Xelis-Dental

User's Guide

CE 2460

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Europ.Representative: Obelis s. a. Avenue de Tervuren 34 Bte 44 B-1040 Brussels, Belgium

Precaution

1. Only Experts should use this medical imaging solution for a safe use.
2. If the program arrives unexpectedly, please contact us or send us your crash-dump file, which contains some useful information for trouble shooting.

This document is for the sole purpose of explaining the usage of Xelis-Dental. Anyone with inquiries concerning this document or Xelis-Dental should contact INFINITT using the contact information provided below.

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Email ▸ infinitt@infinitt.com

The user manual provided with the product may not include the most recent version.

Table of Contents

Chapter 1. Xelis-Dental Introduction

Xelis-Dental is dental imaging software which offers 3D image visualization, 2D image analysis and various MPR functions for fast and accurate diagnosis all from one workstation using DICOM format CT image loading.

1. Main Xelis-Dental Functions

Xelis-Dental makes 3D image viewing and analysis convenient by providing a simple and easy to use user interface. The main Xelis-Dental functions are summarized below.

◊ VR (Volume Rendering)/MIP/minIP/X-ray – Functions that provide various integrated rendering methods for easy conversion.

◊ MPR Rotating, Curve, 3D Zoom – Functions that provide more accurate 3D image viewing.

◊ Function for Easily adding and managing object, color map and preset files.

◊ All Xelis-Dental functions can be accessed from one screen for convenient viewing of 2D and 3D images. Reconstructed images can be easily saved in one series as DICOM images.

2. Copyright

All Software programs, data files, data, manuals and other documented contents included in Xelis-Dental products are protected by Korean computer program protection laws and copyrights. Please carefully read the copyright contents enclosed in the product CD or the End User License Agreement that comes up upon installation of the product.

INFO.	Windows Vista are products of Microsoft.
	DICOM is the standard for medical images that has been issued by the ACR/NEMA.

Chapter 2. Installation, Removal and Operation

3. System Requirements

	Requirements
CPU	Quad-Core 2.0GHz
Memory	4GB
HDD	250GB or more free space
Video-card	1280x1024, 32bpp (Except FireGL or Quadro series)
OS	Microsoft Windows Vista
Explorer	Microsoft Internet Explorer 9.0
Etc.	USB port, Mouse, Keyboard, Network card, CD-R/RW drive

4. System OS Update

For proper operation of Xelis-Dental, be sure to install the following Windows service pack and Internet Explorer update.

If the Windows or Internet Explorer version installed on the system is an earlier version than specified in the Xelis-Dental system requirements, first install the update included in the Xelis-Dental installation CD. Microsoft MDAC is included in the Xelis-Dental installation CD.

WARNING!	The Windows or Internet Explorer language setting on the user's system and the language setting of Windows or Internet Explorer included in the Xelis-Dental installation CD may be different. In this case, the user should go directly to the Microsoft Website and update the system with the appropriate language version.
	Go to the Microsoft Website directly for the most current Windows service pack and Internet Explorer updates.

5. HASP Key lock Installation

HASP Key lock must first be installed before using Xelis-Dental. The installation of Keylock using the USB port is described in order below.

➢ USB Keylock installation order

- After rebooting the system, login with an Administrator account.

- After inserting the Xelis-Dental installation CD, click the Install HASP button on the screen that automatically comes up and process as indicated.

- Install the HASP Keylock driver software as ‘Typical’.

- After installation, insert the dongle Keylock into an empty USB port.

When the Key lock and Key lock driver software have been installed properly, the red light on the Key lock will come on. If the red light does not come on, remove the Key lock and repeat the above process from the beginning.

(1) Types of HASP key lock

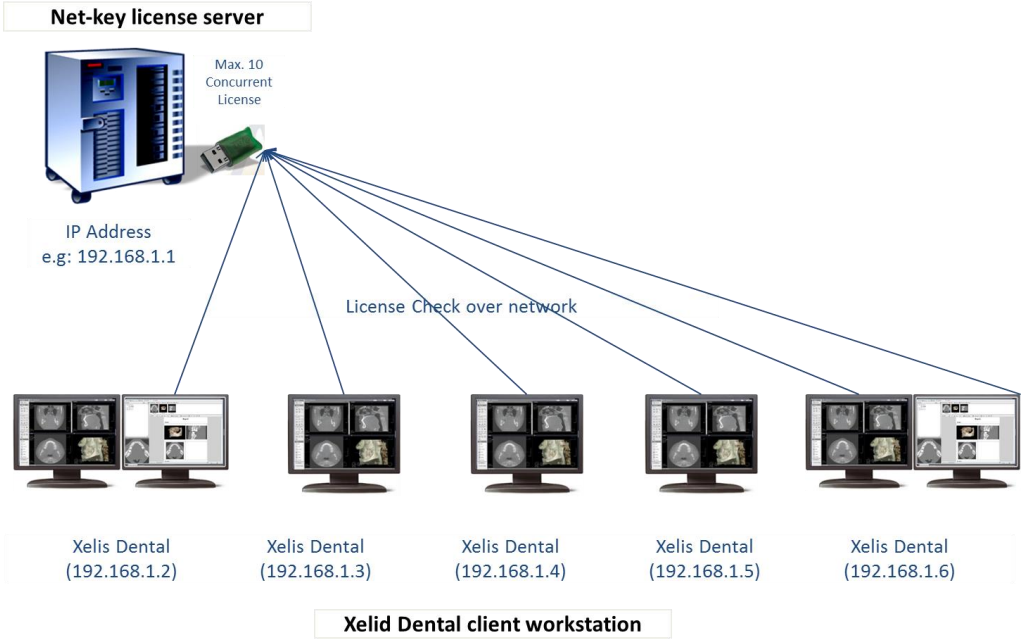
HASP key lock is supplied in 3 types as followed features.

a. Time key: This type of black color HASP key is provided where demo license is required.

b. Permanent key: This type of green color HASP key is provided where single user license is required.

c. Net key: This type of red color HASP key is provided where multiple concurrent user licenses are required on multiple Xelis Dental workstations, which are installed in same network.

(2) How to configure license server and clients with Net-key



a. Plug-in Net key to license sever, which can be installed at a secured place.

b. Install “HASP_License_Manager” on the license server. Manual is included in the same folder.

c. Run “ServerConf.exe” in “NetHaspConf” folder on the license server.

- Configure client network range, which you allow to access the license server.

d. Run “ClientConf.exe” in “NetHaspConf” folder on the client workstation.

- Check Xelis Dental, and then input the IP address of the license server.

6. Software license

If the user is not using the HASP key lock, and instead using software license, please go through the instructions below.

(1) Types of software license

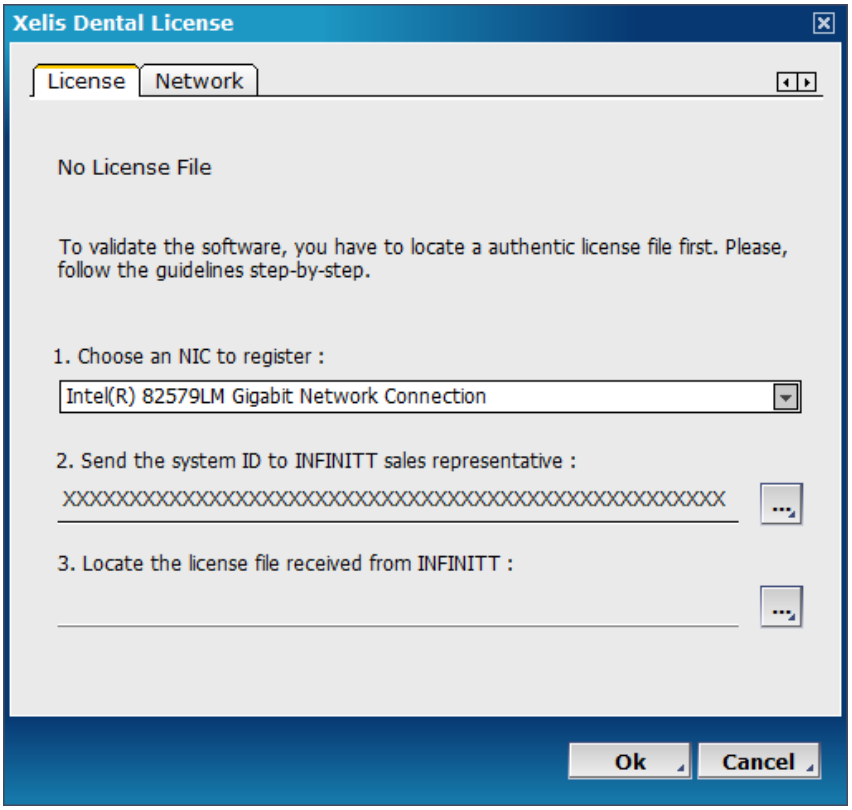
There are two types of Software license.

a. Stand alone : License for just one user

b. Network : One user registers the network license to his/her PC. The other users can login to that registered PC to get licensed for using Xelis Dental.

(2) License Registration

If there is no HASP key lock, running Xelis Dental brings up the below dialog, ‘Xelis Dental License’.



For registering the license file, follow the instructions in the window. To get a new license file, please contact INFINITT sales representative, and send us the system ID.

(3) How it works

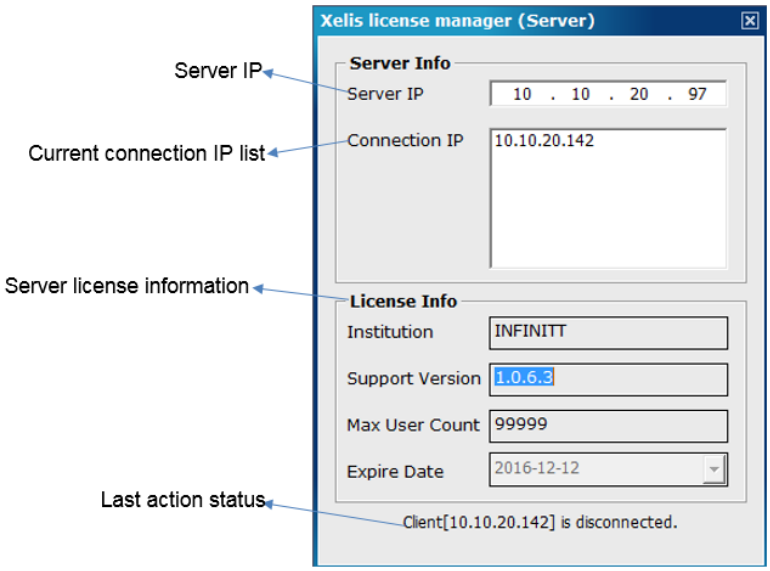
a. Stand alone

I. Register a License, then the user can use Xelis Dental.

b. Network license

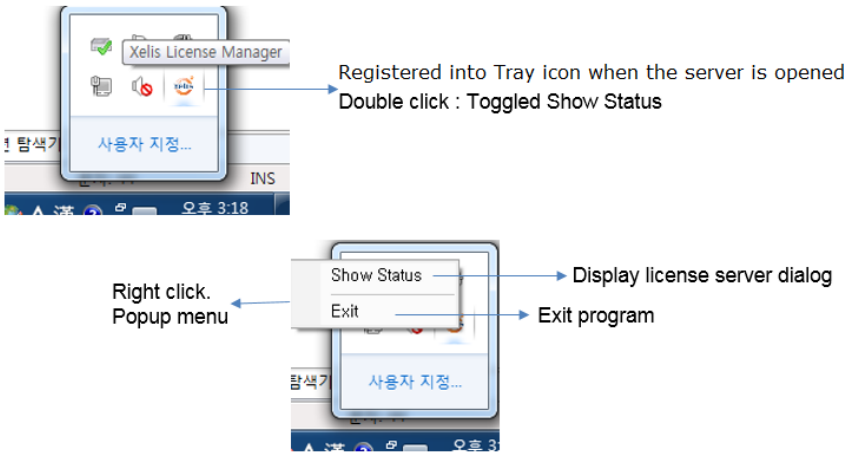
I. Server license

i. For PC/Server that registered the actual Network software license file, when opening Xelis Dental, ‘Xelis license manager (Server)’ is executed as well.



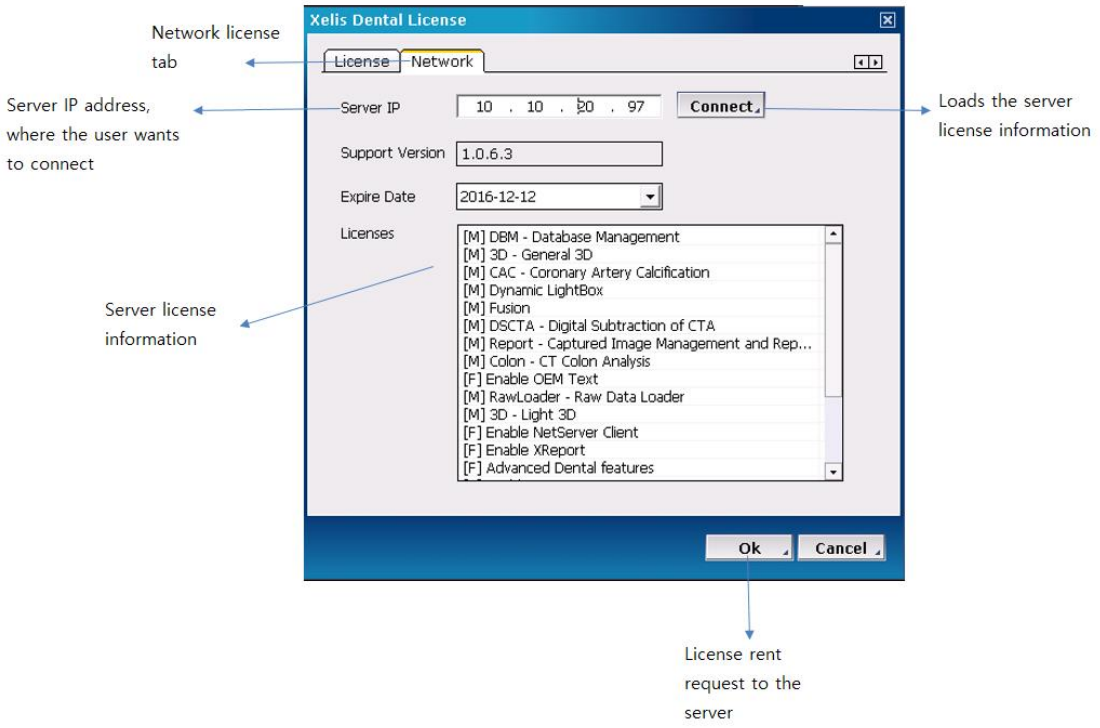
ii. While ‘Xelis license manager (Server)’ is running, it allows other PCs to connect to the license-registered PC/Server, and open Xelis Dental. Also, the program provides the current license information. Server IP, Current connection IP list, Support version, max user count, and Expire date.

iii. If running new Xelis Dental for the first time, the program asks whether user wants to register the License manager program into the starting program list. When registered to the starting program list, the license manager opens without running Xelis Dental.



II. Client license

i. If getting licensed from the license-registered PC/Server, go to 'Xelis Dental License' - 'Network' tab, and enter the IP address of the license-registered PC/Server. (Xelis Dental License tab can be opened from 'About' – 'New License'.



ii. Enter the IP address, then press 'Connect'. It will load the server license information. Press 'Ok' button to open Xelis Dental.

7. Xelis-Dental CD Installation

Xelis-Dental CD installation is similar to that of Windows Vista.

➢ Xelis-Dental CD Installation

- After the Xelis-Dental installation CD has been inserted and the sample graphic shown below comes up, install the programs listed below.

1) Xelis Dental

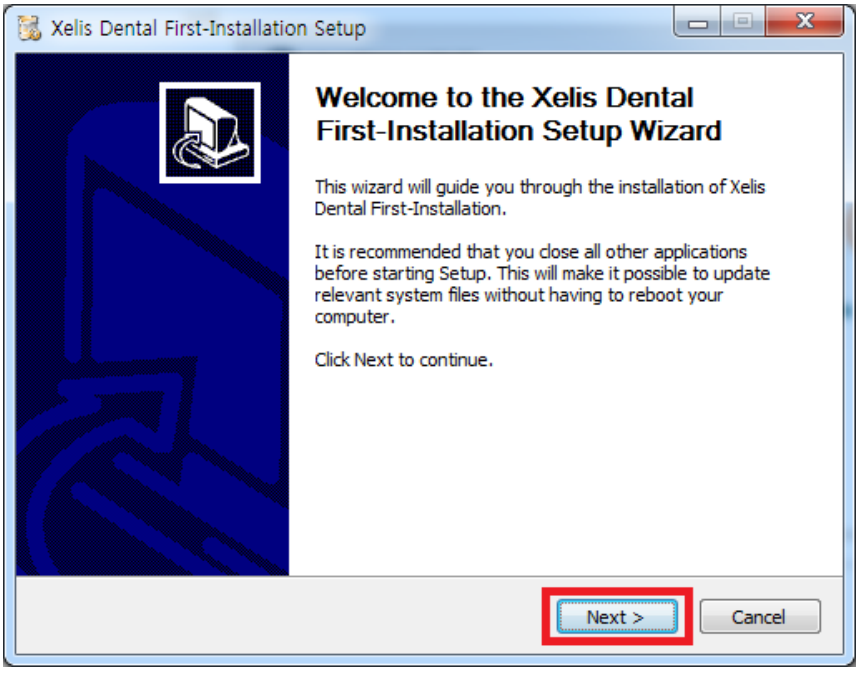
2) MSSQL 2005 Express

3) HASP License Manger

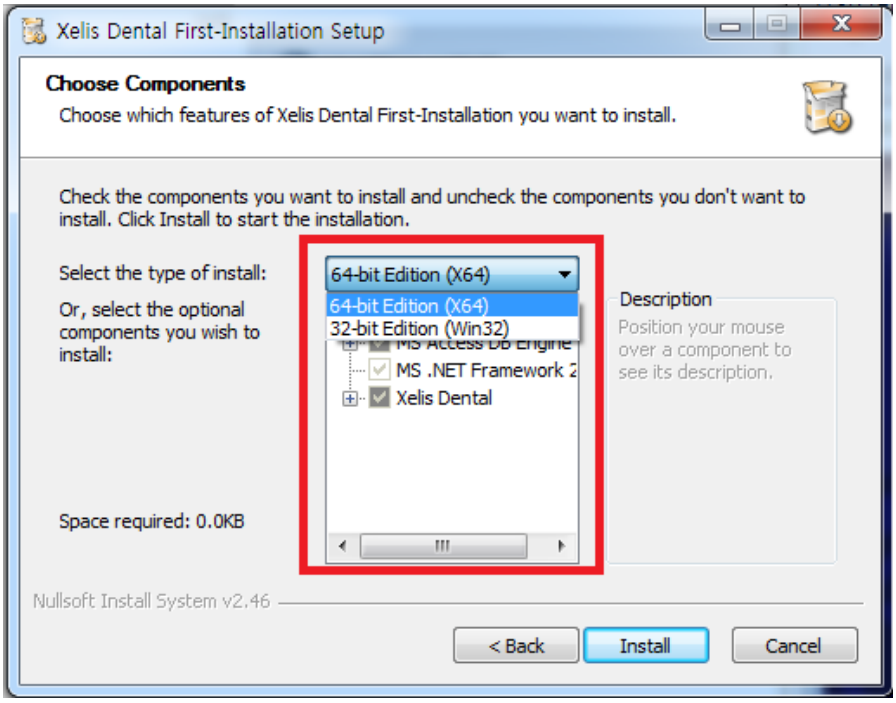
4) HASP Driver

Xelis Dental

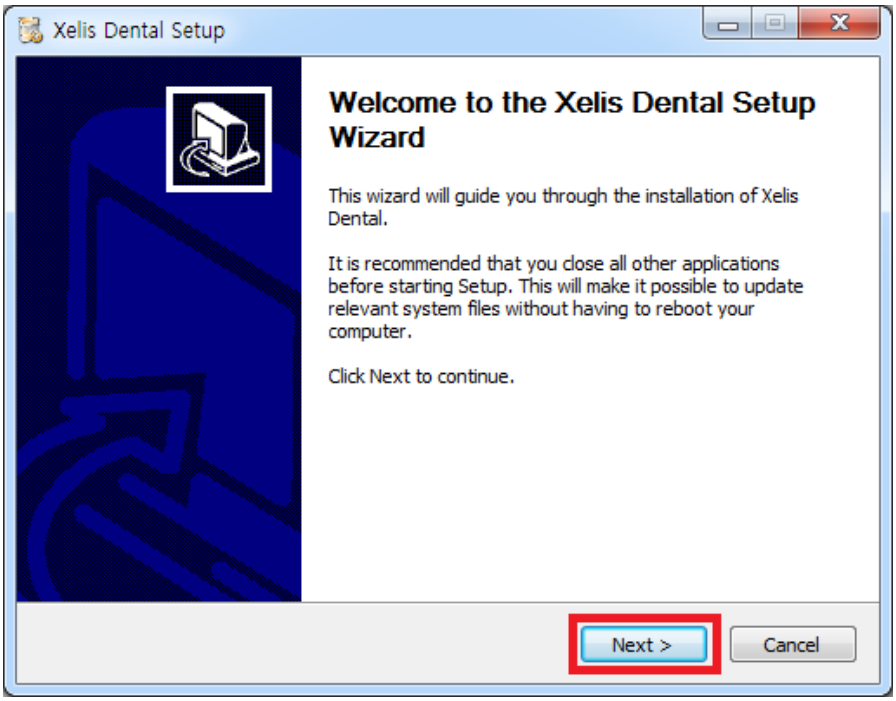
- When select 'Full Installation of Xelis Dental', excute Xelis Dental First-Installation Setup, then click Next button.

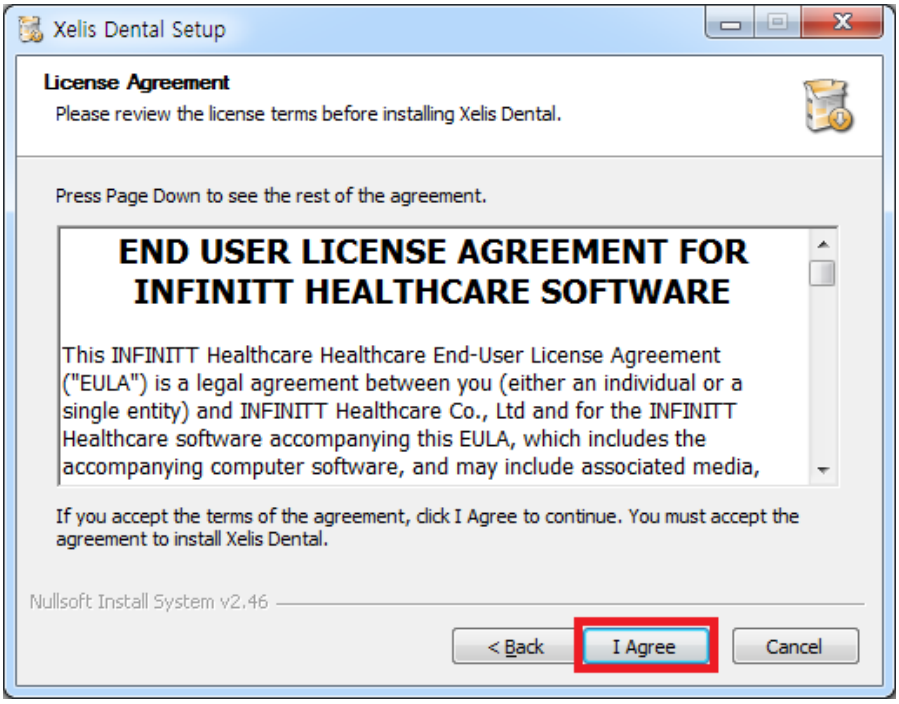


- Select the type of install, click the Install button that is displayed.

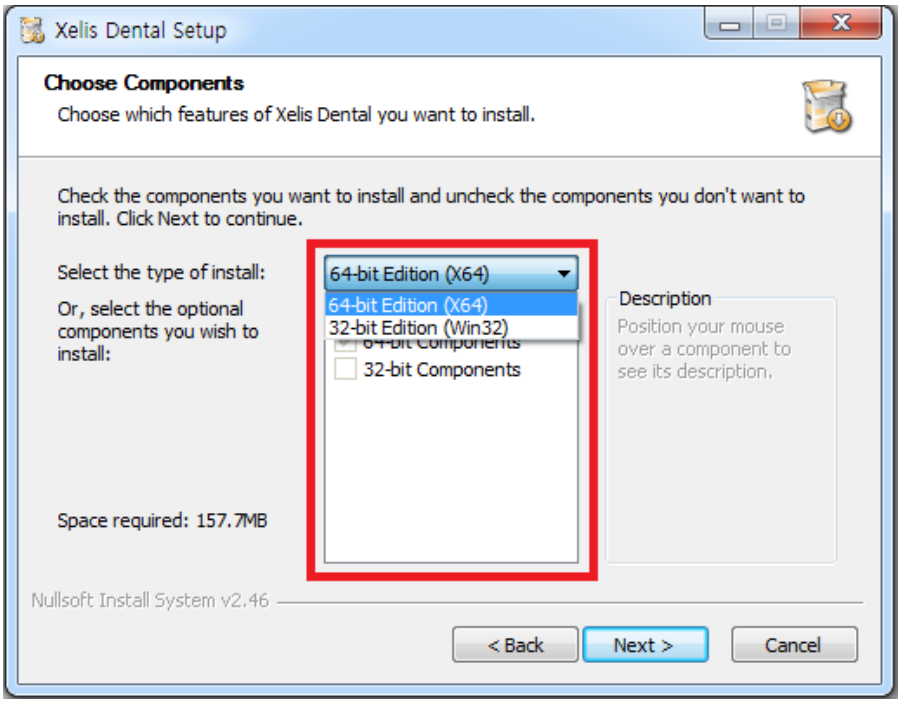


- After reading the License agreement and clicking the I Agree button, click the Next button that is displayed.

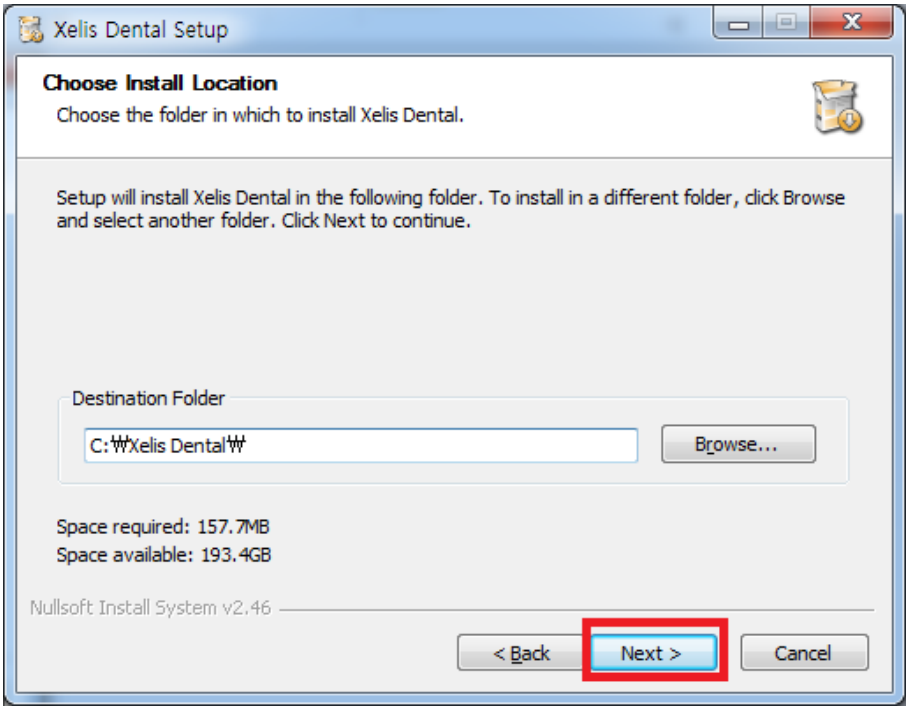


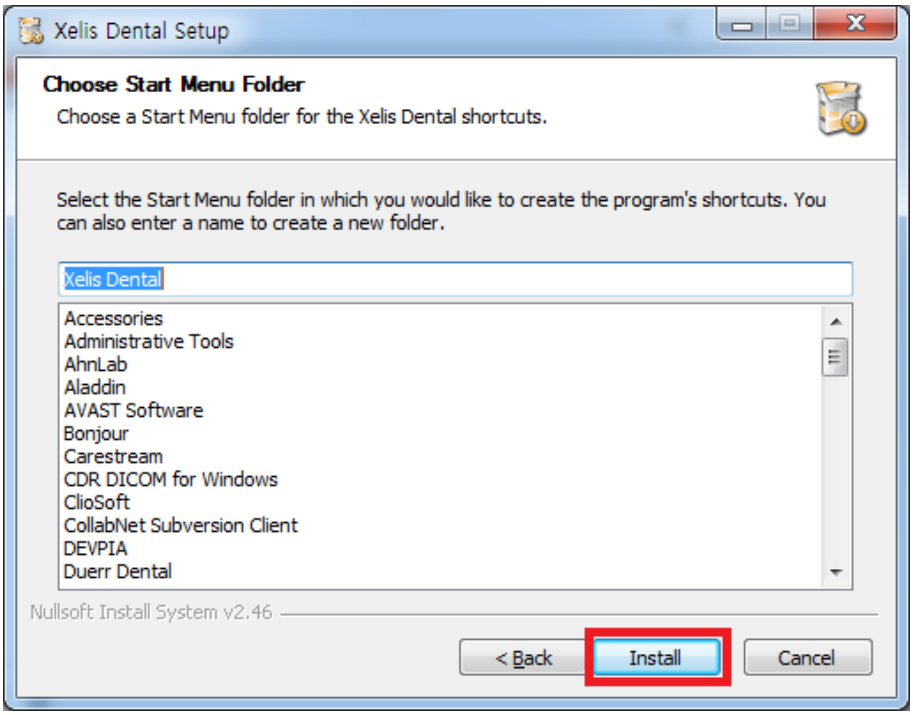


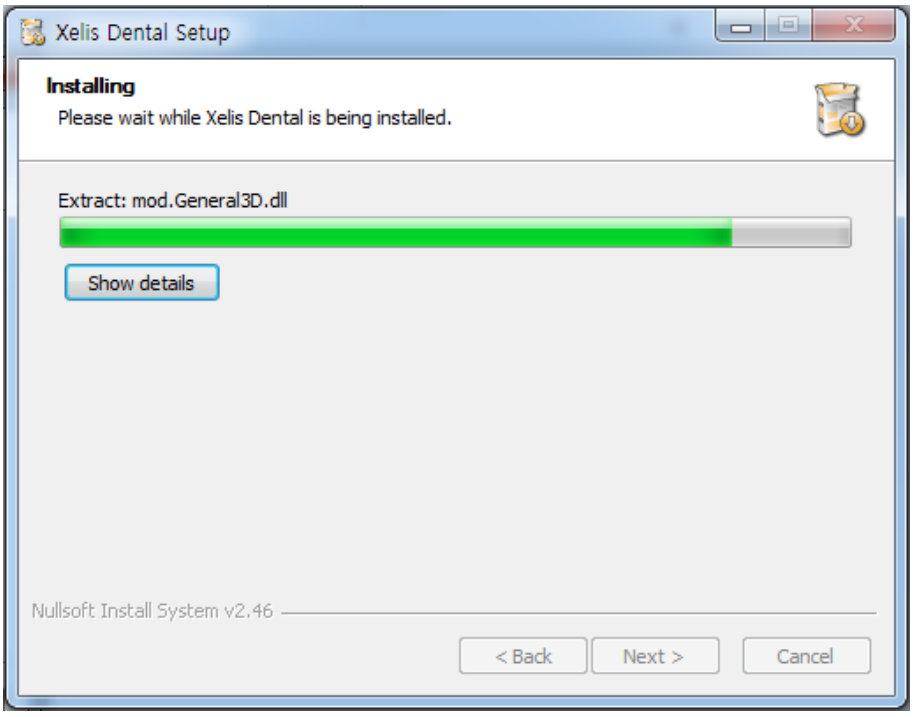
- Select the type of install, click the Next button that is displayed.

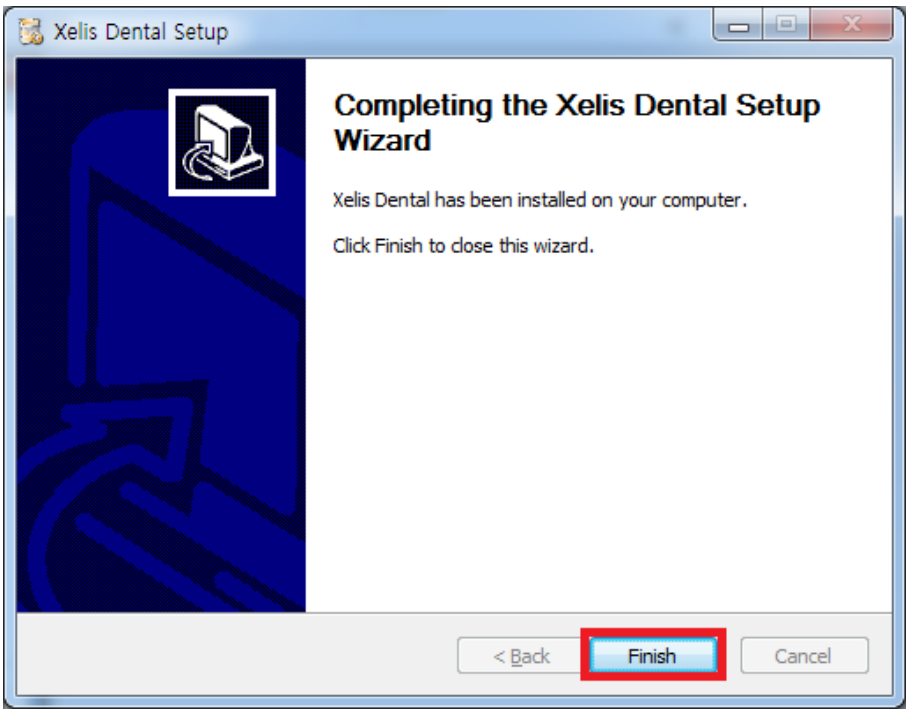


- Select the installation folder in the graphic shown below and continue to click the Next button to complete installation.









8. Xelis-Dental Installation for Basic Users

After Xelis-Dental has been installed, any user, even though they are not logged on as an Administrator, can use Xelis-Dental. Install the following according to the system OS version.

➢ Windows Vista Professional / Windows .NET 2003 Server

- Log in using an Administrator ID and install the HASP Key lock driver. (MDAC 2.7 or later only for .Net 2003 Server)

- While installing Xelis-Dental, be sure to check Install for everyone so that all users can access the system.

- When installed as described above, users logged in using Power-User or Restricted User accounts can log in and use the same Xelis-Dental platform.

➢ Windows Vista Home

- Log in using an Administrator ID and install the HASP Key lock driver.

- While installing Xelis-Dental, be sure to check Install for everyone so that all users can access the system.

- Use Windows Search on the folder in which Xelis-Dental is installed to remove 'Read-Only' properties and configure as a Shared Network.

- When installed as described above, user logged in using Power-User or Restricted User accounts can log in and use the same Xelis-Dental platform.

WARNING!	If installed on a Windows Vista Home system, though this OS is not meant for use by a large number of users, the Xelis-Dental installation folder is still made a Shared Folder. Since this can cause system security problems to occur, it is not recommended that Xelis-Dental be used for a large number of users on a Windows Vista Home system.

9. Installation Folder Structure

The Xelis-Dental installation folder is configured as "C:\Xelis-Dental". This folder can be changed on the installation screen. Make sure that, when Xelis-Dental is installed, the folder structure is the same as depicted below.

\Bin	Folder for executed files
\Users	Location of stored DICOM images
\Log	Location where Xelis-Dental log files are stored

\Preset	Folder where OTF/color presets are stored for VR
\Spool	Folder where DICOM SCP function temp files are stored
\Temp	Folder where temp files are stored

When modifying option for the files saved in each folder, be careful not to change or modify contents of the files that improperly affect the operation of Xelis-Dental.

10. Removing Xelis-Dental

Remove Xelis-Dental software from the system using the procedure described below.

➢ Removing Xelis-Dental

- Open Control Panel from the Windows Startup menu.
- Select Add/Remove Program.
- Select Xelis-Dental from the list of currently installed programs and click the Remove button.
- Xelis-Dental is automatically removed.

WARNING!	Even though Xelis-Dental is automatically removed using the process detailed above, DICOM image data and user preset files are not automatically removed from the hard disk. In order to remove all files, the files must be found using Windows file search and removed directly. This is because Xelis-Dental data is protected in case the software is removed accidentally.

11. FAQ

Q. If Xelis-Dental will not run and the ‘HASP not Found’ message comes up?

A. Make the sure the Key lock is properly seated in the USB slot.

Q. If the entire screen does not come up properly when Xelis-Dental is running?

A. Make sure that the screen is configured to at least 1024x768 in Settings by right clicking on the desktop and selecting Properties from the menu.

Q. If the screen color is not displayed properly when Xelis-Dental is running?

A. Make sure that the color is configured to at least 16bit in Settings by right clicking on the desktop and selecting Properties from the menu. (24bit or higher are recommended.)

Q. How is Xelis-Dental data retained if the OS needs to be reinstalled because of a virus?

A. First, save all the data located in the C:\Xelis-Dental directory when the program was installed, then reinstall the OS. Next, reinstall Xelis-Dental then overwrite all the data that was saved into the same C:\Xelis-Dental directory.

Q. What if the “An error occurred during the move data process:-115” error message comes up during installation?

A. Close the V-Link by right clicking on the V-Link icon and then reinstall Xelis-Dental.

Q. What if the “User has no access to the Database Registry” error message comes up when installing the Key lock device driver?

A. Check that the current user status is Administrator in User Profiles but right clicking on the My Computer icon. If the user status is not Administrator, log out of the system and login in with and Administrator account. Then restart the installation program and install the device driver.

12. Support

(1) ▪ **Internet**

Access the following Website.

http://www.infinitt.com/

Support can also be contacted using this e-mail address.

Email ▸ overseas@infinitt.com

(2) ▪ **Support by Telephone**

Tel ▸ 02-2194-1600

Fax ▸ 02-2194-1699

Chapter 3. Xelis Dental All-In-One

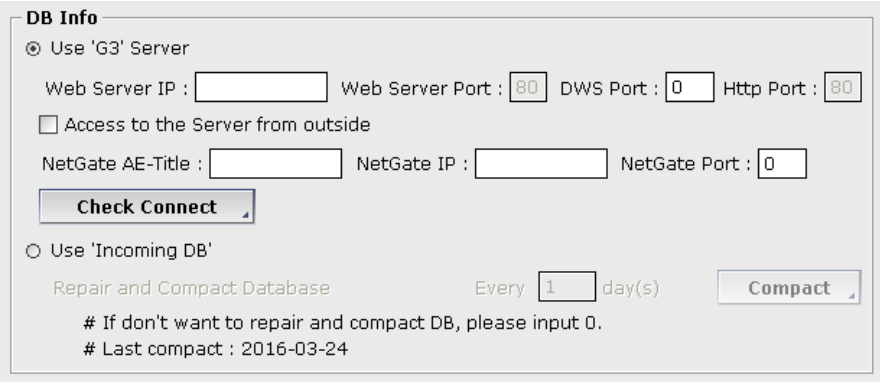
Xelis Dental All-In-One is medical imaging software for loading and acquiring 2D images which are in DICOM format to help fast and accurate diagnosis.

Chapter 3-1. Main Viewer

1. Introduction

It gets orders from outside or creates a new order, to acquire 2D images.

It helps to examine 2D images from local DB or server with various image processing techniques and other image analysis tool. This module can be operated using incoming DB or G3 server DB. (when change selected option from 'Use IncomingDB' to ' Use G3 Server', and then press OK button, Login window pops up. After longing into the G3 server, all the opened series are closed and 2DViewer is now using G3 DB)

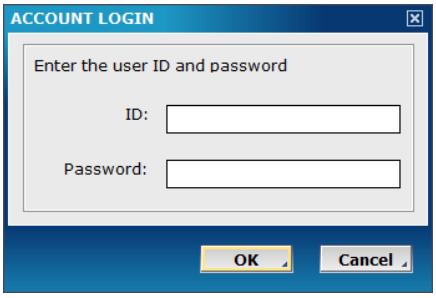


2. Login

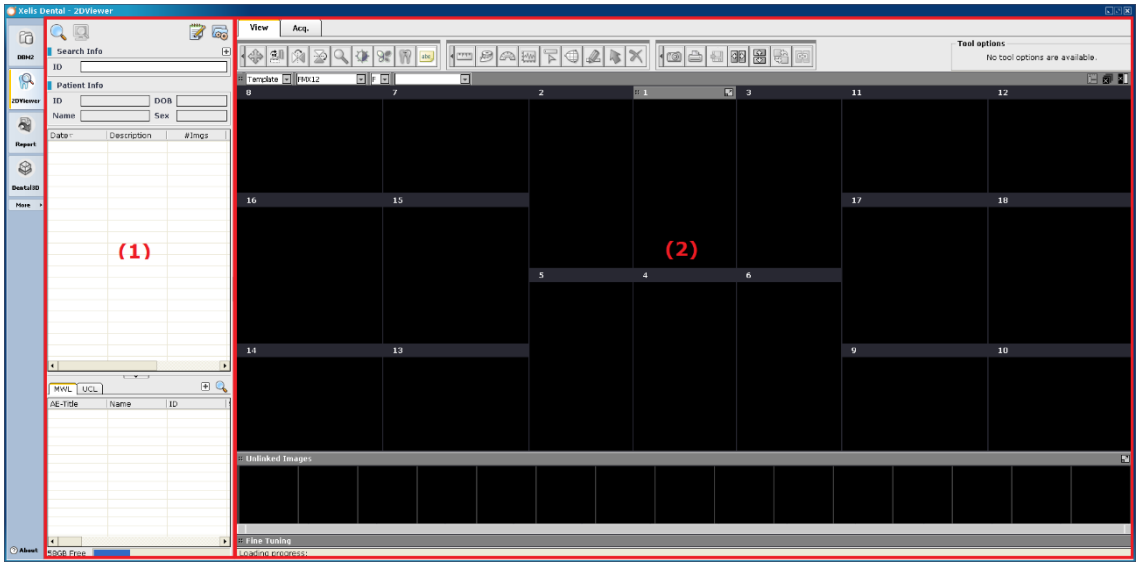
When users start 2DViewer module and server info in filled in, login window pops up.

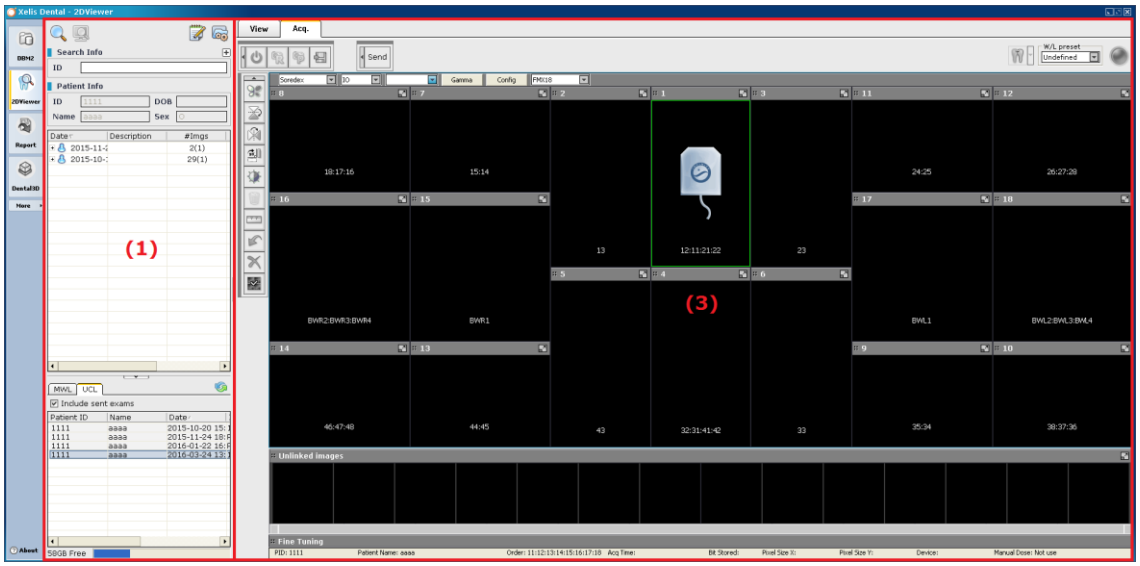
Users can start 2DViewer without login however some features will be limited without login.

