



Ultrasonic Spot Weld Detector

User Manual

for Model: NextSpot 600

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Statements and Information

Attention

NextSpot 600 Spot Weld Detector consists of high-precision ultrasonic sensors and high-precision electronic computing systems. Please read this manual carefully before any usage, transportation, storage, and operation. All losses caused by the user's incorrect usages against the instructions in this user manual, and personal injuries or human damages from incorrect usages are not the responsibilities of NextNDT Technology Inc.

About this User Manual

This "User Manual" provides users with the proper equipment guidelines, quality assurance, safety guidelines, and other important information, please read carefully before using. If in doubt, please contact your local authorized distributors for technical support.

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1.0 Instrument Overview

1.1 Overview of NextSpot 600

Thank you for choosing NextSpot 600 Spot Welding Detector

NextSpot 600 is developed and designed for spot welding quality inspection and analysis. This system has the following characteristics:

- Advanced high-frequency (16MHz) phased array ultrasonic transducers with 52 independent control channels.
- 64-channel highly integrated ultrasonic signal controlling and the processing circuit.
- Embedded industrial control systems with Linux platform that offer the highest stability and data security.
- Industrial protection design (IP54), suitable for harsh industrial usages.
- Highly integrated database platform technologies that provide seamless data management with efficient Planning-Inspecting-Analyzing functions.
- Easy software update with one click.
- Advanced NAS cloud data storage and data management system (optional)
That is suitable for big data analyzing of smart factories.

1.2 Read before using

NOTE

This section contains important information for using phased array ultrasonic testing equipment safely, maintenance, and storage. Please read this chapter carefully before using the instrument.

1.2.1 Product shipping list (Standard Mode)

- This User Manual
- NextSpot 600 Main unit (fig.1)
- Phased array ultrasonic transducer probe (fig.1)

- Li-ion rechargeable battery (fig.2)
- IR-Remote controller (fig.3)
- AC / DC power adapter (SPU61A-106) with power cable (fig.4)
- Ultrasonic Delay Chips (fig.5)
- Document folder with following documents (fig.6)
 - * Factory calibration certification
 - * Warranty card.
 - * Getting started instructions



fig.1 NextSpot 600 with sensor probe
Remote control



fig.2 smart Li-ion battery



fig.3



fig.4 AC/DC adapter with cable
holder



fig.5 Delay line chips

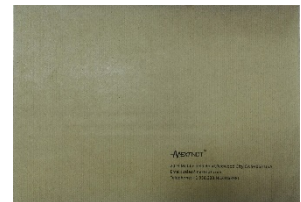


fig.6 Document

1.2.2 Notice of utility limitation and warranty conditions

1.2.2.1 Equipment usage restrictions

NextSpot 600 series are high precision electronic equipment specifically designed for inspecting resistance spot-welding joints.

Do not use NextSpot 600 in any other usages. Please NOTE that all the damages or malfunctions due to wrongful usages ARE NOT COVERED BY WARRANTY.

1.2.2.2 Warranty policies and conditions

NextNDT Group provides reliable quality assurances, and professional after-sales services to all the official registered users. The warranty policies for NextSpot 600 Ultrasonic Spotwelding Analyzing systems are:

- 12-month warranty for NextSpot 600 Analyzer Unit after delivery and acceptance.
- 3-month warranty for ultrasonic transducer probe after delivery and acceptance.

NOTE

Please contact your official regional agent to confirm the details of any optional warranties or other relevant provision that provided the regional agent.

1.2.3 Visual inspections before using

NextSpot 600 is a high-tech product created by advanced phased array sensor technology and advanced semiconductor technologies. It is a high-precision equipment that requires sensitive handlings. We do our best to ensure the quality of our products, and we also use the best protective packaging to avoid damages during transportation and delivery. However, we recommend a full visual inspection of the instrument to ensure that it has been delivered in good condition.

1.2.3.1 Inspecting the Protection Case

NextSpot 600s are delivered in a professional carry case (Case600), and it is made of high-strength protective material. It will protect your equipment from most impacts during transportations and storage, and can also further protect the unit from moisture, dust, and other harsh elements. Please check the case exterior appearance for the following details:

- ✓ Ensure that the appearance of the case does not have deformations, holes, and depressions. (Except for slight scratches caused by transportation)
- ✓ Ensure that all labels on the case are intact.
- ✓ Ensure the double-throw latches are in proper condition and can firmly lock the case.
- ✓ Check the trolley handle and the caster wheels to verify if they are working properly. (Except for minor wheel wear and tear)

1.2.3.2 Inspecting the carry case internal side

- ✓ Are the products and materials that listed in section 1.2.1 complete?
- ✓ Are the foam material inside the storage case damaged?
- ✓ Is there moisture or water trace inside the case?

1.2.3.3 Inspecting the NextSpot 600 instrument unit

- ✓ Are there any gouges or scratches on the instrument?
- ✓ Are the label and logos on the instrument intact?
- ✓ Are there any damages or cracks on the LCD screen?
- ✓ Are there any loose or missing screws on the instrument?

1.2.3.4 Inspecting the ultrasonic transducer probe

- ✓ Are there any damages on the transducer probe cable?
- ✓ Are there any nicks or scratches on the transducer's metal housing?
- ✓ Is the ring fixes the delay chip loose or missing?
- ✓ Are there any defects or depressions on the delay chip?

1.2.3.5 Inspecting the remote controller

- ✓ Is the remote controller damaged or scratched?
- ✓ Is the battery cover intact?
- ✓ Are the Internal batteries installed correctly?

1.2.3.6 Inspecting the power adapter

- ✓ Is the power adapter exterior appearance damaged or scratched?
- ✓ Is the power adapter cable damaged or scratched?
- ✓ Is the power adapter specification label intact?

1.3 Hardware Description

1.3.1 NextSpot 600 instrument unit

1.3.1.1 Unit exterior descriptions

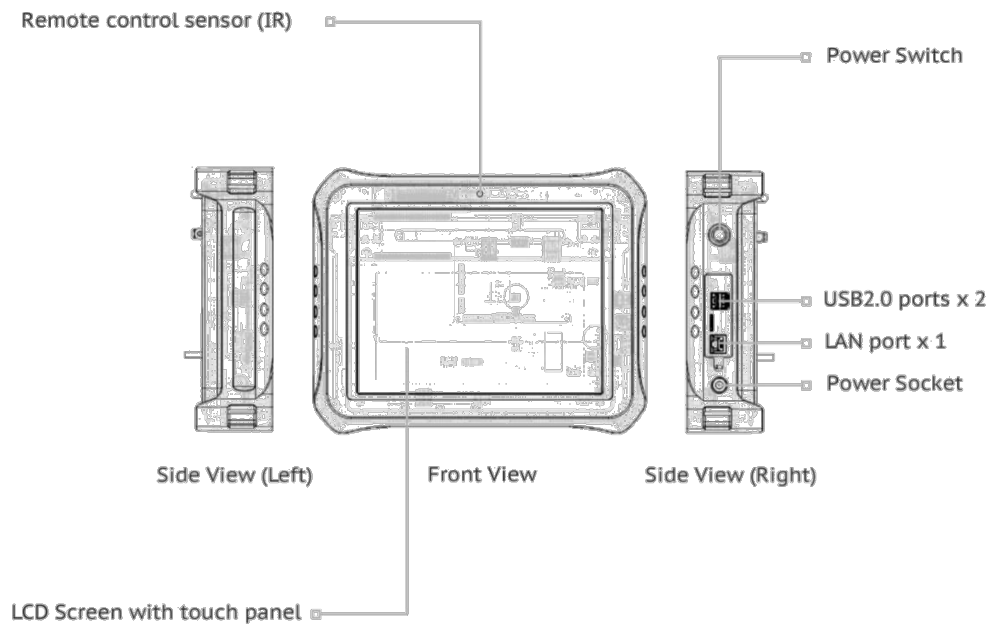


fig.7 Overview of NextSpot 600 Instrument Unit

1.3.2 NextSpot 600 phased array ultrasonic transducer probe



fig.8 Disassembled Ultrasonic Transducer Probe

1.4 Li-ion rechargeable battery

NextSpot 600 Spot Weld Detectors use a high capacity Li-ion rechargeable battery pack.

The battery pack is pre-installed into the instrument before the delivery to the end user.

Battery Model: LI204SX

Battery Type: Intelligent Li-ion rechargeable battery

NOTE

For your safety, please read Chapter 3.4 carefully. <Safety information for rechargeable battery pack >.

1.5 NextStudio Software Platform

1.5.1 NextStudio Software Platform for NextSpot 600 Spot Weld Detector

NextSpot 600 Spot Weld Detector has a powerful software platform named NextStudio. The NextStudio Software Platform is a highly integrated software system that provides the following functions and features:

- Inspection Route Designing and Pre-planning Database
- Spotwelding joints inspecting and analyzing.
- Spotwelding inspection data managing and analyzing Database.
- Spotwelding inspection data reports.

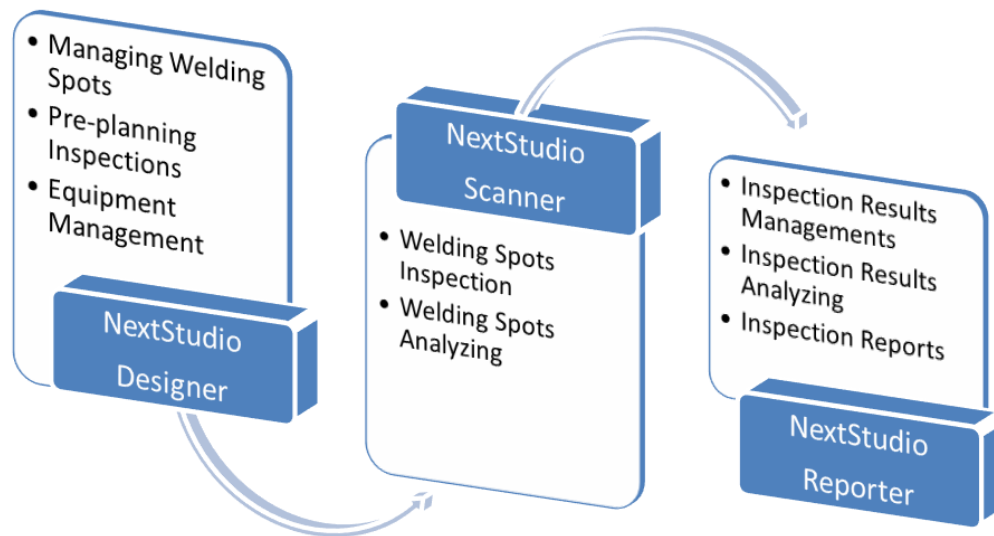


fig.8 NextStudio Software Platform

NextStudio Software Platform is both powerful and efficient yet user-friendly. With the support of this software platform, your Spotwelding quality management will be greatly improved. For further information and instructions, please refer to chapter 2.2.3.

1.5.2 Introduction of NextStudio software functions

1.5.2.1 NextStudio Designer

NextStudio Designer is a powerful and user-friendly Spotwelding inspection managing and planning database software system. Mastering this software will give you a powerful tool that can greatly improve your Spotwelding inspections efficiency.

The main functions of NextStudio Designer are:

- Instrument users management functions: to add, remove, or edit usernames and passwords, and manage user privileges and permissions.
- Determining and designing reasons of inspection judgments: to design and manage the reasons that caused the pass or fail judgments of each inspection.
- Database management functions: to create, delete, query, import, exporting the welding spot inspection databases.

- Templates (EXCEL) for designing welding spot specifications: a simple and powerful design tool for designing the specifications and inspection standards for every single welding spot of parts and BIW (parts groups). The figures and information can be managed as the following:
 - a. Structure information of welding spots: Spot name or number, the thickness of each layer, the number of layers configuration,
 - b. The requirements of welding process control: nugget diameters, depth of indentations, stack thickness,
 - c. Identification of welding spots: Parts names, part group, welding station, notes, etc.
- Importing welding joints data from templates, and manage the welding joints information.
- Welding parts database: create and manage welding parts, and parts groups with accompany real photo images or CAD images: to manage weld implant or remove welding part assembly images.
- Inspection path planning database: to create required inspection path planning of welding joints. Can add or remove welding joint inspection route planning.

NOTE

For detailed information of NextStudio Designer software, please refer to section 2.2.3 <pre-planning Inspection database >, or obtain professional technical training by NextNDT authorized service personnel.

1.5.2.2 NextStudio Scanner

NextStudio Scanner software is an integrated software that drives the NextSpot 600 detector to inspect and analyze spotwelding joints. NextStudio Scanner is a powerful inspection database software. However, it is simple and easy to understand and can be mastered by any trained inspection staffs.

The main functions of NextStudio Scanner are:

- Instant inspection mode: suitable for instant spotwelding inspections or simple welding parts with less welding joints that does not request a pre-planning inspection database. It is recommended to take photo images of the welding parts that have been marked and

- indicated with numbers and the inspection route of the welding joints for the reference inspection reports.
- Pre-planning inspection mode: suitable for welding joints inspection of mass production parts. NextStudio Designer software is used to create and manage the inspection planning programs.
 - Exporting inspection result data: to export data of inspection results to a specified storage instrument.
 - Standard export mode: export inspection data to a USB Drive and synchronize with the host PC.
 - Network export mode: export inspection data to the NAS storage via network connections.
(NAS data management is optional and requires additional service charges)
 - Inspection parameter settings: use to set and edit various parameters for the ultrasonic inspections.
 - System settings: setting the language, time, LCD brightness, and upgrade the basic operating system
 - Algorithm: setting inspection standards of nugget diameters and indentation.
 - Sound velocity setting: setting or adjusting the velocity of welding materials and the maximum thickness of single sheet that require inspection.
 - Ultrasound setting: setting the parameters for ultrasonic inspections, gain, delay time, threshold, surface tracking, and the second echo analysis.

NOTE

For further detailed information about this software, please refer to Chapter 2.1 or obtain technical training by NextNDT authorized service personnel.

1.5.2.3 NextStudio Reporter

NextStudio Reporter is a powerful software for welding joints inspection data management and analysis. It can also export test data in Excel formats.

