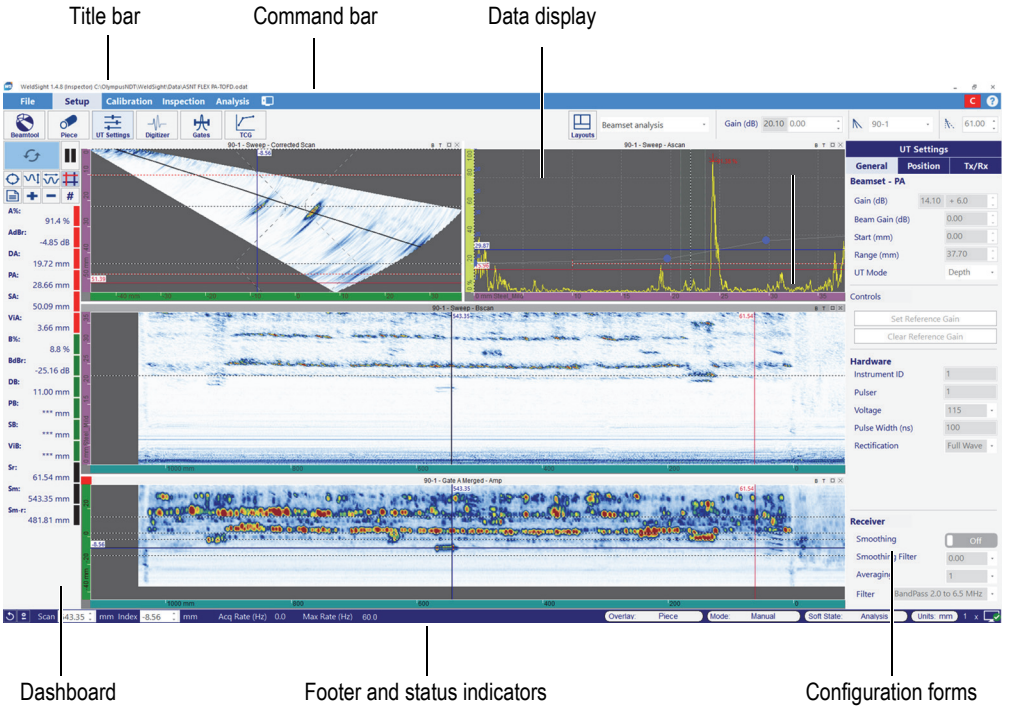


Figure 2-1 WeldSight software user interface

2.1 Title Bar

Figure 2-2 Title bar

The title bar displays the WeldSight version number, license type, and the name and path of the file currently opened. See “Help and License Management Forms” on page 36.

2.2 Command Bar

The command workflow menus, **File**, **Setup**, **Calibration**, **Inspection**, and **Analysis**, each include icons to configure the inspection workflow.

The icons update according to the properties of the active beamset selected in the command bar. The displayed icons update according to the testing technique used in the beamset, PA, UT, or TOFD.

Additional icons and fields are also part of the command bar, see Figure 2-3 on page 34 and Table 1 on page 35.

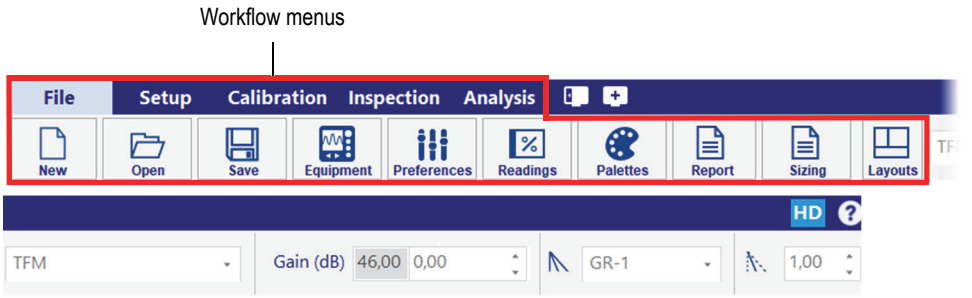


Figure 2-3 Command bar

Table 1 Command bar options

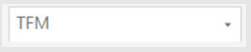
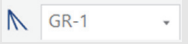
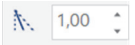
Option	Description
Workflow menus	See “File Menu Reference” on page 45.
	See “Setup Menu Reference” on page 63.
	See “PA Calibration Menu Reference” on page 89.
	See “Inspection Menu Reference” on page 127.
	See “Analysis Menu Reference” on page 137.
 Dashboard toggle	Toggles the dashboard display on or off. The dashboard displays cursor positions and gate data readings for the active beamset. See “Dashboard” on page 42
 Second window	Selecting the second monitor icon launches a second window that can be positioned on a second screen.
 Layout	The layout manager lists available displays for the active beamset type, PA, TOFD, UT, or TFM.
 Gain	General and scan gain of the active beamset also editable in UT settings.
 Active beamset	The beamset selected in this list updates the dashboard readings.
 Active beam	Displays the current selected beam of the active beamset.

Table 1 Command bar options *(continued)*

Option	Description
C HD Display compression mode	Indicates when the display is compressed (C) or when it is in full resolution (HD). Data display compression is managed automatically, and does not require configuration. When the number of data points in the selected data window exceeds the number of pixels on the display, the software is in compression mode and the icon is visible in the control bar. In compression mode, the most relevant point in either amplitude or TOF is represented by the color palette when one pixel may represent multiple data points.
Help and license management	The **Help and License Management** form is launched from the icon in the command bar. It displays software version information, and allows license management. See “Help and License Management Forms” on page 36.

2.2.1 Help and License Management Forms

The **Help and License Management** forms are launched from the icon in the command bar and contains software version information and the license management (see Figure 2-4 on page 36, Figure 2-5 on page 37 and Table 2 on page 37).

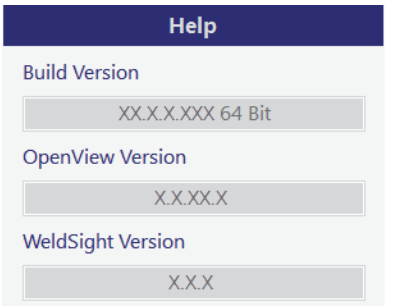


Figure 2-4 Help form

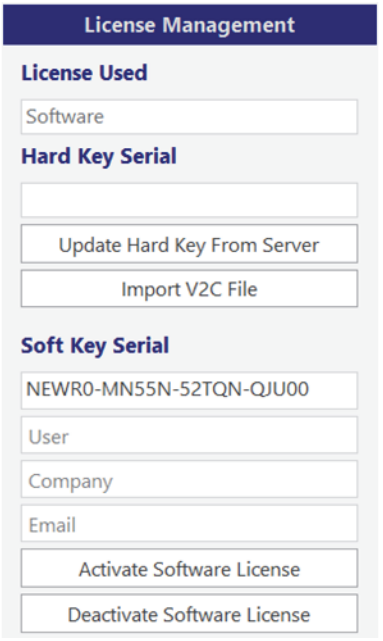


Figure 2-5 License Management form

Table 2 License types

License Type	Description
Viewer	Viewer mode is free and enabled when no license is detected. Viewer mode allows analysis of data files with limited features.
WeldSight-A	WeldSight-A (analysis) license allows offline analysis and reporting of data files and does not allow connection to an instrument for data collection.
WeldSight-I	WeldSight-I (inspection) license allows offline analysis and reporting of data files and connection to an instrument for data collection.

2.3 Footer and Status Indicators

The software footer includes various controls and status indicators (see Figure 2-6 on page 38, Table 3 on page 38, and Table 4 on page 39).

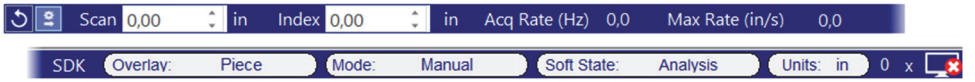


Figure 2-6 Footer and status indicators

Table 3 Footer options

Option	Description
	Encoder preset.
	Invert encoder.
Scan	Position in the scan axis.
Index	Position in the index axis.
Acq Rate (Hz)	Acquisition rate in Hertz.
Max Rate (in/s)	Maximum rate in inches per second.
	Selects the **Piece** or **Calibration Block** overlay.
	Selects **Manual** or **Automatic** inspection mode. **Manual** - Inspection sequence controlled by you. **Auto** - Inspection sequence controlled by a PLC or remote software application. While in Auto Mode, the inspection sequence and certain setup parameters are disabled for edit. The automatic inspection mode is enabled when the inspection sequence is managed by a PLC via the digital I\O or by a remote software application.

Table 3 Footer options *(continued)*

Option	Description
	Displays the current software status of the inspection sequence. See Table 4 on page 39.
	Toggles the measurement units used in the display between millimeters and inches. WeldSight software supports measurement units for metric (default) and imperial (inch). Switching between metric and inches is done by clicking **Units** in the footer or setting the option in **Preferences > Appearance.**
	The connection icon displays the number of active instruments and their connection statuses. Double-clicking the connection icon launches the **Equipment** form. See “Equipment Manager” on page 46.

Table 4 Software states

Soft State Value	Description
Setup	Setup mode is used to create and modify a configuration for inspection. The configuration can be saved in a setup file. When a setup file is loaded by an operator, WeldSight software automatically changes to Setup mode.
Setup (Busy)	Certain software functions, such as calibration wizards, activate the **Setup (Busy)** mode. No external action is possible until the current action or pop-up window has been completed or resolved.
Collection	**Collection** mode is activated when the inspection sequence is started for data collection. Certain functions are limited in the software until data collection is complete.
Analysis	**Analysis** mode is enabled when the inspection sequence is stopped, or when a data file is opened for offline analysis. The acquisition instrument does not need to be connected for offline analysis of data files.

2.4 Configuration Forms

The forms are opened from the command bar icons and can be closed by reselecting the icon or by double-clicking anywhere on the form header.

The form details change depending on the properties of the active beamset, and will adjust for PA, TOFD, and UT probe types (see Figure 2-7 on page 40).

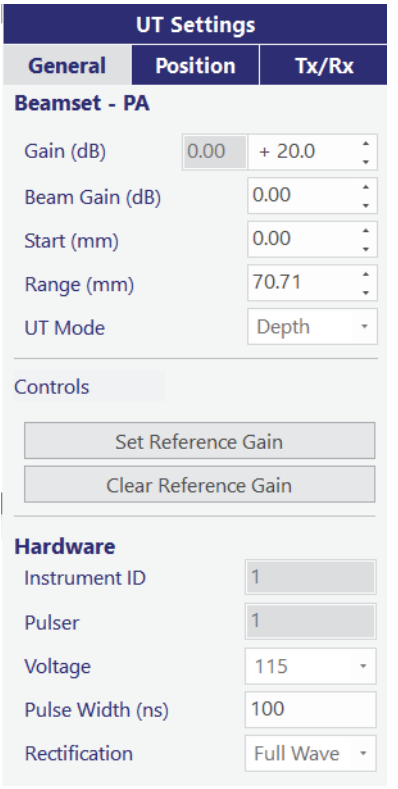


Figure 2-7 Typical Configuration form

2.5 Data Display Layout Form

The data display layout configuration form is launched from the icon in the command bar, and it enables you to drag and drop custom display layout types. Layouts can be created, edited, and recalled.

Data display layouts are saved with the setup configuration file. They also appear as a system setting that can be updated and recalled whenever WeldSight software is launched.

The layout displays included in the installer are designed for analysis only. They are not designed for setup and acquisition. To create custom display layouts and use the OmniScan X3 and FOCUS PX default layout lists, see “Display Layouts Overview” on page 158

The available data display layouts will change according to the selected probe types, PA, TOFD, and UT (see Figure 2-8 on page 41).

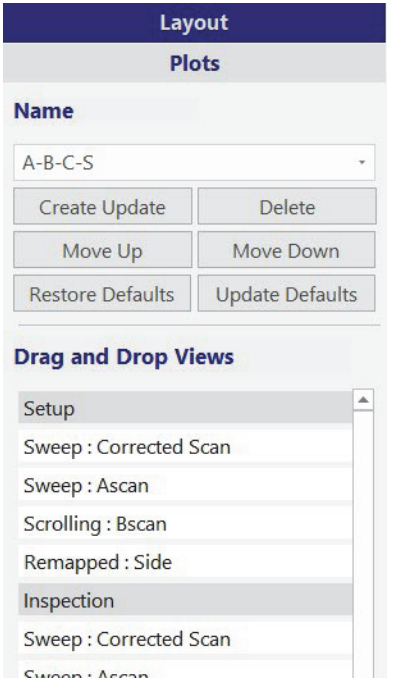


Figure 2-8 Layout form

2.6 Dashboard

The dashboard appears pinned to the left side of the UI, and can be opened or hidden by selecting the dashboard icon in the command bar.

The inspection sequence modes are selected from the dashboard and visible in the **Soft State** zone of the UI footer.

Different readings lists are available for PA, TOFD, and UT, and can be customized by double-clicking the readings area of the dashboard or by clicking on **File/Readings** in the command bar (see Figure 2-9 on page 42). For a description of each individual reading, see “Reading Abbreviation Reference” on page 173.

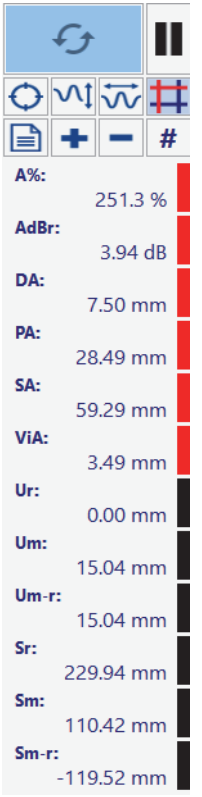


Figure 2-9 Dashboard

2.7 Viewer Mode

Viewer mode is enabled when WeldSight software is launched without a software license or when no USB software key is detected.

Viewer mode give you access to limited offline analysis features such as cursors, default display layout lists, and layout lists saved in the data file. Access to advanced features is disabled. See “Help and License Management Forms” on page 36.

3. File Menu Reference

The file menu includes the usual file management commands, and often-used software settings (see Figure 3-1 on page 45 and Table 5 on page 45).

Figure 3-1 File menu

TIP

WeldSight setup configuration files carry the .osf extension for all Evident PA device models. Supported data file extensions are .opd, .odat, .nde, and .odf.

Table 5 File menu options

Menu item	Description
 **New**	Select **New** to clear all existing beamsets and displays in preparation for a new setup configuration.
 **Open**	Select **Open** to open a dialog box with a preset file filter according to the current software state.

Table 5 File menu options *(continued)*

Menu item	Description
 **Save**	Select **Save** to open a dialog box with a preset file filter according to the current software state.
 **Equipment**	Under **Equipment**, you can manage the instrument configuration, **Encoder**, **Digital Inputs**, and alarm hardware configuration. The **Equipment** form can also be launched by double-clicking the connection icon in the footer.
 **Preferences**	Under **Preferences** you can set the system default parameters for **Beamset**, **Files**, **Appearance,** and **Application**.
 **Readings**	**Readings** are displayed on the dashboard and can be hidden or shown.
 **Palettes**	The Palette manager associates color palettes available in the WeldSight system folder to the various data display types.

3.1 Equipment Manager

The Equipment manager displays the master instrument information and manages advanced settings to connect up to four instrument acquisition units for simultaneous inspection.

You can also launch the Equipment manager by double-clicking the connection icon in the footer (see Figure 3-2 on page 47 and Table 6 on page 48). Also see “Configuring the Network Connection to the OmniScan X3 Instrument” on page 23 and “Starting WeldSight with the FOCUS PX Unit” on page 31.

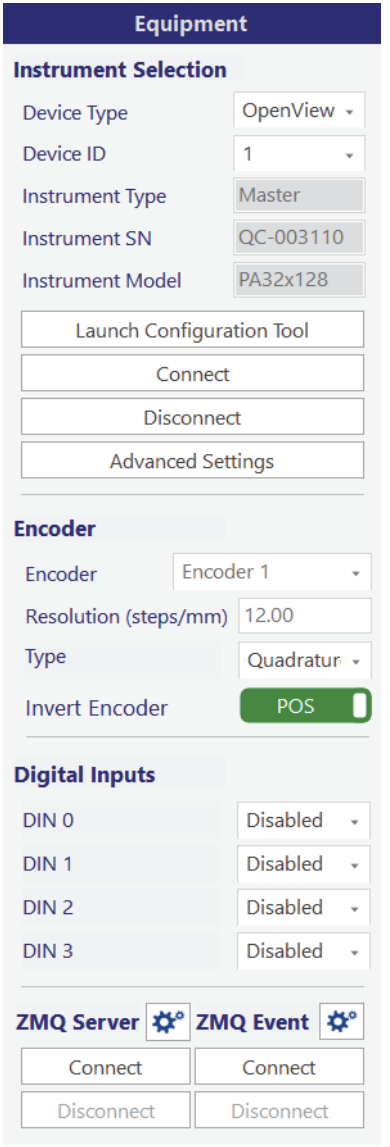


Figure 3-2 Equipment manager form

Table 6 Equipment manager form options

Option		Description
Instrument Selection	**Device Type**	Loads the appropriate firmware for supported Evident instrument models.[a] Select **OpenView** to connect to an OmniScan X3 instrument and FOCUS PX unit. Select **NDT Device API** for connection to a QuickScan iX unit.
	Device ID	Available with **OpenView**. Connect up to four FOCUS PX instruments to acquire data simultaneously. **Device ID 1** is the master unit. In single instrument acquisitions the Device ID is always **1**. Select the device number from the drop-down menu to display information on any additional instrument used for acquisition.
	Instrument Type	**Master** - Primary instrument that controls the synchronization and encoding for the inspection sequence. In a single instrument acquisition, the **Instrument Type** will always be **Master**. **Instrument SN** - The serial number of the selected instrument as read by the firmware. **Instrument Model** - The instrument pulser configuration as read by the firmware.
	Launch Configuration Tool	Select **Launch Configuration Tool** to open a configuration form independent of WeldSight that manages the network configuration between the instrument and the system computer. The tool allows you to update instrument firmware, run self tests, assign an IP address, and read hardware configuration.
	Connect	Initiates the connection between the instrument and WeldSight. The connection is automatic if the network settings remain unchanged. A check mark in a green circle in the WeldSight footer indicates a successful connection.
	Disconnect	Disconnects the instrument from WeldSight.
	Advanced Settings	Opens Advanced Equipment Settings for configuration of multi pod data acquisition, and additional device settings.

Table 6 Equipment manager form options *(continued)*

Option		Description
Encoder	**Encoder**	Selecting encoders 1 or 2 for configuration of resolution and type.
	Resolution	Steps per count resolution of the selected encoder.
	Type	Select either **quadrature** or **step and direction** encoder type.
	Invert Encoder	Toggles encoder direction, negative or positive.
Digital Inputs	**DIN 0** **DIN 1** **DIN 2** **DIN 3**	The digital inputs are programmable and enable remote inspection sequences initiated from a PLC, scanner hardware, or other external device to the digital I\O connector on the instrument. Supported commands are **Encoder Reset**, **Toggle Firing**, and **Toggle Inspection**. See instrument model user manual for connector wiring schematics, voltage specifications, and available DIN pins.
ZMQ Server / Event	**Connect** **Disconnect**	The ZMQ Server enables remote inspection sequences initiated from third party software using a JSON protocol and ZeroMQ TCP/IP communication. Supported commands include Start Acquisition, Stop Acquisition, Name File, Load Setup, Read Soft State, Set Soft State, Preset Encoders, and Get Scan and Index Encoder Positions.

a. OpenView requires installation of the Evident OpenView SDK included in the WeldSight installer. **NDT Device API** does not require additional software.

NOTE

For WeldSight software to automatically connect with the OmniScan X3 at start-up, begin by starting up the OmniScan X3 instrument with a network cable connection, then launch WeldSight software on the PC. Additionally, all configured IP addresses must remain unchanged.

NOTE

Close the Configuration Tool before connecting the instrument to WeldSight. Keeping the Configuration Tool open prevents connection of the instrument to WeldSight.

3.2 System Preferences

The system preferences allows you to set the default parameters for the setup and data collection tasks.