- Tooth positioning function at Viewer mode. (Available only with admin authority)
- Number of default template. (3 templates in case of standalone case)
- Authority checking when sending acquired images. (No checking in case of standalone case)



3. Main Screen





(1) **Worklist**

Users can search series related to the patient. Also, users can check orders and uncompleted works.

INFO.	Refer to ‘Chapter 3-3: Worklist’ for detailed instructions on using the tools.

(2) **View Mode**

Users can check acquired images.

INFO.	Refer to ‘Chapter 3-4: View mode’ for detailed instructions on using the tools.

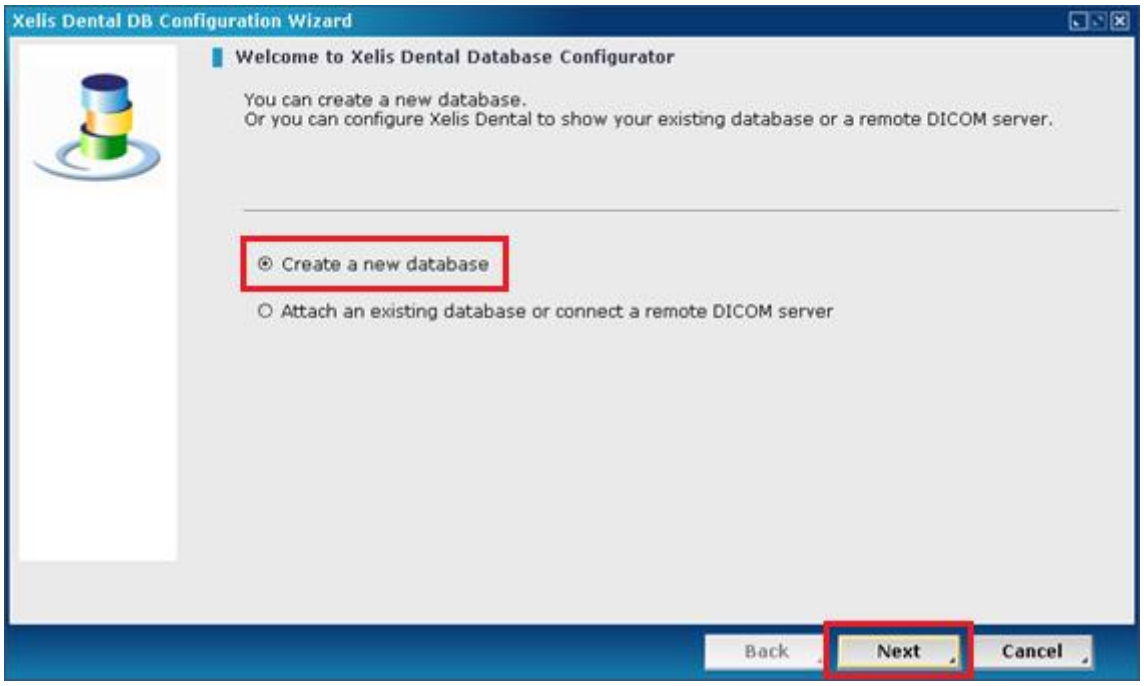
(3) **Acquisition Mode**

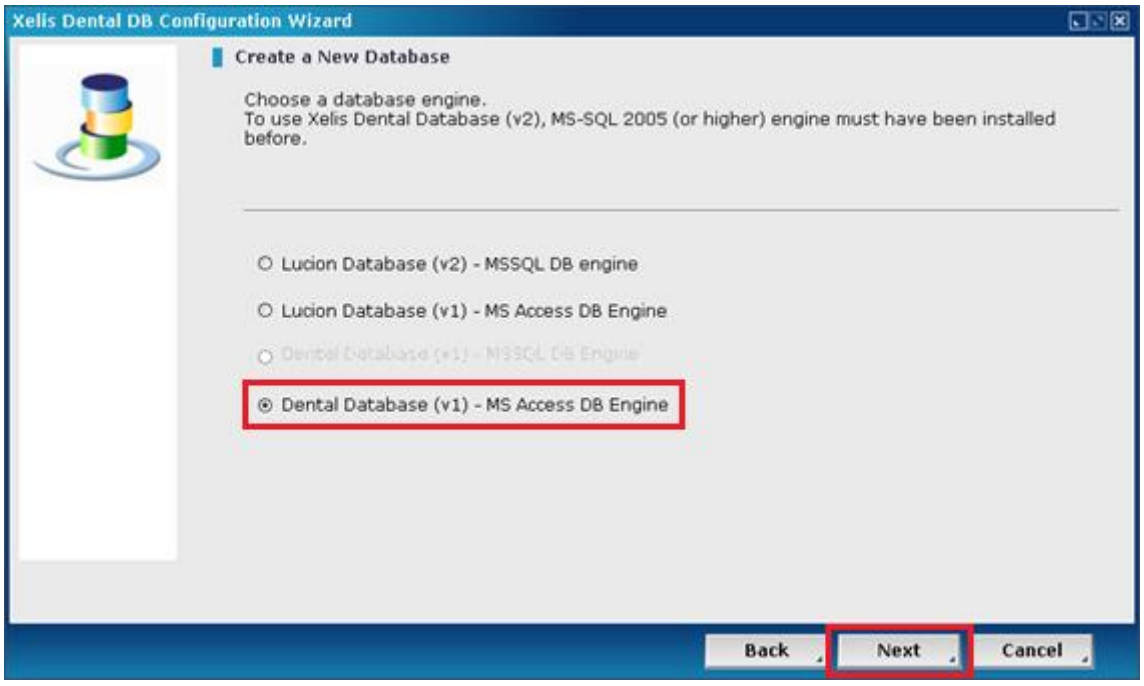
Users can acquire images.

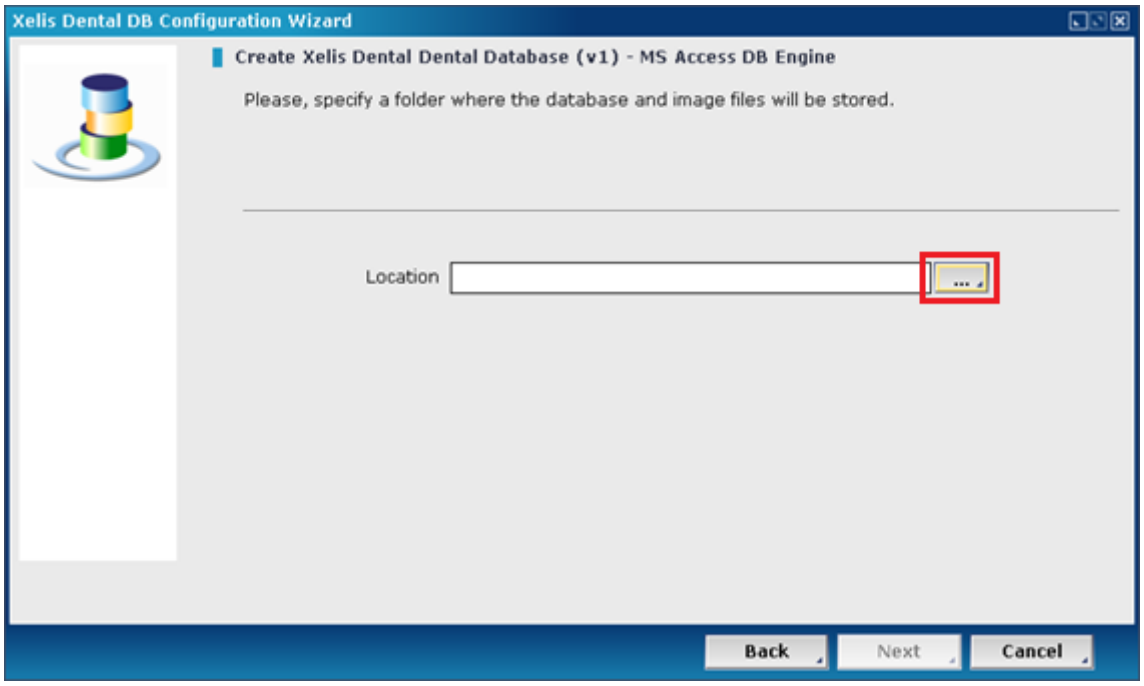
INFO.	Refer to ‘Chapter 3-5: Acquisition mode’ for detailed instructions on using the tools.

Chapter 3-2. Create Dental DB

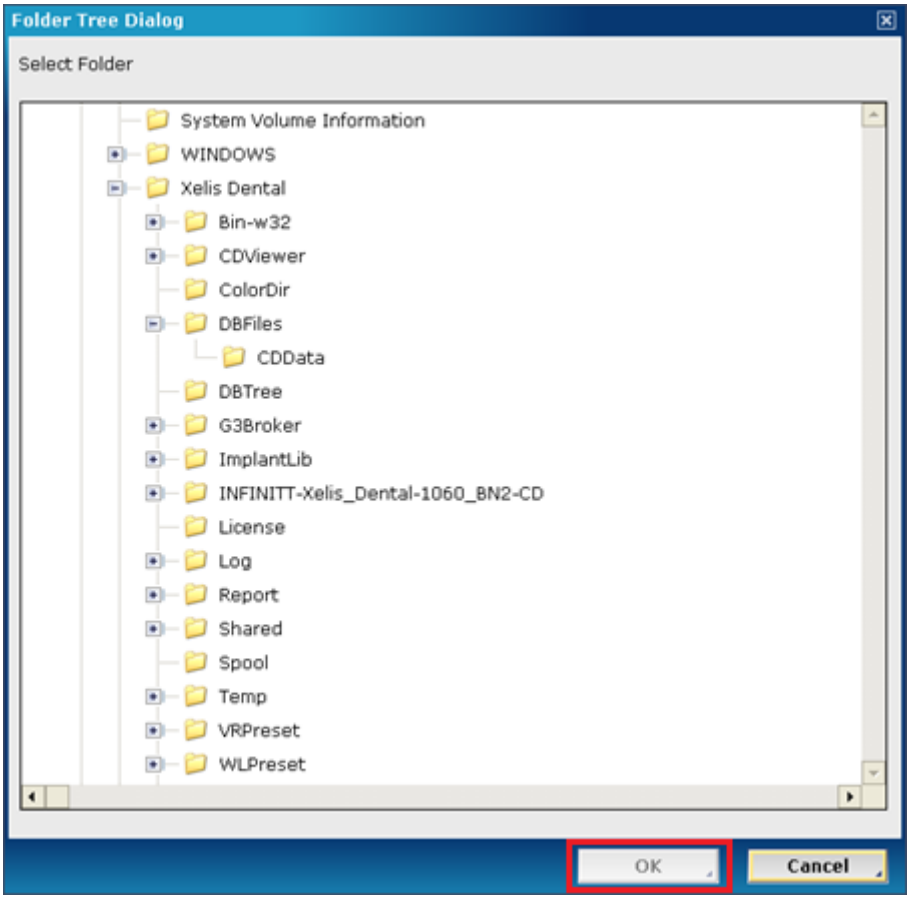
To create database, start LDCWizard, and follow instructions below.

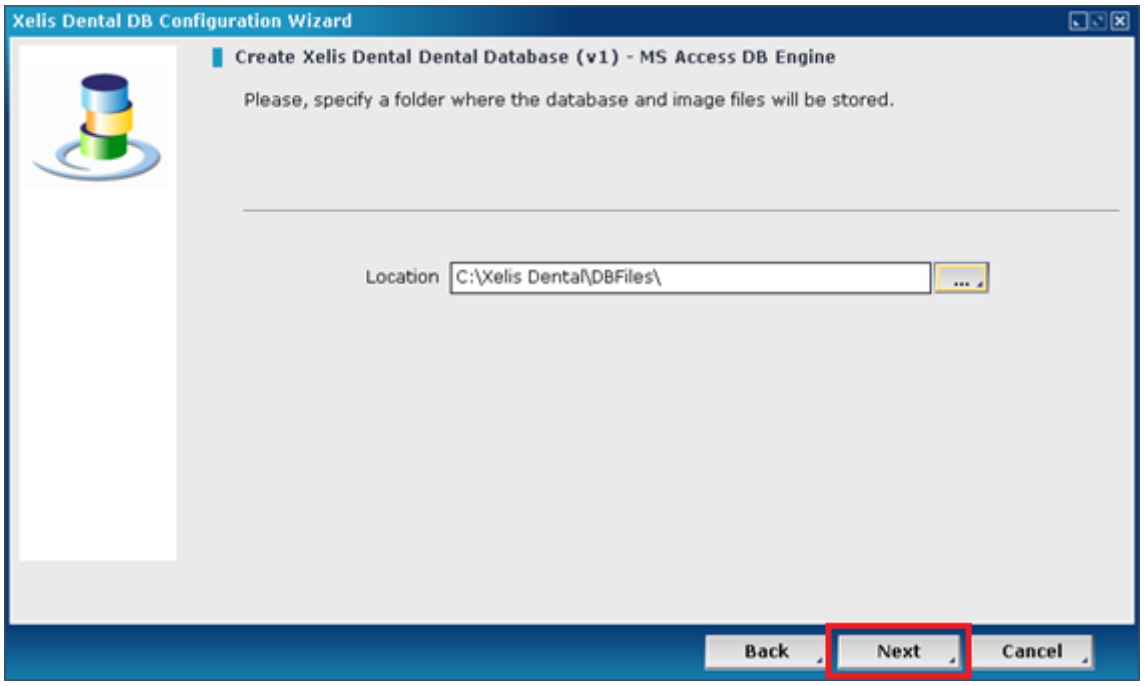


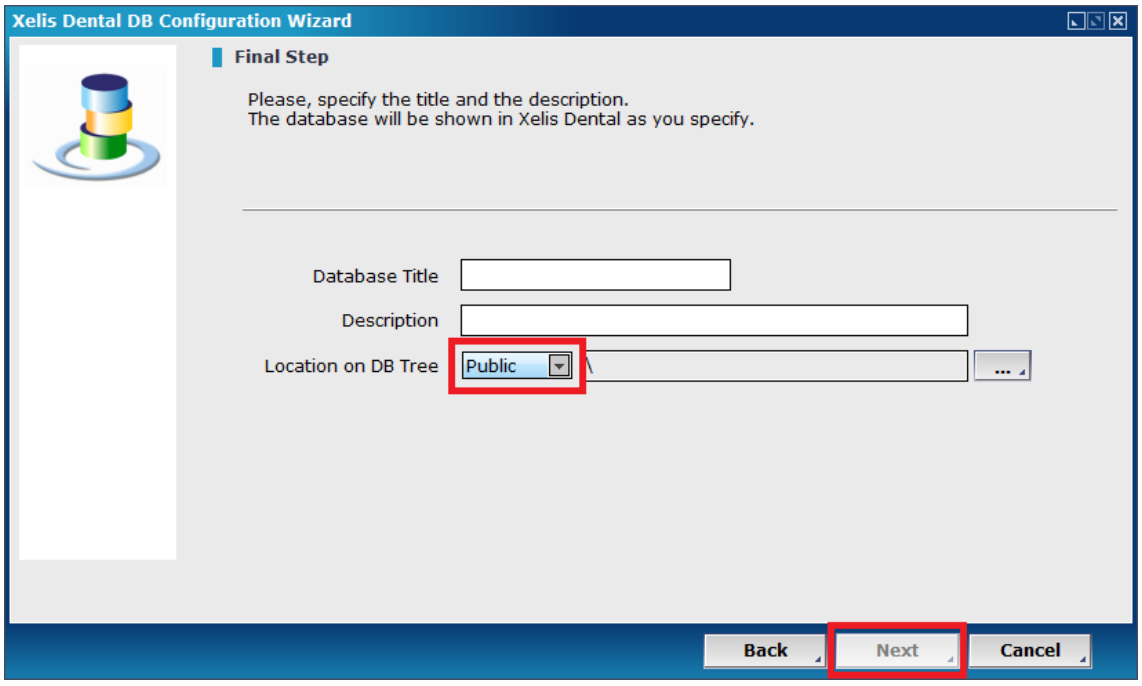




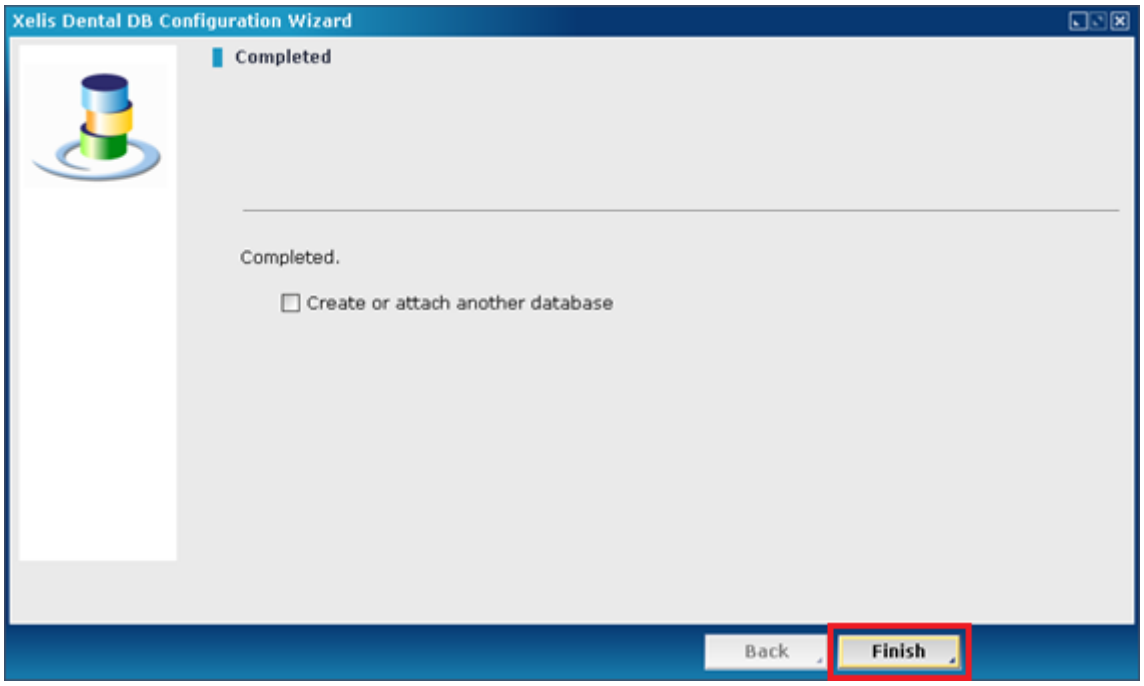
- By clicking the "…" button specify the directory for the DB using the window which pops up after.





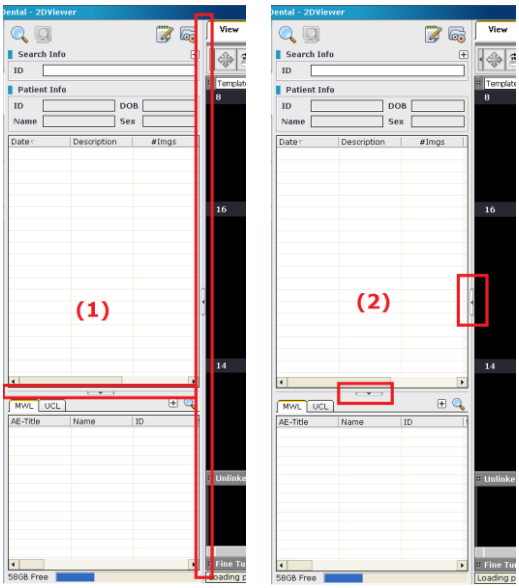


- Fill the information and click “Next”.


Xelis Dental DB Configuration Wizard
Completed
Completed.
Create or attach another database
Back
Finish

Chapter 3-3. Worklist

1. Worklist Bar

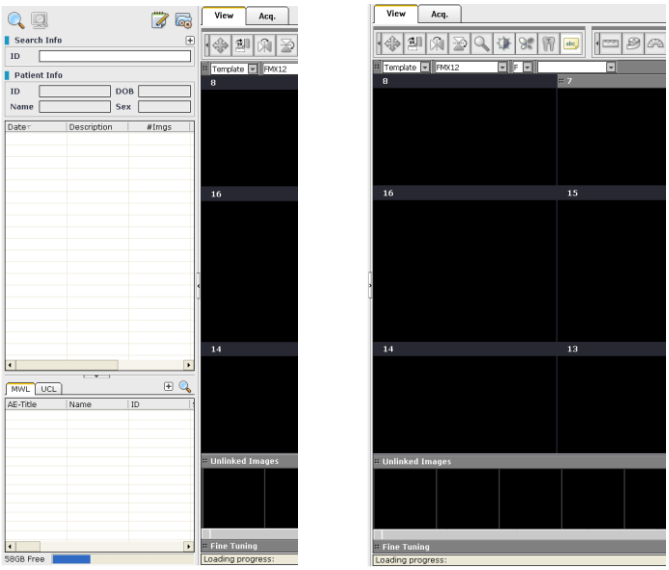


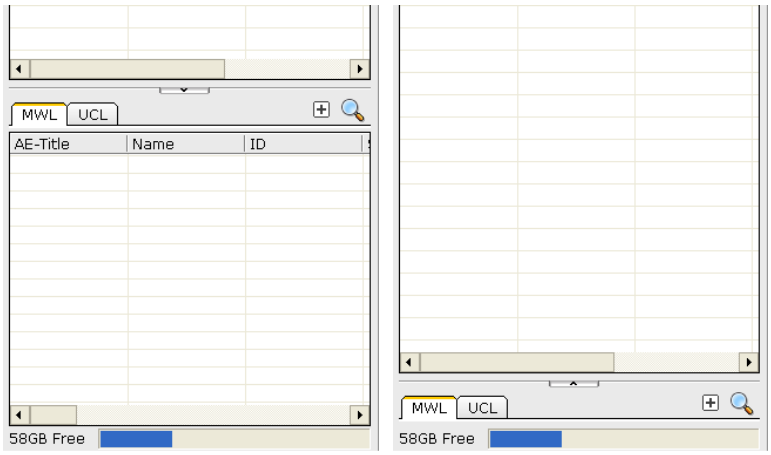
(1) **Scaling**

Scaling the size of the “Worklist” by Drag & Drop.

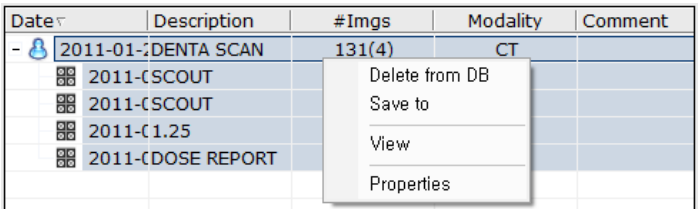
(2) **Folder**

Hide “Worklist” by clicking the button.



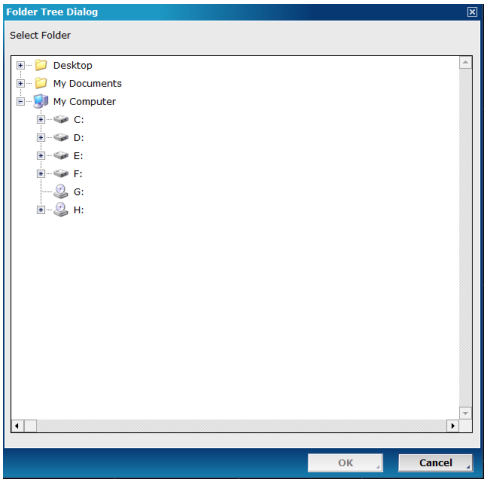


(3) **Context menu**



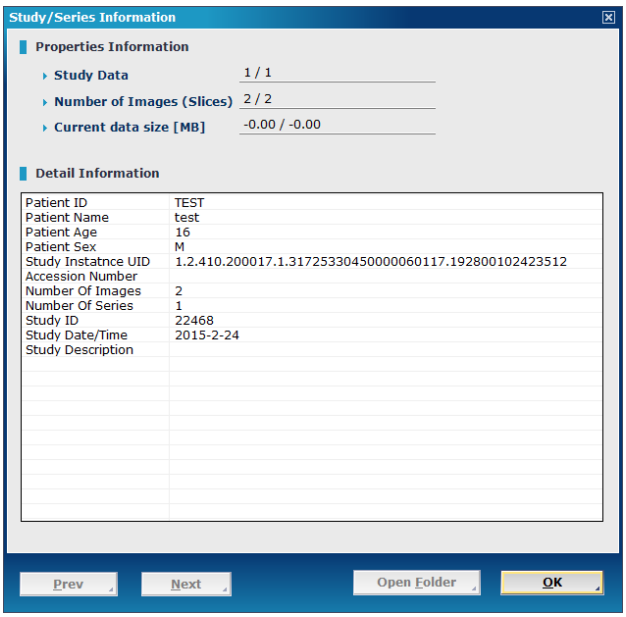
By clicking left button on the list user can use context menu.

- Delete from DB: delete selected study or series from the DB.
- Save to: Save images to the destination

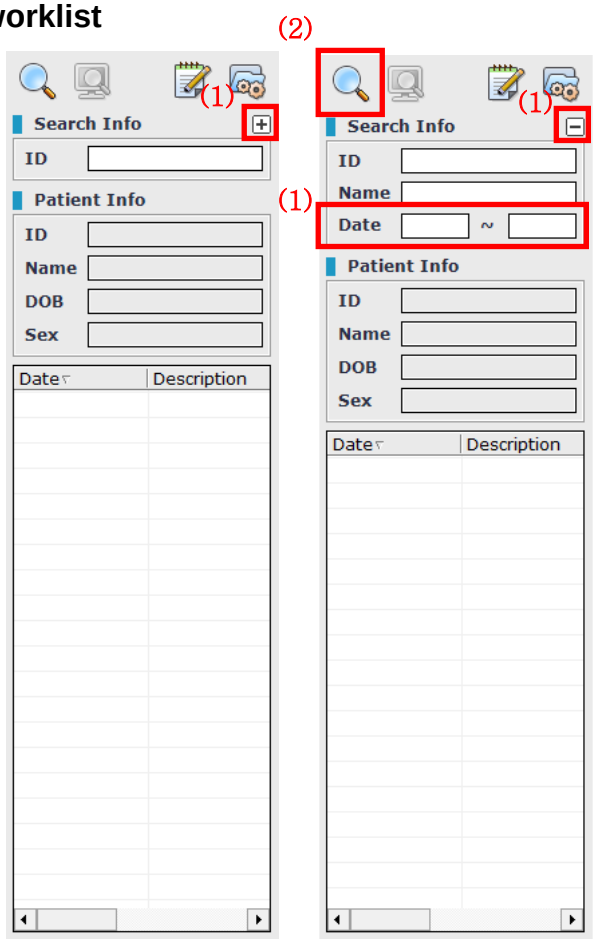


  - File downloading progress pops up
    - Acquiring images from the G3 DB when using G3 server.
    - ‘Save to’ action will be aborted and pressing ‘Cancel’ button.
    - Acquired images are saved in the local disk and maintained before program is terminated in order not to download already acquired images from the server.

- View: Open selected series
- Properties: Shows properties about the study or series.



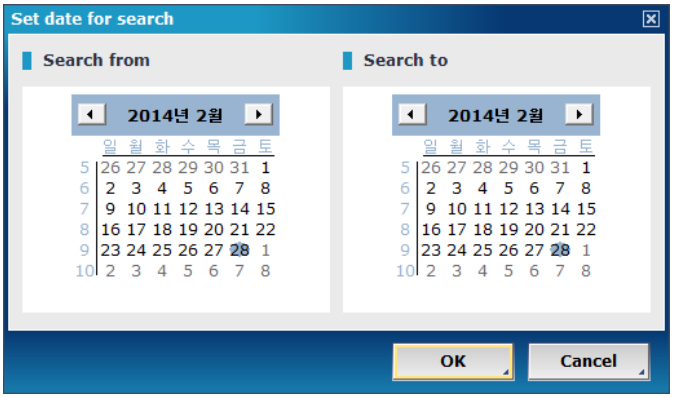
2. Patient worklist



(1) **Search Information**

Place where users can fill information including patient ID, name, and range of the acquisition date. Users can fold it away by clicking the “-” button and unfold it by clicking “+” button.

When users click the date section, date range selecting window pops up, and users can input the searching date range.

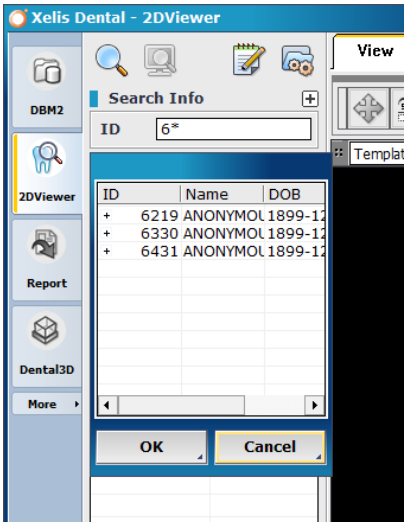


(2) **Search**

By clicking the button below, user search images of the patient based on the “Search Information”.

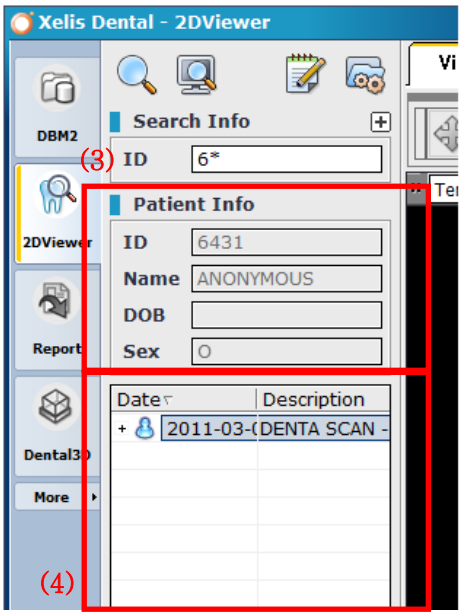
Function for Search data of patient.

Multiple patients can be found as a result. Patient ID or name can be redundant, but not both, In this case users can choose a patient, using patient selecting window. (Only patients, who have relating studies, can be searched when using G3 DB.)



(3) **Patient Information**

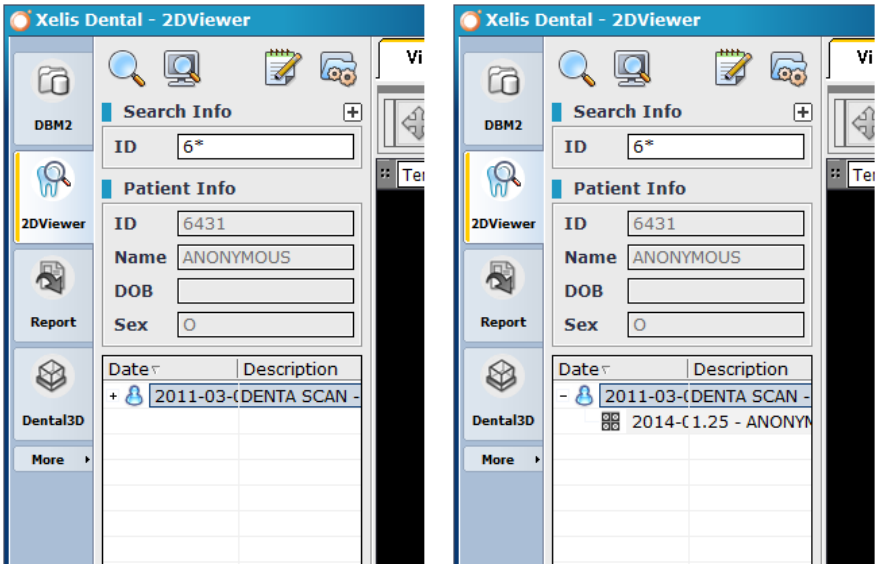
Information about the searched patient is filled. When user searched different patient, Patient Info section is filled with the new patient and all the images related with the previous patient is closed.



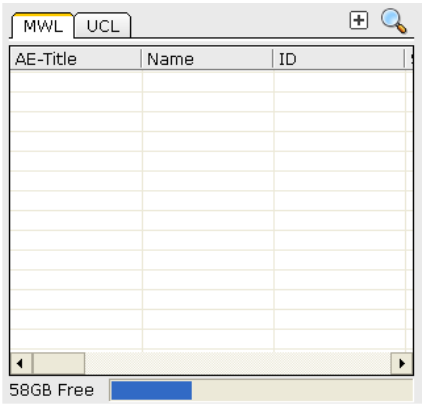
(4) **Study/Series List**

Place where the study lists of the current patient are located. By clicking the “+” button in front of the study or double-clicking it will show the related series.

(5) **Study/Series List**

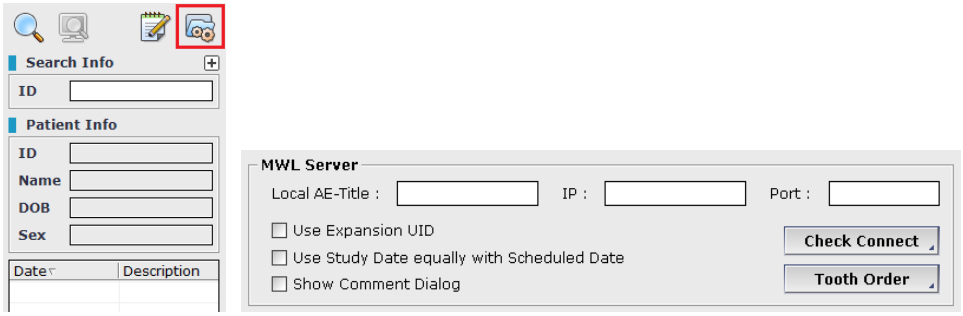


3. Modality worklist



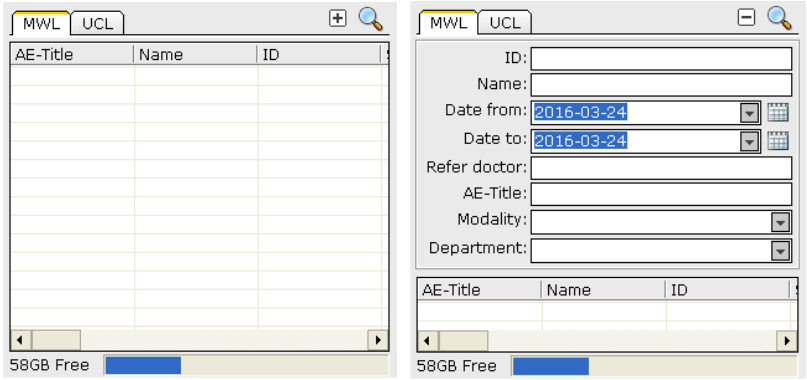
(1) MWL Server

Fill the server information where the users want to obtain orders in the configuration (Worklist tab). When users attempt to search without the server information, configuration window pops up automatically.



(2) Search Condition

Place where users can fill information to search orders. It can be folded away by clicking the “+” button and unfold it by clicking the “-” button. (Use current date as default for the ‘Date from’ and ‘Date to’.)



(3) **Search**

User can search orders by clicking the search buttons.

Function for Search data of orders.

User can search orders by clicking the search buttons. When result of the search operation is not singular, users can choose one of them.

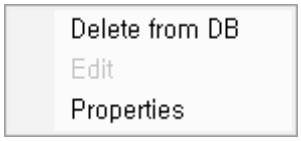
(4) **Order List**

Place where the searched orders are located.

User can see AE-title, name, ID, Sex, and Date of birth.

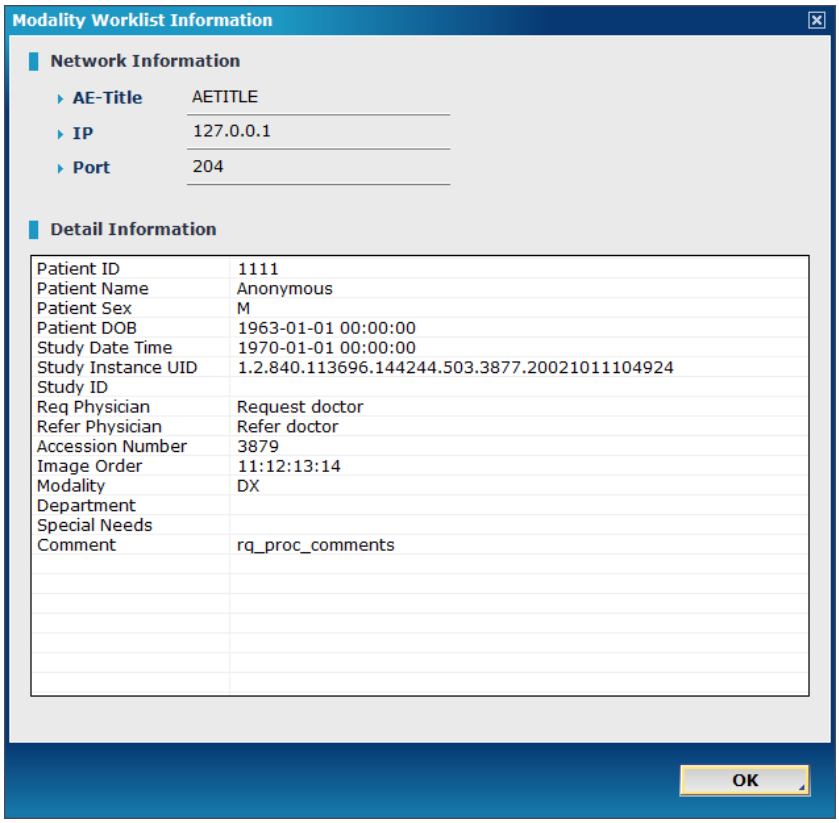
(5) **Context menu**

By clicking left button on the list user can use context menu

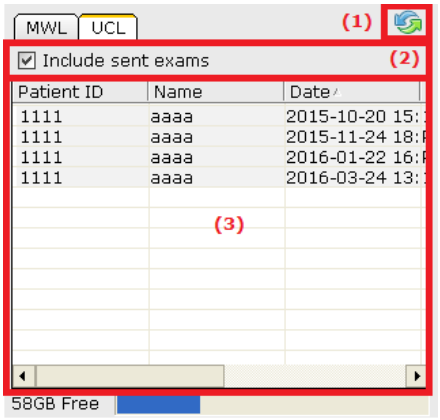


Delete from DB: Delete the uncompleted capture.

Properties: show properties of the uncompleted capture.



4. Uncompleted capture list



(1) **Refresh**

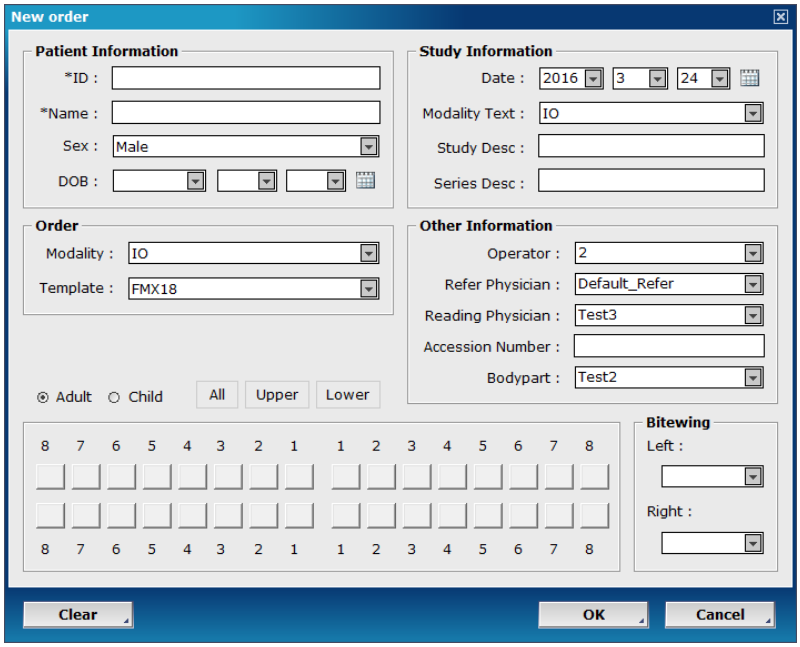
Click the refresh button to refresh the Uncompleted Capture List.

(2) **Filter**

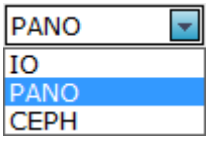
If check this option, include the sent exams in the list.

(3) **Make new list**

By clicking the “new order” button or acquisition tab without any selected orders, dialog creating a new order pops up, and after creating an order, acquisition starts. (Cannot create a new patient when using G3 DB) Users should fill the patient information, study information and other information. Patient ID, name and modality are mandatory.

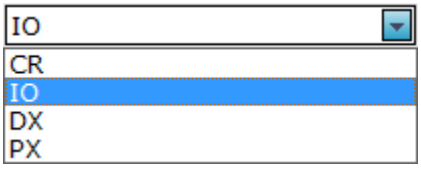
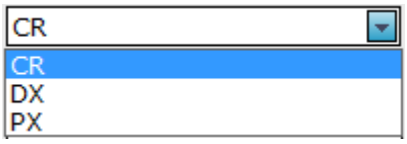


In “Other Information” section, operator’s name, refer doctor’s name, reading doctor’s name and bodypart are possible to be typed in. After creating an order, typed name is saved in the list and users can choose the name in the list. Number of names to be saved is limited to 5.

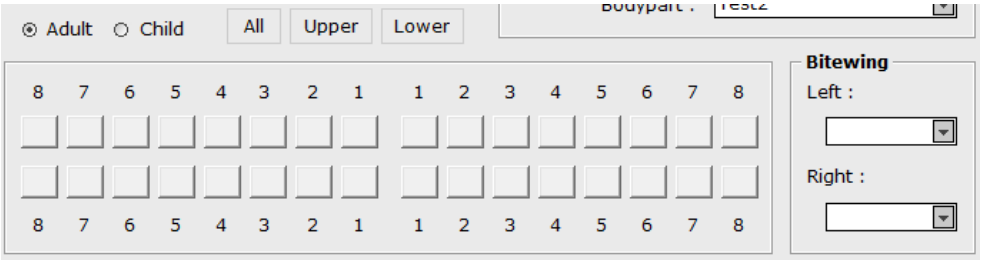


Modality of the order.

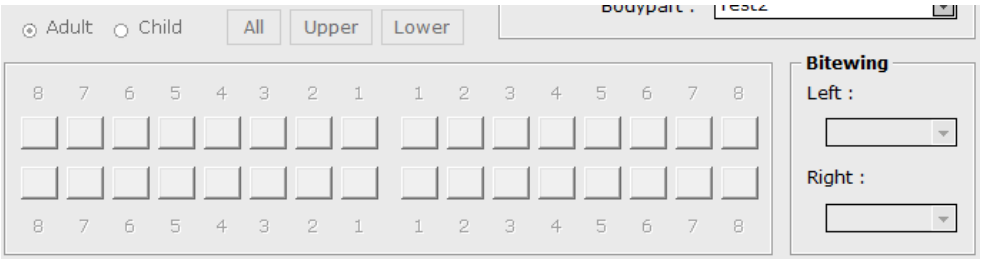
“Modality Text” in the study information changes as modality changes.

	
IO	Pane/Ceph

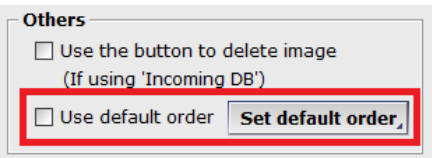
When modality is IO, template selection menu is enabled and users should click and select the image orders.