The main function of NextStudio Reporter are:

- Inspection database management: NextStudio Reporter can import welding joints inspection data from Scanner and create inspection database for backup and analyzing on the host PC.
- Managing inspection data: Within each inspection database, users can search, arrange, and retrieve the inspection data with search engines.
- Retrieving inspection data: Reporter software is designed for a PC desktop environment. It can display the following welding joint inspection data: A- scan waveform, C- scan imaging, nugget diameter, the depth of the indentation, and other critical data.
- Inspection Data Analysis: Reporter provides a simulation function which can analyze the inspection data by adjusting ultrasonic parameters for each welding joint. This simulation function is very useful for the further optimization and analysis of the spotwelding process. And this simulation will not affect the original data. The raw data will still maintain its original state after the simulation analyzing.
- Export inspection data report in Excel format: NextStudio Reporter software can export the inspection results in Excel format files. The data can be further analyzed by the ERP systems.

NOTE

For detailed instructions on NextStudio Reporter software, please refer to chapter 2.2.7, <export inspection data> or obtain technical training by NextNDT authorized service personnel.

2.0 Operating Instructions

2.1. Inspection Process Guidelines

2.1.1 Instant inspection process guidelines

The procedures of an instant welding spot inspection mode are as below:

Inspection preparation → Create new inspection task → applying couplant gel → inspecting welding joints

→ export inspection data → Manage inspection data with Reporter → exporting test reports

2.1.1.1 Inspection Preparation

The preparations requested before inspecting spotwelding joints are as below:

- **Preparing the parts for inspection:** prepare welded parts, confirm welding joints of each part for inspection and visually inspecting the welding joints.
- **Preparing the couplant gel:** prepare the necessary couplant gel for inspection.
- **Preparing the NextSpot 600:** check the instrument conditions, such as visual checking the instrument and the transducer probe, turn on the instrument, checking the login status, checking the date and time, checking battery status, ensure that database is “Weld_Check.db”.

2.1.1.2 To create an inspection task

Create a new inspection task by clicking on the “” button the screen.

2.1.1.3 Applying couplant gel to the welding parts

Apply coupling gel to cover the pits of the welds

(multiple welds can be applied at once to speed up the inspection).

NOTE

Do not apply coupling gel too much as it might be wasteful and increase your inspection cost.

2.1.1.4 Inspecting Spotwelding joints

Welding joint inspection procedures :

Calibration → Inspection → Analyzing → Make judgment and Record**NOTE**

The “calibration” is requested before the inspections to a new part that its top layer sheet has different thickness from the previous welding joints that had been inspected. However, the calibration may be done only once if there should be multiple welding joints with the same structures.


2.1.1.5 Data export

Insert a USB drive into the USB port of the instrument and the inspection data will be exported to the USB drive by following the instruction steps on the screen.

2.1.1.6 Synchronize the inspection data to the Host PC

Using NextStudio Reporter software to import the inspection data from the USB drive to the Host PC.

2.1.1.7 Generating inspection reports

Using NextStudio reporter software to arrange and analyze the synchronized inspection data. User can export the necessary data to an Excel format file by clicking the “  ” button.

2.1.2 The procedures of pre-planning inspection

A complete process of pre-planning inspection includes the following steps:

Planning and establish an inspection planning database → Export Pre-planning database to a USB Drive

→ Synchronize with the NextSpot 600 → Preparation inspection → Create new inspection

→ Applying coupling gel → inspecting welding joints → Inspection data export & synchronize with the host PC → Inspection data management and analyzing → Exporting inspection report to Excel

2.1.2.1 Establish a pre-planning inspection database

Use the NextStudio software to create the pre-planning inspection database. The planning database can manage the specifications of welding parts, welding planning information, determine

the number of welding joints, paths, and other parameters. It can also manage multi-images of the welding parts and multi-inspection routes.

2.1.2.2 Export the pre-planning database


The pre-planning inspection database can be exported and synchronized with the NextSpot 600 instrument via a USB flash drive.

2.1.2.3 Prepare for inspection

The preparation requirements before inspecting a spotwelding joint are as below:

- **Preparing the parts for inspection:** prepare welded parts, confirm numbers of the parts, confirm welding joints of each part for inspection and the pre-visual inspection of spot welding joint.
- **Preparing the couplant gel:** prepare the necessary couplant for inspection.
- **Preparing the NextSpot 600:** check the instrument conditions, such as visual checking the instrument and the transducer probe, turn on the instrument and check the login and battery status, and ensure that the correct database is selected. If not, you need to choose and change the inspection database.

2.1.2.4 Create a new inspection task

Select the inspection planning database first, then click on the “  ” button to start a new inspection task.

For other procedure, please refer to chapter 2.1.1.3 to 2.1.1.5 <Instant inspection process guidelines>

2.2. Detailed inspection procedures

2.2.1 Turn on the NextSpot 600

2.2.1.1 Start the instrument

Press and hold the power button for about 3 to 5 seconds to start the instrument; you can hear a single beep tone when the power is activated. The total start time may take about 13 to 15 seconds.

2.2.1.2 Initial login

Click on the numeric keys on the pop-up keypad to input password to log into the database.

NOTE

The latest used database will remain for the next login. The user needs to login with the correct password of the active database. If you do not have the password, please contact the administrator of the database to log in the database first and change the database to the “Weld_Check.db” (Instant Inspection mode).

2.2.1.3 Introduction of the display

Below is the initial login screen



Fig.9 Login Dialog box and keypad

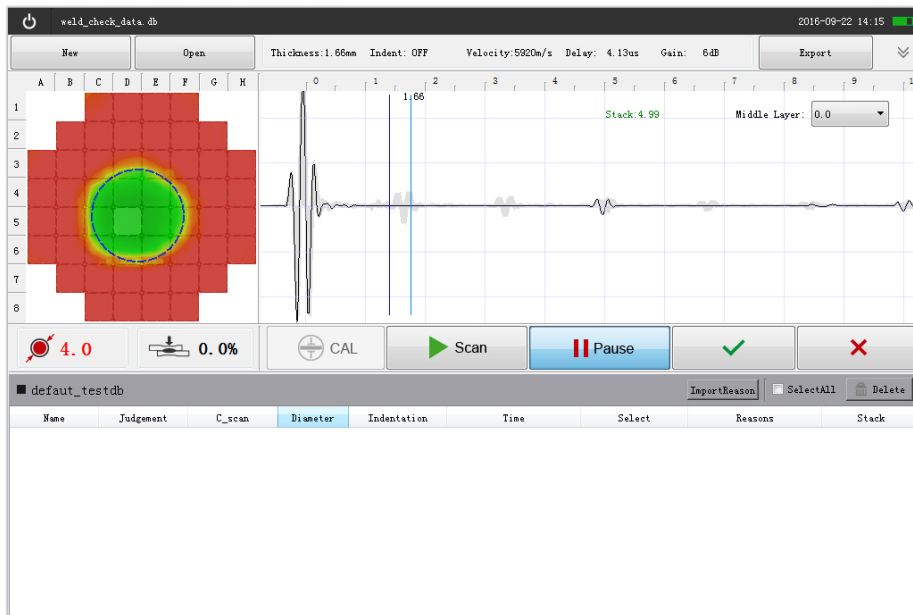



Fig.10 example of a Main interface displayed after login

2.2.2 Instrument Setting and configuration (if necessary)

The system comes with its default parameters settings, and it can be modified. The switch to get into system setting is located top right corner as shown: 

NOTE

The Instrument setting operation is only allowed by the authorized personnel. Incorrect setting the instrument may cause system failures and other technical issues to the instrument system.

2.2.2.1 Language Selection

NextSpot system provides other multi-languages besides English. Currently simplified Chinese is the second language that is available for the users who prefer Chinese. Click on the “Set” to open the setting phase, and then click on “System” and system setting interface will appear as fig.11 .

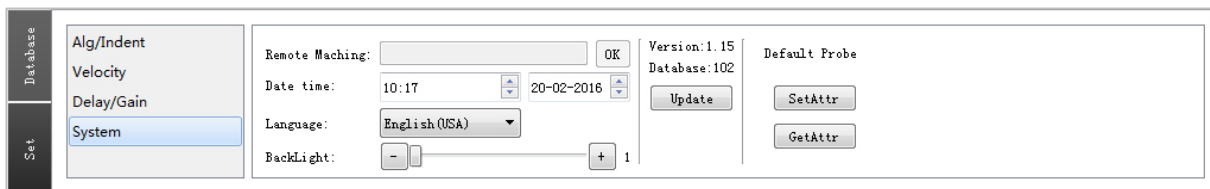


Fig.11 System setting interface

The system default language is English (USA) , by clicking on the “Language “ drop-down menu, the “Simplified Chinese “option will appear, and the system language can be changed to Chinese by choosing “Simplified Chinese.”

2.2.2.2 Verify the software version and database version

The version information of NextStudio Scanner and database are critical and it can affect the compatibilities between the Scanner and the database. The user can confirm the current version information of the Scanner system and database on the right side of the Set-System interface. See fig. 11.

2.2.2.3 Setting system time

System date and time could be set in the “Set – System interface.” The user can adjust the time by choosing from pop-up virtual calendar or input directly with the pop-up virtual keyboard. See fig.

11.

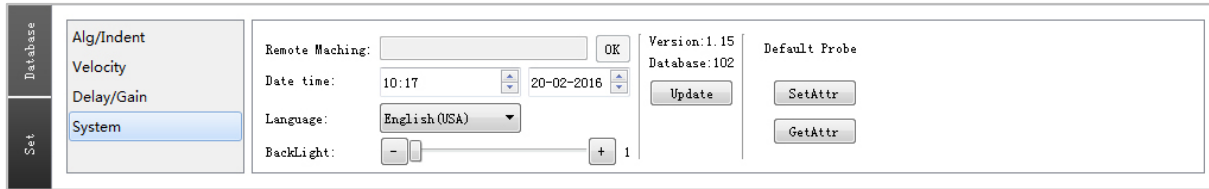


Fig.11 System time setting interface

2.2.2.4 Setting inspection algorithms

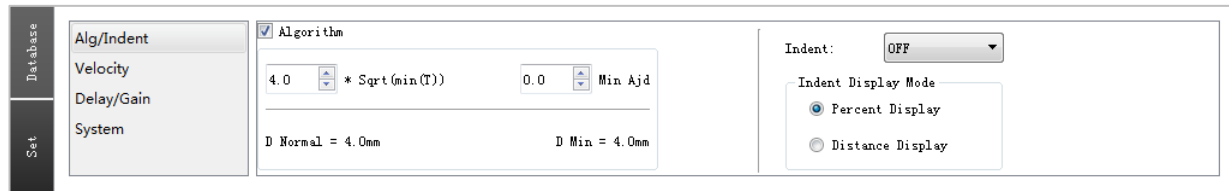


Fig.12 Analyzing Algorithms setting interface

The user can set the analyzing algorithms for “Instant Inspection Mode”:

➤ **Setting the analyzing algorithms for welding nugget diameters**

The user can determine the standards nugget diameter requirement and the minimum diameter requirement. Fig.12. [$X * \text{Sqrt}(\text{min}(T))$] is a nugget diameter calculation formula, by changing the value, the diameter requirements will be changed. The system also allows the user to set the lower limit from the nugget diameter requirements.

➤ **Choose and set the analyzing algorithms for indentation depth**

Open the instrument setting screen, select "Set - Algorithm/indentation," as shown, and modify the parameters in the "indentation" option to set the required range for welding indentation. Fig.12. fig.13.

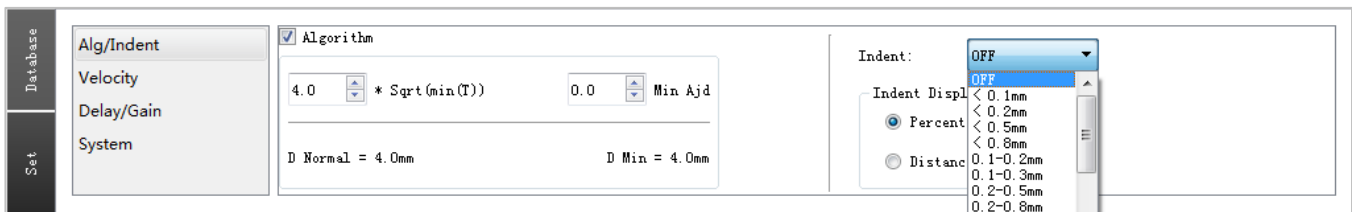


Fig.13 Analyzing Algorithms setting interface for Indentation

2.2.2.5 Setting the Sound Velocity of Materials

➤ **The importance of the velocity setting**

The accuracy of an ultrasonic inspection depends on the speed of ultrasonic wave traveling in the materials (velocity). The velocity setting affects much to the inspection accuracy; therefore, **it must be set correctly.**

➤ **Setting velocity for inspecting steel parts**

Open the instrument setting screen, select "Set - Velocity," as shown in fig.14, and select the "Steel (5920)" button to complete the setting for steel inspection.

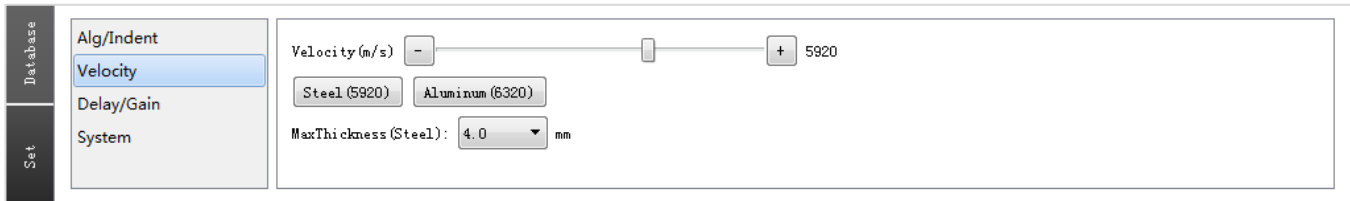


Fig.14 setting interface for Velocity

➤ **Setting velocity for inspecting aluminum parts**

Open the instrument setting screen, select "Set - Velocity," as shown in fig.14, and select "aluminum (6320)" button to complete the setting for aluminum inspection.

