QuantorDent

User Manual

Acquisition and Diagnostic Software

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Warnings and used symbols

To ensure the safety of patients, staff and other persons, any changes to software and hardware delivered by ***Digiray Corp.*** may only be made with prior written permission from ***Digiray Corp.***

Please read the respective manuals of the connected devices, such as of the X-ray generator, sensor, or reader, before starting to use the system.

The following symbols will be used throughout this manual:

DANGER
General prohibition indication.
The functionality of the system can be destroyed in the case of incorrect use.
If unauthorized changes have been made to delivered software and hardware components, the warranty by ***Digiray Corp.*** becomes void. ***Digiray Corp.*** will not accept any responsibility or liability for the proper functioning oh the product in such a case.

DANGER
General mandatory action manual.
The functionality of the system can be destroyed in the case of incorrect use.
If unauthorized changes have been made to delivered system and accessories, the warranty by ***Digiray Corp.*** becomes void.
Digiray Corp. will not accept any responsibility or liability for the improper functioning of the product in such a case.

WARNING
The functionality of the system can be limited in the case of incorrect use. Hints that require special attention.

NOTE
Notes represent information that is important to know but which do not affect the functionality of the system.

Medical Device Security

Users must take steps to secure their networks and protect their Medical Information Systems which includes a risk assessment strategy, network defense in depth strategy, business continuity planning, etc.

- ✓ User Authentication
  Only authorized users should log on to computers on which medical information systems are installed.

- ✓ Password Security
  In today's world, passwords can be compromised in literally seconds by using a wide variety of tools and techniques. To lower the possibility of a compromised password, it is vital to adhere to a set of protocols.
  - Choose a password between 7 ~ 10 characters using both alpha and numeric characters.
  - Do not share the password.
  - Do not base the password on a pet's name, a relative's name or any dictionary word.
  - Do not write down the password.
  - Do not leave the account logged on.

- ✓ User Access Control
  Configure the workstation to prompt for logon after coming out of stand-by mode.

- ✓ Internet Usage
  Accessing to the Internet exposes the computer to a plethora of vulnerabilities such as:
  - Viruses
  - Spyware
  - Trojans
  - Hostile Codes

  It is not recommended to install any unauthorized software on the computer. Peer-to-peer software can expose your entire hard drive to any individual running the same type of software.

- ✓ Antivirus Products
  Use of antivirus software can increase CPU and memory usage, which can cause a slight degradation in the performance of the system. However, functionality should not be affected.

- ✓ Physical Security
  It is recommended that the user employs some method of physical security when dealing with the system to ensure that only authorized personnel have access to the product.

There are several vulnerabilities a malicious user could exploit locally. Some examples are:

- Theft of equipment
- Local password cracking
- Installation of hardware key loggers

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1. Introduction

QuantorDent is an acquisition and diagnosis software for intraoral X-ray imaging. ***QuantorDent*** is used to scan and review intraoral X-ray images. When scanning an IP radiated with X-ray, ***FireCR Dental*** shows the preview image on the LCD screen and the image is saved in the built-in memory storage. Shortly after the end of scanning, the IP is deleted and it can be used for the next imaging.

Images stored in the scanner are transferred to ***QuantorDent*** in the image workstation via network or USB. The images are post-processed through ***QuantorDent*** and saved in the database that allows searching in the future.

QuantorDent can transport the acquired images to the hospital image storage system using DICOM Send.

The scanner can be connected to the in-hospital network or directly to the image workstation.

The system has following components:

- ***FireCR Dental***
- ***Fire ID***
- ***QuantorDent***

Safety Instruction

To ensure the safety of patients, staff and other people, any changes to software and hardware delivered by ***Digiray Corp*** may only be made with prior written permission from ***Digiray Corp***.

Liability

If unauthorized changes have been made to software and hardware components delivered by ***Digiray Corp***, the warranty by ***Digiray Corp*** becomes void. ***Digiray Corp*** will not accept any responsibility or liability for the improper functioning of the product in such a case.

1.1. Main Features

Image Acquisition and Management

QuantorDent supports various image acquisition methods that meet the needs of dental hospital. It can be used in a simple structure where one workstation is connected to a scanner for basic use as well as in a multi-structure where multiple image workstations are connected to multiple scanners. When multiple systems are used, it supports ***Fire ID***, which enables automatic image classification to designated patient and test information regardless of the scanning location.

Image Processing

To create an optimal image, you can apply different functions, including cropping, enhancing edges and increasing contrast. You can also add or delete images and modify the image sequence at your discretion.

Built-in Viewer

QuantorDent is not just a simple image acquisition software but can also be used as a diagnostic viewer. Like other viewers, it can manage patient and test information and contains all basic viewer functions.

2. Installation

2.1. Installation Environment

2.1.1. Recommended Computer Environment

Operating system	Microsoft Window 7, 8 and 10
CPU	Intel CORE i5
Memory	4G or higher
Hard disk	500GB or higher
Network	1Gbps Ethernet
Video output	32-bit color display
Screen resolution	1920 x 1080, 1440 x 900

2.1.2. Minimum Computer Requirements

Operating system	Microsoft Window 7
CPU	Intel Processor
Memory	2GB
Hard disk	80GB
Network	1Gbps Ethernet
Video output	32-bit color display
Screen resolution	1280 x 800, 1600 x 900, 1280 x 1024

2.1.3. License Dongle

You need the license dongle enclosed in the product package to operate this product. The dongle should be inserted into a USB port of your PC, and the dongle driver is installed at the same time the program is installed.

Codes	Number of License	Picture
QD	1	
QN	1~N	

There are two types of dongle: D and QN. The dongle product code is displayed followed by the 4-digit serial number on the sticker attached to the dongle. The D dongle is blue and is recognized only in the PC to which the dongle is connected. The QN dongle is red and can be recognized by all PCs in the same private network as the PC to which the dongle is connected. A hospital licensed with multiple QuantorDent programs can use a D dongle with each PC or just a QN dongle in the network. A QN dongle is configured with the maximum number of users that can be connected to the product. Note, however, that any QuantorDent in the network will be disabled if the PC to which the QN dongle is connected is turned off. A separate dongle driver must be installed if only the QN dongle is used without the installation of QuantorDent.

2.2. Installation

Software installation methods are divided into the Stand-alone type and Client of Quantor Dent Server type. The Stand-alone type saves study information and images in the PC where software is installed, whereas the Client of Quantor Dent Server type saves study information and images in the server PC.

2.2.1. Stand-alone type Software Installation

1. Log on to a PC with an administrator account.
2. Connect the USB dongle to a USB port.
3. Insert Installation CD. Install program will automatically launch.
4. If the install program is not launched automatically, find and execute the "***QuantorDent 2.x.x. Setup.exe***" file on the CD.

5. Click the "Next" button as shown in Figure 2.1.

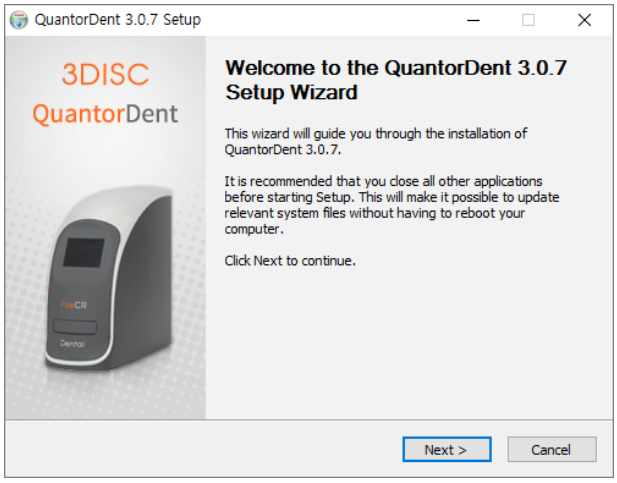


Figure 2.1 Welcome Dialog Box

6. Choose all components and click the "Next" button as shown in Figure 2.2.
7. If you are installing QuantorDent for the first time, check the "HASP HL Driver" box.

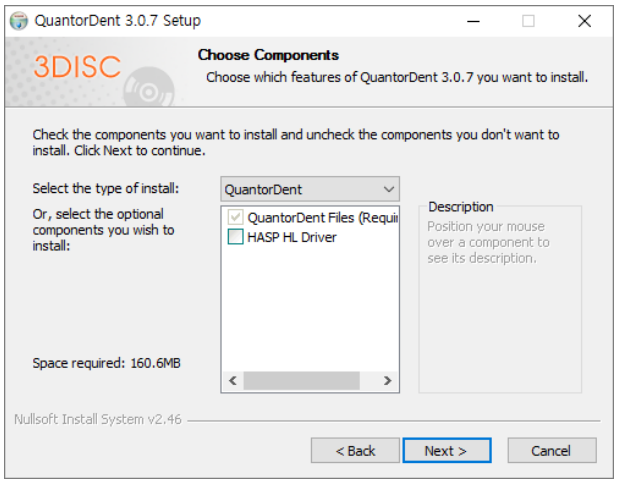


Figure 2.2 Components Dialog Box

8. Choose your language and click the “Next” button as shown in Figure 2.3.

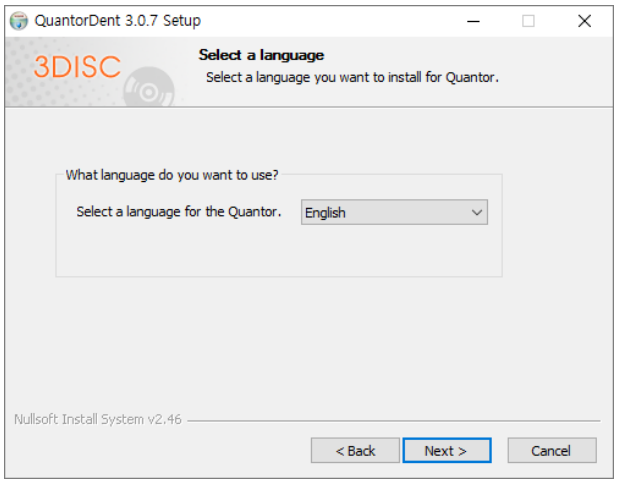


Figure 2.3 Language Select Dialog Box

9. As shown in Figure 2.4, select the application type and click the "Next" button.

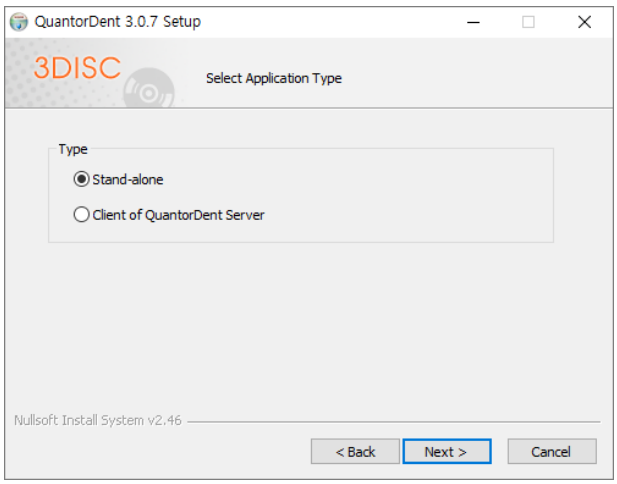


Figure 2.4 Application Type Dialog Box

10. Choose the destination folder and click the “Install” button as shown in Firgure 2.5.

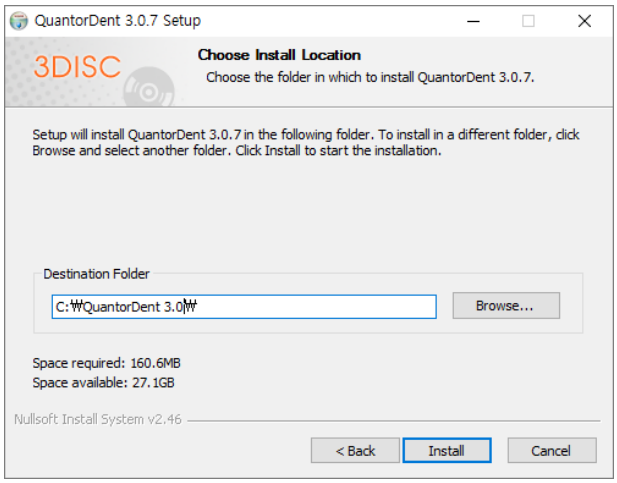


Figure 2.5 Installation Location Dialog Box

11. Installation status will be displayed as shown in Figure 2.6.

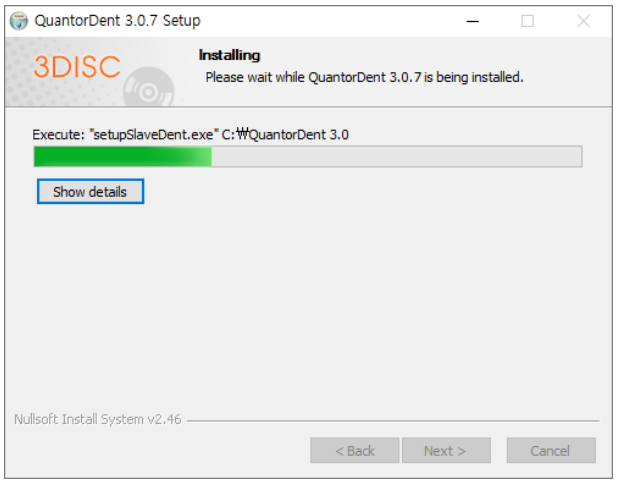


Figure 2.6 Installation Status Dialog Box

12. Installation status of the dongle driver will be displayed as shown in Figure 2.7.

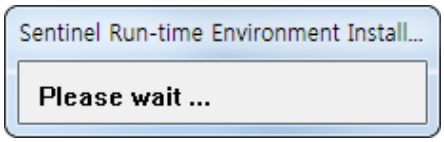


Figure 2.7 Installation of dongle Driver

13. If the dongle driver is installed successfully, a message box appears as shown in Figure 2.8.
14. Click the "OK" button.

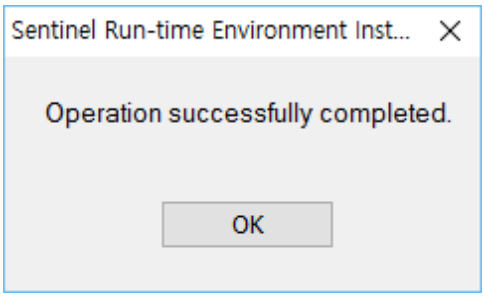


Figure 2.8 Dongle Driver Installation Complete

15. If installation is successful, Figure 2.9 will show up.
16. Click “Finish to finish the installation.

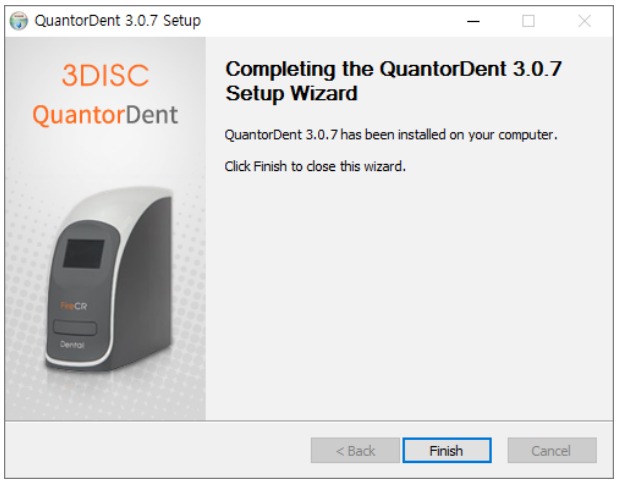


Figure 2.9 Installation Finish Dialog Box

2.2.2. Client Server type Software Installation

- Connect the installation PC to the private network.
- Inquire with the administrator to confirm that there is a PC with Quantor Dent Server in the same network. Quantor Dent Server is mandatory for installation.
- Inquire with the administrator to confirm that adequate network speed of 100Mbps or higher is guaranteed. The network speed must be guaranteed in order to transfer the image data from the server. The requirement is applicable to both wired and wireless environments.
- Log on to a PC with an administrator account.
- Connect the License dongle to USB port.
- Connect FireCR Dental to the installation PC through a USB or a network.

1. Insert Installation CD. Install program will automatically launch.
2. If the install program is not launched automatically, find and execute the "***QuantorDent 3.0.x. Setup.exe***" file on the CD.
3. Click the "Next" button as shown in Figure 2.10

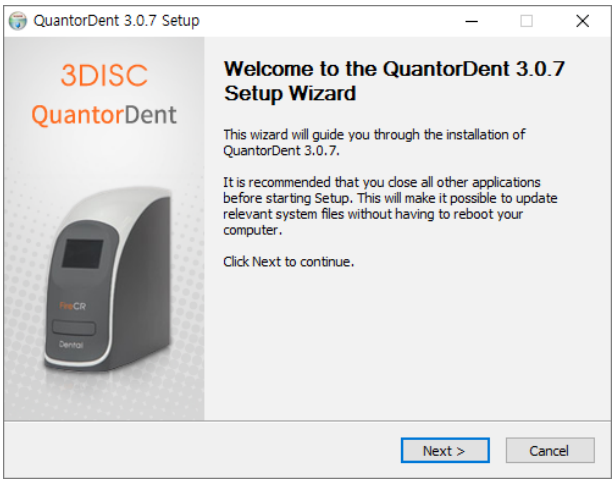


Figure 2.10 Welcome Dialog Box

4. Choose all components and click the "Next" button as shown in Figure 2.11.
5. If you are installing QuantorDent for the first time, check the "HASP HL Driver" box.

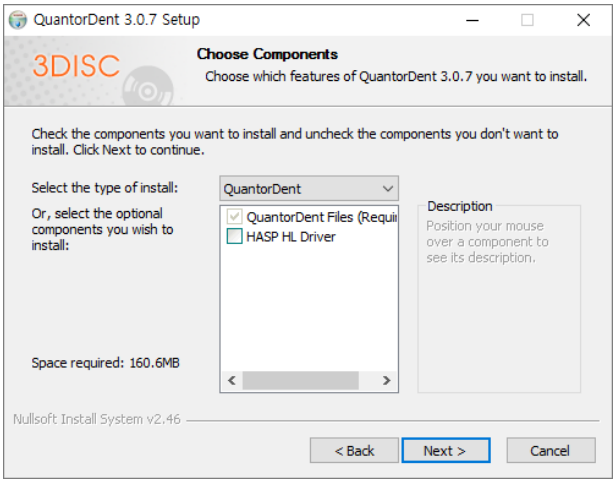


Figure 2.11 Components Dialog Box

6. Choose your language and click the “Next” button as shown in Figure 2.12.

Figure 2.12 Language Select Dialog Box

7. As shown in Figure 2.13, select the application type and click the "Next" button.

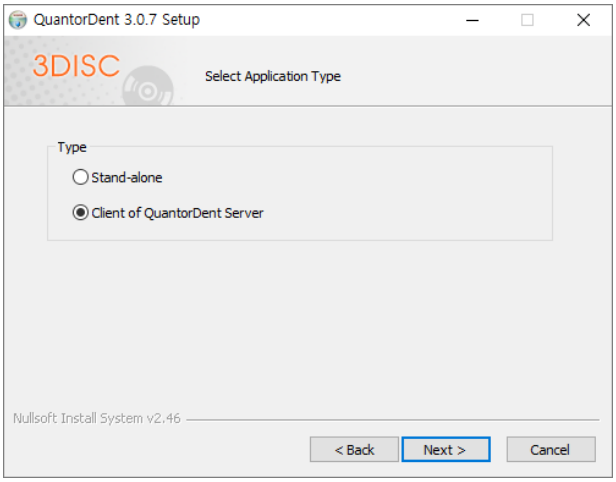


Figure 2.13 Application Type Dialog Box

8. Choose the destination folder and click the “Install” button as shown in Firgure 2.14.

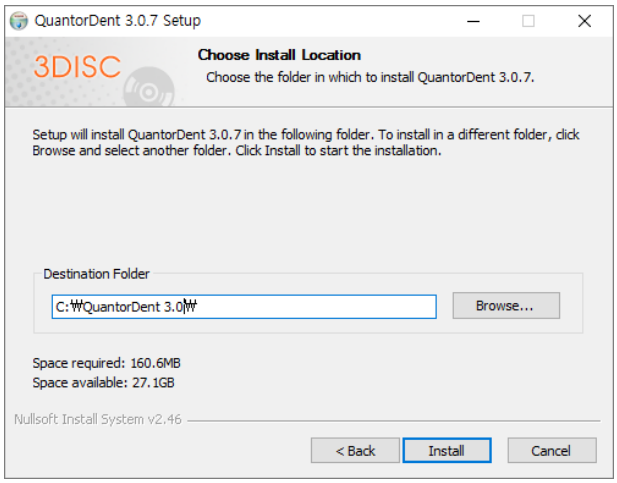


Figure 2.14 Installation Location Dialog Box

9. Installation status will be displayed as shown in Figure 2.15.

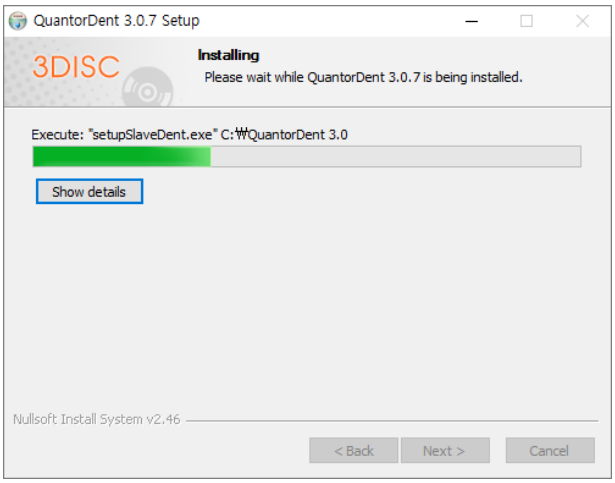


Figure 2.15 Installation Status Dialog Box

10. Installation status of the dongle driver will be displayed as shown in Figure 2.16.

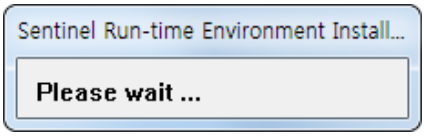


Figure 2.16 Installation of dongle Driver

11. If the dongle driver is installed successfully, a message box appears as shown in Figure 2.17.
12. Click the "OK" button.

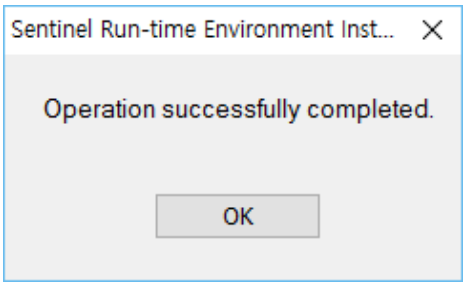


Figure 2.17 Dongle Driver Installation

13. The Quantor Credential Manager (QCM) window is displayed. Follow the procedure in Section 2.2.3.
14. If installation is successful, Figure 2.26 will show up.
15. Click “Finish to finish the installation.

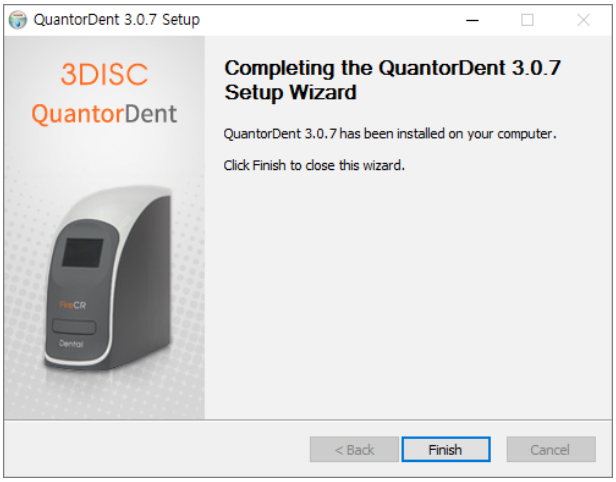


Figure 2.26 Installation Finish Dialog Box

2.2.3. Quantor Credential Manager

Since the acquired images are stored in the shared folder of the server in client server version, the client PC must be able to access the shared folder of the server PC. Quantor Credential Manager helps the client PC obtain the Windows credential to access the shared folder of the server PC.

1. The Quantor Credential Manager (QCM) window shown in Figure 2.18 is automatically opened during the installation process. Run "QCM.exe" in the installation folder if you need this process due to a change of server while using the product. The program automatically searches the server when it is started.

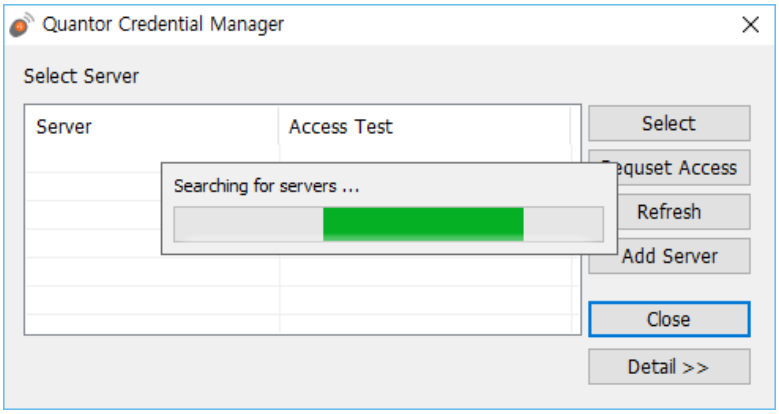


Figure 2.18 Quantor Credential Manager

2. Once server search is completed, the Server List appears as shown in Figure 2.19.

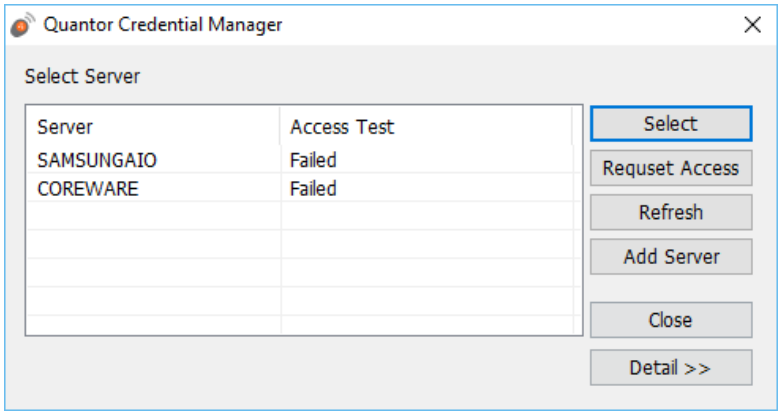


Figure 2.19 Server List

3. The server may not be found depending on the security environment of the private network. A server can be manually added in that case. Click the "Add Server" button first, and then enter the IP address of the server received from the administrator as shown in Figure 2.20 and click the "Connect" button.