3.2.1 Beamset Tab

Use this tab to set default values for the beamset parameters (see Figure 3-3 on page 50 and Table 7 on page 51)

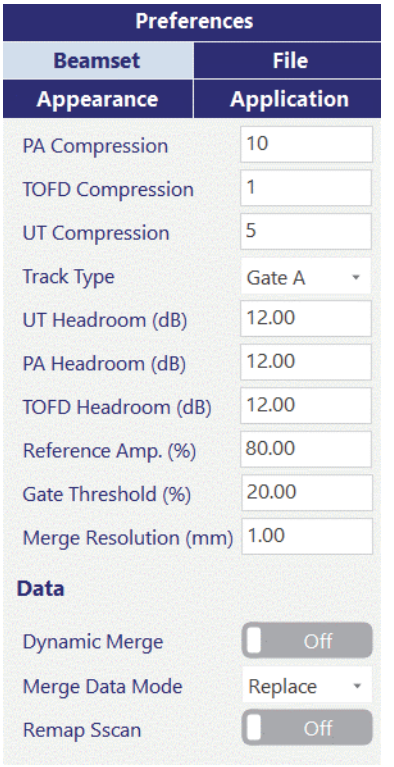


Figure 3-3 Beamset tab

Table 7 Beamset tab options

Option	Description
PA Compression	Sets the default compression value applied in Digitizer settings to new PA beamset creation.
TOFD Compression	Sets the default compression value applied in Digitizer settings to new TOFD beamset creation.
UT Compression	Sets the default compression value applied in Digitizer settings to new UT beamset creation.
Track Type	Tracking will follow the maximum amplitude in Gate A or inside the whole UT range.
Headroom	This value represent the amount of dB above 100% that WeldSight can use. A value of 12 dB (ratio 4:1) means that the data can be represented up to 400%. The higher this value goes, the higher the signal can go without saturation, but the lower the resolution, because the bit quantity per data point is fixed. Having a very high headroom but low bit resolution (8 bits) can even lead to non-linearity in the amplitude axis. Recommended values are 12 dB for 12 bits (400% limit), 6 dB for 8 bits (200%) and 18 dB for 16 bits (800%).
Reference Amplitude	Reference value for calibration.
Gate Threshold	The default value of the gate threshold. Can be edited in gate settings.
Merge Resolution	Sets the default value of data merge resolution. Can be edited before merging in the Merge section.
Dynamic Merge	If switched On, WeldSight builds by default merge views that include the whole UT range (as opposed to only gated signals). While this view has benefits for analysis, it can slow down the software, because the view consumes a lot of RAM, even if not used.
Merge Data Mode	Defines what data should be kept if it is overlapped during acquisition. **Replace**: Typically used for one-line scan, if some data is overwritten (by running the encoder back and forth for example), only the last value is kept for every scan position. **Maximum**: When some data overlaps, the A-scan kept is the one with maximum amplitude inside Gate A. This setting is typically used with raster scan, in particular when raster lines overlap. Only the highest amplitude data is kept on the overlap.

3.2.2 File Tab

Use this tab to set default values for the file parameters (see Figure 3-4 on page 52 and Table 8 on page 52).

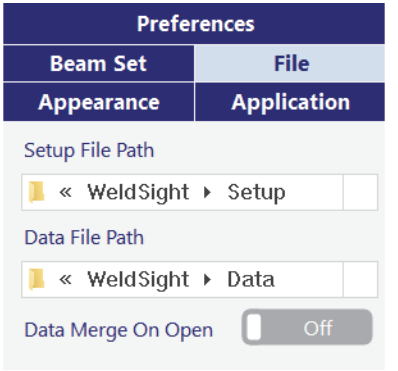


Figure 3-4 File tab

Table 8 File tab options

Option	Description
Setup File Path	Sets the default path for opening and saving .osf setup configuration files.
Data File Path	Sets the default path for opening and saving data files.
Data Merge On Open	Sets the **Data Merge** option in the file open dialog box. The option activates projection merge views on opening the file.

3.2.3 Appearance Tab

This tab allows you to change the various appearance settings of the software (see Figure 3-5 on page 53).

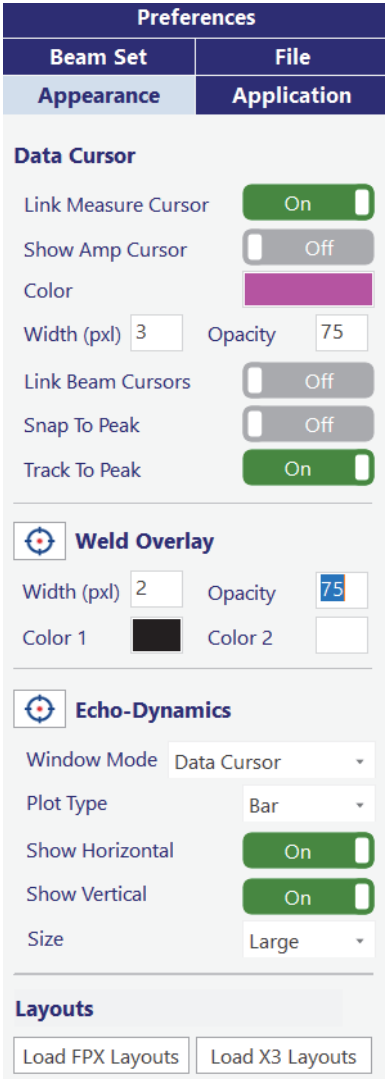


Figure 3-5 Appearance tab

3.2.3.1 Data Cursor

Use this form to set parameters for data cursors (see Figure 3-6 on page 54 and Table 9 on page 54).

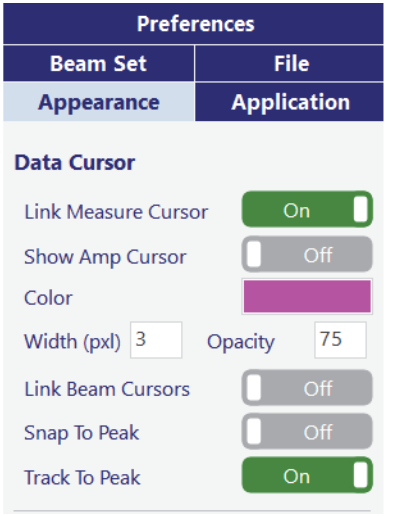


Figure 3-6 Data Cursor form

Table 9 Data Cursor form options

Option	Description
Link Measure Cursor	Links the blue sizing measure cursor position to the red sizing reference cursor so they can be moved simultaneously. When disabled, the red and blue sizing cursors move independently.
Show Amp Cursor	Displays the sizing cursors on the amplitude axis of the A-scan display.
Color \ Width \ Opacity	Allows customization of the appearance of the data cursor for all beamset types and displays.
Link Beam Cursors	Links the data cursors of all beamsets for simultaneous analysis. Also available from right click on display header.
Snap To Peak	Activates the snap to peak function when repositioning any sizing cursor. This is the same function as the snap to peak function on the dashboard but will refresh as the sizing cursors are repositioned, without selecting each instance from the dashboard. The option is also available by right clicking on the display header.

TIP

How to differentiate **Track To Peak** versus **Snap To Peak**?

While these functions may look similar, they are not used in the same way.

Snap To Peak will find the maximum peak amplitude within the area delimited by the reference and measurement cursors. If there are two data cursors in a view (C-scan for example), both data cursor will snap to the maximum amplitude. The snap is performed after the movement of any cursor is done.

Track To Peak is refreshed live, as the scan axis data cursor is moving. While the cursor is in movement, WeldSight will find the beam with the maximum amplitude inside Gate A and snap the beam data cursor on it.

3.2.3.2 Weld Overlay

Use this form to set parameters for weld overlays (see Figure 3-7 on page 55).

Figure 3-7 Weld Overlay form

Width \ Opacity \ Color 1 \ Color 2 settings allow customization of the appearance of the weld, calibration block, and CAD overlays for all beamset types and displays.

Selecting the target icon will apply the new appearance to the current data file (see Figure 3-7 on page 55).

3.2.3.3 Echo-Dynamics

Use this form to modify the **Echo-Dynamics** display options. The display is a linear interpolation of the color palette on the vertical and horizontal display axis (see Figure 3-8 on page 56 and Table 10 on page 56).

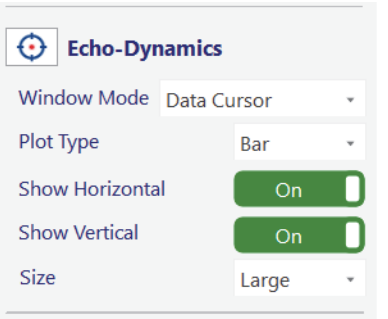


Figure 3-8 Echo Dynamics form

Each display can be configured independently and saved with the display layout. The saved configuration includes the **Window Mode** for sizing cursors or data cursors.

Select the target icon to apply the preferences to the active display.

Table 10 Echo-Dynamics form options

Option	Description
Window Mode	**Data Cursor** - Single slice display on the data cursors.
	Sizing Amp - For use on Amp displays for maximum amplitude between the reference and measure cursors.
	Sizing TOF - For use on TOF displays for minimum TOF (thickness) between the reference and measure cursors.
	Data Envelope - Dynamic display that will envelop the data cursor as it is moved over an indication. Data envelope is refreshed on zoom, active beamset change, or display layout change.
	Envelope All Beams - For use on Amp displays to visualize all beams between the reference and measure cursors.
Show Horizontal	Enables the echo dynamic display on horizontal axis.
Show Vertical	Enables the echo-dynamic display on the vertical axis.

Table 10 Echo-Dynamics form options *(continued)*

Option	Description
Size	Provides a big and small option for the echo-dynamic displays.

3.2.3.4 Layouts

Use this form to modify the display layout.

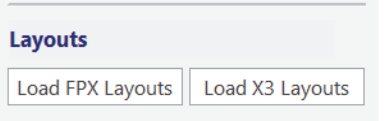


Figure 3-9 Layouts form

These options load the default display layout list for the FOCUS PX unit typical of acquisition and the OmniScan X3 layout list typical of offline analysis.

3.2.4 Application Tab

Use this tab to modify the application preferences (see Figure 3-10 on page 57 and Table 11 on page 58).

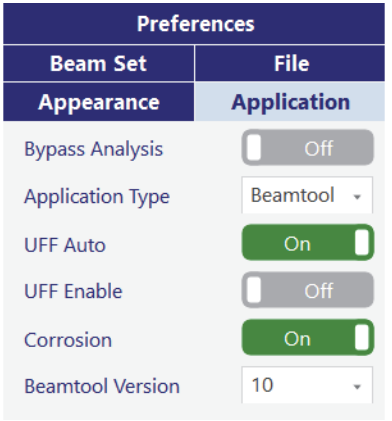


Figure 3-10 Application tab

Table 11 Application tab options

Option	Description
Bypass Analysis	When a file is saved, this bypasses analysis mode and jumps directly to the next inspection setup. Use this option for high-production successive inspections where analysis is performed after data collection.
Application Type	**BeamTool** - Displays the BeamTool icon in the Setup command bar for visualization of scan plans offline or for scan plan import using the BeamTool software for data collection. **OmniScan X3** - Displays the OmniScan icon in the Setup command bar for visualization of X3 data file beamset information used in data collection.
UFF Auto	Automatically loads OmniScan .nde files with or without the OpenView SDK depending on file version. Any .nde files collected in the OmniScan X3 instruments running MXU 5.13 software or earlier require the SDK to gain access. Any .nde files collected with MXU 5.13 or later feature an open architecture HDF5 format and can be read by WeldSight or third-party software without the SDK. When disabled, the .nde version is not considered and will load based on the **UFF Enable** toggle selection.
UFF Enable	Loads the .nde file via the domain and JSON without regard for file version. When disabled will load the .nde file via the OpenView SDK, and does not include benefits of the HDF5 file format.
Corrosion	Displays the Corrosion Manager in the Analysis command bar.
BeamTool Version	Selects BeamTool version 9 or version 10 to import scan plans used for data collection. You must set the BeamTool version as it is not automatically detected.

3.3 Readings

Use this form to customize the readings that are displayed on the dashboard (see Figure 3-11 on page 59 and Table 12 on page 59). Individual reading abbreviations are described in Table 54 on page 173 and Table 55 on page 176.

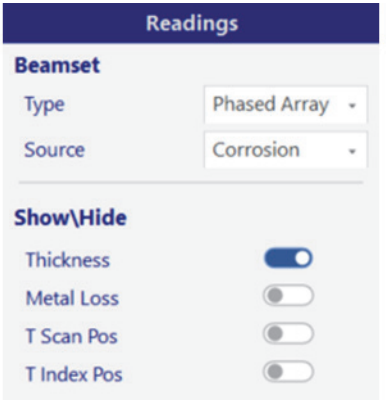


Figure 3-11 Readings form

Table 12 Readings form options

Option			Description
Beamset	**Type**		Select **Phased Array, Conventional**, **TOFD**, or **TFM** in the drop-down list.
	Source	Select **Cursors**, **Gates**, **Sizing**, **Zone**, or **Corrosion** in the drop-down list.	
		Cursors	Toggle the available cursors. The list changes according to the selected Type and Source.
		Gates	Toggle the different Gate thresholds. The list changes according to the selected Type and Source.
		Sizing	Toggle the different ratios.
		Zone	Toggle the different zone maximums.
		Corrosion	Toggle the different thickness readings.
Show\Hide	To customize the readings lists, select the Type and Source, and toggle readings on or off. Individual readings are described in Table 54 on page 173 and Table 55 on page 176.		

NOTE

New dashboard readings are visible when the active beamset is refreshed the first time.

TIP

Hovering the cursor above the readings listed under **Show\Hide** displays a tool tip description.

3.4 Palettes

The Palettes form associates color palettes available in the WeldSight system folder to the various display types.

Selecting the color palette for the display type will update all saved display layouts with the new color palette (see Figure 3-12 on page 61).

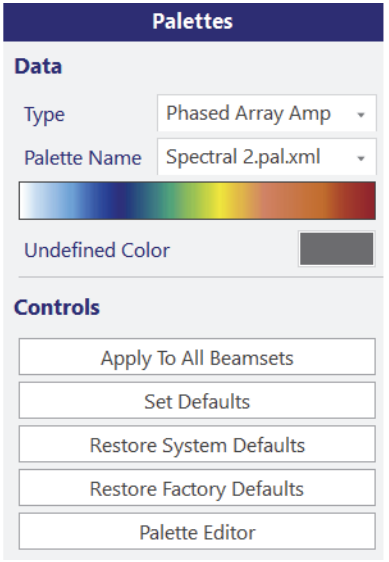


Figure 3-12 Palette form

3.5 Report Form

Report options are available for weld and corrosion inspections, and the sections that make up the report can be included or excluded by selecting the toggles.

Reports are generated from the Weld Manager and the Corrosion Manager forms.

Under the **Flaw Types** section of this form, you can set the number of flaw types required, and each **Flaw Type** name entered in the table is also displayed in the pull-down menu of the indication table records.

Indication table options are available for weld inspections. You can use the toggle buttons to include or exclude the fields appearing in the table (see Figure 3-13 on page 62). See “Reporting” on page 169 and “Indication Table Overview” on page 169.

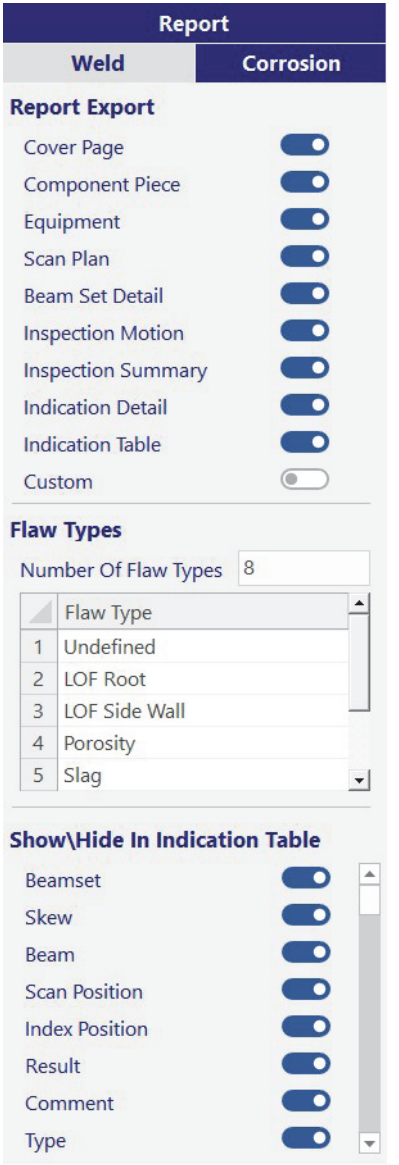


Figure 3-13 Report form

4. Setup Menu Reference

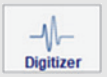
Use the **Setup** menu to prepare the software for inspection (see Figure 4-1 on page 63 and Table 13 on page 63).

Figure 4-1 Setup menu

Table 13 Setup menu options

Menu item	Description
 **OmniScan X3 Viewer**	This option is enabled in **File >Preferences > Application > Application Type**. Selecting **OmniScan** enables the OmniScan viewer in the File menu where probe, wedge, and beamset parameters are displayed.
 **BeamTool Import**	This option is enabled in **File >Preferences > Application > Application Type**. Selecting **BeamTool** enables the pre-configured scan plan .ebwk files to be imported that include all parameters of the inspection.
 **UT Settings**	The **UT Settings** menu enables you to access the General, Position, and Tx/Rx parameters.

Table 13 Setup menu options *(continued)*

Menu item	Description
 **Digitizer**	The **Digitizer** settings are for all beamsets in the configuration. The **Time Base Resolution** is configurable for each beamset.
 **Gates**	Two detection gates A (red) and B (green) are available for time of flight, amplitude readings, and trigonometry.
 **TCG Manager**	The TCG Manager allows you to import and export tables for repetitive use, edit points, and enables the overlay on the A-scan data display.

4.1 OmniScan X3 Viewer Form

Use the OmniScan X3 viewer form to see the configuration parameters (see Figure 4-2 on page 65 and Table 14 on page 65).

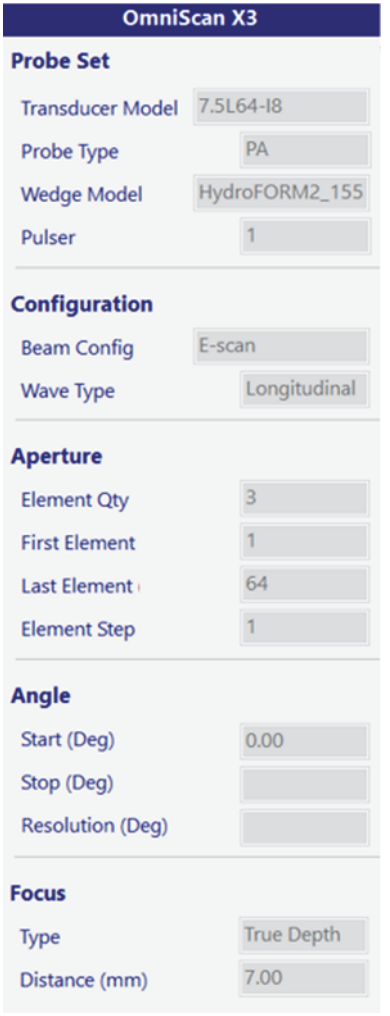


Figure 4-2 OmniScan X3 viewer form

Table 14 OmniScan X3 viewer form options

Option	Description
Probe Set	Transducer and wedge model number.

Table 14 OmniScan X3 viewer form options *(continued)*

Option	Description
Probe Type	PA, UT, or TOFD.
Pulser	Instrument pulser connection to element 1 of the probe.
Beam configuration	S-scan, Compound S-scan, E-scan, UT, TOFD, or TFM.
Wave type	Shear or longitudinal
Aperture	Element quantity, positions of first and last elements, and element step resolution.
Angle	Start and stop positions, and beam resolution in degrees.
Focus Type	Depth, sound path, projection, or unfocused
Focus Distance	Focus distance from beam exit for depth and sound path, and focus distance from wedge face for projection.

4.2 BeamTool Form

Use the Eclipse Scientific BeamTool (ESBT) form to manage the BeamTool settings (see Figure 4-3 on page 66 and Table 15 on page 67).