➤ **Setting Velocity for inspecting other materials**

For inspecting other materials, the user can manually adjust the velocity. Open the instrument setting screen, select "Set - Velocity", as shown in fig.14, manually set the velocity by adjusting the slider.

➤ **Set the maximum thickness of single layer that can be measured**

The default maximum thickness of the single layer can be measured is 3 mm. Users can change this range to 4 mm if necessary.

2.2.2.6 Setting the parameters for ultrasonic inspections

➤ **Importance of ultrasonic parameter setting**

Ultrasonic parameter setting is the most important configuration that affects the spotwelding inspection results and the even affect the analyzing results! Optimize the parameters setting can improve inspection results. **Conversely, incorrect parameters can easily lead to data deviation or inspection failures.** The key parameters of ultrasonic inspection are shown in fig.15

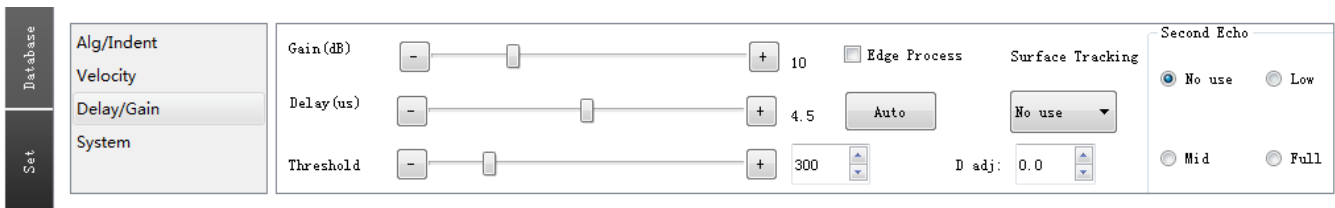


fig.15 Ultrasonic Parameter setting panel

➤ **Setting Gain value**

Gain value (dB) is the factor that determines the sensing capability of ultrasonic Inspections. By adjusting gain value correctly, this can achieve better signal-to-noise ratio and better inspection accuracies.

Setting procedures: Open the instrument settings interface, select "Settings - Delay / Gain" and drag the "Gain (dB)" slider, or click on the increase and decrease buttons to make adjustments.

➤ **Delay time setting**

Ultrasonic delay adjustment ensures the accuracy of distance from ultrasonic transducers to the inspection interfaces of the testing parts. Use the delay adjustment to achieve good ultrasound reception signal for inspection accuracy.

Setting procedures: Open the instrument settings interface, select "Settings - Delay / Gain" and drag the "Delay (us)" slider, or click on the increase and decrease button to adjust the delay value.

➤ **Threshold value setting**

The threshold value is a critical factor that determines the limitation value that calculates to see if an ultrasound reflection is a defects signal or not. A reasonable threshold value setting can achieve good ultrasonic signal calculation and determination for accurate inspection results.

Setting procedures: Open the instrument setting screen, select "Set - Delay / Gain" and drag the "threshold" slider or click on the increase and decrease button to complete the adjustment threshold.

➤ **UT Parameter AUTO Button**

NextSpot 600 has an "Auto" button that can help users to set the 3 ultrasonic parameters automatically. The user needs to obtain this "Auto Setting" after the maintenance for the transducers: e.g. re-applied couplant gel to the transducers, replaced delay chips. This auto setting progress is very useful to setting the ideal values for gain, delay, and the initial thresholds to achieve the best compatibility between the transducers and the NextSpot 600.

NOTE

User who needs to adjust the key ultrasonic parameters must be an authorized user that is skillful enough or have received professional training by NextNDT technical instructors.

2.2.2.7 Diameter calculation correction

NextSpot 600 system allows the user to manually adjust the tolerance of the use nugget diameters for correction purpose. The setting procedures are:

Open the instrument setting screen, select "Set - delay/gain," as shown in fig.16 "D adj.," then manually modify the diameter correction value.

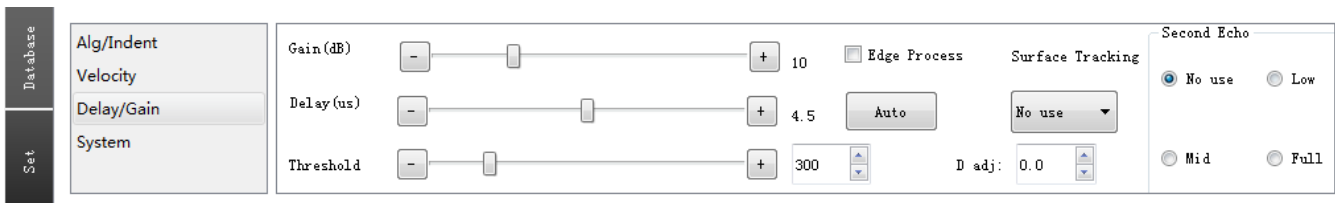


fig.16 Diameter adjustment, Surface Tracking, Second Echo analyzing setting

2.2.2.8 Setting surface tracking mode

NextSpot 600 has its unique "Surface Tracking" technologies which can reduce the interferers caused by the deformation of the welding surfaces. It is recommended to activate the surface tracking function for most of the spotwelding inspections.

Setting procedures: Open the instrument setting screen, select "Set - Delay / Gain" to select "Surface Tracking" for the necessary levels that is suitable for inspections. There are 5 levels available:

- No use: Do not use surface tracking. This is only suitable for very flat and very fine surfaces.
- Low: minimum surface tracking; this is suitable for very flat and fine surfaces.
- Mid: medium surface tracking; this is suitable for common welding surfaces.
- Full: high surface tracking; this is suitable for welding surfaces with obvious deformation.
- Enhance: Very strong surface tracking; this is suitable for welding surfaces with deep indentations and bad deformation.

2.2.2.9 Setting secondary echo inspection mode

Secondary Echo inspection mode is used to detect the area of HAZ (Heat Affected Zone),

Setting procedures: Open the instrument setting screen, select "Set - Delay / Gain" to select "Second echo" to obtain adjustments for the secondary echo mode. There are 4 levels available:

- No use: do not use secondary echo process, only suitable for calibration.
- Low: low secondary echo process, suitable to very stable spotwelding process.
- Mid: medium secondary echo process, suitable to common spotwelding process.
- Full: full scale secondary echo process, suitable to complicated spotwelding process, such as tin plated spotwelding joints or unstable welding process inspections.

NOTE

User who needs to adjust the key ultrasonic parameters must be an authorized user that is skillful enough or has received professional training by NextNDT technical instructors.

2.2.3 Preparing the inspection databases:

Inspection databases are vital for test data collection, storage, backup, sharing, management, and traceability. To create an inspection database correctly is one of the most important procedures of ultrasonic spotwelding inspection and analysis. Therefore, the user must set up a new database or choose an existing database before starting inspections. NextSpot 600 provides 2 types of inspection databases for different inspection purposes: instant inspection database and pre-planning Inspections Database.

➤ **Instant inspection mode database:**

The instant inspection mode is for temporary inspections, immediate inspections, and simple inspections that do not request further routine tests.

✧ **Creating a new inspection database**

Open the instrument settings interface, select "Settings - Database," on the right side of the screen and enter the name of the database, then click on the "New DB" button as shown below:

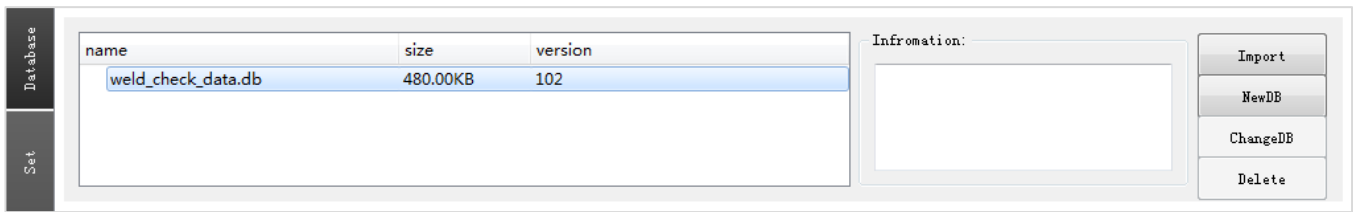


fig.17 Database setting Panel

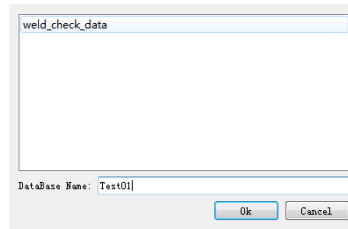


fig.18 Input Database name

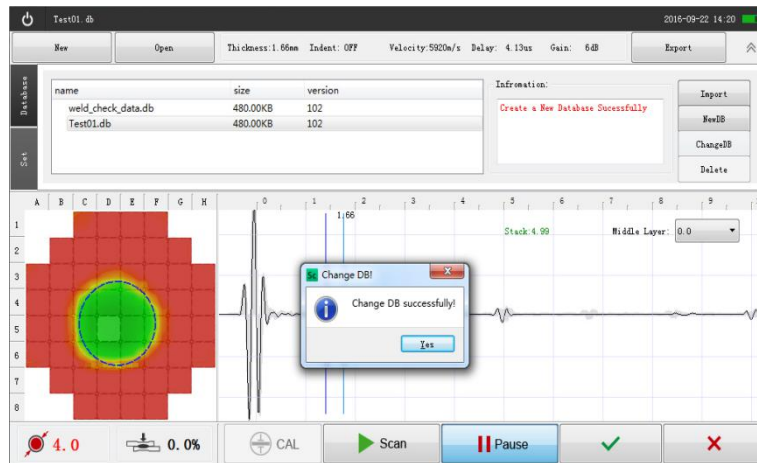


Fig.19 choose a created database

❖ **Choosing the database for inspection**

Open the Instrument Settings interface, select "Settings - Database," select the newly created database, and then click on the "Change Database" button on the right side of the setting panel (fig.19) to activate the new database for inspection. A pop-up message box will appear and inform the user that "Change DB successfully."

❖ **Creating new inspection tasks**

To start a new inspection in a chosen database requires the user to create a new inspection task. This function can organize the inspection tasks for further data comparisons and analysis within multi inspection tasks.

Operation procedures: Close the instrument settings interface, click on the "New" button located on the upper top left corner of the screen and enter the name of the new task "Test001" as shown below:

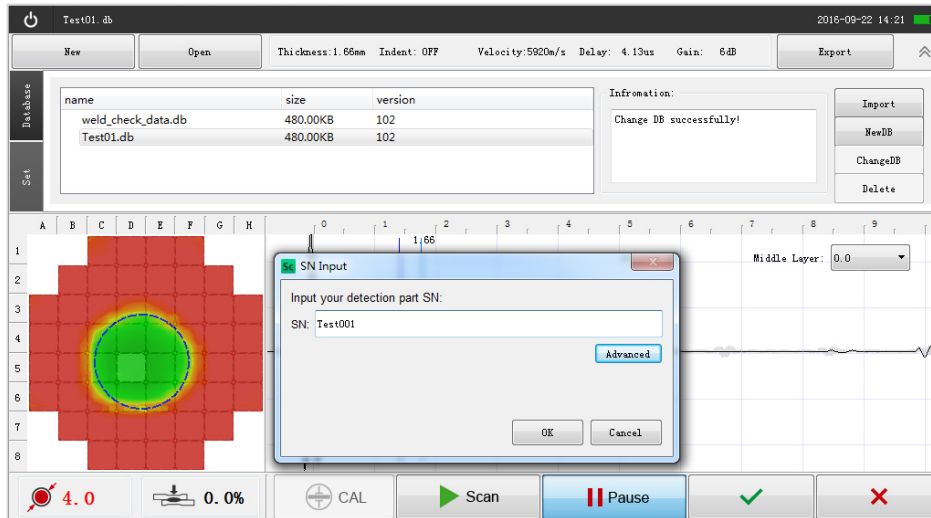


Fig. 20 Input the name of a new inspection

➤ **Pre-Planning the inspection database:**

To create an pre-planning inspection database

A Pre-planned inspection database can help to set up a unified inspection standard for all inspectors that will significantly increase the efficiencies of Inspections and data flows management, archiving, and create traceability analysis for spotwelding Quality controls.

Pre-planned inspection databases could be created through the following procedures:

- ✧ Identify the Parts for inspection pre-planning

Preparing the information that could identify the parts and weld spots, such as parts name, the parts group and photo images of the parts and the inspection standards of all welding spots (must include the inquiries of nugget diameters and indentations). The parts images should be able to show the locations of all welding spots.

Hints & tips!

It is recommended to use the welding process instruction documents for planning the inspection database. The reasonable logic of creating inspection planning database should be, a Parts-group

may include a few welding parts, e.g. An engine room compartment could be considered as a “Parts-group” and a “left beam” of the engine room compartment could be considered as a welding part.

❖ **Logics of inspection planning and classification**

The designing of inspection routes should be referred to the spotwelding orders that indicated and instructed by the welding process documents, or design a new inspection routes if necessary.