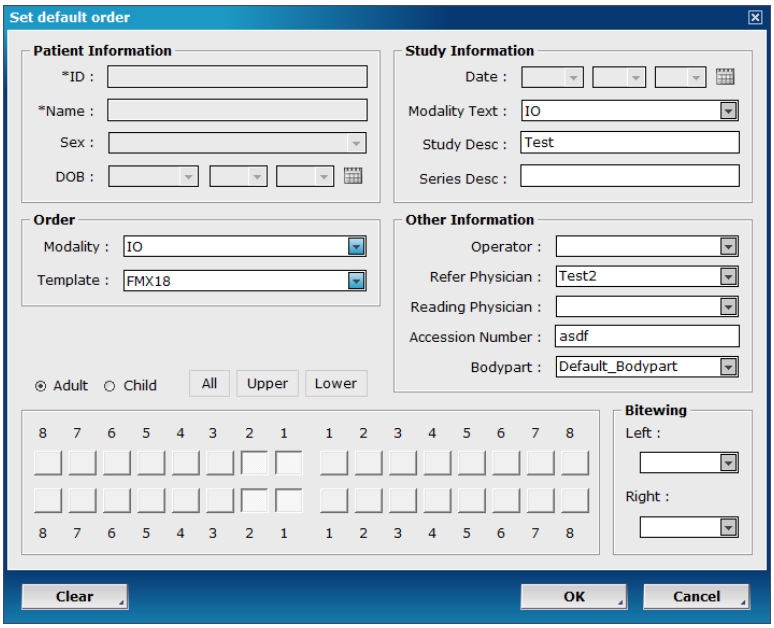
When modality is non-IO, template selection menu is disabled.

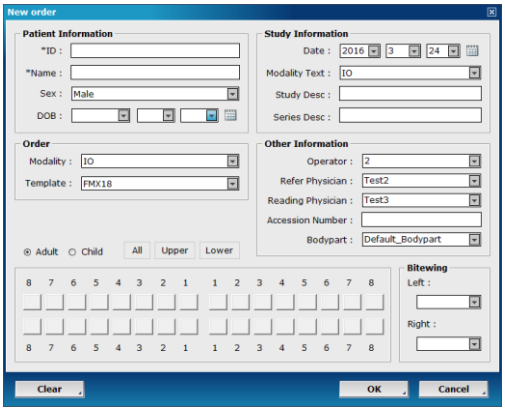
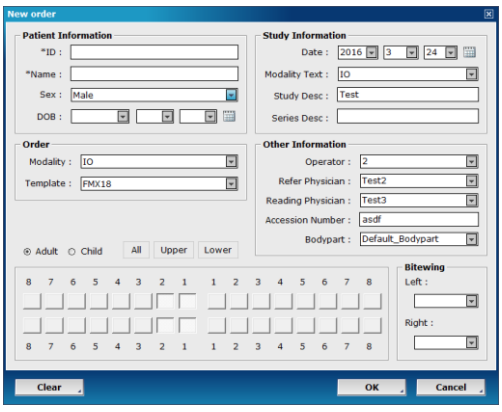


▪ Use default order



Pre-set the most frequently used information. Exclude patient information and study date, all information can be input. When creating a new order, the informations entered in the default order are first used.



	
Unused	Used

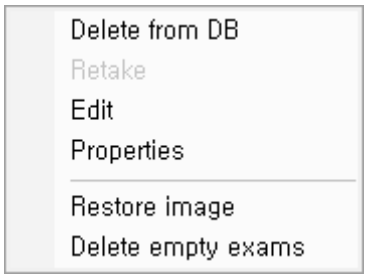
(4) **Worklist**

Place where Uncompleted Capture List is located.

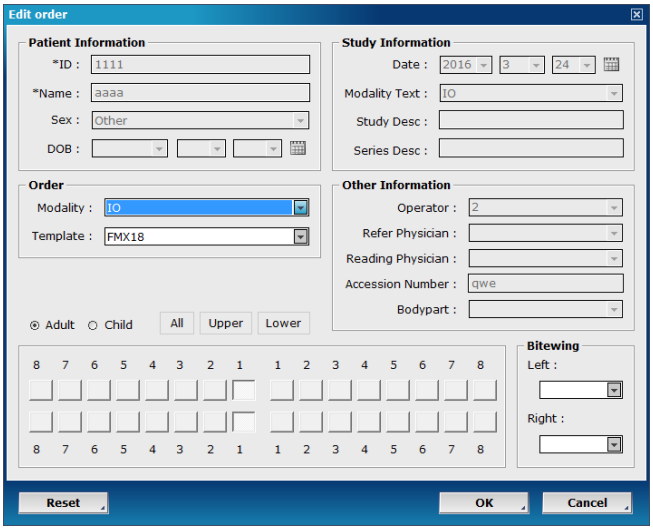
Users can see patient ID, name, Date, image order, accession number, and status.

(5) **Context menu**

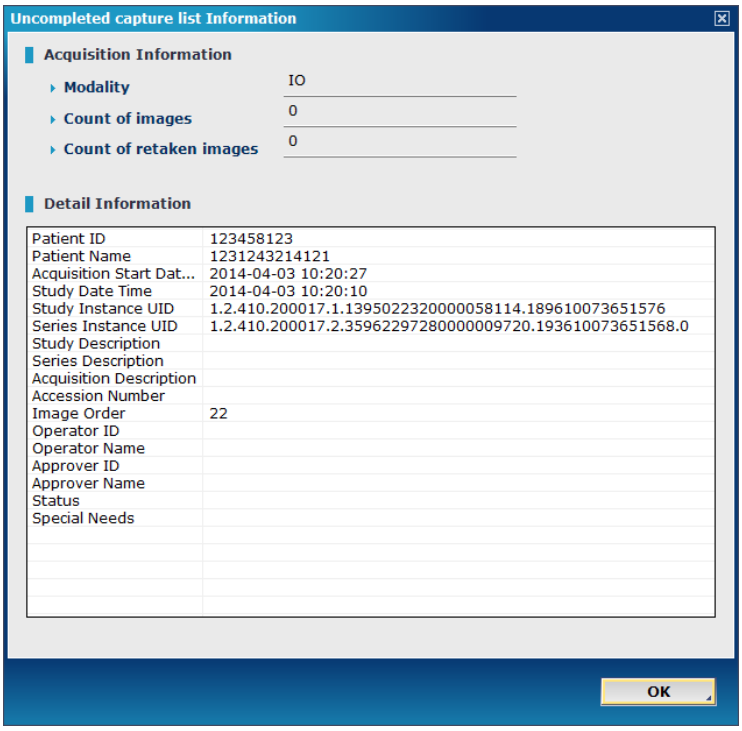
By clicking left button on the list user can use context menu



- Delete from DB: Delete the uncompleted capture item.
- Retake: To be defined.
- Edit(Reset): Edit the uncompleted capture item.



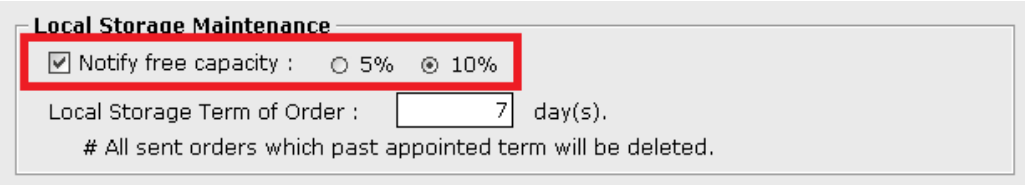
- Properties: show properties of the uncompleted capture item.



- Restore image: Load XAI file for restoring image. If uncompleted capture item related loaded image does not exist, One will be created.
- Delete empty exams: Delete uncompleted capture items which have no image.

5. Capacity of local storage

It shows the remaining capacity of the local storage ‘Xelis Dental’ is installed. If the capacity is insufficient, message pops up. At worklist tab in configuration, you can change options.

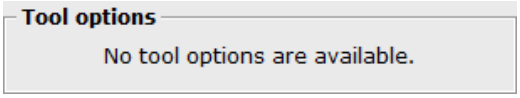


Chapter 3-4. View mode

1. Main Screen

(1) **Toolbar**

Each tool is grouped into three sections. One is “Image Viewing Tools”, another group is “Image Analysis Tools”, and the other group is “ETC Tools” Tool option can change the characteristics of the selected tool, and it is displayed on the right-end corner for the Toolbar. Tool option is changed depending on the selected tool.



Screen shot image of the tool option in case of choosing a tool with no tool option.

(2) **Screen**

Place where the images of the loaded series are displayed. There are two display modes, one is “Template mode” and the other is “Exam mode”.

(3) **Fine Tuning**

Users can see the histogram data of the selected image. Also user can adjust windowing values by drag & drop of the windowing bar.

INFO.	Refer to ‘Chapter 3-4: 4. Fine tuning’ for detailed instructions on using the Fine tune.

(4) **Status bar**

Users can check progress of image loading.

2. Tools

(1) Image Viewing Tools

This group applies various image processing technics to the image. Group can be folded away by clicking the arrow button on the left.

▪ Panning

Tool for panning images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to move the image as needed. A button for panning tool has no tool options.

▪ Rotating

Tool for rotating images. Clicking the tool to rotate selected image through 90 degrees in a clockwise direction. A button for rotating tool has no tool options.

▪ Reverse

Tool for panning images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to move the image as needed. A button for reverse tool has no tool options.

▪ Flip

Tool for panning images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to move the image as needed. A button for flip tool has no tool options.

▪ Zooming

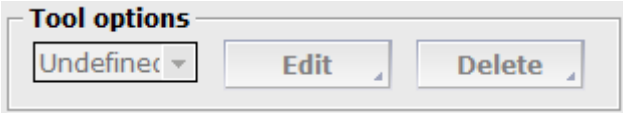
Tool for zooming in and out on images. After selecting the tool, click and hold the left mouse button and drag the mouse to zoom in and out on images. Also, click the left mouse button when it start, and click the right mouse button or use the ‘ESC’ key when it finish. A button for zooming tool has no tool options.

▪ Windowing

Tool for managing image Width/Level. After selecting the tool, click and hold the left mouse button, and then drag the mouse left and right to control Width and up and down to control Level.

- Left/Right : Adjust Windowing Level
- Up/Down : Adjust Windowing Width

A button for selecting Windowing presets is located on the Tool Options screen. Previously configured Windowing values can be applied to images by selecting presets from the dialog window. The Tool Options and Windowing Preset dialog screen are shown below.



INFO.	Refer to ‘Chapter 3-13:Windowing Preset’ for detailed instructions on using the tools.

▪ Invert

Tool for inverting image display. When the button is clicked the image is inverted. Pressing the button again returns image to original state. A button for invert tool has no tool options.

▪ Sharpen

Tool for apply sharpen filter on images. Sharpen filter is applied on the image when the button is clicked. Pressing the button again returns image to original state.

INFO.	Refer to ‘Chapter 3-12: Sharpening’ for detailed instructions on using the tools.

▪ Text Overlay

Tool for text overlay display. When the tool is selected, text information is displayed on images. A button for text overlay tool has no tool options.

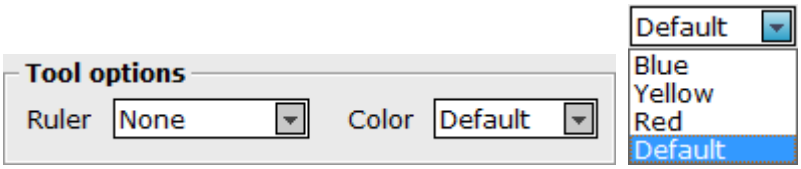
(2) **Image Analysis Tools**

This group applies various annotations on the image. Group can be folded away by clicking the arrow button on the left.

▪ Ruler

The distance between 2 selected points is measured in [mm]. After selecting the tool, select 1 point on the image, then select another point and the distance is automatically calculated and displayed. The line between the 2 points can then be moved by clicking on the line and dragging the mouse.

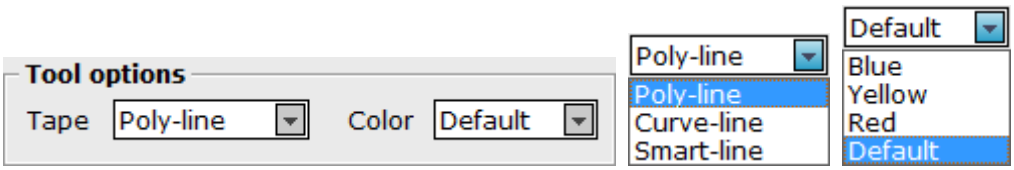
This tool can change color.



▪ Tapeline

The distance of straight or curved lines is measured in [mm]. After selecting the tool, select several points in order on the image and then double click or right click to complete the line.

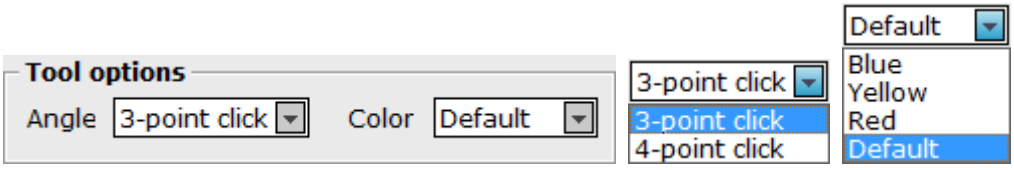
When the Tapeline tool is selected, Line Type or Curve Type lines can be selected from the Tool Options screen. (This tool can change color)



▪ Angle

Tool for measuring the degree of angles between 2 lines. After selecting the tool, draw an angle by selecting 3 points on the image and click to measure the angle.

When the Angle tool is selected, the type of angle measurement can be selected from the Tool Options screen. Select 3-Point Click or 4-Point click from the list as shown in the image above. (This tool can change color)



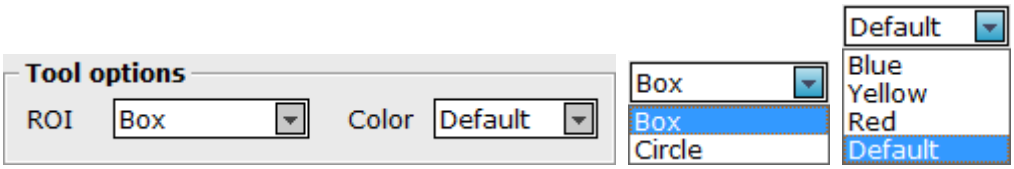
▪ Profile

The pixel value of a line drawn on a 2D mage is shown above the line. Use the mouse on the graph to move the points on each end of the line.

▪ ROI (Region of Interest) Information

The pixel average value, high value, low value and standard deviation information can be measured on ROI images.

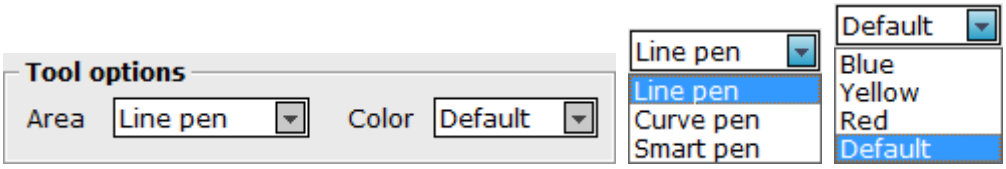
Box and Circle type ROI can be selected in Tool Options. (This tool can change color)



▪ Area

Tool for measuring the area of ROI drawn on images. After selecting the tool, click on a point then move the mouse to other points to draw the ROI.

The line type can be selected from ‘Tool Options’. (This tool can change color)



▪ Notes

Notes can be written at a selected location on 2D images.

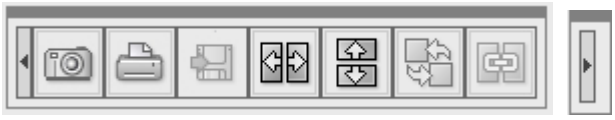
▪ Arrow

Areas of images can be emphasized easily using the Arrow tool.

▪ Delete

Delete all the existing annotations.

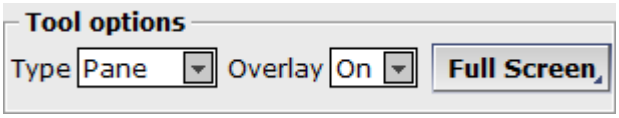
(3) **Etc.**

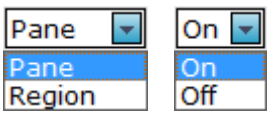


▪ Capture

Tool for capturing entire screens (Pane) or specific region of the image.

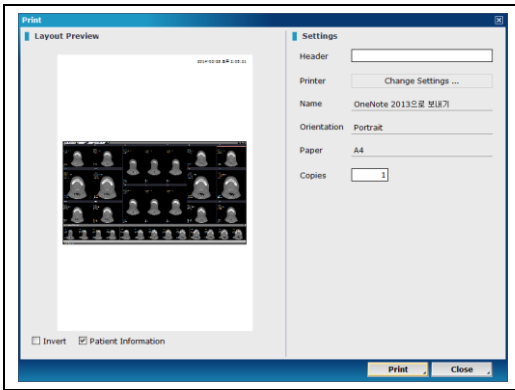
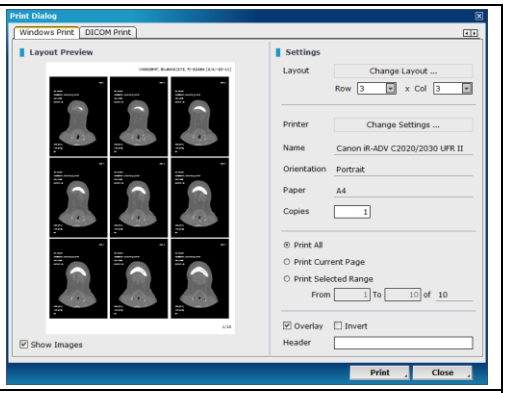
When overlay capture type is pane, entire image on the slide is captured and when type is region user have to drag & drop to specify the region. When Overlay option is on captured image includes text on the image and when it's off only image is captured. Finally when users select "full screen" button, the whole screen image is captured. Users can check their captured images on the "Report" module.





▪ Print

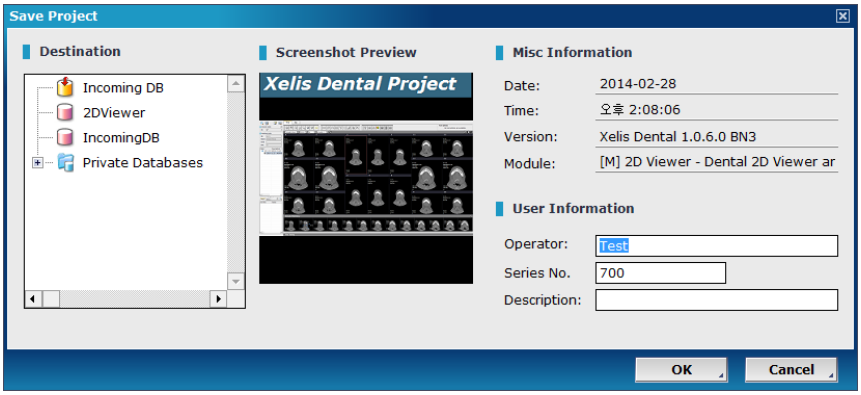
Function for printing images.

	
In template mode	In exam mode

▪ Save Project

Save Project is a function to save the current state of program

Function for Project save.



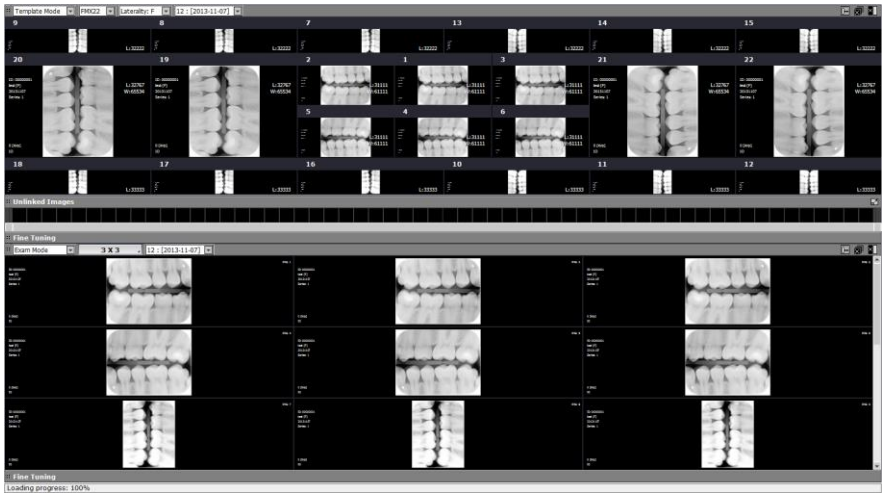
▪ Vertical Split

Vertical separation screen. User can compare different series by using the different type of layout.

INFO.	Refer to ‘Chapter 3-6: ‘Split screen’ for detailed instructions on using the ‘Vertical Split’.

▪ Horizontal Split

Horizontal separation screen. User can compare different series by using the different type of layout.



INFO.	Refer to ‘Chapter 3-6: ‘Split screen’ for detailed instructions on using the ‘Horizontal Split’.

▪ Switch position

In the split mode, each exam can be changed the display position.

▪ Sync

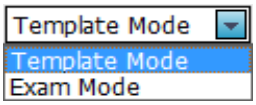
In the split mode, user can synchronize with the different studies at the same time.

INFO.	Refer to ‘Chapter 3-7: ‘Synchronization’ for detailed instructions on using the ‘Sync.

3. Viewer Screen

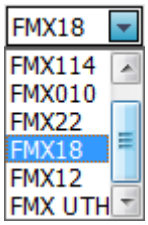
(1) Title bar

▪ Display mode



User can choose display mode of the screen. One is template mode, and the other is exam mode.

▪ Template type



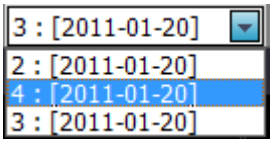
In case of the template mode, user should select the type of the template.

INFO.	Refer to ‘Chapter 3-14: ‘Template Import/Export’ for detailed instructions on using the ‘Sync.

▪ Laterality

In case of the template mode, user can choose the laterality of the template.

▪ Series



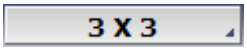
In case of multiple series loading, user can select series to examine. This section contains series number and acquisition date.

▪ Tooth positioning 

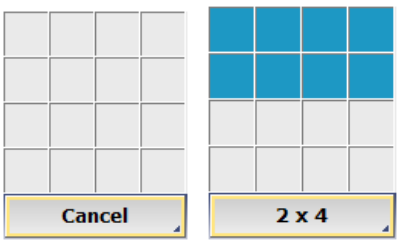
In case of template mode user can change the information about the image such as image position, windowing, and rotation angle by activating tooth positioning option. Image position can be changed by drag and drop to the desired slide position. This option is available only when the user has the administration authority. (If you are using a G3 DB only it is kept open while the changes are not saved in the series DB.)

<Non-administrator>

<Administrator>

▪ Light box split 

In exam mode, users can choose number of rows and columns of the screen. By clicking the 'light box split' button, a 4x4 table shows up, and by clicking it, current screen is divided.



▪ Sharpening configuration 

Choose filter type and depth of the sharpening filter.

INFO.	Refer to 'Chapter 3-12: 'Sharpening' for detailed instructions on using the 'Sharpening configuration'.

▪ Closing the split. 

Close the split window by clicking the button.

▪ Closing the series. 

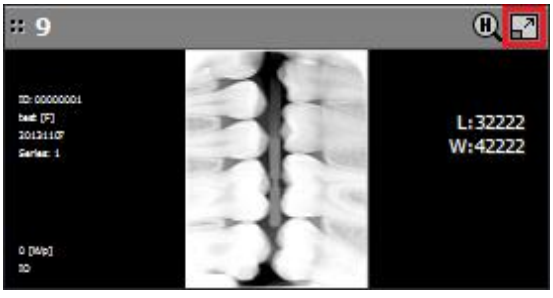
Close current displaying series by clicking the button.

(2) **Template Mode**

Template mode can display the selected series with standard FMX templates or user-defined template. Without server information FMX 12, FMX 18, FMX 22 are provided, and with server information FMX UTH, FMX 010, FMX 014, FMX 114 are additionally provide including the templates on the server.

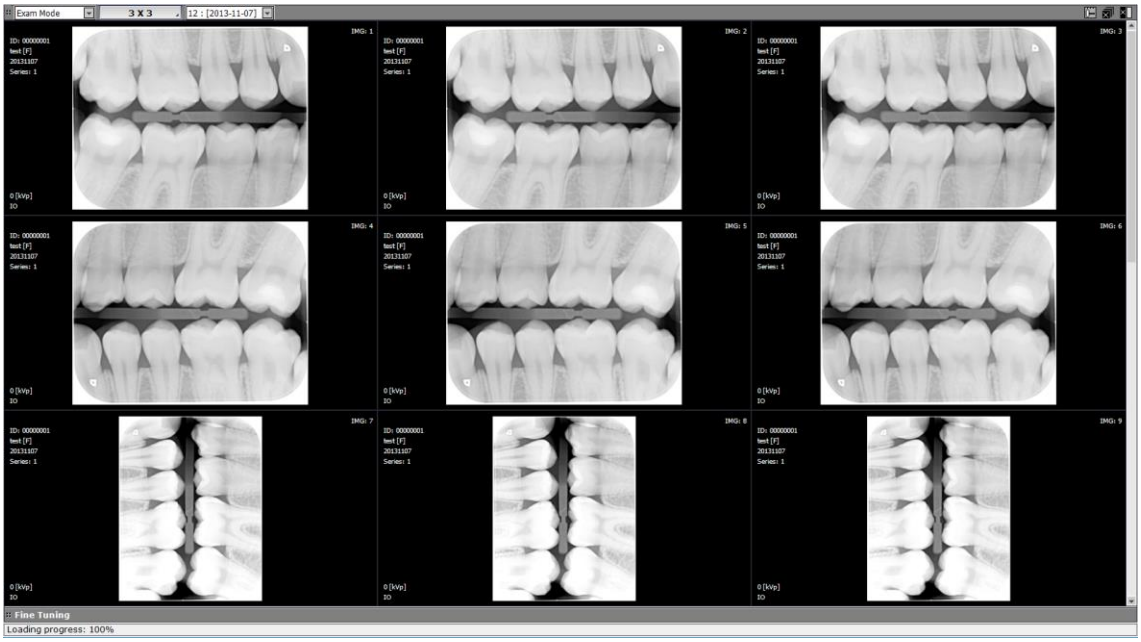
▪ Maximizing and restoring the image. 

Maximize and restore the selected image by clicking the button



(3) Exam Mode

Exam mode can display the selected series through the light box which is the divided screen. User can scroll the images with mouse wheel or arrow buttons on the keyboard, or ‘page up’ & ‘page down’ buttons.

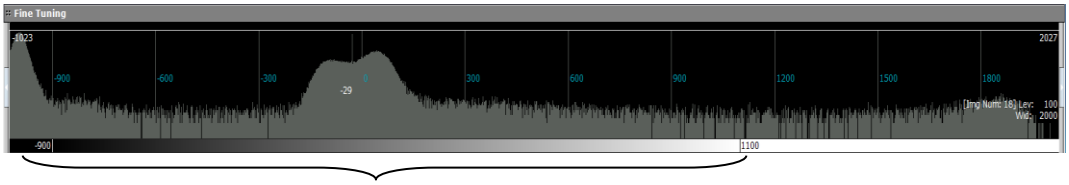


4. Fine Tuning

The Fine Tuning screen provides a function for controlling the windowing value of the selected image. Histogram graph of the selected image is displayed on the top and windowing bar is located below.

The Windowing values for the images currently being viewed are displayed and the user can adjust these values in the Windowing Bar. The lines representing the border values at each side of the bar can be clicked and dragged to change Windowing values.

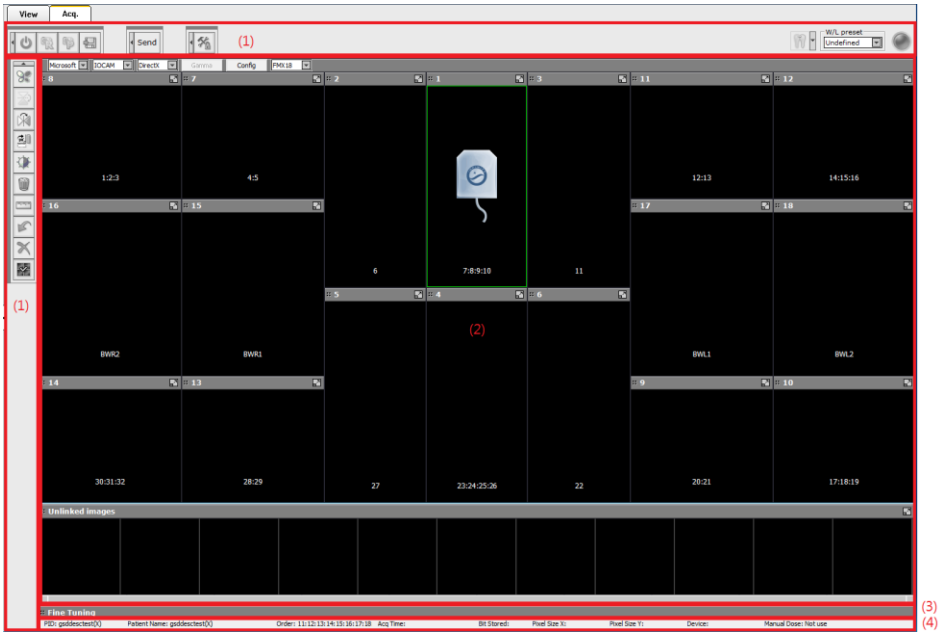
Fine Tuning is minimized at the bottom of the module. Click on Fine Tuning to bring up the Fine Tuning window as shown below. Click on Fine Tuning again to minimize the window.



Windowing range

Chapter 3-5. Acquisition mode

1. Main Screen



(1) Tools

Each tool is grouped into two sections. One is “Image Acquiring Tools”, another group is “Image Viewing Tools”.

(2) Screen

Acquired images are displayed with acquisition device selecting UI, template selecting UI, gamma configuration, and sharpening configuration is displayed. Users can check the device status by colors of the lamp on the left.

(3) Fine Tuning

Users can see the histogram data of the selected image. Also user can adjust windowing values by drag & drop of the windowing bar.

INFO.	Refer to ‘Chapter 3-4: 4. Fine tuning’ for detailed instructions on using the Fine tune.

(4) Status bar

Users can check patient info or image info.

2. Tools

(1) Image Acquiring Tools

▪ Device on/off

Tool for powering on/off the device. When the button is clicked the device is turned on. Pressing the button again turns the device off.

▪ Ready

Tool for changing state of the device to ready.
The sensor has ready state by default and the lamp indicating the sensor's state will be changed to green color.

▪ Pause

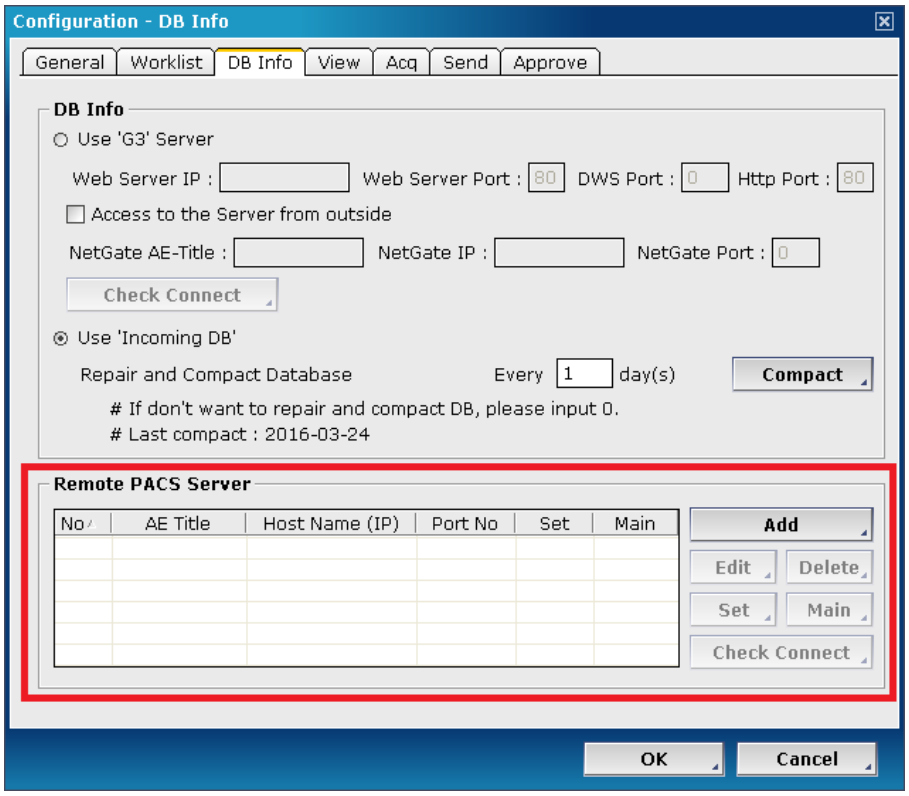
Tool for changing state of the device to pause.
The lamp indicating the sensor's state will be changed to red color.

▪ Save

Tool for saving current changes of the acquired images. When the button is clicked the image is inverted. Pressing the button again returns image to original state

▪ Send

Tool for converting acquired images to DICOM files and sending DICOM files to PACS server. When the button is clicked the image is sent to PACS server set by user in the configuration (DB info).



INFO.	Refer to ‘Chapter 3-15: (3) DB Info’ for detailed instructions on using the Remote PACS Server.

▪ Lock

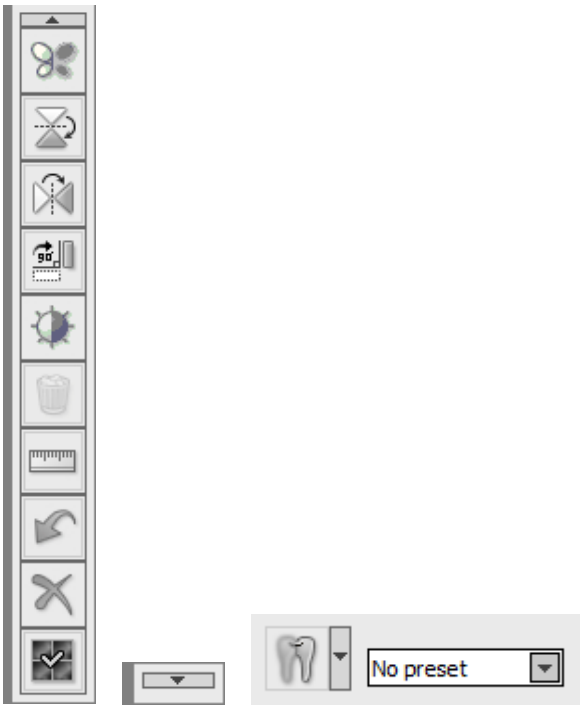
Lock button enables disabled buttons. This button is only shown when 2DViewer is executed by the external order by student authority.

▪ Lamp

The lamp displays current state of the intra-oral device. When power is turned off, its color is changed to gray and when it’s ready, changed to green, and when it’s pause, changed to red.

Color of lamp, red and green, can be changed each other in the Acq tab of configuration.

(2) **Image Viewing Tools**



▪ Invert

Tool for inverting image display. When the button is clicked the image is inverted. Pressing the button again returns image to original state

▪ Flip

Tool for panning images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to move the image as needed.

▪ Reverse

Tool for panning images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to move the image as needed.

▪ Rotating

Tool for rotating images. Clicking the tool to rotate selected image through 90 degrees in a clockwise direction.

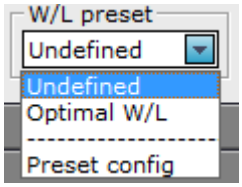
▪ Windowing

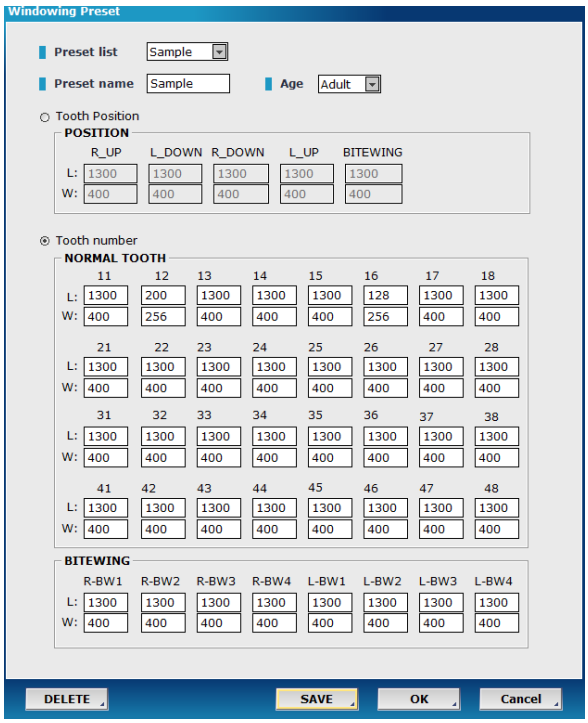
Tool for managing image Width/Level. After selecting the tool, click and hold the left mouse button, and then drag the mouse left and right to control Width and up and down to control Level.

- Left/Right : Adjust Windowing Level
- Up/Down : Adjust Windowing Width

When acquiring images windowing is applied to the images by the preset options.

- Undefined: After acquiring an image, apply windowing with default windowing values. (defined by the bits of the acquired image)
- Optimal W/L: After acquiring an image, apply windowing with optimal windowing values of the image.
- Preset: Apply windowing with specific values by the dental code.
- Preset config: Create a new preset or edit existing one.





▪ Delete

Tool for delete acquired images. When the button is clicked the images are deleted.

▪ Ruler

The distance between 2 selected points is measured in [mm]. After selecting the tool, select 1 point on the image, then select another point and the distance is automatically calculated and displayed. The line between the 2 points can then be moved by clicking on the line and dragging the mouse.

▪ Reset

Reset windowing, panning, zooming

▪ Delete All

Delete all the existing annotations.

▪ Select All

Synchronizing actions of the all image modifying tools except windowing to all slides except images on the “Unlinked images”.

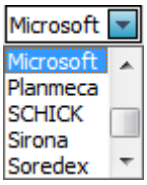
▪ Sharpen

Tool for sharpening acquired images. When the button is clicked the images are sharpened. Pressing the button again returns image to original state. By clicking the arrow button on the left, sharpen configuration window pops up. Details about the sharpening set-ups are in chapter 12.

3. Acquisition Screen

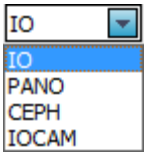
(1) Title bar

▪ Company



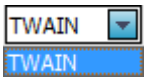
Select company name.

▪ Modality



Select modality of the order which is provided by the selected company.

▪ Device

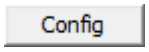


Select device name.

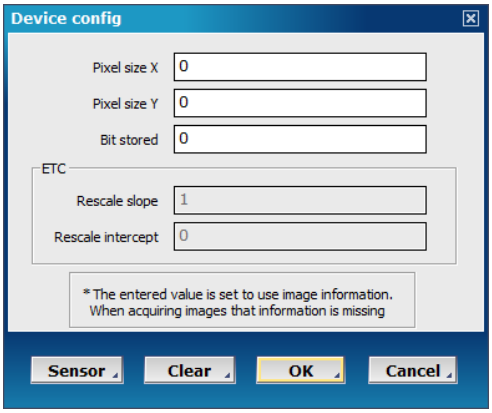
▪ Gamma 

Change the gamma value of the focused image by clicking the button. This function changes the raw data, so changing this value is not recommended

INFO.	Refer to ‘Chapter 3-11: ‘Gamma’ for detailed instructions on using the ‘Gamma’.

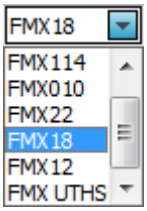
▪ Device configuration 

Adding DICOM tag from the device configuration, this is not provided by the device currently using. By clicking the ‘Config’ button, Device configuration button pops up and users can fill in the information.



Press ‘Sensor’ button for device specific configurations. Configuration windows will pop up to modify the detailed set-up values.

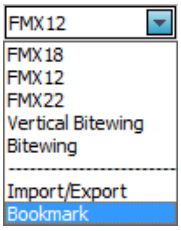
▪ Template



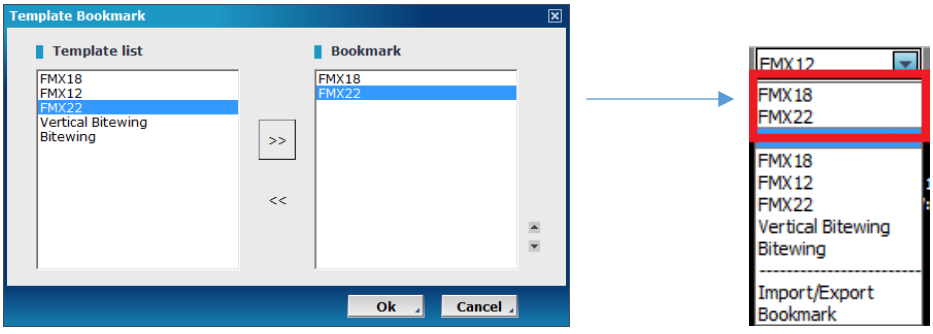
Select template to use. It is disabled, when modality is not IO.

INFO.	Refer to ‘Chapter 3-14: ‘Template Import/Export’ for detailed instructions on using the ‘Sync.

▪ Bookmark

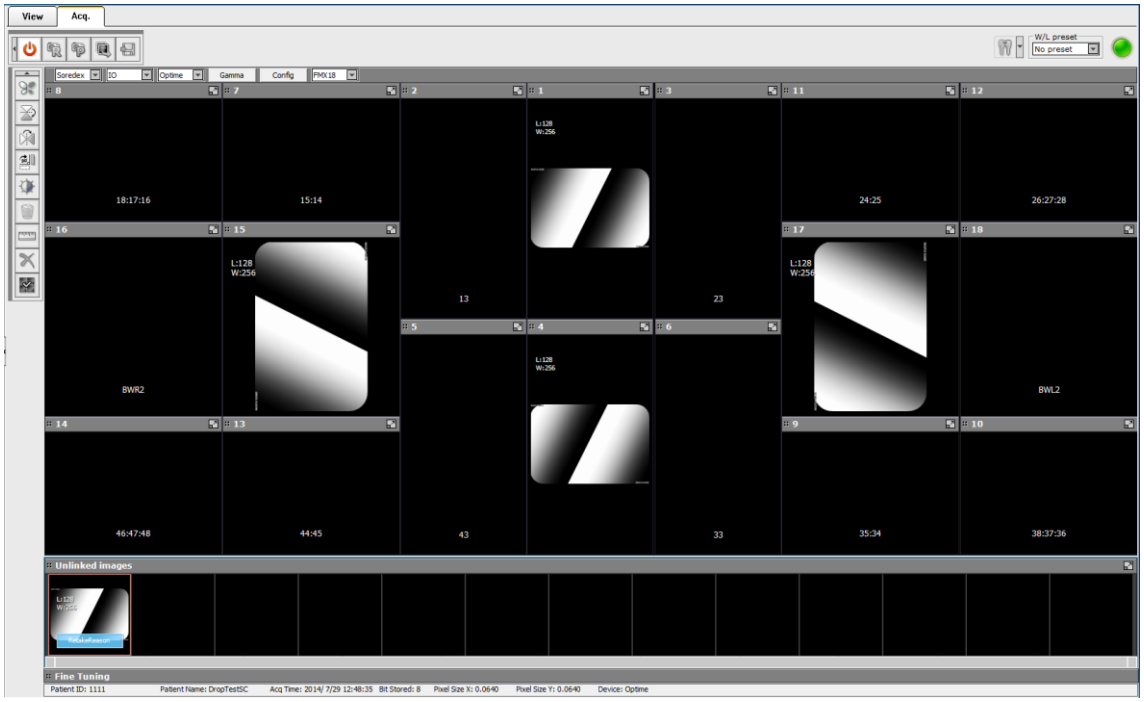


Place the template that used frequently to the top of the list.