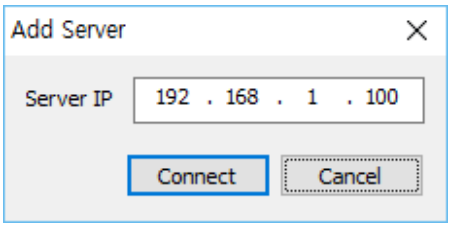


Figure 2.20 Add Server

4. Click the server to use in the Server List.
5. As shown in Figure 2.21, click the "Request Access" button.

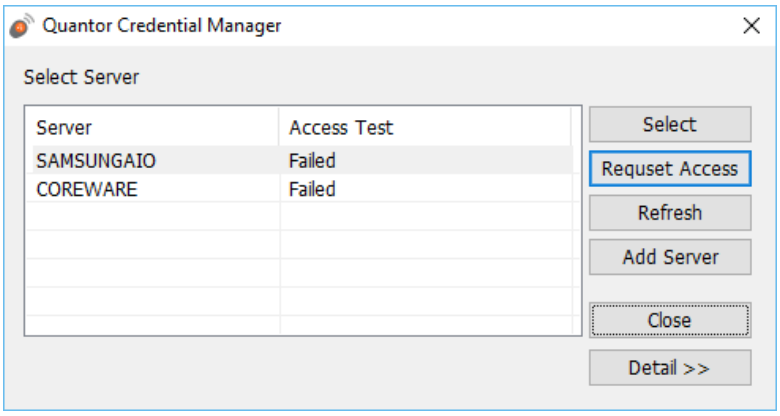


Figure 2.21 Request Access

6. The Windows Security dialog box is displayed as shown in Figure 2.22. Enter the user ID and password received from the administrator. If the dialog box is not displayed, it means that the installation server already has the Windows credential to access the shared folder of the server.

.

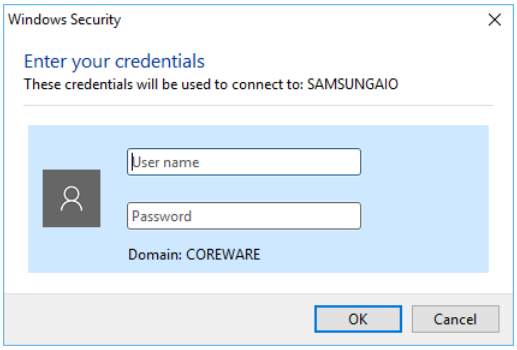


Figure 2.22 Entering the Windows Account

7. If the Windows account info matches, a message appears as shown in Figure 2.23.
8. Click the "OK" button.

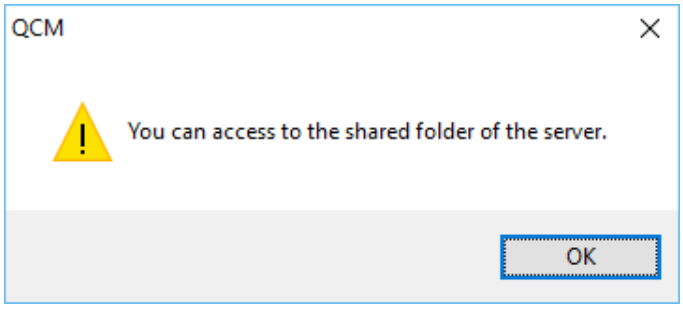


Figure 2.23 Successfully Accessed to the Shared Folder

9. As shown in Figure 2.24, if the status of the Access Test is Passed, click the "Select" button.

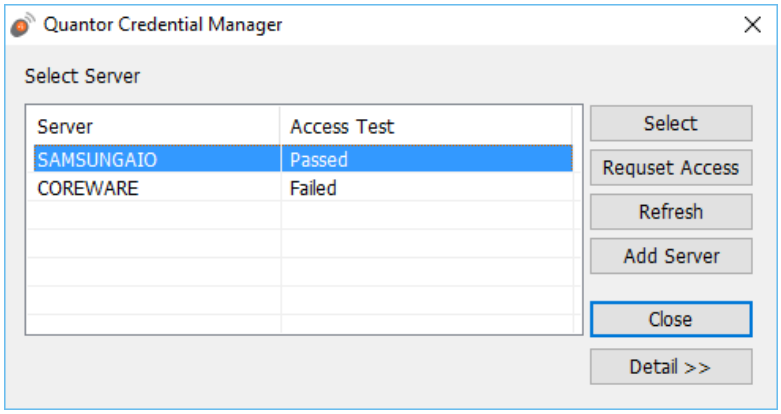


Figure 2.24 Selecting the Server

10. Click the "Close" button to close Quantor Credential Manager.

2.3. Start and Exit

2.3.1. Start system

1. Turn on the FireCR Dental
2. Turn on the Quantor Dent Server if QuantorDent is installed as Client Server.
3. Connect PC to network if QuantorDent is installed as Client Server or FireCR Dental is connected to netword.
4. Turn on the PC and monitor.

CAUTION
Do not run any application software other than ***QuantorDent*** during operation of the scanner. This may slow the scanner response.

2.3.2. Start program

After successfully booting Windows, double-click the ***QuantorDent*** icon on the desktop screen as shown in Figure 2.27.

QuantorDent

Figure 2.27 Desktop Icon

Figure 2.28 shows the initial page if the installed product is a standalone type. Figure 2.29 shows the initial page for a client server type. In the case of a client server version, the programs do not start if the server connection fails. Please inquire with the administrator if there is a server error. Perform the Windows credential setting process in 2.2.3 again if the server PC or the server account has been changed.

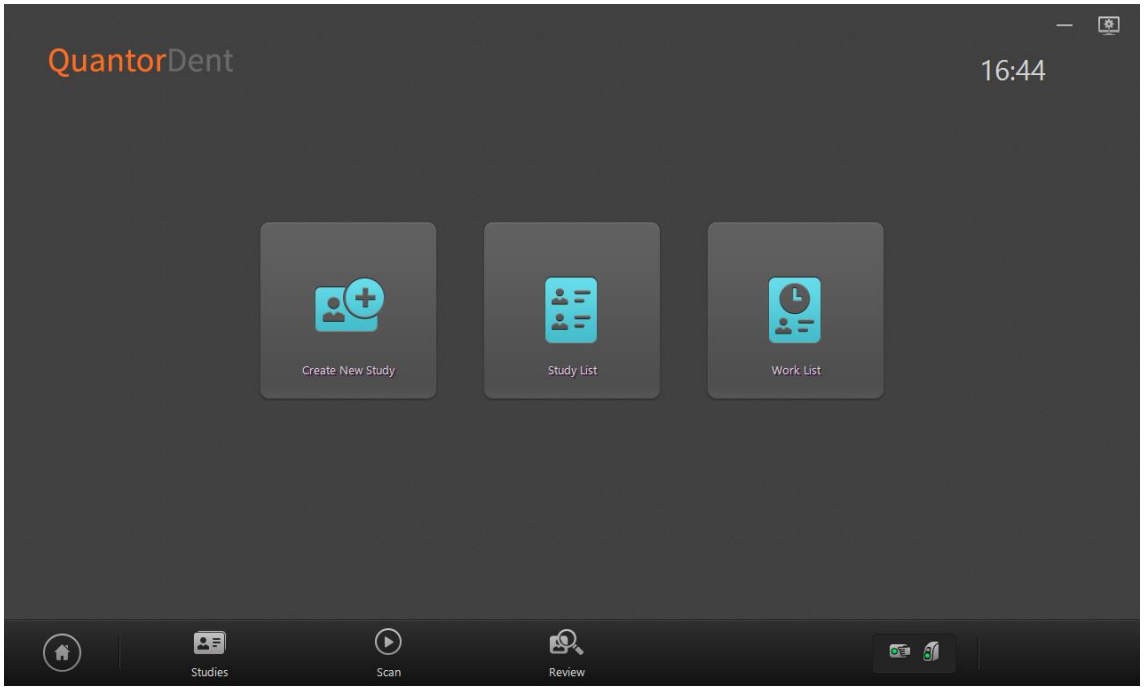


Figure 2.28 Home Screen of Standalone

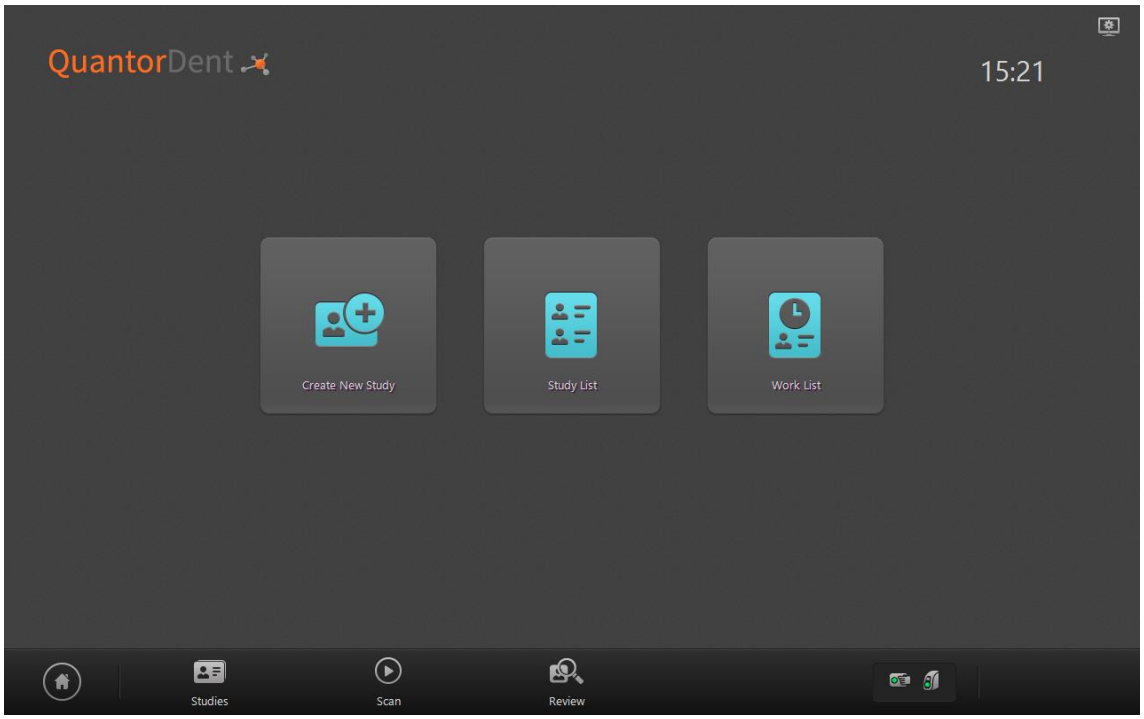


Figure 2.28 Home Screen of Client Server

2.3.3. Exit program

Select the system button that looks like Figure 2.30 on the Home screen.

Figure 2.30 System button

You can select "Exit" in the system menu to close the program.

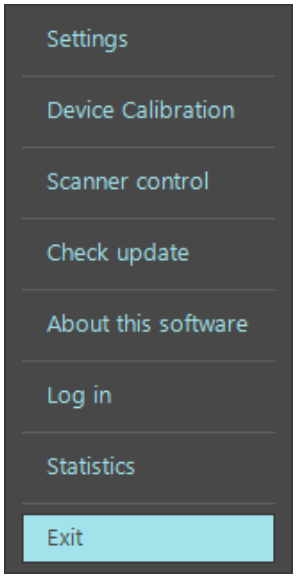


Figure 2.31 System menu

2.3.4. Network Adapter List

If there are 2 or more network adapters in the PC, the following process is required. (Skip this clause if there is 1 network adapter.) If you initially run the QuantorDent program, the Network Adapter List window appears as shown in Figure 2.29. The information of the network adapter installed in the PC appears in the Network Adapter List. Select the right network adapter that can access the FireCR Dental scanner and click the "OK" button.

CAUTION
If you select a wrong network from the Network Adapter List after initially running the QuantorDent program, you cannot access the scanner.

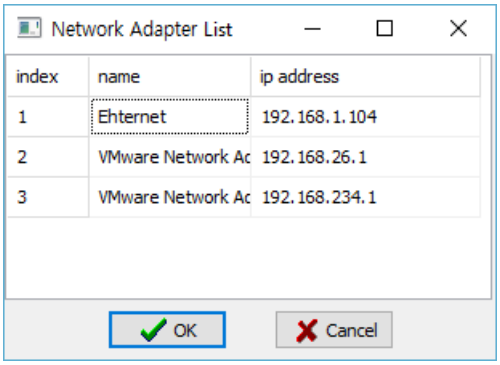


Figure 2.29 Network Adapter List

If you selected the wrong network adapter, you need to select another network adapter. Run the following process:

1. Close the QuantorDent program.
2. In File Explorer, go to the Public Documents folder.
3. Find and open the FireCR Dental folder.
4. Find the "FireCR.ini" file and open it in Notepad.

If you open the FireCR.ini file, it appears as shown in Figure 2.30. As shown in Figure 2.30, clear all content from the [NETWORK] to [NETWORKSELECTED] items and save the file. (If there are many network adapters installed in the PC, there may be more contents to clear.)

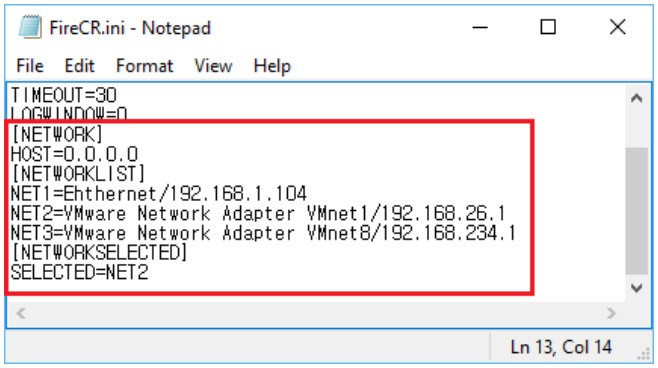


Figure 2.30 FireCR.ini

CAUTION
Do not modify other parts when modifying the "FireCR.ini" file.

2.4. FireCR Dental Calibration

In the system menu, select IP Calibration to open a window as shown in Figure 2.31. Process calibration as instructed in the window.

CAUTION
Calibrate the scanner before use. The “Please calibrate system” message pops up if the scanner is not calibrated or calibration data does not exist.
It is recommended to calibrate the reader after moving it and as a part of regular maintenance.

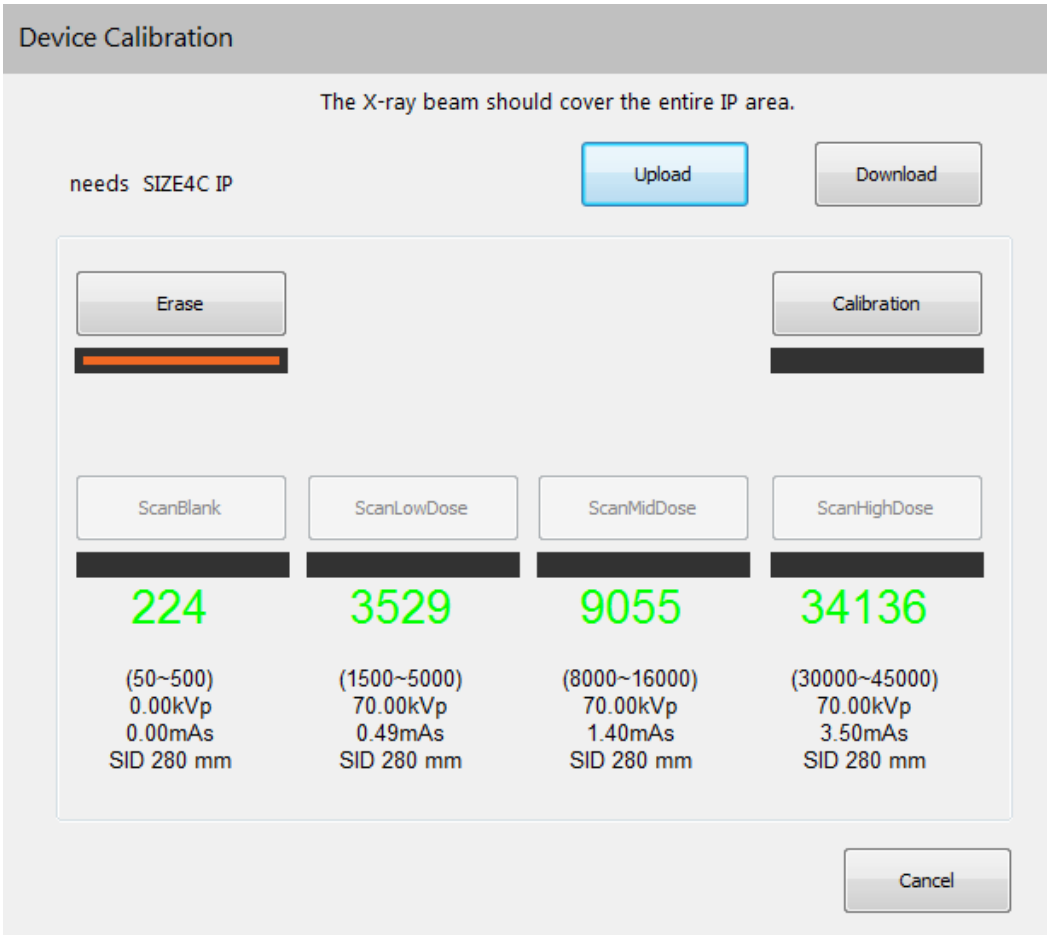


Figure 2.31 Calibration

CAUTION
SIZE 4c IP must be used for calibration.

2.4.1. Step 1: Erase

At first, you can see the Erase button flickering. Place the IP on the tray and insert it. When the erase is completed, the Scan Blank part starts flickering.

2.4.2. Step 2: Scan Blank

Place an IP that has not been radiated with X-Rays on the tray and insert it. At the scan completion, the Scan Low Dose part starts flickering.

2.4.3. Step 3: Scan Low Dose

Adjust the X-Ray imaging settings to 70kVp, 0.49mAs and scan the IP from the recommended X-Ray imaging distance. Place the IP on the tray and insert it. Once the scan is completed, the measurement is displayed below the button. It should be between 1500 and 5000. If so, click Accept to process the next step. If not, click Reject to repeat Step 3.

2.4.4. Step 4: Scan Mid Dose

Adjust the X-Ray imaging settings to 70kVp, 1.4mAs and scan the IP from the recommended X-Ray imaging distance. Place the IP on the tray and insert it. Once the scan is completed, the measurement is displayed below the button. It should be between 8000 and 16000. If so, click Accept to process the next step. If not, click Reject to repeat Step 3.

2.4.5. Step 5: Scan High Dose

Adjust the X-Ray imaging settings to 70kVp, 3.5mAs and scan the IP from the recommended X-Ray imaging distance. Place the IP on the tray and insert it. Once the scan is completed, the measurement is displayed below the button. It should be between 30000 and 45000. If so, click Accept to process the next step. If not, click Reject to repeat Step 3.

2.4.6. Calibration

This creates a Calibration data file.

2.4.7. Upload

If you click the Upload button, the calibration data is transferred to the scanner for storage.

2.4.8. Download

If you click the Download button, stored calibration data in the scanner is downloaded to the PC.

3. Software Overview

3.1. Supported Resolutions

Landscape resolutions with 16:9, 4:3 and 5:4 ratios are supported. Portrait ratios are not supported. The horizontal resolution of the monitor must be at least 1280 pixels, and the vertical resolution of the monitor must be at least 768 pixels. Recommended resolutions are listed in Table 3.1.

Table 3.1. Supported Resolutions

Screen ratio	Screen resolution
16:9	1366 x 768 1280 x 800 1400 x 900 1600 x 900 1920 x 1080
4:3, 5:4	1280 x 1024

If you have multiple monitors you can select ***QuantorDent*** display monitor at Setting's [System – System Option – Display Monitor]. If you select Review Monitor differently from Display Monitor at Setting's [System – System Option – Review Monitor], Review Screen will be displayed with full screen mode at assigned monitor. Full screen review monitor supports all screen resolution types, and both landscape and portrait monitor orientation.

3.2. Home

The Home screen is the first screen that appears when the program is run. From the Home screen, you can create a new study or view existing studies.

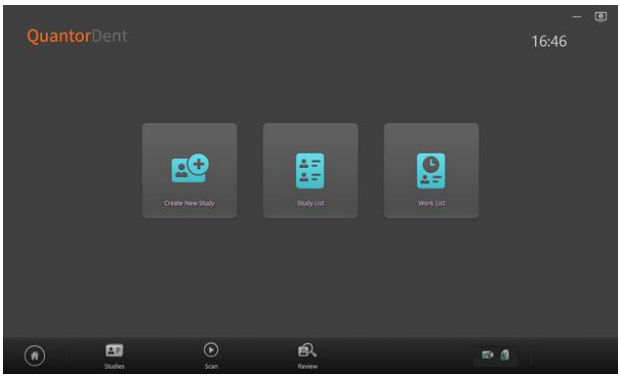


Figure 3.1 Home Screen

3.3. Navigation Bar

The Navigation Bar is located at the bottom of the screen. The Navigation Bar is always displayed while the program is running, allowing the user to easily switch screens during a task.

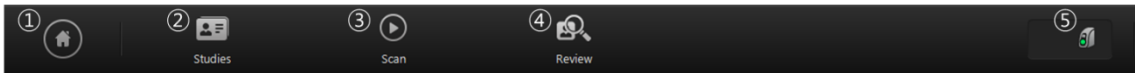


Figure 3.2 Navigation Bar

① Home
② Studies
③ Scan
④ Review
⑤ Indicator

3.4. Study List

The Studies screen shows a collection of windows that are related to the studies. You can enter the Studies screen by clicking the Studies button in the Navigation Bar. The Sub-Navigation Bar is located on the left of the screen. In the Sub-Navigation Bar, you can select a Study List, Work List or Transport windows that are related to the study.

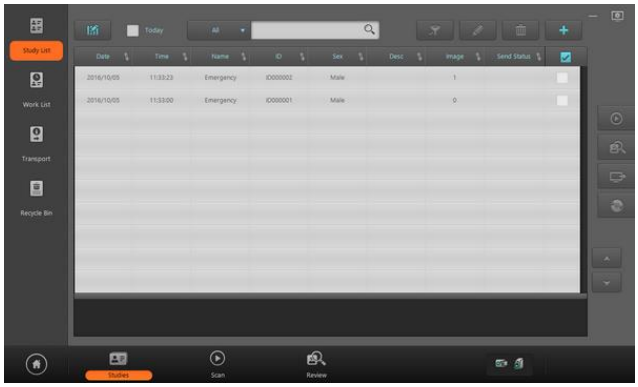


Figure 3.3 Studies Screen

① Study List: You can perform various tasks by searching existing studies and selecting a study.
② Work List: You can query the work list from the PACS work list server, select the desired study and immediately begin image acquisition.
③ Transport: You can confirm the transmission results of the acquired images.
④ Recycle Bin: You can restore or completely remove the deleted studies. The method of using and searching the Recycle Bin window is the same as the Study List.

3.5. Create New Study

The New Study screen is the first page to start a scan. After entering necessary patient and study information and adding a new study, you can begin a scan.

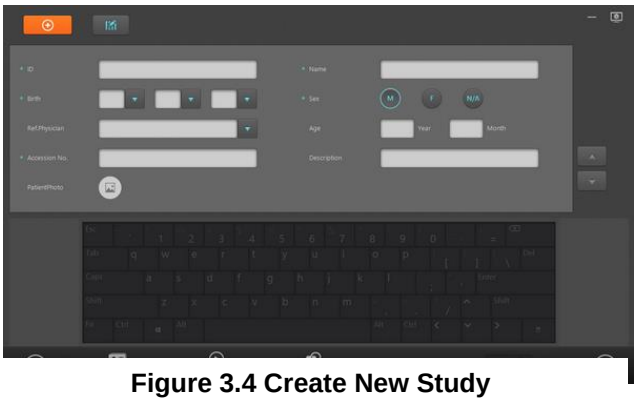


Figure 3.4 Create New Study

3.6. Patient Information

The Patient Information Bar is displayed at the top of all the screens, with the exception of the Home screen and the New Study screen. The Patient Information Bar displays patient information and other related information.

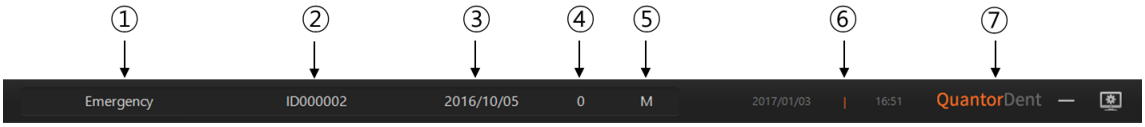


Figure 3.5 Patient Information

① Patient Name
② Patient ID
③ Patient's Date of Birth
④ Patient's Age
⑤ Patient's Sex (M: Male, F: Female, N/A: Other)
⑥ Current Time
⑦ Model Name
⑧ System

3.7. Scan

In the Scan screen, you can insert an IP into the ***FireCR Dental*** and process image acquisition.