❖ **Creating a pre-planned inspection database**

✓ **To complete the welding spot information data table**

The database template is a convenient tool that provide efficient welding spot information input and management (Fig. 21). Users can create the data table with a spreadsheet.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
1	Weld Name	Top Layer	Center Layer	Bottom Layer	3-Layer	Min-Diameter	Normal Diameter	Min-Indentation	Max-Indentation	Min-Stacks	Max-Stacks	Safte Weld	Chisel Check	Welding Station	Parts Group	Parts Name	Remark	
2	1	3	0	2	N	6.0	6.5	0.01	0.6	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
3	2	3	0	2	N	6.0	6.5	0.01	0.6	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
4	3	3	0	2	N	6.0	6.5	0.01	0.6	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
5	4	1.4	3	2	Y	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
6	5	1.4	3	2	Y	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
7	6	1.4	3	2	Y	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
8	7	1.4	3	2	Y	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
9	8	1.4	3	2	Y	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
10	9	1.4	0	2	N	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
11	10	1.4	0	2	N	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
12	11	1.4	0	2	N	6.0	6.5	0.01	0.28	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
13	12	2	0	3	N	6.0	6.5	0.01	0.4	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
14	13	2	0	3	N	6.0	6.5	0.01	0.4	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
15	14	2	0	3	N	6.0	6.5	0.01	0.4	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
16	15	2	0	3	N	6.0	6.5	0.01	0.4	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
17	16	1.6	0	1.4	N	4.7	5.2	0.01	0.2	0.1	0.5	N	N	LH	DNL	Ream Beam	KP	
18	17	1.6	0	1.4	N	4.7	5.2	0.01	0.2	0.1	0.5	N	N	LH	Floor	CutBeam	KP	
19	18	1.6	0	1.4	N	4.7	5.2	0.01	0.2	0.1	0.5	N	N	LH	Floor	CutBeam	KP	
20	19	1.6	0	1.4	N	4.7	5.2	0.05	0.15	0.1	0.5	N	N	LH	Floor	CutBeam	KP	
21	20	1.6	0	1.4	N	4.7	5.2	0.01	0.2	0.1	0.5	N	N	LH	Floor	CutBeam	KP	
22	21	1.6	0	1.4	N	4.7	5.2	0.01	0.2	0.1	0.5	N	N	LH	Floor	CutBeam	KP	
23	22	1.6	0	1.4	N	4.7	5.2	0.01	0.2	0.1	0.5	N	N	LH	Floor	CutBeam	KP	
24	23	1.6	0	1.4	N	4.7	5.2	0.01	0.2	0.1	0.5	N	N	LH	Floor	CutBeam	KP	

Fig. 21 Image of welding spots data table

NOTE

- Do not delete the formulas in the template.
- Do not delete or increase the columns of the data table.
- Inputting a large number of welding joints information requests repetitive copying and pasting the formula in the template.

✓ **Creating a new pre-planning inspection database**

Run the database designing software, "NextStudio-Designer.exe," click on the "New Database" button to create a new database, then select the database storage location and input the database name as shown below:

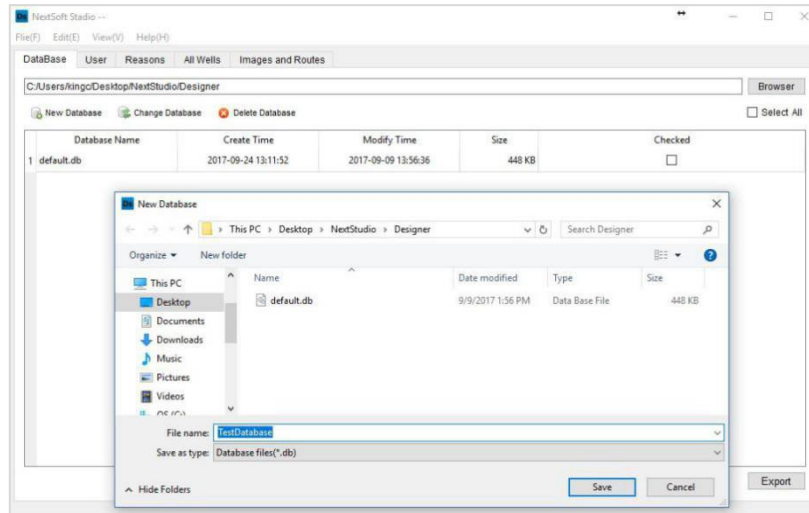


Fig.22 create new database and save with designated names

✓ **To create users for the database**

Activate the user manager by clicking on the “User” tab. On this page, the administrator can create and manage the NextSpot 600 instrument users and modify their levels of permissions.

- Click on “Add User” button to create a new user.
- Double click on the “User Name” area to change and edit the user’s name.
- Double click on the “Icon” area to change user’s thumbnail image.
- Double click on the “Password” area to change and edit the user’s password.
- Tick the marks to determine the permissions as needed:

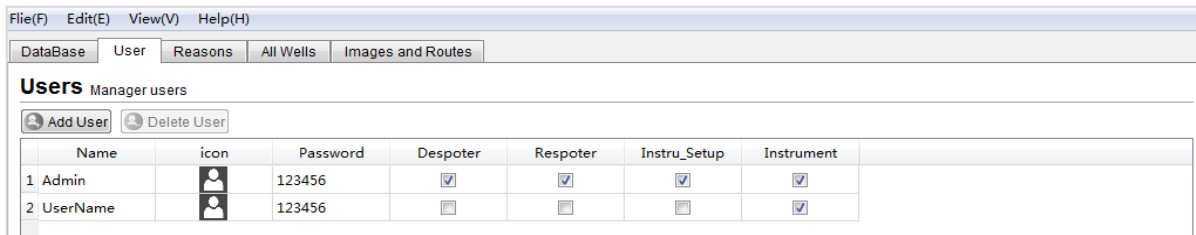


Fig.23 User Manager

NOTE

- Only the administrators should have full permissions.
- It is recommended that that limited permissions are set to non-admin inspection staffs.

✓ **Managing the descriptions of inspection judgment reasons**

Click on the tab of “Reasons” to switch to the “Reasons” management panel. Double click on each method area of “Reasons to pass a weld” or “Reasons to fail a weld”, will active the dialog boxes to edit the descriptions for an inspection judgment, e.g. Edit the judgment reason of visual inspection to “Missing” which means “the welding spot was missing”, then click on the “apply” button to save the changes, or click on on “Cancel” to abort the changes.

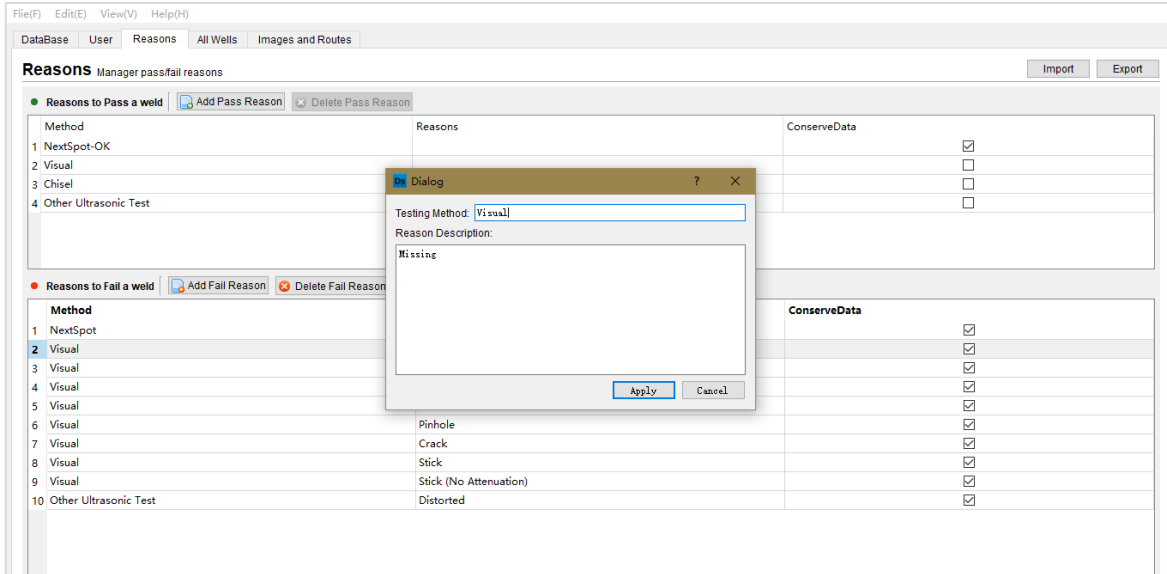


Fig.24 Reasons Editor panel

Besides editing the reasons, the administrator can add new reasons or delete unnecessary reasons by clicking on “Add Pass reason” or “Add Fail Reason”

NOTE

- It is recommended to check the “Conserve Data” for each reason, which will keep all inspection data.
- All the reasons have been created or changed can be exported to a USB thumb drive and synchronized with NextSpot 600 instruments.

✓ **Importing welding joints data from Excel template**

Open the Excel file that the welding joints information has been designed, drag the mouse cursor to select all the weld information, and then copy them to the clipboard.

Run “NextStudio-Designer.exe” and click on “All Welds” to switch to the “Weld Manager” panel then click on the “Import” button to import the welding information from the clipboard into the Designer.

Click on the “OK” button to complete the weld data import procedure as fig.25:

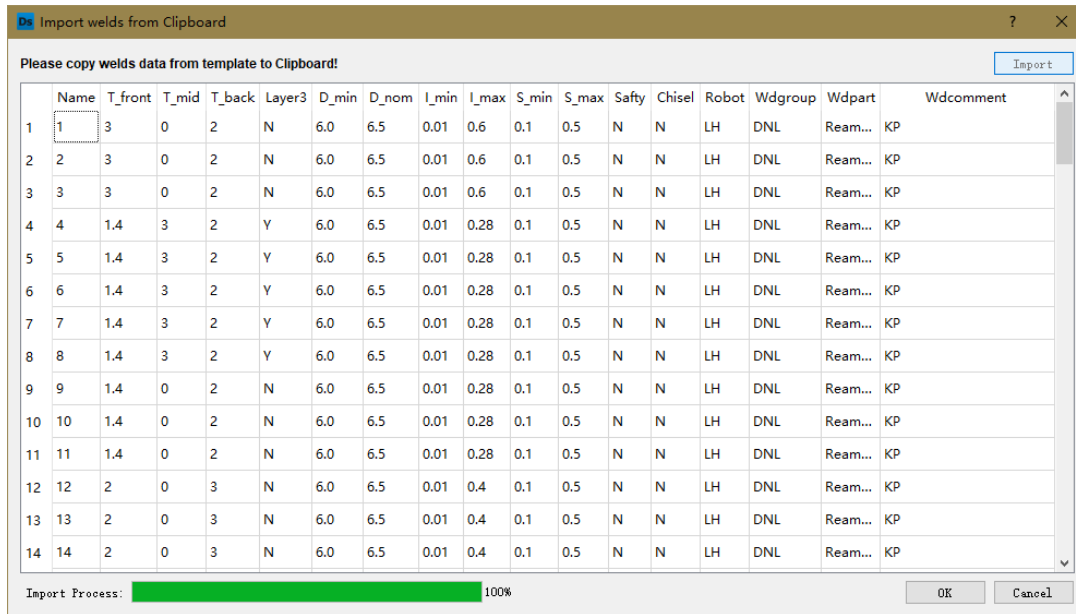


Fig.25 import welding joints information from clipboard

✓ **Importing Spotwelding Parts Images**

Click on "Images and Routes" tab to activate the part image and Inspection route manager. The Part Image manager and Inspection Route manager are on the left side of the Panel, fig.26 .

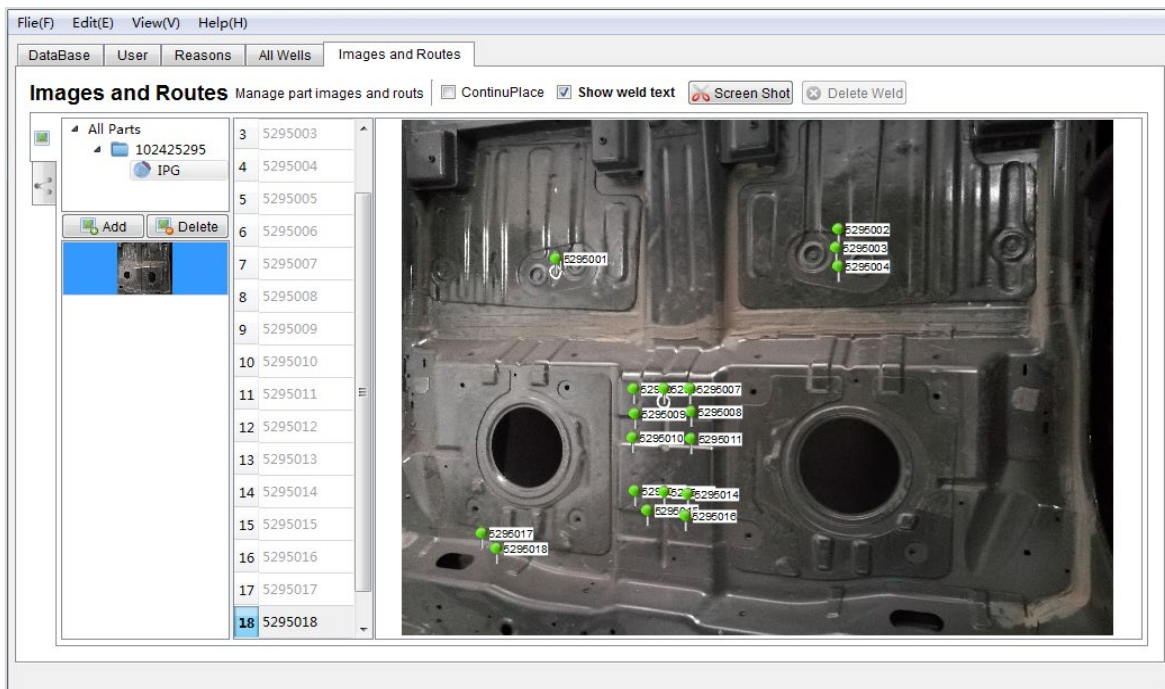





Fig.26 Part image and inspection Route Manager


There are 2 Tabs On the left edge of part ID frame, click on  to activate the “Part Image Manager Panel,” and click on  to activate the “Inspection Route Manager Panel.” In the **Part Image Manager** panel, the  button is for newly importing part images to the database. Click on the “Add” button and the software will assist the authorized planner to import Parts images from PC efficiently. If the import were successful, the parts images will appear on the right side of the panel, see fig 26.

✓ **Planting welding spots on the Parts Images**

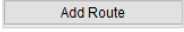
After the parts images are successfully imported to the database, the planner can choose an image and drag the welding spots to the proper locations and place them there.

Click on the “Continue Place” option will help the planner to plant the welding spots fast and efficiently.

✓ **Create inspection routes**

Click on the  tab to activate the **Inspection Route Manager Panel**.

Choose a part that needs to be created with new inspection routes.

Click on  to create a new inspection route; it is recommended to use a unique route name for efficient management.