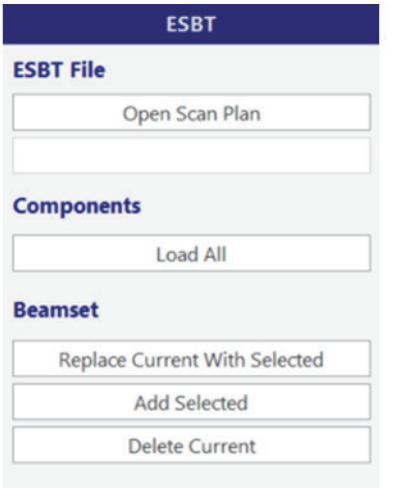


Figure 4-3 ESBT form

Table 15 Eclipse BeamTool form options

Option	Description
Open Scan Plan	Enables you to select the BeamTool .ebwk file for import into WeldSight for data collection. Upon loading the .ebwk scan plan, the beamset information is visible in the data viewer.
Load All	Imports the entire scan plan including the piece and weld bevel, and all probes and beamsets.
Replace Current With Selected	Replaces the active beamset in the command bar with the current highlighted beamset in the data view list.
Add Selected	Adds the highlighted beamset in the data viewer to the current configuration.
Delete Current	Deletes the active beamset in the command bar.

NOTE

Replacing, deleting, or adding beamsets individually to a scan plan configuration will allow data collection but may not match the original scan plan. We recommend Editing the complete scan plan in the BeamTool .ebwk file before importing it into WeldSight software.

NOTE

If the BeamTool scan plan has been changed in WeldSight, save and reload the .ebwk file to ensure the scan plan is stored correctly for data collection.

4.3 Piece Form

WeldSight software supports standard piece types for display overlays, including plate, pipe, and axial long seam welded components, volumetric data merge, and data modeling. You can import 2D CAD drawings in DXF file format for display overlays, and extruded or rotated for 3D data modeling.

You can also import raster images for use as overlays on the volumetric Scan display.

4.3.1 Piece Tab

You can use the **Piece** tab of the **Piece** form to modify the characteristics of plate, pipe, and axial long seam welded components (see Figure 4-4 on page 68 and Table 16 on page 69).

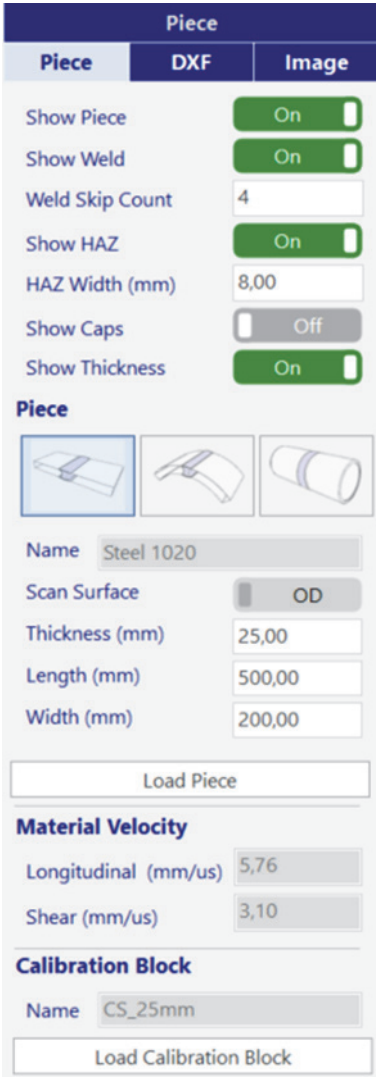


Figure 4-4 Piece tab

Table 16 Piece tab options

Option	Description
Show Piece	Enables the component piece overlay on the volumetric data displays.
Show Weld	Enables the weld bevel overlay on the volumetric displays as part of the piece.
Weld Skip Count	Number of rebound skips visualized on the volumetric S-scan, D-scan, and B-scan displays. Weld skip count starts with 0 as the first leg, then 1 for the full V path, 2 for next rebound, etc. The weld skip number entered here will affect the number of skips included in the weld gate top view C-scans.
Show HAZ	Enables visualization of the HAZ (heat-affected zone) adjacent to the weld, and includes it in the weld gate top view C-scans.
HAZ width	Sets the size of the HAZ adjacent to the weld, and includes it in the weld gate top view C-scans.
Show Caps	Enables visualization of the weld crown and weld root as configured in the OmniScan X3 unit or in BeamTool.
Show Thickness	Enables a repeating thickness line on the volumetric and A-scan displays.
Piece parameters	Adjust parameters according to selected piece type.
Load Piece	Replaces the current component piece configuration from BeamTool .EBP file import.
Material Velocity	Sets the default shear and longitudinal velocities associated to the component piece prior to calibration. Individual beamset velocities are edited or calibrated, and stored in UT Settings.
Calibration Block	Name of the calibration block imported with the scan plan .ebwk file. The calibration block is visualized by toggling the overlay in the footer between piece and calibration block. The calibration block can be updated or replaced by importing a BeamTool .btcb file.

4.3.2 DXF Tab

The CAD drawing overlay is enabled by its presence in the OmniScan data file, or by importing a DXF file into WeldSight. When a CAD overlay is active, the component piece overlay is disabled and **Show DXF** is automatically enabled (see Figure 4-5 on page 70 and Table 17 on page 70).

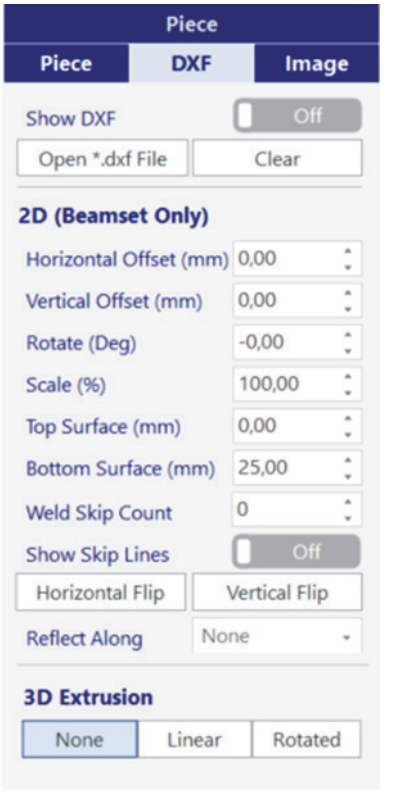


Figure 4-5 DXF tab

Table 17 DXF tab options

Option	Description
Open *dxf File	Enables CAD overlay to be imported from a .dxf file.
Clear	Clears the current CAD overlay from the data displays.

Table 17 DXF tab options *(continued)*

Option	Description
2D (Beamset Only)	The 2D controls reposition the CAD overlay after import and can be edited individually for each beamset for multi-probe inspections. The 2D controls are relative to the 0,0 mm position defined in the DXF file (horizontal, vertical, rotate, scale, hor flip, vert flip, top surface, and bottom surface).
Weld Skip Count	Defines the number of repeat skips or reflections.
Show Skip Lines	Enables multiple skip images of the CAD overlay.
Reflect Along	Enables the CAD overlay to be reflected along the vertical or horizontal axis. Selecting **None** will result in no reflection.
3D Extrusion	3D extrusion enables the 2D CAD overlay to be converted to a 3D component by a linear or rotated extrapolation. The DXF file must be a closed loop polyline for the outside component definition, and it must not have open-ended line segments in the drawing.
Linear Extrusion	Selection for square or rectangular geometry extruded on the length axis for 3D data modeling.
Rotated Extrusion	Selection for round geometry typical of a flange extruded in degrees. After selecting **Rotated**, it is necessary to place red reference sizing cursor at 0 degrees, the blue measure sizing cursor at the inspection stop position (typically 360 degrees), and update the region to define the rotated part for 3D data modeling.
Update Part	Update the extruded part geometry with the new offsets after edit.
Merge All Data	Merges all beamsets for visualization of data after updating the extruded part. This is the same function available on the **Analysis > Merge** form and also available from CTL-V shortcut, and is necessary after any edits to the component piece geometry.

4.3.3 Image Tab

The **Image** tab of the **Piece** form allows you to import common image file types and use the image as an overlay on the S-scan display (see Figure 4-6 on page 72 and Table 18 on page 72).

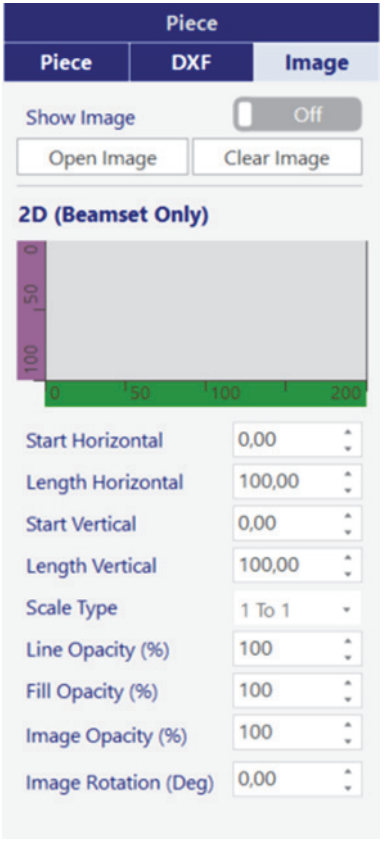


Figure 4-6 Image tab

Table 18 Image tab options

Option	Description
Show Image	Enables the image overlay on the S-scan display. When enabled, **Show Piece** is disabled.
Open Image	Enables import of the image overlay file. Compatible image file extensions for import include .png, .bmp, .gif, .jpg, and .jpeg.
Clear Image	Clears the current image file on the S-scan display.

Table 18 Image tab options *(continued)*

Option	Description
Image offsets	Enables you to reposition and configuration of the image superimposed on the S-scan display.

4.4 UT Settings Form

Use the **UT Settings** form to modify UT parameters.

4.4.1 General Tab

Use the **UT Settings > General** tab to adjust common UT settings (see Figure 4-7 on page 74 and Table 19 on page 75).

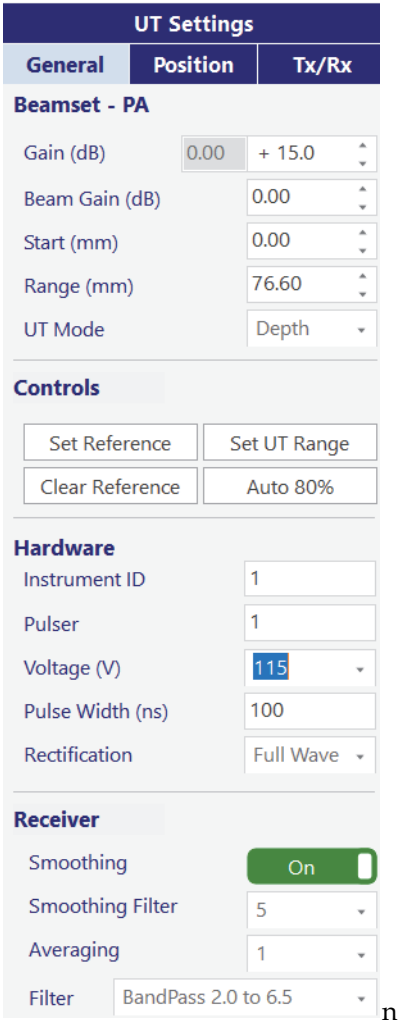


Figure 4-7 General tab

Table 19 General tab options

Item		Description
Beamset	**Gain**	Used to set the gain value in dB applied to all beams of the current beamset in the command bar.
	Beam Gain	Used to set the gain value in dB to the current beam (angle, or VPA) from the active beamset.
	Start	Used to set the starting location of the ultrasound axis (expressed in units of distance or time, according to the UT Mode setting).
	Range	Used to set the length of the ultrasound axis (expressed in units of distance or time, according to the UT Mode setting).
	UT Mode	UT: Used to change the ultrasound axis representation: Time, Sound Path, and True Depth. TOFD is set to Time and PA is set to True Depth in read-only.
Controls	**Set Reference**	Sets the current gain setting in dB as the reference sensitivity for amplitude compliance.
	Clear Reference	Clears the current reference sensitivity gain.
	Set UT Range	Sets the UT range from the red and blue sizing cursors on the UT axis.
	Auto 80%	Adjusts the general gain value for the signal in gate A to 80% amplitude.
Hardware	**Instrument ID**	Instrument number of the current beamset. Used for multi-pod data collection for compatible instruments.
	Pulser	Pulser number on the PA multiplexer that defines position of element number 1 of the current beamset.
	Voltage	Used to set the voltage of the PA and UT pulsers.
	Pulse Width	Duration of the pulse wedge in nanoseconds. Set at time of beamset creation defaulted to 500 \ probe frequency editable in 2.5 nanosecond increments.
	Rectification	Used to set rectification of the A-scan signal. The four options are RF (radio frequency) non-rectified, HW+ (half wave positive), HW- (half wave negative), and FW (full wave).

Table 19 General tab options *(continued)*

Item		Description
Receiver	**Smoothing**	Applies a video smoothing filter to the receiver defaulted to the probe frequency
	Smoothing Filter	Allows you to select the video smoothing frequency applied to the smoothing
	Averaging	Used to select an averaging value (1, 2, 4, 8, or 16) for the current beamset or UT channel. The averaging value divides the PRF value. For example, an averaging value from 1 to 4 causes an original PRF value of 1 kHz to drop to 250 Hz but echo signals from all four pulses are averaged to produce a unique signal. Averaging is useful for reducing the noise on the received signals. An averaging value of 1 corresponds to no averaging.
	Filter	Allows you to select predefined digital bandpass frequency filters.

4.4.2 Position Tab

Use the **UT Settings** > **Position** tab to adjust probe properties (see Figure 4-8 on page 77 and Table 20 on page 78).

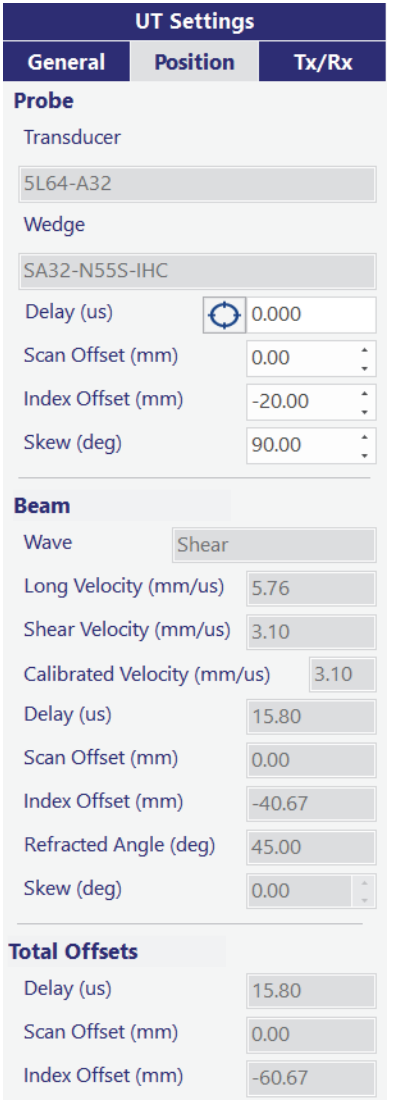


Figure 4-8 Position tab

Table 20 Position tab options

Item		Description
Probe	**Transducer**	Model of the transducer.
	Wedge	Model of the wedge.
	Delay	Probe delay in microseconds applied to all beams of the current beamset. Normally 0 µs unless manually calibrated. Editable in setup mode by positioning the red UT axis sizing cursor on the relevant signal, the blue UT axis sizing cursor on the desired depth or sound path, and selecting the icon to update the probe delay.
	Scan Offset	Mechanical offset of the probe center on the scan axis relative to 0 mm on the part.
	Index Offset	Mechanical offset of the probe on the index axis relative to 0 mm weld centerline.
	Skew	Mechanical probe skew in degrees relative to the scan axis typically 90 and 270 degrees for opposing probes in weld line scans.
Beam		Read-only information of the beam offsets and skew angles inside the wedge.
Total Offsets		Combination of the beam offsets and probe offsets.

4.4.3 Tx/Rx Tab

The **Tx/Rx** table displays element delay and offset information for individual beams in the active beamset (see Figure 4-9 on page 79).

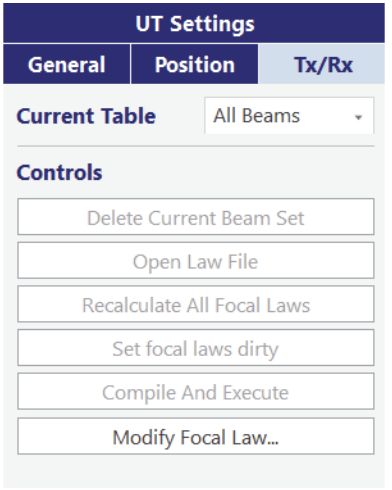


Figure 4-9 Tx/Rx tab

4.5 Digitizer

The digitizer form displays the different settings and values used to process the data coming from the instrument.

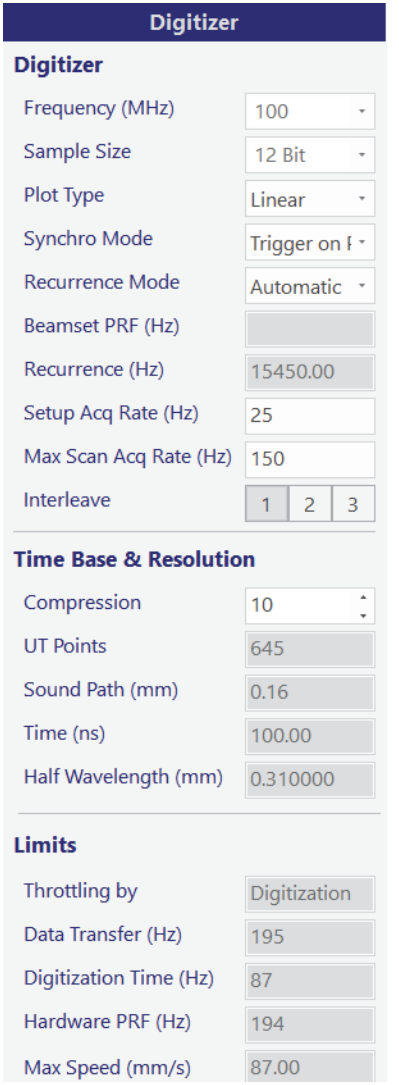


Figure 4-10 Digitizer

Table 21 Digitizer form options

Item		Description
Digitizer	**Frequency (MHz)**	Effective digitizing frequency before compression is applied.
	Sample Size	Digitizer amplitude resolution.
	Synchro Mode	Synchronization of the pulse.
	Recurrence Mode	Used to manage cross-talk with multiple beamset configurations.
	Beamset PRF (Hz)	Pulse repetition frequency for each beamset in the configuration. Indicates the number of times per second a beamset is pulsed.
	Recurrence (Hz)	The effective recurrence is the number of ultrasonic pulses generated per second, for all beamsets included.
	Setup Acq Rate (Hz)	The cycle rate in setup mode
	Max Scan Acq Rate (Hz)	The maximum cycle rate
	Interleave	Changes the firing order to reduce ghost echoes in multiple beamset configurations.
Time Base & Resolution	**Compression**	Compression factor. Combines the maximum amplitude of adjacent ultrasonics sample (the compression factor) into one, in order to make file size smaller. The effective frequency divided by the compression factor equals the net digitizing frequency.
	UT Points	Number of ultrasonic samples after the compression is applied.
	Sound Path (mm)	Distance between two ultrasonic points after compression, calculated with the current velocity.
	Time (ns)	Time between two ultrasonic points after compression.
	Half Wavelength (mm)	Calculation of the ultrasonic half wavelength based on current velocity.

Table 21 Digitizer form options *(continued)*

Item		Description
Limits	**Throttling by**	Displays the current limit used for throttling.
	Data transfer (Hz)	Limit rate at which the data can transfer from the instrument.
	Digitization Time (Hz)	Calculated rate limit to digitize all ascans and setup between ascans.
	Hardware PRF (Hz)	Limit according to the PRF of the instrument.
	Max speed (mm/s)	Scan speed according to the limit and scan resolution

4.6 Gates

Two detection gates (A and B) and one A-scan synchronization gate are available for configuration. Menu options update according to the active beamset type (PA, UT, TOFD, or TFM).