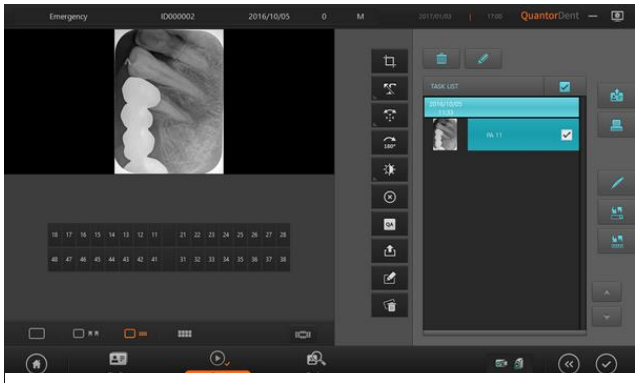


Figure 3.6 Scan Screen

3.8. Review

In the Review screen, you can query scanned images. The Review screen is very useful for conducting diagnosis after acquiring the images.

Figure 3.7 Review Screen

4. Home Screen

4.1. Screen Layout

The Home screen is the first screen that appears when the program is run. From the Home screen, you can create a new study or view existing studies. You can go back to the Home screen by using one of the actions below.

- Clicking the Home button in the Navigation Bar
- Clicking the End Study button in the Scan screen
- Clicking the End Study button in the Review screen

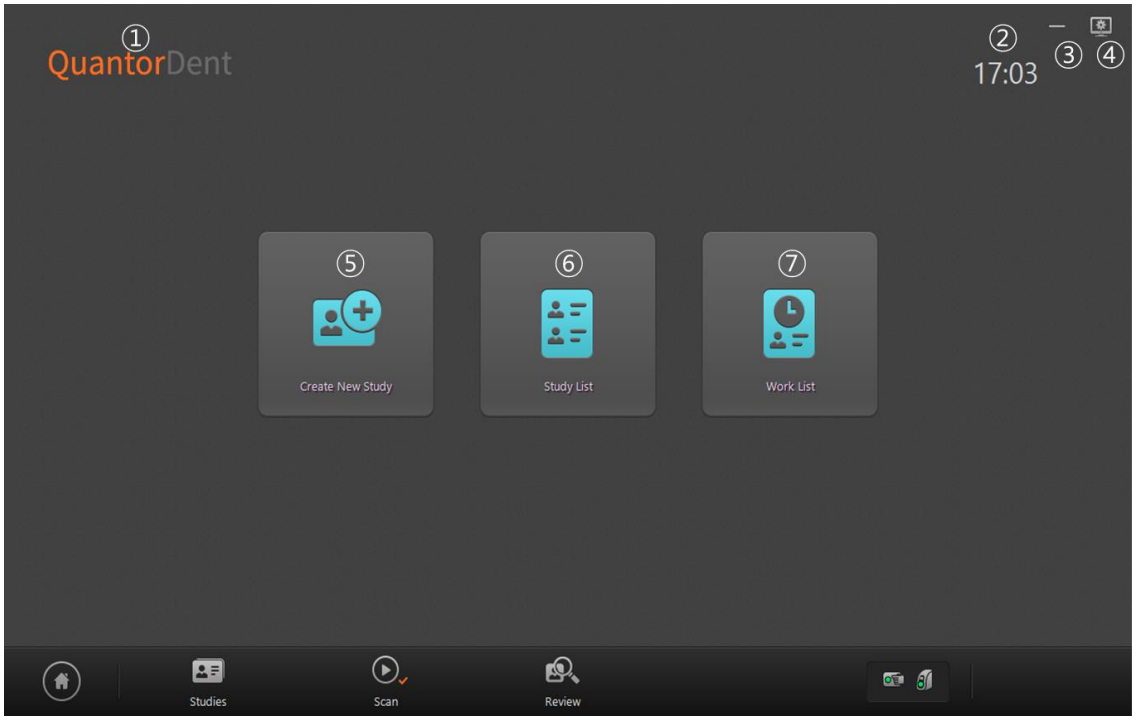


Figure 4.1 Home Screen

① Model Name: Displays the model name of ***QuantorDent***
② Current Time: Current time is displayed in hours and minutes.
③ Minimize: Minimize the main window.
④ System: Displays the System menu.
⑤ Create New Study: Go to New Study screen.
⑥ Study List: Go to Study List screen.
⑦ Work List: Go to Work List screen.

4.2. System menu

The System button is always displayed in the upper-right corner of the program. When the button is clicked, the following menu appears on the screen.

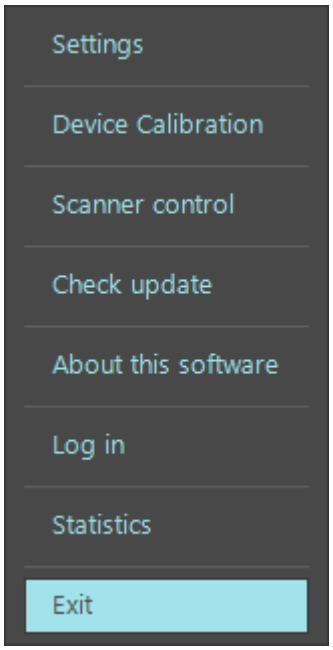


Figure 4.2 System menu

- Settings: Displays the Settings window.
- IP Calibration: Runs IP Calibration program.
- Scanner Control: Runs Scanner Control program.
- Check Update: Checks for a new version. If a new version is available, it is automatically downloaded and installed.
- About this software: Displays software version information
- Log in: Logs in with a user ID.
- Statistics: Displays the statistical data.
- Exit: Exits the program.

4.2.1. Log in

Log in will show login dialog box as Figure 4.3

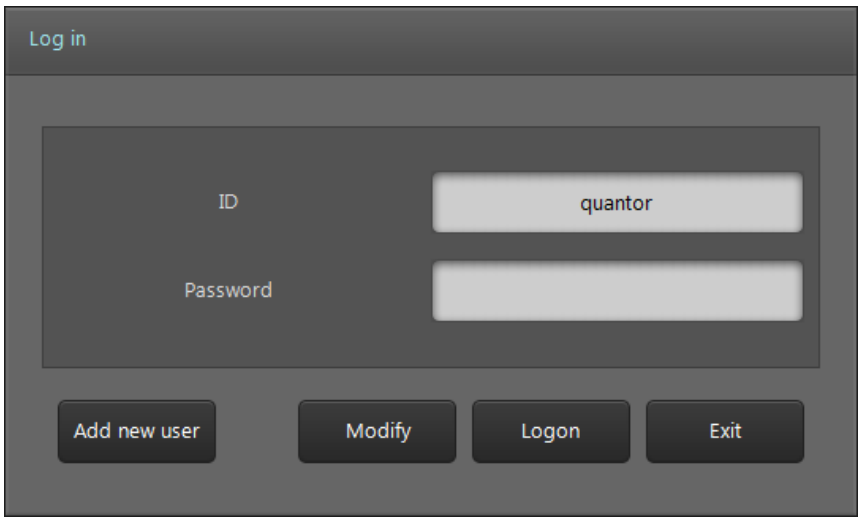


Figure 4-1 Login Dialog Box

- Log in after entering the user ID and password.
- Click the "Add New User" button to add a new user. (Figure 4.4) You will need an administrator account to add a new user.
- Enter a user ID and click the "Modify" button to change the user information.
- User name will be written to DICOM file (0008, 1070 - Operators Name)
- You must log out and then log in again if the user is changed.

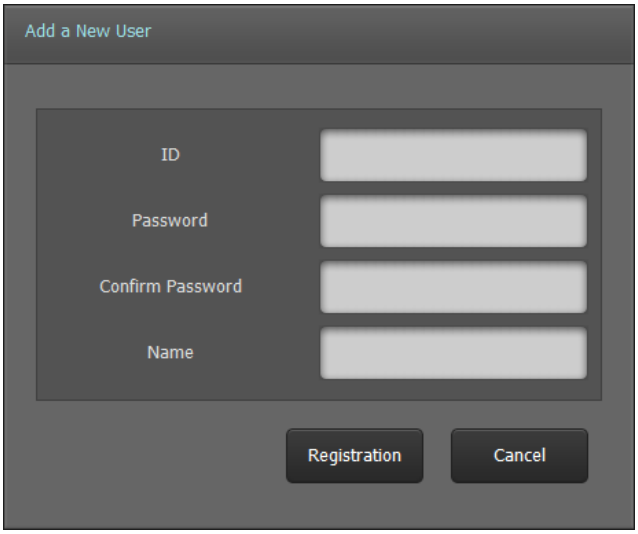


Figure 4-2 Add User Dialog Box

4.2.2. Statistics

On the statistics window, you can search for the number of scans performed by a user during a specified period. The default value of the specified period is 1 month.

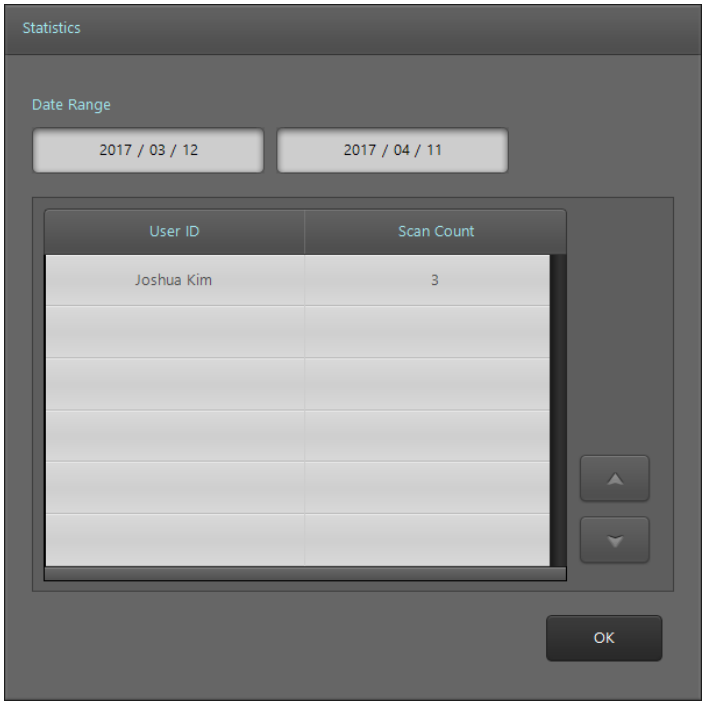


Figure 4-5 Statistics

5. Create New Study

5.1. Screen Layout

The New Study screen is the first page when performing a scan. Enter the necessary patient and study information. You can easily switch to the next input field by using the Tab key. Fields marked by * are mandatory DICOM fields that must be filled in.

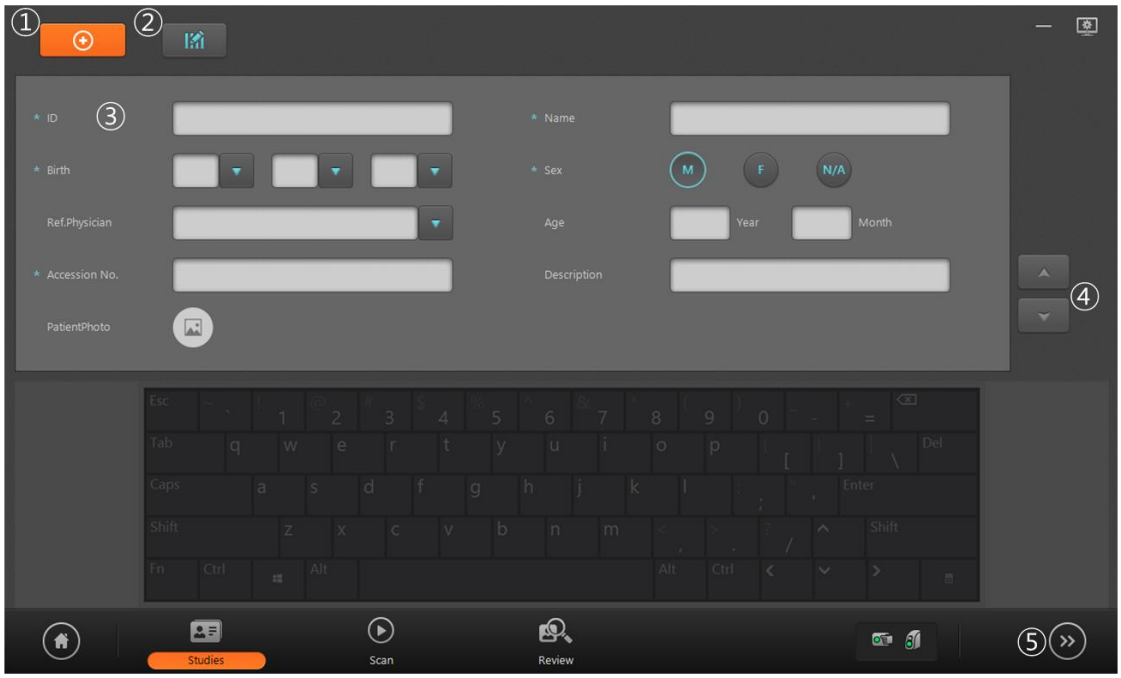


Figure 5.1 Create New Study

① Emergency: Mandatory fields are filled in automatically. This function is used in emergencies where patient information has not been identified to perform a scan first and fill in the patient data later.

② Edit Input Field: Bring up Input Field Edit dialog. In the Input Field Edit dialog, you can change the order of the input fields, and add or remove input fields.

③ Input Field: Details about each input field are described in **오류! 참조 원본을 찾을 수 없습니다.**.

Table 5.1 Input Field

Title	Description	Mandatory
Name	Enter patient name. In the Edit Input Field area, select “Name (+)” to enter the patient's last name and given name separately.	O
ID	Enter patient ID.	O
Birth	Enter patient’s date of birth. You can select a date from the drop-down box or manually enter numbers. When only the date of birth is entered and not the age, age is calculated automatically.	O
Sex	Select patient’s sex. M stands for male. F stands for Female. N/A stands for other.	O
Age	Enter patient’s age. Leave the Year field blank if the patient is less than 1 year old. When only the age is entered and not the date of birth, date of birth is calculated automatically. When it does, month and date are automatically entered as January 1.	X
Ref. Physician	Enter the referring physician or select the referring physician already entered in Settings. For details on how to input on the Settings window, refer to Chapter 14.	X
Description	Enter study description.	X
Accession No.	Enter accession number. Entering an accession number is mandatory. If not entered, a new number will be generated automatically.	O
Patient Photo	You can add the photo of the patient. For details on how to input, refer to 5.3.	O

④ Page Up/Down: Go to another page.

⑤ Next: Go to the Region Selection screen, which is the next step.

WARNING
Warning message pops up if any of mandatory item is missing, and can’t proceed to the next step.

5.2. Edit Column Dialog Box

In the Input Field Edit dialog box, you can change the order of the input fields, and add or remove input fields. The input fields can be edited according to the user's environment. However, mandatory input fields cannot be removed. For patient names, two fields are provided: "Name" and "Name (+)". "Name" has only one input box while "Name (+)" provides two so that the user can enter the last name and the given name separately.

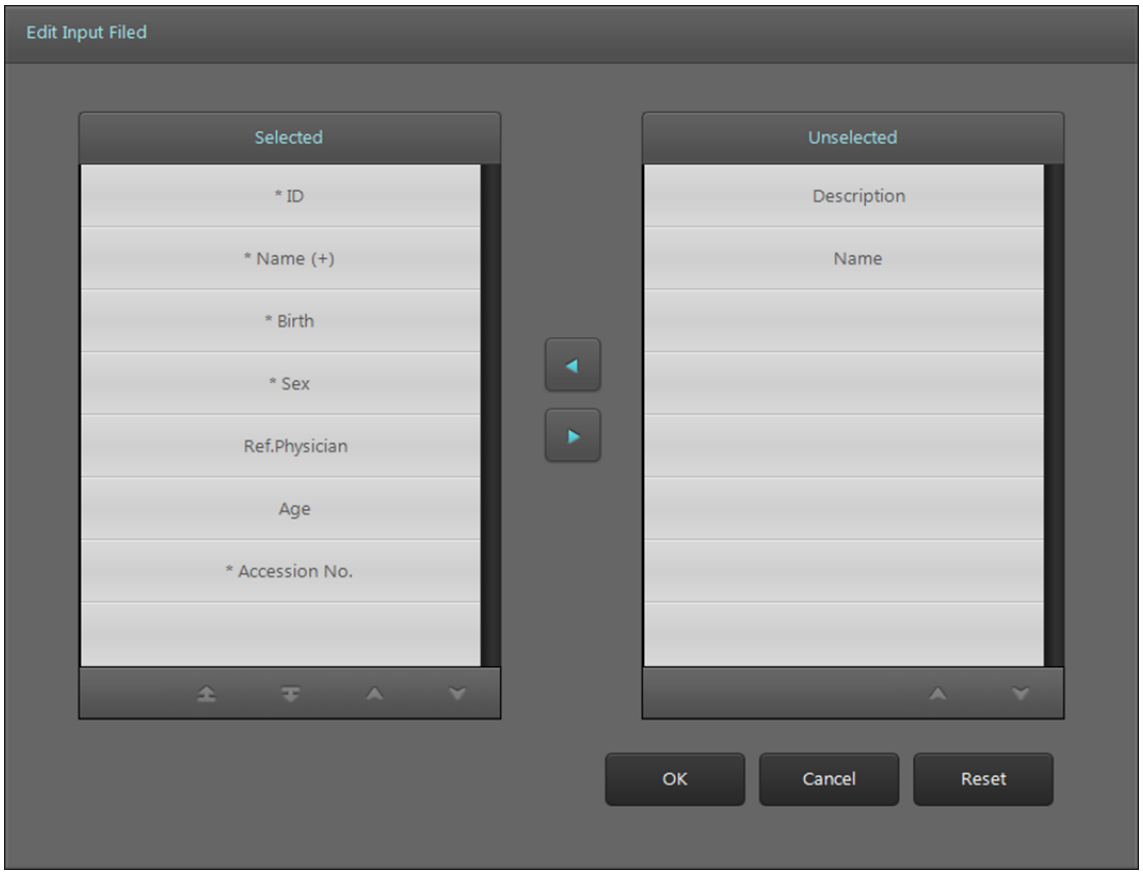


Figure 5.2 Edit Input Fields

① Input field items to be displayed on the screen.

② Input field items not to be displayed on the screen.

③ Move selected items to left and right. Items on the left are displayed on the screen and the items on the right are not displayed on the screen.

④ Button for switching pages.

⑤ Move the selected items up or down on the list to change order.

⑥ Save changes and close the dialog box.

⑦ Cancel changes and close the dialog box.

⑧ Reset the fields to default settings.

5.3. Add Patient Photo

Click the Patient Photo icon.

The screen as shown in Figure 5-3 appears.

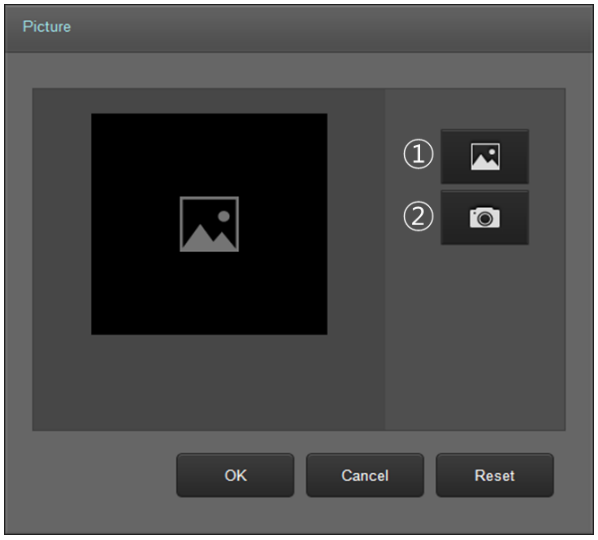


Figure 5-1 Add Patient Photo

① Select a photo file.

② Use the USB camera to take a photo. If you select Take Photo, the Shutter button appears as shown in Figure 5-4.

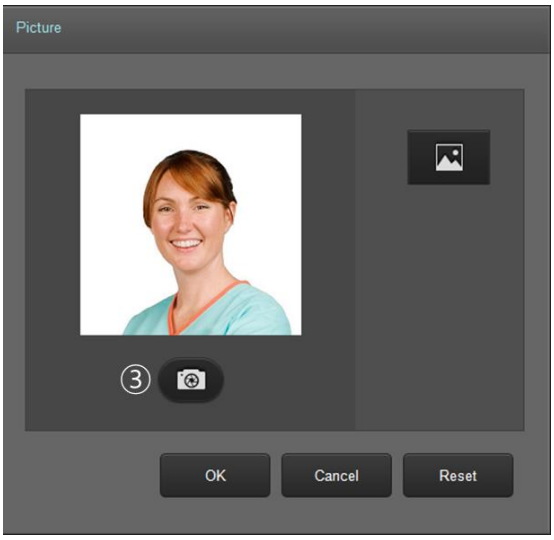


Figure 5-2 Take Photo

③ Press the Shutter button to take a photo.

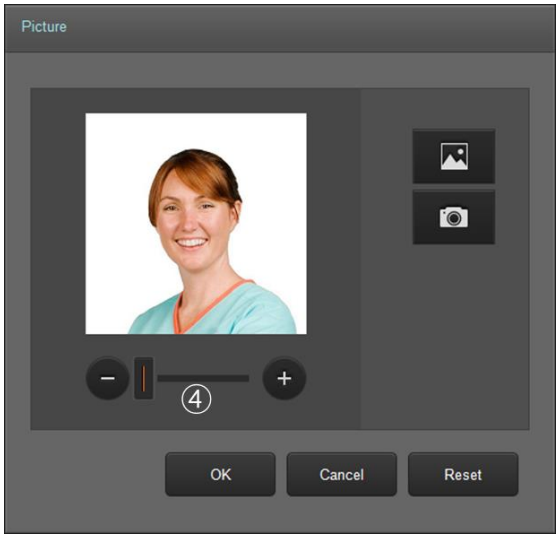


Figure 5-3 Adjust Photo Size

④ Press the Zoom In/Out button to adjust the photo size.

⑤ Press the "OK" button to save the photo.

⑥ Press the "Cancel" button to close the current screen without saving the photo.

⑦ Press the "Reset" button to delete the photo.

6. Scan

In the Scan screen, you can insert the IP into the ***FireCR Dental*** and acquire images. You can also import scanned images from the FireCR Dental. If you have equipment that supports TWAIN, you can use TWAIN to acquire images as well.

6.1. Screen Layout

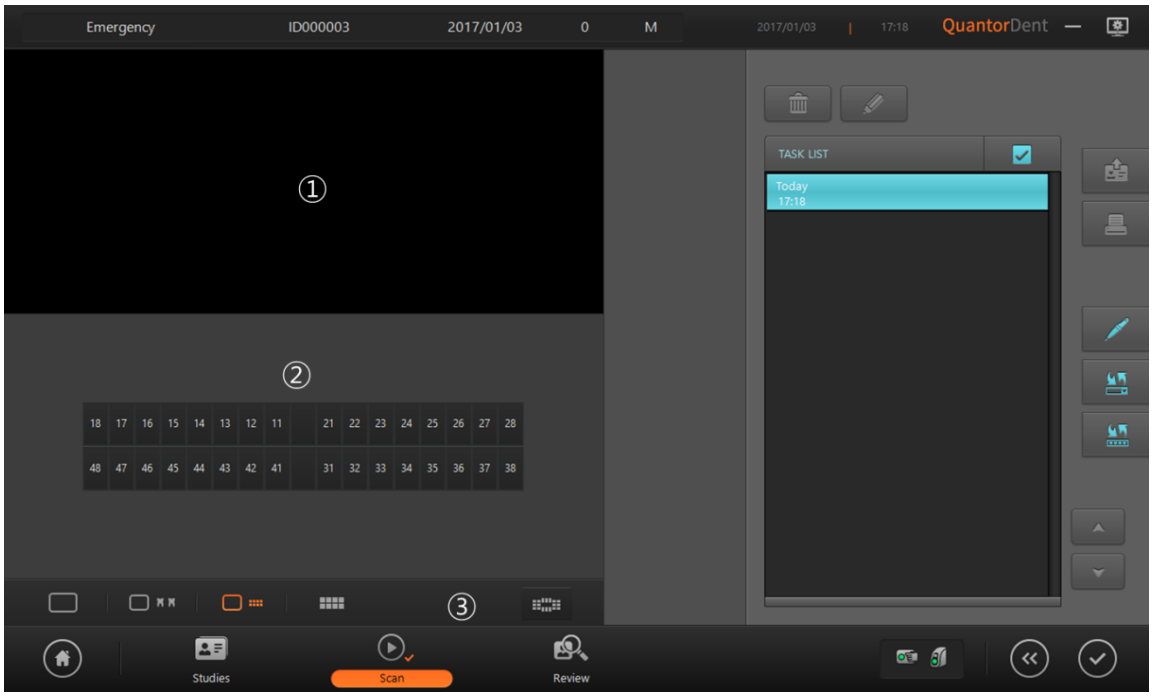


Figure 6.1 Scan Screen

① Image window: Displays an image selected in the Task List.

② Support window: Displays various forms of information related to teeth.

③ Tool box: You can change contents shown in the image view window and support window.

6.2. Tool Box

Figure 6.2 Scan Screen

① Image window: Displays images only.

② Image window + Dentition: Displays images and dentition.

③ Image window + chart: Displays images and charts.

④ Chart: Displays chart only.

⑤ Template: Displays a template instead of chart.

6.2.1. Image

When you click the Image button in the tool box, the image window only displays an image.

Figure 6.3 Image only

6.2.2. Image + Dentition

When you click the "Image + Dentition” button in the tool box, it displays an image on the top and dentition on the bottom. Using dentition, you can record which teeth have been scanned after scanning completion. The dentition and the chart are synchronized. The teeth selected in the dentition are also selected in the chart.