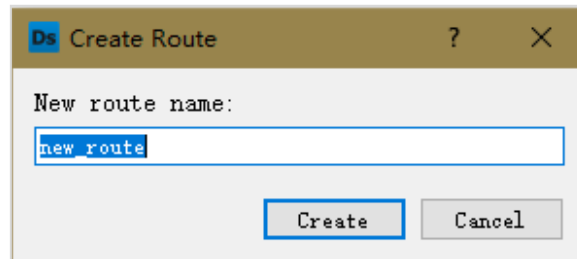


Fig.27 Create new inspection route name

Choose the designed welding spots from the weld list to the space for designing Inspection Route, see Fig.28. The inspection order of the welding spots could be adjusted and modified by the drag and drop operation. Multi inspection routes can be created.

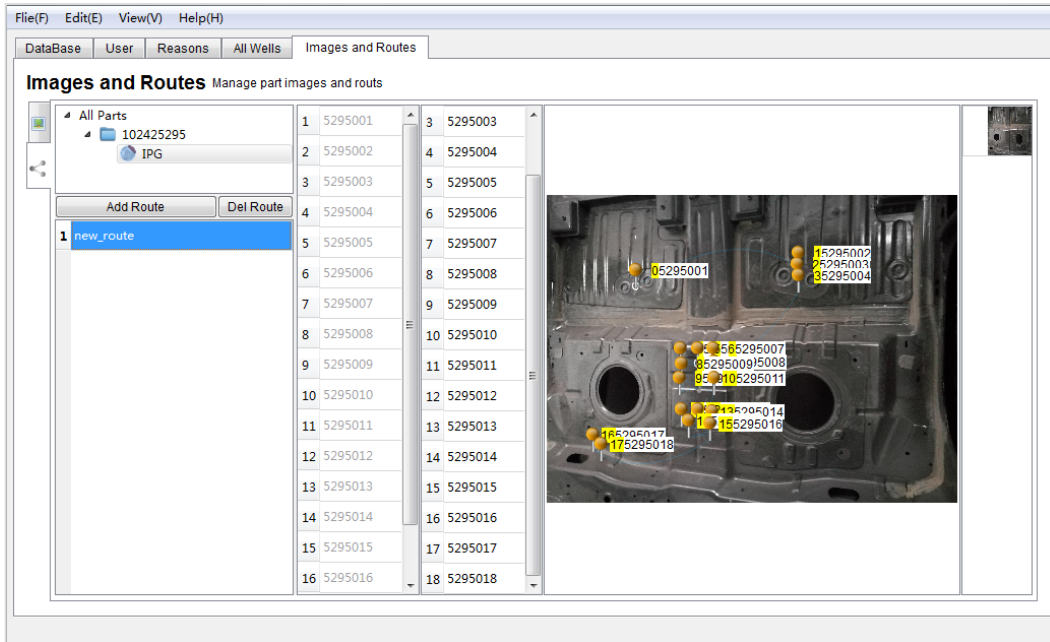


Fig.28 Create new inspection route on part image

✓ **Export pre-planned inspection database and synchronize with NextSpot 600**

➤ **Export the pre-planned inspection database**

Insert a USB flash drive to the HOST PC. Run "NextStudio-Designer.exe," select the entire pre-planned databases by tick the "☐" on the right of the database list. Click on the button, then select the USB Flash drive to export the planned inspection databases.

Click on the "Select folder" button and wait until the export is completed.

➤ **Synchronize with NextSpot 600**

Insert the USB flash drive into the USB port of the NextSpot 600. The system will recognize the USB flash drive automatically. Open the instrument setting menu, select the "Database" tab, and click on the "Import" button. Select the entire databases under the data path, wait until the import to complete as shown in fig. 29.

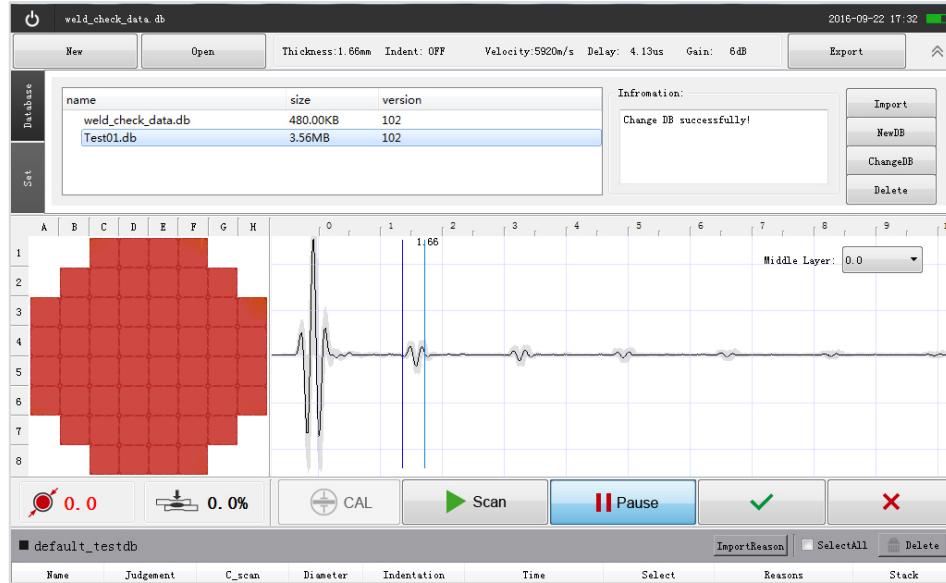


Fig.29 Synchronize the Inspection Database with NextSpot 600

➤ **Choosing a pre-planned inspection database**

Open the Instrument Settings interface, select the “Database” tab, select an imported database from the database list. Then click on the **ChangeDB** button to switch to the selected database. The message of “Change DB successfully!” will appear in the information window, Fig.30.

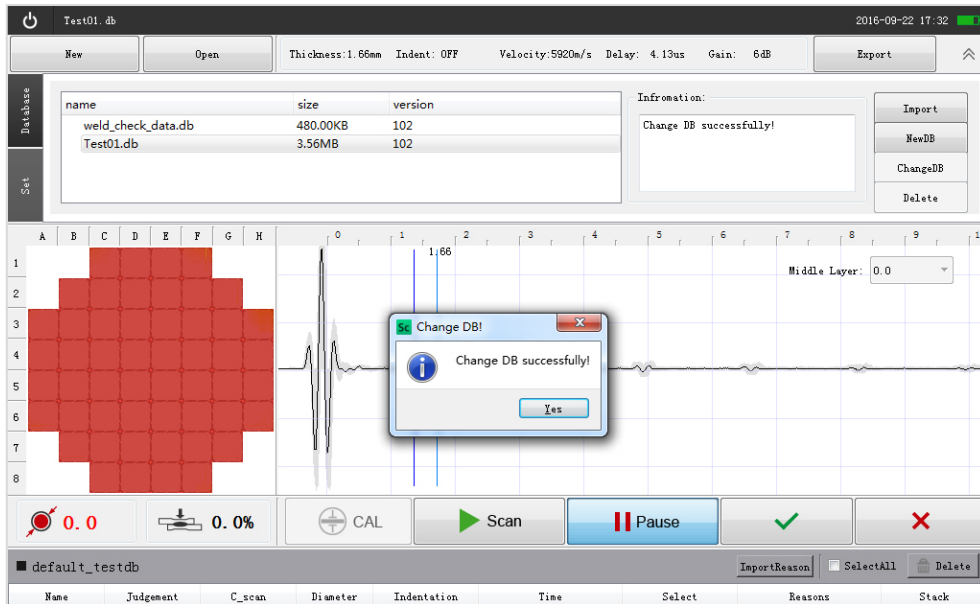


Fig. 30 To choose an inspection Database

NOTE:

Please check and confirm that the inspection database is correct and suitable for the next inspection task.

➤ **To create new inspection tasks**

Check the left top of the screen of NextSpot 600 to ensure that the correct database is chosen; the database name is displayed beside the power icon, Test01.db. In fig. 30 and fig.31, the database name is “Test01.db”. New inspection task will be created under this database.

- Click on the button, a dialog box that request inspection task name (SN, Serial numbers of parts). Input the SN and click on “OK” to complete creating inspection task.

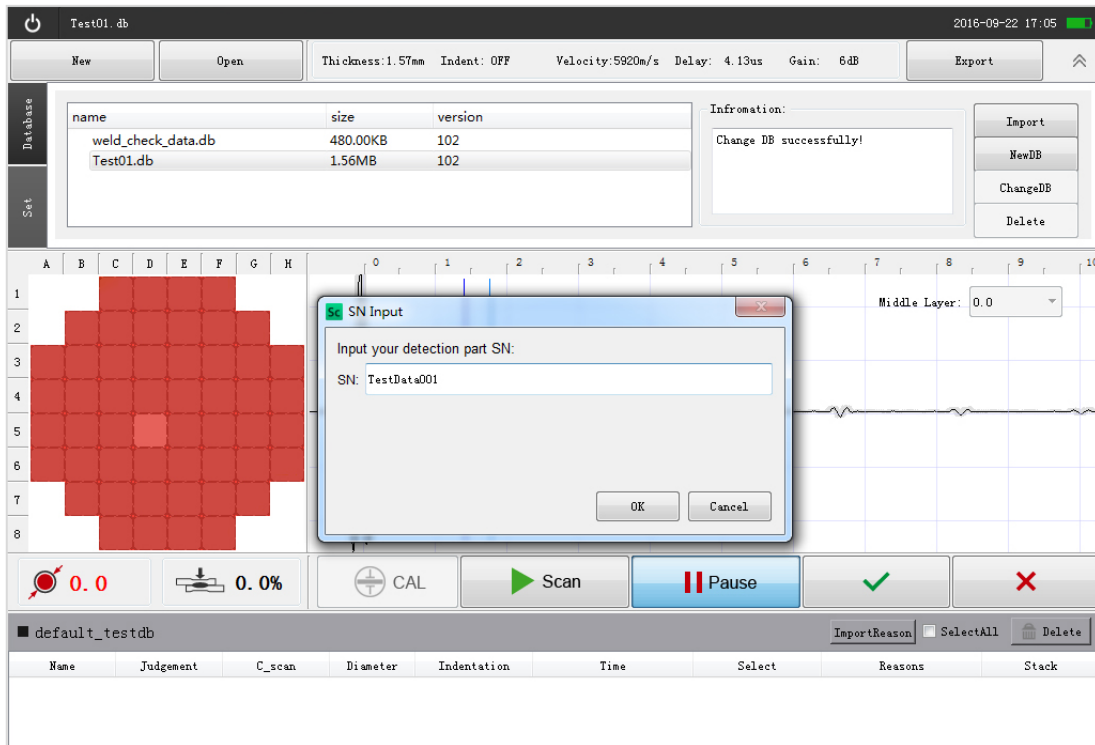


Fig. 31 To create an inspection task

NOTE

All the new inspection tasks must be created in the correct inspection database. If there are multi inspection routes, the inspection route must selected correctly!

2.2.4 Preparing for inspection parts and supplements for inspections

2.2.4.1 Preparing for inspection parts

The preparation of parts, inspection station, and the supplemental materials should be done before the ultrasonic inspections.

The visual inspections for the welding joints should be proceeded before the Spotwelding Ultrasonic Inspections. The combination of visual inspections and ultrasonic inspections can perform the best inspection efficiencies and keep the lowest running costs.

2.2.4.2 Preparing couplant gel and wiping rags

The ultrasonic spotwelding inspections require couplant gel for the coupling between the inspection surfaces and the transducer delay lines. The couplant gel should be applied with proper amount. The proper amount of couplant gel applying needs to be applied along with inspection experiences or follow the instructions from the NextNDT's technical staffs.

Ultrasonic couplant gel has the characterization to absorb moisture from the atmosphere. This moisture on the steel parts may cause rust. Therefore it is crucial that couplant gel residues on inspected parts must be cleaned with wiping rags or paper towel after ultrasonic Inspections.

2.2.5 Instructions of applying couplant gel

Applying couplant gels is one of the most important procedures that will affect the ultrasonic inspection results. Applying couplant gel with the proper amount can achieve not only with the accurate inspection results but also can save the consumption of couplant gel, which can lead to inspection cost savings. On the other hand, improper couplant applications will adversely affect the inspection results and will also increase the ultrasonic inspection cost.

There are a few methods to apply couplant gel to the inspection parts. e.g. apply couplant gels with a piece of rubber spatula, or dip the transducer delay chip into a small jar filled with couplant gels etc.

Most of the tools and methods are applied by the experience from ultrasonic inspectors. The inexperienced inspectors can get the instructions from the technical training provided by NextNDT's qualified instructors.

Here is a photo example of two different couplant gels amount applied on a sheet metal as

shown in fig.32, the gel on the left side is applied to a welding spot for inspection and the gel on the right side is for calibration before inspection.



Fig. 32 Couplant gel applying samples

SAFETY NOTE

The edges and surfaces of welding parts are very sharp and dangerous! Please use tools or wear protective gloves to apply couplant gels to avoid injuries!

2.2.6 Inspecting welding joints with NextSpot 600

Besides the capability of the ultrasonic spotwelding analyzing equipment, the experience of the inspectors will also affect the inspection results. The human factors are critical during spotwelding inspections. The inspectors must have ultrasonic inspection knowledge and experience, perform proper operations, proper recognition methods, and proper recordings to ensure the effective and accurate inspection and analyzing results.

2.2.6.1 Inspection techniques and considerations

During an ultrasonic inspection, the inspectors are required to have the techniques to hold the ultrasonic transducer probe correctly. The following operation techniques will improve the inspection efficiency and accuracy.

- Fill the weld joint indentation with couplant gel and ensure that the couplant gel has been applied evenly between the ultrasonic probe and the surface of welding parts.
- Hold transducer probe with one hand, while using the other hand to operate the instrument on the touch screen panel or with remote controller.
- Hold the probe and the contact the surface of welding parts vertically to maintain good

coupling and good ultrasonic transmit performance.

- The probe should completely cover the weld joints and try to keep the nugget images in the center of the C-Scan area as much as possible.