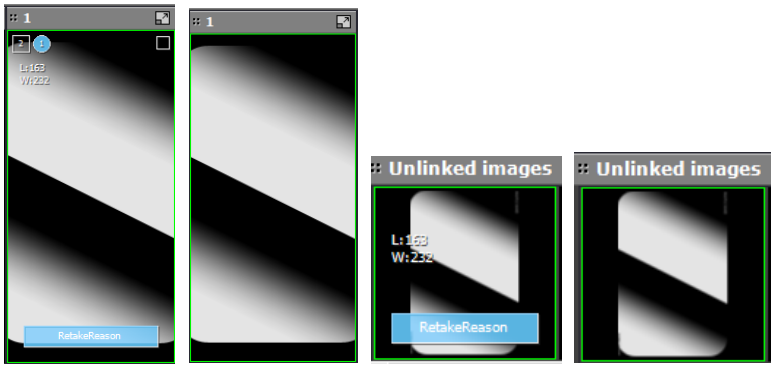


(2) **Screen**

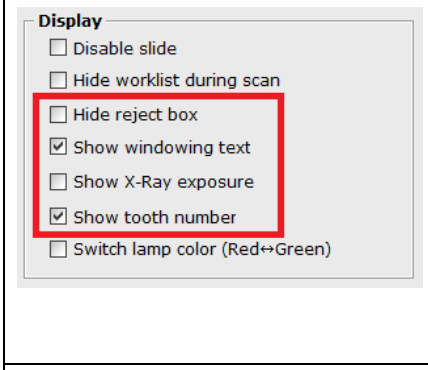
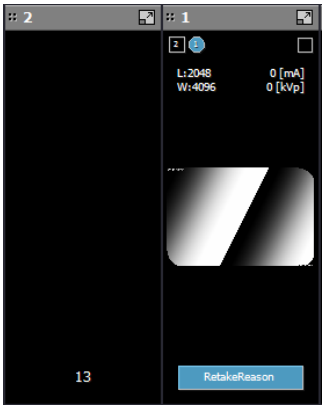
There are two sections on the screen. One is template section which contains template slides and the other is unlinked images section which contains images which is not included in the template. Images in the template slide are provided dental code, but images in the unlinked image aren't.



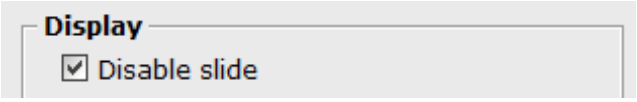
Each slide contains overlays indicating windowing texts, tooth numbers, piled image numbers, retake reason, and indication check box for the slide which needs to be retaken. These overlays can be visualized or hidden by pressing the 'Enter' button.

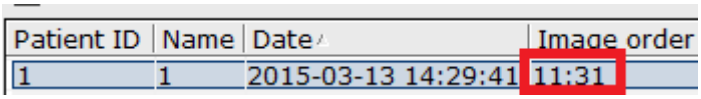


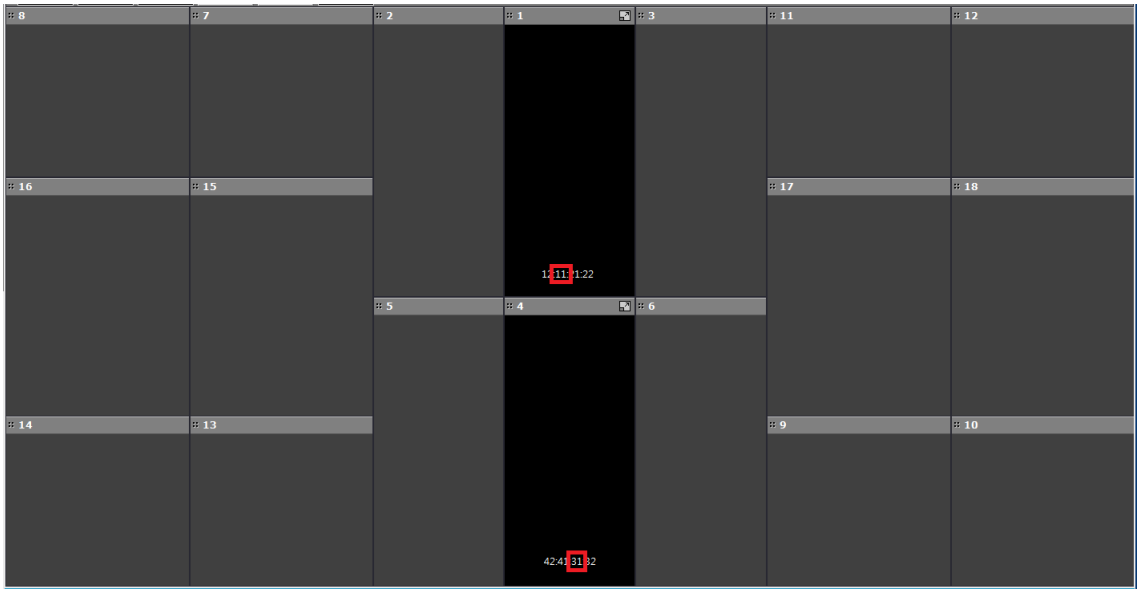
Overlays can be show or hide depanding on optios options in the 'Display' section of 'Acq tab' of configuration.

		
Options	Show all overlays	Hide all overlays

Slide can be disabled according to the order.







Chapter 3-6. Split Screen

Users can split the screen to examine a series with different layout, or multiple series simultaneously. Screen can be split in vertical or horizontal direction. Rules for loading series is differed when split status changes. This rule is summarized in the table below.

Horizontal split: 

Vertical split: 

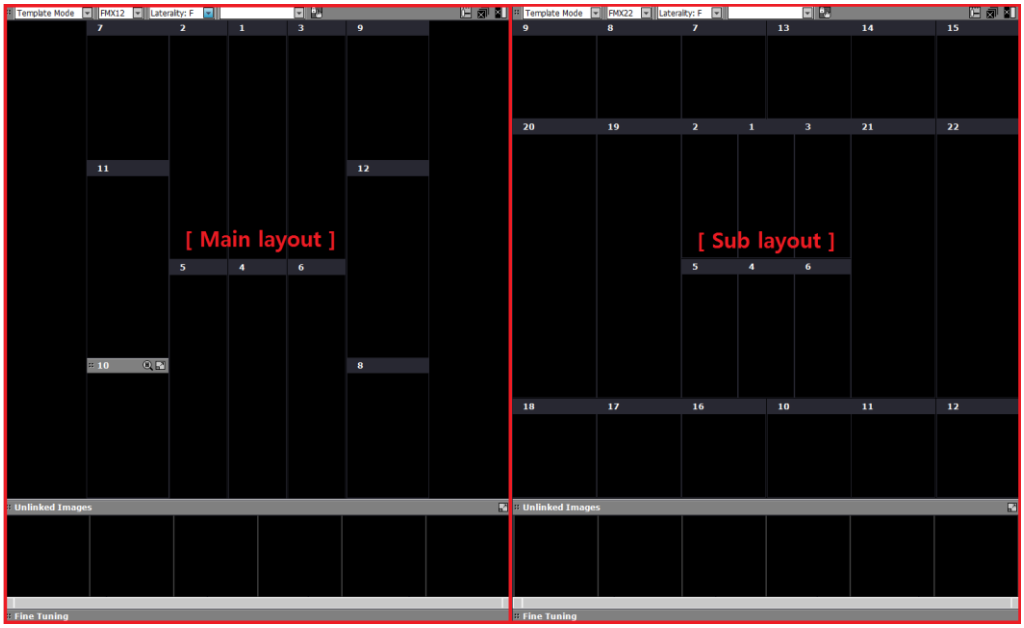


Table 1. Series loading rules with split status.

	Non Split	Same Display	Differ Display
One Series No.1	Main	Both	Both
One Series No.2	Main	Sub	Both
One Series No.3	Main	Sub	Both
Multi Series (Series No.4,5)	Both (Series No.4, Split)	Each (Series No.4/5)	Both (Series No.4)

Chapter 3-7. Synchronization

Users can synchronize the scroll event when both split screens are exam mode. Users can change the scroll option in the ‘View’ tab of configuration.

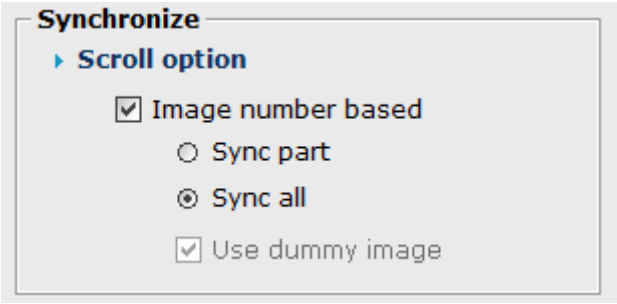
Sync off: 

Sync on: 

Sync part: Scroll event is synchronized when scroll bar of the focused screen is within the range of the other screen.

Sync all: Scroll event is synchronized at all position.

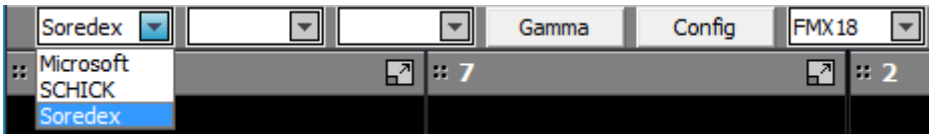
Use dummy image: To be defined.



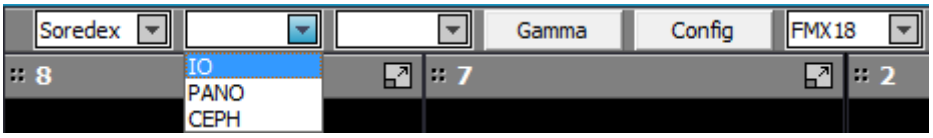
Chapter 3-8. Device

Users should choose company, modality, and device name before acquiring images. After selecting a device, users should click the ‘on/off’ button and when it’s ready, users can start shooting. When users fail to turn on the device, lamp color changes to red, and “Ready”, “Pause” buttons are disabled. Then users should turn off the device and turn it on again.

< Company selection >



<Modality selection>

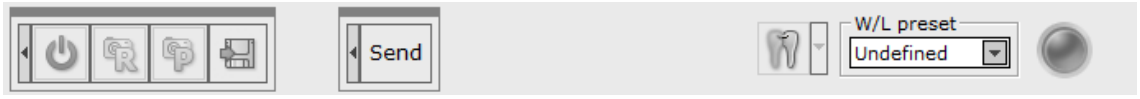


<Device selection - IO>

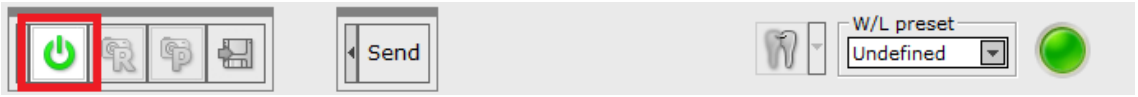
<Device selection - Others>

In case of the Kodak device users should shoot an image within certain amount of time, after the device is turned on to acquire qualitative image. Users can pause and ready the device in this case without turning off and on the device again. Pressing pause button makes the device in pause status and lamp changes to red. Pressing ready button makes the device in ready status and lamp changes to green.

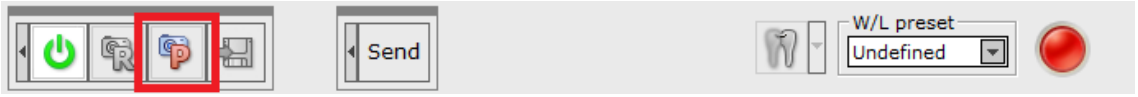
< Device off >



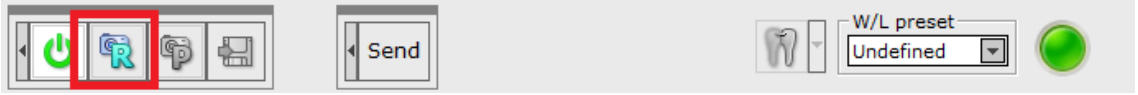
< Device on >



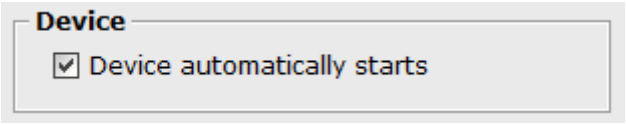
< Device pause >



< Device ready >



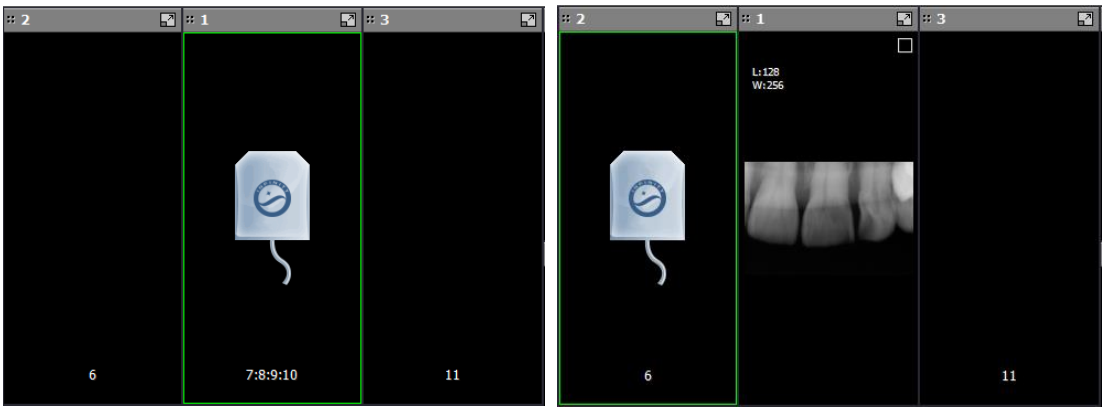
Automatically turning the device on when device automatically starts option in the ‘Acq’ tab of configuration is on.



Chapter 3-9. Image Acquiring

To acquire an image, click the slide to move the focus, which is indicated as green box, and shoot an image with the device. After shooting an image focus is moved to the next blanked slide automatically.

<Before acquisition> <After acquisition>



When user moves the focus to the slide which already has the image and shoot an image, result is differed by the 'Image piling option' in the configuration. When image piling is on, retake reason window pops up to fill in the information about the retake reason of the previous image, and new image covers the previous images and number buttons are created. Biggest number indicates the latest image and by clicking the number buttons, user can see the previously acquired images. When Image piling option is off, previously acquired image move down to unlinked image section.

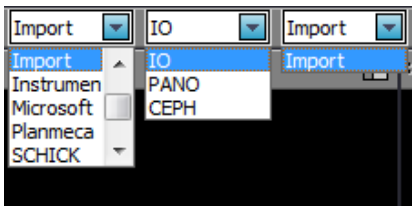
<Previous image> <Recent image>

Image position can be changed by drag and drop. By dragging the image and drop the image on

the designated slide will change the image position. Result of the drag and drop event is differed by the drag slide position and drop slide position. Rules are summarized below.

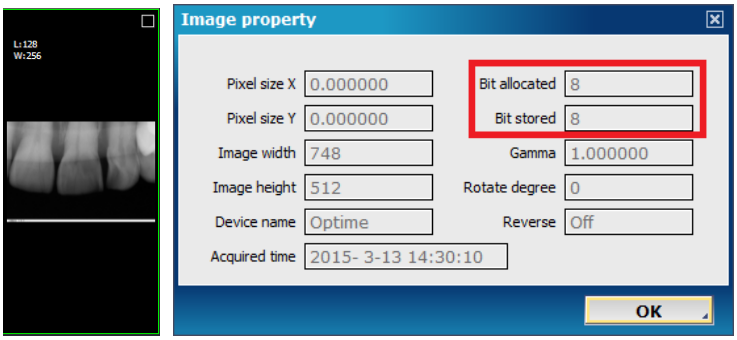
		No images at the drop slide	Images exist at the drop slide
Image Piling On	Slide to slide	Move to the slide.	Switch
	Slide to unlinked	Add the image to the last position	Add the image to the last position
	Unlinked to slide	Move to the slide.	Switch
Image Piling Off	Slide to slide	Move to the slide.	Switch
	Slide to unlinked	Add the image to the last position	Add the image to the last position
	Unlinked to slide	Move to the slide.	Pop up the retake reason window and add the image to the last position

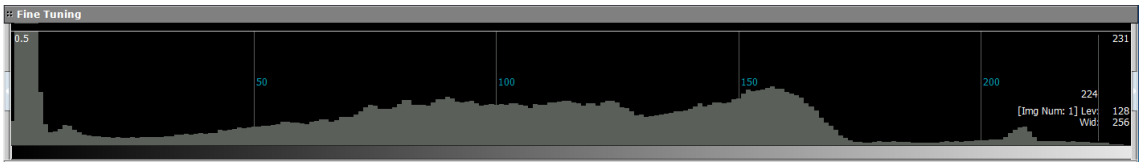
2DViewer supports external image files, by dragging the file and dropping it into the slide (bmp, jpg, riff, png). Even though external image files are not acquired by the device, users need to select the device.



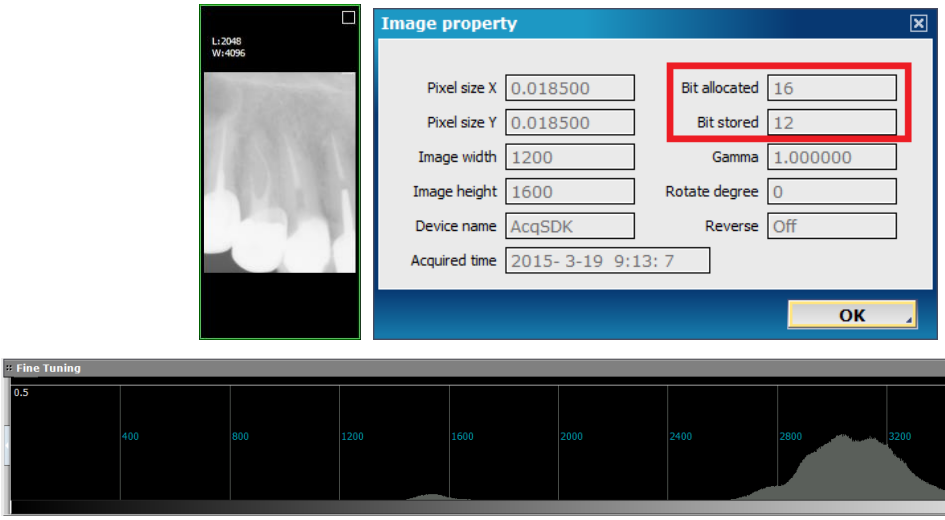
Ranges of the windowing width and level are varied by the bit stored value of the acquired image.

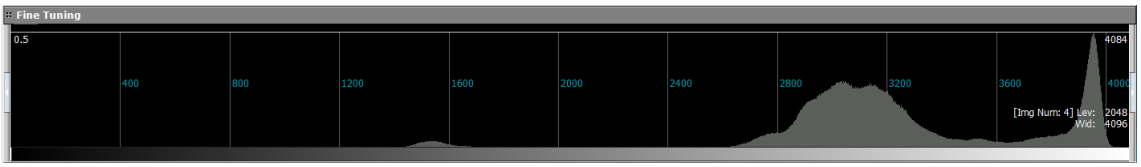
- 8bit image





- 12bit image





- 16bit image

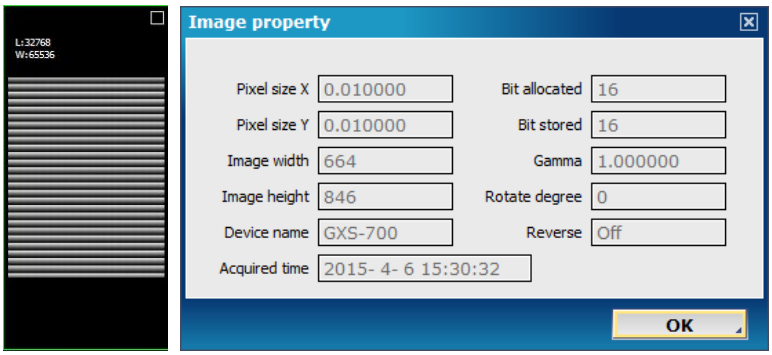
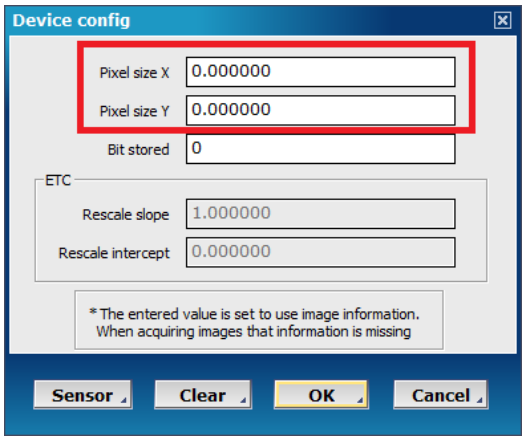


Image property can be found, by right clicking on the image and selecting the ‘Properties’ menu.

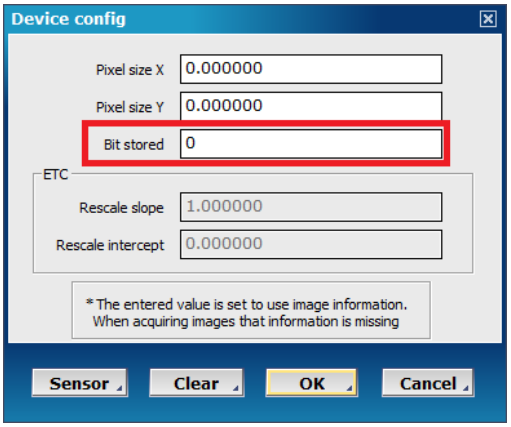
Pixel size, bit stored, and dose values are acquired by the device, however when the device is passing the wrong values, these values can be modified in the Xelis Dental.

- Pixel size
  - After setting up the values, newly acquired images are going to use pixel sizes which are defined in the ‘Device config’, and even though the device are sending the pixel values, Xelis Dental will use the data in the ‘Device config’ (when the values are non-zero)



- Bit stored
  - This value affects the image, so changing this value needs caution. Bit stored can be modified when the image is acquired, or through the ‘Device config’, ‘2D Viewer config’ or the context menu by right clicking the image.

  - Device config
    - Put values in the ‘Bit stored’ section (8, 12, 16), then the value of newly acquired image will be changed. Xelis Dental will use the value in the ‘Device config’ prior to the value sent from the device (when the value is non-zero). Upscaling from 8bit to 12bit and 12bit to 16bit is possible and downscaling from 12bit to 8bit and 16bit to 12bit is possible. However changing values from 8bit to 16bit and vice versa are not possible. In case of downscale, data are going to be cut. (8 ←→ 12 ←→ 16)

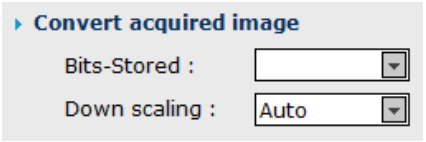


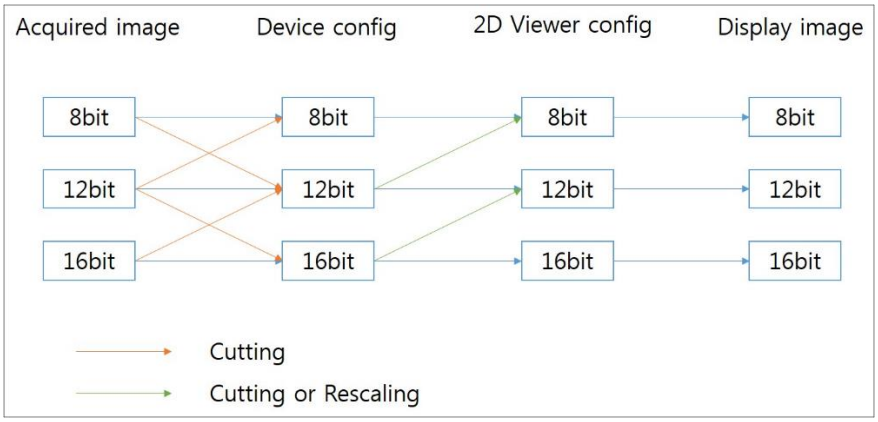
■ 2D Viewer config

◆ Bit stored can be modified by inserting the value in the ‘Convert acquired image’ at the ‘Acq’ tab of the 2D Viewer config. Only downscaling by 4 bits is available by the 2D Viewer config, so downscaling from 16-bit to 8-bit, upscaling process is not supported. (8 ← 12 ← 16)

There are 3 types of downscaling method.

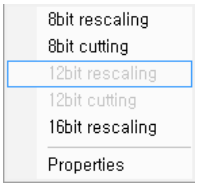
1. Auto
   - If there are no data above the value defined by the ‘Bits-Stored’, Xelis Dental automatically cuts the data, and if are then rescale (compress) the data into the value defined by the ‘Bits-Stored’.
2. Rescale
   - Rescale (compress) the data into the value defined by the ‘Bits-Stored’.
3. Cutting
   - Cuts (compress) the data into the value defined by the ‘Bits-Stored’.



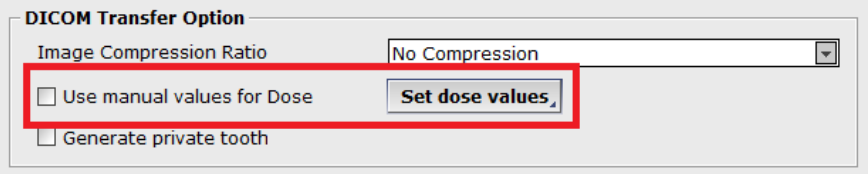


■ Context menu

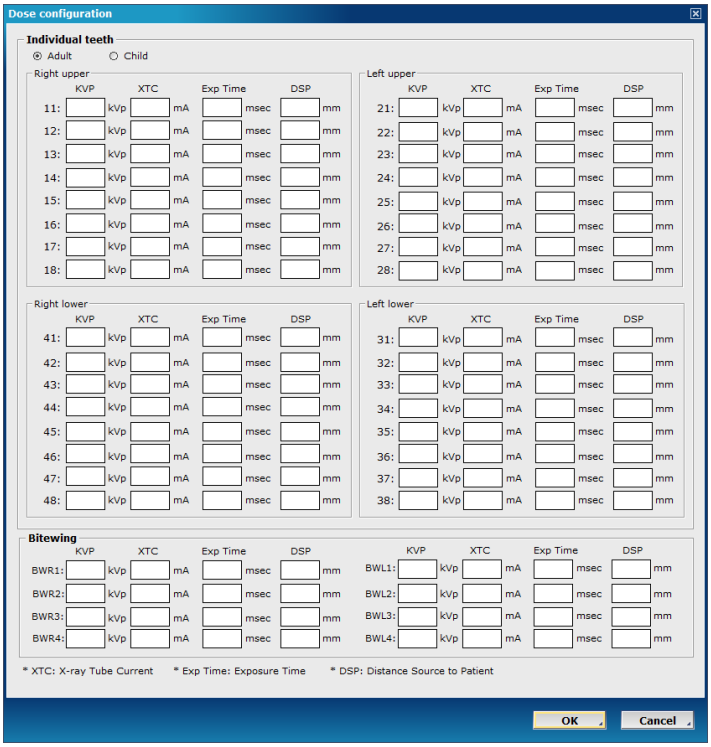
◆ Rescale or cut the acquired image to the higher bit or lower bit by clicking the right mouse button on the image. Context menu pops up and select the action want to perform.



- Dose values
  - Dose value of the image can be inserted into the DICOM by setting the value manually at the ‘DICOM Transfer Option’ menu in the ‘Send’ tab of the 2D Viewer config.



    - Set dose values
      - Dose values can be specified by the dental codes and there are 4 items indicating exposure does. (KVP, XTC, Exp Time, DSP)

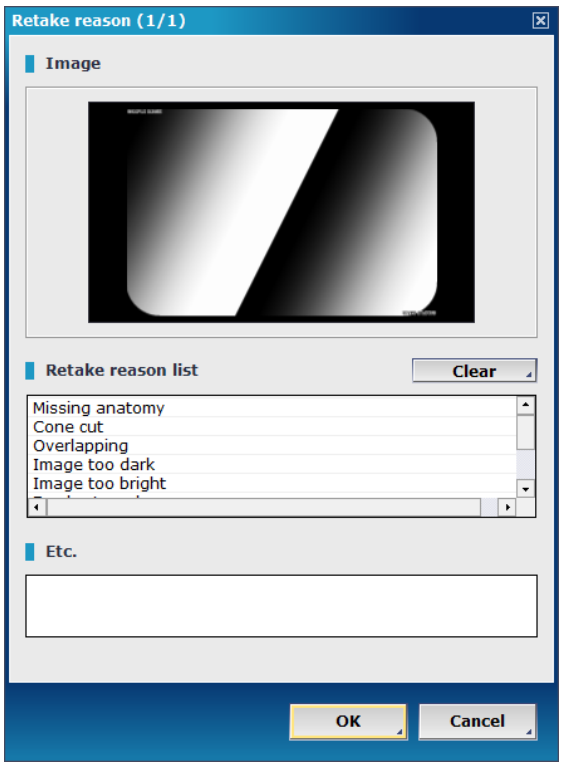


    - Use manual values
      - Xelis Dental puts values into the DICOM if this option is checked.

Chapter 3-10. Reject & Retake reason

By pressing the ‘retake reason’ button below the image, user can see the pop-up window. In view mode, buttons are only exist on the images which has retake reason and it is read-only. In acquisition mode, buttons are exist on the all images which need retake reason. User can fill the information by clicking the list or typing on the ‘Etc’ section.

< Retake reason button>

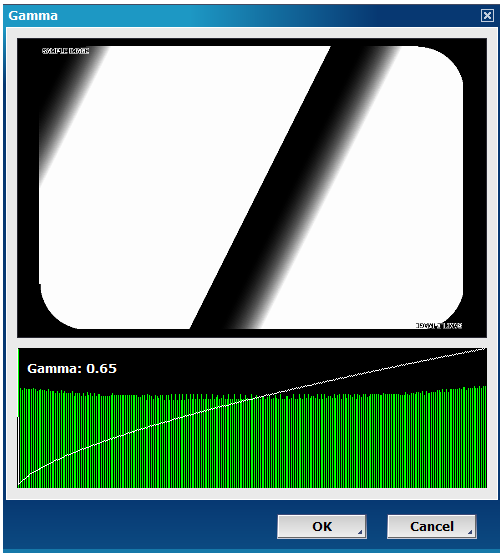


<Retake reason window>

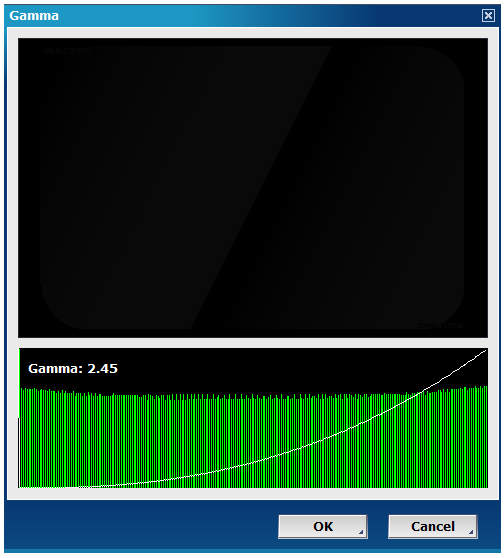
Chapter 3-11. Gamma

After selecting a slide and pressing gamma button, users can see the gamma configuration window below. It has the selected image and below the image there are histogram data, current gamma value, and actual gradation intensity expressed as white line. Press the right button and drag to the right to increase the gamma value in order to decrease the intensity of the bright color. Dragging to the left will decrease the gamma value and increase the intensity of the bright color. Gamma configuration changes raw data of the acquired image so it is not recommended to change this value.

<Gamma: 0.65>



<Gamma: 2.45>



Chapter 3-12. Sharpening

Sharpen filter configuration window can be opened in different way.

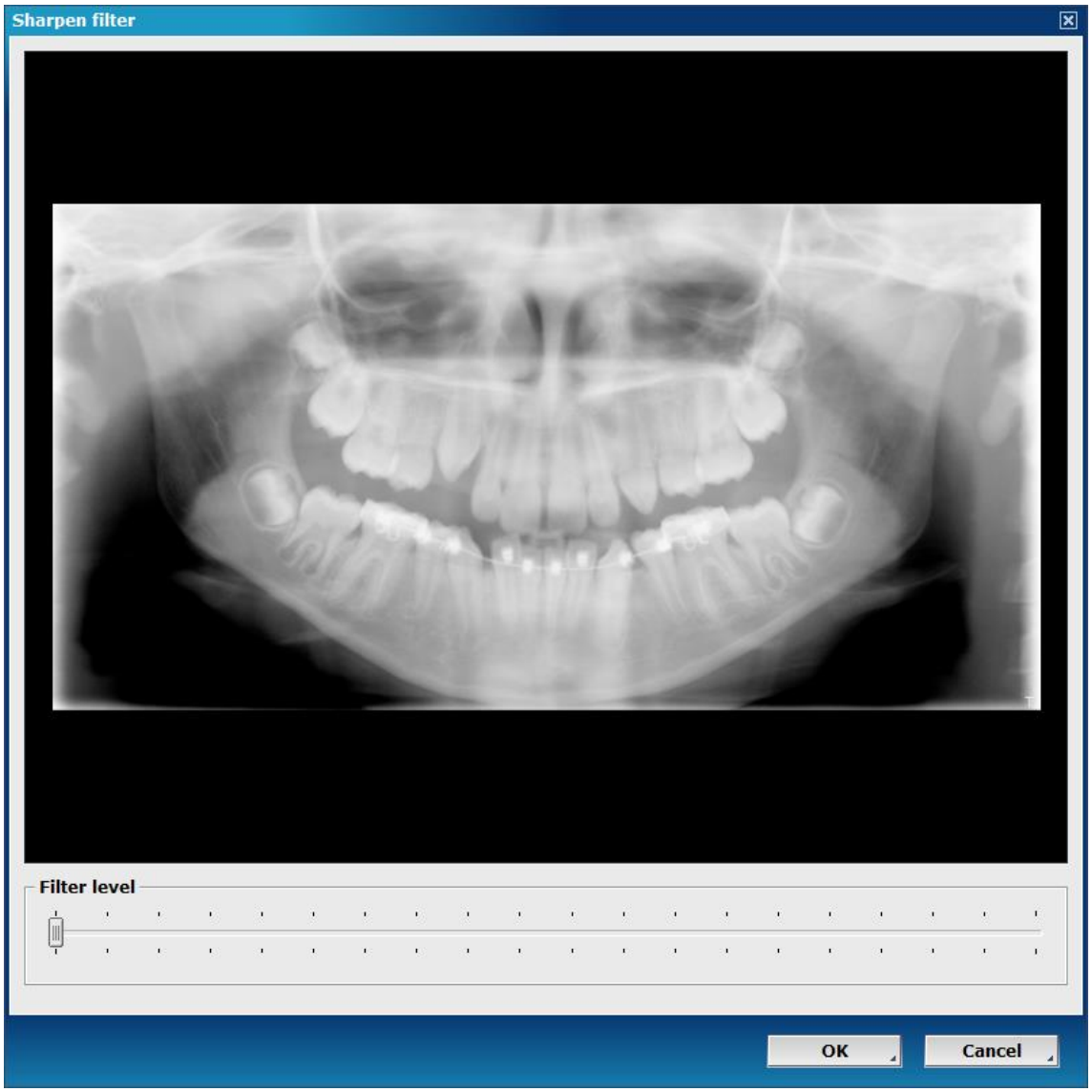
In view mode

 Click sharpen configuration button.

In acquisition mode

 Click the arrow button

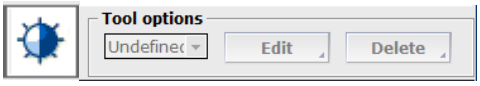
Change the sharpening strength using this configuration.



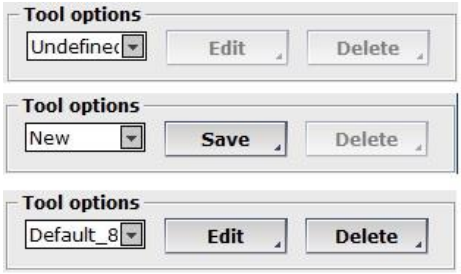
Chapter 3-13. Windowing Preset

Users can save windowing values for specific teeth as a preset file, and use that for other images.

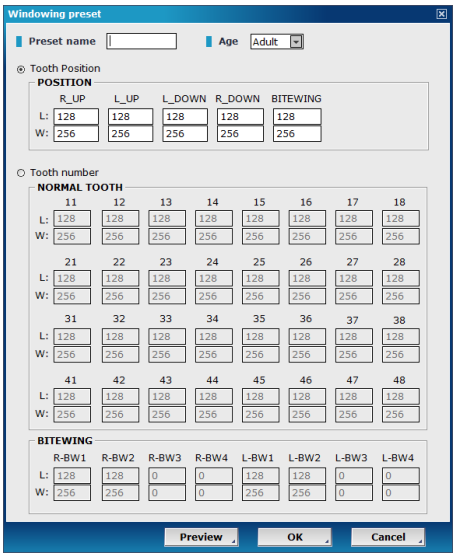
- View tab
  - At the ‘View’ tab, windowing preset is located in the ‘Tool options’ for the windowing tool.



  - Windowing preset is activated only when there is a selected image, and either can save a new preset file or edit/delete existing one.



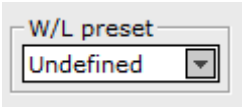
  - When a preset is not specified ‘Tool options’ is indicating ‘undefined’, and in order to apply the preset select the preset file.
  - In case of creating the new preset, select ‘New’ menu and click the ‘Save’ button, then a window for the new preset will pop up. Put values for the teeth and press OK to create.



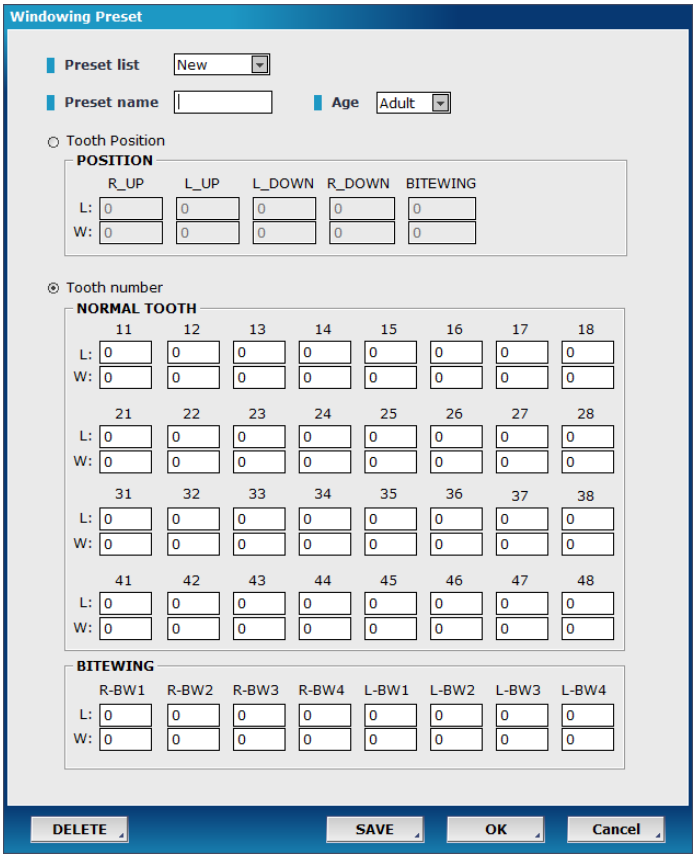
  - In order to change the preset, select the one want to modify and press the ‘Edit’ file, then a window pops up. Change the values and press OK.
  - In order to delete the preset, press the ‘Delete’ button.

- If users want to check how the image will be shown with the current values before creating the preset, press the ‘Preview’ button then images will be changed with that values but the window will not be closed.

- Acq tab
  - Windwing preset is located at the right top section of the ‘Acq’ tab.

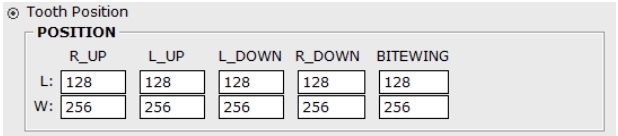


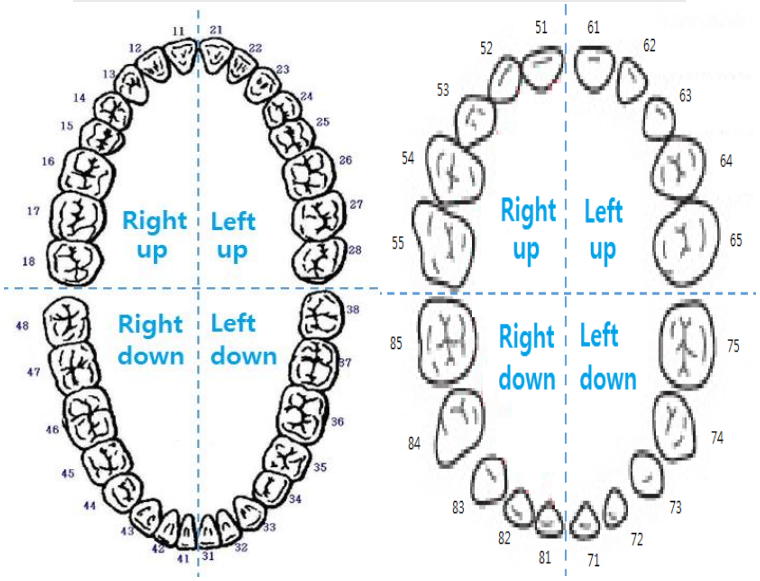
  - When a preset is not specified, it is indicated as ‘undefined’ and select the preset to apply.
  - Select ‘Preset config’ in order to create a new preset, or modify existing one. Select ‘New’ option at the ‘Preset list’ to create a new preset. Put values, and press the ‘OK’ or the ‘Save Preset’ button. In case of midification, select a preset to change and edit its value and then press the ‘SAVE’ or the ‘OK’ button. Press ‘Delete’ button in order to delete the preset.



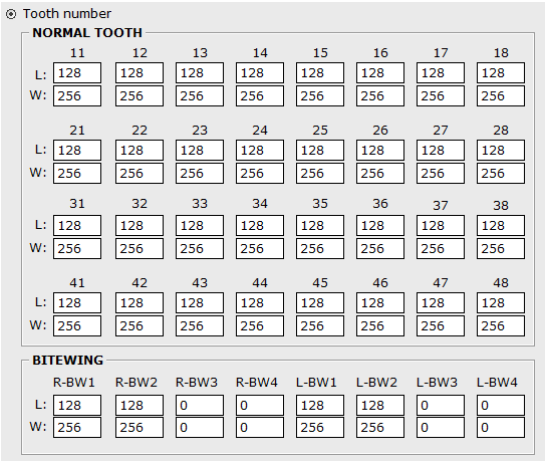
- Common particulars
  - Windowing Preset dialog can save windowing values for both adult and child teeth. Choose ‘Adult’ or ‘Child’ at the ‘Age’ section.