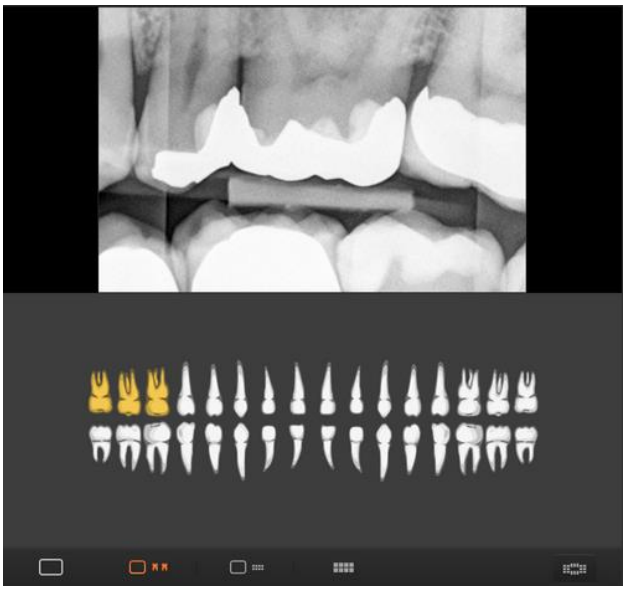


Figure 6.4 Image+ Dentition

6.2.3. Image + Chart

When you click the "Image + Chart" button in the tool box, it displays an image on the top and the chart on the bottom. The chart provides the international standard teeth number in the center. You can drag an image from the image window or task bar and align them on the chart. The chart and the dentition are synchronized. The teeth selected in the chart are also selected in the dentition.

Figure 6.5 Image + Chart

6.2.4. Chart

When you click the "Chart" button in the tool box, the chart is provided in full screen.

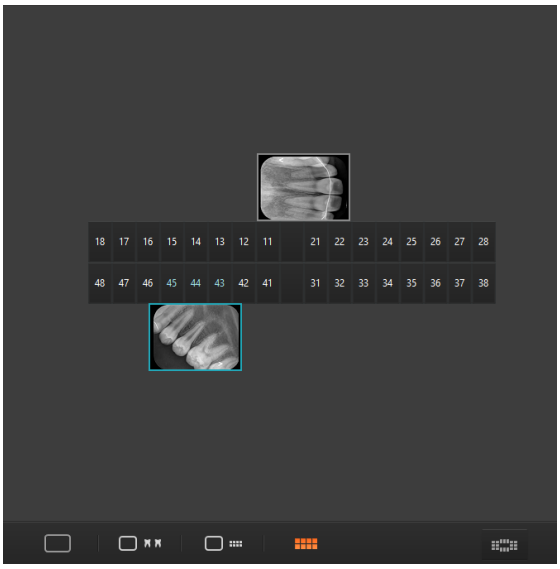


Figure 6.6 Chart

6.2.5. Template

When you click the Template button in the tool box, templates are provided that can scan the full mouth series. Drag images from the image field or task bar and align them on the template.

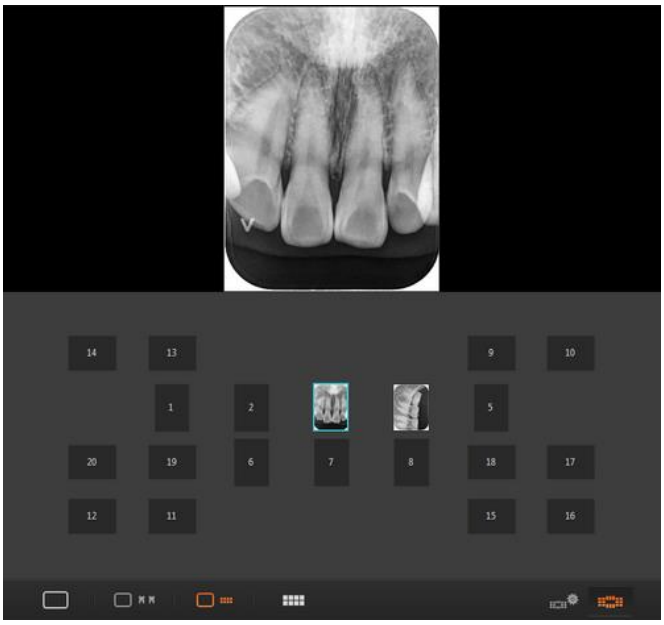


Figure 6.7 Template

Click the Select Template button to see a list of available templates. Select a new template and it will be applied instantly. Click the "Add" button to add a new template or the "Edit" button to edit an existing template and call Template Designer. Refer to the separately distributed User Manual for details on how to use Template Designer.

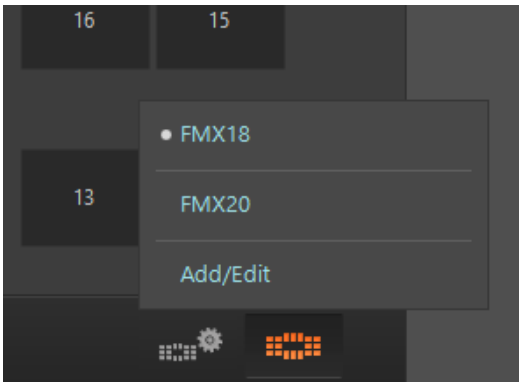


Figure 6.8 Select Template

6.3. Connection Mode

FireCR Dental provides 3 connection modes. Please select appropriate mode for your purpose.

6.3.1. USB

Scanner is connected to USB port. Only 1 user can use scanner.

6.3.2. LAN – Single Scanner

Single scanner is connected to LAN port. Multiple users can use scanner but only 1 user can use at a time. Pairing is required before scanning.

6.3.3. LAN – Multiple Scanner

Multiple scanners are connected to LAN port. Multiple users can use any scanner at any time. Using Fire ID is mandatory.

6.4. Indicator

Indicators show scanner’s various states as an icon.

6.4.1. Scanner Indicator

Connection	Indicator	Status
USB		Scanner is not connected to PC
		Scanner is connected to PC
LAN		Scanner is not detected on the network
		Scanner is detected on the network
		Scanner is connected to this PC and ready to scan
		Multiple scanners found on the network
		Scanner is connected to other PC

6.4.2. Fire ID indicator

Indicator	Status
	Fire ID is connected to PC
	Fire ID is not connected to PC

6.5. Image Scan

6.5.1. USB Mode

1. Connect the scanner to PC's USB port.
2. Turn on the scanner. Figure 6.9 shows the scanner LCD window. The USB Connection icon is located at the upper right corner of the window.

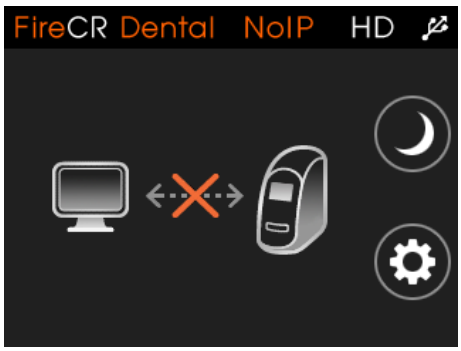


Figure 6.9 Not Connected

3. The scanner is connected shortly after the QuantorDent program begins. The Scanner icon is displayed in green in the lower right section of QuantorDent as shown in Figure 6.10. The Scanner LCD window is changed as shown in Figure 6.11 and the name of the connected PC is displayed in the lower left section.

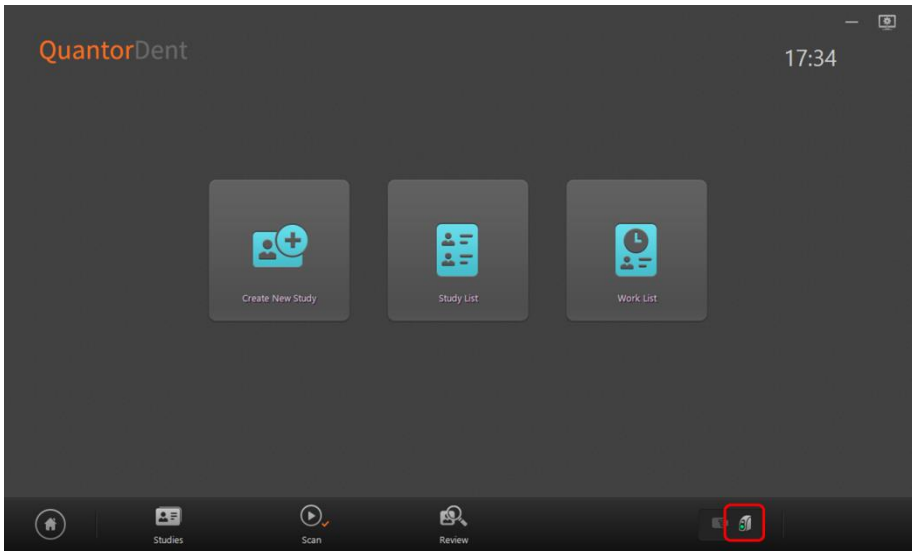


Figure 6.10 Connected

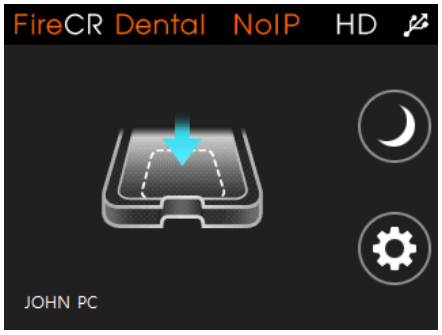


Figure 6.11 Connected

4. Enter study information in the New Study screen and click “Next”. Or select a study in the Study List screen and click “Scan”.
5. Place an IP on the scanner tray. The Scanner LCD screen is changed as shown in Figure 6.12.

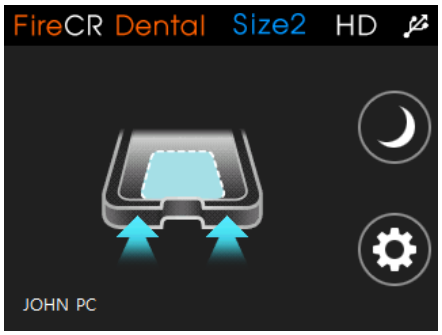


Figure 6.12 Push the Tray

6. Push the tray toward the scanner.
7. The image scanning process is displayed on the right side of the navigation bar as Figure 6.13. The Scanner LCD screen also displays the scanning process as shown in Figure 6.14.

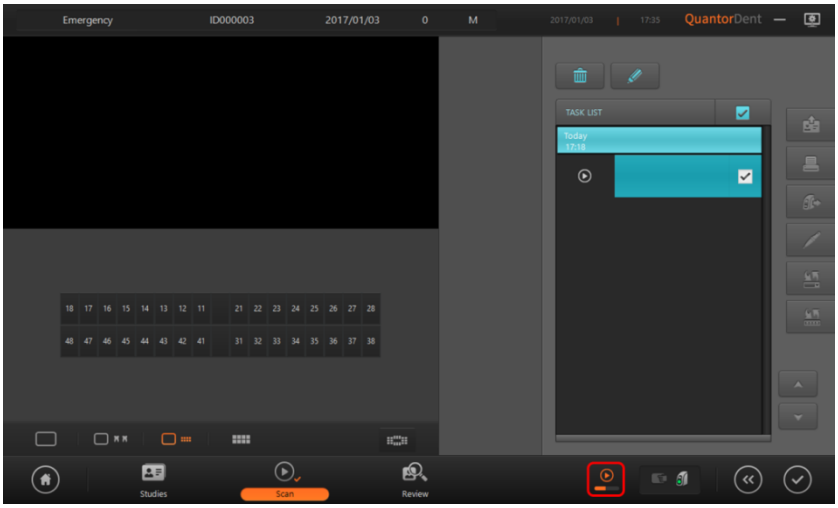


Figure 6.13 Scanning

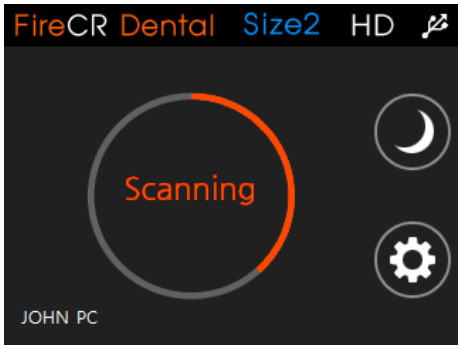


Figure 6.14 Scanning

8. When the scan is completed, the image is provided on the screen.

NOTE
When you insert the tray into a scanner without opening the study, the scanner conducts scanning but does not transport the image to ***QuantorDent***.

NOTE
If the scanner is physically not connected anywhere, the Offline mode appears on the LCD screen.

6.5.2. LAN Mode – Single Scanner

1. Connect single scanner to LAN port
2. Turn on the scanner. Figure 6.15 shows the scanner LCD window. The LAN Connection icon is located at the upper right corner of the window.

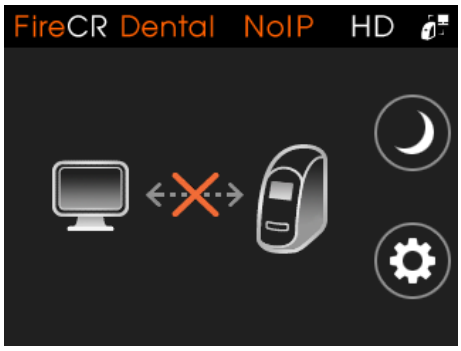


Figure 6.15 Not Connected

3. Start the QuantorDent Program. If idle scanner is detected on the network, Scanner indicator will set to yellow as Figure 6.16.

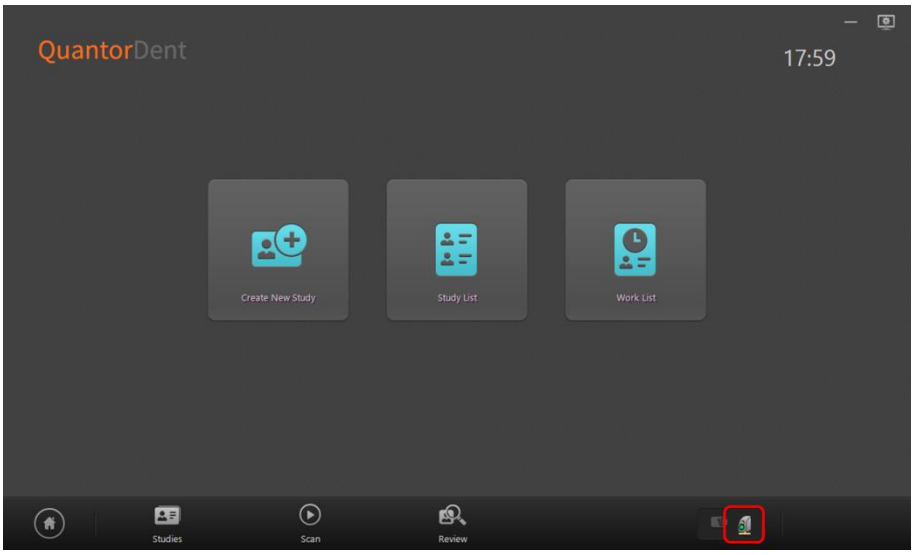


Figure 6.16 Scanner found on the network, but not connected

4. The "Connect XXX" button is displayed as shown in Figure 6.17 when the Scanner icon is clicked. XXX is the name of the searched scanner. Click the button to connect the scanner.

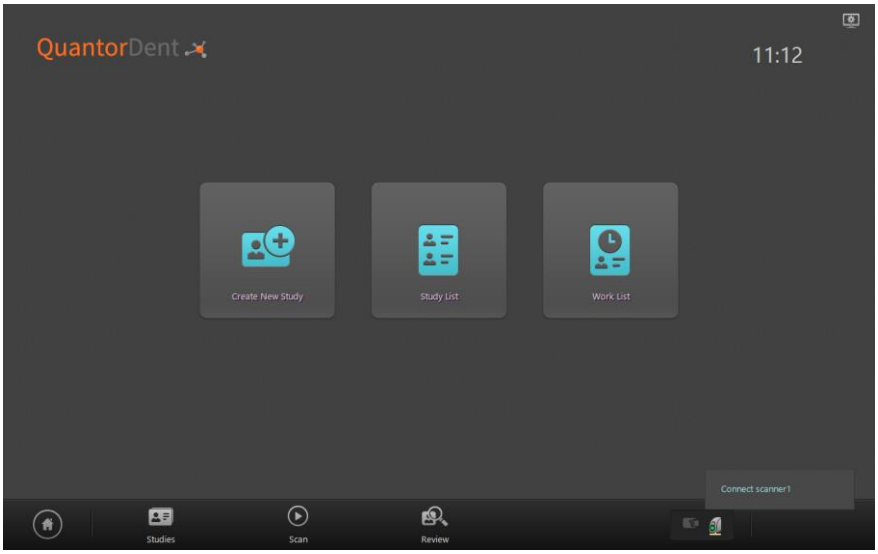


Figure 6.17 Connect Scanner

5. Scanner indicator will set to green. Now you own the scanner and ready to scan. The Scanner LCD window is changed as shown in Figure 6.18, and the name of the connected PC is displayed in the lower left section.

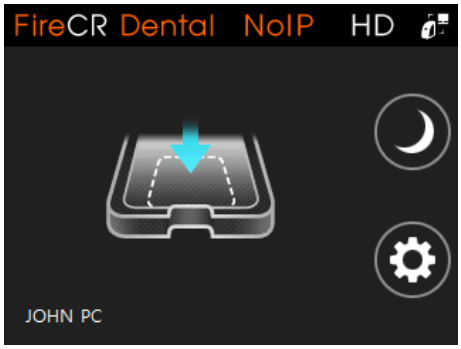


Figure 6.18 Connected

6. Enter study information in the New Study screen and click “Next”. Or select a study in the Study List screen and click “Scan”.
7. If scanner is connected to your PC for the first time, calibration files will be transferred to your application folder automatically. Wait till the file transfer is completed, and then begin scanning.
8. Place an IP on the scanner tray. The Scanner LCD screen is changed as shown in Figure 6.19.

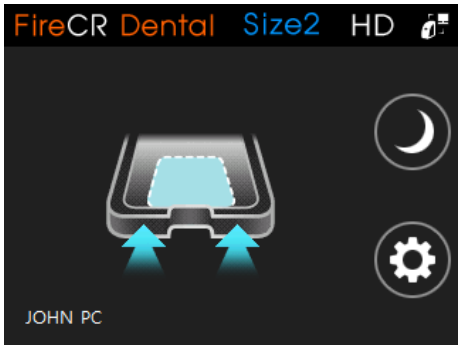


Figure 6.19 Push the Tray

9. Push the tray toward the scanner.
10. The image scanning process is displayed on the right side of the navigation bar as Figure 6.20. The Scanner LCD screen also displays the scanning process.

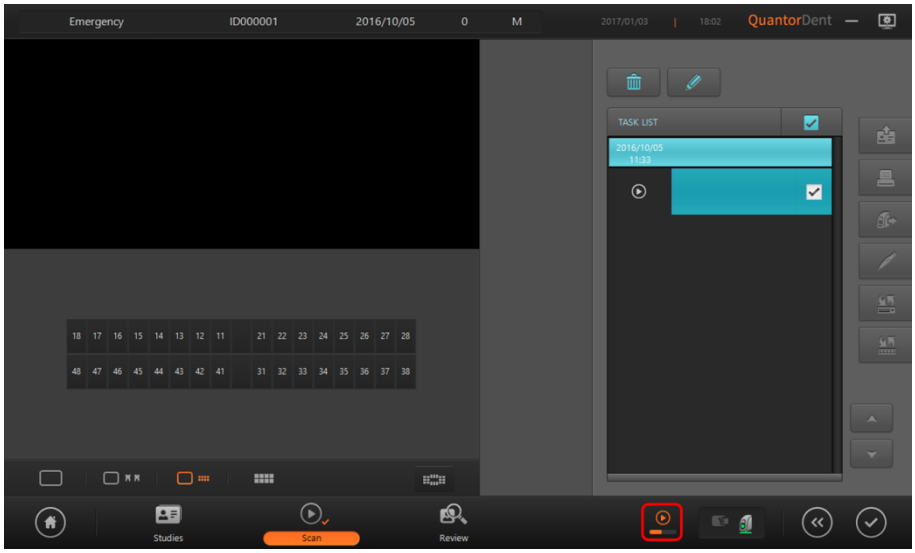


Figure 6.20 Scanning

11. When the scan is completed, the image is provided on the screen.
12. Click the scanner indicator icon then “Disconnect” button will pop up. Click the button to disconnect. Other users cannot use the scanner until the scanner connection is terminated after use.

NOTE
If the Fire ID is connected to the PC, skip the scanner connection process shown in Figure 6.12 and tag an IP to the Fire ID to start scanning right away.

6.5.3. LAN Connection – Multiple Scanner

1. Connect multiple scanners to LAN port.
2. Connect **Fire ID** to all PCs. **Fire ID** is mandatory for Multiple Scanner scanning.
3. Turn on the scanners. Figure 6.21 shows the scanner LCD window. The LAN Connection icon is located at the upper right corner of the window.

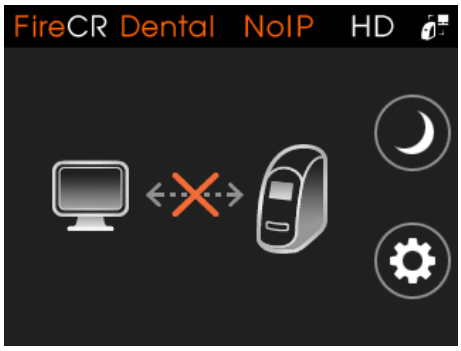


Figure 6.21 Not Connected

4. Run the QuantorDent program to display the Fire ID indicator and scanner indicator in green as shown in Figure 6.22. In this case, the bottom part of the scanner indicator is colored gray, which means multiple scanners are found on the network.

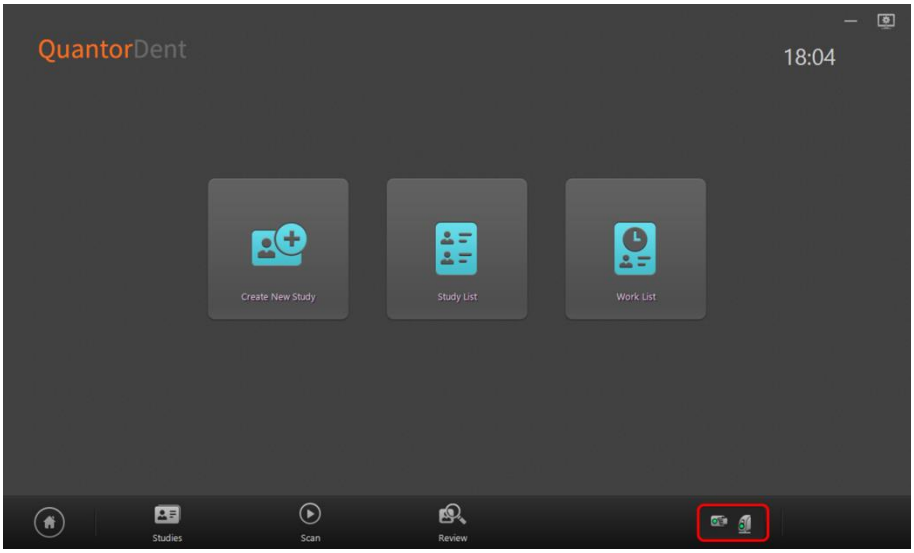


Figure 6.22 Multiple Scanners Found on the Network and Fire ID Connected

5. Enter study information in the New Study screen and click “Next”. Or select a study in the Study List screen and click “Scan”.
6. Tag the IP to the Fire ID. The task is added to the Task List as shown in Figure 6.23.

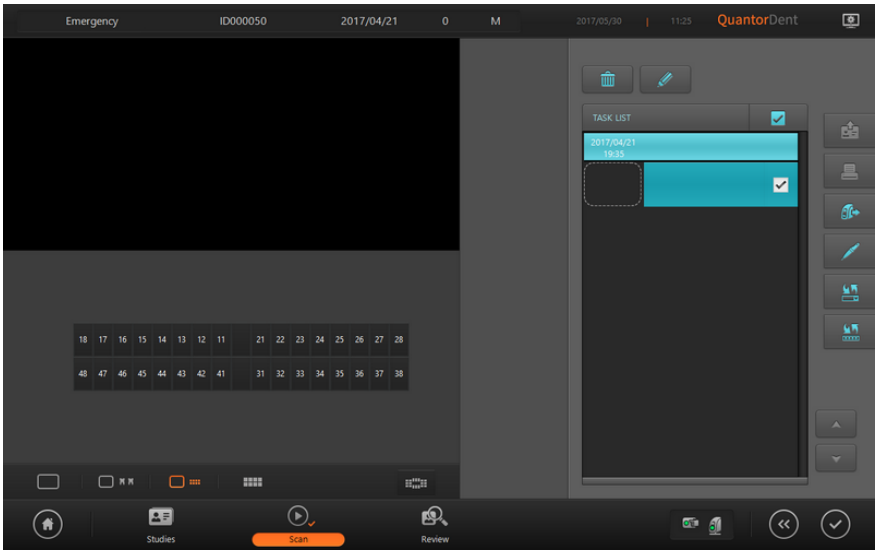


Figure 6.23 Fire ID tagging creates new empty task

7. Place the IP on the tray of the scanner. The scanner and the program are connected, and the color of the Scanner icon is changed to green. The Scanner LCD screen is changed as shown in Figure 6.24.

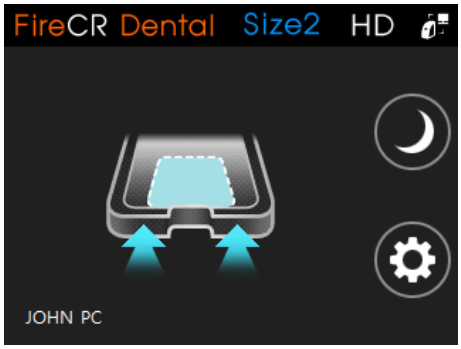


Figure 6.24 Push the Tray

8. If scanner is connected to your PC for the first time, calibration files will be transferred to your application folder automatically. Wait till the file transfer is completed. After the file transfer, remove the IP from the tray and tag it to the Fire ID again and put it on.
9. The image scanning process is displayed on the right side of the navigation bar as Figure 6.25. The Scanner LCD screen also displays the scanning process.