NOTE

The improper surface condition of welding parts will result in inaccurate data, and may also damage the transducer probe surface. Ultrasonic inspections should be suspended if the welding joint surface condition failed to pass the visual inspection.

If the welding joint surfaces have splashing or burr issues, auxiliary polishing treatments are required before ultrasonic inspections are conducted.

If the welding joints are twisted or deformed, the welding joints may only be inspected and analyzed partially.

2.2.6.2 The display of Inspection screen

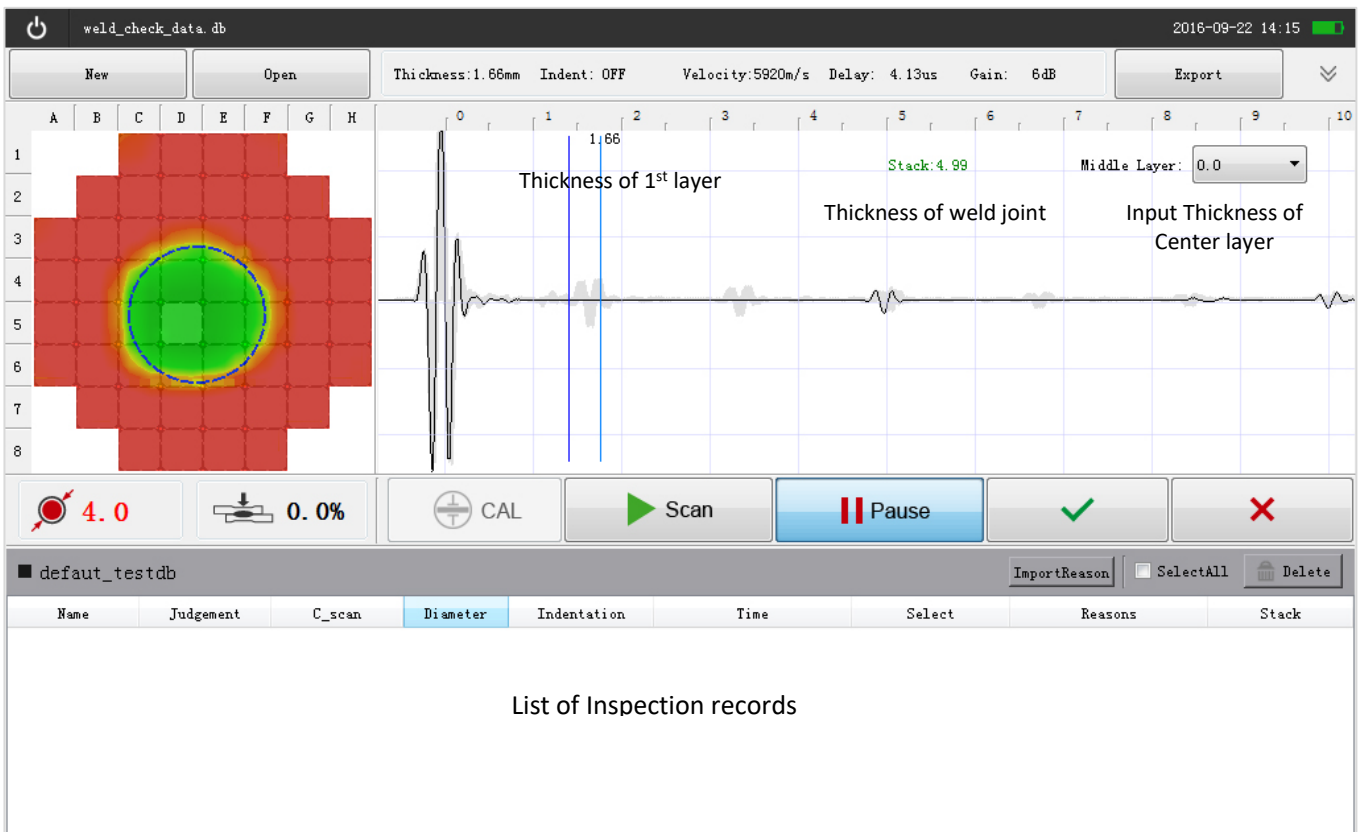

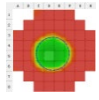




Fig. 33 Display of inspection screen

Real time inspection graphic images


 : Display area of Ultrasonic A-Scan graphs


 : Display area of Ultrasonic C-Scan images

 : Display area of nugget diameters

 : Display area of Indentations

Buttons for Inspections

 : Calibration before inspections


 : Start Real-time Ultrasonic Scanning


 : Pause the Real-time Ultrasonic Scanning

 : Record the inspection with **Passed** Judgment

 : Record the inspection with **Failed** Judgment


Buttons for file Operation and Record management

 : Create new inspection tasks

 : Open and view Inspection records

 : Export inspection data

 : Import Judgment Reasons

 : Delete the selected Inspection records

2.2.6.3 Inspection Analysis

NextSpot 600's system (NextStudio Scanner) provides real-time ultrasonic inspections and real-time inspection data analysis. By comparing with the pre-set analyzing standards and quality inquiries, the system automatically advise the inspector the analysis results of nugget diameters and indentations. Good results is displayed in **Green Figures**, and the failed results will be displayed in **Red Figures**.

If the analysis function were turned OFF, the analysis results will be displayed in **Black Figures**.

Fig.34.

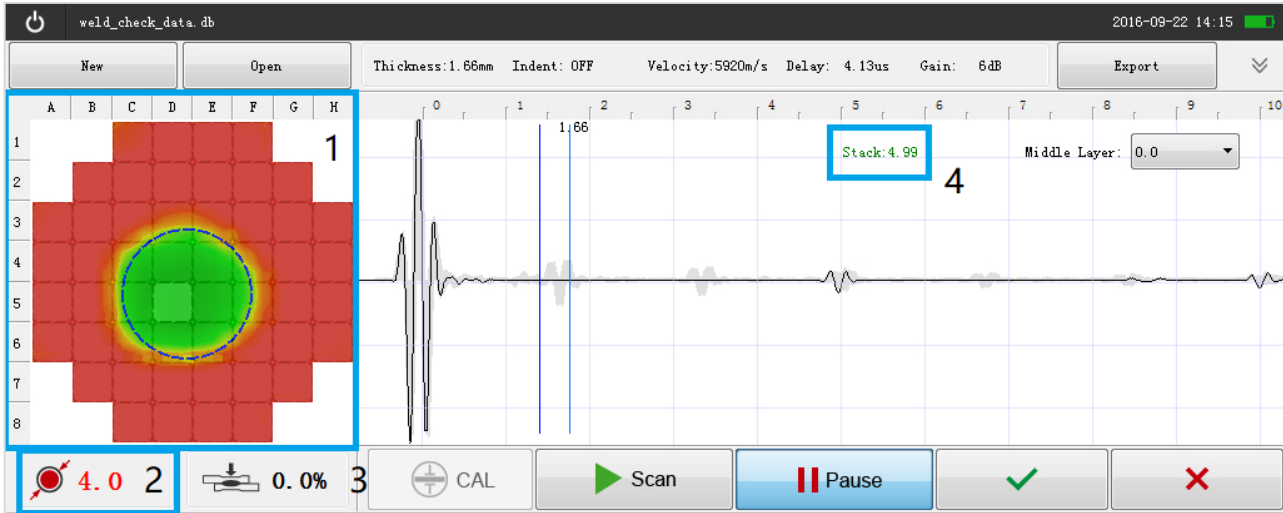


Fig. 34 Couplant gel applying samples

e.g. As shown in fig. 34,

No. 1 shows good C-Scan image of welding nugget.

No.2 shows measured diameter value and its analysis result, the RED value of “4.0” means that the measured diameter was 4.0mm, but it does not fulfill the minimum inquiries. (Failed)

No.3 Shows the measured indentation depth was 0.0% of the top layer. It was a Failed result. However, due to analysis setting was turned OFF, the result was displayed in Black Color.

No.4 Shows the total thickness of the welding joint. Currently, the stack thickness need to be analyzed by the inspectors.

2.2.6.4 Final judgments and recording Inspection results

NextSpot 600 requires the inspectors to do the final judgments for the inspection results, and the inspection results can be recorded as “Passed” by clicking on the button or to be recorded as “Failed” by clicking the button.


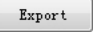
2.2.7 Exporting Inspection data

Ultrasonic inspection data is vital to the welding process controls. It is recommended to export the inspection data as soon as the inspection is completed. And the inspection data should be backed up frequently. The procedures of exporting inspection data are,

- Export the inspection data to the USB drive.

- Use host computer to importing inspection data from the USB drive.
- Managing / Analyzing inspection data with the host computer
- Issue inspection report in Excel format.

Instructions for exporting data to USB Drive

- Insert the USB Flash drive to the USB port of NextSpot 600,
- Click on the  button; a dialog box will appear,
- Select the inspection data that need to be exported
- Click on the  button at the bottom of the dialog box
- Confirm the message “Export 'XXXXX.ntdb' successfully!” at the dialog box bottom.
- Click the “OK” button
- Unplug the USB from the NextSpot 600 instrument

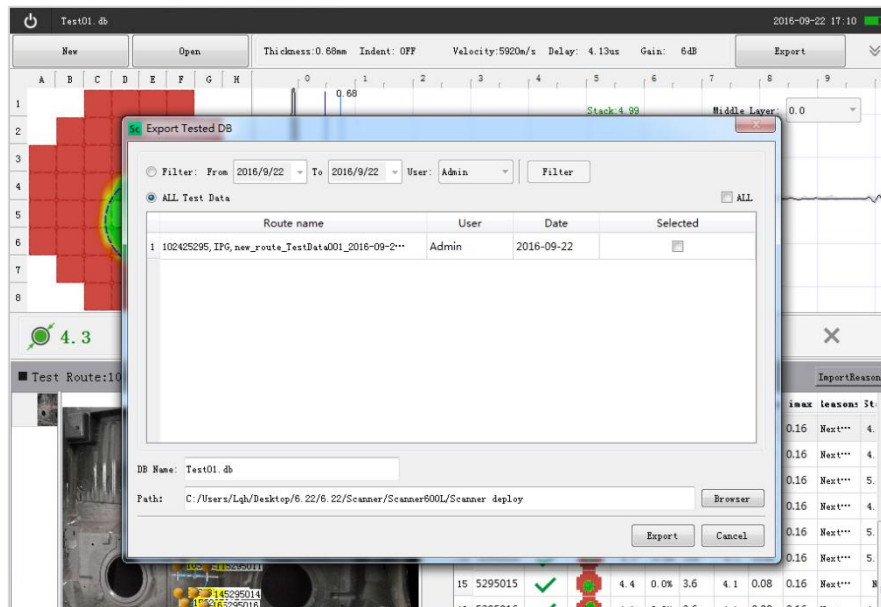



Fig. 35 Exporting Inspection data Dialog box

Instructions for importing data from the USB Drive into the host computer

- Plug the USB flash drive that contains the data to the USB port of the host computer
- Run *NextStudio_Reporter.exe*
- Click on the  button to create a new blank database for the importing inspection data. Fig.36
- Input the name for this new database. Fig.36

- Click on “Save” to save the new blank database. Fig.36
- Click on the “Import” button to start importing data. Fig.36
- Choose the inspection data in the USB flash drive directory to start the import process. Fig.36

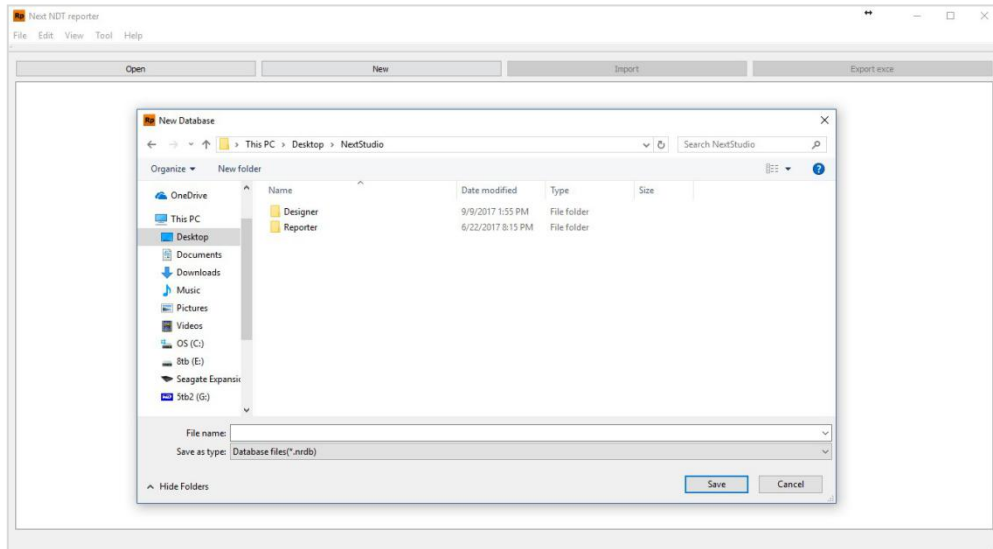


Fig. 36 To create new blank database for importing

- The complete of data importing

	tester	weldgroup	weldpart	weldname	ok_nok	icon	d_mes	i_mes	stack	checktime	dmin	dmax	imin
	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1	Admin			Weld0	✓		6.5	0.16	1.72	2016-11-14 1...	0	0	0
2	Admin			Weld1	✓		7.8	0.07	2.15	2016-11-14 1...	0	0	0
3	Admin			Weld2	✓		7.6	0.05	2.16	2016-11-14 1...	0	0	0
4	Admin			Weld3	✓		7.5	0.05	2.13	2016-11-14 1...	0	0	0
5	Admin			Weld4	✓		7.7	0.02	2.16	2016-11-14 1...	0	0	0
6	Admin			Weld5	✓		7.4	0.02	2.15	2016-11-14 1...	0	0	0
7	Admin			Weld6	✓		7.1	0.01	2.16	2016-11-14 1...	0	0	0
8	Admin			Weld7	✓		6.8	0.24	1.72	2016-11-14 1...	0	0	0
9	Admin			Weld8	✓		7.0	0.10	1.75	2016-11-14 1...	0	0	0
10	Admin			Weld9	✓		6.7	0.08	1.72	2016-11-14 1...	0	0	0
11	Admin			Weld10	✓		7.3	0.13	1.72	2016-11-14 1...	0	0	0
12	Admin			Weld11	✓		6.0	0.15	1.76	2016-11-14 1...	0	0	0
13	Admin			Weld12	✓		5.8	0.09	2.81	2016-11-14 1...	0	0	0
14	Admin			Weld13	✓		6.8	0.19	2.03	2016-11-14 1...	0	0	0
15	Admin			Weld14	✓		6.7	0.25	1.84	2016-11-14 1...	0	0	0
16	Admin			Weld15	✓		6.3	0.05	2.90	2016-11-14 1...	0	0	0
17	Admin			Weld16	✓		5.1	0.05	2.90	2016-11-14 1...	0	0	0

Fig. 37 Inspection data imported to the host computer

Managing and analyzing the inspection data

NextStudio Reporter is a powerful software reporting application that provides efficient inspection data management and analyzing.