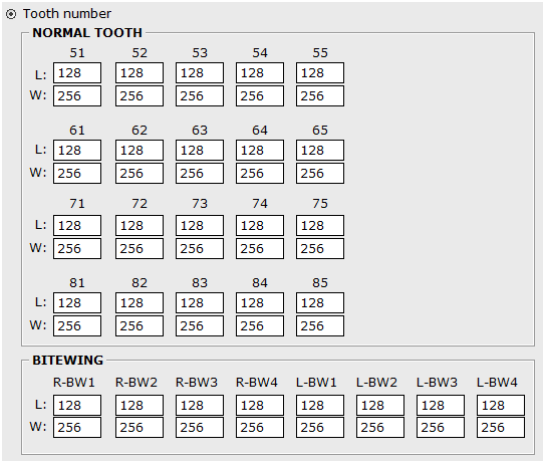
  - Preset can be applied by the teeth position or the teeth number..
    - Tooth position
      - Same windowing values are applied if they are at the same position based on the dental arch.





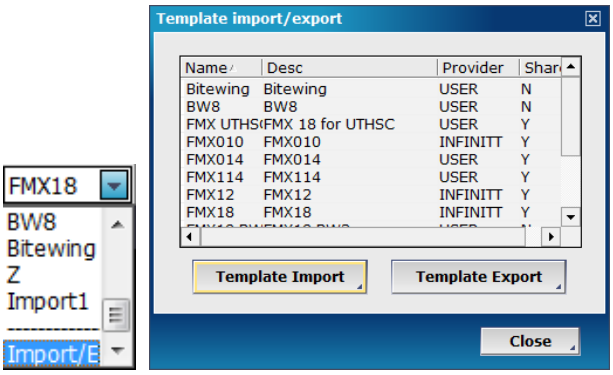
    - Tooth number
      - Specific windowing values can be applied for each tooth.



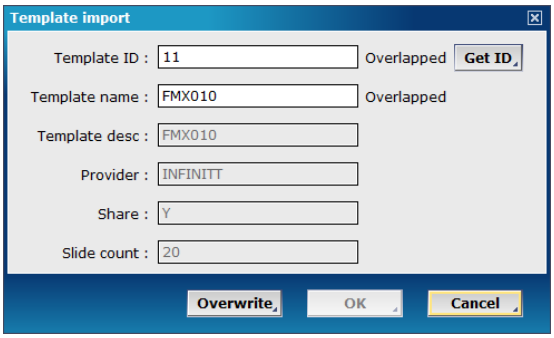


Chapter 3-14. Template Import/Export

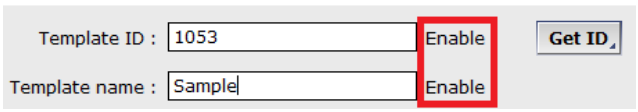
When using G3 server, Xelis Dental will use templates in the G3 DB, and when using ‘Incoming DB’, it will use default templates stored in the local disk. Use ‘Template Import/Export’ function to add or modify the current template lists. It is located in the ‘template list’ of the title bar.



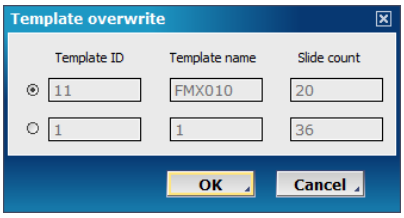
Current templates are shown after selecting the ‘Import/Export’ item. Select a template and press the ‘Template Export’ button to export the template. In order to import it, press the ‘Template Import’, and change the template ID and the name to guarantee the uniqueness of the imported template at the ‘Template import’ dialog shown after pressing the button.



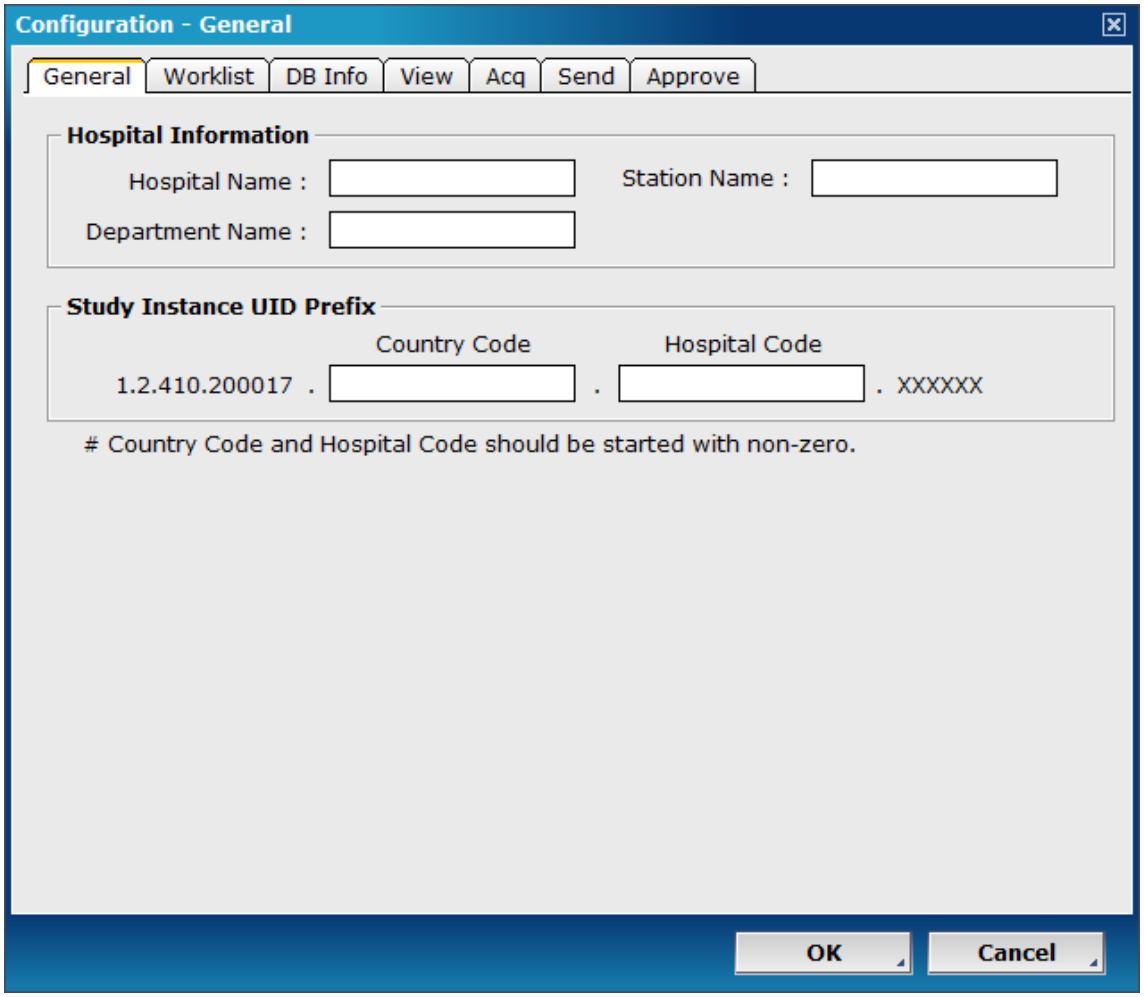
Press ‘Get ID’ button to acquire available IDs, and then the ‘OK’ button will be activated after filling in the information. If there are no templates which has the same ID or the same name, ‘Enable’ text will be shown, if not, ‘Overlapped’ text will be shown.



If one of the items are overlapped, the ‘Overwrite’ button will be activated and by pressing the button, existing template is substituted by the new one. If there are more than one template which have the same ID or the same name, a dialog to select a specific template pops up.



Chapter 3-15. Configuration



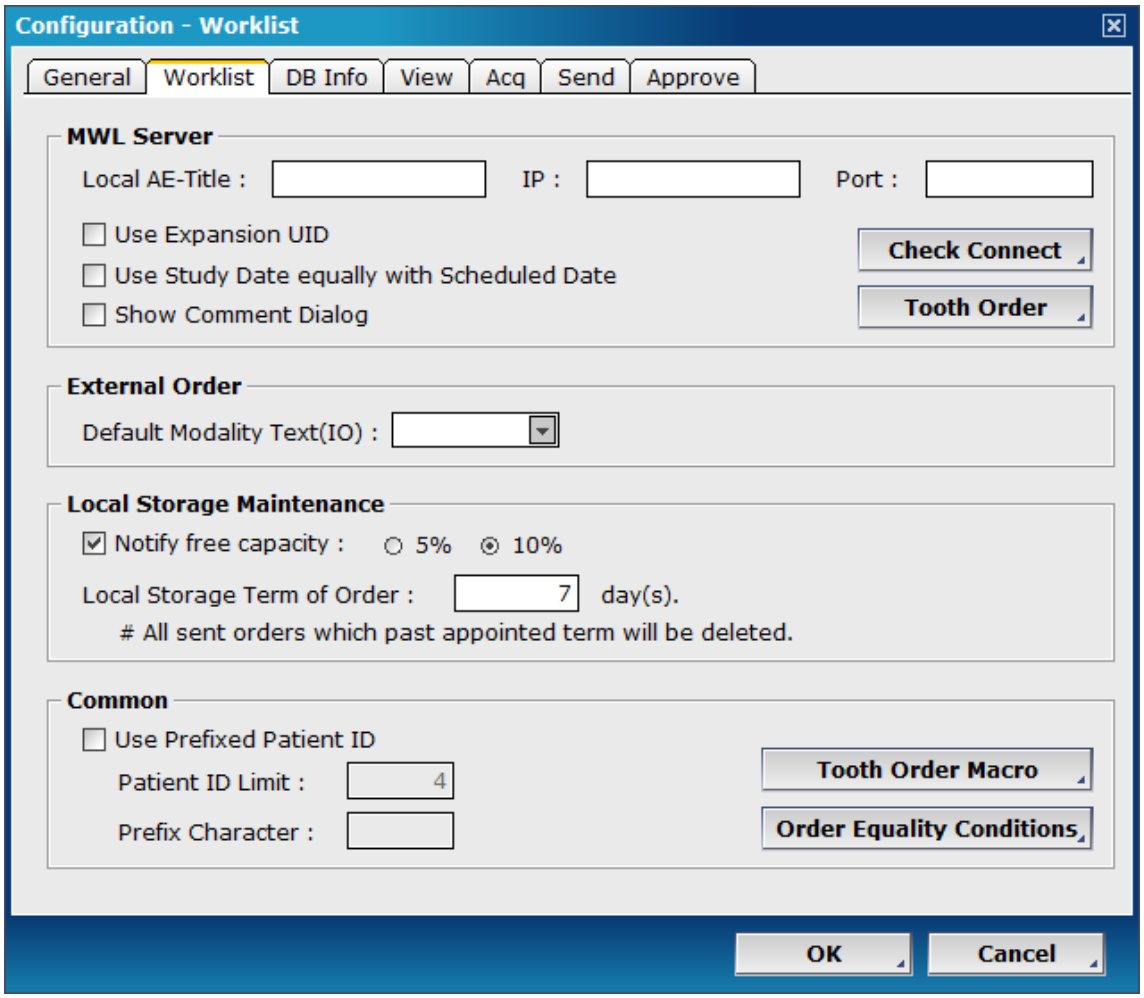
(1) **General**

- Hospital Information

Set hospital information.

- Study Instance UID Prefix

Set country and hospital code for study instance UID.

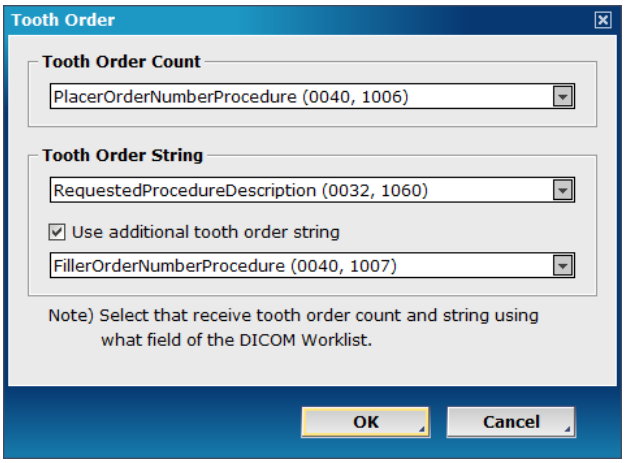


(2) **Worklist**

■ MWL Server

Set MWL server info.

Use Expansion UID	When get MWL list, add '.[number]' to study instance UID. Use the number after 'Xelis Dental' input to the 'SCP AE Title' of Env configuration.
Use Study Date equally with Scheduled Date	Set scheduled date to study date.
Show Comment Dialog	When start shooting, show a comment.
Tooth Order	Create order with the values related selected tag.

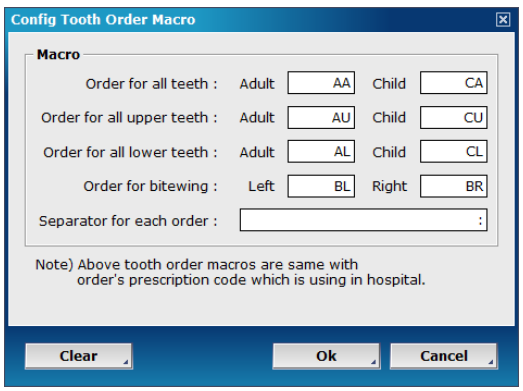
- External Order

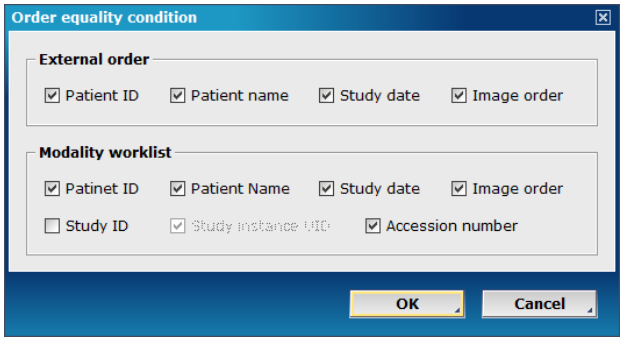
  If modality of external order is IO and modality text is empty, selected value is used.

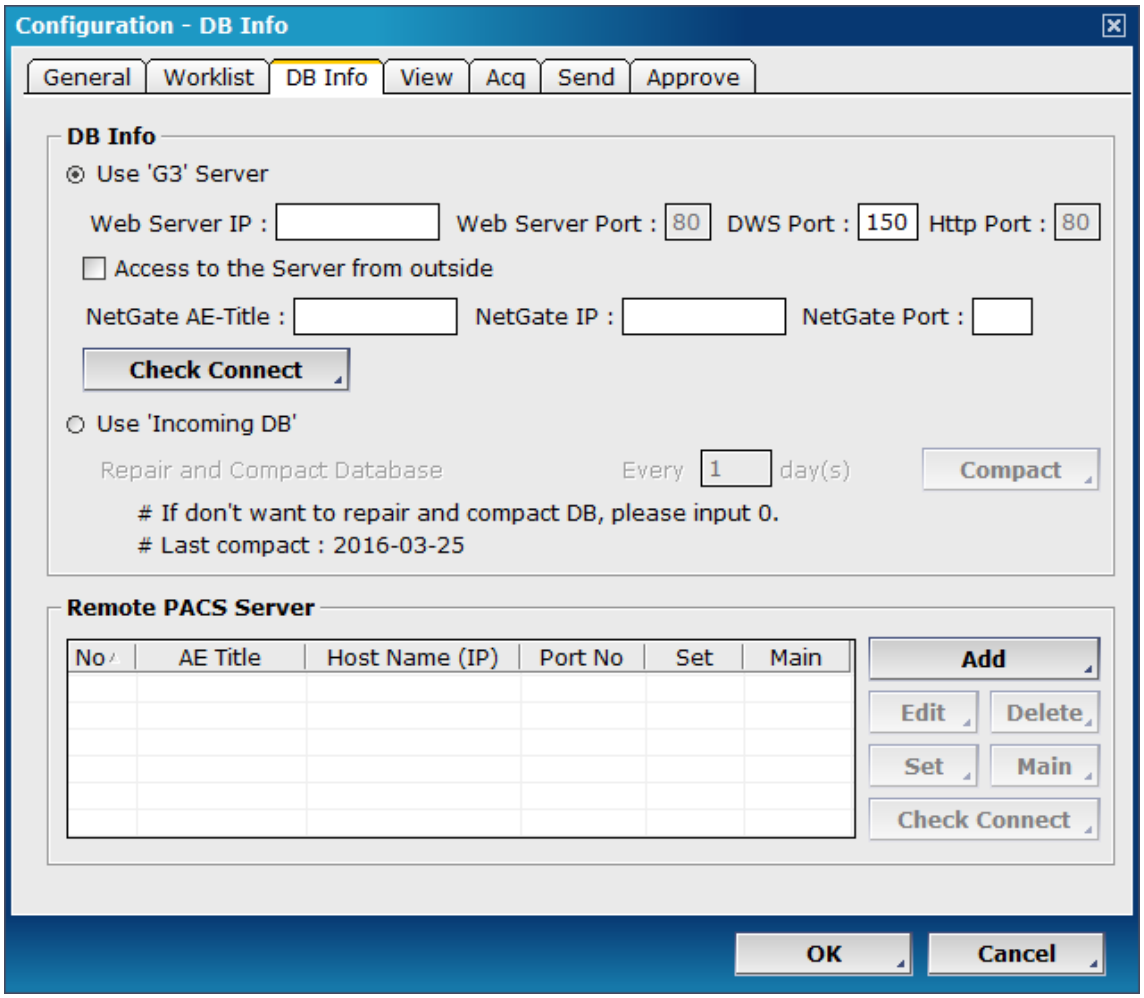
- Local Storage Maintenance

Notify free capacity	If the capacity is insufficient, message pops up.
Local Storage Term of Order	Sent order is stored as an input period.

- Common

Use Prefixed Patient ID	Set length of Patient ID and prefix character.
Tooth Order Macro	Set macro which used creating order. 

Order Equality Conditions	It can be checked whether external order exist or not according the selected information. It can identify the same internal order according the selected modality worklist option. 



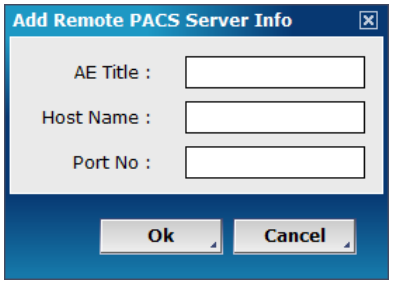
(3) **DB Info**

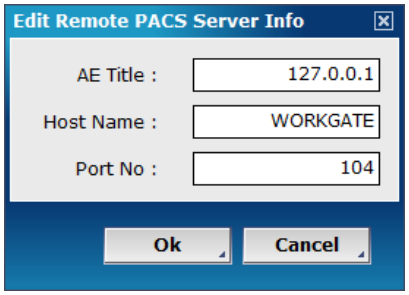
- DB Info

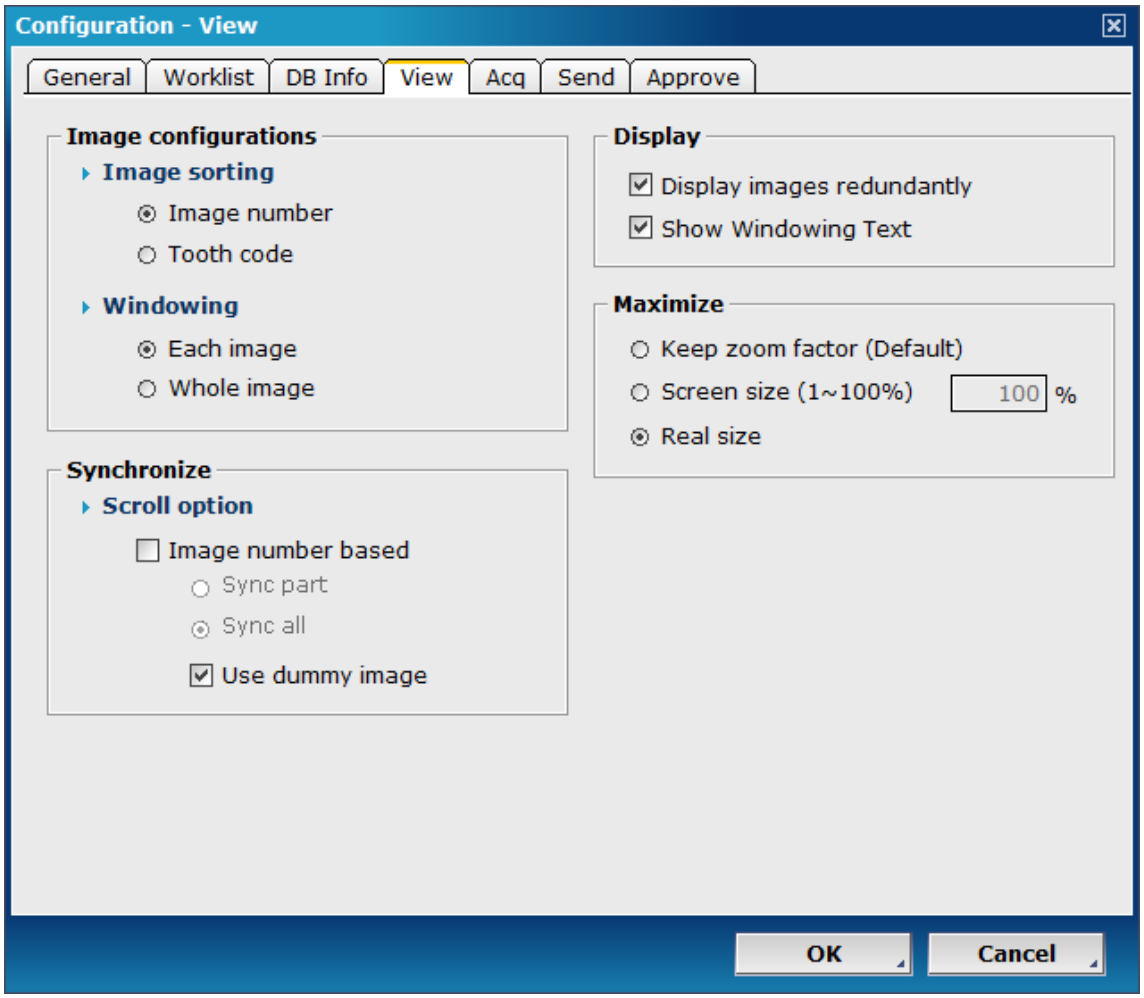
  If you want use ‘G3 server’, set G3 server info for search. If you select ‘Use Incoming DB’, you can use ‘Incoming DB’ in DBM2.

- Remote PACS Server

  Set DB info for send images.

Add	Add PACS Server to the list. 

Edit	Edit information of selected PACS Server. 
Delete	Delete selected PACS Server.
Set	Transmit the images to the set server.
Main	The state of the program is determined according to the result of transmit to the main server.
Check connect	Check the connection status of the selected PACS Server.



(4) **View**

If you have authorization, View tab is visible.

- Image configurations

Image sorting	Sort images in 'Image number' or the 'Tooth code'.
Windowing	If you select 'Whole image' in Windowing section, all images have same windowing value.

- Synchronize

  Set options for sync. It is only applied if split the screen and both screen is exam mode.

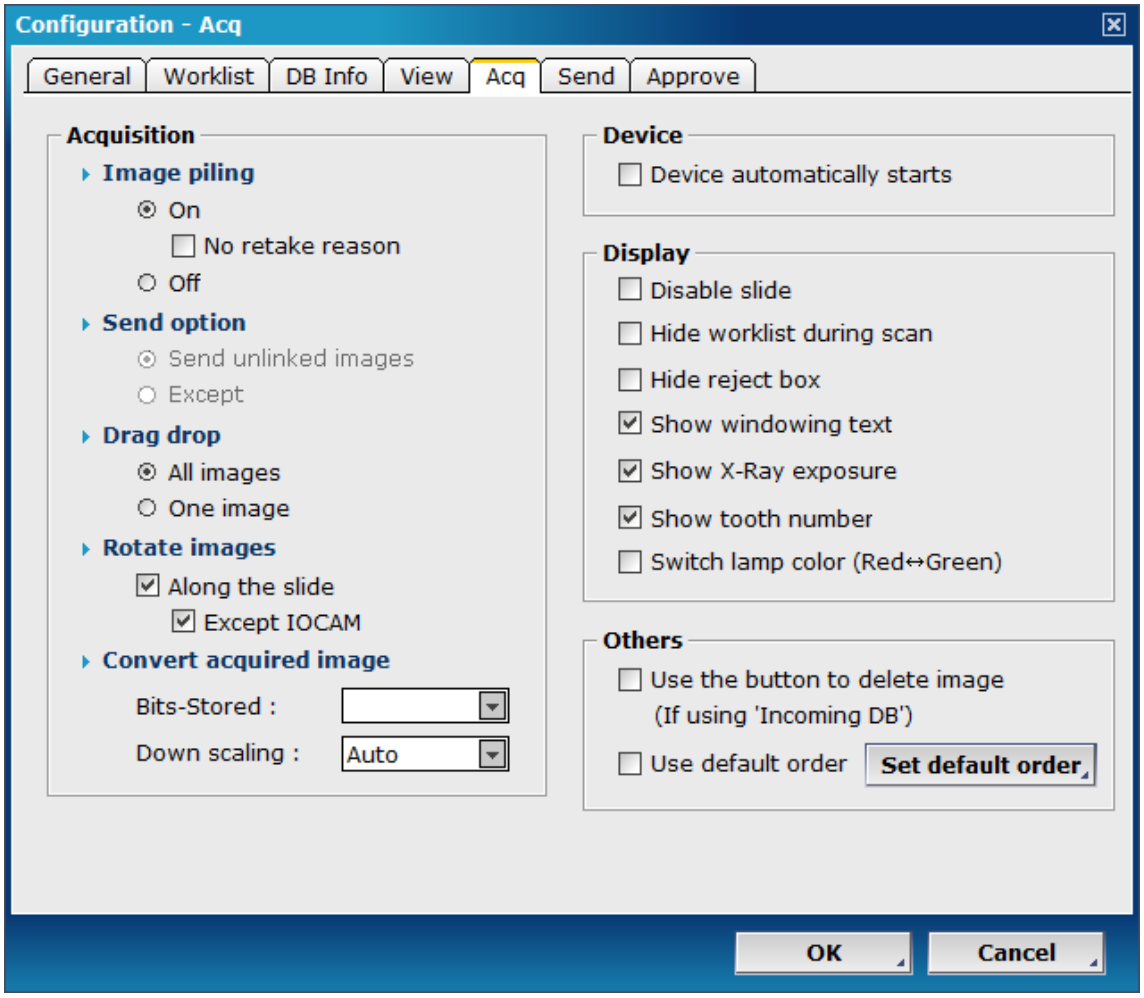
- Display

Display image redundantly	Display an image on all of the slides corresponding to the tooth code of the image.

Show Windowing Text	Select whether to display the windowing value.

- Maximize

  It determines how to set the size of the image when maximize the slide.



(5) **Acq**

If you have authorization, Acq tab is visible.

■ Acquisition

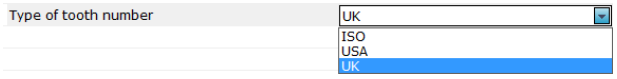
Image piling	Obtain multiple images in a slide.
Send option	If Image piling is off, this option is available. Select whether to send images in ‘Unlinked images’.
Drag drop	If Image piling is on, this option is available. Choose whether to go together, when drag & drop the piled images.
Rotate images	If ‘Along the slide’ option is on, Image in the template is rotated when acquired. And if ‘Except IOCAM’ option is on, image from the IOCAM device is not rotated.

Convert acquired image	When acquired image, you can change bits-stored value. Applies only when the down scaling.

- Device

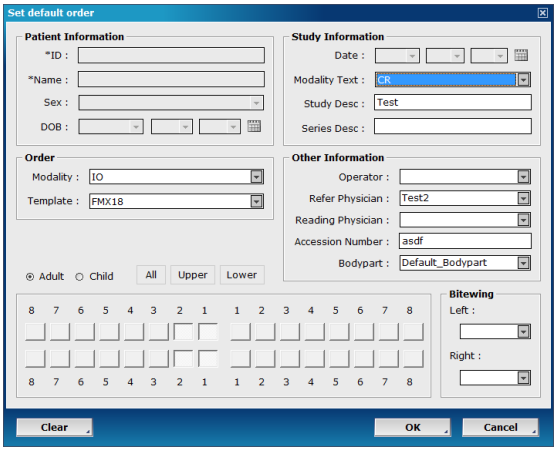
  Device starts automatically.

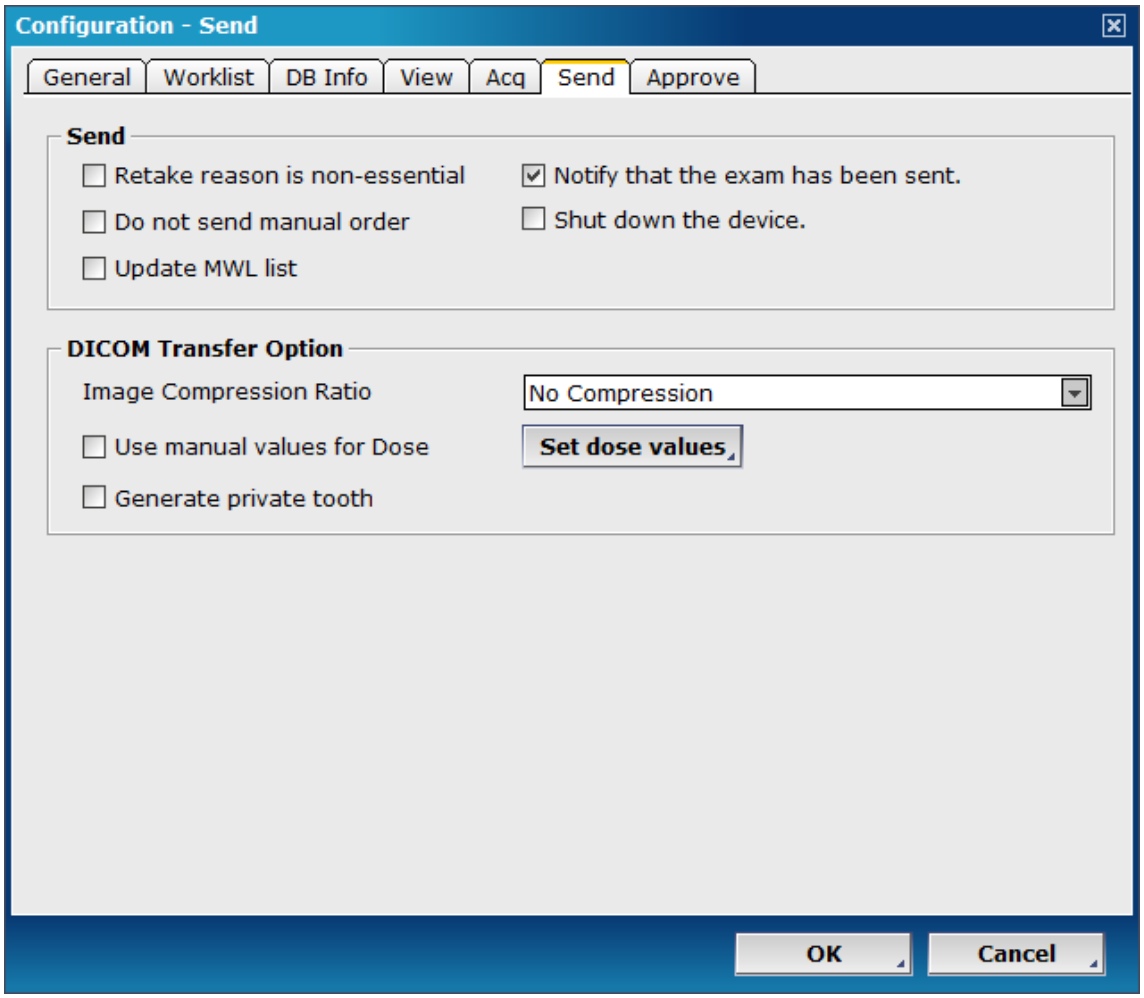
- Display

Disable slide	Slides corresponding to the image order are just opened.
Hide worklist during scan	When start scanning(double click an order in the UCL), hide worklist. And when send the order, show worklist.
Hide reject box	Hide reject box of the slides.
Show windowing text	Show windowing values.
Show X-Ray exposure	Show X-Ray exposure which entered in the ‘Set dose values’ of ‘Send tab’.
Show tooth number	Show tooth number for the set type in the ‘Type of tooth number’ of Env configuration. 
Switch lamp color	Change color of lamp(red and green) each other.

- Others

Use the button to delete image	Enable to delete image, if using ‘Incoming DB’.
Use default order	When create order, use preset information entered in the ‘set default order’.


Set default order
Patient Information
*ID :
*Name :
Sex :
DOB :
Study Information
Date :
Modality Text : CR
Study Desc : Test
Series Desc :
Order
Modality : IO
Template : FMX18
Other Information
Operator :
Refer Physician : Test2
Reading Physician :
Accession Number : asdf
Bodypart : Default_Bodypart
Adult
Child
All
Upper
Lower
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8
8 7 6 5 4 3 2 1 1 2 3 4 5 6 7 8
Bitewing
Left :
Right :
Clear
OK
Cancel



(6) **Send**

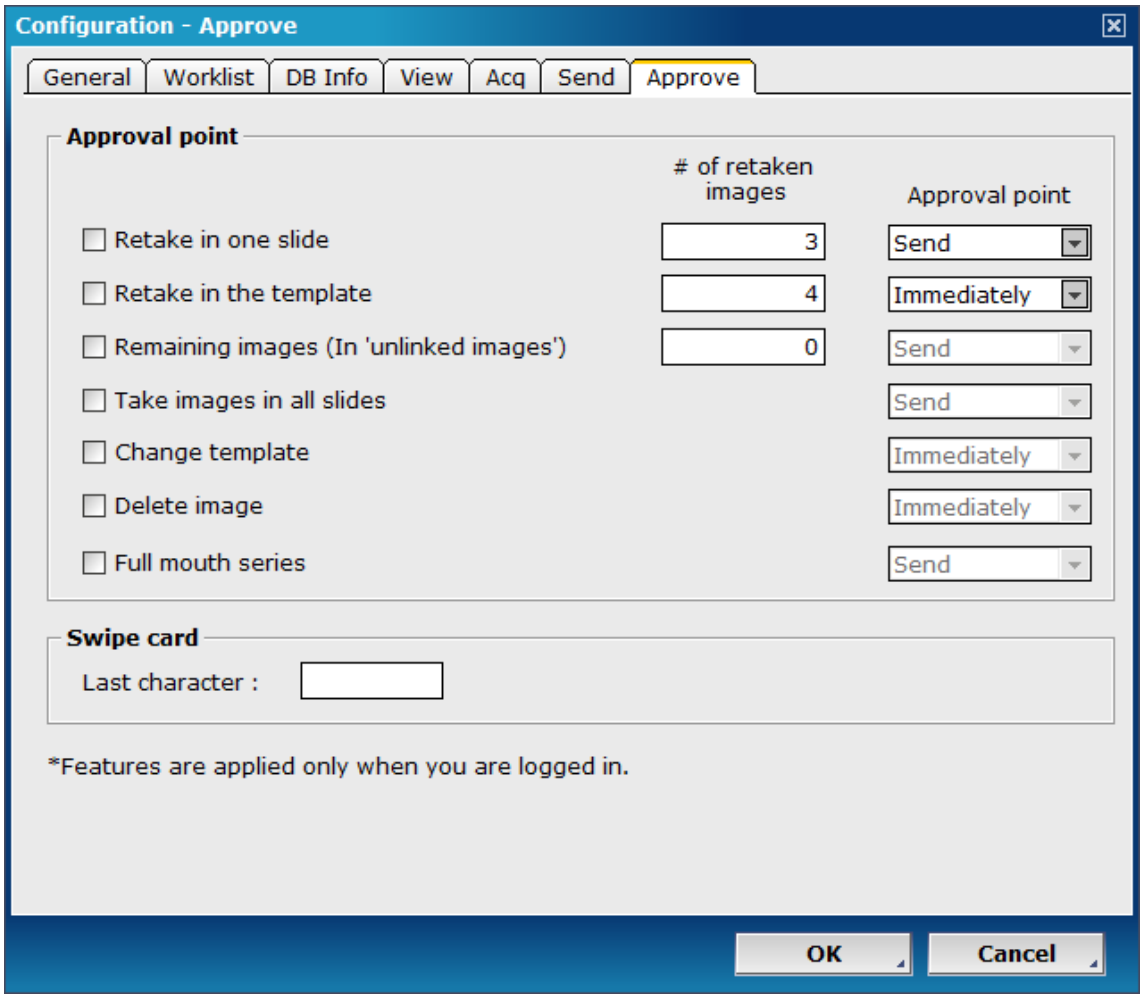
If you have authorization, Send tab is visible.

- Send

Retake reason is non-essential	If the retake reason is strictly necessary, uncheck this option.
Do not send manual order	The order made in the 'New order' can't be sent.
Update MWL list	After send, update MWL list.
Notify that the exam has been sent	Notify that transmission is finished.
Shut down the device	When order change or send, the device is closed automatically.

- DICOM Transfer Option

Image Compression Ratio	Send compressed images.
Use manual values for Dose	Dose values can be specified for each tooth and be put in the DICOM file before sending.
Generate private tooth	Put private tooth code in the DICOM file used by Xelis Dental.



(7) **Approve**

- Approval point

  Set the time to receive approval.

- Swipe card

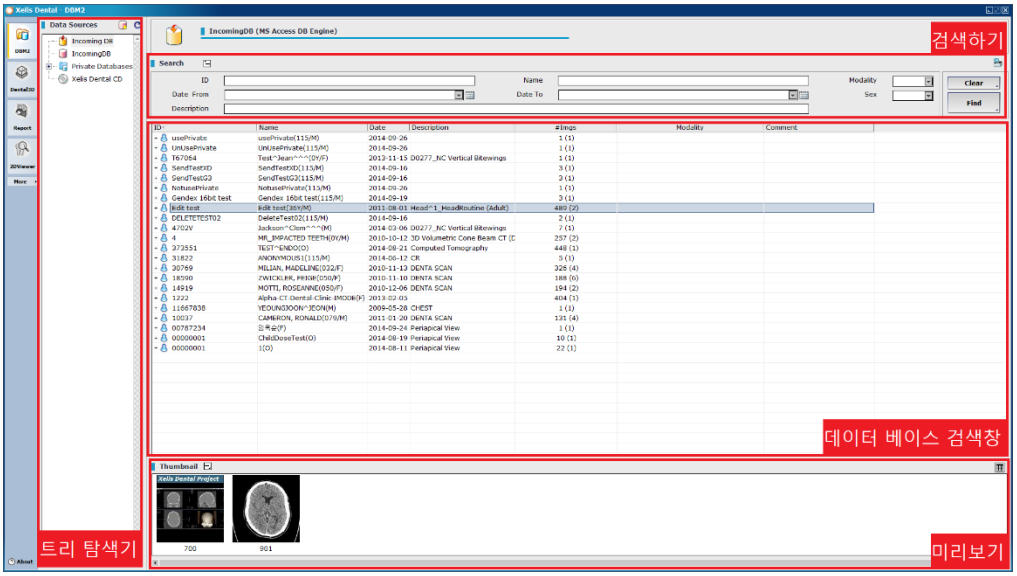
  Recognize a last character of swipe card, and process the work automatically.

Chapter 4. DBM

DICOM first started in 1992, at the RSNA (Radiological Society of North America) congress in order to connect devices which have different forms of image information by making a standard for network message protocols. After that at the ACR-NEMA(American College of Radiology-National Electrical Manufacturers' Association), each working group had formed and proceeded the standardization, and now DICOM 3.0 is presented becoming a standard medical image device. Xelis Dental DBM can manage DICOM (Digital Imaging Communication in Medicine) standard format of the medical image in the Xelis Dental. It can use images from the remote PACS server supporting DICOM Query/Retrieve by TCP/IP network protocol as well as local storage. Also users can burn a back-up CD using DBM if the system has CD-R/CD-RW recorder.

Chapter 4-1. DBM GUI

DBM UI is described at the image below.

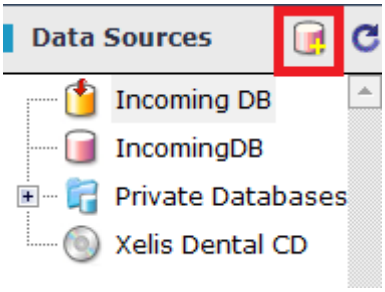


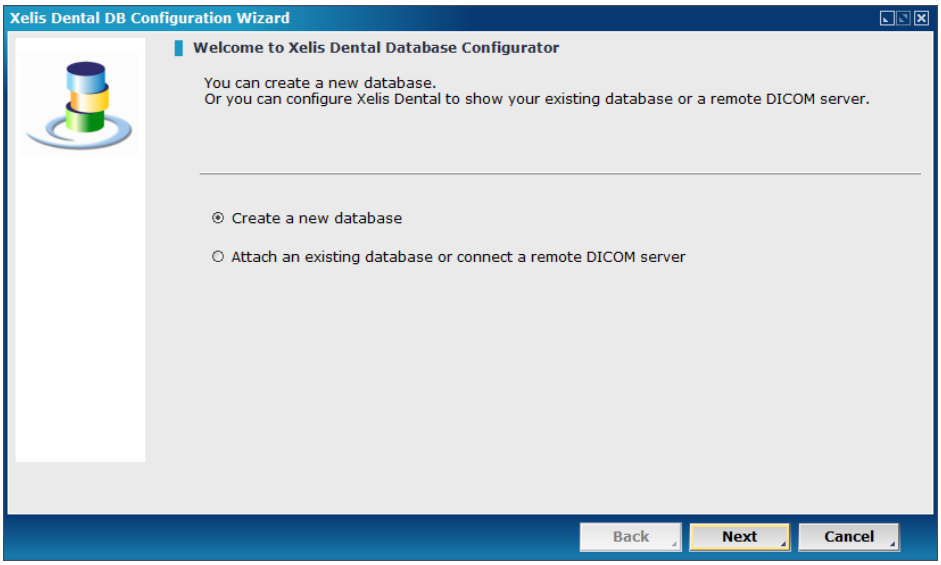
DBM is composed of 'Module Menu', 'Data Sources', 'Search', 'Search Results', and 'Thumbnails'. The 'Data Sources' is composed of 'master database', 'local database', 'Remote PACS Servers', 'DICOM CD', 'CD Writer', 'My Computer', and 'My network Places'. Users can search data from the database using keywords, typed by the users. 'Search Result' shows patients, studies, or images information of the selected database at the 'Data Sources'.

Chapter 4-2. Database management

1. Database addition

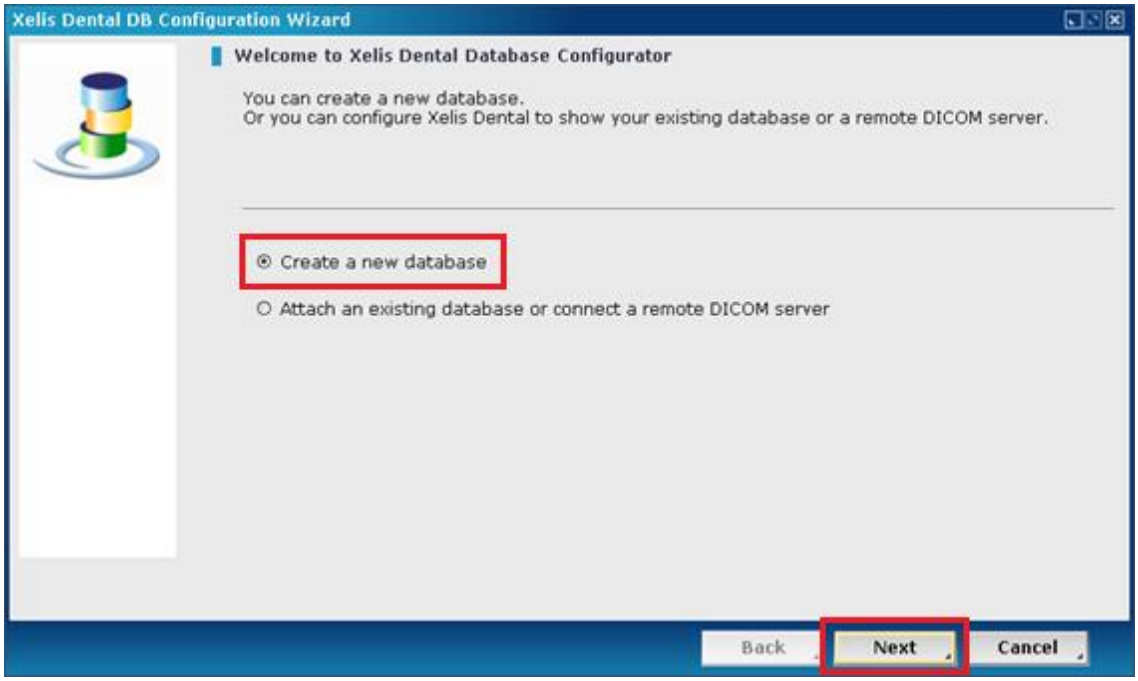
Click the  icon at the ‘Data Sources’ and the ‘Xelis Dental DB Configuration Wizard’ described below pops up.