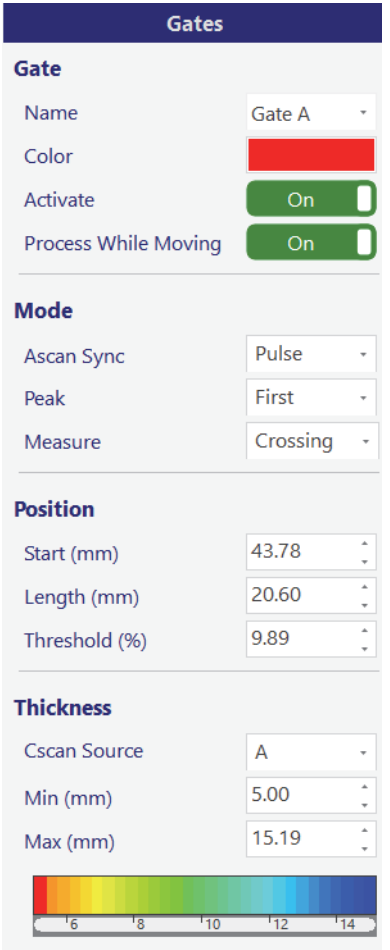


Figure 4-11 Gates form

Table 22 Gates form options

Item		Description
Gate	**Name**	Selectable detection Gates A (red), Gate B (green), or synchronization Gate I (yellow).
	Color	Associated color of the selected gate.
	Activate	Activates the selected gate. Gate annotations appear on A-scan and volumetric displays, and associated C-scans are activated in the display list.
	Process While Moving	Allows dynamic offline update of the C-scan displays and readouts as the gate positions or threshold are repositioned.
Mode	**Ascan Sync**	Pulse - No A-scan synchronization. A-scan start position is set in **UT Setting > General.** **Gate I** - A-scan start position is synchronized to Gate I (yellow). **Gate A** - Gate B position is synchronized to Gate A (red). **Gate B** - Gate A position is synchronized to Gate B (green).
	Peak	**First** - The detection gate is triggered when the maximum amplitude peak of the first waveform exceeds the gate threshold. **Max**.- The detection gate is triggered when the maximum amplitude waveform reaches its peak.
	Measure	**Peak** - Measurement readouts and C-scan are calculated based on the maximum point exceeding the gate threshold. **Crossing** - Measurement readouts and C-scan are calculated based on the first point that exceeds the gate threshold.
Position	**Start (mm)**	Start position of the selected gate.
	Length (mm)	Length of the selected gate.
	Threshold (%)	Amplitude threshold of the selected gate.

Table 22 Gates form options *(continued)*

Item		Description
Thickness	Thickness controls appear on the Gates form when the active beamset is a zero degree PA beamset or UT zero degree beam typical of corrosion inspection. The thickness controls can be edited from the Gates form or the Corrosion Manager, and are linked for each gate.	
	Source	Defines the source of the thickness T reading and thickness C-scan. Selectable for detection gates A and B and synchronization gate I.
	Min	Defines the minimum thickness T reading to generate the low thickness color band (red if using default corrosion thickness color palette).
	Max	Defines the maximum thickness T reading to generate the high thickness color band (blue if using default corrosion thickness color palette).
	Color Slider	Enables manipulation of the color palette by adjustment of the low and high thickness limits.

4.7 TCG

The **TCG** form in the **Setup** menu enables manual creation of a PA or UT TCG one point at a time and allows you to import and export a TCG for use in other setup configuration files.

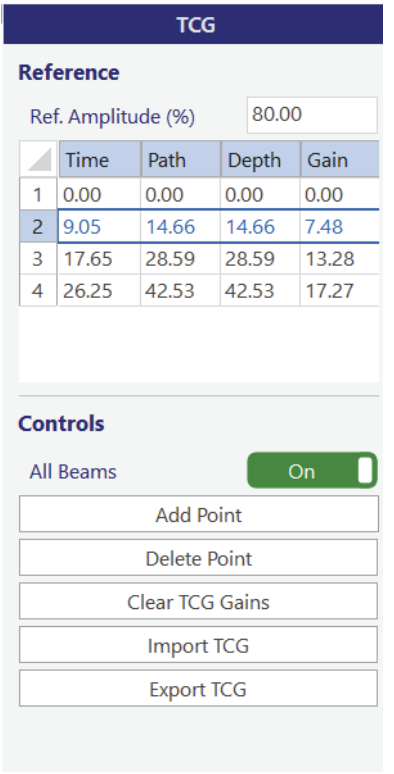


Figure 4-12 TCG form

Table 23 TCG form options

Item		Description
Reference	**Ref. Amplitude (%)**	Reference amplitude for the TCG correction calculation, typically set at 80%.

Table 23 TCG form options *(continued)*

Item		Description
Controls	**All Beams**	Applies the current TCG correction to all beams at the same sound path position. When disabled, applies the TCG correction to the current beam only.
	Add Point	TCG is calculated using gate A maximum peak amplitude. The TCG point is stored in the table with dB correction and position.
	Delete Point	Deletes the TCG point selected in the table.
	Clear TCG Gains	Deletes the TCG gain for the selected point, and maintains the point position in the table.
	Import TCG	Imports a preconfigured .csv format TCG file, and applies it to the current beamset.
	Export TCG	Exports the TCG of the current beamset.

5. PA Calibration Menu Reference

Use the Calibration menu to prepare the hardware and settings for inspection (see Figure 5-1 on page 89 and Table 24 on page 89).

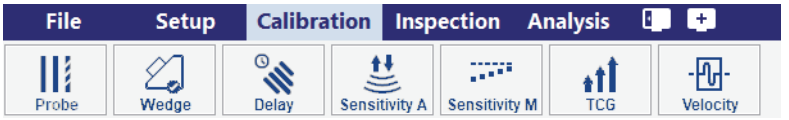


Figure 5-1 PA Calibration menu

Table 24 PA Calibration menu options

Menu item	Description
 **Probe**	Hardware validation of the probe.
 **Wedge**	Wedge model and wedge wear validation.
 **Delay**	Beam delay compensation.

Table 24 PA Calibration menu options *(continued)*

Menu item	Description
 **Auto Beam Sensitivity**	Applies a measured gain offset (Automatic).
 **Manual Beam Sensitivity**	Applies a measured gain offset (Manual).
 **TCG**	Time-corrected gain validation.
 **Velocity**	Velocity validation.

5.1 Probe Element Activity Validation Form

The phased array probe check validates the probe element, instrument pulser, and multiplexer integrity by generating a one element step, one element aperture E-scan for comparison of element activity (see Figure 5-2 on page 91 and Table 25 on page 92).

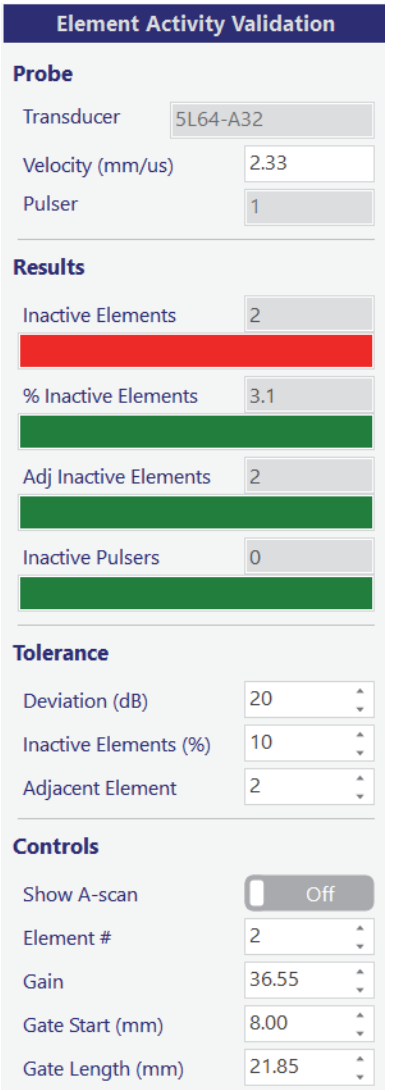


Figure 5-2 Probe Element Activity Validation form

NOTE

The probe check is essentially a hardware validation. It only needs to be performed once for each probe. The probe check does not depend on the current beamset, so any additional beamsets on the same probe do not need to be selected.

NOTE

During the probe check, the software state will change to **Setup (Busy)**. See "Footer and Status Indicators" on page 38.

Table 25 Element Activity Validation form options

Option		Description
Probe	**Transducer**	Displays the transducer model.
	Velocity (mm/µs)	Indicates the velocity of the medium used for the probe verification. The velocity is set by default to the velocity of Rexolite. It can be manually edited.
	Pulser	Displays the pulser number of the instrument multiplexer corresponding to element number 1 of the probe.
Results	Results are a comparison between the auto-generated results and the user-defined tolerances. When within tolerance, a green bar is generated. When out of tolerance, results in a red bar are generated for each check. Results will vary if checked with an angle wedge, a flat wedge, or a contact probe inspection with no wedge installed.	
	Inactive Elements	Displays the number of elements in the probe that exceed the beam to beam deviation tolerance in dB. The default is 20 dB, which is typical of an angle beam wedge.
	% of Inactive Elements	Displays the number of elements expressed as a percentage of all elements in the probe that are inoperable.
	Adjacent Inactive Elements	Displays the number of elements in the probe that are adjacent to a bad element.
	Inactive Pulsers	Displays the number of pulsers on the instrument multiplexer that are inoperable based on an initial pulse detected at the A-scan start.

Table 25 Element Activity Validation form options *(continued)*

Option		Description
Tolerance	The tolerances are set to determine at what level or number of elements a red fail indicator is generated for the probe check.	
	Deviation (dB)	Sets the beam to beam comparison of the minimum and maximum amplitude of each element in dB. This generates a green pass or red fail indicator. By default, 20 dB is used for angle beam wedges, and 2 dB for zero-degree wedges or flat test specimens.
	Inactive Elements (%)	Displays the number of failed probe elements expressed as a percentage of total elements that are permitted to generate a green pass or red fail indication.
	Adjacent element	Displays the number of elements in the probe that are adjacent to a failed element. Work procedures typically prohibit using a probe with two adjacent bad elements.
Controls	**Show A-scan**	Selecting **Show A-scan** enables visualization of the A-scan of each individual element for troubleshooting or optimizing the gate positions on particular probe models.
	Element #	Selects the element of the probe in the display from the first to the last element.
	Gain	Allows adjustment of the gain dB to optimize the signal in the gate.
	Gate Start (mm) and Gate Length (mm)	Allows adjustment of the gate start position and length to optimize the entire probe.

5.2 Wedge Validation Form

The phased array wedge check validates the wedge model and wedge wear by generating a one element step, one element aperture E-scan to compare wedge parameters against the measured values (see Figure 5-3 on page 94 and Table 26 on page 95).

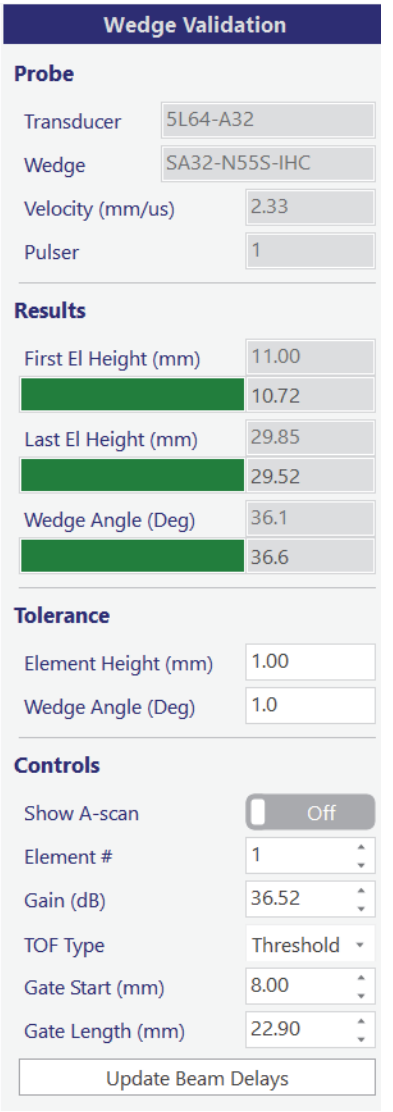


Figure 5-3 Wedge Validation form

IMPORTANT

Before performing a wedge check, ensure that the wedge is coupled properly to the probe and secured tightly with the set screws.

NOTE

The wedge check is a hardware validation. It only needs to be performed once for each probe.

NOTE

During the wedge check, the software state will change to **Setup (Busy)**. See "Footer and Status Indicators" on page 38.

Table 26 Wedge Validation form options

Option		Description
Probe	**Transducer**	Displays the transducer model.
	Wedge	Displays the wedge model.
	Velocity (mm/µs)	Displays the velocity of the medium used for the probe verification. The velocity is set by default to the velocity of Rexolite. It can be manually edited.
	Pulser	Displays the pulser number of the instrument multiplexer corresponding to element number 1 of the probe.

Table 26 Wedge Validation form options *(continued)*

Option		Description
Results	Results are a comparison between the wedge design parameters and the acoustic measurements. When wedge parameters are within tolerance, green bars are generated, and when out of tolerance, results in a red bar are generated for each check.	
	First Element Height	Displays the height of the wedge at the element number 1 position measured perpendicular to the wedge bottom. The wedge design height is displayed above the measurement.
	Last Element Height	Displays the height of the wedge at the position of the last element measured perpendicular to the wedge bottom. The wedge design height is displayed above the measurement.
	Wedge Angle	Displays the calculated angle of the wedge based on the height parameters.
Tolerance	The tolerances are set to determine at what deviation from the wedge design generates a green pass or red fail indicator.	
	Element Height	Displays the tolerance between the design and measured height of element 1 and last element for an acceptable wedge validation.
	Wedge Angle	Displays the tolerance between the design wedge angle and the measured wedge angle for acceptance wedge validation.
Controls	**Show A-scan**	Selecting **Show A-scan** enables visualization of the A-scan of each individual element for troubleshooting or optimizing the gate positions on particular probe models.
	Element #	Selects the element of the probe in the display from number 1 to last.
	Gain	Allows adjustment of the gain dB to optimize the signal in the gate.
	Gate Start and Length	Allows adjustment of the gate start position and length to optimize the entire probe.
	Update Beam Delays	Selecting Update Beam Delays will recalculate the beam delays based on new measured values.

IMPORTANT

Using **Update Beam Delays** is not recommended when the wedge is within tolerance. Wedges do not wear evenly, therefore, any adjustments based on measured results will be less accurate than the original design.

5.3 Beam Delay Form

The Beam Delay calibrator is used to compensate the beam precision by considering minor differences between the used PA calculation velocity and the component velocity. It can also compensate minor wedge wear to achieve a precise time of flight measurement (see Figure 5-4 on page 97 and Table 27 on page 98).

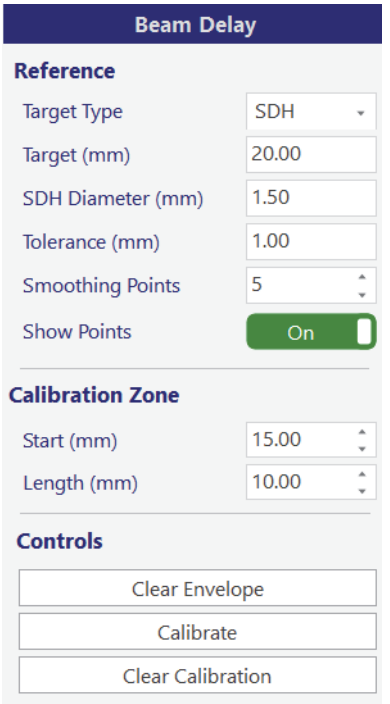


Figure 5-4 Beam Delay

Table 27 Beam Delay form options

Option		Description
Reference	**Target Type**	The calibration reflector type used for the inspection. **SDH** – Side-drilled hole target typical of angle beam inspection. Will result in a slight depth difference between beams for the different beam angles. **Radius** – A calibration block with a radius designed to maintain a constant sound path distance for different beam angles typical of angle beam inspection. **Backwall** – Component backwall or calibration block of fixed depth for zero-degree E-scan calibration.
	Target (mm)	The distance to the target of SDH, radius, or backwall.
	SDH Diameter (mm)	When SDH is selected, entering the size of the SDH will adjust the tolerances by considering the different depth of the SDH for each beam angle. Using a 0 mm SDH will put the wedge delay at the SDH center depth.
	Tolerance (mm)	Sets the green tolerance window on the calibrator.
	Smoothing Points	Using smoothing points will provide a linear extrapolation between beams to prevent a saw tooth correction. Using 3 or 5 point quality is recommended for best results.
	Show Points	Displays the red point for every beam in the delay calibration window.
Calibration Zone	The red calibration zone on the S-scan is automatically set when the target depth is selected, and it can be manually adjusted. The red calibration zone is automatically set to 2.5 mm before the target and 2.5 mm after the target. For the wedge delay correction to be performed, the calibration zone must be over the target, and the target must be within the green calibrator zone.	
Controls	**Clear Envelope**	Resets the delay calibration window prior to performing the wedge delay correction.
	Calibration	Adjusts the beam delay of each beam to the appropriate target depth.
	Clear Calibration	Clears the beam delay correction, and returns the beamset to the original beam delays.

5.4 Auto Beam Sensitivity Form

Automatic beam sensitivity is used to apply a measured gain offset to each beam in the beamset based on a single calibration target. The beam gain sensitivity after calibration is visible in **Setup > UT Setting > General > Beam gain**, and can be manually edited or created from the **Auto Beam Sensitivity** form. The beam gain offset is added to the general gain for the beamset, and is independent from the TCG (see Figure 5-5 on page 99 and Table 28 on page 100).

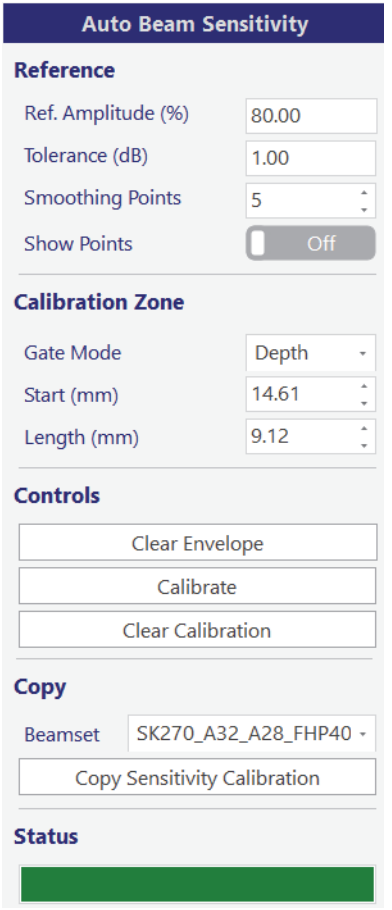


Figure 5-5 Auto Beam Sensitivity form

Table 28 Auto Beam Sensitivity form options

Option		Description
Reference	**Ref. Amplitude (%)**	Sets the amplitude or screen height adjustment that will be calculated for each beam in the beamset (typically 80%).
	Tolerance (dB)	Sets the green tolerance window in the calibration for verification of compliance. The default of 1 dB would put the green window at +\- 1 dB for amplitude compliance after calibration.
	Smoothing Points	Using smoothing points will provide a linear extrapolation between beams to prevent a sawtooth correction. Using a 3 or 5 point quantity is recommended for best results.
	Show points	Displays the red point for every beam in the delay calibration window.
Calibration Zone	The red calibration zone on the S-scan is set manually to cover the intended calibration target.	
	Gate Mode	**Depth** – Sets the red calibration zone on the S-scan to a fixed depth for all beams used for a dynamic calibration where the probe is moved on the calibration block across each beam. **Sound Path** – Sets the red calibration zone on the S-scan to a fixed sound path for all beams used for a static or dynamic calibration for each beam.
	Start and **Length**	Sets the red calibration zone position on the S-scan for coverage of all beams on the target.
Controls	**Clear Envelope**	Resets the sensitivity calibration window prior to performing the sensitivity calibration.
	Calibration	Adjusts the beam gain offset of each beam to 80% amplitude.
	Clear Calibration	Clears the beam sensitivity correction, and returns the beam gain offset to 0 dB.
Copy	**Beamset**	Displays all compatible beamset for which the current sensitivity calibration can be copied. To copy a beam sensitivity calibration the corresponding beamset must be the same configuration included beam angle, beam resolution, and number of beams.
	Copy Sensitivity Calibration	Copies the current beam sensitivity calibration to the selected beamset.

Table 28 Auto Beam Sensitivity form options *(continued)*

Option	Description
Status	Green bar indicator when all beams are within the sensitivity tolerance window. Red bar indicator prior to calibration completion.