Inspection data management function

NextStudio Reporter has the query function and search engines for searching and filtering inspection data in the database. Fig 37

Inspection data analyzing function

The engineers can use NextStudio Reporter to do detailed analysis for all inspection data. The system supports reviewing A-Scan and C-Scan, and also support virtual simulations with manual ultrasonic parameters adjustments. However, this analysis will never alter the original raw data in the database. Fig. 38, fig.39

weldgroup	weldpart	partsn	weldname	ok_nok	icon	d_mes	i_mes	stack	checktime	reasons	tester
Filter	Filter	Filter	62	Filter	Filter	Filter	Filter	Filter	Filter	Filter	Filter
1		default_route...	Weld62	✓		6.7	0.10	1.67	2016-11-14 1...	NextSpot-OK	Admin
2		default_route...	Weld162	✓		7.7	0.22	1.27	2016-11-14 1...	NextSpot-OK	Admin
3		default_route...	Weld262	✓		6.0	0.14	0.00	2016-11-14 1...	NextSpot-OK	Admin

Fig.38 filtering inspection data

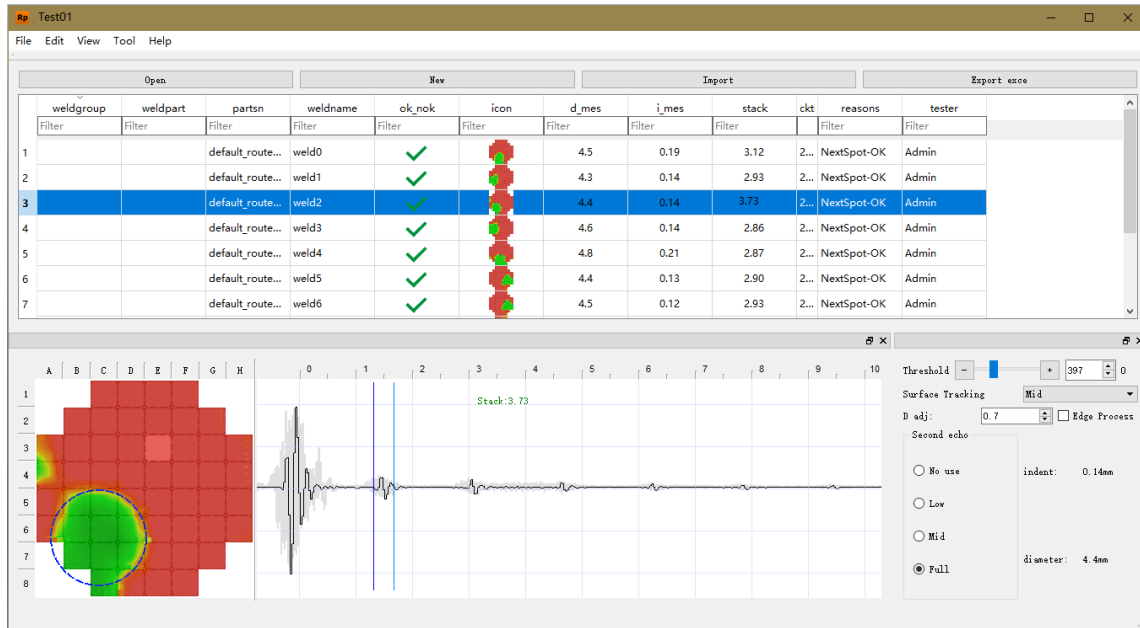


Fig. 39 analyzing inspection data with host PC

Export Inspection data report in Excel format

Click on the **Tool** button to open the tool panel, then click **Option** to open option panel. Next, select the inspection data that need to be exported to Excel format by clicking under the View option bar, fig. 40.

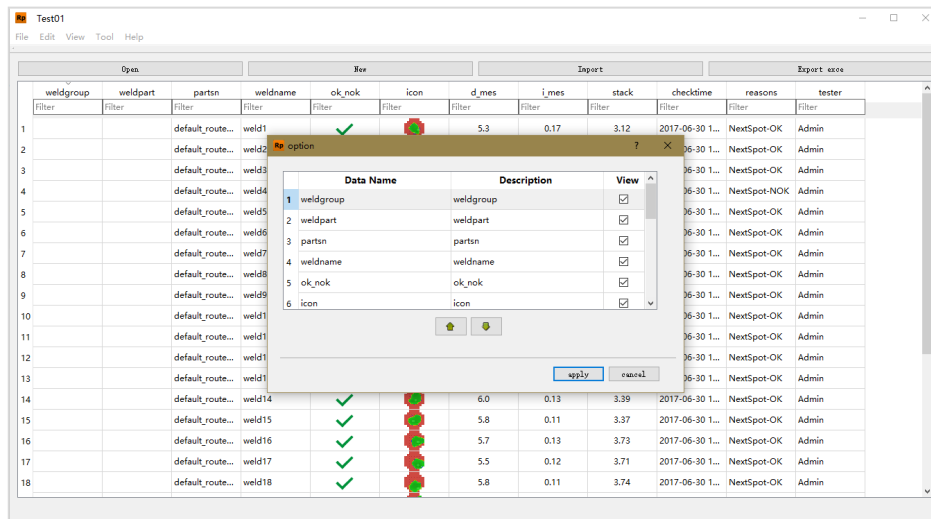


Fig. 40 Choose the necessary data for exporting reports

Procedures of Exporting Reports to Excel

- Clicking on the **Export exce**

- Choose and determine the data directory and location to save the inspection reports. fig 41
- Modify the file name of the inspection reports if necessary, fig.41

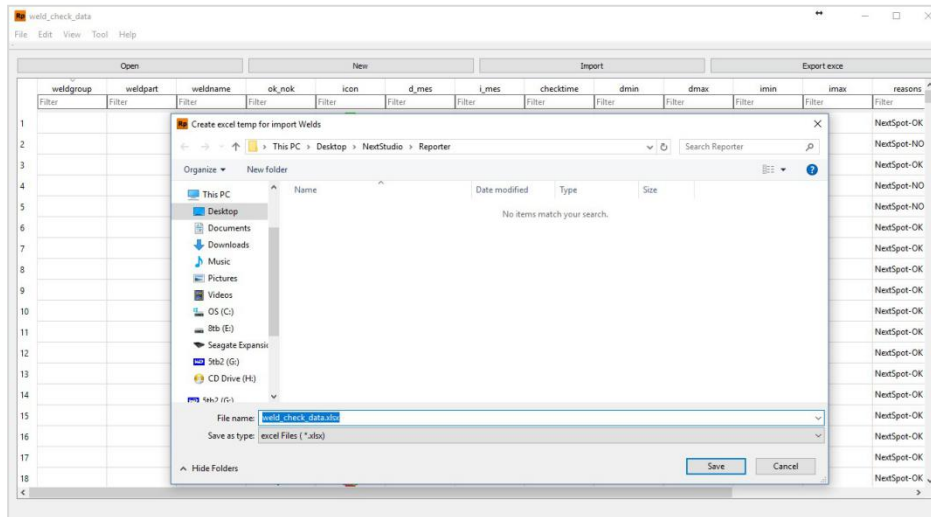


Fig.41 to save the excel report

2.3. Managing and personalizing the Database system

2.3.1 Managing users and passwords

It is recommended to create user accounts and passwords individually for each designed database.

The individual log in the system can maintain good traceability history to the inspection data. Run the NextStudio-Designer.exe, and active the user manager panel, the system’s default user is ‘Admin’ (Administrator) for each database. The authorized administrator can add new user accounts or delete user accounts for their requirements.

The ‘Username,’ user image and user passwords can be personalized by the administrator.

The administrators can also determine the permission rights for each user.

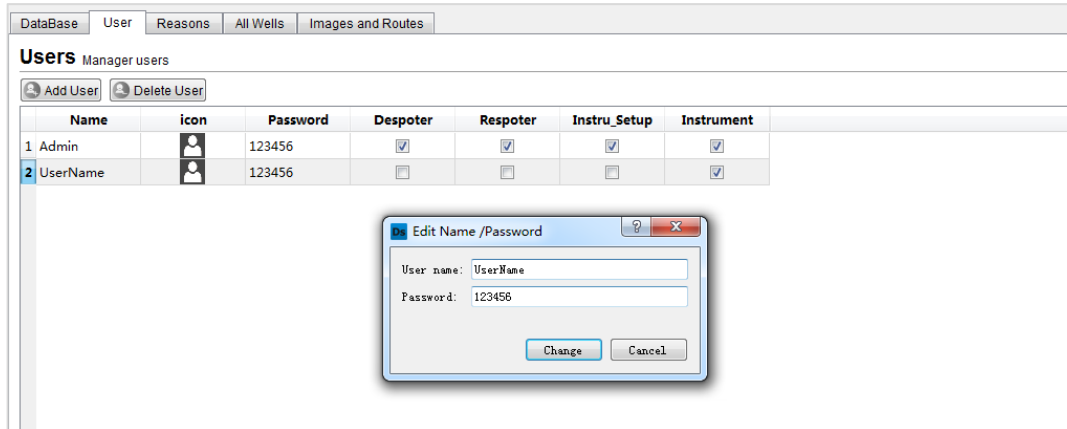


Fig.42 Managing using name and password

User Authorizations

- 【Despoter】** - Permission of using Designer
- 【Respoter】** - Permission of using Reporter
- 【Instru_Setup】** - Permission of setting NextSpot 600
- 【Instrument】** - Permission of using NextSpot 600

2.3.2 Manage descriptions of inspection judgment reasons

Click on the tab of “Reasons” to switch to the “Reasons” management panel. Double click on each method area of “Reasons to pass a weld” or “Reasons to Fail a weld” will active the dialog boxes to edit the descriptions for an inspection judgment, e.g. Edit the judgment reason of visual inspection to “Missing” which means “the welding spot was missing”, then click on the “apply” button to save the changes, or click on “Cancel” to abort the changes.

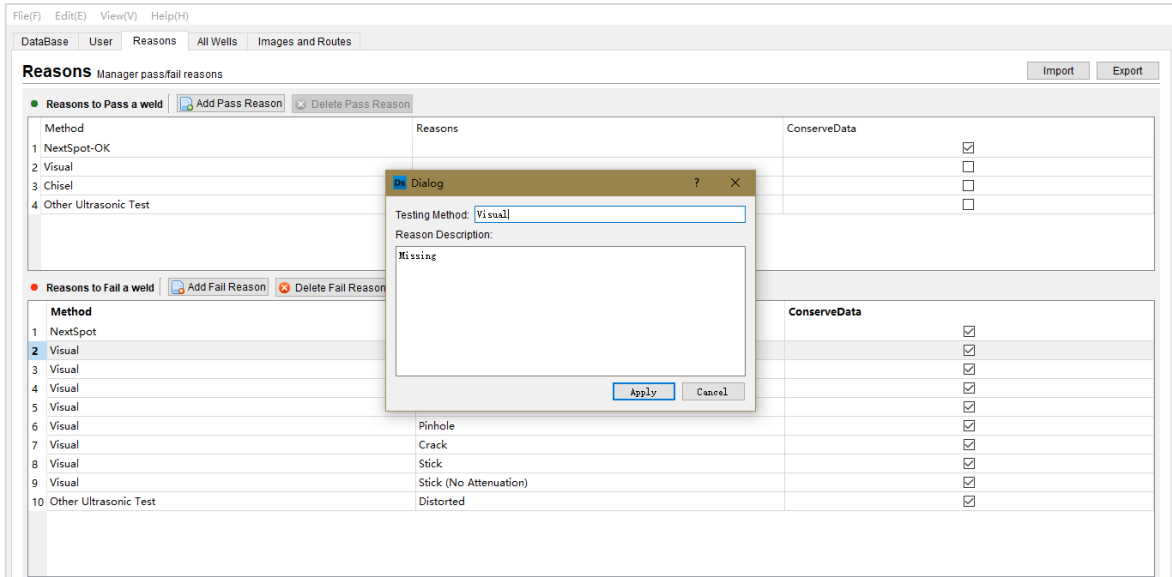


Fig.43 Judgment Reasons Editor panel

Besides editing reasons, the administrator can add new reasons or delete reasons by clicking on “Add Pass reason” or “Add Fail Reason”

NOTE

- It is recommended to choose the “Conserve Data” for each reason, which will keep all inspection data.
- All the reasons created or changed can be exported to a USB thumb drive and synchronized with NextSpot 600 instruments.

3.0 Maintenance Instructions

Daily care and maintenance for NextSpot 600

NextSpot 600 is a high precision electronic equipment. Please read the safety instructions in this chapter for the correct usage and maintenance. This will help you to prevent unexpected failures or accidents caused by improper usage or handling.