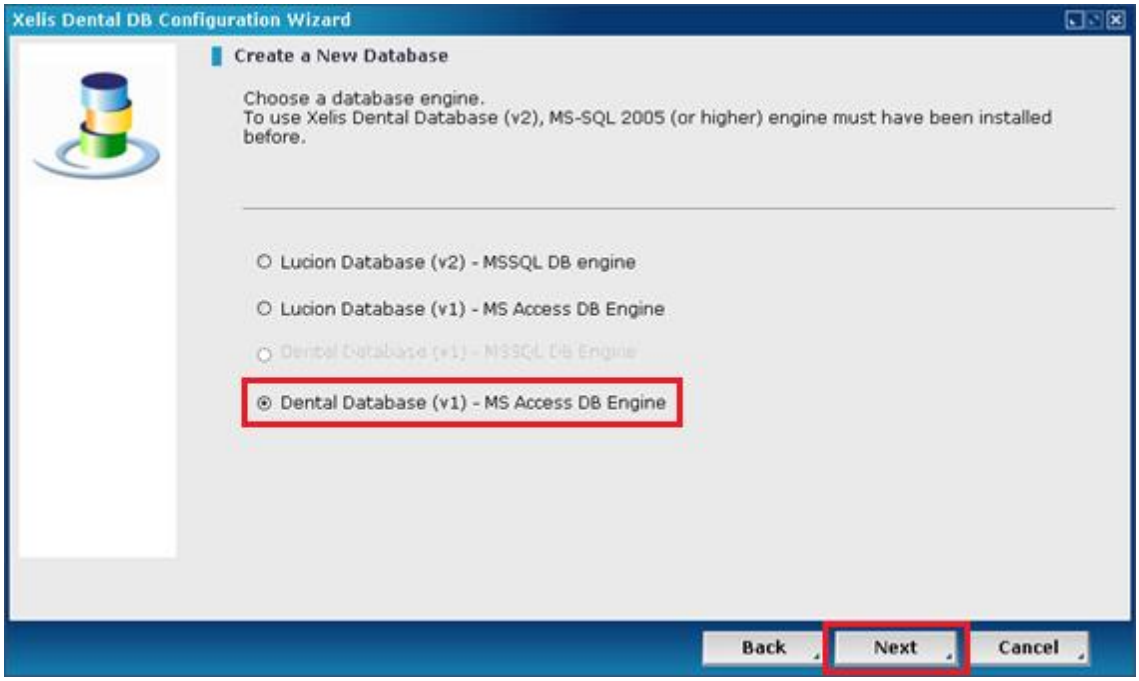


▪ Create a new database.

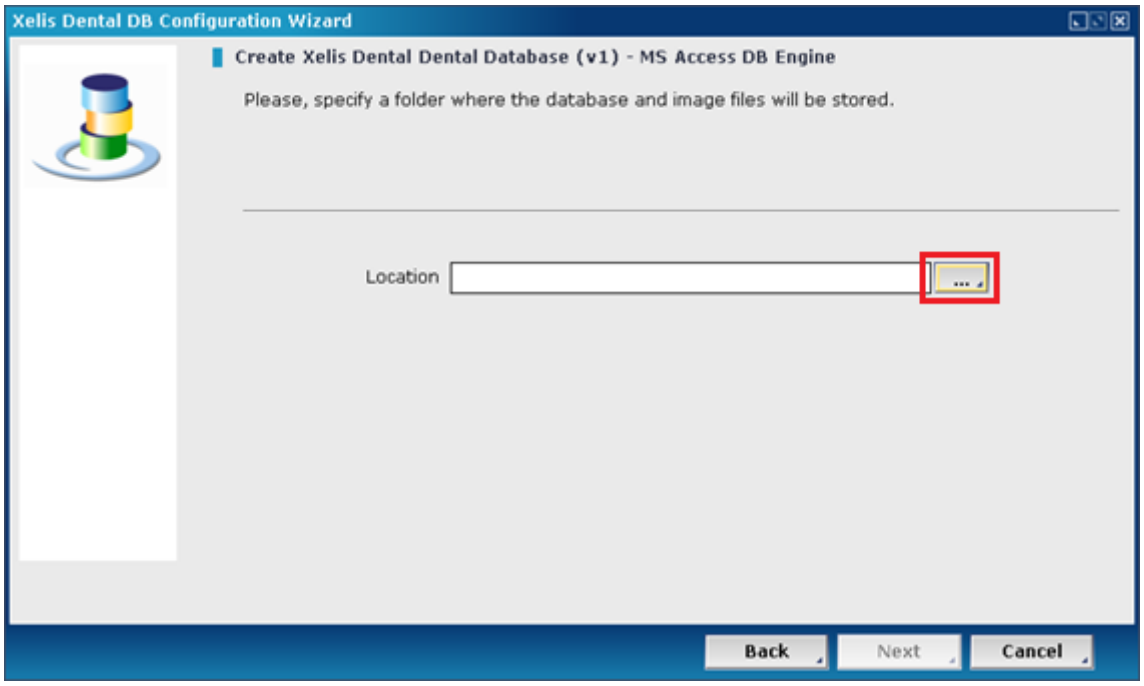
To create database, start ‘LDC Wizard’, and follow instructions below.



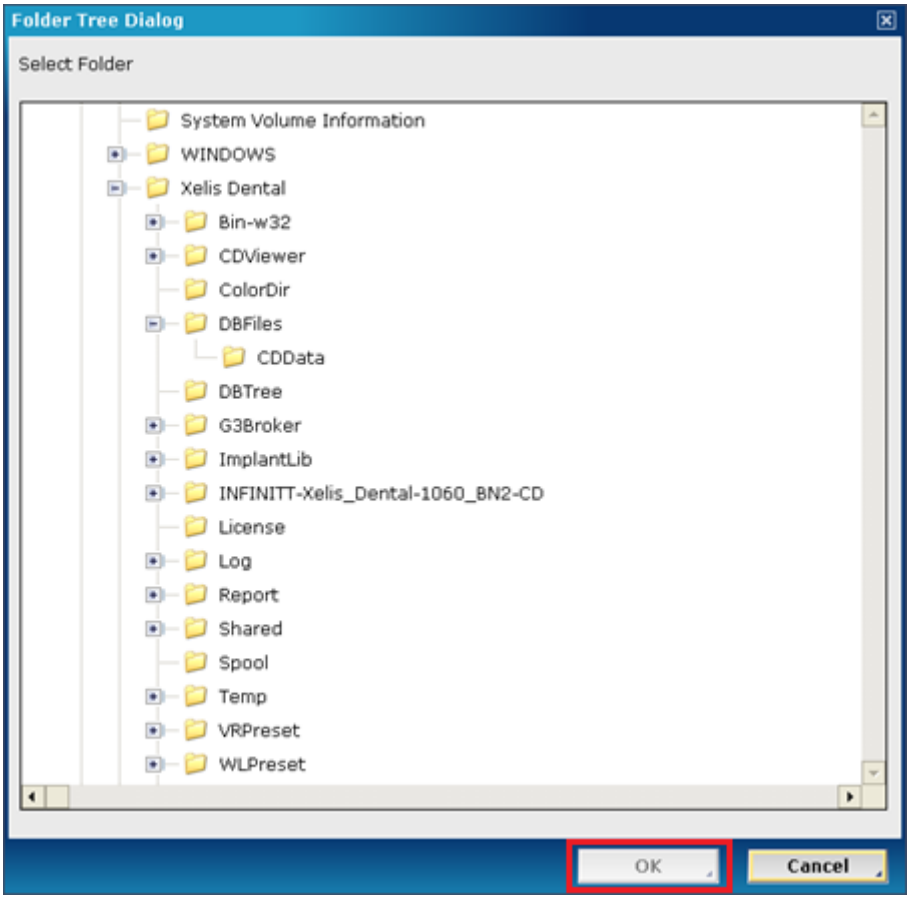
- Select “Create a new database” and click ‘Next’.

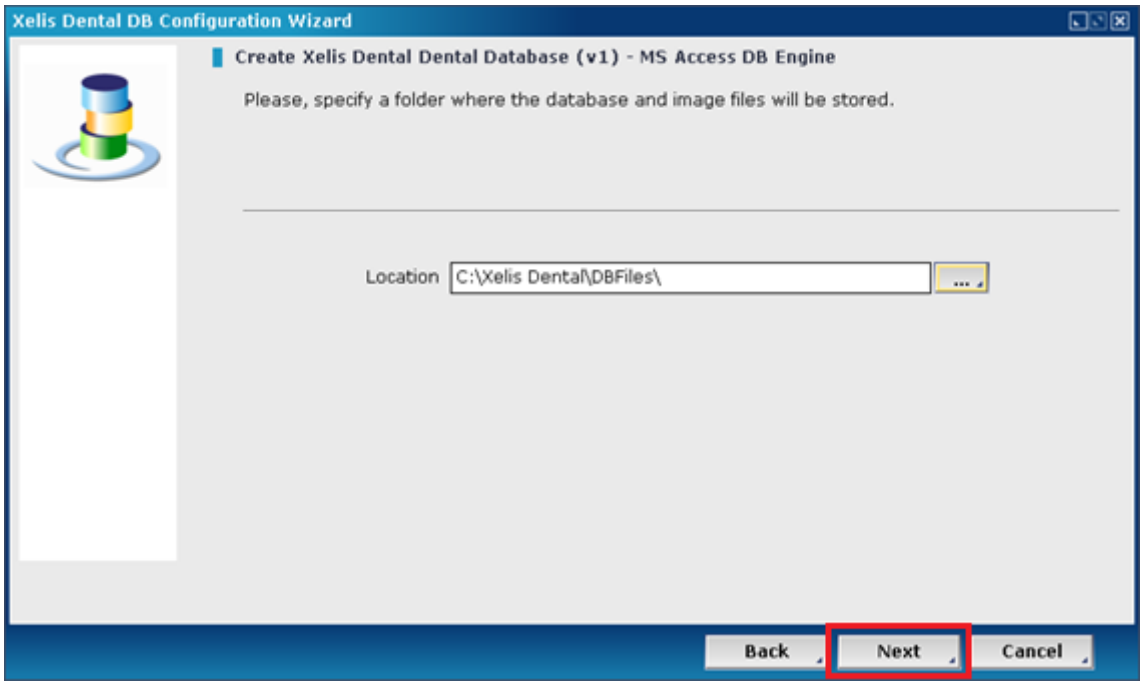


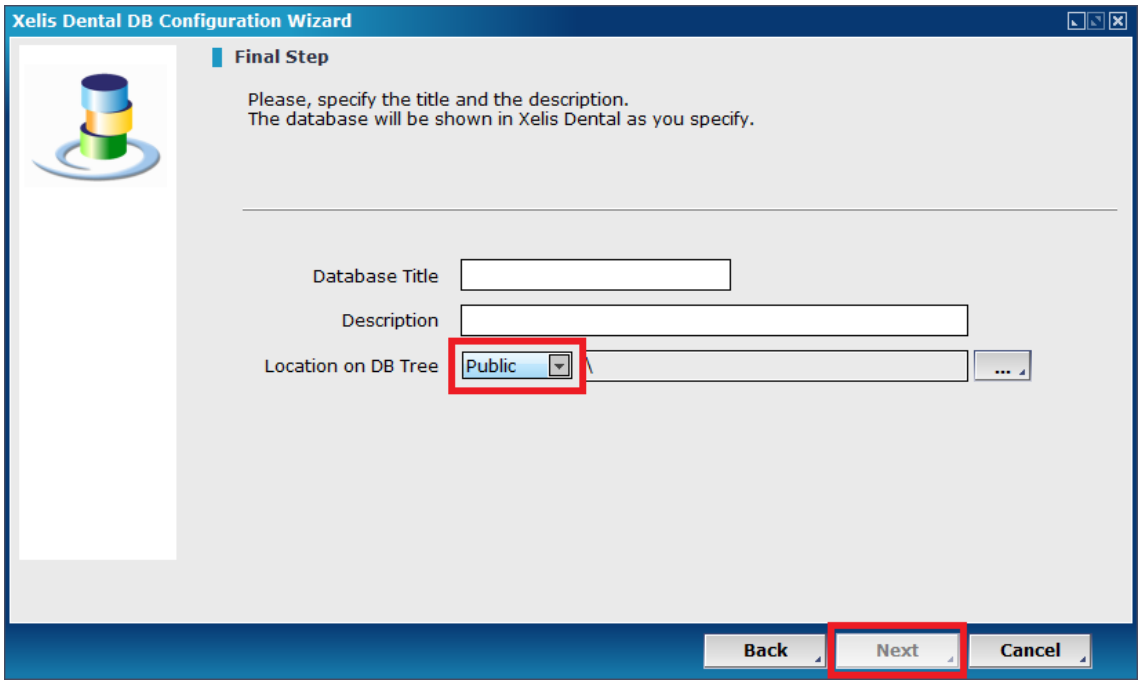
- Choose DB type, and click ‘Next’.



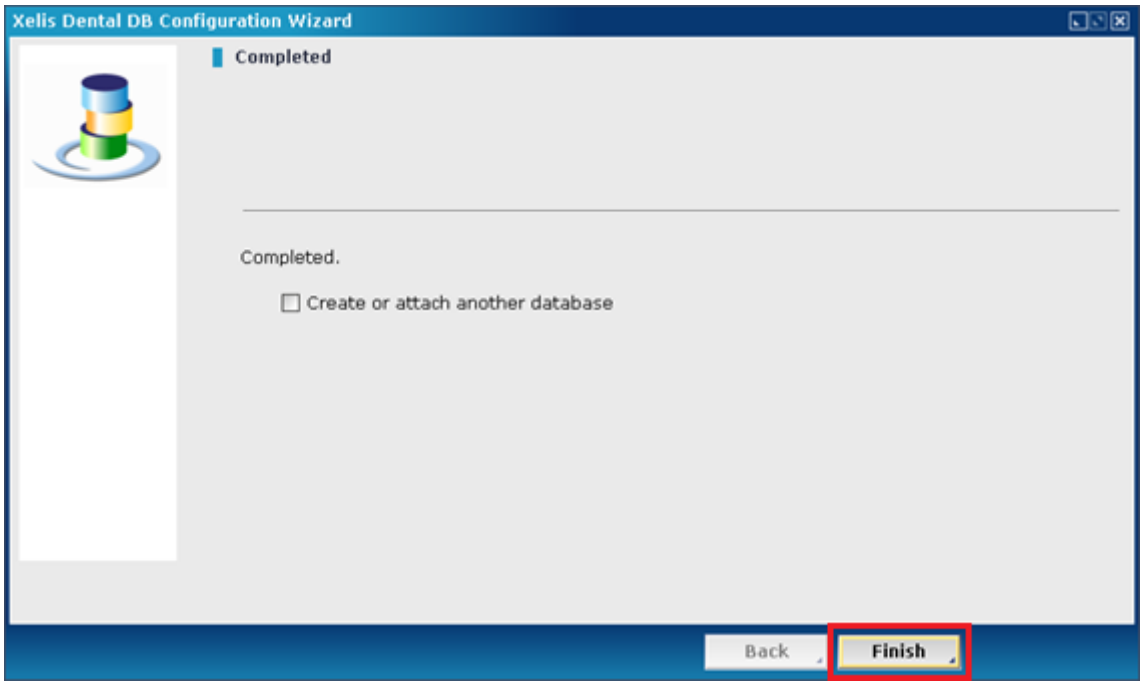
- By clicking the "…" button specify the directory for the DB using the window which pops up after.





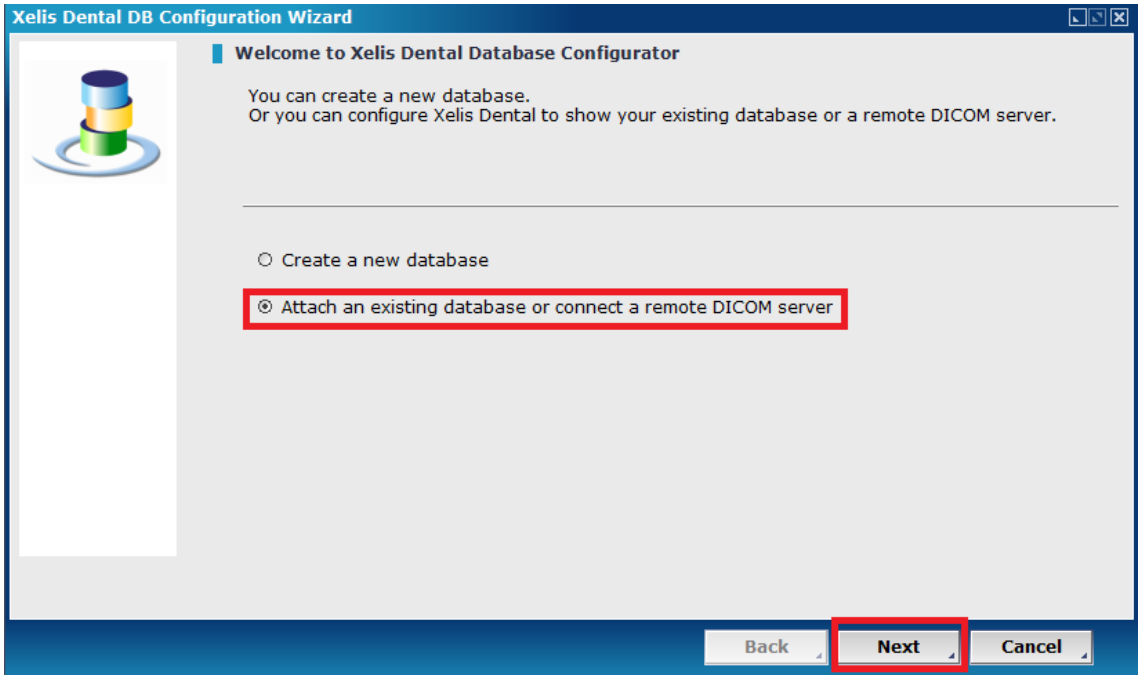


- Fill the information and click “Next”.

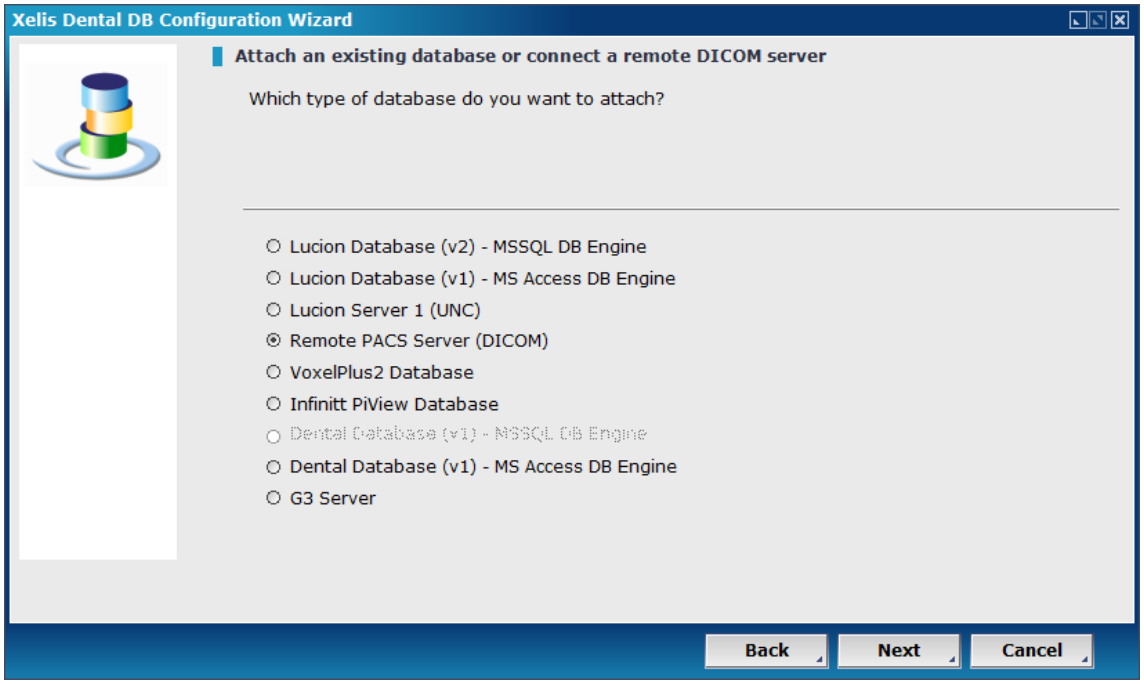


▪ Attach an existing database

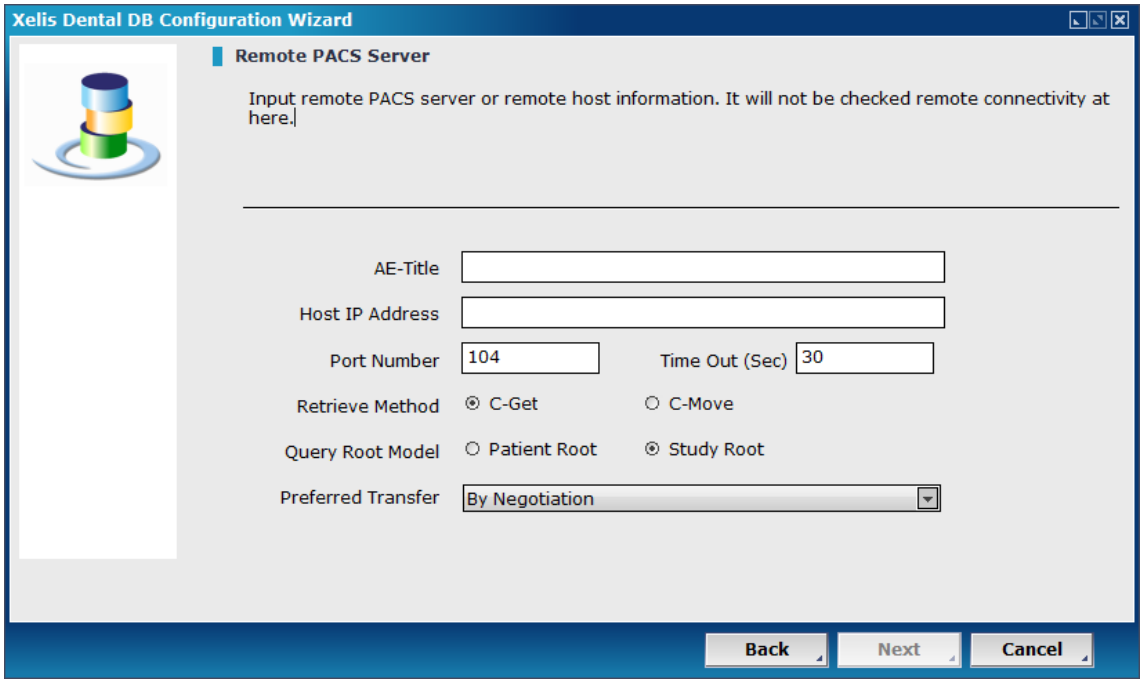
To attach an existing database, start ‘LDC Wizard’, and follow instructions below.



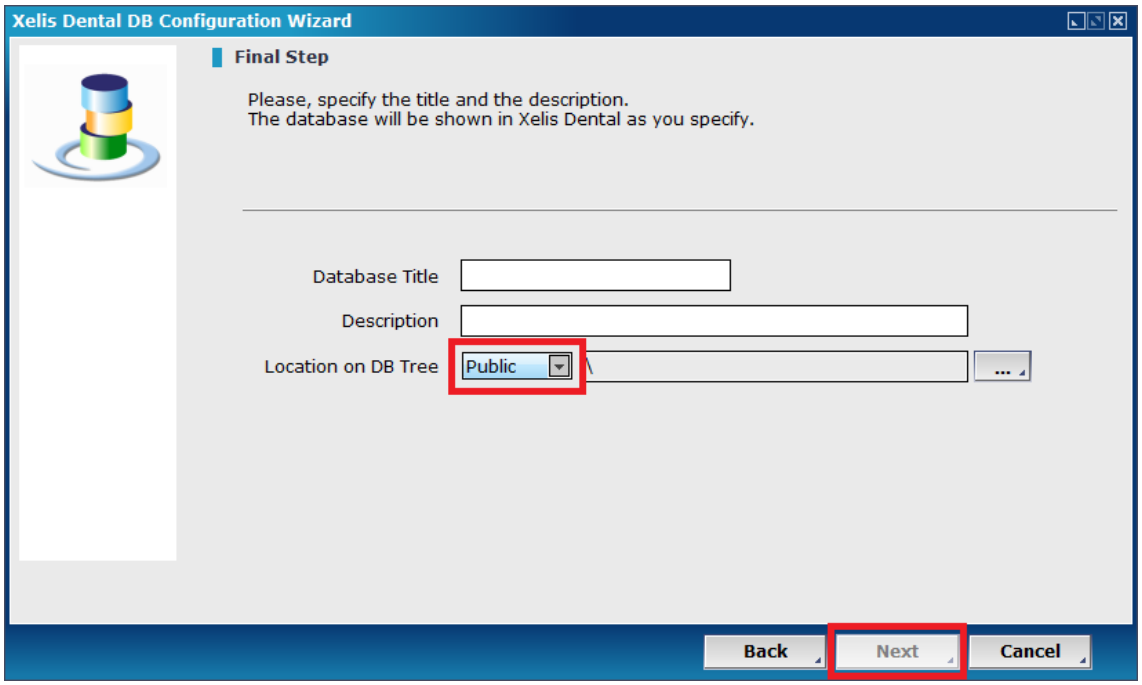
- Select “Attach an existing database or connect a remote DICOM server” and click ‘Next’.



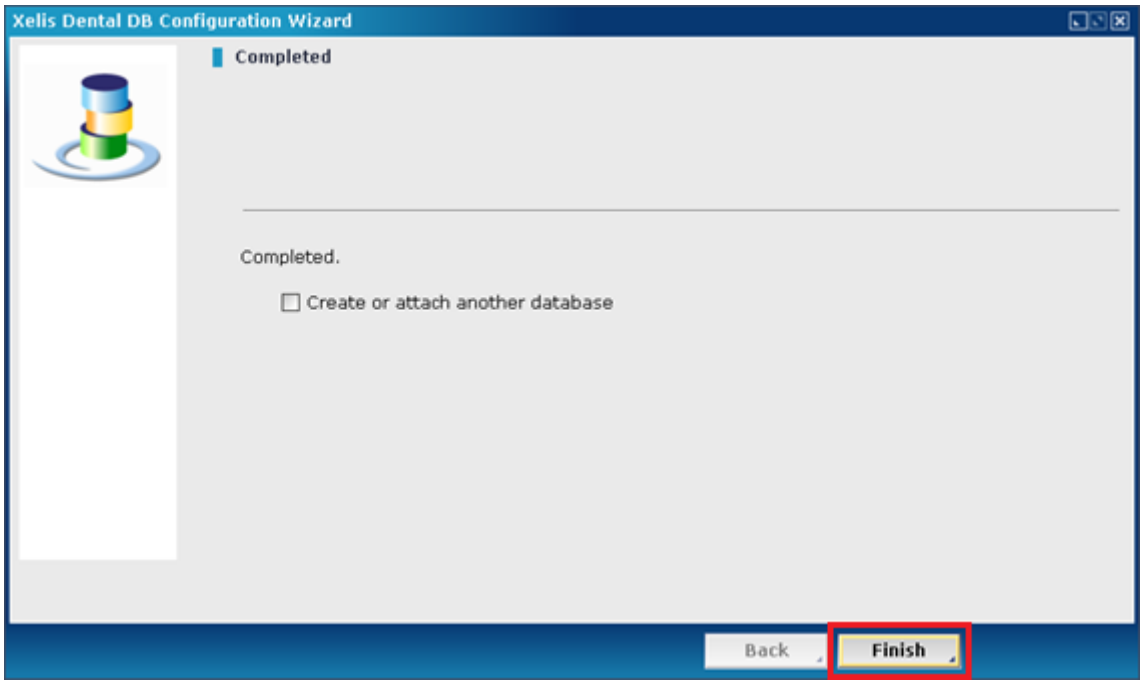
- Choose a DB type and click ‘Next’.



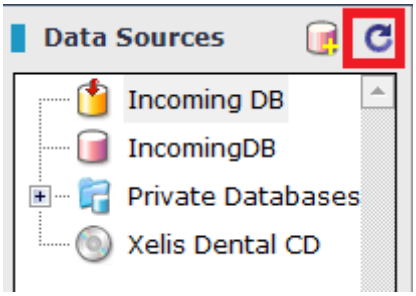
- Fill in the information to access existing database (An image above is for a Remote PACS Server)



- Fill the information and click “Next”.



2. Refreshing the ‘Data Sources’



In order to refresh the databases click the  icon.

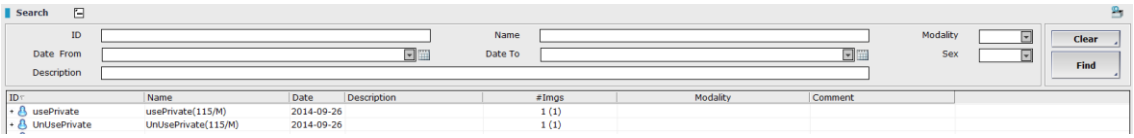
3. Database attachment and detachment

Select attached DB in the tree list, and click the right mouse button then menu is shown like the image below. By clicking the 'Configure Database' selected DB can be modified.

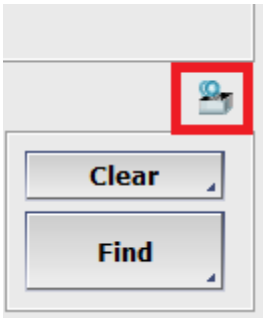
Import DICOM Files from Disk	Add DICOM files stored in the local to the selected DB.
Detach Database	Release the selected database. Detached DBs are disappearing at the 'Data Sources', and they can be re-attached again.
Set As IncomingDB	Set selected database as the 'IncomingDB'. Only one DB can be set as the 'IncomingDB'.
Configure Database	Identify and modify the selected DB.

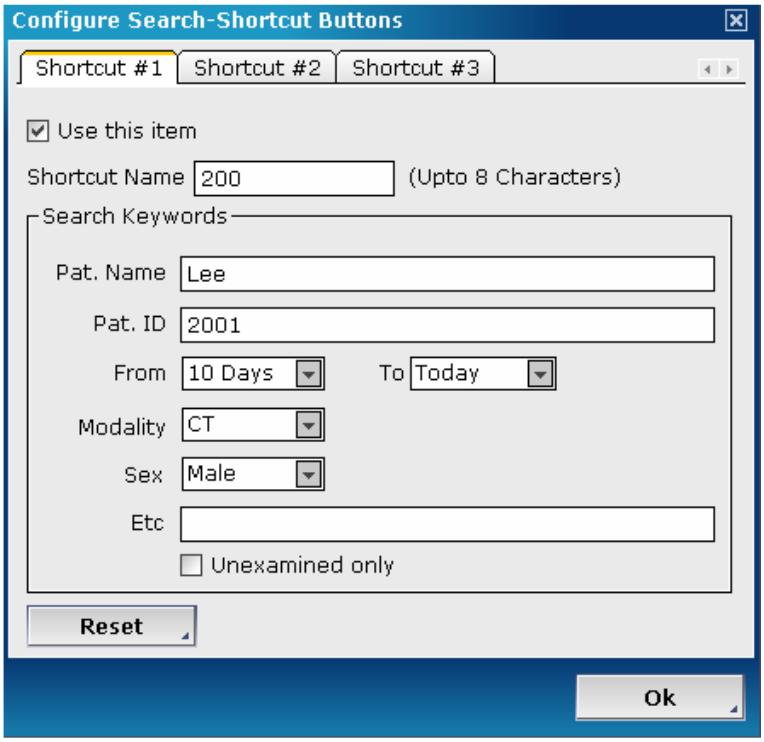
Chapter 4-3. Searching study data

Search study data from the database at DBM by the patient name, the patient ID, the acquisition date, or the modality.



Frequently used search keywords can be stored as ‘Search Shortcuts’. Three shortcuts can be stored.





Add ‘*’ keyword for convenient searching.

V*	Show all studies starting with ‘V’.
X	Show all studies including X in the middle.
*P	Show all studies ending with ‘P’.

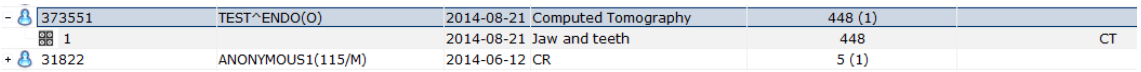
Chapter 4-4. Studies/Series Previews and Light-Box

Images for the study or the series are shown in the thumbnail without opening them.

Also by clicking the red box indicated in the image above, series is opened in the ‘LightBox’ module.

Chapter 4-5. Data Loading

Select studies or series to open various modules. Double click ( ) the study to see the related series.

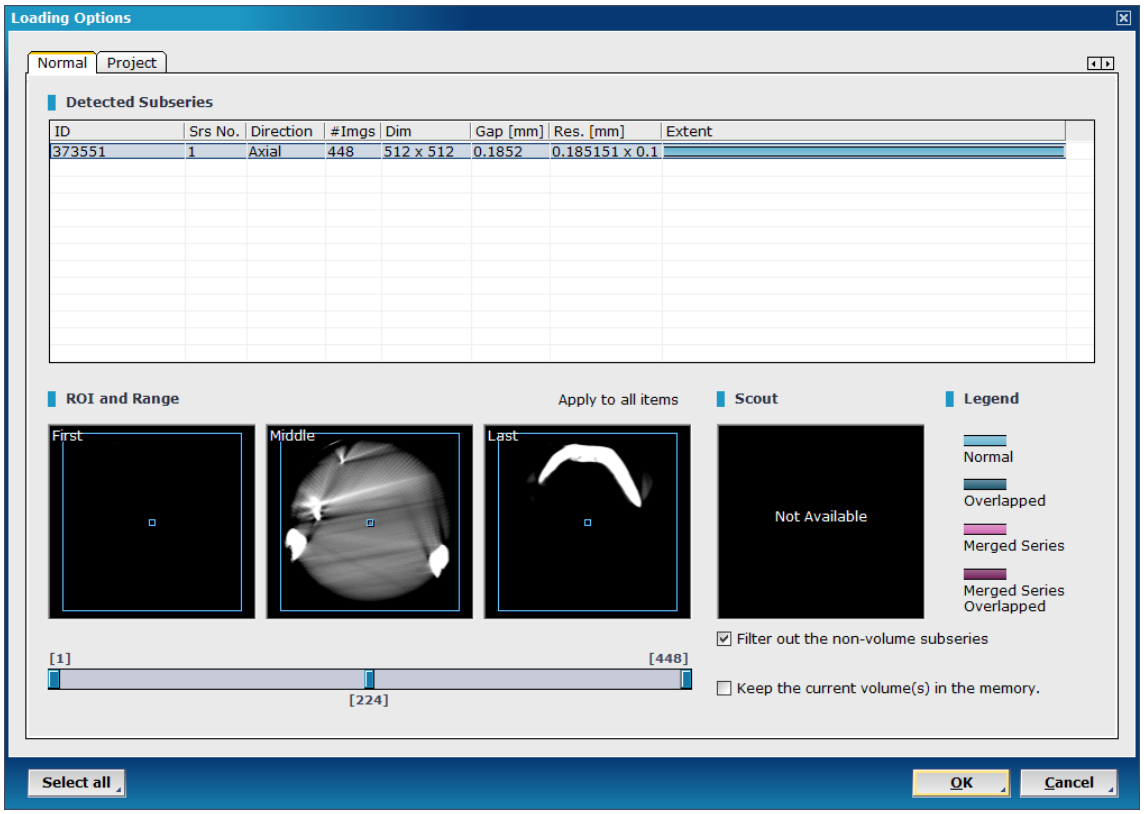


-	373551	TEST^ENDO(O)	2014-08-21	Computed Tomography	448 (1)	
	1		2014-08-21	Jaw and teeth	448	CT
+	31822	ANONYMOUS1(115/M)	2014-06-12	CR	5 (1)	

Select series and click the module button to load images. When only one study is selected the first series is loaded. Also by clicking the right mouse button on the study/series, menu pops up like the image below, and by selecting 'Load to Monitor #1', study/series is loaded. (#1 indicates monitor number loading that study/series)

1. Loading Options

When launching modules creating a volume such as a '3D' module, the 'Loading option' dialog pops up, to choose loading option.

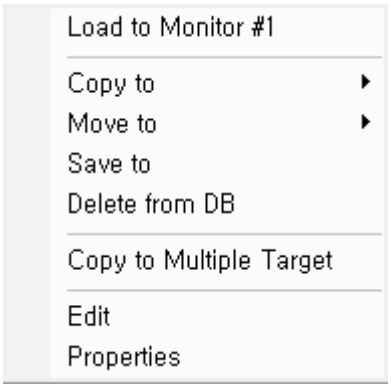


There are 5 items to set in the ‘Loading Options’ dialog.

Detected Subseries	When multiple series are chosen, all series will be shown. Select series to load by clicking the left mouse button while pressing ‘Shift’ key.
ROI	Modify blue box indicating an area to reconstruct a volume.
Filter out the non-volume subseries	Hide series which cannot construct volumes.
Keep the current volume(s) in the memory	Keep already loaded volumes in the memory instead of deleting them before loading a new volume. Volumes can be changed by clicking the ‘Volume’ button at the menu bar.
Range	Select image range to reconstruct a volume.

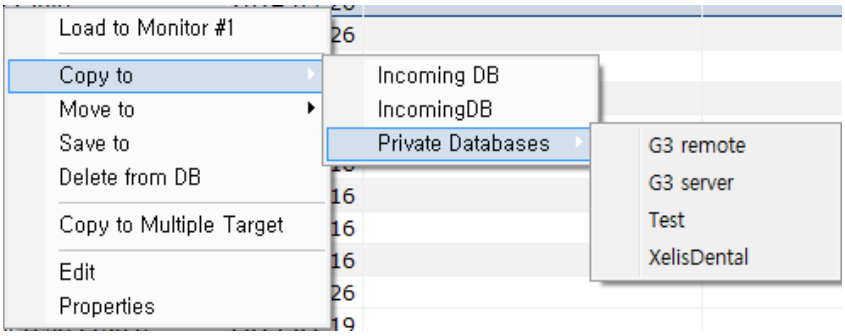
Chapter 4-6. Study/Series settings

A context menu pops up by clicking the right mouse button on the selected study/series.

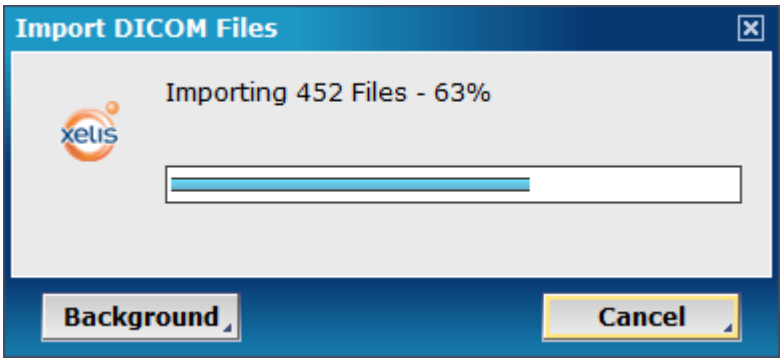


1. Copy to, Move to

Copy or move the studies or the series in the database to others by selecting a 'Save to' or a 'Move to' after clicking the right mouse button on the selected lists.



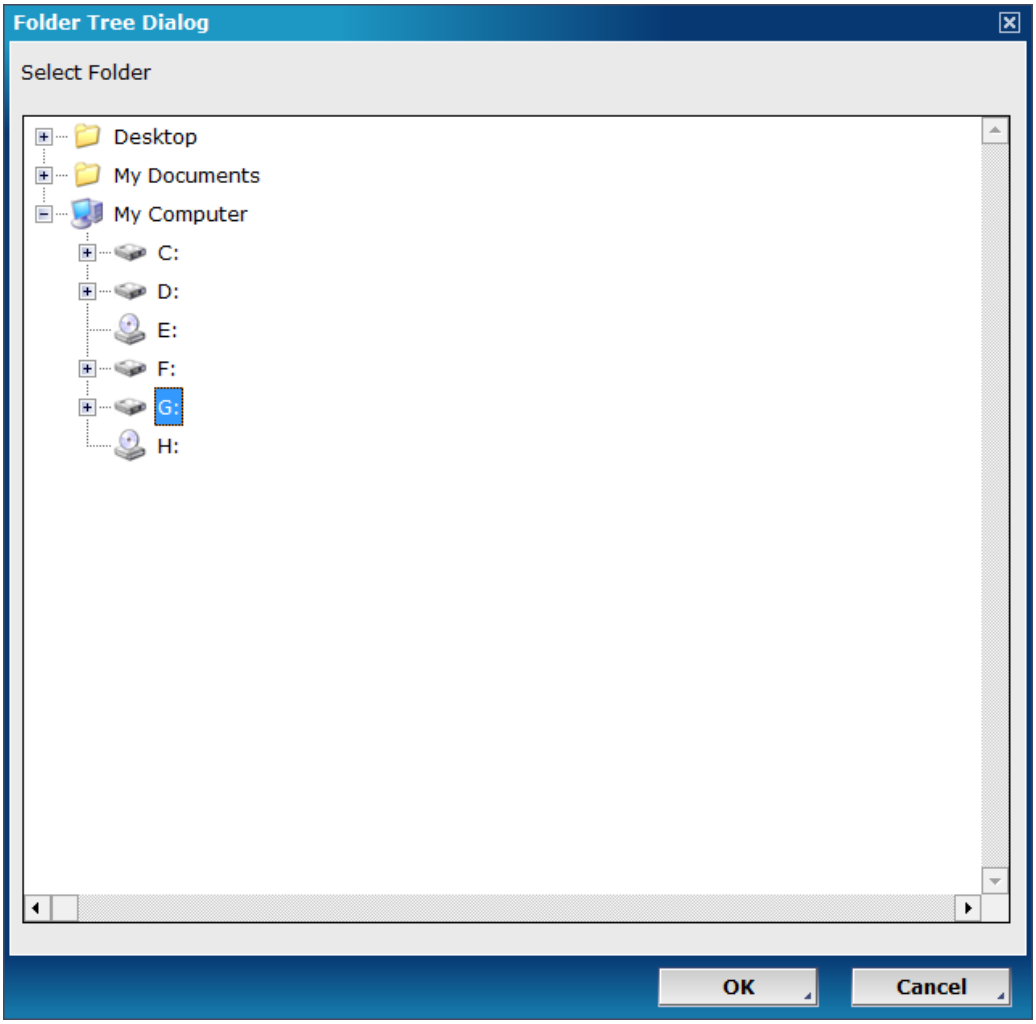
Choose a DB to send and press OK to initiate the process. The 'Background' button makes the sending process as a background job to do other actions before the process is finished.



Copy to	Selected data are not deleted in the current DB after sending.
Move to	Selected data are deleted in the current DB after sending.

2. Save to

Save study or series data into the local disk to DCM file format. Select a destination and press OK to save images.