5.5 Manual Beam Sensitivity Form

Manual calibration is used to apply a measured gain offset to each beam in the beamset based on a series of calibration targets from a static index position.

The beam gain sensitivity after calibration is visible in **Setup > UT Setting > General > Beam gain**. The gain can be manually edited or created from the **Manual Beam Sensitivity** form. The beam gain offset is added to the general gain for the beamset, and is independent from the TCG (see Figure 5-6 on page 102 and Table 29 on page 102).

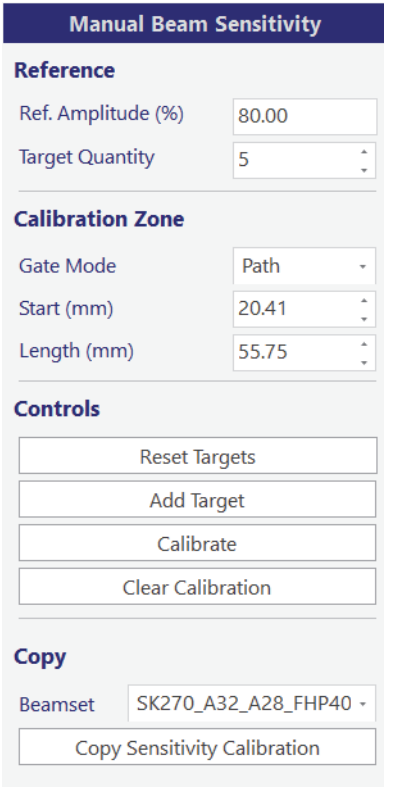


Figure 5-6 Manual Beam Sensitivity form

Table 29 Manual Beam Sensitivity form options

Option		Description
Reference	**Reference Amplitude (%)**	Sets the amplitude or screen height adjustment that will be calculated for each beam in the beamset (typically 80%).
	Target Quantity	Sets the number of targets that will be used in the calibration (minimum of 2). Best results are achieved with the first and last targets as close to the first and last beam in the S-scan as possible.

Table 29 Manual Beam Sensitivity form options *(continued)*

Option		Description
Calibration Zone	**Gate Mode**	**Depth** – Sets the red calibration zone on the S-scan to a fixed depth for all beams used for a dynamic calibration where the probe is moved on the calibration block across each beam. **Sound Path** – Sets the red calibration zone on the S-scan to a fixed sound path for all beams used for a static or dynamic calibration for each beam.
	Gate Start and Length	Sets the red calibration zone position on the S-scan for coverage of all beams on the target.
Controls	**Reset Targets**	Clears the stored targets.
	Add Target	Each target in the S-scan must be selected one by one by moving the beam cursor and selecting Add Target. When the total number of targets are added the yellow amplitude trace is visible for the correction curve.
	Calibrate	Adjusts the gain offset of each target to 80% amplitude, and applies a linear extrapolation gain offset for beams between the targets.
Copy	**Beamset**	Displays all compatible beamsets for which the current sensitivity calibration can be copied. To copy a beam sensitivity calibration the corresponding beamset must be the same configuration, including the beam angle, beam resolution, and number of beams.
	Copy Sensitivity Calibration	Copies the current beam sensitivity calibration to the selected beamset.

5.6 TCG Sensitivity Form

The TCG (time-corrected gain) calibrator corrects the sensitivity of each beam for a series of targets over the inspection area, and allows you to calibrate the S-scan for all targets simultaneously (see Figure 5-7 on page 104 and Table 30 on page 105).

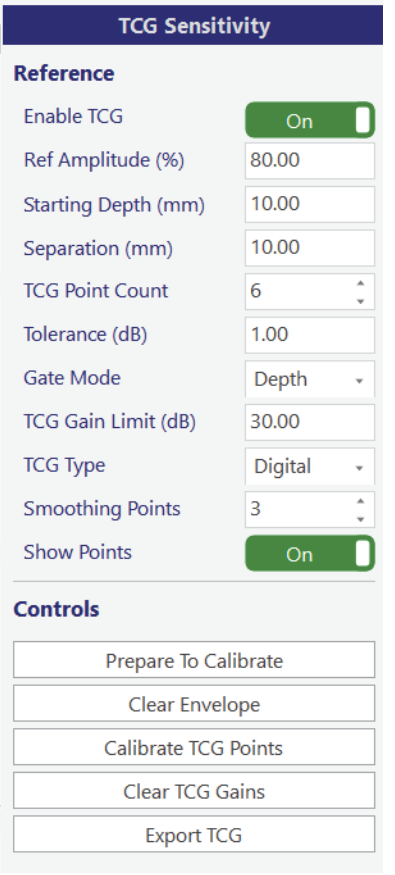


Figure 5-7 TCG Sensitivity form

Table 30 TCG Sensitivity form options

Option		Description
Reference	**Enable TCG**	Enables the TCG on the A-scan and for availability of calibration.
	Ref Amplitude (%)	Sets the amplitude or screen height adjustment that will be calculated for each beam and TCG point in the beamset (typically 80%).
	Starting Depth (mm)	Sets the depth of the first TCG target used for auto-placement of gate position.
	Separation (mm)	Sets the separation between TCG targets used for auto-placement of gate positions.
	TCG Point Count	Sets the total number of TCG points to be used in the calibration.
	Tolerance (dB)	Sets the tolerance in dB for the green zone on each TCG point window.
	Gate Mode	**Depth** – Sets the TCG zones on the S-scan to fixed depth for all beams and TCG points. **Sound Path** – Sets TCG zones on the S-scan to a fixed sound path for all beams and TCG points.
	TCG Gain Limit (dB)	Sets the limit in dB of total points across the TCG limited by the instrument dynamic range.
	Smoothing Points	Using smoothing points will provide a linear extrapolation between beams to prevent a sawtooth correction. Using a 3 or 5 point quantity is recommended for best results.
	Show Points	Displays the red point for every beam in the TCG calibration window.
Controls	**Prepare to Calibrate**	Sets the number of selected calibrator windows, and positions the TCG gates as per the start depth and separation.
	Clear Envelope	Clears all TCG calibration windows, resetting the amplitude trace.
	Calibrate TCG Points	Adjusts the TCG gain of each target and beam to the reference amplitude.
	Clear TCG Gains	Resets the TCG clearing the gain on all beams and targets.
	Export TCG	Exports the current TCG to a .csv file for import to another beamset or successive inspections.

5.7 Velocity

Performing a phased array velocity calibration is essential to validate a known velocity, but it may not be used to measure an unknown velocity (see Figure 5-8 on page 106 and Table 31 on page 107).

TIP

To measure an unknown velocity, we recommend using UT shear or a longitudinal 0-degree beam on the parallel machined surfaces of the calibration block or test piece. We do not recommend using angle beam measurement on SDHs or radiuses to measure velocity, as this measurement method can lead to degraded results.

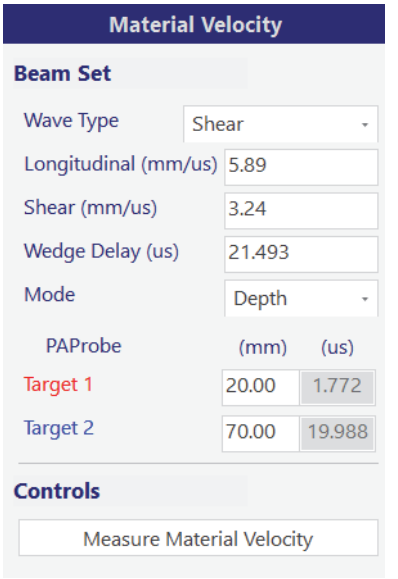


Figure 5-8 Velocity form

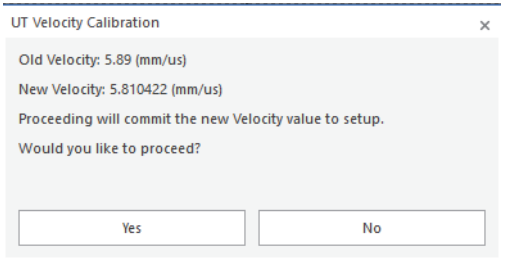


Figure 5-9 Velocity Calibration dialog box

Table 31 Velocity form options

Option	Description
Wave type	Shear or longitudinal for use in the velocity calculation or validation.
Longitudinal (mm/us)	Longitudinal velocity value stored for the current component piece.
Shear (mm/us)	Shear velocity value stored for the current component piece.
Wedge Delay	Delay in microseconds of the current beam calculated at time of beamset creation.
Mode	UT scale for the ultrasound axis ruler used for the velocity calculation or measurement.
Target 1	Distance of target 1 defined by the red UT axis sizing cursor.
Target 2	Distance of target 2 defined by the blue UT axis sizing cursor.
Measure Material Velocity	Calculates new velocity based on position for red and blue sizing cursors. A message is displayed with the old and new velocity for verification before proceeding. Selecting yes will recalculate all beam delays on all beamset with the velocity value (see Figure 5-9 on page 107).

6. UT Calibration Menu Reference

The options for calibrating conventional UT probe wedge delay, velocity, and TCG are available from the command bar when the active beamset is a conventional UT probe channel (see Figure 6-1 on page 109).

Figure 6-1 Conventional UT Calibration menu

Table 32 Calibration menu options

Menu item	Description
UT	This option is used for UT calibration.
TCG	This option is used for TCG (time-corrected gain) calibration.

6.1 Wedge Delay Calibration Form (WD)

The UT wedge delay calibrator is a single point calibration that adjusts the probe delay to a specified depth or sound path at the selected wave type velocity (see Figure 6-2 on page 110 and Table 33 on page 111).

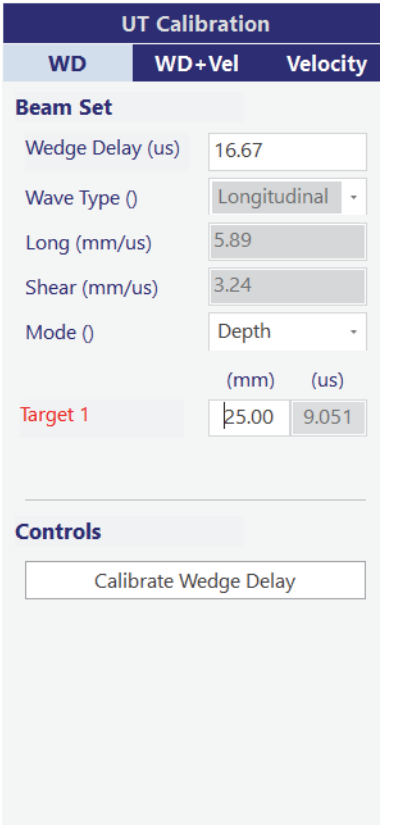


Figure 6-2 Conventional UT Calibration form, WD tab

Table 33 UT Calibration form, WD tab options

Option		Description
Beamset	**Wedge Delay (µs)**	The wedge delay of the probe being adjusted.
	Wave Type	Select **Shear** or **Longitudinal** velocity for the current channel.
	Long (mm/µs) **Shear (mm/µs)**	Displays the default material velocities for the component stored in **Setup > Piece > Material Velocity**.
	Mode	Select a mode for the calibration target. **Sound Path** - Used for angle beam probes. **Depth** - Used for zero-degree probes.
	Target 1	Depth in mm or sound path in µs of the calibration target used for the wedge delay calibration. For 0-degree probes, a backwall reflector is typically used. For angle beam probes, a radius is typically used. Locate the red reference cursor on the A-scan UT axis prior to calibration to define the signal of interest used for the wedge delay calculation.
Controls	**Calibrate Wedge Delay**	Select to adjust the wedge delay for the signal at the red reference cursor position to the specified depth or sound path. The new wedge delay is updated on the form, and stored in **Setup > UT Settings > Position > Probe Delay**.

6.2 Wedge Delay and Velocity Calibration Form

The UT wedge delay and velocity calibrator is two-point calibration that adjusts the probe delay to a specified depth or sound path, and the material velocity for the current channel (see Figure 6-3 on page 112 and Table 34 on page 113).

Figure 6-3 Conventional UT Calibration form, WD +Vel tab

Table 34 UT Calibration form, WD +Vel tab options

Option		Description
Beamset	**Wedge Delay (µs)**	The wedge delay of the probe being adjusted.
	Wave Type	Select **Shear** or **Longitudinal** velocity for the current channel.
	Long (mm/µs) **Shear (mm/µs)**	Displays the default material velocities for the component stored in **Setup > Piece > Material Velocity**.
	Mode	Select a mode for the calibration target. **Sound Path** - Used for angle beam probes. **Depth** - Used for zero-degree probes.
	Target 1	Position 1 in depth or sound path of the calibration target used for the wedge delay calibration. For 0-degree probes, a backwall reflector is typically used. For angle beam probes, a radius is typically used. Locate the red reference cursor on the A-scan UT axis prior to calibration to define the first of two signals of interest used for the wedge delay calculation.
	Target 2	Position 2 in depth or sound path of the calibration target used for the wedge delay calibration. Locate the blue reference cursor on the A-scan UT axis prior to calibration to define the second target.
Controls	**Calibrate Wedge Delay**	Select to adjust the wedge delay for the signal at the red reference cursor position to the specified depth or sound path. The new wedge delay is updated on the form, and stored in **Setup > UT Settings > Position > Probe Delay**.

A dialog box appears with the new calculated velocity, and it can be accepted to update the channel or canceled if the velocity is out of tolerance, or if it is only measured for validation (see Figure 6-4 on page 114). The new calculated velocity is updated in **Setup > UT Settings > Position > Beam > Calibrated Velocity**.

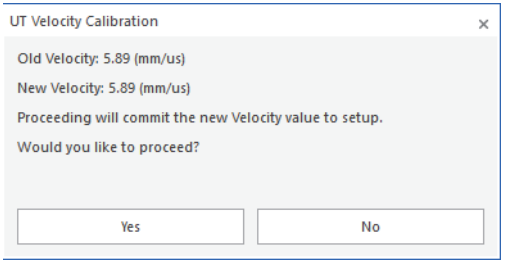


Figure 6-4 UT Velocity Calibration dialog box

6.3 UT Probe Velocity Calibration Form

The UT probe velocity calibrator is two-point calibration that calculates the material velocity of the material component based on the depth or sound path of two known targets (see Figure 6-5 on page 115 and Table 35 on page 116).

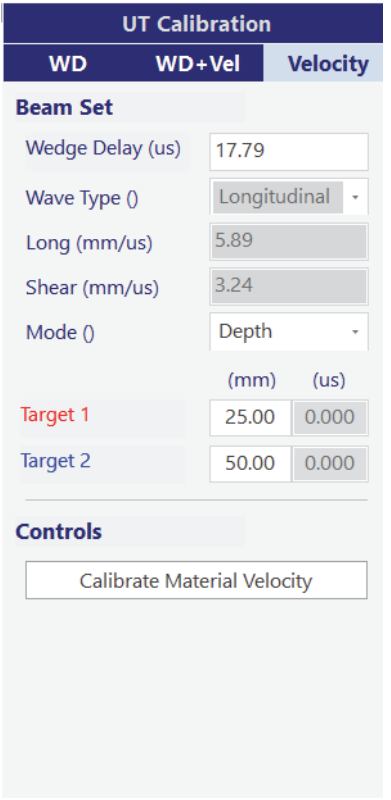


Figure 6-5 Conventional UT Calibration form, Velocity tab

Table 35 UT Calibration form, Velocity tab options

Option		Description
Beamset	**Wedge Delay (µs)**	The wedge delay of the probe being adjusted.
	Wave Type	Select **Shear** or **Longitudinal** velocity for the current channel.
	Long (mm/µs) **Shear (mm/µs)**	Displays the default material velocities for the component stored in **Setup > Piece > Material Velocity**.
	Mode	Select a mode for the calibration target. **Sound Path** - Used for angle beam probes. **Depth** - Used for zero-degree probes.
	Target 1	Position 1 in depth or sound path of the calibration target used for the wedge delay calibration. For zero-degree probes, a backwall reflector is typically used. For angle beam probes, a radius is typically used. Locate the red reference cursor on the A-scan UT axis prior to calibration to define the first of two signals of interest used for the wedge delay calculation.
	Target 2	Position 2 in depth or sound path of the calibration target used for the wedge delay calibration. Locate the blue reference cursor on the A-scan UT axis prior to calibration to define the second target.
Controls	**Calibrate Material Velocity**	Select to calibrate the material velocity.

A dialog box appears with the new calculated velocity, and can be accepted to update the channel, or canceled if the velocity is out of tolerance, or if it is only measured for validation (see Figure 6-6 on page 117). The new calculated velocity is updated in **Setup > UT Settings > Position > Beam > Calibrated Velocity**.

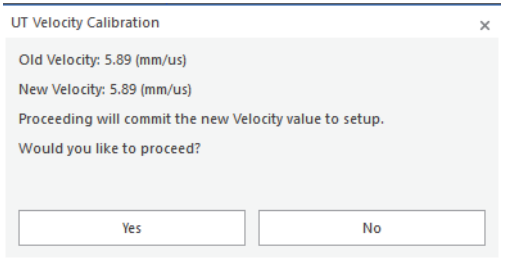


Figure 6-6 Velocity Calibration dialog

6.4 UT Probe TCG Calibration Form

The UT probe TCG calibration is used to consider sound attenuation over distances using a series of calibration targets, typically backwalls for zero-degree probes, and side-drilled holes for angle beam probes (see Figure 6-7 on page 118 and Table 36 on page 118).

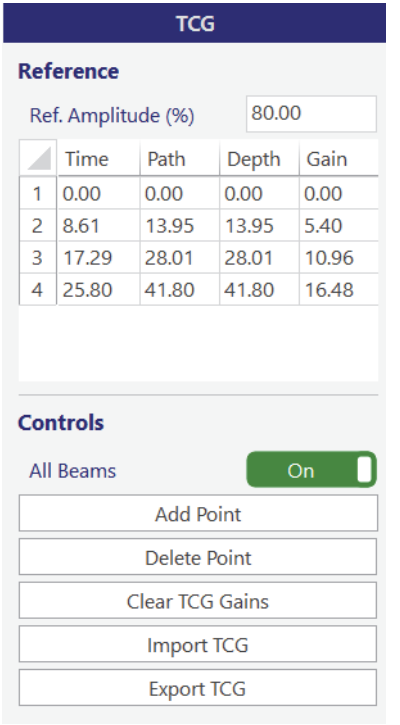


Figure 6-7 Conventional UT Calibration form, TCG

Table 36 UT Calibration form, TCG options

Option	Description
Reference Amplitude (%)	Sets the screen height percentage for each TCG point to be adjusted (typically 80%).
Add Point	Prior to adding the first TCG point, the red gate A is positioned on the first TCG target in the A-scan display. Selecting **Add Point** calculates the dB required to adjust the point to 80% amplitude and stores it in the TCG table. Reposition gate A to successive targets and select add point to complete the TCG table.
Delete Point	Deletes the current TCG point in the table.
Clear TCG Gains	Clears all the gain values in the TCG table but maintains the point locations.

Table 36 UT Calibration form, TCG options *(continued)*

Option	Description
Import TCG	Enables import of preconfigured TCG for the current probe configuration from a .csv file.
Export TCG	Exports the current TCG to a .csv file.

7. TOFD Calibrators

The TOFD calibrators are used to calibrate wedge delay, PCS (probe center separation), and material velocity. The calibrators are useful online, prior to data acquisition, or offline, in analysis.

7.1 TOFD Wedge Delay and PCS Calibration

The WD+PCS calibration calculates the probe wedge delay and the PCS simultaneously using two targets of known depth, typically the lateral wave and backwall signals (see Figure 7-1 on page 121 and Table 37 on page 122).

Figure 7-1 Conventional UT TOFD Calibration form, WD + PCS tab

Table 37 TOFD calibration form, WD +PCS tab options

Option		Description
Beamset	**Wedge Delay (µs)**	The combined wedge delay of the transmitter and receiver wedges for the current TOFD channel.
	PCS (mm)	Mechanical probe center separation of the two TOFD wedges in the scanner measured exit beam point to exit point on the wedges.
	Velocity	Longitudinal material velocity of the component.
	Target 1	First target signal depth, typically the TOFD lateral wave at 0 mm.
	Target 2	Second target signal, typically the component backwall at part thickness.
Controls	**Calibrate Wedge Delay and PCS**	Prior to calibration, set the red reference sizing cursor on the UT axis of the A-scan to target 1 position, typically the TOFD lateral wave at 0 mm. Set the blue measure sizing cursor to Target 2 position, typically the component back wall, and enter the thickness in Target 2. Select **Calibrate Wedge Delay and PCS** to update the new TOFD wedge delay and calculated PCS on the form and in **Setup > UT Settings > Position**. After calibration the TOFD Ur, Um, and Um-r sizing cursors are linearized for conversion of the time scale to mm readings on the dashboard.