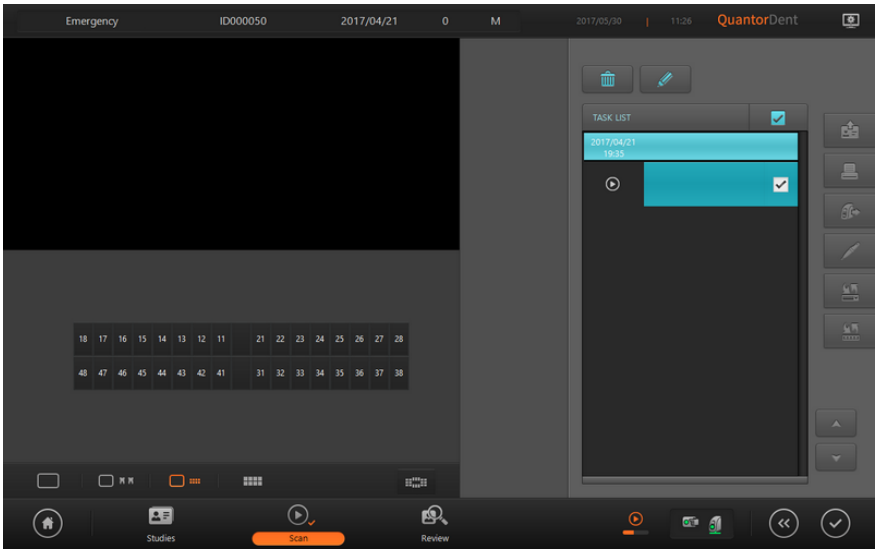


Figure 6.25 Scanning

10. When the scan is completed, the image is provided on the screen.

6.6. Import Scanned Images

FireCR Dental stores up to 100 recently scanned images. The following instructions explain how to import these images. First, click the Image List button on the right side of the screen.

Figure 6.26 Image List button

If the PC is connected to the scanner and USB, or if there is only 1 scanner on the network, a dialog box appears as shown in Figure 6.27. When the dialog box appears, import the Image List from the scanner and display on the screen. Double-click the desired item from the list to transmit the selected image from the scanner to the PC and which appears on the Preview screen temporarily.

- Close: Close the current window.
- Delete All: Delete all images saved in the memory card in the connected scanner. You can use it only if it is connected to the USB.
- Import: Import the images shown in the Preview to the scan window.

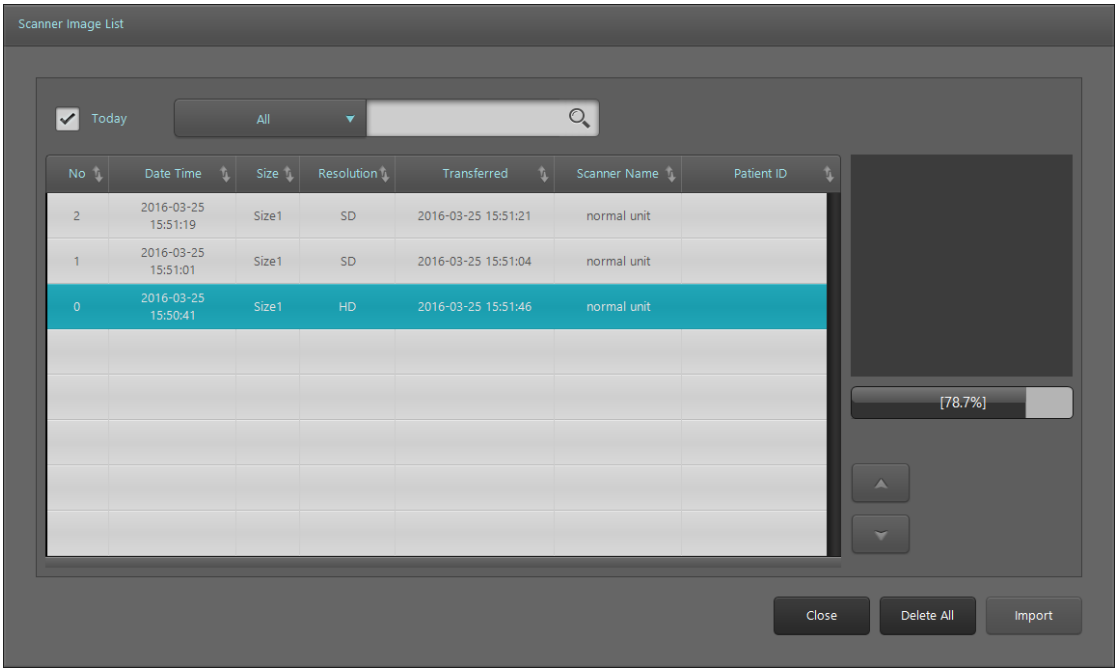


Figure 6.27 Scanner Image List dialog box

If there are 2 or more scanners on the network, there is a Scanner List available on the upper right as shown in Figure 6.28, and you can select the scanner to which the image will be imported. The scanner is indicated in the form of "scanner name (IP address)."

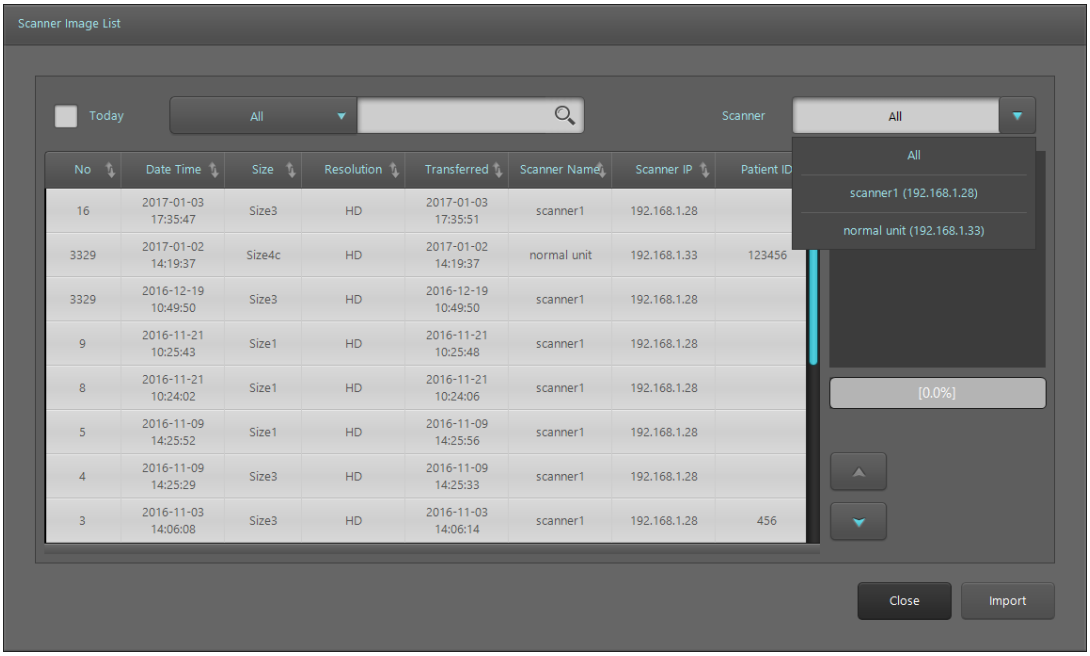


Figure 6.28 Scanner Image List dialog box

6.7. Intra Oral Camera

The following explains how to acquire images from the camera:

1. Connect the Intra Oral Camera to the USB port of the PC.
2. Start the QuantorDent Program.
3. Enter study information in the New Study screen and click “Next”. Or Select a study in the Study List screen and click “Scan”.
4. Click the "Intra Oral Camera" button as shown in Figure 6.29.

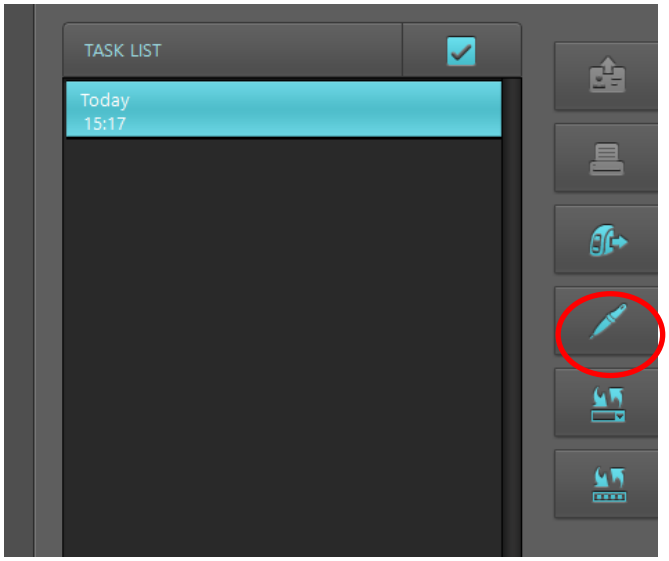


Figure 6.29 Intra Oral Camera

6.7.1. Screen Layout

The screen layout appears as shown in Figure 6.30.

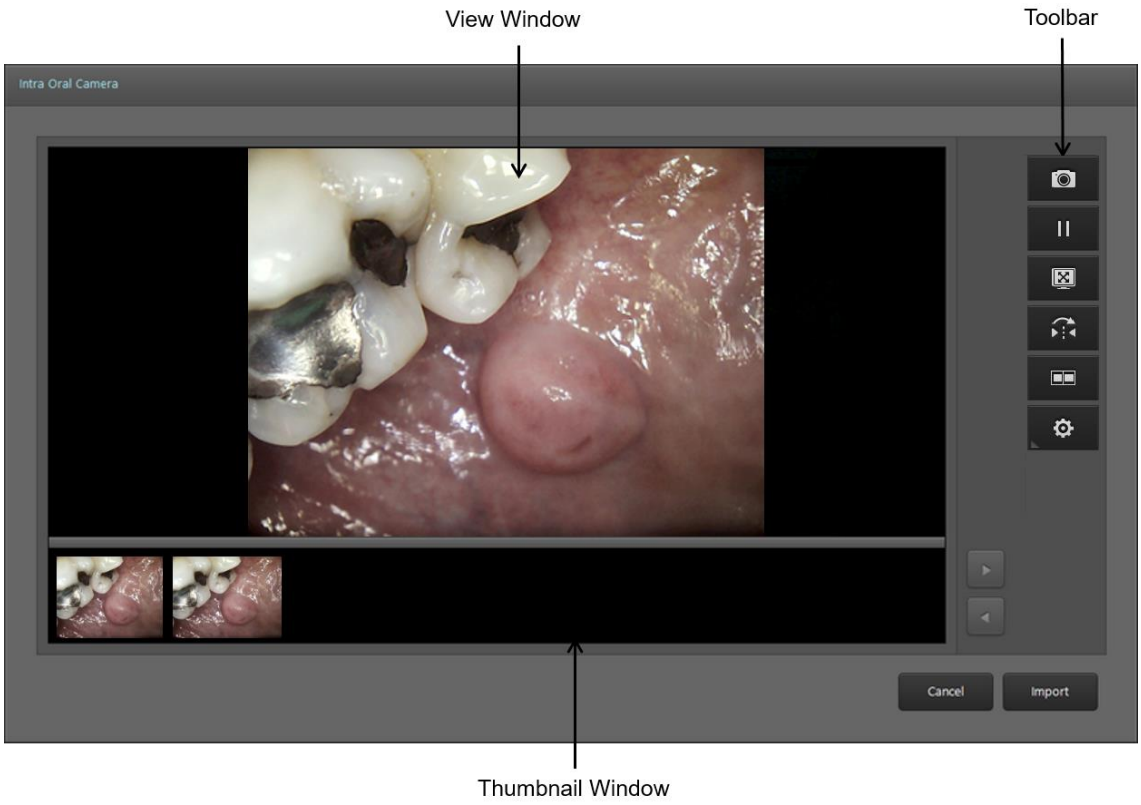


Figure 6.30 Screen Layout

Main Screen has 3 regions, View Window, Toolbar and Thumbnail Window. Live video and captured image are displayed at View Window. Toolbar has function buttons. Thumbnail Window displays all captured image as small size. The main window itself can be resized manually or full sized by clicking the full screen button.

6.7.2. Toolbar

Icon	Name	Description
	Capture	Captures image
	Pause/Resume	Pauses or resume the live video.
	Full Screen	Displays the live video or captured image in full screen.
	Flip Horizontally	Flips the live video and the captured image horizontally.
	Dual View	Split View Screen to 2 views as Figure 4.1. Left view displays live video and right view displays last captured image.
	Options	Show 1 sub button.
	Import	Import the image captured by the Intra Oral Camera to QuantorDent.

6.7.3. Resolution

Click Resolution button to show Resolution window as Figure 6.31.

Figure 6.31 Resolution Button

As shown in Figure 6.32, select the desired Video Resolution value from the Resolution window and change it.

Figure 6.32 Video Resolution

6.8. Acquire TWAIN Images

Click the Select TWAIN Source button on the right side of the screen.

Figure 6.33 Select TWAIN Source button

As shown in Figure 6.34, the Select TWAIN Source dialog box of Windows appears. Select the TWAIN equipment you want and click the Select button.

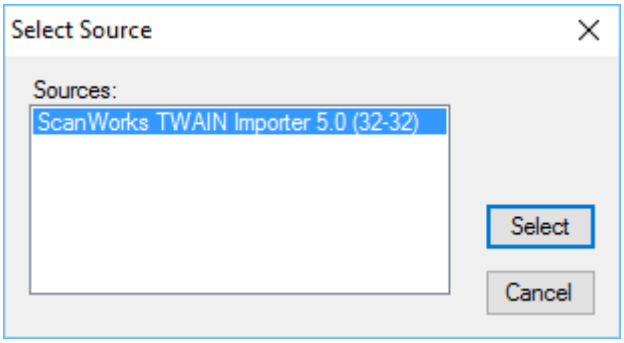


Figure 6.34 Select TWAIN Source dialog box

Click the Acquire TWAIN button on the right side of the screen.

Figure 6.35 Acquire TWAIN button

The image in Figure 6.36 and the TWAIN software made by the TWAIN manufacturer will appear. (The below screen is a sample.) Close the window after acquiring images from the software and the acquired images will be moved to the Scan window.

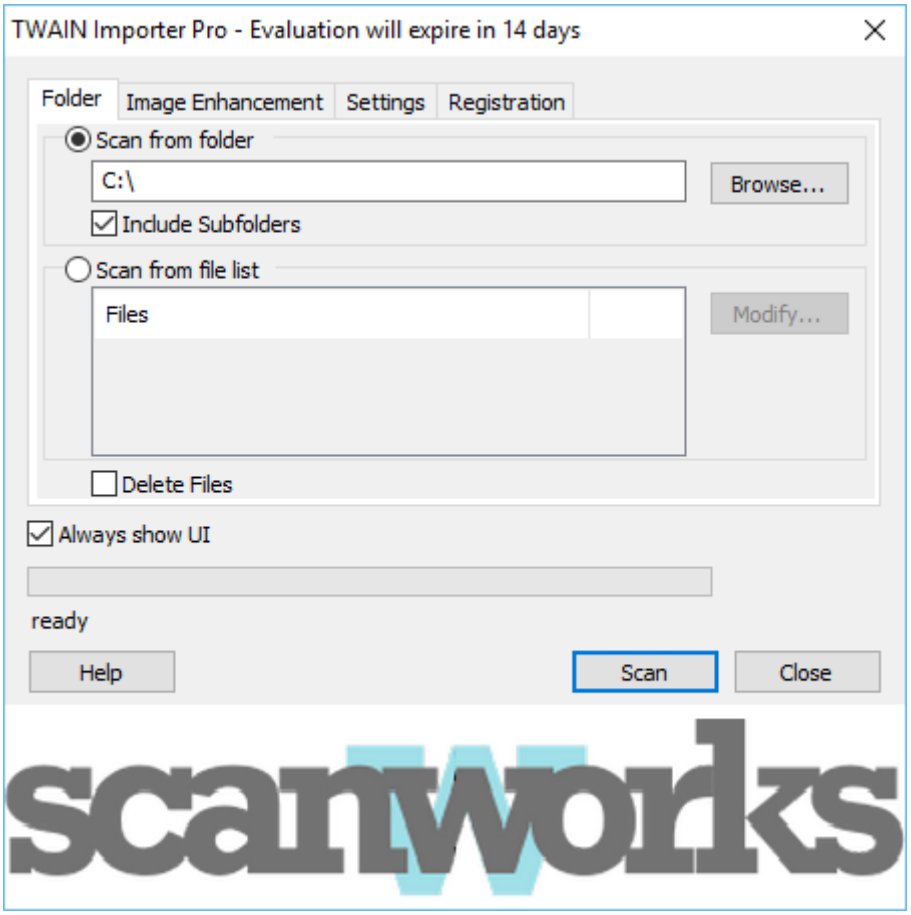


Figure 6.36 An example of an acquired TWAIN image

7. Image

7.1. Screen Layout

When an IP scan has been completed, the acquired image is displayed on the Scan window as shown in Figure 7.1.

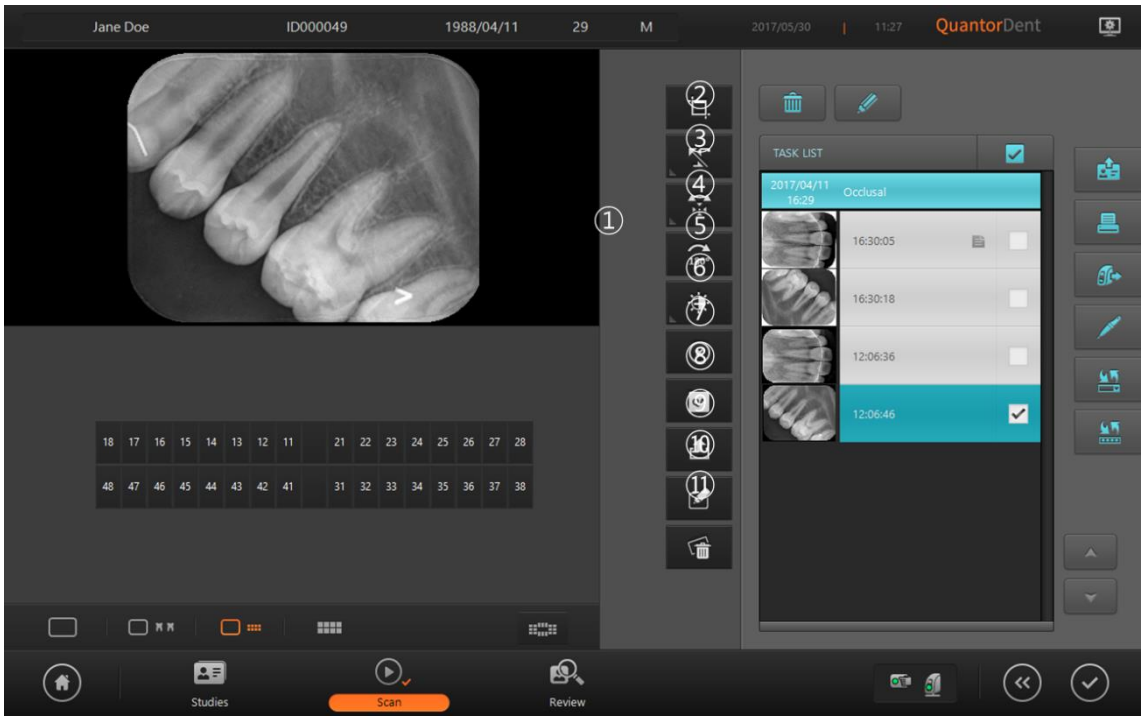


Figure 7.1 Image output

① ROI Box: A tool for cropping the valid region of the scanned image.

② ROI: ROI-related tools

③ Marking: Add markings on the image.

④ Rotate Flip: Rotate/flip the image.

⑤ 180 degree rotation: Rotate the image 180 degrees.

⑥ Window: Adjust the window width/center.

⑦ Reject: Add Rejects marking the image.

⑧ QA: Bring up tools for adjusting image details.

⑨ Transport: Transport the image.

⑩ Memo: Use to enter image-related contents.

⑪ Delete chart image: Delete the image selected on the chart or the template.

7.2. ROI

When a scan is completed, the image is displayed and the ROI Box is automatically displayed as shown in Figure 7.2. When you drag the ROI Box to the desired location and double-click the ROI Box or click on the ROI button, the ROI is cropped and fitted to the screen as shown in. To adjust the size of the ROI Box, drag the small rectangles at each corner of the ROI. When transmitting or printing the image, only the ROI are used.

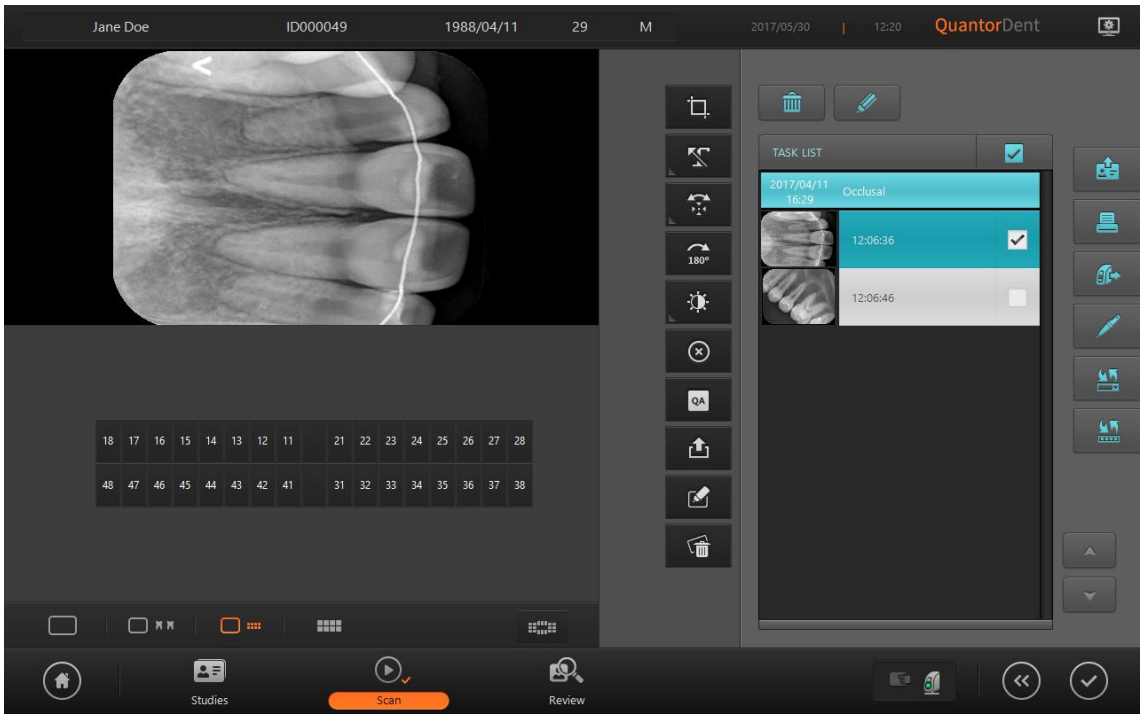


Figure 7.2 Image with cropped ROI region

7.3. Marking

This adds markings on the image. You can add markings to the image by selecting a predefined marking or manually typing text.

Add predefined marking

① Click on the Marking button.

② Select a marking.

③ Click a point on the image.

You can edit predefined markings in the [Overlay - Marking] under Settings.

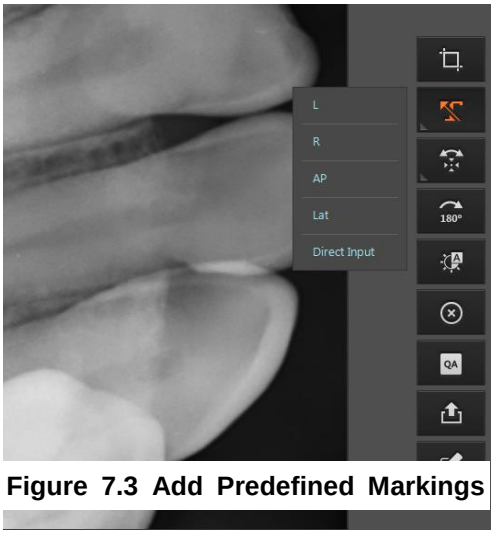


Figure 7.3 Add Predefined Markings

Direct input marking

① Click on the Marking button.

② Select Direct Input.

③ Click on a position where you want to add the marking and a text box appears. Enter your text. Click outside the text box when you are done.

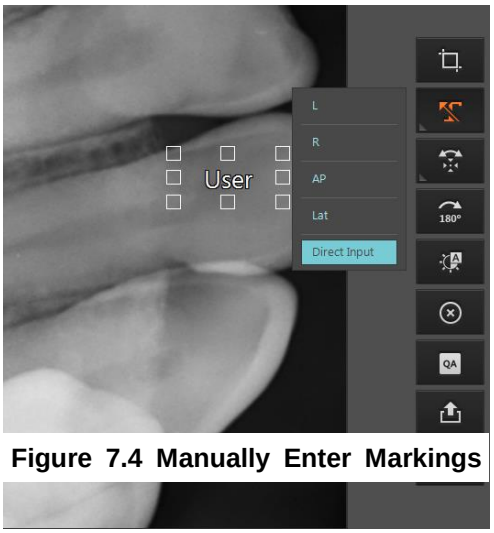


Figure 7.4 Manually Enter Markings

7.4. Rotation/Flip

You can rotate or flip the image.

Icon	Action
	Rotate Left
	Rotate Right
	Flip Horizontally
	Flip Vertically

7.5. 180-degree rotation

Rotate the image 180 degrees.

7.6. Window

Icon	Action
	Automatically adjust the window center/width
	Adjust window center/width with mouse drag

7.7. Reject

When the quality of the scanned image is insufficient, Reject preserves the current image with a “Reject” marking without rescanning. When the Reject button is clicked, a “Reject’ marking is added on the upper left corner of the image as shown below, and a “Reason” input field appears on the screen. Type in the reason for rejection, and click outside the input box when you are done. You can cancel a rejection by clicking the Reject button again.