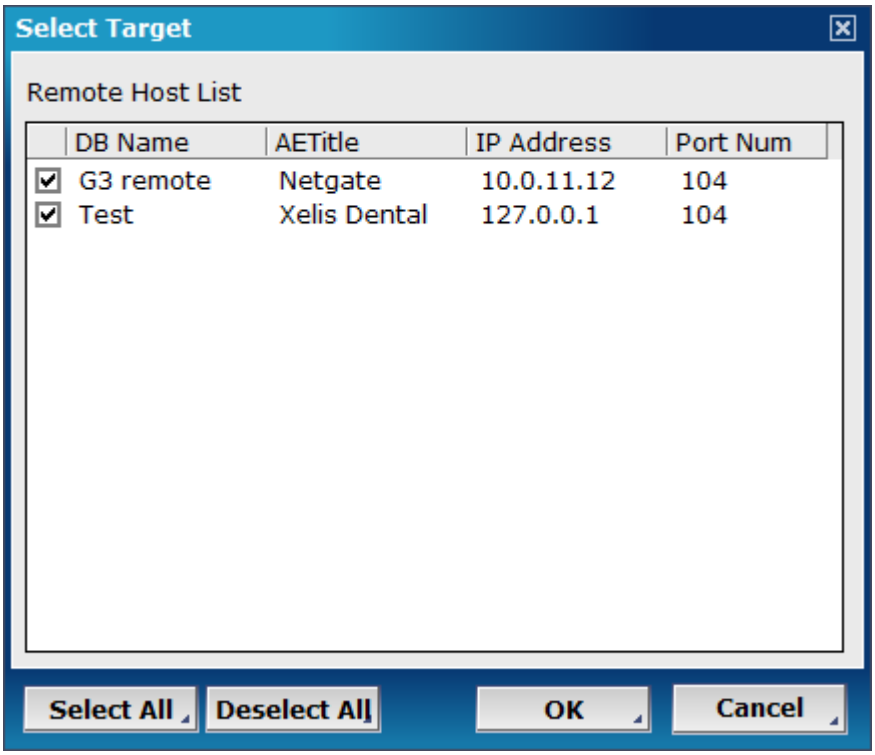


3. Delete from DB

Delete data from the database by clicking the ‘Delete from DB’ button.

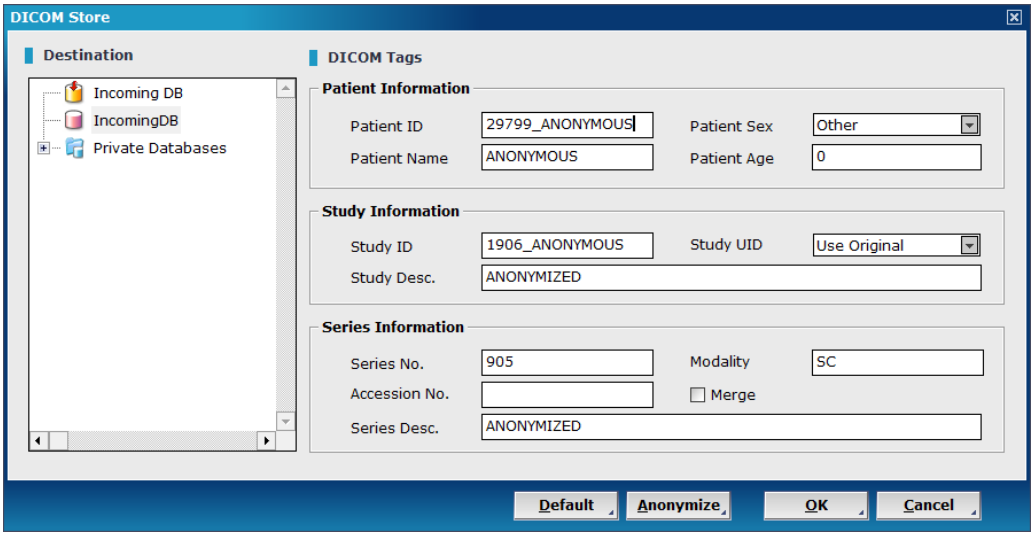
4. Copy to Multiple Target

Send selected series to multiple remote PACS server. Select ‘Copy to Multiple Target’ menu and chose the destinations.



5. Edit

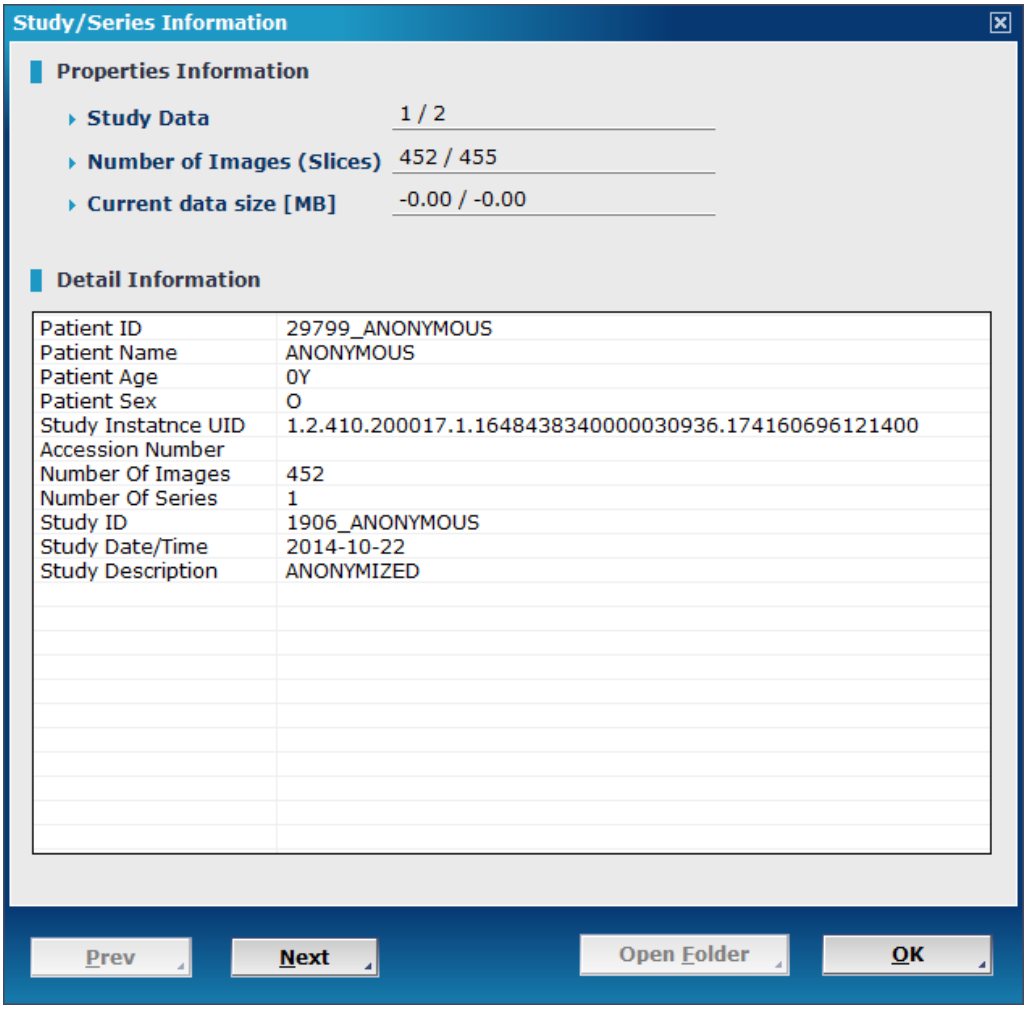
Change DICOM tag of the selected series and create new series. Select ‘Edit’ menu, and change the tags.



Destination	Select a destination to store.
DICOM Tags	Change DICOM tags.
Default	Get DICOM tags of the current series.
Anonymize	Anonymize the DICOM Tags.

6. Properties

Select ‘Properties’ menu in order to check the selected study/series information.



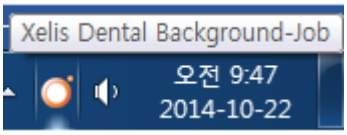
Prev, Next	Press buttons to change the study/series when multiple studies/series are selected.
Open Folder	Open a directory of selected study/series images is located.

7. Receiving Images through DICOM SCP

Xelis Dental supports DICOM SCP(Service Class Provicer) in order to send images from PACS client software to Xelis Dental through network. Sent images are stored in the default database. (Incoming DB)

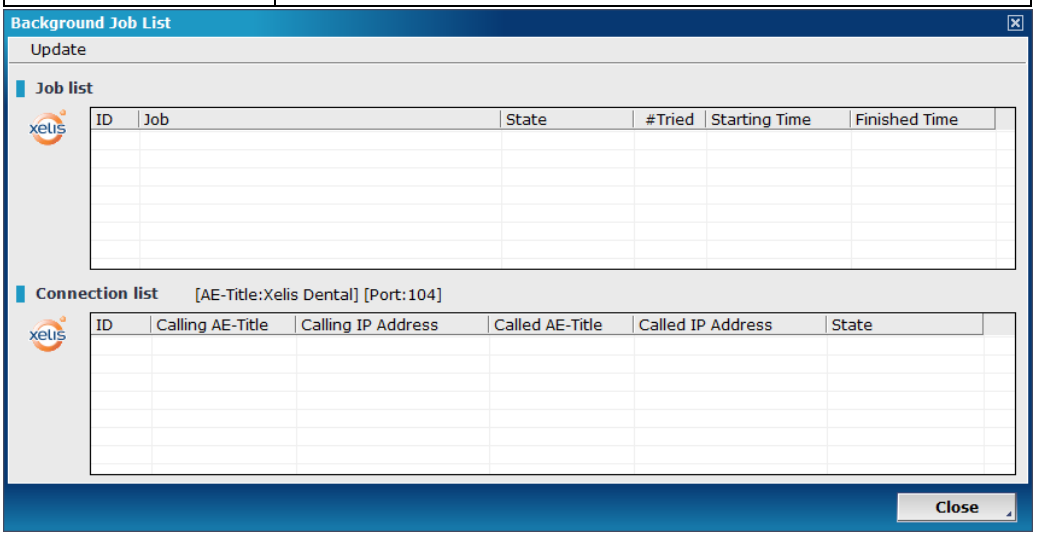
▪ Checking status of the DICOM SCP

Status is displayed on the system tray region, right side of the task bar. Icon can be differed along the operating system.



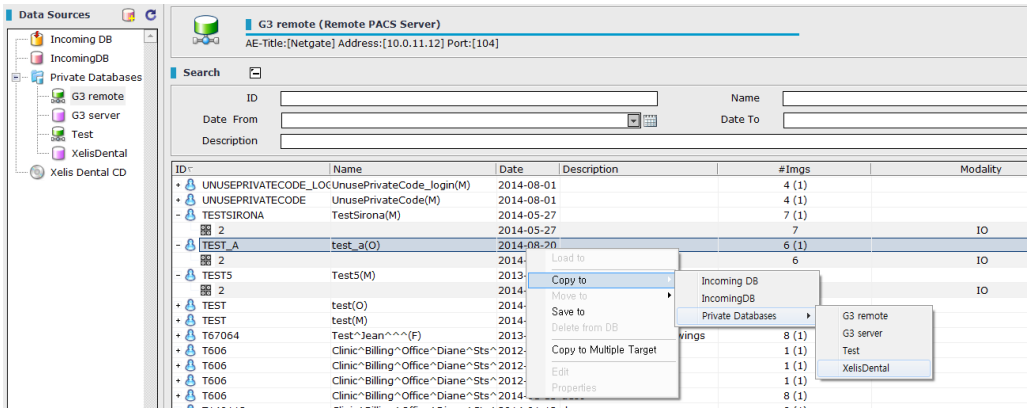
'Show status window' menu pops up after clicking the right mouse button on the icon.

Show Status Dialog	DICOM SCP dialog pops up to check its status.



8. DICOM Query/Retrieve from Remote PACS server

In order to use DICOM query/retrieve function defined by the DICOM 3.0 standards, first select the PACS server in the tree list. Remote PACS server doesn't display any results before clicking the 'Find' button, however searching interface is the same as the local database. After finding study/series want to find and choose 'Copy to' or 'Save to ' actions to save DICOM files into the local disk.

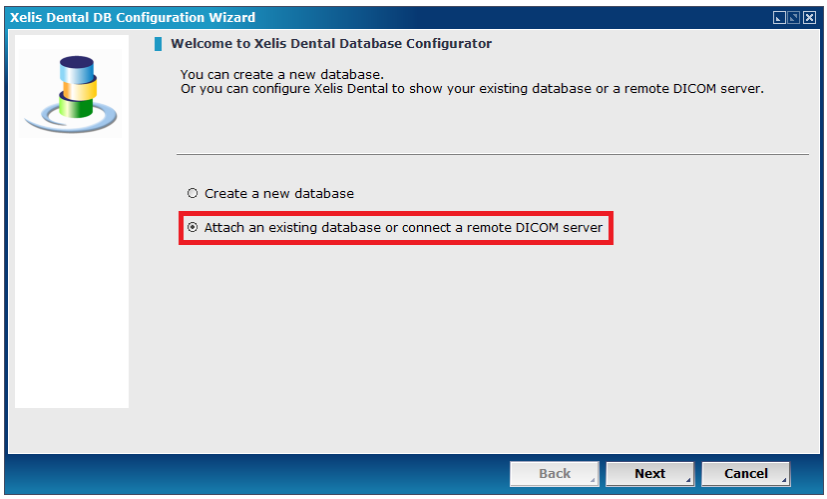


9. DICOM Query/Retrieve from G3 server

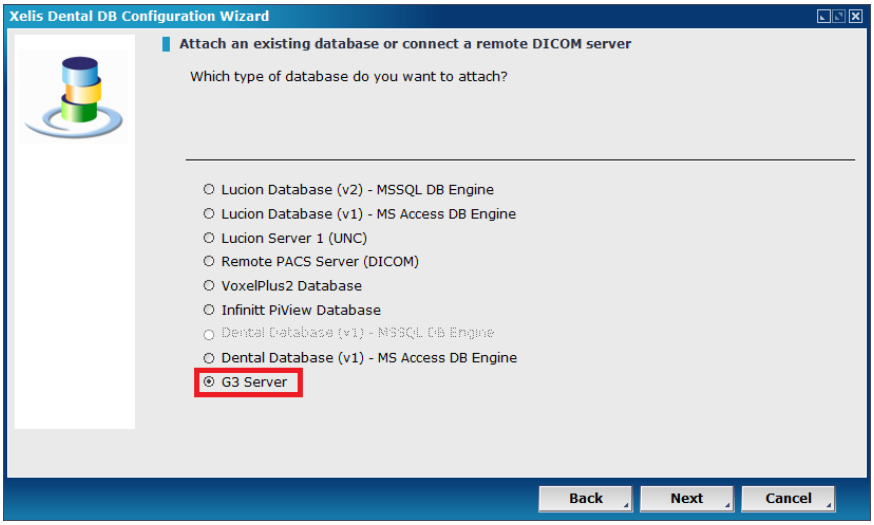
Select registered G3 server in the tree list, G3 server doesn't display any results before clicking the 'Find' button, however searching interface is the same as the local database.

(1) **Attaching G3 DB**

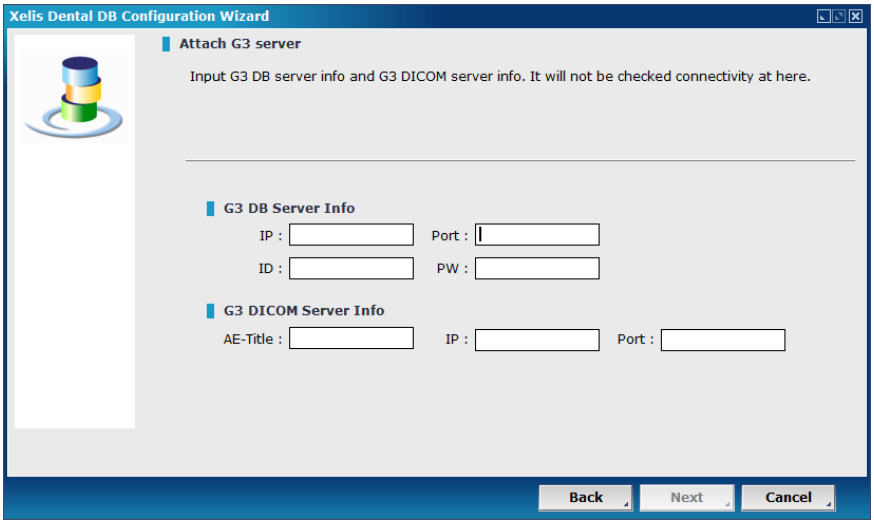
- Select "Attatch an existing..." option.



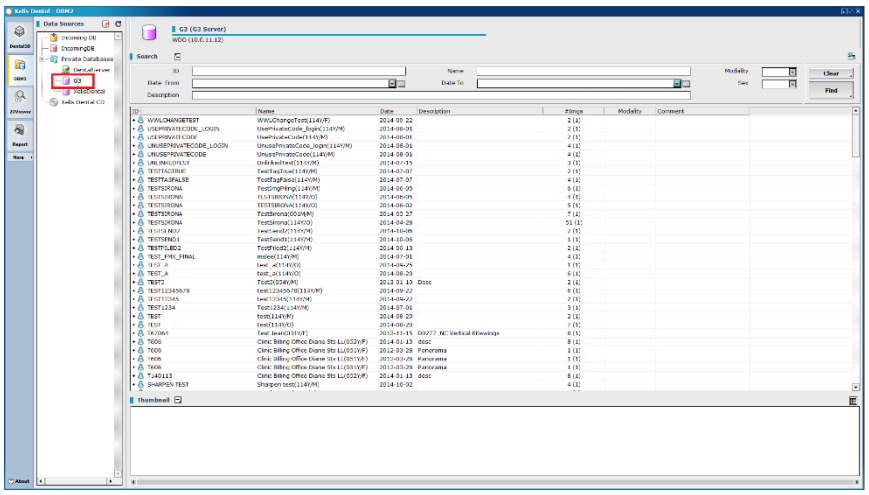
- Choose G3 server.



- Put DB information.
  - G3 DB Server Info: Server information to get images.
  - G3 DICOM Server Info: Server information to send images. (Server information to store files acquired from other databases.)

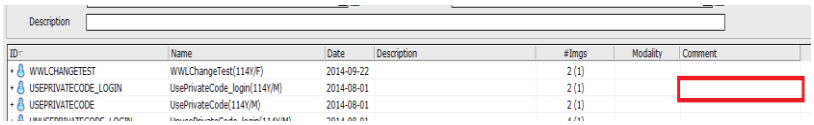


- Select G3 DB at the DBM
  - G3 DB doesn't search all studies when selecting it, becaues large data can be stored.
  - Press the ‚Find' button to search studies after selecting the G3 DB.

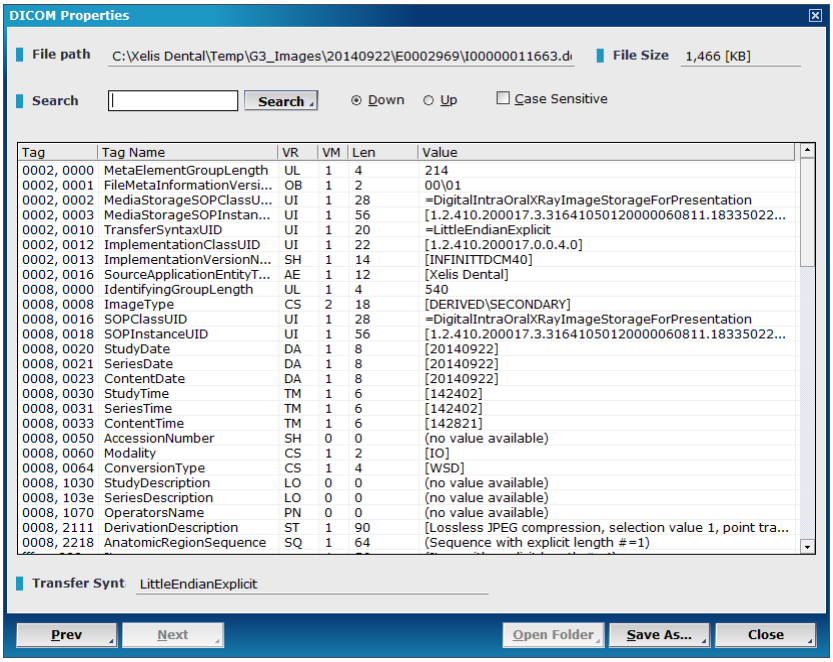


(2) **Unsupporting functions in G3 DB**

1. Comment
   - G3 server doesn't support comment function.



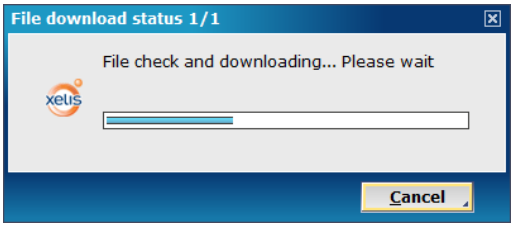
2. Open folder
   - Located at the image properties by clicking the right mouse button on the thumbnail images.
   - This function is disabled because images are located in the server.



3. Displaying Project/Smart volume modality
   - G3 server doesn't support project and smart volume modality.
   - Those files are indicated as CT.
   - Loading those files is available.

(3) **Changed functions using G3 DB**

1. Show file download progress bar while loaing volumes.
   - Progress bar indicating the file download process from G3 server.
   - Process file downloads as number of selected studies.
   - Press ‘Cance’ to abort the process.
   - Maintain downloaded data before terminating the program.



2. Show file download progress bar while ‘Copy to’, ‘Move to’, ‘Save to’ and ‘Edit’ function
   - The same as volume loading case

Chapter 5. Xelis Dental 3D

Xelis Dental 3D is a medical imaging software for loading CT or MR images which are in DICOM format, creating and visualizing loaded images in 3D,analyzing images in 2D, and providing various MPR functions to help fast and accurate diagnosis.

Chapter 5-1. Tools

1. Main Tools

The most commonly used tools on Xelis-Dental are collected together on the toolbar. On a standard landscape monitor, the toolbar is located to the right of the screen. On a portrait monitor, the toolbar is located at the top of the screen

(1) Image Viewing Tools

Zooming, Panning, Windowing, Rotating, Inverting tools etc. are located in the View section at the top of the toolbar. Options for selecting types of tools are located in Tool Option at the bottom of the toolbar.

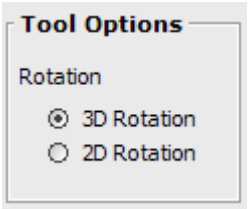
▪ Panning

Tool for panning images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to move the image as needed.

▪ Rotating

Too for 3D rotation of 3D images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to rotate the image as needed.

Rotating methods can be selected from the Tool Options screen. 3D rotation is possible on the MPR screen, but right and left rotation is also possible on 2D images



▪ Zooming

Tool for zooming in and out on images. After selecting the tool, click and hold the left mouse button and drag the mouse to zoom in and out on images.

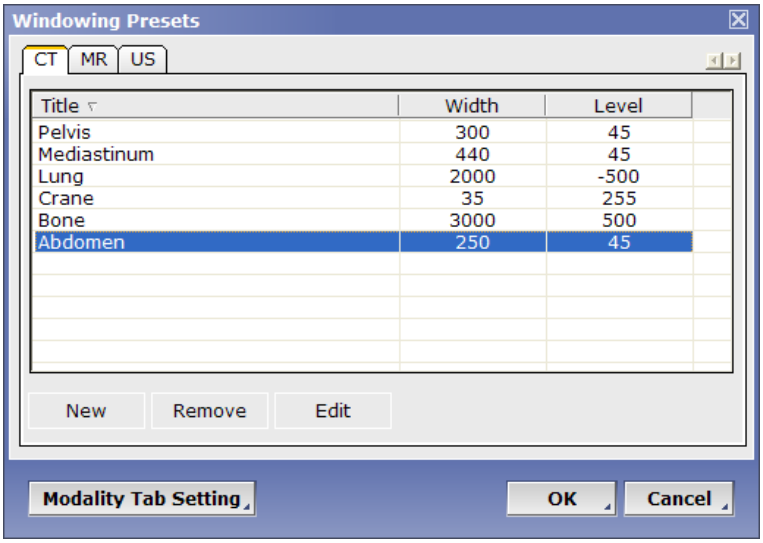
▪ Windowing

Tool for managing image Width/Level. After selecting the tool, click and hold the left mouse button, and then drag the mouse left and right to control Width and up and down to control Level.

Left/Right : Adjust Windowing Level

Up/Down : Adjust Windowing Width

A button for selecting Windowing presets is located on the Tool Options screen. Previously configured Windowing values can be applied to images by selecting presets from the dialog window. The Tool Options and Windowing Preset dialog screen are shown below.



The following options are offers on the Windowing Preset dialog screen.

Modality Tab Setting	Adding and removing tabs.
New	Adding new preset values.
Remove	Removing currently selected preset value.
Edit	Editing currently selected preset value.
OK	Applying currently selected preset value to image.
Cancel	Canceling operations and returning screen to original state.

▪ Inverting

Tool for inverting image display. When the button is clicked the image is inverted. Pressing the button again returns image to original state.

▪ Sharpen

Tool for apply sharpen filter on images. Sharpen filter is applied on the image when the button is clicked. Pressing the button again returns image to original state.

▪ Text

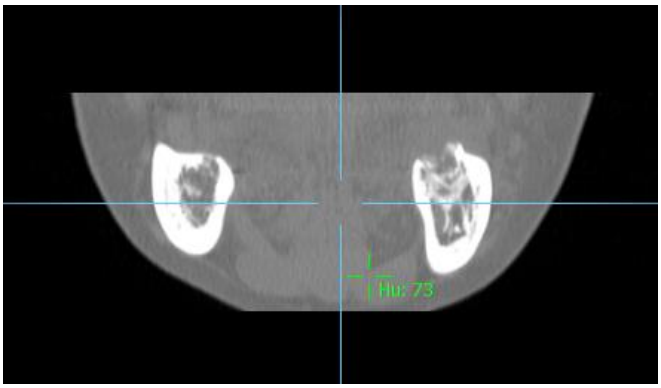
Tool for text overlay display. When the tool is selected, text information is displayed on images.

▪ VOI Overlay

Tool for managing VOI box image location and size.

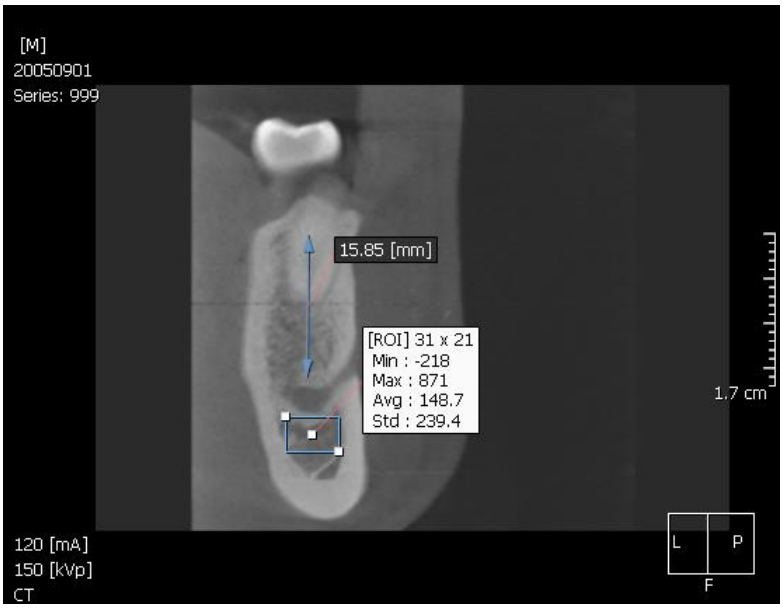
▪ Lens

Tool for HU(Hounsfield Unit) value display.



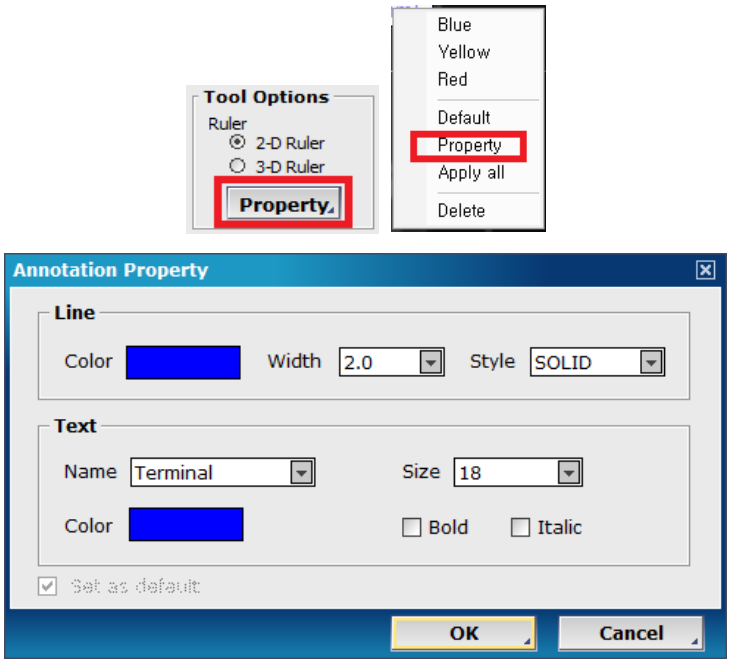
(2) Image Analysis Tools

Ruler, Tapeline, Angle, Profile, Area, ROI (Region of Interest), Note and Delete All image analysis tools are also provided. These tools make image analysis easy by offering information such as the distance between 2 selected points, the angle between several points, ROI area, and the average value of image data.



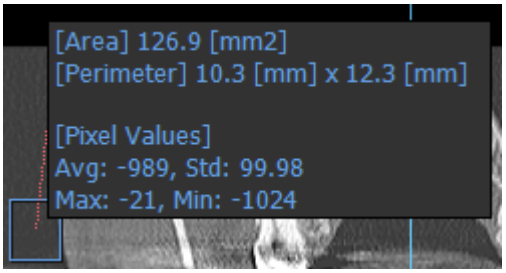
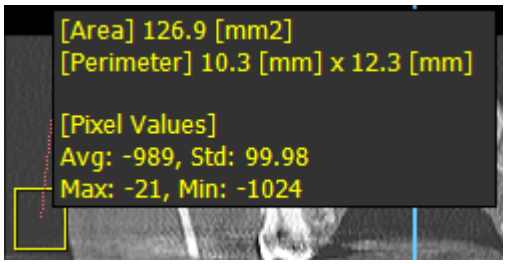
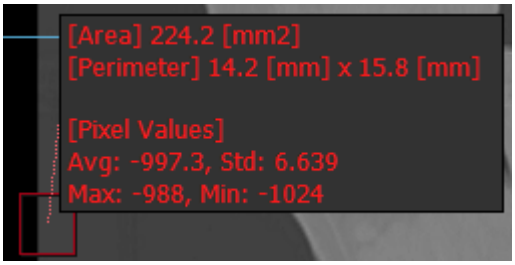
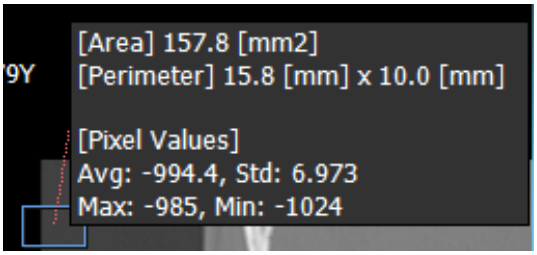
▪ Tool option – Property

You can change line property(color, width, style) and text property(font, size, color, bold, italic). The program remembers the color you have chosen. Refer to the figures below.

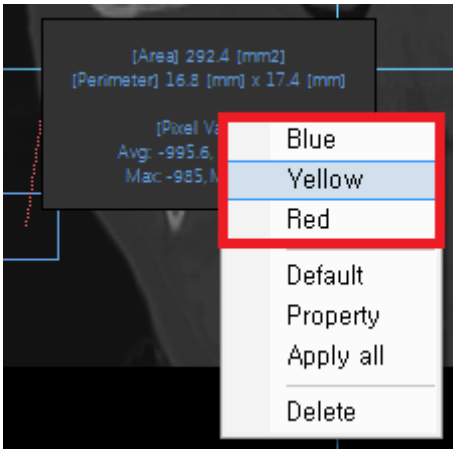


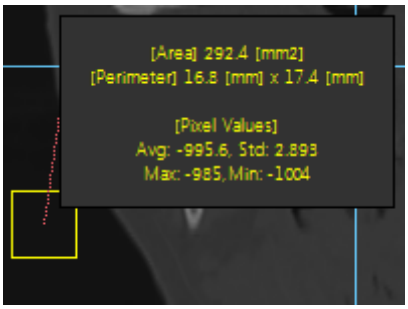
▪ Tool option – Color Preset

You can choose the color of the text and the line. The default line color is blue and the default text color is white. The program remembers the color you have chosen. Refer to the figures below.

Blue	Yellow
	
Red	**Default**
	

To change the color, select the menu from the right mouse context menus.





▪ Measuring Distances

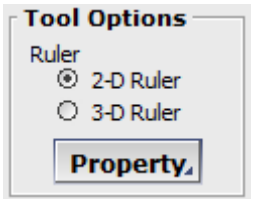
Ruler

The distance between 2 selected points is measured in [mm]. After selecting the tool, select 1 point on the image, then select another point and the distance is automatically calculated and displayed. The line between the 2 points can then be moved by clicking on the line and dragging the mouse.

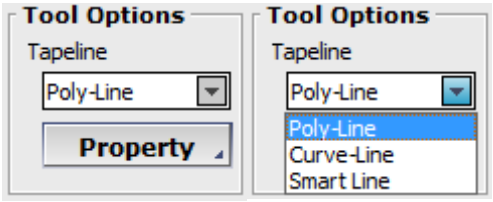
Tapeline

The distance of straight or curved lines is measured in [mm]. After selecting the tool, select several points in order on the image and then double click or right click to complete the line.

When the Ruler tool is selected, 2-D Ruler or 3-D Ruler types can be selected from the Tool Options screen. (This tool can change color)



When the Tapeline tool is selected, Line Type or Curve Type lines can be selected from the Tool Options screen. (This tool can change color)

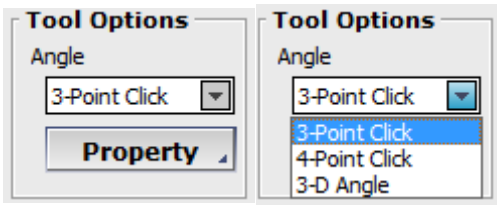


WARNING!	Measurements can be done on regions of interest on images where Fine Tuning has been applied using the OTF graph on the 3D screen.

▪ Measuring Angles

Tool for measuring the degree of angles between 2 lines. After selecting the tool, draw an angle by selecting 3 points on the image and click to measure the angle.

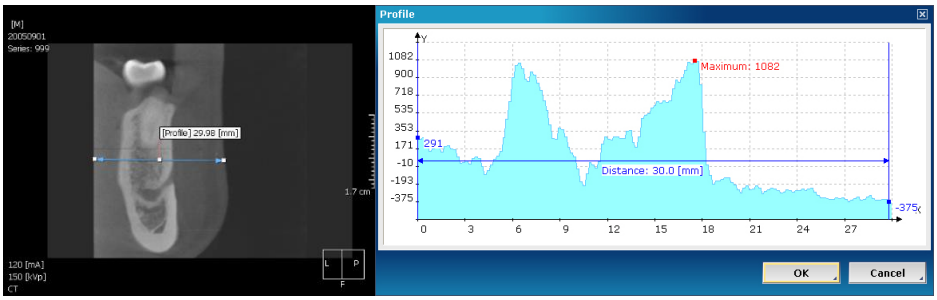
When the Angle tool is selected, the type of angle measurement can be selected from the Tool Options screen. Select 3-Point Click, 4-Point click or 3-D Angle from the list as shown in the image above. (This tool can change color)



WARNING!	Measurements can be done on regions of interest on images where Fine Tuning has been applied using the OTF graph on the 3D screen.

▪ Profile

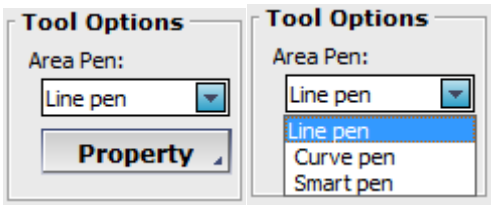
The pixel value of a line drawn on a 2D mage is shown above the line. Use the mouse on the graph to move the points on each end of the line.



▪ Measuring Area

Tool for measuring the area of ROI drawn on images. After selecting the tool, click on a point then move the mouse to other points to draw the ROI.

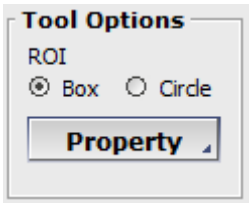
The line type can be selected from ‘Tool Options’. (This tool can change color)



▪ ROI (Region of Interest) Information

The pixel average value, high value, low value and standard deviation information can be measured on ROI images.

Box and Circle type ROI can be selected in Tool Options. (This tool can change color)



▪ Arrow

Areas of images can be emphasized easily using the Arrow tool.

▪ Notes

Notes can be written at a selected location on 2D images.

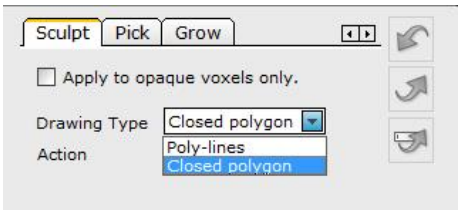
(3) Segmentation

Draw Mask, 3D Picker, Mask Overlay, Reset Mask, Undo Mask, and Redo Mask tools etc. are offered in the Segmentation section at the middle of the toolbar to the left of the screen.

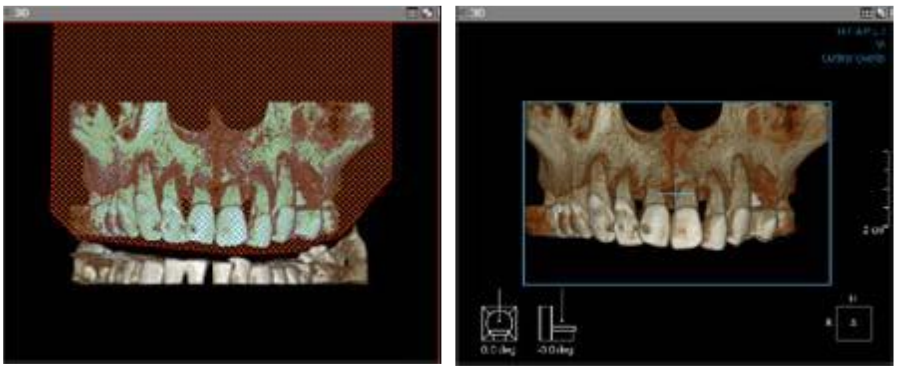
Draw Mask

Select region of image for segmentation using Poly-lines or Closed Polygon. The Remove, Keep and Restore functions can then be applied to the selected region.

Select Poly-lines or Closed Polygon from Drawing Type then select the action (Remove, Keep, Restore) to be applied to the region.



The image is configured as shown in the sample below. To complete configuration of region, double click on the image, and then click on the desired region.

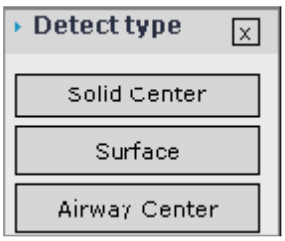


3D Picker

Segmented structures that are selected can be removed with Opacity, and region ns with certain bone densities can be extracted using the Threshold Value function.

▶Using opacity

Click on one point of a structure that is to be extracted from an image. When a point is entered on a 3D image, the menu shown below will come up. Select an item from the list according to the type of structure that is to be extracted.



Click the Start button on the Object Mask Tool dialog box to initiate image extraction.

▶Using threshold values

After selecting Using Threshold Values, enter the high and low threshold values. Clicking the Start button initiates extraction.

Mask Overlay

Function for configuring MPR image options when segementing images. When segmenting an image while Mask Overlay is executed, the MPR image is also executed. When Mast Overlay is not initiated, only the 3D image is removed and the MPR image remains.

Reset Mask

Resets image segmentation.

Undo Mask

Undoes the last executed operation.

Redo Mask

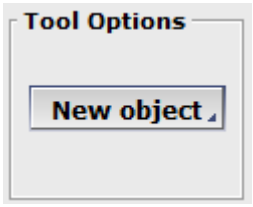
Re-applies last undone operation.

(4) **Object**

Three objects (Bone, Airway and Skin) were included. User can extract bone, air and skin objects easily.

Bone

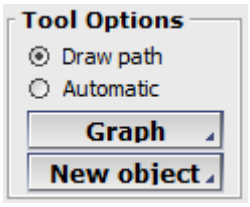
It shows bone object. OTF graph is changed.



If user click the button, new bone object was added.

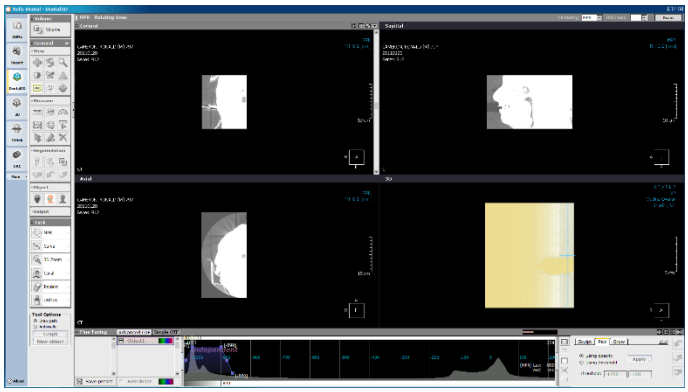
Airway

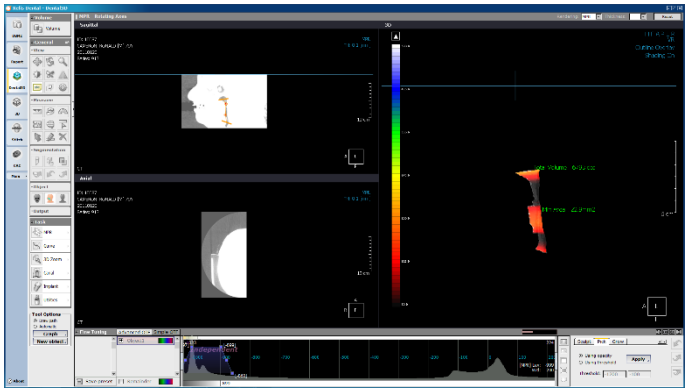
It shows airway object made by sculpting and picking automatically.
In the airway, two tool options were provided. One is “draw path”, and the other is “automatic”.



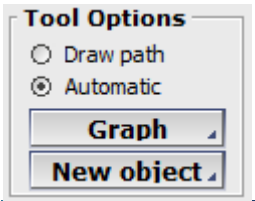
It can be used when user wants to track the airway directly,

When the draw path is clicked, the screen was set like picture below. User has to pick at least 2 points on sagittal or coronal plane. At last, user has to click left button twice or right button.

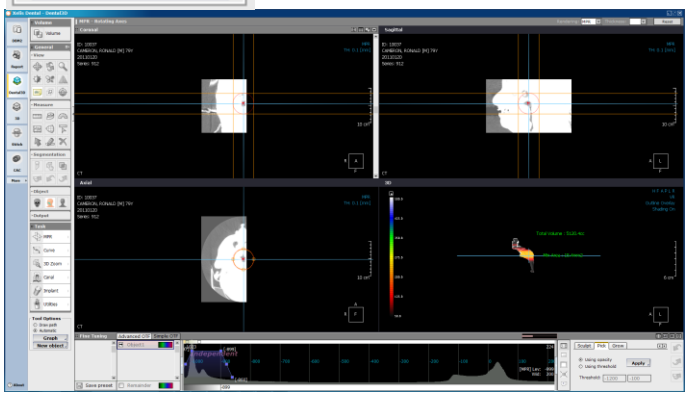




The layout is set when draw path is used.