7.2 TOFD Wedge Delay (WD) Calibration

The TOFD wedge delay calibration uses a single target, typically the TOFD lateral wave at 0 mm, to set the time base of the A-scan to the intended position in depth (see Figure 7-2 on page 123 and Table 38 on page 123).

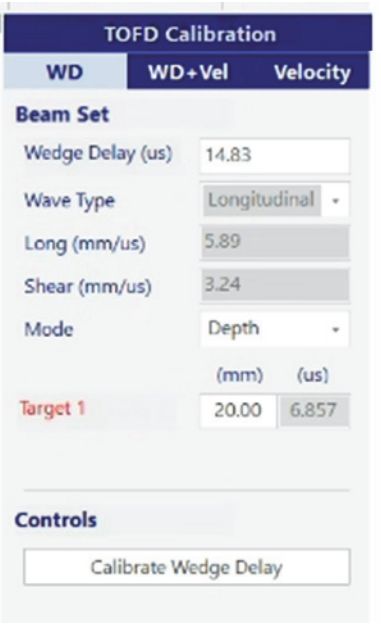


Figure 7-2 TOFD Calibration form, WD tab

Table 38 TOFD Calibration form, WD tab options

Option		Description
Beamset	**Wedge Delay (µs)**	The combined wedge delay of the transmitter and receiver wedges for the current TOFD channel.
	PCS (mm)	Mechanical probe center separation of the two TOFD wedges in the scanner measured exit beam point to exit point on the wedges.
	Velocity	Longitudinal material velocity of the component.
	Target 1	TOFD signal depth, typically the lateral wave at 0 mm.

Table 38 TOFD Calibration form, WD tab options *(continued)*

Option		Description
Controls	**Calibrate Wedge Delay**	Prior to calibration, set the red reference sizing cursor on the UT axis of the A-scan to target 1 position, typically the TOFD lateral wave at 0 mm. Select **Calibrate** to update the new TOFD wedge delay on the form and in **Setup > UT Settings > Position**. After calibration the TOFD Ur, Um, and Um-r sizing cursors are linearized for conversion of the time scale to mm readings on the dashboard.

7.3 TOFD Wedge Delay and Velocity

The WD + Velocity calibration calculates the probe wedge delay and the component velocity simultaneously using two targets of known depth, typically the lateral wave and backwall signals, or two side drilled holes in a multi-zone calibration block (see Figure 7-3 on page 124 and Table 39 on page 125).

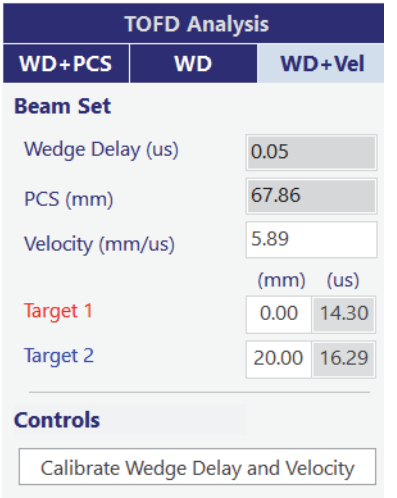


Figure 7-3 TOFD Calibration form, WD + Velocity

Table 39 TOFD Calibration form, WD + Velocity tab options

Option		Description
Beamset	**Wedge Delay (µs)**	The combined wedge delay of the transmitter and receiver wedges for the current TOFD channel.
	PCS (mm)	
	Velocity (mm/**µs**)	
	Target 1	First target signal depth, typically the TOFD lateral wave at 0 mm.
	Target 2	Second target signal typically the component backwall at part thickness.
Controls	**Calibrate Wedge Delay and Velocity**	

8. Inspection Menu Reference

The Inspection menus are used to configure the setup file for data collection. It includes the mechanical sequence parameters for line or raster scanning, and the file saving parameters (see Figure 8-1 on page 127).

Figure 8-1 Inspection menu

Table 40 Inspection menu options

Menu item	Description
 **Motion**	Use this option to set up scanning and encoder for data collection.
 **Data**	Use this option to the select the parameters saved in the file when the inspection sequence is complete or stopped by the operator
 **Alarms**	Use this option to set up the alarm parameters.

8.1 Motion Settings Form

After configuring the beamsets for setup and calibration, prepare WeldSight for data collection in the Motion Settings form (see Figure 8-2 on page 128 and Table 41 on page 129).

Figure 8-2 Motion Settings form

Table 41 Motion Settings form options

Option		Description
Scan Parameters	**Type**	Available scan types for data collection are One Line Scan, Raster Scan, and Clock Inspection. **Line Scan** – The one-line scan inspection sequence defines a linear data collection using a single encoder on the scan axis. In a line scan, only the scan axis settings are displayed. **Raster** - The raster scan inspection sequence defines a 2D or bi-directional data collection using a primary encoder for the scan axis, and a secondary encoder for the index axis. In a raster scan, both the scan and index settings are displayed **Clock** – The clock inspection sequence defines an inspection sequence collected at a fixed acquisition rate, without using an encoder.
	Trigger on	Used to set the inspection trigger for the data collection. **Encoder** – Data is collected at the interval of the encoder movement, and is defined at the inspection resolution distance. Used with Trigger on Position data synchronization set in **Setup** > **Digitizer**. **Clock** – Data is collected at a fixed interval based on the max scan acquisition rate when used with Position Stamped data synchronization located in **Setup** > **Digitizer**.
Scan Parameters (continued)	**End Scan**	Used to set the stop inspection sequence automatically or manually. When the inspection sequence is stopped, the data is available for offline analysis and the software state in the footer changes to **Analysis**. **At End** – The inspection sequence is automatically stopped at the end of the defined inspection length on the scan axis for one-line scan, and on the scan and index axes for raster scan. **Manual** – Used to stop the inspection manually.
	Preset on Start	Used to preset the encoders to a fixed position at start of inspection. When On at the start of inspection, a one-line scan inspection sequence will set the encoder position to the preset value of the scan axis, and a raster scan inspection sequence will set the encoder positions to the preset values of the scan and index axis.

Table 41 Motion Settings form options *(continued)*

Option		Description
Scan Axis	**Encoder**	Determines whether encoder 1 or encoder 2 is used for the scan axis of the raster scan. In a raster scan, whichever encoder is selected for the scan axis, the other encoder is automatically selected for the index axis.
	Start	Sets the start position of the inspection sequence on the index axis.
	Length	Sets the relative position from start for the end of the inspection sequence.
	Preset Encoder	When Preset on Start is set to On, the encoder preset value is set on inspection sequence start.
	Resolution	Sets the interval between success data points on the index axis.
	Invert Encoder	Changes the polarity of the index axis encoder from positive to negative reversing the inspection direction.
Index Axis	**Encoder**	Determines whether encoder 1 or encoder 2 is used for the index axis of the raster scan. In a raster scan, whichever encoder is selected for the index axis, the other encoder is automatically selected for the scan axis.
	Start	Sets the start position of the inspection sequence on the index axis.
	Length	Sets the relative position from start for the end of the inspection sequence.
	Encoder Preset	When Preset on Start is set to On, the encoder preset value is set on inspection sequence start.
	Resolution	Sets the interval between success data points on the index axis.

Table 41 Motion Settings form options *(continued)*

Option		Description
Encoder Calibration	**Encoder**	Selectable for encoder 1 or 2, defines the encoder for the specified resolution in steps\mm, and the active encoder for the calibration wizard.
	Encoder Resolution (steps/mm)	Sets the resolution of the encoder that determines the scan increments for the selected encoder. Can be set manually, and will update automatically after a calibration.
	Scan Length	Sets the length of the scan desired for the encoder calibration.
	Start Calibration	Initiates the encoder calibration wizard for the selected encoder (1 or 2). Provides a step-by-step process to move the encoder a fixed distance for calculation or validation of the encoder step resolution

8.1.1 Encoder Calibration Procedure

Start Calibration – Initiates encoder calibration wizard.

Stop Calibration – Saves traveled distance after encoder reposition for calibration

Yes \ No – Accepts calibration update dialog box.

To calibrate the encoder using the calibration wizard

1. Select **Start Calibration** and the active encoder position is set zero.
2. Move the encoder to the scan position entered for the calibration.
3. Select **Stop** and a pop-up message is generated with the original encoder resolution, and the new calculated resolution.
4. Select **Yes** or **No** to accept the new encoder resolution.

8.2 Inspection Data Form

The Inspection Data form allows you to configure the parameters saved in the file when the inspection sequence is complete or stopped by the operator. This includes the file version, inspection date information, and missed data point statistics after the inspection is complete (see Figure 8-3 on page 132 and Table 42 on page 133).

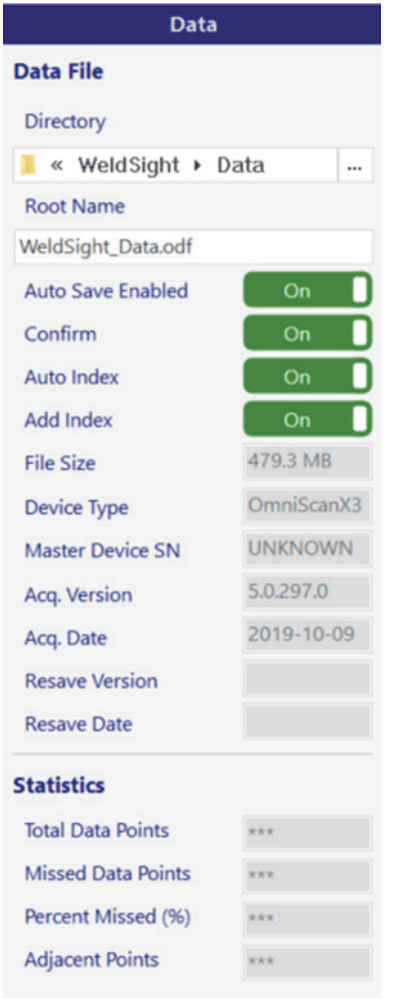


Figure 8-3 Inspection Data form

Table 42 Inspection Data form options

Option		Description
Data File	**Directory**	Sets the default folder location for saving new data files.
	Root Name	Sets the default root file name for new data file collection. Appears in pop-up window on stop inspection.
	Bypass analysis	Sets the software state mode directly to **Setup** the for next inspection, after the inspection has been stopped, bypassing analysis mode.
	Auto Save Enabled	When On, it automatically saves the file when the inspection is stopped to the default location.
	Confirm	When On, a File Save window appears when the inspection is stopped so that the file name and location can be confirmed or edited.
	Auto-index	Increments an index number, 1,2,3 etc., after the file name for repeat inspections.
	File Size	Displays the size of the current data file in MB, based on number of probes, scan size, resolution, etc.
	Device Type	Displays the instrument model used to create the data file.
	Master Device SN	Displays the serial number of the instrument used to collect the current data file. For instruments compatible with multi-pod data acquisition, only the master serial number is displayed.
	Acquisition Version	Displays the original software version used for data collection.
	Acquisition Date	Displays the date of the original data file creation.
	Re-save Version	Displays the software version used for offline resave of the data file. If blank, the data file is in the original software version.
	Re-save Date	Displays the date that the data file was resaved offline.

Table 42 Inspection Data form options *(continued)*

Option		Description
Statistics	The statistics generated from one-line scan data files. It displays the information between the sizing cursors on the scan axis, regarding missed and adjacent data points, for procedure or code compliance. The statistics will update as the sizing cursors are repositioned at the beginning and end of the line scan.	
	Total Data Points	Displays the number of data points between sizing cursors on the scan axis.
	Missed Data Points	Displays the number of data points that were missed or without data between the sizing cursors on the scan axis.
	Percent Missed	Displays the number of missed data points as a percent of total data points between the sizing and cursors on the scan axis.
	Adjacent Missed Points	Displays the number of missed data points that are adjacent to another missed data point between the sizing cursors on the scan axis.

TIP

Set the position of the red and blue sizing cursor on the scan axis to the inspection area, and the statistics will refresh for this area.

8.3 Alarms

Alarms are available via the digital I\O, and will provide an output from the instrument for an audio or visual alarm device when a signal is detected in one or more of the detection gates for the specified configuration.

Alarms are created for the active beamset and stored in the Alarms table. When active, each alarm appears in the dashboard under the readings and will change from green to red when an alarm condition is detected (see Figure 8-4 on page 135 and Table 43 on page 135).

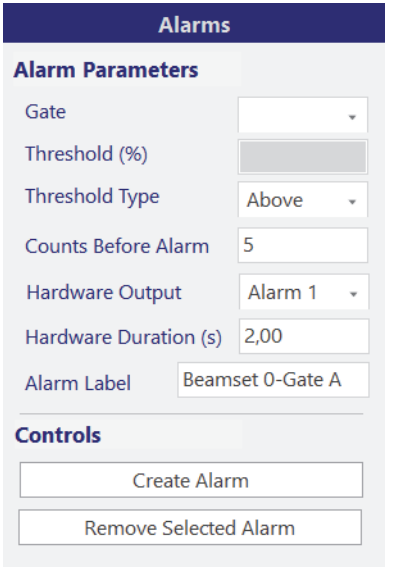


Figure 8-4 Alarms form

Table 43 Alarms form options

Option		Description
Alarm Parameters	**Gate**	Gate A or gate B selection for the current alarm.
	Threshold (%)	Amplitude threshold of the detection gate to trigger an alarm. The value is set in the gate menu of the current beamset, and is displayed as read-only on this form.
	Threshold type	Selectable as above threshold or below threshold to trigger the alarm.
	Counts Before Alarm	Sets the number of successive data points meeting the amplitude threshold to trigger an alarm condition.
	Hardware Output	Sets the alarm output on the digital I\O connector of the instrument for the alarm hardware interface.
	Hardware Duration (sec)	Sets the number of seconds that hardware will generate the alarm on the digital I\O output after alarm condition is detected.
	Alarm Label	Custom name for the current alarm.

Table 43 Alarms form options *(continued)*

Option		Description
Controls	**Create Alarm**	Creates the alarm for the active beamset in the table for the current configuration.
	Remove Selected Alarm	Removes the highlighted alarm from the table.

9. Analysis Menu Reference

WeldSight is useful for offline analysis of data files collected in WeldSight software, or collected with compatible instruments such as the OmniScan series flaw detectors. You will find the list of supported file extensions under the **File > Open** dialog box.

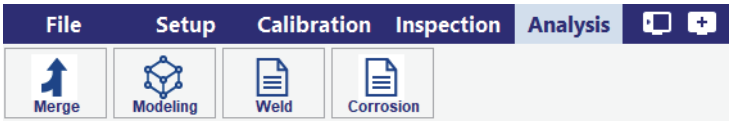


Figure 9-1 Analysis menu

Table 44 Analysis menu options

Menu item	Description
 **Merge**	Use this option to analyze multiple PA beamsets or TFM modes using volumetric side, end, and top view displays.
 **Modeling**	Use this option to model standard geometry such as plate, pipe, and axial long seam components.
 **Weld**	Use this option to analyze and report weld inspection data.

Table 44 Analysis menu options *(continued)*

Menu item	Description
 **Corrosion**	Use this option to analyze and report material loss inspection data.

9.1 Merge

The merge functions allows you to analyze multiple PA beamsets or TFM modes using volumetric side, end, and top view displays.

9.1.1 A-Scan Merge Data Type

The A-scan data type is used for merging PA beamsets typical of weld inspection, and is limited to one line scan inspections. The processed volumetric merge displays are not saved to file, and must be re-merged to realize in the data displays.

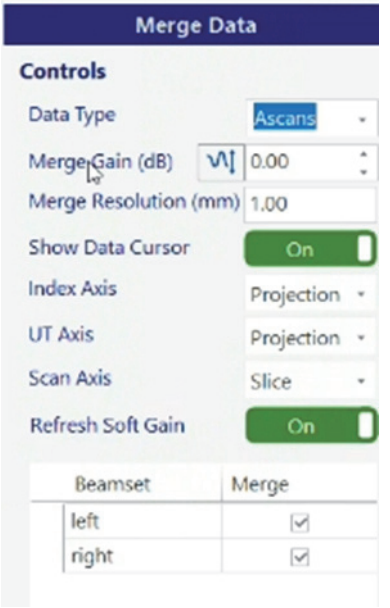


Figure 9-2 A-scan Merge Data form

Table 45 A-scan Merge Data form options

Option		Description
Controls	**Data Type**	Select **AScans.**
	Merge Gain (dB)	The PA volumetric, side, end, and top merge views have a processed gain that is applied off line and is independent of the general gain, beam gain offset, and TCG. Editing the merge gain applies only to the merge display and does not apply to the original beamset groups.
	Merge Auto 80 	Select this button to automatically set the merge data point to 80% amplitude.
	Merge Resolution (mm)	A multiple beamset volumetric merge is usually performed at lower resolutions than the original beamset resolution, typically around 0.25 to 1 mm. The system computer's ability to merge large files, merge beamsets at a high resolution, and the time required to complete the merge process is dependent on RAM, CPU, and GPU specifications. See "Minimum Computer and Software Requirements" on page 15.
	Show Data Cursor	Displays the slice and projection data cursors on the volumetric merge side, end, and top displays.
	Index Axis **UT Axis** **Scan Axis (mm)**	Displays a volumetric merge as a single **Slice** of the data, or as a **Projection** of all data between the data cursors. This function is independently available for each axis. Selecting **Slice** will enable a single merge gate cursor on the axis, and selecting **Projection** will enable two data cursors to define an area.
	Refresh Soft Gain	When enabled, changing the gain of an individual beamset automatically refreshes the volumetric merge display amplitude. When disabled, the gain changes to individual beamsets will not refresh until the beamsets are merged again.

Table 45 A-scan Merge Data form options *(continued)*

Option		Description
Polar Interpolation	The polar interpolation is used for piping, flanges, or any inspection performed on circular or radial geometry. It converts the scan axis distance to degrees, enabling polar display views.	
	Scan Start	Places the red sizing cursor at the start of the inspection on the scan axis of any display and enters the position, typically 0 degrees represents 12 o'clock on the part.
	Scan End	Places the blue sizing cursor on the scan axis at the end of the inspection and enters the position, typically 360 degrees represents the full circumference of the part.
	Update Region button	Select **Update Region** to convert the scan axis distance to degrees on the polar displays.
Controls	**Merge Skips**	Displays individual skip legs or all legs in the polar merge displays.
	Skips to Plot	Select **All** or an individual skip leg to be visualized in the polar merge displays.
	Merge button	Select **Merge** to perform the A-scan volume merge, after which, the data is visible in the processed merge side, end, and top view displays. Use the Alt+V keyboard shortcut to merge all beamsets, and Alt+C to merge the current beamset.

9.1.2 C-scan Merge Data Type

The C-scan data type is used for merging PA beamsets, typically used for corrosion or composite inspections. It is compatible with line and raster scan inspections. Processed C-scan merge displays are not saved to file, and must be re merged to appear in the data displays.

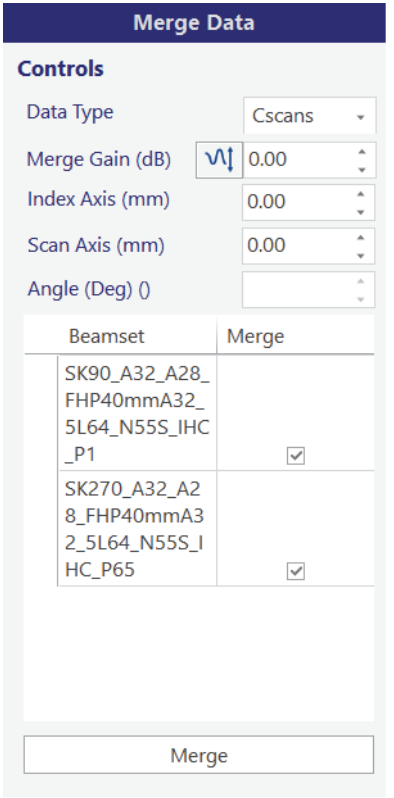


Figure 9-3 C-scan Merge Data form

Select Merge to perform the C-scan merge, after which, the data from all beamsets is visible in the processed Thickness C-scan display.