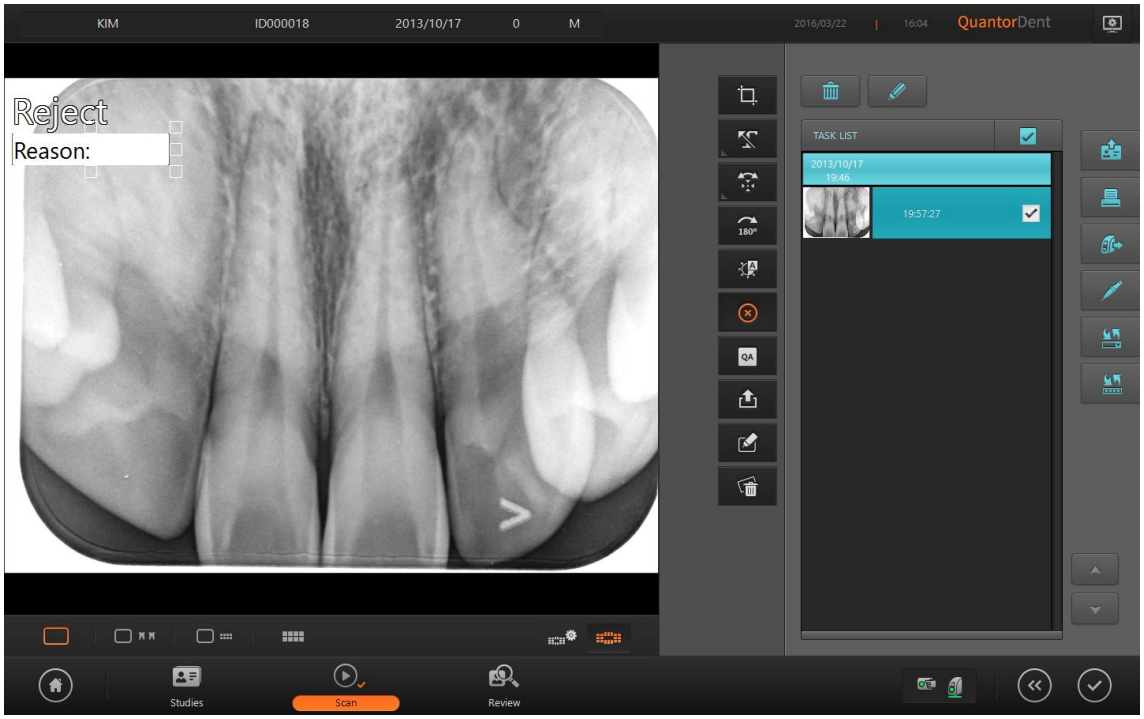


Figure 7.5 Reject

7.8. QA – Image Adjustment

Used to adjust the LUT Curve of the image. Adjusting the image requires expert knowledge about images. Adjusting the image without proper knowledge may result in lower image quality.

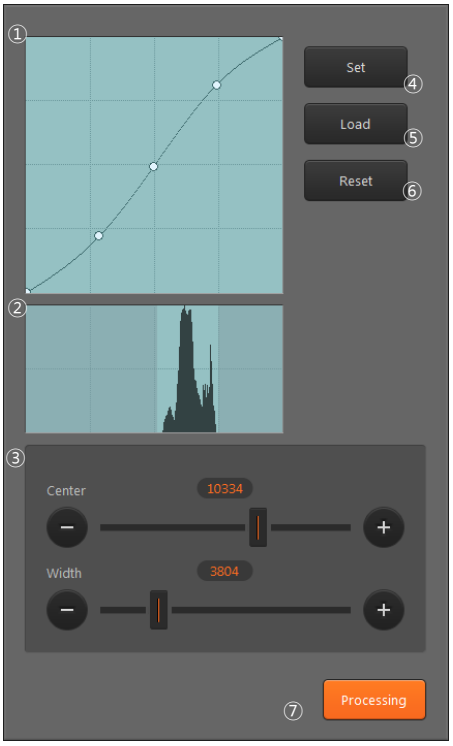
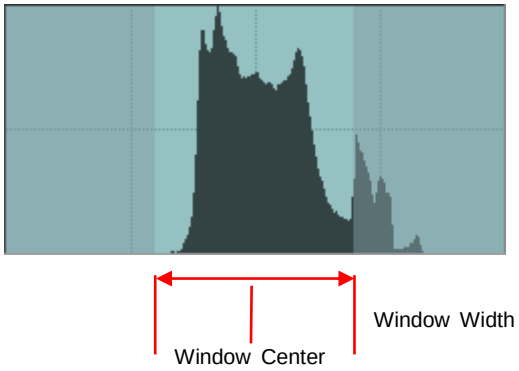


Figure 7.6 LUT Curve

① LUT Curve: LUT curve applied to the image. A default curve for each region is provided. The user can adjust the curve to their preference. To adjust the curve, set a control point and drag the curve using the mouse. To add a new control point, click on the line using the mouse. A control point can be removed by dragging it outside the box.

② Histogram: Shows the histogram of the image. The bright region at the center is the region currently displayed on the screen. The left part of the histogram indicates the frequency where X-ray penetration level is low and image is bright. The right part of the histogram indicates the frequency where X-ray penetration level is high and image is dark. Images have low pixel values in bright regions and high pixel values in dark regions.

③ Window Center / Width: Used to adjust the window center and width of the image. The window center is adjusted when you drag the image up or down, and window width is adjusted when you drag the image left or right. Dragging the sliders have the same effect as dragging the image.



④ Set: Set the curve and window value adjusted by the user as the default value for images of the current region.

⑤ Load: Load and apply default curves and window values of the current region.

⑥ Reset: Reset curve.

⑦ Processing: Go to Image Processing Filters screen.

7.9. QA – Image Processing

Used to adjust image processing filters. Adjusting the image requires expert knowledge about images. Adjusting the image without proper knowledge may result in lower image quality.

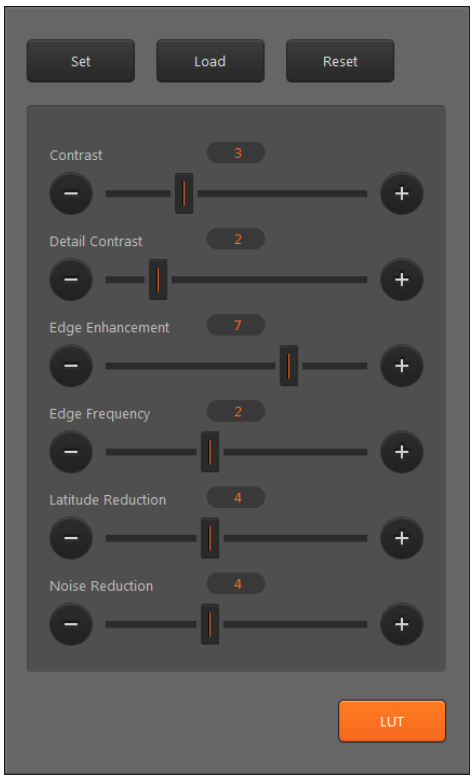


Figure 7.7 Image processing filter

① Contrast: Increases the image's contrast. The level can be adjusted from 0 to 10. Higher levels increase the intensity. Filter is not applied when 0 is selected.

② Detail Contrast: Increases the contrast in regions of the image with low contrast. The level can be adjusted from 0 to 10. Higher levels increase the intensity. Filter is not applied when 0 is selected.

③ Edge Enhancement: Enhances edges. It is used to increase visibility of blood vessels or small calcifications. The level can be adjusted from 0 to 5. Higher levels increase the intensity. Filter is not applied when 0 is selected.

④ Edge Frequency: Designates the range of the edges to emphasize. The level can be adjusted from 0 to 5. Lower level emphasizes the smaller edges. Higher levels emphasize the bigger edges.

⑤ Latitude Reduction: Compresses the low frequency regions to improve the overall visibility of the image. The level can be adjusted from 0 to 10. Higher levels increase the intensity. Filter is not applied when 0 is selected.

⑥ Noise Reduction: Reduces the noise in the image. The level can be adjusted from 0 to 10. Higher levels increase the intensity. Filter is not applied when 0 is selected.

⑦ Set: Set the filter values adjusted by the user as the default value for images of the current region.

⑧ Load: Load and apply filter values of the current region.

⑨ Reset: Reset filters.

⑩ LUT: Go to LUT Curve adjustment screen.

7.10. Send Image

Immediately transmits the current image to the image server designated in Settings.

7.11. Image Comment

Add a memo about image-related findings and extra information. The image comment is recorded in the Image Comments (0020:4000) tag during DICOM transfer or storage. It is also displayed in the print media.

7.12. Delete Chart Image

Delete the image selected on the chart or the template.

8. Task List

8.1. Screen Layout

The Task List is a list of scans to be performed. Tasks are group by studies, and arranged in chronological order. The user can select the desired region and perform a scan. The Task List consists of a list of studies, and each study consists of a list of tasks. The check boxes located to the right of the task bar is used to select tasks.

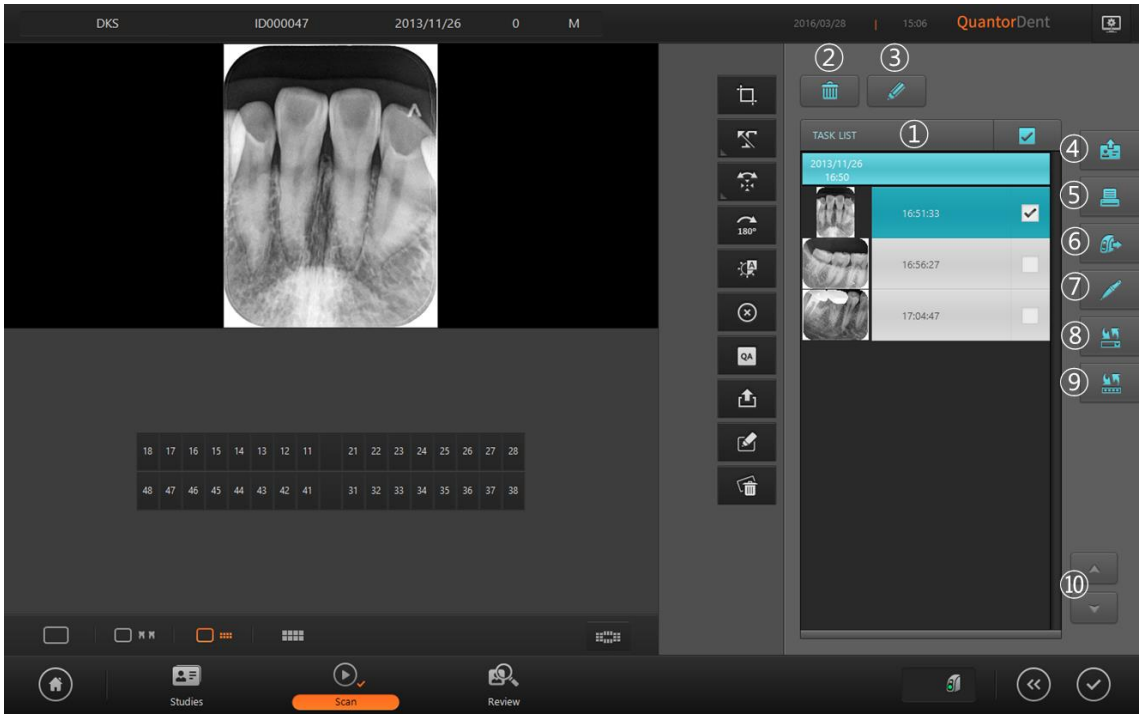


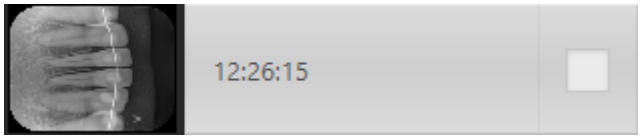
Figure 8.1 Task List

① Task bar
② Delete
③ Edit
④ Send Study
⑤ Print
⑥ Image List
⑦ Intra Oral Camera
⑧ Select TWAIN source
⑨ TWAIN Acquire
⑩ Page UP/Down

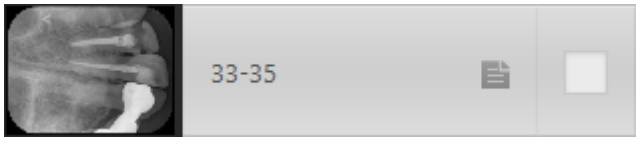
8.2. Task List

Task List consists of Study-Task tree structure. Study Bar is shown below, and it shows Study Date, Study Time and Study Description.

The task bars affiliated with the study are displayed at the bottom of Study Bar. Task Bar shows the information related to recording and image. Task Bar is structured into the Thumbnail image on the left, image acquisition time in the middle, and check box for selecting Task Bar on the right.



The tooth number is displayed instead of the image acquisition time if the image is specified in the dental chart. An indicator is displayed to the left of the check box if there is a comment on the image.



If an IP is tagged to a Fire-ID, an IP-shaped rectangle is displayed in the thumbnail box as shown below.

An indicator is displayed in the Thumbnail box as shown below when an image is being scanned.

8.3. Tool Button

Icon	Title	Action
	Delete	Delete selected tasks
	Edit	Switch to the mode where you can change the order of images.
	Send Study	Transmit the selected study. Destination of the transmission can be added in Settings
	Print	Print the selected images using a DICOM printer or a Windows printer.
	Image List	Display the Image List dialog box from which you can import images from the scanner.
	Intra Oral Camera	Display the intra oral dialog box
	Select TWAIN source	Display the dialogue box from which you can select a TWAIN source.
	TWAIN Acquire	Display the dialogue box from which you can acquire a TWAIN image.

8.4. Change image order

Click the Edit button, and the down and up arrow buttons will appear as shown in Figure 8.2. Click the image you want to move and then move it in the direction you want.

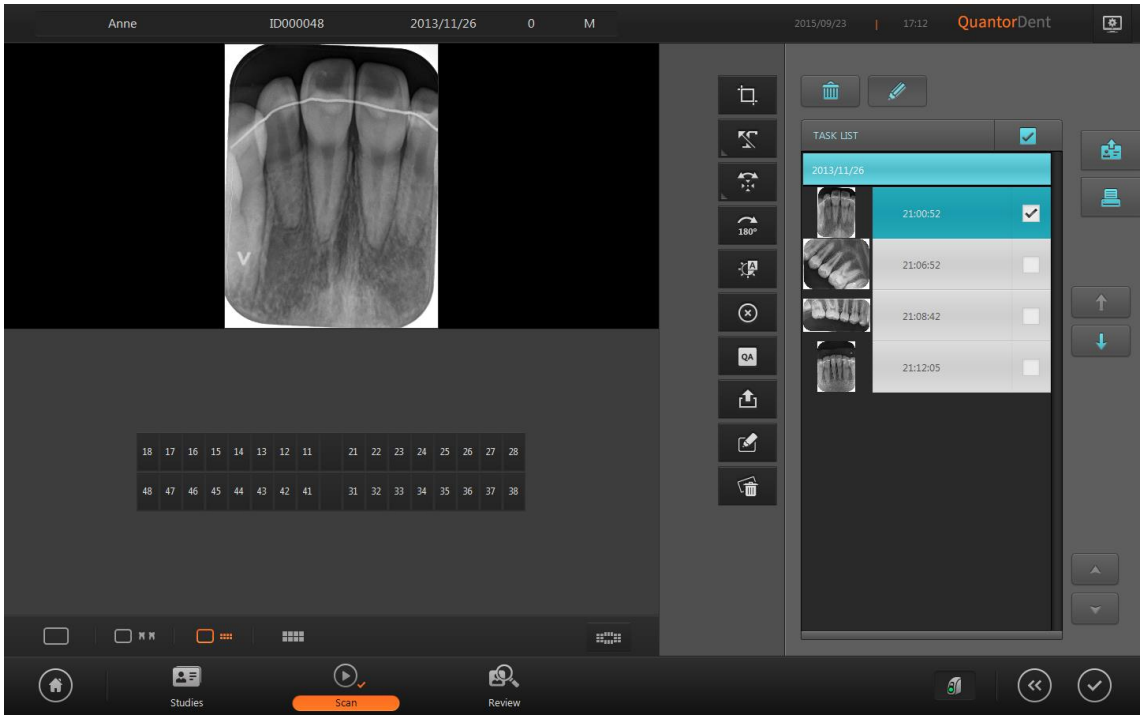


Figure 8.2 Change image order

8.5. Print

The acquired image may be printed with a DICOM printer or a Windows printer.

8.5.1. DICOM Print

On the Print window, click the DICOM Print tab. To use DICOM Print, the DICOM printer should be registered to the Network item of Settings. On the left of the screen is the Preview, and on the right are the print settings. The logo above the Preview may be dragged with the mouse to place it freely, and its size may be changed freely using the rectangle adjustment points. To print the logo, you should add the logo picture file in the Overlay item of Settings. Since the DICOM printer does not support color printing, the logo is automatically converted into black and white.

Figure 8.3 DICOM Print

8.5.1.1 DICOM Print Settings

Name	Description	Supported
Layout	Select the layout of the image to be printed on film or paper	1x1 ~ 5x5
Film Size	Select standard DICOM film size	8INx10IN, 10INx12IN, 10INx14IN, 11INx14IN, 14INx14IN, 14INx17IN, 24CMx30CM, 24CMx24CM
Orientation	Select film orientation	Portrait Landscape
Destination	Select DICOM printer	
Top Margin(mm)	Assign the height of the margin on which the header will be printed. Select 0 so as not to print the header.	0mm ~ 18mm
Bottom margin(mm)	Assign the height of the margin on which the footer will be printed. Select 0 so as not to print the footer.	0mm ~ 18mm
Text Height (mm)	Assign the height of the header and footer fonts.	4 ~ 13mm
Image Font Size	Assign the image overlay font size. Image font size propotional to the image size.	8 ~ 17
Template	The mode changes to Template Print mode.	

On the lower right are buttons related to printing.

- Close: Close dialog box.
- Print: Start printing.
- Stop: Stop printing.

8.5.1.2 DICOM Print Overlay

The print overlay is set in Setting - Overlay - Print. Figure 8.4 shows the position of overlay displayed on the image.

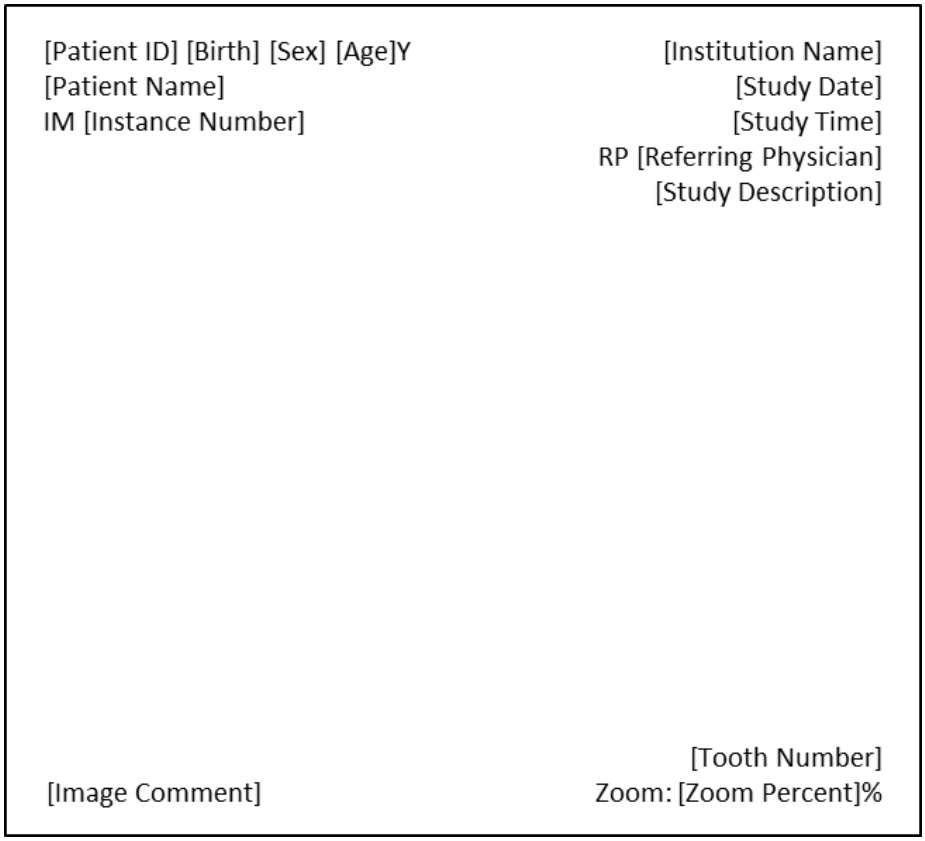


Figure 8.4 DICOM Print Overlay

8.5.2. Windows Print

On the Print window, click the Windows Print tab. To use Windows Print, the printer should be registered to Windows. On the left of the screen is the Preview, and on the right are the print settings. The logo above the Preview may be dragged with the mouse to place it freely, and its size may be changed freely using the rectangle adjustment points. To print the logo, you should add the logo picture file in the Overlay item of Settings.

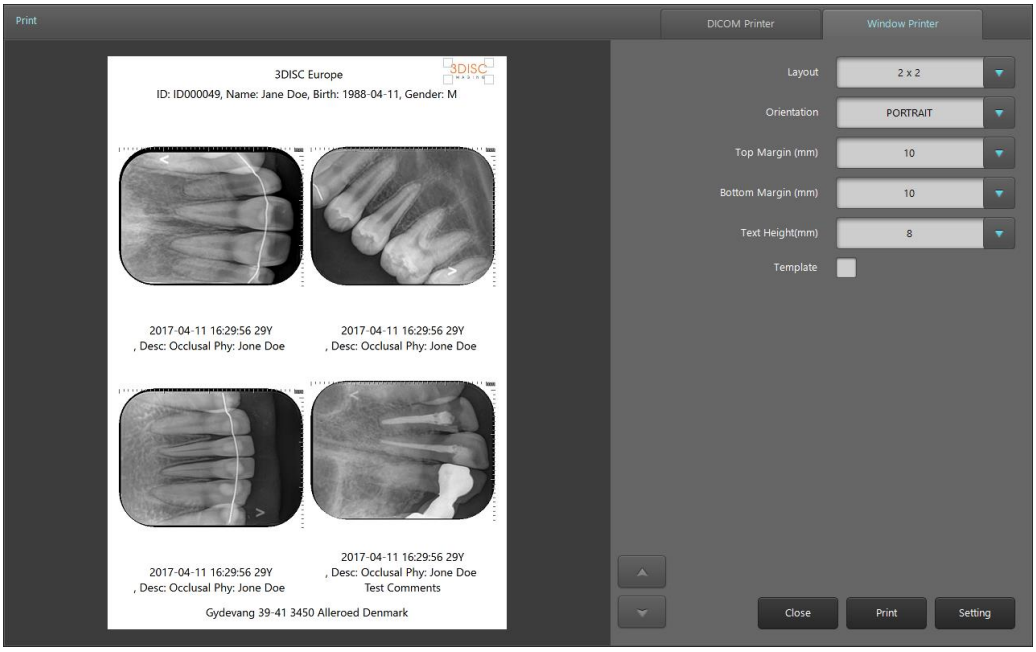


Figure 8.4 Windows Printer

8.5.2.1 Windows Print Settings

Name	**Description**	**Supported**
Layout	Select the layout of the image to be printed on film or paper	1x1 ~ 5x5
Orientation	Select media orientation	Portrait Landscape
Top Margin(mm)	Assign the height of the margin on which the header will be printed. Select 0 so as not to print the header.	0mm ~ 18mm
Bottom margin(mm)	Assign the height of the margin on which the footer will be printed. Select 0 so as not to print the footer.	0mm ~ 18mm
Text Height (mm)	Assign the height of the header and footer fonts.	4 ~ 13mm
Template	The mode changes to Template Print mode.	

On the lower right are the buttons related to printing.

- Close: Close dialog box
- Print: Start printing
- Setting: Print the Printer Settings window.

8.5.2.2 Windows Print Overlay

The print overlay is set in Setting - Overlay - Print. In the case of Windows print, the overlay is not displayed on the image to improve legibility since the paper is too small. The patient data are displayed at the top in the format shown below.

ID: [Patient ID] , Name: [Patient Name] , Birth: [Patient Birth] , Gender: [Patient Sex]

The examination and image data are displayed at the bottom of the image in the format shown below.

[Study Date] [Study Time] [Patient Age]Y
[Tooth Number], Desc: [Study Description] Phy: [Reffering Physician]
[Image Comment]

8.5.3. Template Print

Check the "Template" button on the DICOM Print window or Windows Print window to move to Template Print mode. Figure 8.5 is an example of DICOM Template Print. To print the template, change the mode to Template mode on the Tool Box of the Scan window and position the images on the template.

The Template Print page is organized into header, footer, text box, logo, patient picture, and image, and the layout of all fields is designed in Template Designer. Since the template is designed with the fixed-size media in the design step, the designed media must be used to display the layout correctly.

Figure 8.5 DICOM Template Print

9. Review

Review screen offers the identical functions as a PACS Viewer. It supports various image comparison, processing and measurement tools for performing a diagnosis.

9.1. Screen Layout

Screen layout of the Review is as Figure 9.1

Figure 9.1 Review screen

① Study list: Opened study list

② Thumbnail bar: Display thumbnail images of selected studies in study list.

③ Image display area

④ Toolbar

9.2. Open Study

In order to use Review window, select study and open it in Review window.

Open in Study List window

- Select studies in study list.
- Click review button in right side of study list.
- Then, selected studies are listed in study list in Review window, and the first image is displayed.

Open in Scan window

- Click Review button in navigation bar in Scan window.
- Then, the image displaying in Scan window is displayed in Review window.

9.3. View

The screen displaying the image consists of multiple views. Each view consists of multiple images. The user can customize the view layout and image layout according to their needs. When images are displayed in the View window, the default image layout is 2×2. To change this value, go to [General – Option - Image layout] in Settings.