3.1 Daily Cares and Maintenance

3.1.1 Power supply and charging:

- **ONLY USE the AC / DC power adapter (SPU61A-106) for charging!**
- **DO NOT connect any other unauthorized power supplies to NextSpot 600!**
- Constantly charge the battery to prevent over discharging (**Over discharge shortens battery life!**)

3.1.2 Storage and transportation

- When the NextSpot 600 is not in use, it must be kept in its carry case (Case600), which comes with the equipment, and make sure that the double-throw latches are locked properly.
- **It is recommended to use padlocks to lock the carry case during transportations.**
- Checks and maintenance before storage or transportation:
 - Export the inspection data and backup the data ASAP.
(see chapter 2.2.7 <export inspection data>)
 - Unplug any flash drives attached to instrument.
 - Check the battery indicator on the screen, and charge the equipment if the indicator level shows red or the battery capacity is less than 30%.
 - Unplug the DC plug from the equipment if not in use.
 - Visually inspect the instrument for any damage or anomaly
 - ✓ Check for any obvious gouges or scratches.
 - ✓ Check whether the instrument LCD screen have any scratches, breakage or cracks

- ✓ Check for any loose or missing screws
- ✓ Check the strap for tears or cuts.
- ✓ Check for any signs of loose or broken rivets.
- ✓ Check for contaminations around the ports of the equipment such as metal powder, couplant gel, moisture or other substances.
- ✓ Check to see if the protective rubber cover is properly seal the port-bay.
- ✓ Check for contaminations on the exterior of the equipment such as metal powder, couplant gel, moisture or other substances.
- Daily cleaning of the equipment before returning instrument to storage
 - Clean off any metal powder or dust with a soft brush.
 - Do not use paper towels or other wiping towels to remove any metal powders, dust, or other solid contaminants.
 - Use soft tissues or towel to remove liquid contaminations such as couplant gels.
 - **Do not use water or organic solvents to clean the equipment!**
- Check before closing the carrying case
 - ✓ Is the equipment turned off?
 - ✓ Are there still any visible contaminants?
 - ✓ Is the instrument in any abnormal temperature or have condensation?

3.1.3 Routine maintenance for ultrasonic transducer probe (UT Sensor)

The ultrasonic transducer probe is a high-precision electronics sensor assembled with multi super fine cable harness. The transducer probe must be handled carefully in daily usages. Instructions for handling the ultrasonic transducer probe:

3.1.3.1 Safety prohibitions

- DO NOT DROP the transducer probe!
- DO NOT bump the transducer probe against other hard materials!
- DO NOT allow sensor probe to contact any surface that is over 120 degree F.
- DO NOT USE transducer probe without attached with the delay chip!
- DO NOT swing the sensor probe while holding the sensor harness!
- DO NOT bend the sensor harness sharply with force!

- Avoid mechanical impacts and pinches to the transducer probe.
- Avoid frictions and scratches between the sensor probe's delay chip and rough surfaces.
- KEEP the sensor probe and the cable away from water, organic solvents, or corrosive gases.

3.1.3.2 Routine maintenance for ultrasonic transducer probe

- Must use NextNDT couplant Gel when inspecting welding parts. (see Chapter 2.2.5)
- Use soft tissue paper to clean off couplant gel residues on the sensor or harness.
- Proceed daily maintenance checks for the sensor probe and the harness as below:
 - ✓ Is the exterior housing of the sensor damaged?
 - ✓ Is there any abnormal appearance on the sensor surface?
(lacerations, scratches, metal powder residue, or particles)
 - ✓ Is the delay chip ring loose?
 - ✓ Are there any cuts or cracks on the mesh protector of the cable harness?
 - ✓ Is the cable harness bent with inflection angle?
 - ✓ Is the transducer probe connector loosen or damaged?

3.1.3.3 Delay chip maintenance and replacement:

Delay chip (wedge) is an important element to ensure the accuracy of the ultrasonic inspections. The delay chips of NextSpot 600 are made of special resin material through precision processes. When the delay chips are worn down, replace the delay chip immediately.

➤ **Protection for delay chips**

Do not pull or rotate the delay chip against the surface or welding parts during inspection. If the delay chips is damaged or wore out, replace the delay chip as soon as possible. (Using wore out delay chips will adversely affect the Inspection results)

➤ **Apply couplant gel between the sensor and delay chip:**

Apply couplant gel between the sensor surface and the delay chip is very important for ultrasonic inspections. Users need to frequently disassemble the delay chip and apply couplant gel to maintain good working condition.

Couplant gel must be applied when replacing the delay chips.

➤ **Procedures for applying couplant gel to sensor surface**

- a. Loosen the delay chip fix ring.

- b. Apply NextSpot coupling gel on the ultrasonic sensor surface.
- c. Spread the couplant gel evenly on the surface of ultrasonic transducer opening. A little couplant gel overflow is preferred.
- d. Attach the delay chip inner side to the transducer surface, and slide the delay chip slowly and gently towards the outer edge of the sensor window.
- e. Put back the delay chip ring, gently rotate the ring and fix the ring firmly until tight. (do not over tighten ring)
- f. Observing the delay chip outer side and edges, if air bubbles are visible, repeat the above steps a ~ e.

3.1.4 Maintenance for remote controller

NextSpot 600 can be remote controlled with an industrial-grade infrared (IR) controller.

Note on using the IR remote controller

- 2 pcs of AAA alkaline batteries are required for powering the unit.
- Remove the batteries from the remote controller if the remote controller will not be used for more than one week.
- Avoid couplant gel or other liquids getting into the remote controller.
- Avoid dropping the remote controller to prevent from damages.

3.1.5. Specifications and maintenance for the power adapter

- NextSpot 600 uses a high-quality power adapter (SPU61A-106) produced by SINPRO.

Do not use any other brand of adapters.

- **Adapter Information:**

Manufacturer: SINPRO

Model: SPU61A-106

Input voltage: AC100~240V, 47-63Hz

Output voltage: DC15C, 4A

- **Daily precautions**
- ✓ DO NOT charge NextSpot 600 outdoor or in a high humidity environment.

- ✓ Disassembling the power adapter is strictly prohibited.
- ✓ If the power supply cable is damaged, contact NextNDT for replacement.

3.2 Maintenance for software

NextSpot series software system consists of three integrated software configuration (See <Overview Description Software System> Chapter 1.5).

3.2.1 Notice of using NextStudio software

- ✓ Please use genuine NextNDT software only.
- ✓ Only update the software with the instructions given by NextNDT technical personnel.
- ✓ Unauthorized software installation, operations, or upgrade are strictly prohibited.

3.2.2 Backup for inspection planning database backup

- ✓ Constantly backup the **Inspection planning database** to prevent loss of data.
- ✓ Backup: Copy ".db" file in the root directory of the NextStudio Designer software folder into an external backup dedicated storage media for data safely.

3.2.3 Backup for inspection data

- ✓ Export inspection data soon after each inspection works
- ✓ Synchronize the inspection data to NextStudio Reporter by creating or updating the existing databases.
- ✓ Regularly backup the NextStudio Reporter weld joint inspection database files to prevent data loss.
- ✓ Backup: Copy ".nrdb" file in the root directory of the NextStudio Reporter software folder into an external backup dedicated storage media.

3.2.4 System software upgrade

- NextNDT regularly upgrades software due to new technical requirements. Our upgrades are free of charge for all authorized and licensed users.
- NextNDT professional and technical personnel will notify your facility manager when an upgrade is available.

3.3 Notice of safe use and storage of NextSpot 600

3.3.1 Environmental conditions

Operation Temperature: 14°F~122°F (-10°C~50°C)

Operation Humidity: Max humidity 70%, @ 113°F (45°C) (Non-condensing)

3.3.2 Electrical power supply

Power supply condition: AC100~240V, 47~60Hz, 1.6A

Instrument charging condition: Do not use power supply to charge other equipments.

3.3.3 Electromagnetic compatibility condition

NextSpot 600 Spot Weld Detector has an IP 54 protection that can be used in most body shops of automakers environments. However, some electromagnetic environment with special strength, special frequency interference may cause EMC & EMI issues. In case of suspected electromagnetic interference are detected, please contact your nearest NextNDT technical service center for technical support.

3.3.4 Safety prohibitions

Users must pay strict attention to the safety instruction during daily usage, and must not violate the safety prohibitions:

- DO NOT disassemble the NextSpot 600!
- DO NOT operate NextNDT software illegally!
- DO NOT allow hard objects to operate or contact the touch screen of the NextSpot 600!
- DO NOT operate the unit with wet hands!
- DO NOT operate on unstable or vibrating surfaces!
- DO NOT operate in highly condensation, or wet environment!
- DO NOT operate under strong direct sunlight!
- DO NOT operate in unstable areas!
- DO NOT operate unit closed to sharp objects to prevent damage to sensor cable!
- DO NOT swing of pull on the sensor harness!

3.3.5 Storage conditions

Storage temperature: -4°F~140°F (-20°C~60°C) with battery installed

-4°F~158°F (-20°C~70°C) without battery

Storage Humidity: Relative humidity <70%, @ <140°F (60°C) (Non-condensing)

3.4 Rechargeable battery pack safety information

The NextSpot 600 series use Li-ion rechargeable battery pack (Model: Li204SX) for portable power supply. The transportation/storage of Li-ion batteries need strict compliance with IATA, ICAO and relevant safety laws and regulations required by various countries of the world.

Please keep in strict compliance with all kinds of attention and prohibit terms of use or storage Li-ion battery pack of this chapter. Please NOTE that equipment damage or accidents caused by your illegal usages are not under the company's quality assurance or security coverage.

※ Important Safety Information※

NextSpot 600 series of ultrasonic spot using Li-ion rechargeable battery pack!
Please read this chapter in order to ensure the safety of you and your equipment!

3.4.1 Battery Information

Model: LI204SX

Type : Smart Li- ion rechargeable battery

Manufacturer: Enertech International, Inc

Weight: about 1.12 lbs (0.506 Kg).

Connector: mating electrode AMP P / N 5787422-1

EMC : EMC Directive 2004/108/EC; Low Voltage Directive 2006/95/EC

Environmental regulations: in line with Battery Recycling Directive 2006/66/EC (revised edition) meets the RoHS Directive 2011/65/EU

3.4.2 General precautions

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- Avoid shorting the battery!
- Do not immerse in water!
- Do not disassemble or deform the battery!
- Do not expose to, or dispose of the battery in fire!
- Avoid excessive physical shock or vibration!
- Keep out of the reach of children!
- Never use a battery that appears to be damaged!

3.4.3 Notice of charging and discharging

- Battery must be charged with authorized chargers only.
- Instrument must be used in standard power adapter/charger for charging
- Do not use a modified charger
- Recharge ambient temperature: 32 °F~113°F (0°C~45°C)
- Recharge ambient humidity: <80%RH
- Charging voltage: 12.6V

3.4.4 Battery storage

- Battery must be stored in a cool, dry, well-ventilated place
- Storage temperature range, -4°F~140°F (-20°C~60°C)
- Do not store batteries in corrosive gases environment
- At >113°F (45 °C) environment, the storage performance of the battery cell will decrease and will reduce battery life

3.4.5 Disposal of batteries

- Li-ion battery scrap and waste must strictly abide by relevant laws and safety and environmental regulations in host countries in the region.
- Do not discard Li-ion battery or mix with household waste

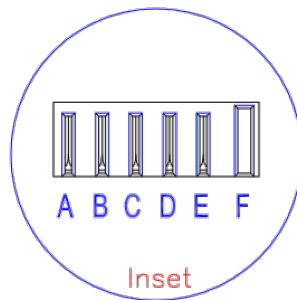
3.4.6 LCD Indications of battery capacity

The battery can directly display the capacity information. The battery capacity is displayed as

the relative SOC. Each LCD segment represents 20 percent of the full charge capacity. The LCD pattern definition is given in the table below. If the battery voltage is low, there will be no LCD indication. During charge, the most significant segment will blink.

Capacity	LCD Segments				
	1	2	3	4	5
0% - 19%					
20% - 39%					
40% - 59%					
60% - 79%					
80% - 100%					

3.4.7 Drawing of battery terminals



- Terminals
- A - Negative
 - B - Temperature
 - C - Data
 - D - Clock
 - E - Positive
 - F - Key

3.4.8 Quality and safety testing standards

3.4.8.1 EMC And Safety

The battery complies with the following: EMC Directive 2004/108/EC Low Voltage Directive 2006/95/EC Battery Recycling Directive 2006/66/EC as amended "RoHS" Directive 2011/65/EU

The battery has been tested in accordance with the UN Manual of tests and Criteria part III subsection 38.3 (ST/SG/AC.10/11/Rev.3) - more commonly known as the UN T1-T8 Transportation tests, and has been found to comply with the stated criteria. [USDOT-E7052]

The battery has the following approvals, and the pack will be labeled according to the following:

- CE [EN55022:2006 (ITE Class B) & EN55024:1998 (ITE)]
- FCC Part 15 Class B
- Tested to IEC62133 & UL2054

3.4.8. 2 Battery Life expectancy

Given normal storage & usage, the battery is expected to deliver 6960 mAh or more after 300 charge/discharge cycles where the charge phase is CC/CV 4000mA, 12.6V±0.05V and the discharge is 1740mA down to 2.9V/Cell at 77°F (25°C).

3.4.8.3 Battery Warranty

NextNDT's battery supplier, Enertech International, Inc maintains a high-quality standard. All products are warranted against defects in workmanship, material, and construction. The warranty period is one (1) year from the date of shipment.

3.4.8.4 Battery Shelf Life

The batteries are shipped from NextNDT with between 50% and 90% rated capacity, and this provides a minimum of 6 months shelf life when stored at 77°F (25°C). If the storage temperature exceeds 77°F (25°C) over the 6-month period, then the shelf life will be reduced, and provisions should be made to recharge the battery periodically. To prevent a parasitic drain on the battery, the electronics will go into a shutdown mode if any cell voltage $\leq 2300\text{mV}$. If this should happen, the battery pack will require an initial low charge to activate the electronics before the implementation of the normal charge. Any SMBus version 1.0, or higher, compatible charger is capable of providing this initial pre-charge.

Warranty Disclaimer

NextNDT Technology, INC. manufactures and designs of all products with stringent process control and management. We will do our utmost to produce high quality and performance products to meet market demand.

However, due to the force majeure (earthquake, war, etc.) or the user's own poor judgment or equipment and property damage caused by not paying attention, do not belong to the scope of responsibility of the Company.

For local warranty service, please refer to your local service center or agency designated by NextNDT appendices.



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