Table 46 C-scan Merge Data form options

Option		Description
Controls	**Data Type**	Select **Cscans**
	Merge Gain (dB)	The PA TOF and Thickness C-scans have a processed gain that is applied off line and is independent of the general gain, beam gain offset, and TCG. Editing the merge gain will apply only to the merge display and does not apply to the original beamset groups.
	 **Merge auto 80**	Automatically sets the merge data point to 80% amplitude.
	Index axis (mm) **Scan axis (mm)**	The scan and index offsets allows you to reposition each beamset in the merged C-scan by taking into account scanner wander and data overlap between inspections. Adjust the scan and index offsets for each beamset to align the data.
	Angle (deg)	The angular position of each beamset can be rotated in the merged C-scan to account for data misalignment. Adjust the rotation for each beamset to align the data.
	Beamset Selection	Compatible PA beamsets with C-scan merge are displayed in the table. Beamsets are included or excluded from the merge by the check box prior to performing the merge.

9.1.3 TFM Merge Data Type

The TFM data type is used for merging TFM modes and is limited to one line scan inspections. Processed volumetric TFM merge displays are not saved to file and must be re merged each time the file is opened.

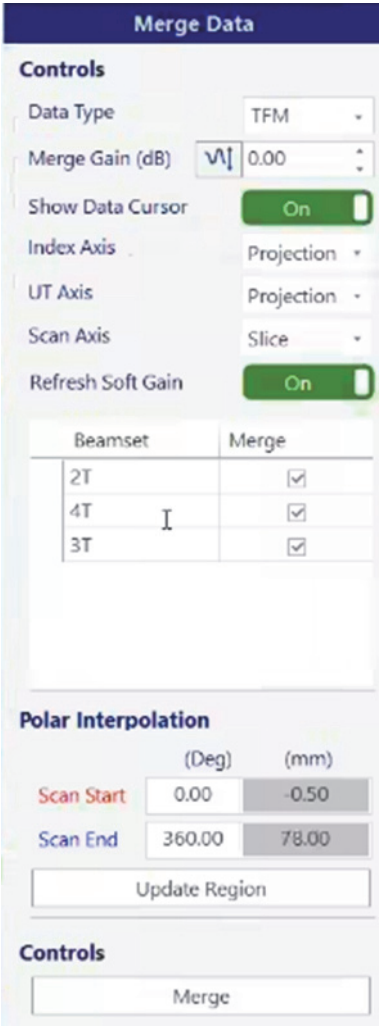


Figure 9-4 TFM Merge Data form

Table 47 TFM Merge Data form options

Option		Description
Controls	**Data Type**	Select **TFM**.
	Merge Gain (dB)	The PA TOF and Thickness C-scans have a processed gain applied off line that is independent of the general gain, beam gain offset, and TCG. Editing the merge gain will apply only to the merge display and does not apply to the original beamset groups.
	 **Merge auto 80**	Automatically sets the merge data point to 80% amplitude.
	Show Data Cursor	Displays the slice and projection data cursors on the volumetric merge side, end, and top displays.
	Index Axis **UT Axis** **Scan Axis (mm)**	Allows you to visualize a volumetric merge as a single **Slice** of the data, or as a **Projection** of all data between the data cursors. This function is available independently for each axis. Selecting **Slice** enables a single merge gate cursor on the axis, and selecting **Projection** enables two data cursors to define an area.
	Refresh Soft Gain	When enabled, changing the gain of an individual beamset automatically refreshes the volumetric merge display amplitude. When disabled, gain changes to individual beamsets will not be refreshed until the beamsets are merged again.
	Beamset Selection table	Compatible TFM beamsets are displayed in the table. Before merging, use the check boxes to include or exclude beamsets.
Polar Interpolation	The polar interpolation is used for piping, flanges, or any inspection performed on circular or radial geometry to convert the scan axis distance to degrees to enable polar display views.	
	Scan Start	Places the red sizing cursor at the start of the inspection on the scan axis of any display and enters the position, typically 0 degrees represents 12 o'clock on the part.
	Scan End	Places the blue sizing cursor on the scan axis at the end of the inspection and enters the position, typically 360 degrees represents the full circumference of the part.
	Update Region button	Select **Update Region** to convert the scan axis distance to degrees on the polar displays.

Table 47 TFM Merge Data form options *(continued)*

Option		Description
Controls	**Merge**	Select **Merge** to perform the TFM merge after which the data is visible in the processed merge side, end, and top view displays. Shortcut ALT-V is available for TFM merge of all beamsets.

9.2 Modeling

Modeling is available for standard plate, pipe, and axial long seam component geometries. For the base sketch, you can import DXF files containing closed loop polyline geometries. Modeling is visualized from the Simulation display available in the display list or selected from the default layouts.

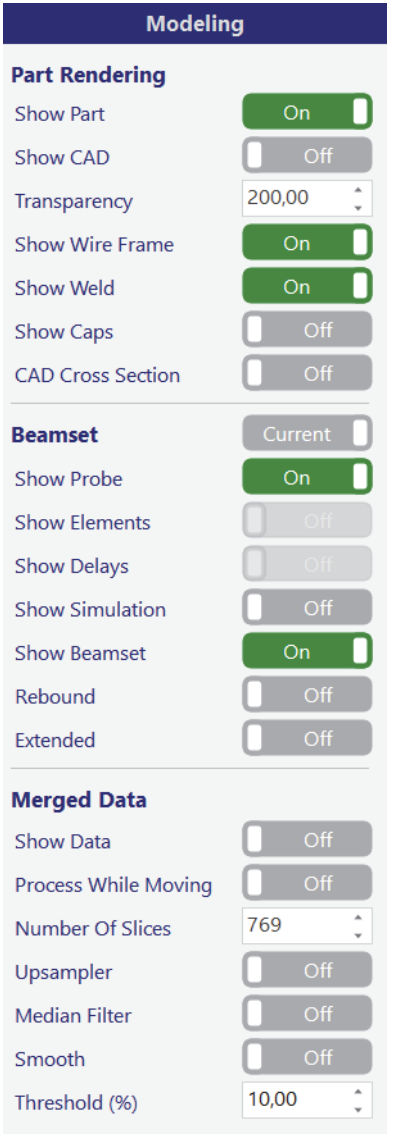


Figure 9-5 Modeling form

Table 48 Modeling options

Option		Description
Part Rendering	**Show Part**	Displays or hides the component part.
	Show CAD	Displays or hides the 3D part from .dxf overlay if present.
	Transparency	Adjustable from 0–250 sets the opacity on the part to enhance the data.
	Show Wire Frame	Displays or hides the part frame.
	Show Caps	If present in the data file, displays or hides the weld cap geometry.
	CAD Cross Section	Displays or hides the .dxf cross section if present.
Beamset	**Current / All**	Toggles between current active probe or all probes if present.
	Show Probe	Displays or hides the probe.
	Show Elements	Displays or hides the probe elements and element start and end numbers.
	Show Delays	Displays or hides the beam delay graphic on the probe.
	Show Simulation	Displays or hides the beam simulation.
	Show Beamset	Displays or hides the PA beamset on the part.
	Show Rebound	Displays or hides the PA beamset on first skip of component surface if extended through the part.
	Show Extended	Displays or hides the complete beamset UT range without skip in part.

Table 48 Modeling options *(continued)*

Option		Description
Data	Data is available after TFM or A-scan data merge.	
	Show Data	Displays or hides the current data merge on the part.
	Process While Moving	When selected, enables dynamic modeling update as the merge gate selectors are repositioned. Processing time and refresh dependent on file size and computer specifications.
	Number of Slices	Resolution of the data image is dependent on acquisition settings. Defaults to inspection scan axis resolution.
	Upsampler Filter	Improves the data image by increasing the spatial resolution between points while keeping the 2D representation.
	Median Filter	Applies a Median image filter to the data that removes noise while maintaining precision edges. The time required to complete the process is dependent on the system computer specifications including RAM, CPU, and GPU. See “Minimum Computer and Software Requirements” on page 15.
	Smoothing	Applies a smoothing filter to the data.
	Threshold (%)	Crops the data at the specified threshold. Use to remove low amplitude data for flaw visualization.

9.3 Corrosion Manager

The Corrosion Manager is useful for analyzing and reporting material loss inspection data using zero-degree phased array and UT probe raster scans. The corrosion workflow is designed around the thickness T reading, thickness C-scan display, and thickness C-scan gate source configuration.

Corrosion display layout**:** This display layout is present in the default layout list and can be edited and saved. When a corrosion data file is opened, the **Corrosion** display in layout list is automatically loaded.

Corrosion Merged display layout**:** This display layout is present in the default layout list and can be edited and saved. The **Corrosion Merged** display is used for analysis of C-scan that has been file merged, and C-merged.

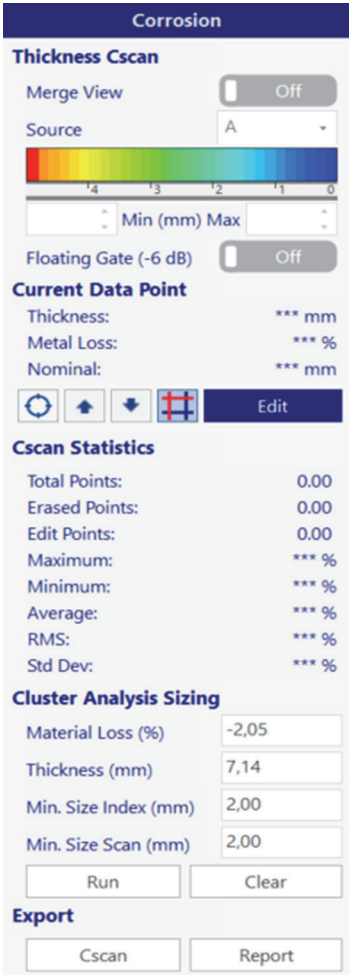


Figure 9-6 Corrosion form

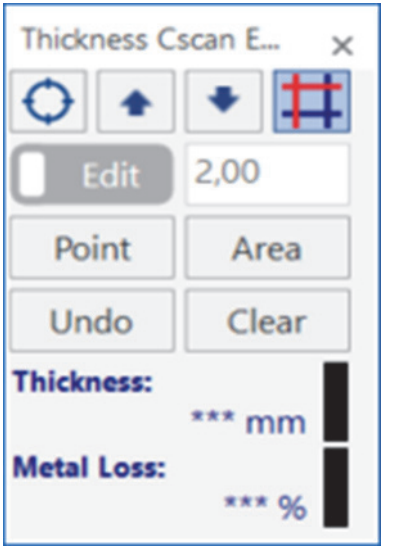


Figure 9-7 Cscan Edit form

Table 49 Corrosion form options

Option		Description
Thickness Cscan	**Merge view toggle**	Automatically loads the Corrosion Merged display layout, and all C-scan merged data is visible in the display.
	Source	Defines the source of the thickness T reading and thickness C-scan. Selectable for detection gates A and B, and synchronization gate I.
	Color Slider	Enables manipulation of the color palette by adjustment of the low and high thickness limits.
	Min	Defines the minimum thickness T reading to generate the low thickness color band (red if using default corrosion thickness color palette).
	Max	Defines the maximum thickness T reading to generate the high thickness color band (blue if using default corrosion thickness color palette).
	Floating Gate toggle	Adjusts the leading edge thickness T reading to be measured from the -6 dB amplitude position from peak instead of the first point over gate threshold. This option is used to improve the accuracy of thickness readings in data with varying amplitude waveforms.
Current Data Point	**Thickness (mm)**	Displays the thickness T reading of the current data point. Dependent on the C-scan source, gate measure mode configuration, UT settings, compression, and point resolution on UT axis.
	Metal Loss (%)	Displays the percentage of metal loss for the current thickness T reading, based on the nominal thickness.
	Nominal (mm)	Displays the nominal thickness of the material used to calculate the percentage of metal loss.

Table 49 Corrosion form options *(continued)*

Option		Description
Control Icons	 Snap to thinnest	When selected, snaps the crosshair position of the scan and index data cursors to the thinnest area in the visible C-scan display. With **Cursors enabled**, snaps the crosshair position of the data cursors to the thinnest area in the zone created between the sizing cursors.
	 Next thickest	Moves the data cursors to the next thickest data point in the visible image of the C-scan, or if cursors are enabled, the next thickest data point in the zone between the sizing cursors.
	 Previous thinnest	Moves the data cursors to the next thinnest data point in visible image or zone between the sizing cursors.
	 Cursor toggle	Displays or hides the sizing cursors on the data displays.
C-scan Edit form		Selecting the C-scan Edit button will pop out the C-scan edit form (see Figure 9-7 on page 150). It can be repositioned closer to the area being analyzed. The C-scan edit form is used to edit the thickness C-scan to recover points that were detected below gate threshold, and to clear or edit points or areas of erroneous readings.
	Erase \ Edit Selection	Individual data points or areas can be removed or edited to a specific thickness by applying the Erase or Edit toggle. Erasing a point or area turns the pixels gray and excludes the point from statistics. Editing a point or area assigns a specific thickness and pixel color regardless of A-scan gate detection.
	Undo	Selecting Undo clears the last point or area that was edited.
	Clear	Selecting Clear erases all edited points on the Cscan.

Table 49 Corrosion form options *(continued)*

Option		Description
Cscan Statistics	**Total Points**	Displays the total number of data points in the thickness C-scan.
	Erased Points	Displays the total number of erased data points in the thickness C-scan.
	Edit Points	Displays the total number of edited points in the thickness C-scan.
	Maximum	Displays the thickest point in the thickness C-scan.
	Minimum	Displays the thinnest point in the thickness C-scan.
	Average	Displays the average thickness of all data points in the thickness C-scan.
	RMS	Displays the root mean square (RMS) thickness of all data points in the thickness C-scan.
	Standard Deviation	Displays the standard deviation between all data points in the thickness C-scan.

Table 49 Corrosion form options *(continued)*

Option		Description
Cluster Analysis Sizing	The cluster analysis feature identifies areas of wall loss based on a percentage of material loss or on a defined specific thickness. Areas with a wall loss value meeting the filter criteria are automatically added to the corrosion indication table and annotations appear on the thickness C-scan display. You can set the cluster analysis gap tolerance and merge overlap under **Setup >Reporting > Corrosion Report**. This will determine the number and size of the areas. When the sizing cursors are hidden, the cluster analysis is performed on the entire thickness C-scan. When the cursors are displayed, the cluster analysis is performed on the zone between the cursors. Each time **Run** is selected, lines are added to the corrosion table.	
	Material Loss (%)	Sets the percentage of material loss used for the cluster analysis detection. Editing the percentage of material loss will update the thickness value calculated from nominal.
	Thickness (mm)	Sets the thickness value used for the cluster analysis detection. Editing the thickness will update the material loss percentage calculated from the nominal value.
	Min Size Index (mm)	Sets the minimum size on the index axis for an area to be recorded in the cluster analysis. Indications smaller than the minimum size are ignored and not included in the table records.
	Min Size Scan (mm)	Sets the minimum size on the scan axis for an area to be recorded in the cluster analysis. Indications smaller than the minimum size are ignored and not included in the table records.
	Run	Select **Run** to apply the current filter criteria over the thickness C-scan, to populate the corrosion defect table and areas on the thickness C-scan.
	Clear	Select **Clear** to remove all records in the corrosion table and remove the cluster annotations on the thickness C-scan.

Table 49 Corrosion form options *(continued)*

Option		Description
Export	**Cscan**	You can export the thickness C-scan to Excel with the current color palette by selecting Cscan. With the sizing cursors off, selecting Cscan will export the complete visible thickness C-scan display to Excel. With the sizing cursors on, only data points between the cursors are exported.
	Report	Select **Report** to generate and save a PDF and Excel file of the corrosion report. Ensure that the corrosion report options in **File** >**Report** >**Corrosion** >**Report** are set prior to running the corrosion report.

NOTE

The accuracy of the **Floating Gate** is dependent on the UT resolution and point quantity and is most accurate when using a compression factor of 1 (no compression). The floating gate -dB value can be edited in **File** > **Report** > **Corrosion** > **Thickness > C-scan Configuration**. Default value is -6.00 dB.

10. Offline Data Analysis

WeldSight software can be used for analyzing data files generated by the software itself or by compatible instruments such as the OmniScan series flaw detectors. The list of supported file extensions appears in the **File > Open** dialog box filter.

10.1 File Merge

If your data was acquired in separate files, they can be merged into a single file by selecting multiple data files while holding the SHIFT key in the File Open dialog box.

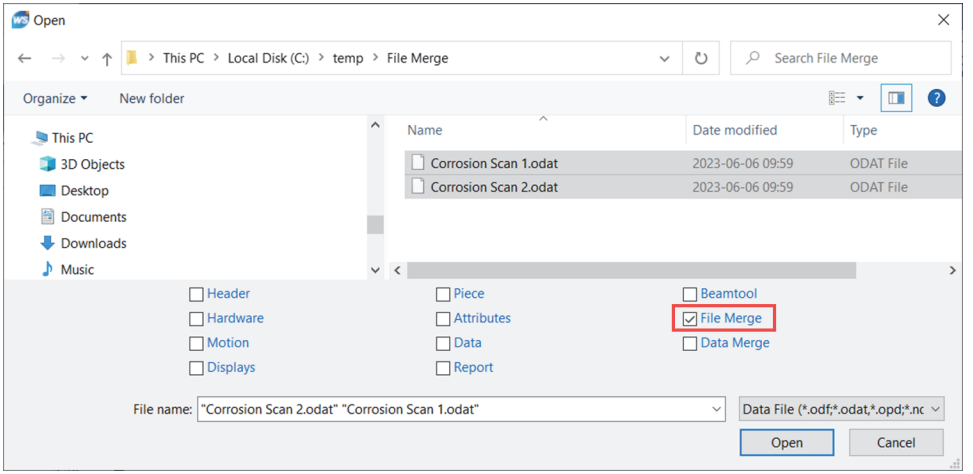


Figure 10-1 File Merge

NOTE

For the files to merge successfully, all selected files must share the same piece configuration, and different files types cannot be combined (.odf, .odat, .nde).

To merge data files

1. Select **File > Open**, and browse to the first data file
2. While holding the SHIFT key select additional data files to be merged. The check box will appear in **File Merge** in the dialog box (see Figure 10-1 on page 157).
3. Select Open. All the beamsets from the merged files become available in the beamset list.

TIP

The file selection order determines the order in which the beamsets appear in the merged file.

10.2 Display Layouts Overview

Default display layouts are available in the command bar and they can be customized (see Figure 10-2 on page 158).

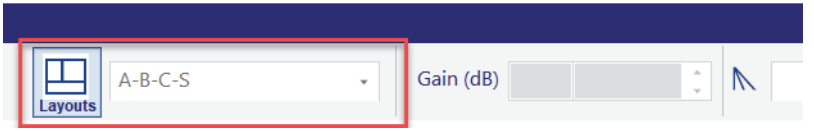


Figure 10-2 Layouts menu

You can create and recall new display layouts. To revert to the default layouts, select the **Restore Defaults** button. (see Figure 10-3 on page 160)

The OmniScan X3 layout list is loaded by default with the installer. It can be changed to the FOCUS PX layout list in **Preferences.**

To change the default layout list:

1. Select the **Preferences** icon from the File menu, and select **Appearance**.
2. Select **Load FPX Layouts** for setup, acquisition, and analysis or **Load X3 Layouts** for analysis only.
3. Click on the **Layouts** button (see Figure 10-2 on page 158).
4. In the Layout form, select **Update Default**s. The display layout list will load at software launch (see Figure 10-3 on page 160).