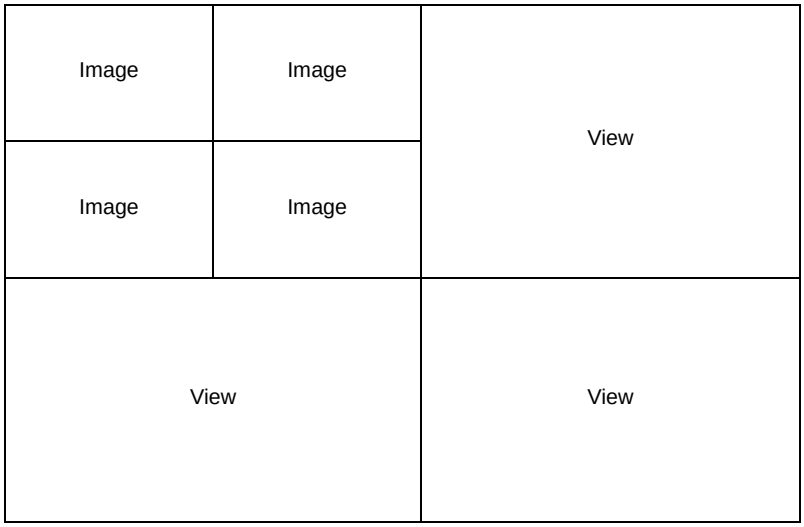


Figure 9.2 View – Image Layout

To display an image in the view, all you have to do is simply drag the image from the Task Bar. When an image is dragged from the Task Bar, only the image is displayed in the view. When a Study Bar is dragged, all the images included the study are displayed in the view.

Caption bar is located at top of the View.

Figure 9.3 View Caption Bar

① Image Layout: Change image layout. When you click on the Image Layout button, a 3x3 grid shown in Figure 9.4 will appear on the screen. Select your desired layout. The largest image layout available 3x3.

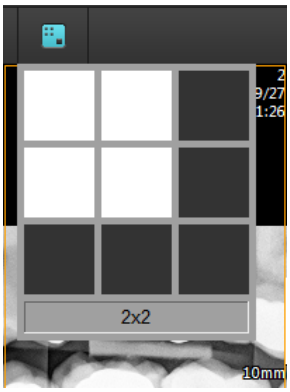


Figure 9.4 Image Layout

① Page Up: Go back to the previous page.

② Page Down: Go to the next page.

③ Close: Close all images.

9.4. Tool Bar

Icon	Title	Action
	View Layout	Change the layout of the view
	Zoom	Used to zoom in and out of the image. Drag the image left, right, up, or down using the mouse.
	Pan	Pan the image. Drag the image left, right, up, or down using the mouse.
	Mouse	Define the behavior that occurs when you drag with the mouse.
	Image	Open image manipulation tools for rotating, flipping and inverting images
	Measure	Provides various measurement tools for measuring distance and angle
	Marking	Provides marking tools
	File	Provides file tools
	Tools	Provides other tools
	Apply	Designate the range in which image adjustments will apply.

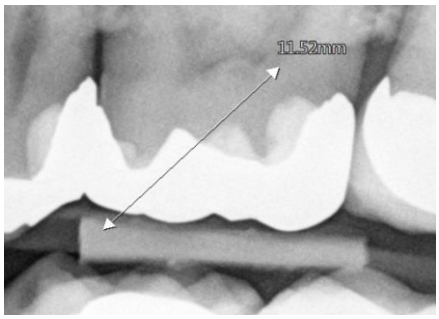
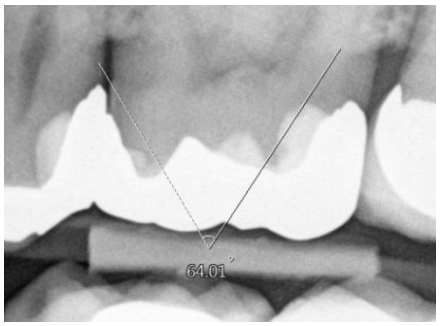
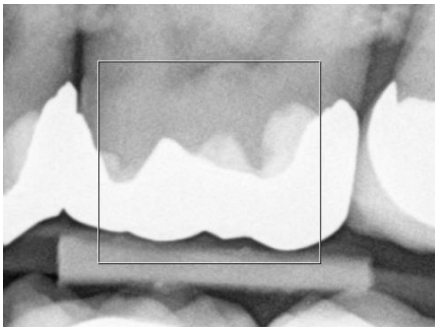
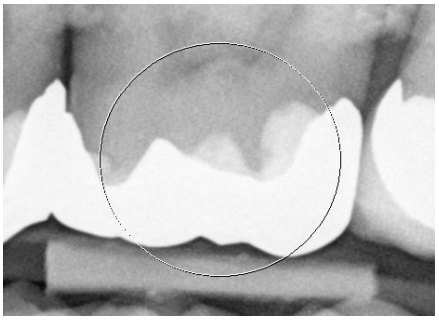
9.5. Mouse Tool Box

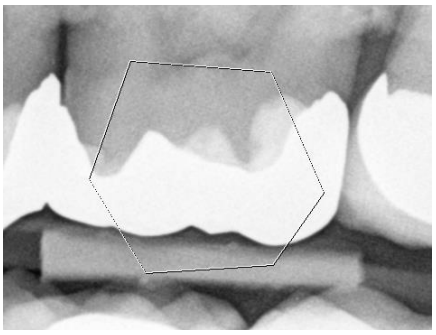
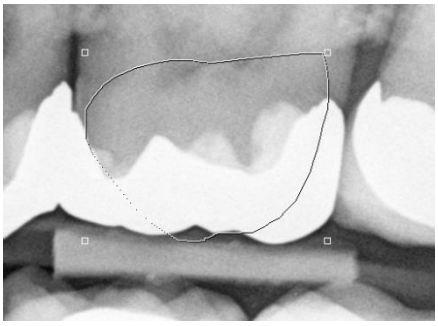
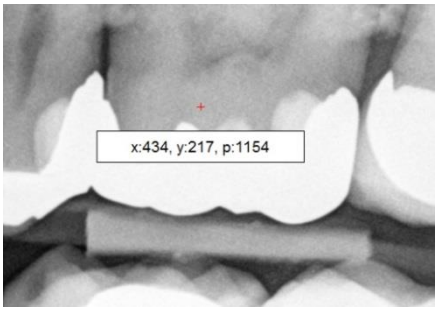
Icon	Title	Action
	Magnifier	Mouse is changed to Magnifier mode. Use Ctrl key to change the zoom ratio and use Shift key to change the magnifier size
	Window Adjust	Adjust the window center/width
	Region Auto Window	This function shows small box on the image if you click mouse left button. Auto window is applied to this small box area. You can change box size if you move mouse with “Shift” key down.

9.6. Image Processing Tool Box

Icon	Title	Action
	Rotate Left	Rotate the selected image to counterclockwise by 90 degree.
	Rotate Right	Rotate the selected image to clockwise by 90 degree.
	Flip Horizontally	Flip the selected image horizontally.
	Flip Vertically	Flip the selected image vertically.
	Reset image to initial state	Reset the image to initial state.
	Negative image	Inverse the image
	Fit to page Size	Scaling the image fit to the page size.
	Original Size	Display the image without scaling. Pixel size of the image and monitor matches 1 to 1.
	Real size	Scaling the image to real size. Monitor calibration is required to use this function.

9.7. Measurement Tool Box

Icon/Title	Description
Distance	Measures distance. Click the start and end point of the measurement. A straight line is displayed between the two points and the measurement value is displayed at the end of the straight line. You can move the measuring line by dragging it. You can move either one of the two control points by dragging them with your mouse. You can also move the position of the measurement values by dragging it with your mouse. 
Angle	Measures angle. Click on the center point of the angle you wish to measure, and then click on two control points. You can move both lines at once by dragging. You can also move either one of the two control points. You can also move the position of the measurement values by dragging them with your mouse 
Rectangle	Draws a rectangle. Click the mouse at the desired position of the upper left corner of the rectangle, and then drag the mouse to the desired position of the lower right corner of the rectangle and release the mouse button. Click on an area within the rectangle to move it. Drag the control points to resize the rectangle. 
Ellipse	Draws an ellipse. Click the mouse at the desired position where the top and left-most point of the ellipse would intersect, drag the mouse toward the bottom right and release the mouse after reaching a desired size and shape. Click on an area within the ellipse to move it. Drag the control points to resize the ellipse. 

Icon/Title	Description
Polygon	A control point is added every time you click the mouse. Double-click when you are done drawing the polygon. Click on an area within the polygon to move it. Drag the control points to change the corners of the polygon. 
Free Draw	Creates a free draw selection. Click and drag the mouse to the desired shape. Release the mouse when you are done drawing. You can click inside the selection to move the free draw selection 
Pixel Value	Measures pixel value. Click and drag the mouse and the coordinates (x, y) and pixel values (p) of the pixel at the cursor position will be displayed on the screen. 
Profile	Profile: Draw a straight line in the same manner as measuring a distance, and a profile dialog box will be displayed automatically. 1. Distance: Distance between two points 2. Start Point: Start point information 3. End Point: End point information 4. Min: Minimum value 5. Max: Maximum value 6. Mean: Average value 7. Current Value: Pixel value of the current position when the mouse was clicked over the graph
Line Color	Changes the color of the line.

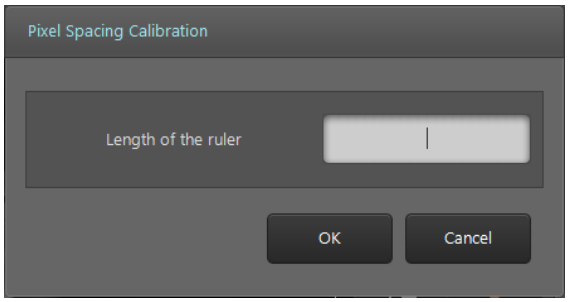
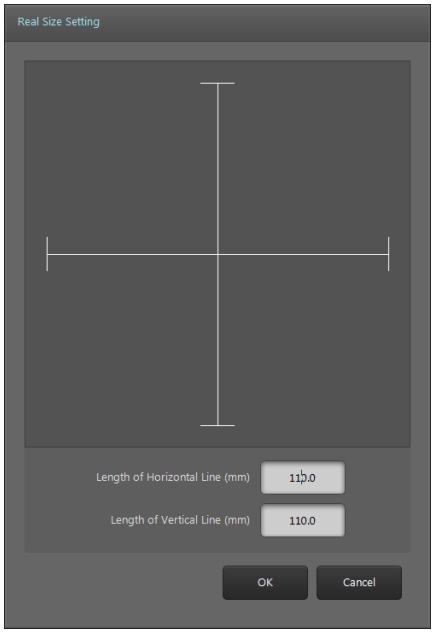
9.8. Marking

Icon	Title	Action
	Arrow	Click two point in the image, then the line is generated with the arrow mark in each end. You can move the line by dragging the line or arrow by dragging the arrow.
	Text	Text edit box is generated by clicking the image where you wish to add the text. Add the text in the box and click outside of the box. You can move the text by dragging it or edit it by double clicking it.

9.9. File Tool Box

Icon	Title	Action
	Open DICOM File	Open DICOM files.
	Open Image File	Open images files other than DICOM.
	Export	Save the image (File format : DICOM, jpg, tiff, bmp)
	Send email	When a new email appears after selecting Send Email in the Window's default mail program, attach the selected image as a jpg file.

9.10. Other Tool Box

Icon	Title	Action
	Copy to clipboard	Copies the active image to the Windows clipboard.
	Pixel Calibration	Sets pixel size. 1. Scan a measuring tool with a determined length. 2. Select the scanned image and click on the Pixel Calibration button. 3. The following dialog box will be displayed on the screen. Enter the actual length of the measuring tool.  4. Click on the start point of the measuring tool over the image and start dragging. 5. Release the mouse at the end point of the measuring tool to complete the calibration.
	Monitor Calibration	It is required to know the pixel size of the monitor to display the image in real size on the monitor. Following window pops up when Monitor Calibration button is clicked. 

Icon	Title	Action
		Measure lengths of horizontal and vertical lines using the ruler and input in the window. You can use the real size function after calibration of the monitor.
	Print	Print selected images.
	DICOM Information	Display the DICOM information of the active image.

9.11. Apply Range

Sets the range in which image processing will be applied. When comparing two images, you can apply the same filters to both windows for easier comparison. Image filters that can be used with Apply Range are as follows.

- Zoom, Pan, Rotate, Flip, Window

Icon	Title	Action
	Active	Active: The image that was clicked last is the active image. The active image is marked by an orange border.
	Select	Select: You can select multiple images by clicking on images while holding down the Ctrl key. The selected images are marked by a blue border.
	Study	Study: Applies image filters to all images in the study that contain the active image.
	All	Active: The image that was clicked last is the active image. The active image is marked by an orange border.

10. Study list

10.1. Screen Layout

You can manage scanned images in Study List.

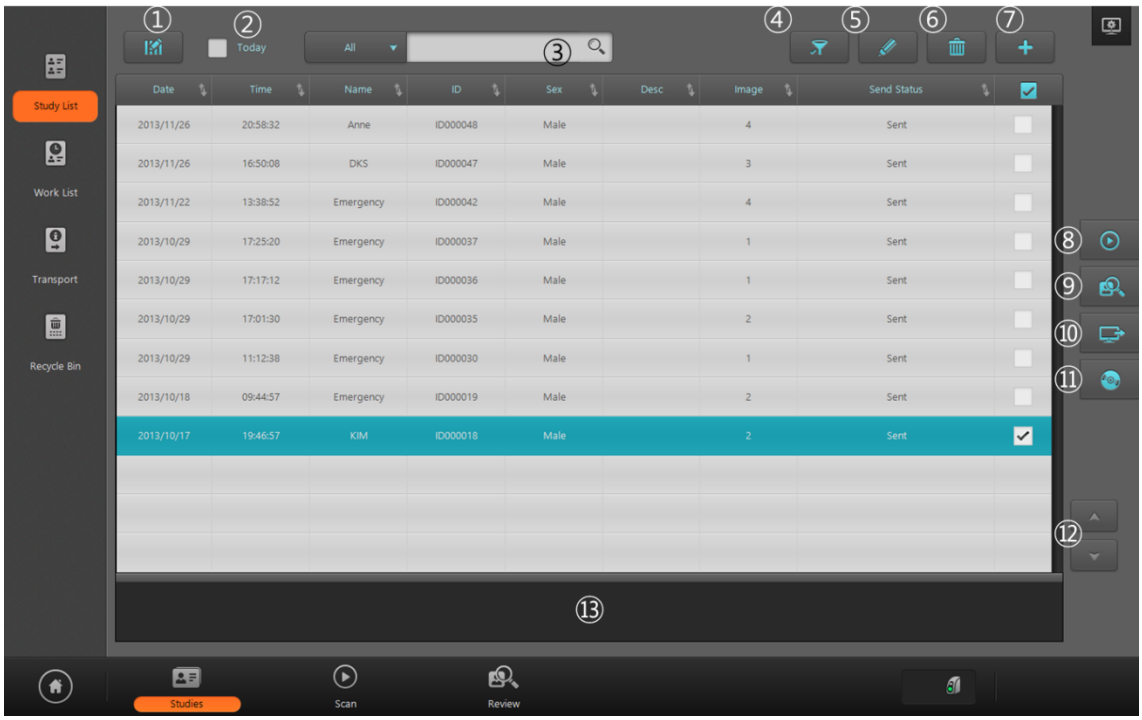
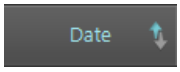
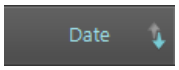


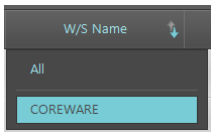
Figure 10.1 Study list

① Edit Column
② Today
③ Search
④ Filter
⑤ Edit
⑥ Delete
⑦ New Study
⑧ Scan
⑨ Review
⑩ Send Study
⑪ Export
⑫ Page Up/Down
⑬ Thumbnail

10.2. List

- Sorting: When you click on the header of each column, the list is sorted by the information in the selected column. The sorting order changes every time the header of the column is clicked.
  - 

 Sort in ascending order
  - 

 Sort in descending order
- Multiple selections: You can use the check boxes to select multiple studies on the list. Use the check box in the column header to select the entire list.
- Switching Pages: You can switch pages by using the scroll wheel on the mouse or by pressing the Page Up/Down buttons.
- Change column width: To change column width, drag and move the separating line between the column headers.
- W/S Name Filter: For the W/S Name column, you can assign a filter to show only the W/S name selected. Click and hold the W/S Name column title for approximately 0.5 seconds to show the W/S Name List as shown in the figure. In this case, select a W/S name.
  - 

 W/S Name list

The columns in the Study List are described in Table 10.1.

Table 10.1. Study List Column

Column Title	Description
Date	Study date
Time	Study time
Name	Patient name
ID	Patient ID
Sex	Patient sex
Birth	Patient birth date
Age	Patient age
Desc	Study description
Ref. Phy	Referring physician’s name
Acc. No.	Accession number
Image	Number of acquired images
Finish Status	Image transportation result
W/S Name	Workstation name (when run in Client mode)

10.3. Edit Column

Figure 10.2 Edit Column

① Columns to be used in the Study List.

② Columns to be hidden in the Study List.

③ Move selected items left and right.

④ Button for switching pages.

⑤ Move the selected items up or down on the list to change order.

⑥ Save changes and close the dialog box.

⑦ Reset the program to default settings.

10.4. Search

① Filter: Select the column to search. When a filter has not been set and All is selected, all the columns will be searched.

② Keyword: Enter the keyword to search.

③ Search: Begin search.

- Search in all columns when "**All**" filter is selected.
- Search studies after set **Date and Time** when it is selected.
- Search studies on set **Date** when it is selected.

10.5. Tool Buttons

Icon	Title	Action
	Edit Column	Display a dialog box for editing the columns of the list
	Patient Filter	Search same patient's study with the selected study's patient.
	Edit	Edit the selected studies.
	Delete	Delete the selected studies.
	New Study	Add a new study
	Region	Open the selected study and go to the Region Selection screen.
	Scan	Open the selected study and go to the Scan screen
	Review	Open the selected study and go to the Review screen.
	Send Study	Send selected study to registered PACS server or DICOM Printer.
	CD Burn	Export the selected studies to a CD, DVD or a local drive.

10.6. CD Burn

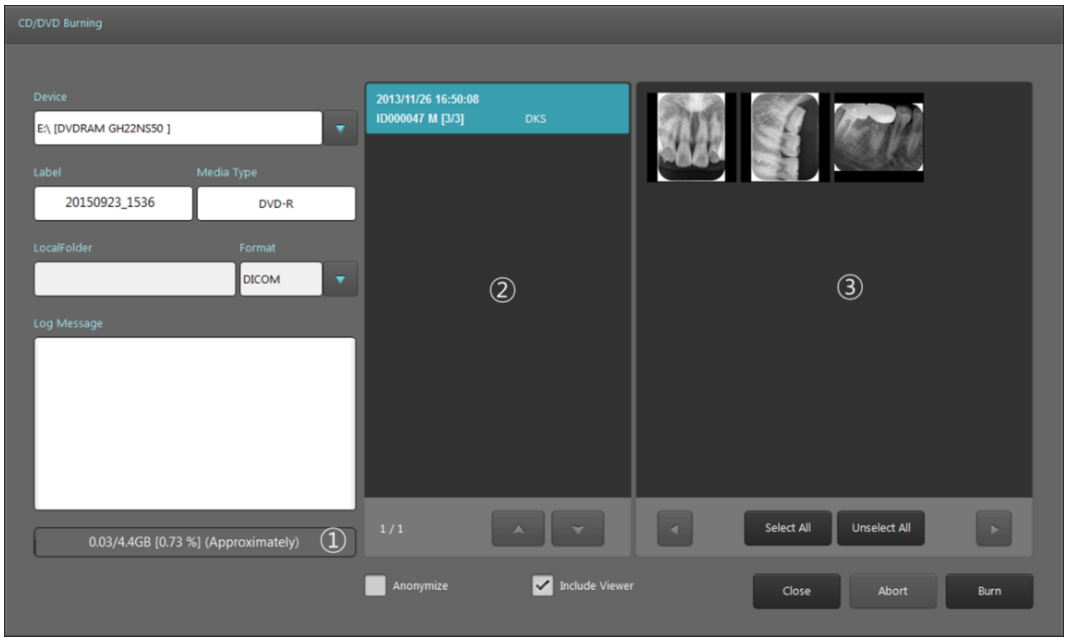


Figure10.3 CD Burn

- Device: Select the storage device to export the images to. Optical disc drives connected to the PC will be listed. If you select Local, you can use other storage devices connected to the PC.
- Label: Label to be displayed on disc.
- Media Type: Displays the type of the media inserted in the drive.
- Local Folder: Activated only when Local is selected in the Device field. Select a destination folder to save images.
- Format: Select format to save images. Supported formats are as follows.
  - DICOM
  - Bitmap: Windows Bitmap file
  - Raw: RAW file
  - Jpg: JPEG
  - Tiff: TIFF
- Log Message: Shows the progress when recording to an optical disc.
- Progress Bar: Shows the image export progress. (①)
- Study List: Shows the list of selected studies. (②)
- Image List: Shows images selected in the Study List. To not export a certain image, click and unselect the image. (③)
- Select All: Select all images.
- Unselect All: Unselect all images.
- Anonymize: Delete patient name and ID when saving as DICOM images.
- Include Viewer: Include a simple view where you can see DICOM images.
- Close: Close the dialog box.
- Abort: Stop recording.
- Burn: Start recording.

11. Work List

In the Work List screen, you can connect to Work List Servers of PACS or HIS systems and query the list of the studies to conduct. To use the Work List, register the Work List Server information in setting, [Network – Work List]. The way of using list, editing column and searching are identical to those of Study List.

11.1. Screen Layout

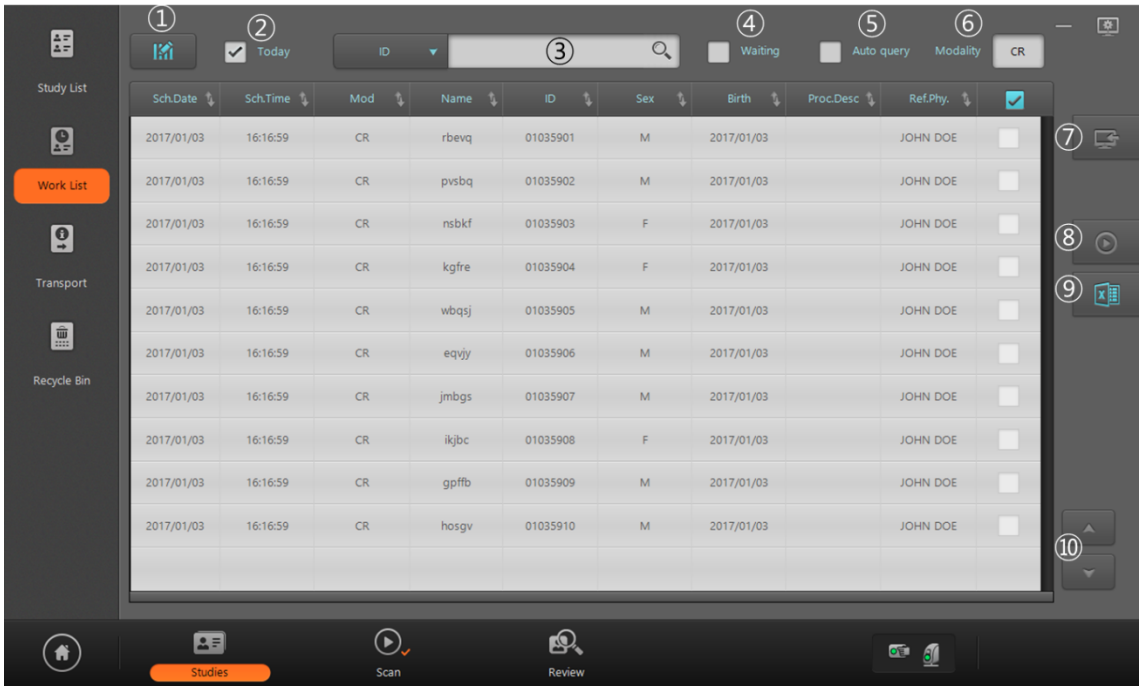


Figure 11.1 Work List

① Edit Column
② Today
③ Search
④ Waiting
⑤ Auto Query
⑥ Modality
⑦ Import
⑧ Scan
⑨ Import excel file
⑩ Page Up/Down

11.2. List

Columns in Work List are described in **오류! 참조 원본을 찾을 수 없습니다.**.

Table 11.1 Work List Columns

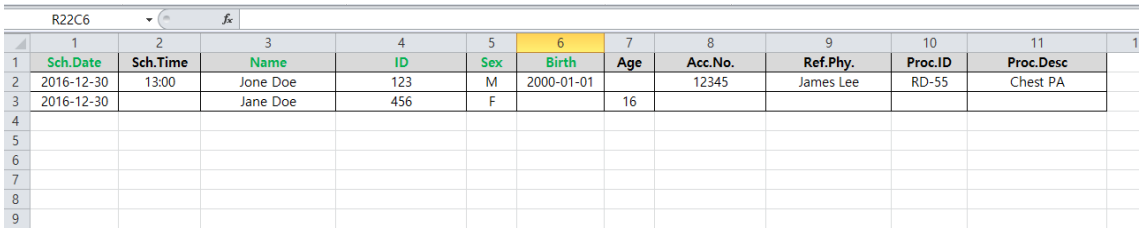
Column Title	Description
Sch. Date	Scheduled date
Sch. Time	Scheduled time
Mod	Modality
Name	Patient name
ID	Patient ID
Sex	Patient sex
Birth	Patient birth date
Age	Patient age
Station AE	Station AE title
Station	Station
Proc. Desc	Scheduled procedure description
Proc.ID	Scheduled procedure ID
Study UID	Study instance UID
Ref. Phy	Referring physician's name
Acc. No.	Accession number

11.3. Tool Buttons

Icon	Title	Action
	Edit Column	Display a dialog box for editing the columns of the list. Using the Work List is identical to using the Study List.
	Waiting	Display the list of studies that have not been scanned yet.
	Auto Query	Perform an auto query at a preset time.
	Modality	Set Modality filter for query.
	Import	Import: Import selected items to the Study List.
	Scan	Open the selected study and go to the Scan screen.
	Import Excel	Import work list from excel file

11.4. Import Excel File

Find and open excel file “Work List Format.xlsx” at installation folder. Columns in Work List are described in Figure 11.2.



	1	2	3	4	5	6	7	8	9	10	11
1	Sch.Date	Sch.Time	Name	ID	Sex	Birth	Age	Acc.No.	Ref.Phy.	Proc.ID	Proc.Desc
2	2016-12-30	13:00	Jone Doe	123	M	2000-01-01		12345	James Lee	RD-55	Chest PA
3	2016-12-30		Jane Doe	456	F		16				

Figure 111-1 Work List Excel Format

1. Insert Study Info
    - Row 1 is title. Do not edit.
    - Green title column is mandatory. Data have to exist.
    - If age column exist, birth date column can be empty.
2. Click Import Excel button

12. Transport

In the Transport screen, you can check the transmission results of images sent to an image server or a DICOM printer. The way of using list, editing column and searching are identical to those of Study List.

12.1. Screen Layout

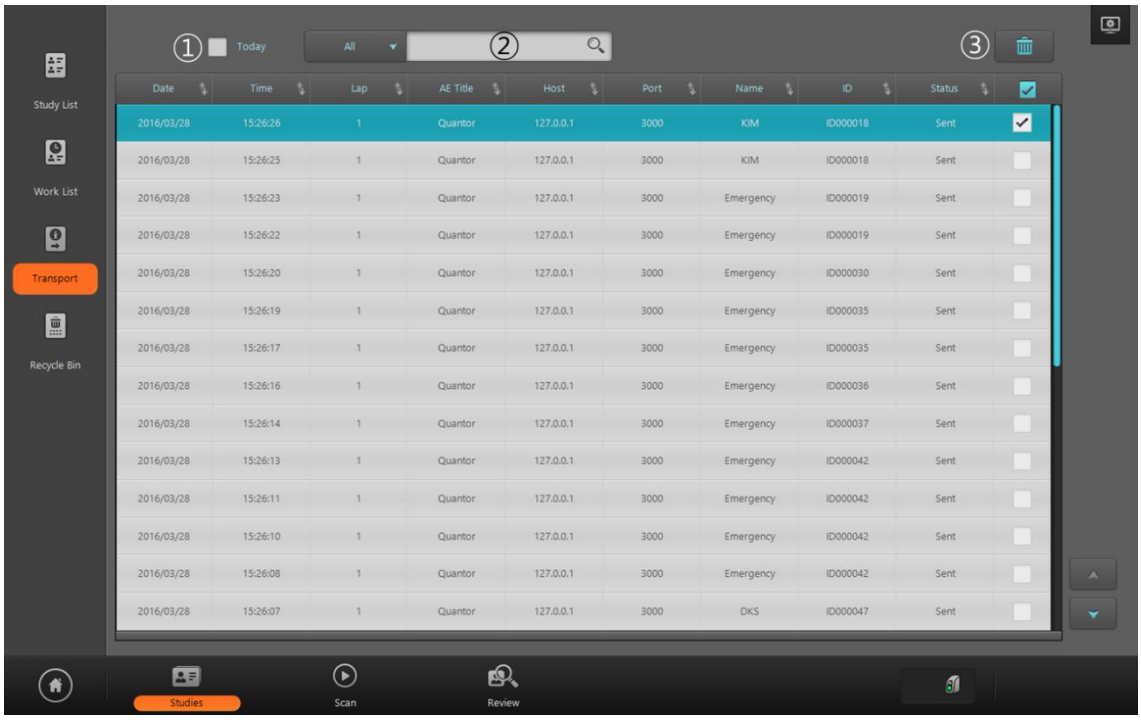


Figure 12.1 Transport

① Today: Search only the studies from today.

② Search: Search various criteria. Search method is identical to Study List.

③ Delete: Delete selected items.

④ Page Up/Down: Go to another page.

12.2. List

Column Title	Description
Date	Send date
Time	Send time
Lap	Duration in seconds
AE Title	Destination AE title
Host	Destination IP address
Port	Destination port
Name	Patient name
ID	Patient ID
Status	Send status

13. Recycle Bin

On the Recycle Bin window, you can restore or completely remove the deleted studies. The method of using and searching the Recycle Bin window is the same as the Study List.

13.1. Screen Layout

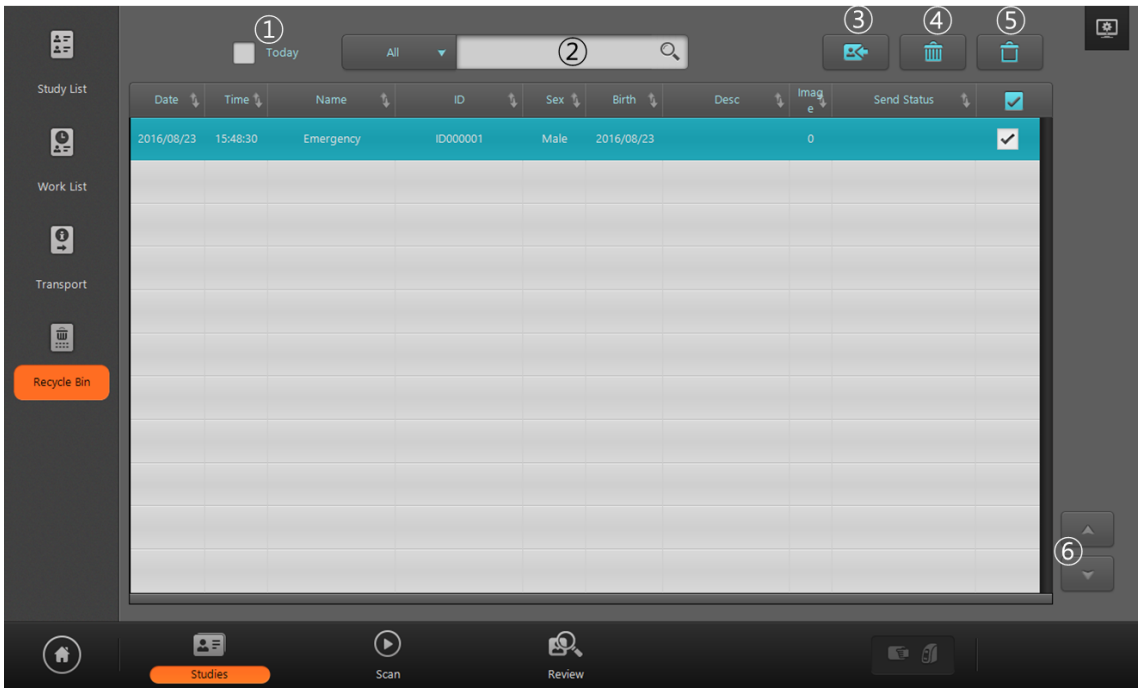


Figure 13.1 Recycle Bin

① Today: It searches studies of today only.

② Search: It searches studies with various conditions. The same method of using the Study List is applied.

③ Restore: It restores the selected studies.

④ Delete: It deletes the selected studies.

⑤ Empty Recycle Bin: It deletes all studies in the Recycle Bin.

⑥ Page Up/Down: Go to another page.

13.2. List

Column title	Description
Date	Study date
Time	Study time
Name	Patient name
ID	Patient ID
Sex	Patient sex
Date of birth	Patient's date of birth
Description	Study info
Number of images	Number of acquired images
Finish State	Results of image transport

14. Settings

14.1. Screen Layout

The Settings screen consists of a main category, sub-category, and specific item. Clicking on the main category item changes the sub-category items. Clicking on the sub-category item changes the specific item in the selected sub-category. Setting values can be changed in the specific item.

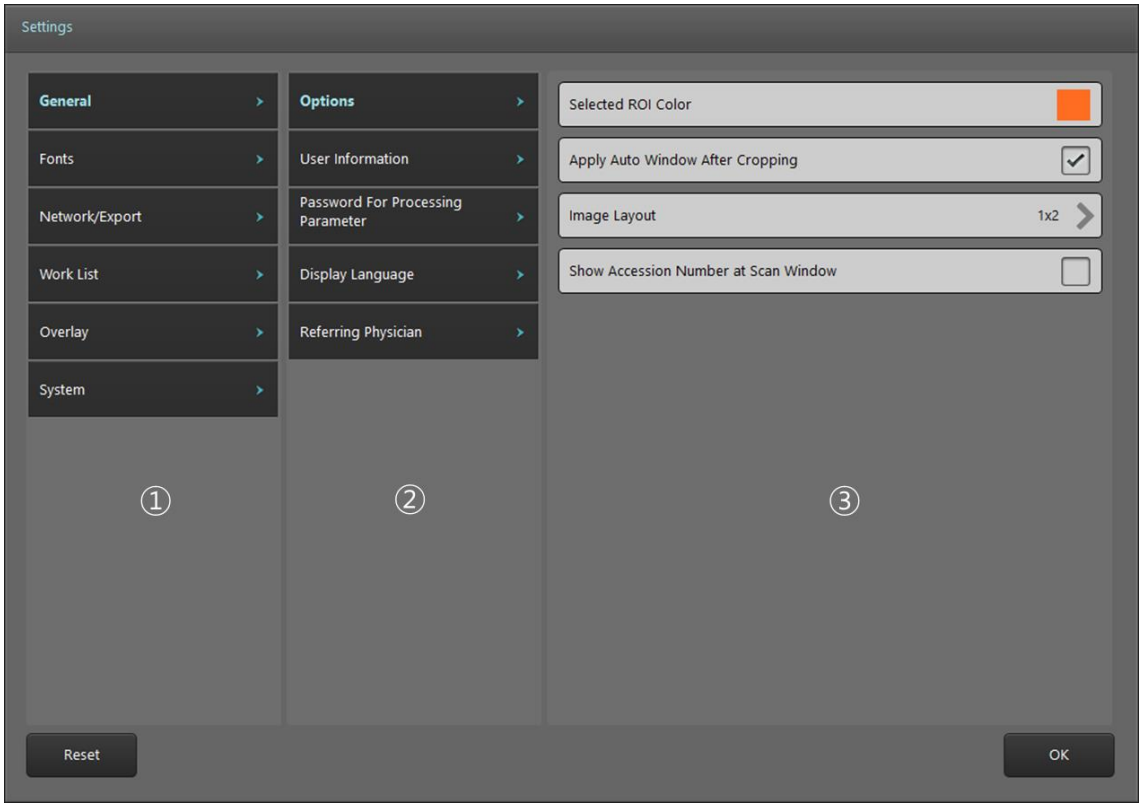


Figure 14.1 Settings

① Main category item list

② Sub-category item list

③ Specific item list

14.2. General

14.2.1. Options

Items	Description	Default value
Color of ROI	Set the color of the ROI Box. Click on the item to change the color in the Color Picker.	Orange
Apply Auto Window After Cropping	Set whether to automatically apply Auto Window after cropping ROI Box.	TRUE
Image Layout	Specify the default layout to use when images are displayed on the review screen.	2x2
Show Accession Number	Show Accession Number at Scan Window	FALSE

14.2.2. User Information

Items	Description
Institution Name	Set hospital name. The entered value will be included in DICOM information.
Dept. Name	Set the department name where the system is installed. The entered values will be included in the DICOM information.

14.2.3. Password for Processing Parameter

Items	Description	Default value
New Password	Set password.	
Confirm Password	Confirm password.	
Use password to access LUT & PROC	Activate password for accessing LUT and processing.	TRUE
Use password to save default value	Activate password for saving default values in the LUT and processing windows.	TRUE

14.2.4. Display Language

Items	Description	Default value
Language	Select language.	Language selected upon product installation

14.2.5. Referring Physician

In this section, you can use the pre-defined referring physician when adding a referring physician on the Add New Study screen. After entering text in the input field, you can perform the following actions:

- Add: Add a new referring physician.
- Modify: Modify the selected referring physician.
- Delete: Delete the selected referring physician.
- Move Upper: Move the selected referring physician on slot up.
- Move Lower: Move the selected referring physician on slot down.

14.3. Fonts

14.3.1. General

Items	**Description**	**Default value**
Font name	Name of font displayed on the screen.	Segoe UI
Font size	Size of font displayed on the screen. Adjustable from 8 to 12 points.	10

14.3.2. Marking

Items	**Description**	**Default value**
Font name	Name of marking font.	Segoe UI
Font size	Size of marking font. Adjustable from 16 to 30 points.	24

14.3.3. DICOM Printer

Items	**Description**	**Default value**
Font name	Name of font used to print.	Segoe UI
Font size	Size of font used to print. Adjustable from 8 to 12 points.	10

14.4. Network / Export

14.4.1. Image Server

Manages list of DICOM servers for transmitting images to.

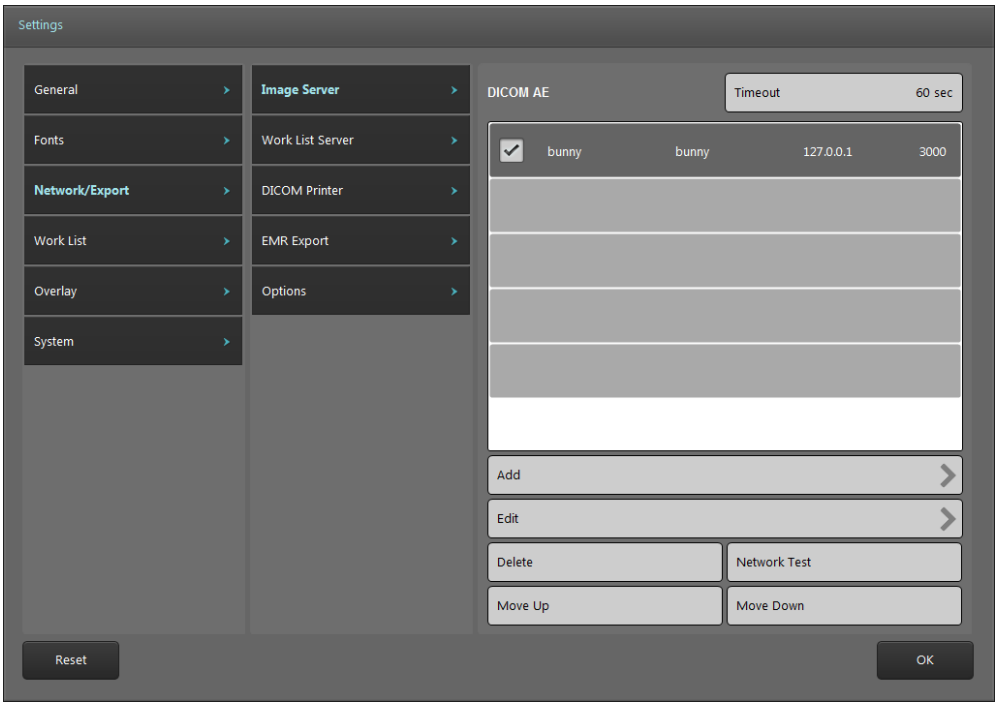


Figure 14.2 Network / Export

① Add: Add an image server.

Name	Description
Calling AE Title	Set AE title of ***QuantorDent.***
Called AE Title	Set AE title of image server.
IP Address	Image server IP address
Port	Image server port
Description	Image server description

② Edit: Edit selected server. An identical screen as adding an image server will be displayed.

③ Delete: Delete the selected server.

④ Network Test: Check the connection by sending DICOM Echo to the selected server.

⑤ Move Up: Move the selected server up.

⑥ Move Down: Move the selected server down.

⑦ Timeout: Drop the connection when responses are not received within the set amount of time.

Check boxes for each item will automatically be activated once a server is added. ***Quantor*** sends images to all checked image servers according to the order on the list.

14.4.2. Work List Server

Manages Work List servers. Management method is identical to that for image servers. Multiple Work List servers can be added, but only one can be checked.

14.4.3. DICOM Printer

Manages DICOM Printers List. Management method is identical to that for image servers. Unlike adding image servers, the following additional settings are required when adding DICOM printers.

Group	Name	Description	Default Value
Film Session	Print Priority	HIGH MID LOW	MID
	Film Destination	MAGAZINE PROCESSOR	PROCESSOR
	Medium Type	PAPER CLEAR FILM BLUE FILM	CLEAR FILM
	Label	Label	
Film Box	Orientation	PORTRAIT LANDSCAPE	PORTRAIT
	Trim	YES NO	NO
	Size	8INX10IN 10INX12IN 10INX14IN 11INX14IN 14INX14IN 14INX17IN 24CMX30CM 24CMX24CM	14INX17IN
	Polarity	NORMAL INVERTED	NORMAL
	Magnification	REPLICATE BILINEAR CUBIC	BILINEAR

Group	Name	Description	Default Value
		NONE	
	Configuration		
	Border	BLACK WHITE	FALSE
	Empty	BLACK WHITE	FALSE
	Min	0	FALSE
	Max	65535	FALSE

Check boxes for each item will be automatically activated once a server is added. ***Quantor*** sends images to all checked servers according to the order on the list.

14.4.4. EMR Export

EMR (Electric Medical Record) export function enables to export the image in JPG file format to designated folder in EMR. Image is exported and saved when study is finished it this function is enabled. File naming rule is as below.
A_B_C_D.jpg (A: Prefix, B: Patient ID or Accession No., C: View Position, D: Image Serial No)

Name	Description	Default Value
Use EMR	Enable to use EMR function.	FALSE
path	Image save path.	
Filename Prefix	Prefix of the file name.	
Filename	Select the item to be used in file name. ● Patient ID ● Accession No,	Patient ID
Use Region Information	Use a specific region of the image as part of the file name.	TRUE
Use Separator	Separate different items with “_” in the file name.	TRUE

14.4.5. Options

Name	Description	Default Value
Auto Send Study	Send the study automatically when the study is finished.	FALSE
Encoding Series	Set DICOM Encoding method. ● Single Series has Single Image ● Single Series has Multi Image	Single Series has Single Image
Encoding Character Set	Select Character Set used in DICOM. ● ISO_IR100 ● ISO_IR192(UTF-8)	ISO_IR100
Modality	You can confirm the text entered in Modality via DICOM Information on the Review screen after scan is completed.	CR

14.5. Work List

14.5.1. Work List

Name	Description	Default Value
Auto Query Interval	Set the execution interval of Auto Query when using the Auto Query function on the Work List screen.	1 min
S. Proc. Match with	The Work List Server records scan codes and descriptions used in the hospital to Scheduled Procedure Step ID and Scheduled Procedure Step Description, respectively, and transmits them. By using the ***QuantorOrganizer*** program, this information can be automatically synced to presets. Define base information to match with when syncing with presets.	S. Proc. ID
Keep a column sorted	Always show by the sorts when displaying query results to the screen.	TRUE
Use (*) for query conditions	Use * in query string. Some Work List Servers must not use * when searching.	FALSE

14.6. Overlay

14.6.1. Marking

This section can be used to edit pre-defined markings when adding markings to images in the Scan screen. After entering text in the input field, you can perform the following actions:

- Add: Add a new marking.
- Modify: Modify an existing marking.
- Delete: Delete the selected marking.
- Move Up: Move the selected marking up by one slot.
- Move Down: Move the selected marking down by one slot.

14.6.2. Auto Mark Margin

Set the margins when markings are automatically added to an image. Each setting value shows margins by % compared to the width and height of the image.

Name	Description	Default Value
Left	Left margin.	10
Right	Right margin.	10
Top	Top margin.	10
Bottom	Bottom margin.	10

14.6.3. Print Overlay Contents

Select items to be shown in the image when printing.

Item	Description	Default
Patient ID	Patient ID	TRUE
Patient Name	Patient's name	TRUE
Patient Age	Patient's age	TRUE
Patient Sex	Patient's Sex	TRUE
Logo	Logo to be displayed above or below the image (jpg files only)	FALSE
Patient Birth Date	Patient's date of birth	TRUE
Study Date Time	Date and time of the study	TRUE
Description	Study information	FALSE

Item	Description	Default
Institution Name	Institution name	TRUE
Acquisition Number	Image acquisition number	TRUE
Physician	Physician's name	FALSE
Ruler	Ruler	TRUE
Zoom	Zoom ratio	TRUE
Header	Header	
Footer	Footer	

14.6.4. Export Overlay Contents

Select items to be shown in the image when exporting.

Item	Description	Default
Patient ID	Patient ID	TRUE
Patient Age	Patient's age	TRUE
Institution Name	Institution name	TRUE
Patient Birth Date	Patient's date of birth	TRUE
Patient Name	Patient's name	TRUE
Study Date Time	Date and time of the study	TRUE
Patient Sex	Patient's gender	TRUE
Ruler	Ruler	TRUE
Acquisition Number	Image acquisition number	TRUE

14.7. System

14.7.1. File Management

Name	Description	Default Value
Data Path	Set the destination folder for images to be stored.	Installation Folder/Database
Use Auto Deletion after idle time	Set whether to use Auto Deletion and Auto Deletion intervals.	TRUE 60 second
Delete Study not Sent	Define the action to take when deleting an image that has not been transmitted. ● Never: Never can be deleted. ● Confirm: Delete after confirmation. ● Always: Always delete without asking.	Confirm

14.7.2. System Options

Set other system settings.

Name	Description	Default Value
Temporary Path	Set the folder for saving temporary files used in the program.	Installation Folder/Temp
Use On Screen Keyboard	Decide whether to use the Windows On Screen Keyboard when entering data on the screen.	FALSE
Display Monitor	Select the displaying monitor when more than 2 monitors are connected.	1
Review Monitor	Select the monitor for review window to be displayed.	1
Show Minimize Button	Show/Hide minimize button	TRUE

14.7.3. Date

Name	Description	Default Value
Date Format	Set the date display format. Choose from one of the three formats below. YYYY/MM/DD DD/MM/YYYY MM/DD/YYYY	YYYY/MM/DD
Separator	Set the separator between year, month and day. Choose from one of the three separators below. / - .	/

14.7.4. Dental

Item	Description	Default value
Numbering System	This selects one from following two dental numbering systems. ● European ● American	European
Default template	This selects a type of Full Mouth Series template.	FMX18
Empty	Automatically fill the image border with white color.	White

14.8. Reset

Reset restores all settings to default settings.

Appendix A: European Numbering System

European Numbering System is *FDI World Dental Federation Notation*

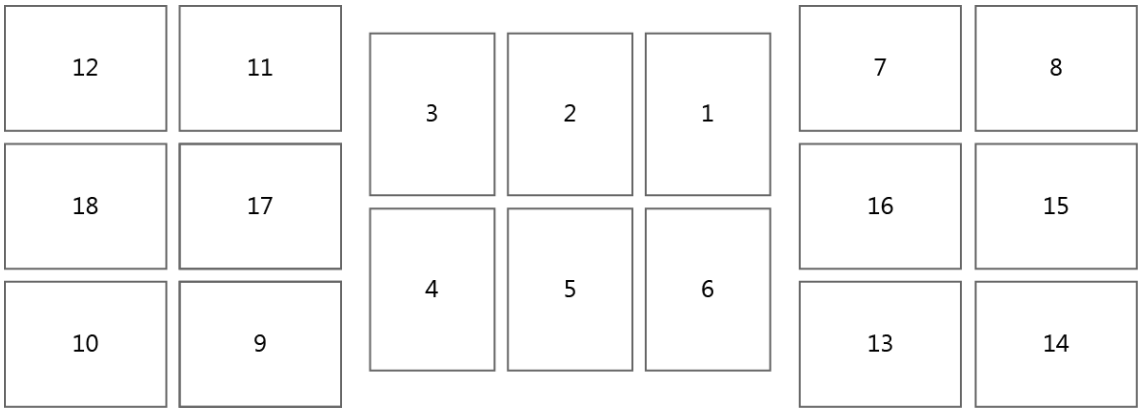
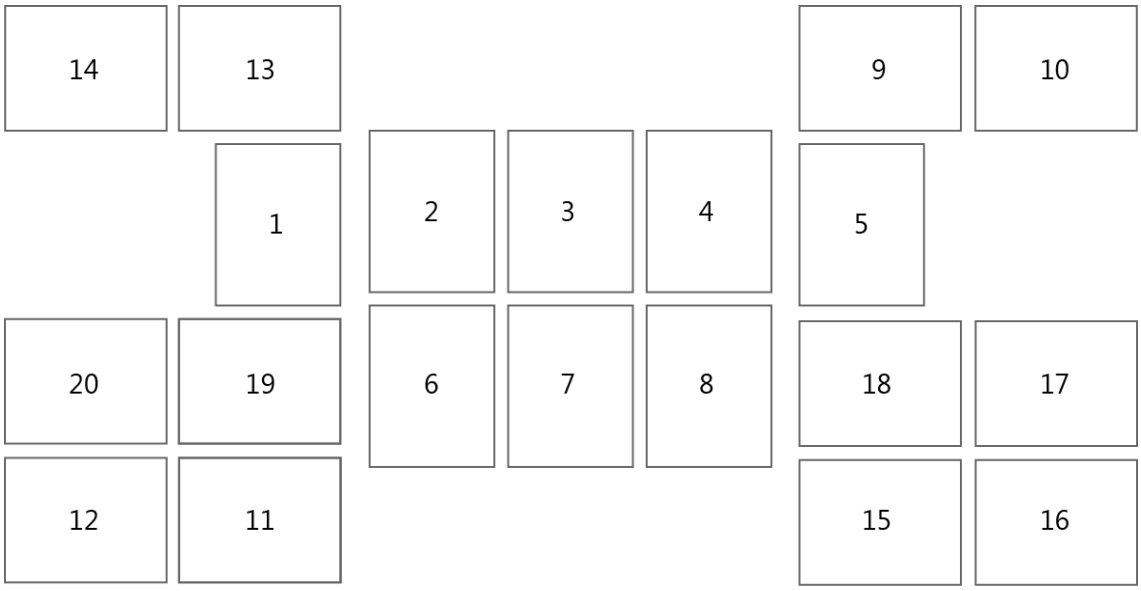
Permanent teeth															
upper right								upper left							
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
lower right								lower left							

Appendix B: American Numbering System

American Numbering System is *Universal Numbering System*

Permanent Teeth															
upper left								upper right							
16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
lower left								lower right							

Appendix C: Full Mouth System FMX18



Appendix D: Full Mouth System FMX20