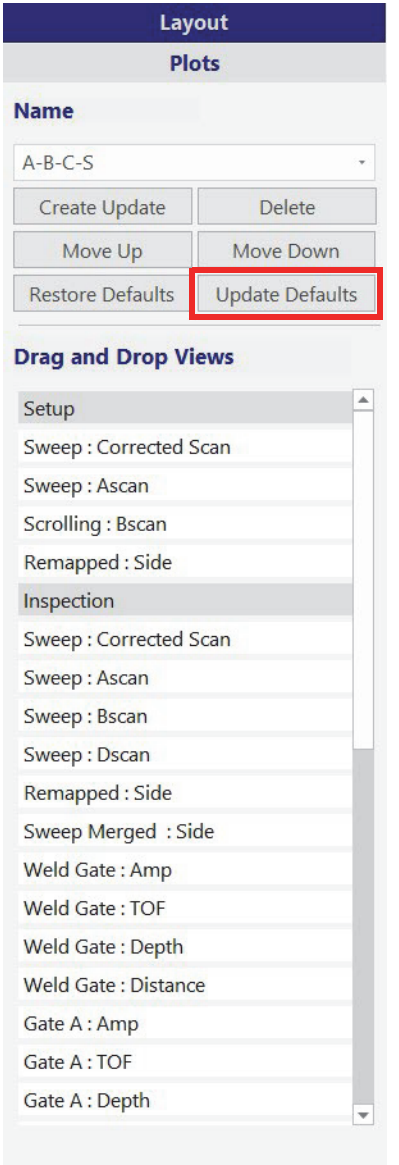


Figure 10-3 Layout form

Table 50 Layout form options

Option		Description
Name	The display layout name that appears in the drop-down list in the header.	
	Create Update	Updates the selected layout with the current configuration. If no layout is present, one is created in the drop-down list in the header.
	Delete	Deletes the active layout from the drop-down list in the header.
	Move Up	Moves the active layout up one position in the drop-down list. Select the layout, and select Move Up successive times to position in the layout in the list as desired.
	Move Down	Moves the active layout down one position in the drop-down list.
	Restore Defaults	Replaces the current display layout list with the stored defaults. The default layouts configuration is stored in C:\OlympusNDT\WeldSight\Layouts\Default Layouts.XML.
	Update Defaults	Replaces the display layouts saved in defaults with the current layout list.
Drag and Drop Views	The data displays are organized for **Setup**, **Inspection**, **Processing**, and **Reporting** and the display list will update based on the active probe and beamset type selected in the command bar. Drag any display from the list to an empty window or already configured window to update with the new display. Select **Create Update** after display configuration to retain the new layout.	

10.3 Display Header Contextual Menu

You can access a contextual menu by right clicking on the header bar of a display (see Figure 10-4 on page 162).

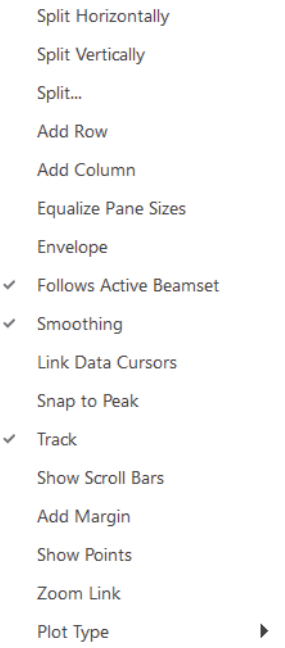


Figure 10-4 Display header contextual menu

Table 51 Display header contextual menu options

Menu Item	Description
Split Horizontally	Splits the current window horizontally.
Split Vertically	Splits the current window vertically.
Split	Enables a customized layout based on a number of rows and columns.
Follows Active Beamset	When selected, updates the data display to the active beamset in the command bar.
Add Margins	When selected, allows a larger zoom window useful when using .dxf overlays.
Show Scroll Bars	When selected, displays a zoom scroll bar on the axis rulers that can resized and repositioned with a mouse or laptop touchpad.

Table 51 Display header contextual menu options *(continued)*

Menu Item	Description
Zoom Link	Links the zoom ruler to any other displays in the layout. Deselect Zoom Link on the display to prevent undesired zoom linked to another display.
Echo Dynamics	When selected, enables the echo dynamic 2D displays adjacent to the data display. Echo dynamics are configuration from **File > Preferences > Appearance > Echo dynamics**.

10.4 Display Window Contextual Menu

You can access a contextual menu by right clicking inside a display window (see Figure 10-5 on page 163).

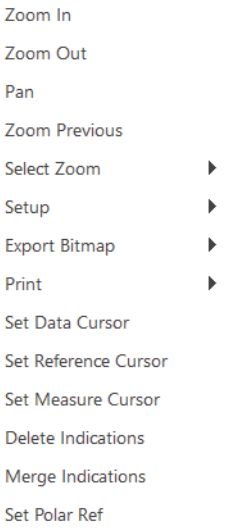


Figure 10-5 Display window contextual menu

Table 52 Display window contextual menu options

Menu Item	Description
Zoom in	Use these commands to zoom and pan the contents of the display window.
Zoom out	
Pan	
Zoom Previous	
Select Zoom	Allows you to select zoom options for the current window.
Setup	Allows horizontal or vertical orientation configuration of the current window and reverse axis.
Export Bitmap	Allows you to export the display to a file, the clipboard, or to a Base64 plot.
Print	Allows you to set print options and print different formats, including PDF.
Set Data Cursor	Places the data cursors and\or beam cursor at the selected position.
Set Reference Cursor	Places the red reference sizing cursor at the selected position.
Set Measure Cursor	Places the blue measure sizing cursor at the selected position.
Delete Indications	Deletes selected records from the indication table. Becomes available after selecting recorded indications on the corrosion thickness C-scan display.
Merge indications	Merges selected records into a single record in the indication table. Becomes available after selecting recorded indication on the corrosion thickness C-scan display.
Set Polar Reference Cursor	Places the red polar sizing cursor at the selected position in degrees. Available on polar piping display.

10.5 Dashboard Overview

You can display or hide the dashboard by selecting the dashboard icon  in the command bar. The dashboard appears pinned to the left side of the UI.

The dashboard includes buttons for the acquisition sequence and common tasks. It also includes a customizable list for gate trigonometry, amplitude readings, TOF readings, and sizing measurements, see Figure 10-6 on page 165.

The readings list refreshes according to the selected active beamset in the command bar drop-down list or by selecting a data display.

Figure 10-6 Dashboard toolbar

Table 53 Dashboard toolbar options

Menu Item	Description
 **Inspection sequence**	Used for data collection, the inspection sequence button will cycle setups, initiate data collection, stop data collection for analysis, and return to setup mode with successive selections. The inspection sequence soft state is displayed in the footer and can be cycled using the dashboard button or F1 shortcut key.
 **Pause**	Available during setup mode and data collection, selecting pause will freeze the encoder position and allow the scanner to be repositioned to the corresponding position, or a new position by presetting the value in **Inspection >Motion Settings >Encoder Preset** and selecting the encoder preset icon on the Inspection Motion form or in the footer (lower-left corner).
 **Auto 80%**	The Auto 80% is used to automatically adjust the gain of the signal in gate A of the active beamset to the stored calibration threshold in preferences (default 80%).
 **Assisted analysis**	When selected, initiates the assisted analysis filters on all beamsets for which auto-execute is enabled. Assisted analysis is an add-on to the standard license.

Table 53 Dashboard toolbar options *(continued)*

Menu Item	Description
 **Snap to peak**	The snap to peak button is used to position the data cursor to the maximum amplitude peak position of the visible data display including zoom, or the zone created by the sizing cursors when they are enabled. On TOF (time-of-flight) data typical of corrosion, the Snap to Peak is used to position the data cursor crosshairs to the thinnest TOF position of the visible C-scan including zoom, or the zone created by the sizing cursors. Snap to peak can also be enabled in **File > Preferences > Appearance** so that it refreshes to the new position any time the sizing cursors are repositioned.
 **Autosizing**	Enables and disables auto-sizing. When enabled, will position data cursors, beam cursor, and sizing cursors to the user defined -X dB drop position after a mouse drag over the area of interest. Independent -X dB drop values are available for the Scan axis, and the Index/UT axis and are configured in **File > Sizing > Auto-Sizing Limits**.
 **Indication table toggle**	Displays and hides the indication table.
 **Add record**	Adds record to the indication table based on active beamset selected in command bar and position of data and beam cursors, and sizing cursors.
 **Delete record**	Deletes current selected record from the indication table.
 **Cursor toggle**	Displays or hides the reference and measure sizing cursors on the data displays.

10.5.1 Readings

Readings are configured independently for PA, Conventional UT, TOFD, and TFM probe types. They include gate trigonometry readings, amplitude gate readings, TOF gate readings, and sizing cursor statistics that refresh on the active beamset and cursors as they are repositioned.

The default readings list can be customized by the user for each probe type in **File > Readings**, or by double-clicking on the readings area in the dashboard.

To customize the default readings lists, select the probe type and source, and toggle readings on or off.

The color bar adjacent to the reading indicates gate A (red), gate B (green), or cursor statistic (black) (see Figure 10-7 on page 168).

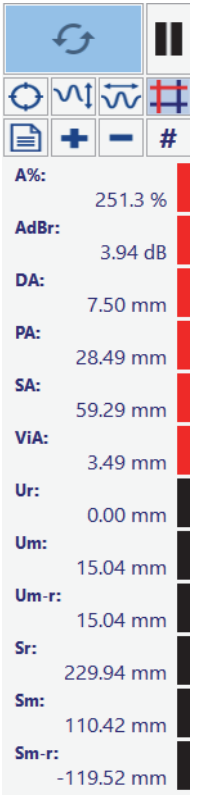


Figure 10-7 Dashboard

11. Reporting

WeldSight software reports include an indication table for recording defects, and customizable weld and corrosion inspection data generated from Microsoft Excel. The reports can be printed or saved to PDF.

11.1 Indication Table Overview

You can display the indication table from the dashboard. It appears in a fixed area below the data windows or can be configured in a custom layout from the data display list.

The indication table is displayed for corrosion or weld, depending on the beamset configuration. The table records includes the data and beam cursor positions, sizing cursor positions, and weld or corrosion readings associated with the inspection.

The indication table can be included in the report either as a table including all records, or as an individual full-page sheet for each record.

11.1.1 Weld Indication Table

When enabled on the dashboard, the weld indication table is displayed for all beamset configurations other than zero-degree PA or UT beamsets. The indication table includes beamset information, sizing cursor positions, gate trigonometry readings, an acceptance decision, and comments for each record.

The reading list that appears in the weld indication table is customizable in **File > Reports > Weld > Show\Hide Indication Table**. It is saved as a system setting.

The flaw types that appear in the pull-down for the weld list can be customized in **File > Reports > Weld > Flaw Types**.

11.1.2 Corrosion Indication Table

When enabled on the dashboard, the corrosion indication table is displayed for PA and UT probe configurations of zero-degree typical of corrosion. The indication table includes beamset information, the thickness reading (T-reading), and corrosion statistics, such as size and percentage of material loss.

The list of readings that appear in the corrosion indication table cannot be customized.

Corrosion indications records are created manually, one at a time from the dashboard. They can also can be created automatically in the corrosion manager.

11.1.3 Creating Indication Table Records

To create a record in the indication table

1. Select **Indication Table**  on the dashboard to display the indication table.
2. Position data cursors and beam cursor on relative data point, and position sizing cursors on each axis around the indication.
3. Select **Add Record**  on the dashboard to create a record in the table, and add an annotation in the data display for indication.
4. To delete a record, highlight a record in the table and select **Delete**  icon on the dashboard, or press the delete key on your keyboard.

11.2 Creating Reports

Reports in WeldSight are generated in PDF format and include a companion Microsoft Excel file of the same name. The corrosion and weld reports combine information such as the indication table, equipment, component, and beamset configuration as sheets that can be turned on or off in **File > Report > Weld** or **> Corrosion** for inclusion in the report.

To generate a weld or corrosion report

1. In **File > Reports > Corrosion** or **File > Reports > Weld**, select the desired sheets to include in the report if different than the installer defaults.
2. In **Analysis > Corrosion Manager**, or **Analysis > Weld Manager**, select **Report** and a file save dialog box appears.
3. Browse to the desired save location, name the file, and select **Save**.
4. The report will generate the companion Excel file of the same name and open the report in PDF format if a viewer is installed on the system computer. If any edits or additions to the report are required, they can be made in the companion Excel file and reprinted or saved to PDF outside of WeldSight software.

11.3 Customizing Reports

The weld and corrosion reports are created from Excel templates in the WeldSight system folder. You can customize WeldSight reports by editing the relevant weld and corrosion sheets in the Microsoft Excel templates. You can also import a custom Microsoft Excel workbook in the template and include it the report.

Custom sheets can include existing customer inspection reports built in Microsoft Excel, pictures, drawings, or inspection details.

To include custom Microsoft Excel Sheets in the weld or corrosion report

1. Open the weld or corrosion Microsoft Excel template located in C:\OlympusNDT\WeldSight\Reports
2. Open the Microsoft Excel workbook containing the sheet to import. On the sheet tab at the bottom of workbook, right click and select **Move or Copy**, and select **OK**.
3. On the copy dialog box select the WeldSight corrosion template file, select **Move to end**, and check **Create a copy**. Close the Microsoft Excel file that contained the new workbook.
4. Close the WeldSight Microsoft Excel template.

TIP

The WeldSight Microsoft Excel template cannot remain open during report creation.

5. In **File > Reports > Corrosion** or > **Weld**, turn on the **Custom** sheet option. This will include any additional sheets in the template when the report is generated.
6. In **Analysis > Corrosion Manager**, or **Weld Manager**, select **Report** and a file save dialog box appears.
7. Browse to the desired save location, name the file, and select **Save**.
8. The software generates an Microsoft Excel companion file of the same name, opens the report in PDF including any additional custom sheets imported to the Microsoft Excel template. Information from the data file is stored in the cover sheet tab; this data can be mapped to an imported custom Microsoft Excel sheet when generating the report.

12. Reading Abbreviation Reference

The readings appearing on the dashboard are identified by unique abbreviations. These abbreviations are described in Table 54 on page 173 and Table 55 on page 176 (also see “Dashboard” on page 42, and “Readings” on page 58).

Table 54 PA, UT, and TOFD readings

Reading	Description
Cursor Readings	
Ur	Position of the reference cursor on the UT axis (not corrected for skips).
Um	Position of the measure cursor on the UT axis (not corrected for skips).
Um-r	Difference between positions of the reference and measure cursors on the UT axis.
Dr	Depth of the reference cursor in the part (corrected for skips).
Dm	Depth of the measure cursor in the part (corrected for skips).
Dm-r	Difference between depth measure and reference cursors in the part.
Ur (TOF)	Position in microseconds of the reference cursor on the UT axis.
Um (TOF)	Position in microseconds of he measure cursor on the UT axis.
Um-r (TOF)	Difference between the reference and measure cursors in microseconds on the UT axis.
Ur (TOFD)	Position of the TOFD reference cursor on the UT axis (available after TOFD linearization).
Um (TOFD)	Position of the TOFD measure cursor on the UT axis (available after TOFD linearization).
Um-r (TOFD)	Difference between the TOFD reference and measure cursors on the UT axis (available after TOFD linearization).
Sr	Position of the reference cursor on the scan axis.

Table 54 PA, UT, and TOFD readings *(continued)*

Reading	Description
Sm	Position of the measure cursor on the scan axis.
Sm-r	Difference between the reference and measure cursors on the scan axis.
Sm-r (SCS)	Difference between the reference and measure cursors on the scan axis corrected for pipe curvature.
Ir	Position of the reference cursor on the index axis.
Im	Position of the measure cursor on the index axis.
Im-r	Difference between the reference and measure cursors on the index axis.
Pr	Position in degrees of the polar reference cursor.
Pm	Position in degrees of the polar measure cursor.
Pm-r	Difference in degrees between the polar reference and measure cursors.
A%r	Value in percentage of the reference cursor on the amplitude axis.
A%m	Value in percentage of the measure cursor on the amplitude axis.
A%m-r	Difference in percentage between the reference and measure cursors on the amplitude axis
Gate Readings	
A%	Peak amplitude of signal in gate A (gate mode dependent).
AdBr	Difference in dB between peak signal in gate A and the reference sensitivity (gate mode dependent).
DA	Depth of the signal in gate A corrected for skips in piece thickness (gate mode dependent).
PA	Surface distance of the signal in gate A measured from the wedge face (gate mode dependent).
SA	Sound path distance of the signal in gate A measured from the beam exit (gate mode dependent).
ViA	Volumetric position of the signal in gate A measured from the weld centerline (gate mode dependent).
B%	Peak amplitude of signal in gate B (gate mode dependent).
BdBr	Difference in dB between peak signal in gate B and the reference sensitivity (gate mode dependent).
DB	Depth of the signal in gate B corrected for skips in piece thickness (gate mode dependent).
PB	Surface distance of the signal in gate B measured from the wedge face (gate mode dependent).

Table 54 PA, UT, and TOFD readings *(continued)*

Reading	Description
SB	Sound path distance of the signal in gate B measured from the beam entry (gate mode dependent).
ViB	Volumetric position of the signal in gate B measured from the weld centerline (gate mode dependent).
W%	Peak amplitude of signal detected in side the weld zone (gate mode dependent).
WdBr	Difference in dB between peak signal in the weld zone and the reference sensitivity (gate mode dependent).
DW	Depth of the signal in the weld zone corrected for skips in piece thickness (gate mode dependent).
PW	Surface distance of the signal in the weld zone measured from the wedge face (gate mode dependent).
SW	Sound path distance of the signal in weld zone measured from the beam entry (gate mode dependent).
ViW	Volumetric position of the signal the weld zone measured from the weld centerline (gate mode dependent).
Sizing Readings	
h\l	Height to length ratio as measured by the UT and scan axis cursors.
h\t	Height to thickness ratio as measured by the UT axis cursors and piece thickness.
Zone Readings	
Zmax%	Maximum amplitude of the active beamset in cursor zone area (3D).
Imax	Position of the Zmax% reading on the index axis.
Dmax	Position of the Zmax% reading on the Depth or UT axis.
Smax	Position of the Zmax% reading on the scan axis.
ZMergeMax%	Maximum amplitude of the volumetric merge in cursor zone area (3D).
IMergeMax	Position of the ZMergeMax% reading on the index axis.
DMergeMax	Position of the ZMergeMax% reading on the Depth or UT axis.
SMergeMax	Position of the ZMergeMax% reading on the scan axis.
Corrosion Readings	
Thickness	Thickness reading in gate A (gate mode and C-scan source dependent).
Metal Loss	Loss of material in percentage from nominal part thickness for current data point.
T Scan Pos	Position of the thickness reading on the scan axis.

Table 54 PA, UT, and TOFD readings *(continued)*

Reading	Description
T Index Pos	Position of the thickness reading on the index axis.

Table 55 TFM readings

Reading	Description
Cursor Readings	
Ur	Position of the reference cursor on the UT axis (not corrected for skips).
Um	Position of the measure cursor on the UT axis (not corrected for skips).
Um-r	Difference between positions of the reference and measure cursors on the UT axis.
Dr	Depth of the reference cursor in the part (corrected for skips).
Dm	Depth of the measure cursor in the part (corrected for skips).
Dm-r	Difference between depth measure and reference cursors in the part.
Sr	Position of the reference cursor on the scan axis.
Sm	Position of the measure cursor on the scan axis.
Sm-r	Difference between the reference and measure cursors on the scan axis.
Sm-r (SCS)	Difference between the reference and measure cursors on the scan axis corrected for pipe curvature.
Ir	Position of the reference cursor on the index axis.
Im	Position of the measure cursor on the index axis.
Im-r	Difference between the reference and measure cursors on the index axis.
Pr	Position in degrees of the polar reference cursor.
Pm	Position in degrees of the polar measure cursor.
Pm-r	Difference in degrees between the polar reference and measure cursors.
Gate Readings	
Rectangle%	Maximum amplitude of the active beamset in rectangle gate.
Drectangle	Depth of the max amplitude signal in rectangle gate.
ViRectangle	Volumetric position from centerline of the max amplitude signal in rectangle gate.
Polygon%	Maximum amplitude of the active beamset in polygon gate.
Dpolygon	Depth of the max amplitude signal in polygon gate.
ViPolygon	Volumetric position from centerline of the max amplitude signal in polygon gate.

Table 55 TFM readings *(continued)*

Reading	Description
Zone Readings	
Zmax%	Maximum amplitude of the active beamset in cursor zone area (3D).
Imax	Position of the Zmax% reading on the index axis.
Dmax	Position of the Zmax% reading on the Depth or UT axis.
Smax	Position of the Zmax% reading on the scan axis.
ZMergeMax%	Maximum amplitude of the volumetric merge in cursor zone area (3D).
IMergeMax	Position of the ZMergeMax% reading on the index axis.
DMergeMax	Position of the ZMergeMax% reading on the Depth or UT axis.
SMergeMax	Position of the ZMergeMax% reading on the scan axis.

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