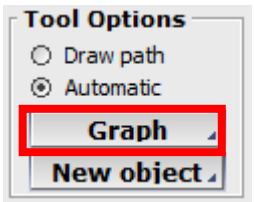


In automatic option, user has to move the point to airway in coronal, sagittal and axial plane. When the point was set on the airway in each plane, click the apply button.

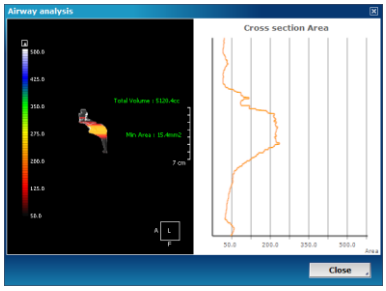


After user shifts point to new position, user has to click apply button to pick the airway on new position.

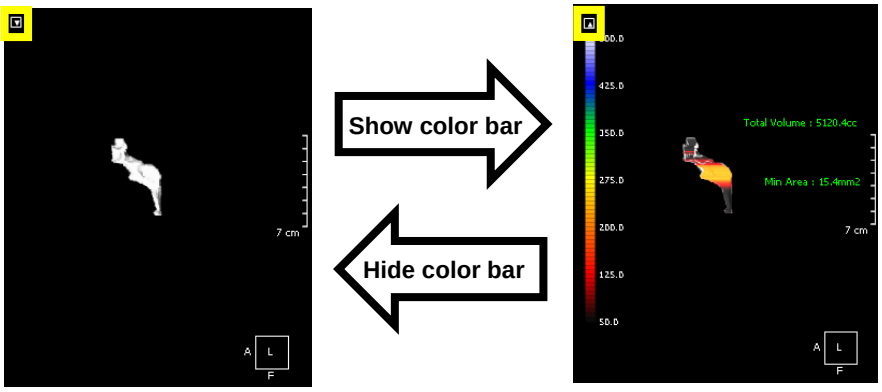
The color bar on the left side of 3D screen shows the cross sectional area of the airway. The range is from 0mm^2 (black) to 500 mm^2 (purple). The cross sectional area is colored in rainbow, based on its value.

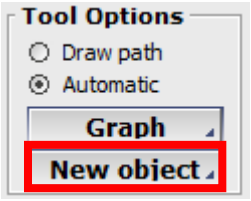


The cross sectional area data is also presented as a graph. The airway analysis dialog will pop up when user clicks graph button.



In 3D airway plane, user can show/hide the color bar and other overlay by clicking button on yellow box below.





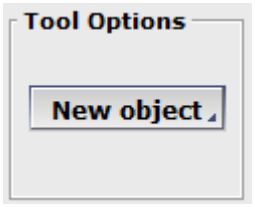
If user click the new object button, new airway object that user selects was added.

Important: The measurement values given from Xelis Dental may not be true and measurements may be inaccurate for anatomical use. The image is not perfect replicate of the body, and contains white noise, scattering, beam hardening, ring noise, off scale H.U. and visible layers. The software measurement tool calculates volume or area from those images and not from the true anatomy. Also, the measurement values depend on the threshold values which users have to set threshold range for their desired structures with their specific images. The measurements must not be used alone for metric measurement for any treatment.

Warning: Diagnosis, treatment plan and/or actual treatment with incorrect measurements will cause surgical complications. End user needs to learn and know how to make accurate measurements and use all measurement tools properly and correctly. When Xelis Dental performs measurement, measurement accuracy will depend heavily on the image data and the body scanning hardware. Software will not generate more precise measurement than the resolution of the image. Medical imaging is a collection of 2D data, therefore the image data has not well-defined boundary. The boundary visible in the software is affected by the software brightness and contrast setting. The boundary can change according to user's adjustment to brightness and contrast. Before taking any action with the measured values, the user must be aware of the limitation of the software measurement value

Skin

 It shows skin object. OTF graph is changed.



If user click the button, new skin object was added.

(5) **Image Output Tools**

▪ **Capture**

Function for capturing images or entire screens. Captured images are saved on the PACS Server or the local database. Captured images can be verified from the PACS Viewer.

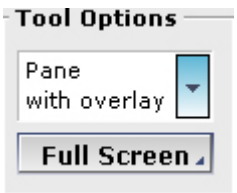
 While this button is pressed, click on an image to capture it.

➢ Capture Pane

Function for capturing entire screens (Pane).

① Click the Capture button from the Output menu.

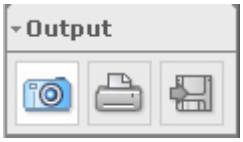
② Click the button to the right of Tool Options and select the Pane option. When the 'with overlay' option is checked, measurements etc. are captured along with the image. When the 'original data' option is checked, only the original image is captured



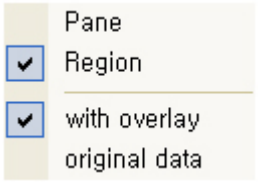
③ Make sure the cursor is in the hand shape and then click on the Pane to be captured.

➢ Capture Region

① Click the Capture button from the Output menu.



② Select the Region option from Tool Options.



③ Be sure that the mouse is in the graphic pointer shape and click on draw a square around the desired region by clicking and dragging the mouse.

④ After drawing a square around the desired region, click on the selected region. The selected region will then be inverted and the capture is complete.

▪ Print

Function for printing images.

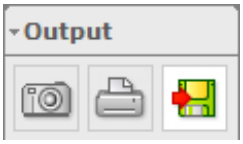
The print method for each module is different. Printing for each screen will be explained.

▪ Save Project

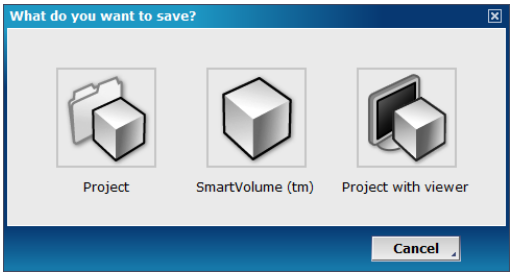
Save Project is a function to save the current state of program

Function for Project save.

Click the Project save button from the Output menu

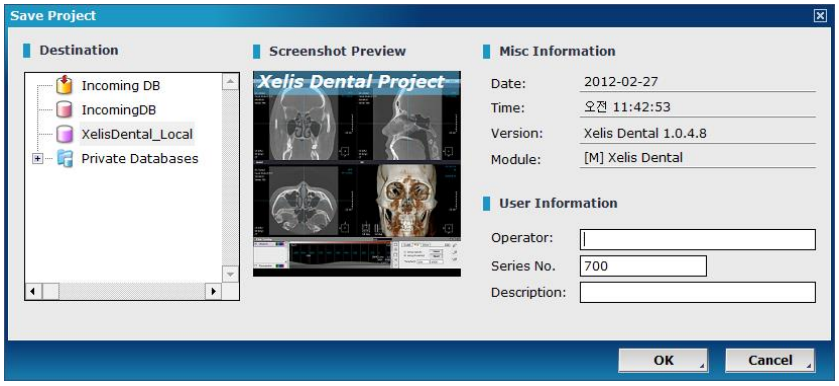


Select the save as type.



➢ Project or SmartVolume

Select a destination to save the project file when the Save Project dialog box appears.

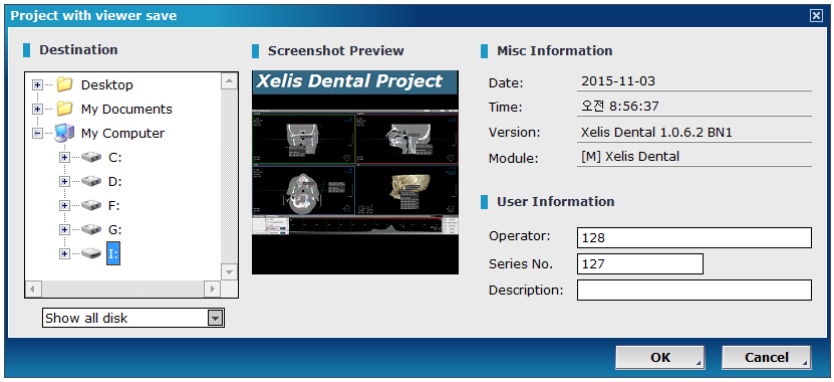


Input operator and description and click the OK button to save

➢ Project with viewer

Select a destination to save the project file with Xelis Dental Viewer when the

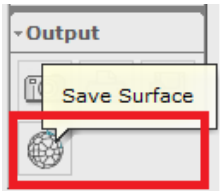
Project with viewer save box appears.



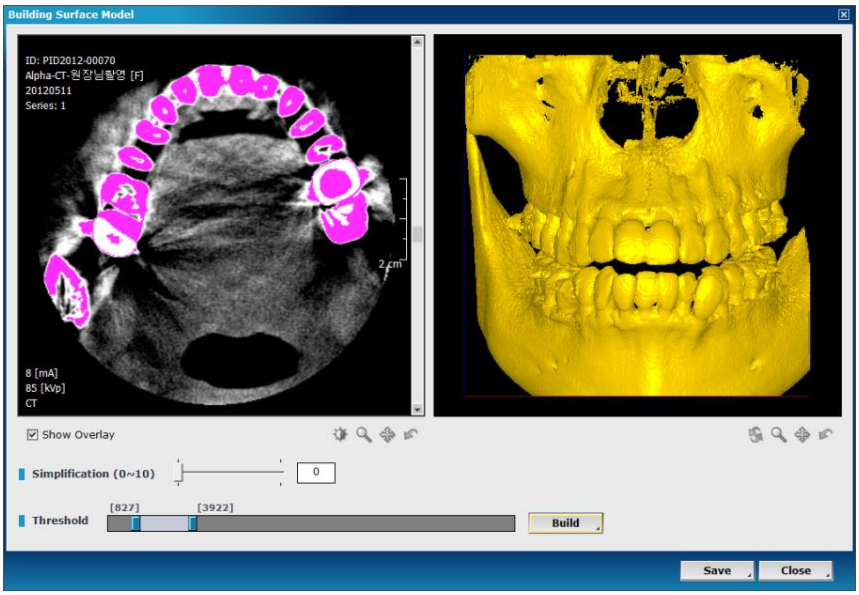
Input operator and description and click the OK button to save

▪ Save Surface

Press the ‘Save Surface’ button in order to save Surface data in form of STL file.



After that, window box appears to store surface data. Press the ‘Save’ button to get STL file.



1. Show overlay
   - ■ Show pink color overlay indicating regions to be the surface data.
2. Simplification
   - ■ Simplify the polygon in order to reduce the size of the file.

- 0: no reduction, 10: max reduction

3. Threshold
   - Select a range to make surface data.

2. Local tools

The Local tools for each screen and module are different. So, explanations for each module will be given separately.

Chapter 5-2. Image Viewer

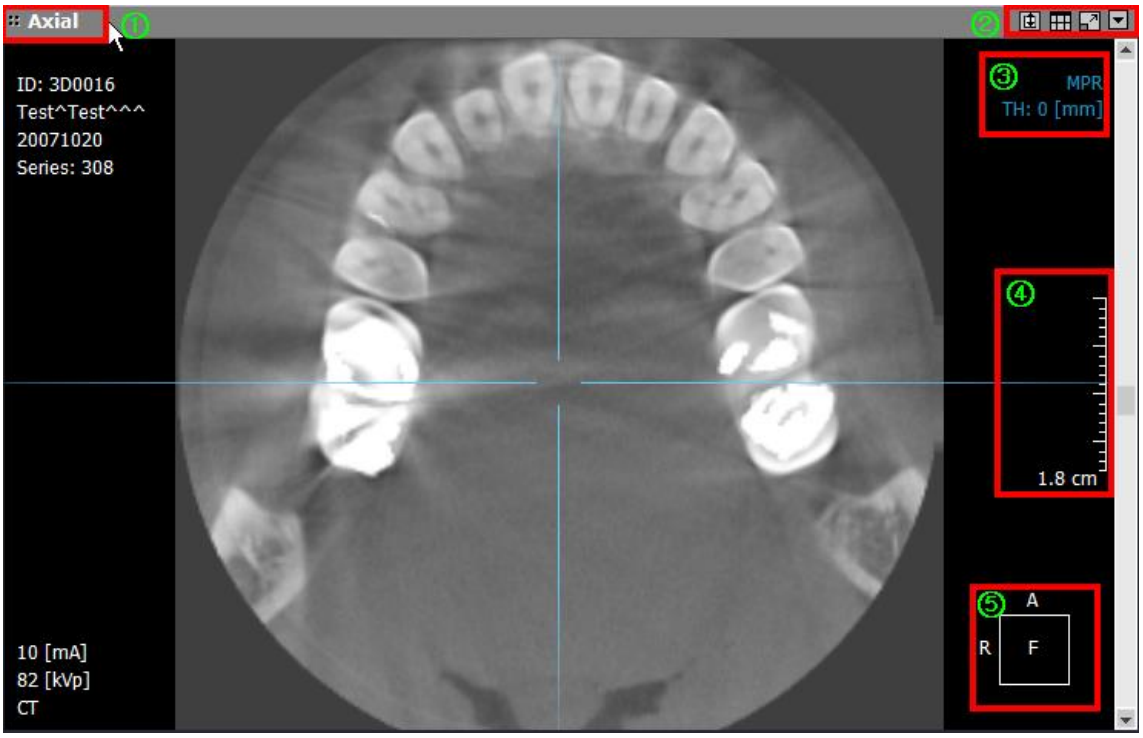
1. Introduction

The Image Viewer is where images are displayed. MPR, 3D and Endo images are all displayed in the Viewer and images can be changed in the Title Bar.

2. Types of Image Viewers

(1) Viewer with title bar

Shown below is the basic Image Viewer. An MPR is used as an example.



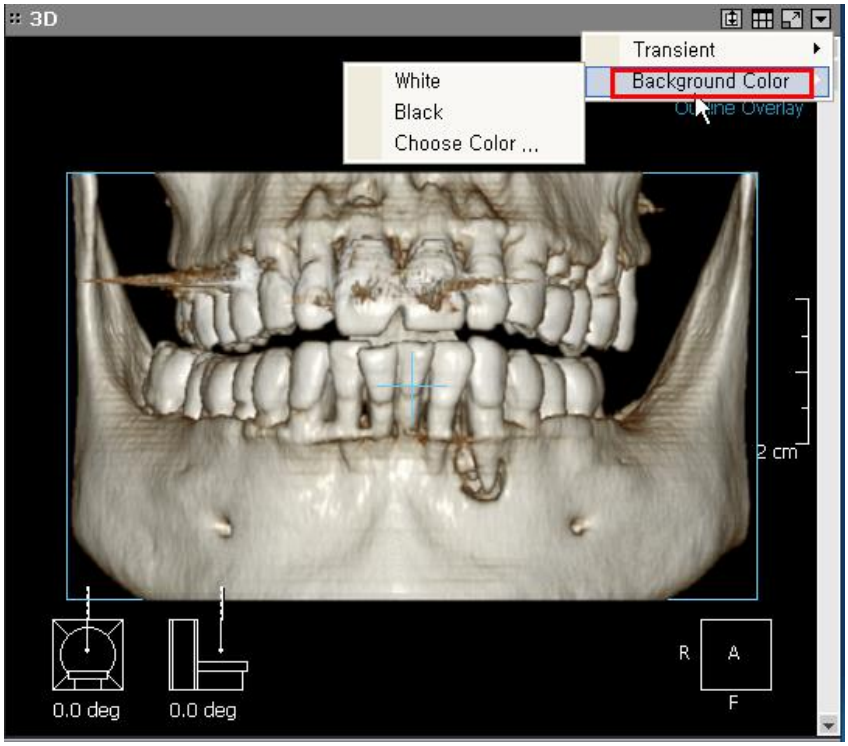
■ **Title Bar**

The image can be changed on the context menu that comes up when the text in the title bar is clicked.

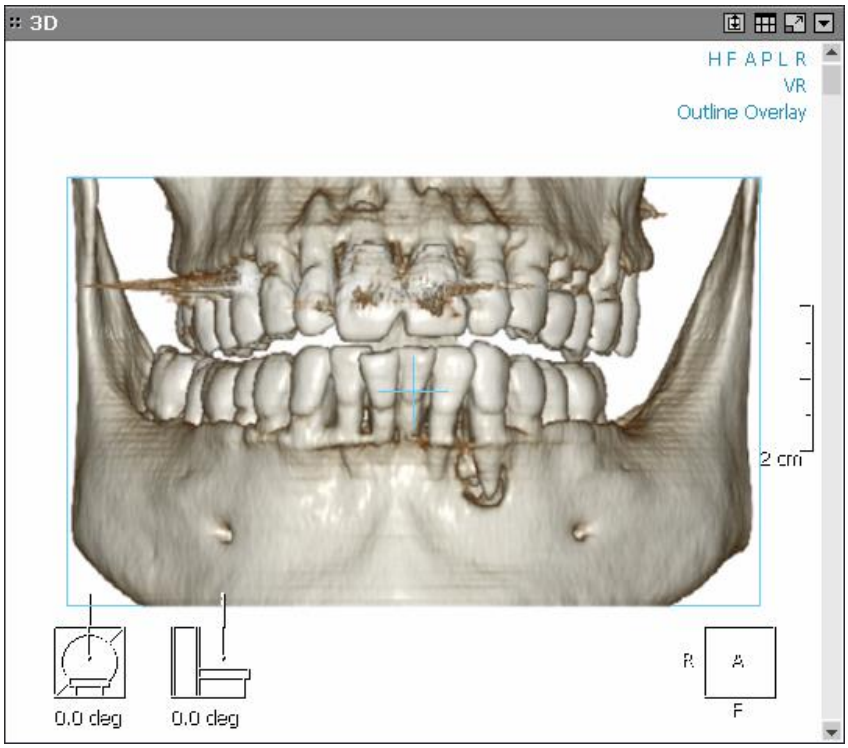
■ **Tools in the Viewer**

Toggle VOI, Quick-LightBox, Maximize etc. function buttons are included in the Viewer.

Transient (Rendering Speed) function and background color can be changed on 3D images.



< Background Color: Black >



< Background Color: White >

■ **Image Information**

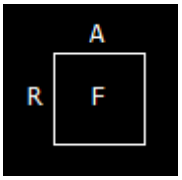
Information for the current image is displayed. Options can be changed by clicking on the text.

■ **Grid**

Shows actual size of images.

■ **Directional Information**

The rotation of the image is represented by a cube as shown below.



The meanings of the letters in the cube are as follows:

(H) Head, (F) Foot, (L) Left, (R) Right, (A) Anterior, (P) Posterior

INFO.	The cube is meant to show only the rotation direction of the image, but the image can be rotated by changing the direction of the cube.

(2) **Viewer with no Title Bar**

This Viewer is used for viewing Quick-Light Box and Cross-Sectional View.

Image can be Maximized/Minimized using the button on the Title Bar.

3. Image Viewer Tools

(1) **Toggle VOI**

Toggle VOI	 Click button to activate VOI (Vision of interest) function. A region of an image can be selected by dragging the mouse and making a dotted line around the region.

(2) **Quick-Light Box**

QuickLB	 Click button to activate Quick-Light Box. Quick-Light Box is used when slicing MPR images on arbitrary angles. 3D images can be rotated and viewed vertically/horizontally on arbitrary angles. Sliced images can be played and saved with Cine Player.

(3) **Maximize / Minimize**

Maximize	 Maximized Viewer.
Minimize	 Minimizes Viewer .

(4) **Menu**

Menu	 Brings up menu on the viewer.

4. Basic Functions

(1) **Scroll**

2D images can be scrolled using the mouse wheel or the scroll button to the right of the screen.

(2) **Rotate**

Right click and drag the mouse on 3D images to rotate images.

(3) **Windowing**

Click the Windowing button on the toolbar or right click and drag the mouse on a 2D image to control the brightness.

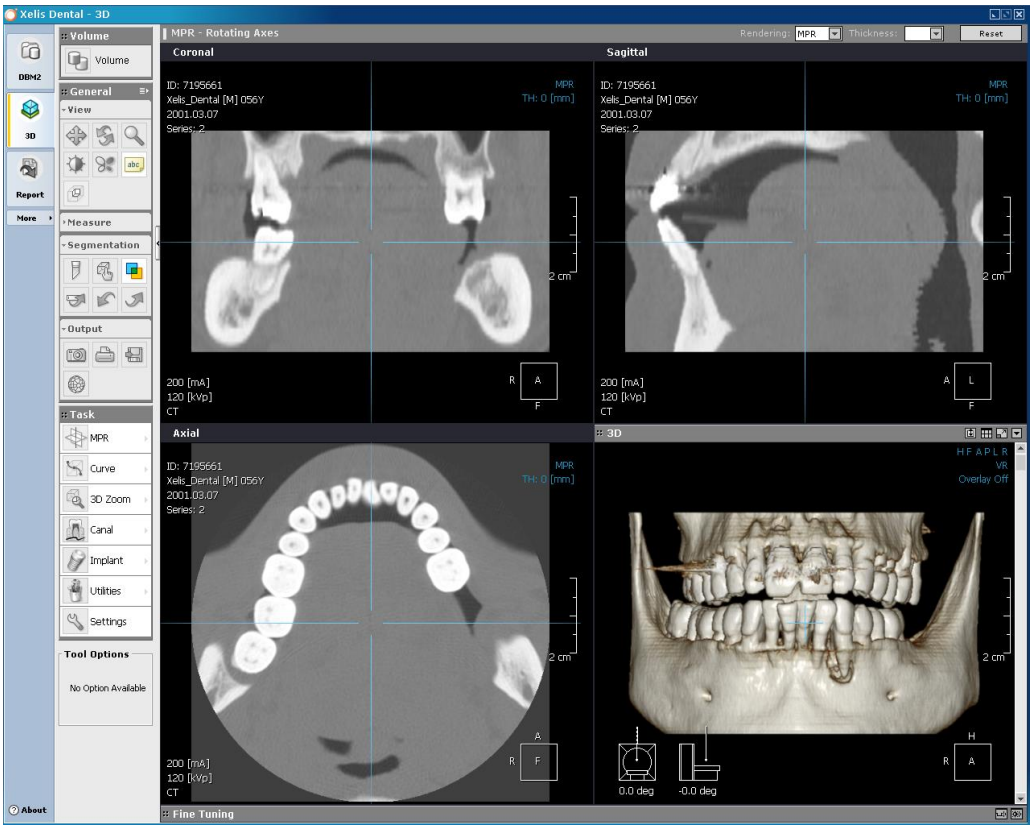
Chapter 5-3. Main Viewer

1. Introduction

3D image reconstruction is possible with Xelis-Dental for more intuitive diagnosis and analysis. The user can easily analyze CT images through a more efficient interface which includes a diverse and convenient set of functions such as MPR Reconstruction, 3D Zoom, Curve and VR on the main screen.

2. Main Screen

The basic 3D screen comes up as shown below.



(1) Main Tools

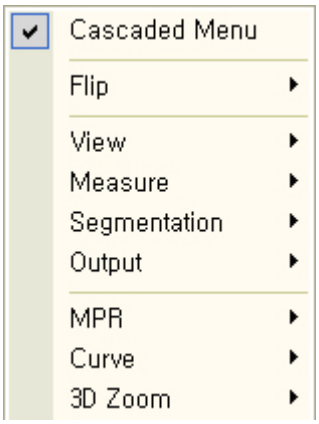
The functions found in main tools from Xelis-Dental can be used here.

INFO.	Refer to ‘Chapter 5-1: Tools’ for detailed instructions on using the tools.

(2) Main Screen

Images can be viewed using MPR and VR.

TIP. Right clicking ( ) anywhere on the main screen brings up a context menu which includes all the main tools except Image Analysis Tools.



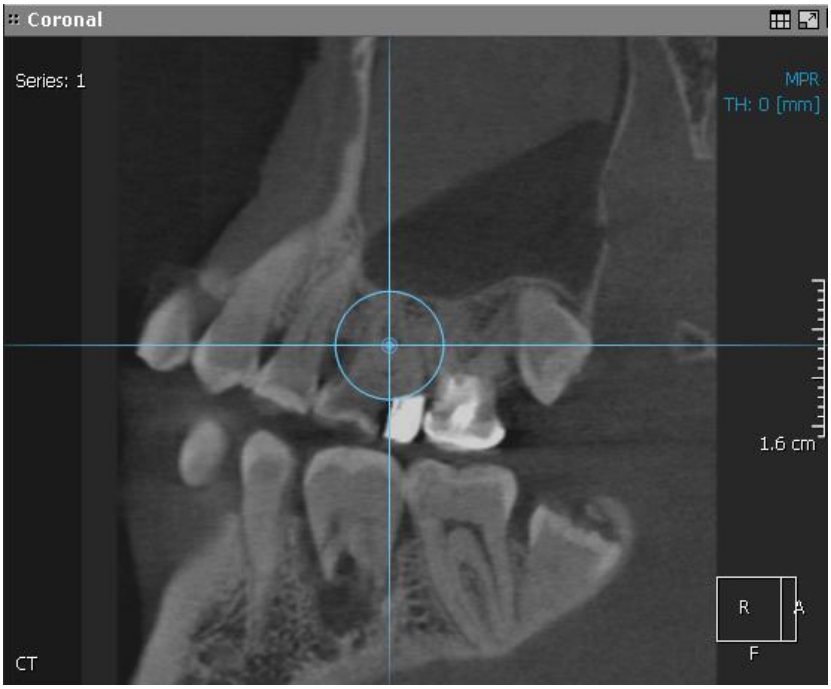
The desired tools can be easily found and changed using this menu.

(3) Fine Tuning

An Opacity control function is available for viewing certain regions of 3D image data.

INFO.	For detailed information on the Opacity function refer to “Chapter 5-10: 3D Image Management”.

3. MPR



(1) **Title Bar**

This section is for setting the direction of images being viewed.

Reconstructed images are shown vertically in Axial/Sagittal/Coronal.

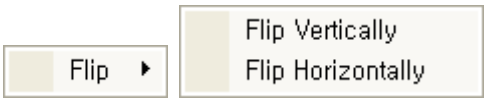
Notice The image shown above is shown in Coronal.

Clicking on the Coronal Text brings up a context menu.

Select the direction for images to be viewed.

(2) **Menu**

Left clicking brings up the following menu.



Flip Vertically: Flips image vertically.

Flip Horizontally: Flips image horizontally.

(3) **Scrolling**

Images can be scrolled through using the mouse wheel or the scroll bar to the right of the screen.

(4) **Rendering Mode / Thickness Management**

▪ **Rendering Mode**

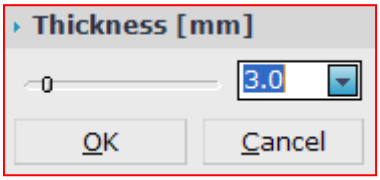
The Rendering Mode currently applied is shown at the top right of the screen. Click on this text to bring up the context menu for changing the Rendering Mode.

The images can then be viewed in the Rendering Mode selected.

REMARK: Moving the cursor over the text ‘MPR’, as shown in the example above, changes the text color from blue to orange.

▪ **Thickness**

Clicking on the Thickness value at the top right of MPR images brings up the following menu for managing the image Thickness.



(5) **Rotation**

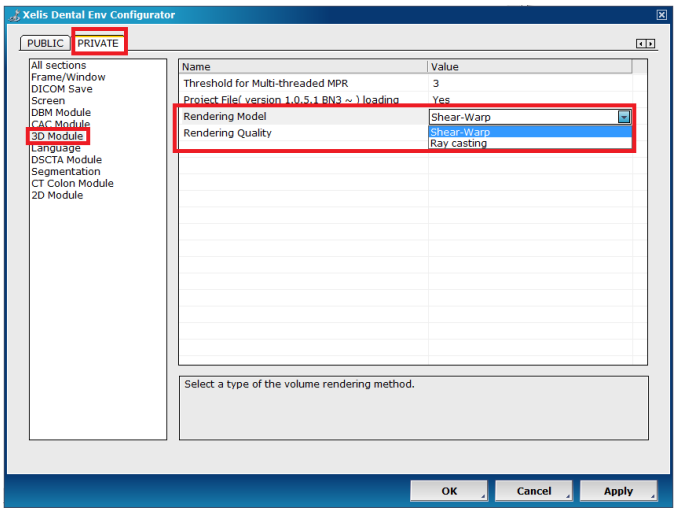
Image rotation can be changed by clicking on the icon where direction information is displayed or by using the Rotate tool in the toolbar.

4. 3D

(1) **Rendering Model**

In the Xelis dental Env configurator, you can select the different type of rendering model, 'Shear-Warp' or 'Ray casting'.

Shear-Warp	Rendering speed is fast
Ray casting	Rendering Image quality is better than Shear-warp



(2) **Rendering Mode Control**

Selecting the menu that says 'VR' at the top of the 3D screen brings up a context menu with the following options. The user can select VR, MIP, minIP and X-ray Rendering Modes

VR	Mode for viewing 3D images.
MIP	Mode for viewing Angio(vessel)

(Maximum Intensity Projection)	
minIP	Mode for viewing inside Bronchus
X-ray	Reset To Posterior View

(3) MPR Overlay Configuration

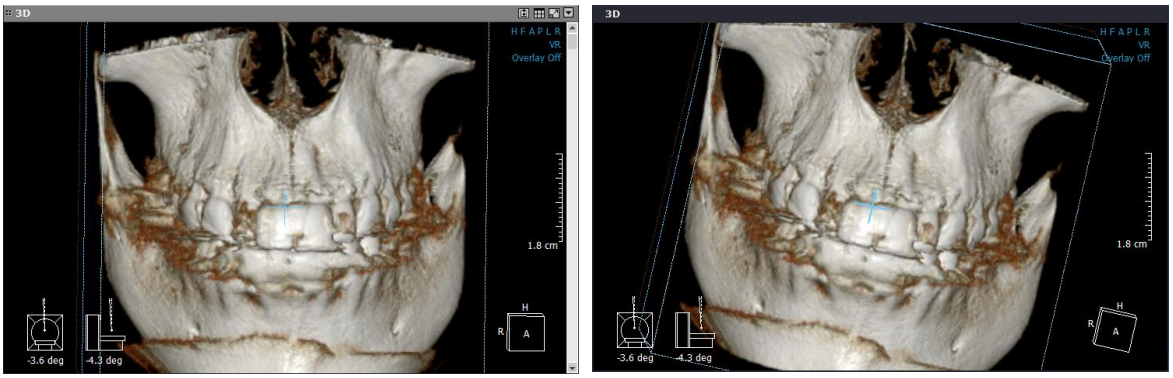
Clicking the Text Overlay button on the toolbar removes all text from the screen, and clicking on the Plane Overlay button on 3D images allows the user to select MPR Overlay or Off Overlay.

Plane Overlay	Displays planer Overlay of selected MPR image
MPR Overlay	Displays MPR image of MPR plane
Overlay Off	Removes Overlay

(4) Rotation

Images can be rotated by clicking on the icon that displays rotations information or by using the Rotation tool on the toolbar and then right clicking and dragging the mouse.

Images can be rotated on the axis easily be using the mouse wheel.



(5) Resetting Rotation

By clicking on the text at the top right of the screen as shown in the example below, the rotation of the image can be reset. The meanings of the text are described below.

.

H	Reset To Head View
F	Reset To Foot View
A	Reset To Anterior View
P	Reset To Posterior View
L	Reset to Left View
R	Reset To Right View

Chapter 5-4. MPR

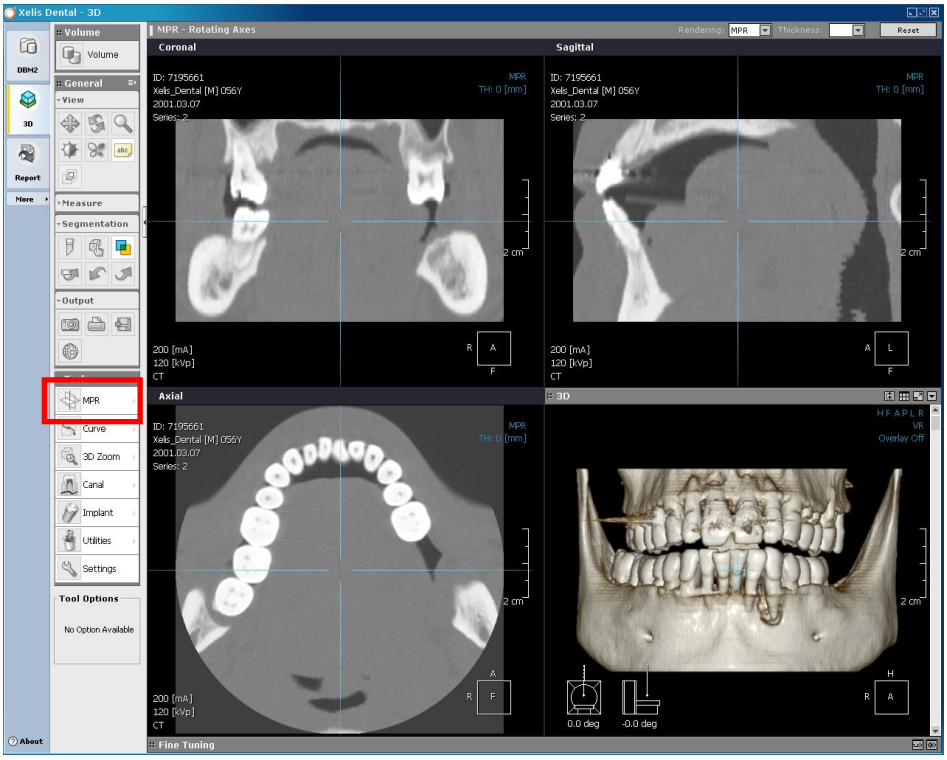
1. Introduction

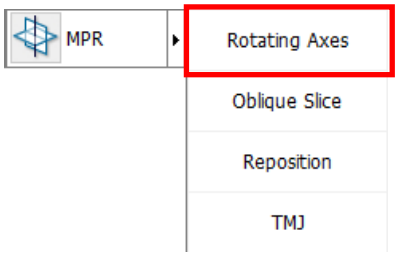
Rotating Axis provides a function for viewing images from any position using Coronal, Sagittal, Axial and 3D images. Rotating Axis is also a window for basic configurations using Curve and 3D Zoom functions. MPR provides an Oblique Slice function for Rotating Axis.

2. MPR – Rotating Axis

The basic Viewer is made up of Coronal, Sagittal, Axial and 3D screens. MPR-Rotating Axis provides functions for rotating images on the axis and viewing images at various angles. Cross-Sectional View can be configured for each screen. The original screen can also be returned to when using Cross-Sectional View or Oblique Slice View.

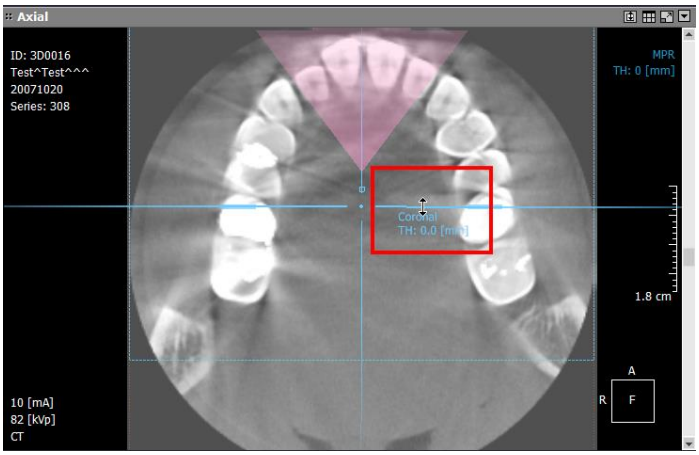
Select 'MPR → Rotating Axis' from the main toolbar.





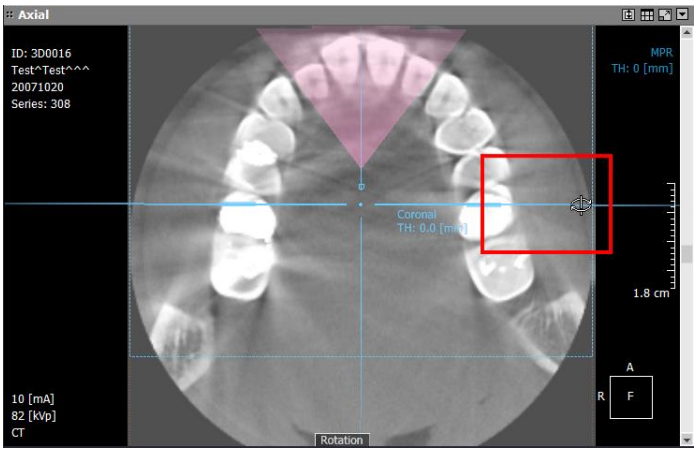
(1) **Moving Axis**

The selected axis can be moved along the vertical axis by clicking on the area inside the blue axis on MPR images. The axis can also be moved freely to the desired location by selecting the area in the middle. Each axis is shown at the same location on images in the MPR screen.



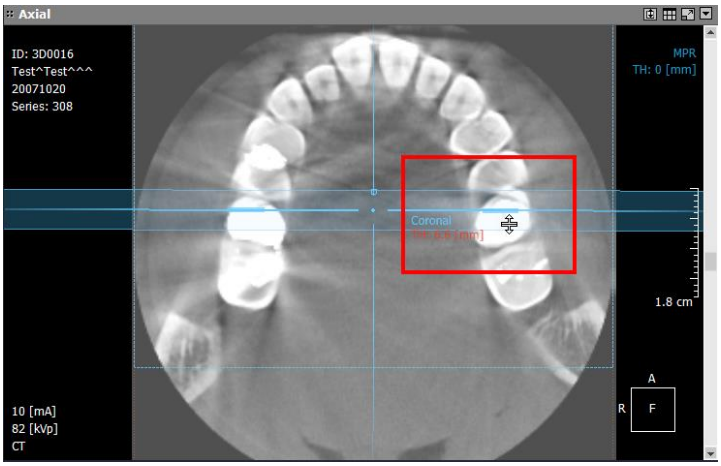
(2) **Rotating Axis**

The axis can be rotated by clicking on the area outside of the blue axis section. When the axis is rotated, it is rotated on each MPR image. The pink arrow shows the direction the image is being viewed when the axis is moved or rotated using the crossbar.



(3) **Adjusting Thickness of Axis**

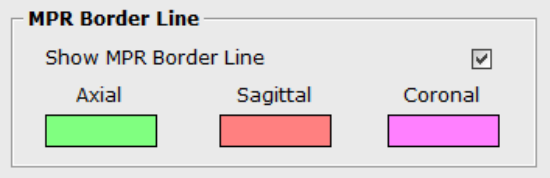
Thickness is altered by combining images to represent the desired thickness. The thickness is changed by clicking on the dark section of the axis and moving it up and down. The thickness value can also be changed in the local tools.



INFO.	Typically Dental CT image slice interval should 2mm and the thickness should be 1mm. If the thickness is too small, objects in the images can be missed. If the thickness is too large, images appear hazy. The name and currently configured thickness information is displayed when the cursor is placed over the Rotating Axis. The direction in which the image is being viewed can be more easily determined with the cube at the bottom right of the screen.

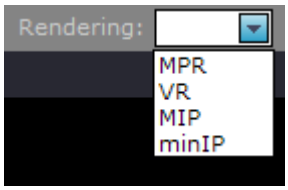
(4) Changing color of Axis

If Change Color of border line of MPR screen, related axis turns into the same color.



(5) Local Tools

▪ Rendering



Rendering mode can be changed to MPR, VR, MIP and minIP.

▪ Thickness

The thickness can be adjusted from Thickness in Local Tools or directly from the crossbar.

▪ Resetting

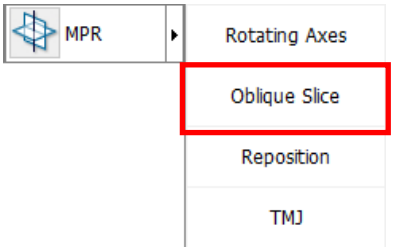
The menu shown below comes up when the Reset button is clicked in Local Tools.

Reset	Resets MPR, Curve, AutoFit and VOI.
Auto Fit	Resets image to appropriate size.
Reset MPR	Resets MPR screen.
Reset Mask	Resets all Objects.
Reset VOI	Resets VOI.
Reset All	Resets all MPR, Curve and AutoFit.

3. MPR-Oblique Slice

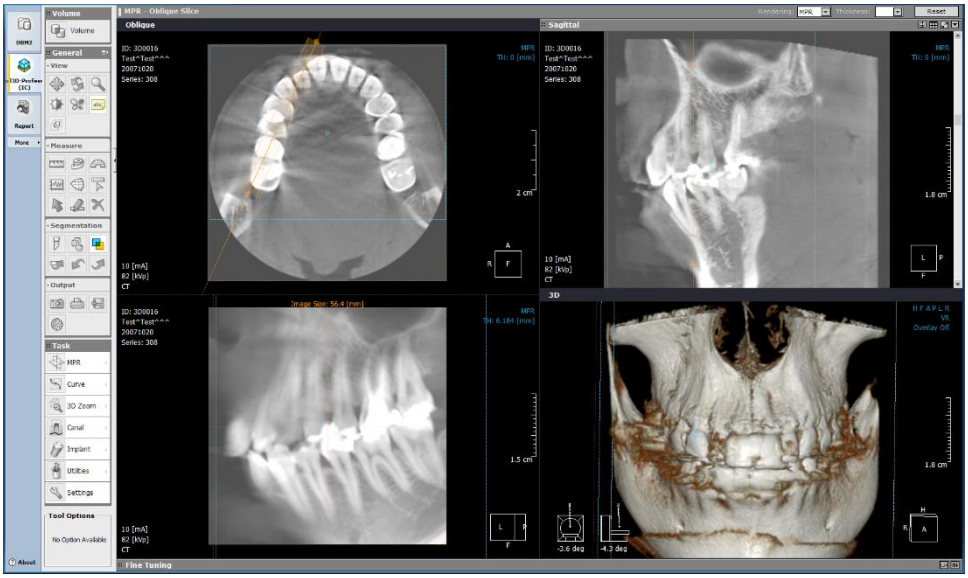
MPR-Oblique Slice is a function for configuring arbitrary planes and simple analysis of sections of images. The Oblique Slice configuration screen and the Oblique Slice Viewer come up at the bottom and top to the left of the screen. The Oblique Slice plane location can be seen in Sagittal view and 3D view.

Select ‘MPR → Oblique Slice’ from the toolbar.



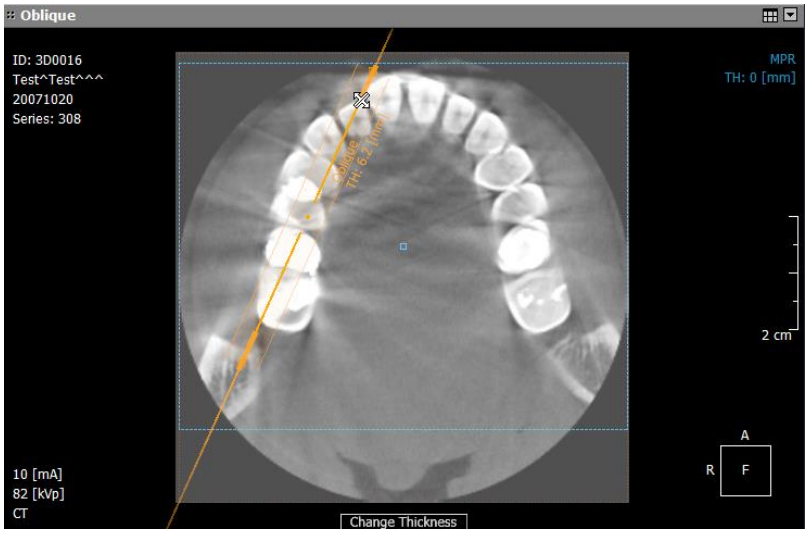
▪ Plane Configuration

Click on a plane and move the mouse to the region to be viewed to configure the Oblique Slice plane. When the Oblique slice has been configured, it is displayed in the Oblique vertical place screen and in the Sagittal and 3D view screens.

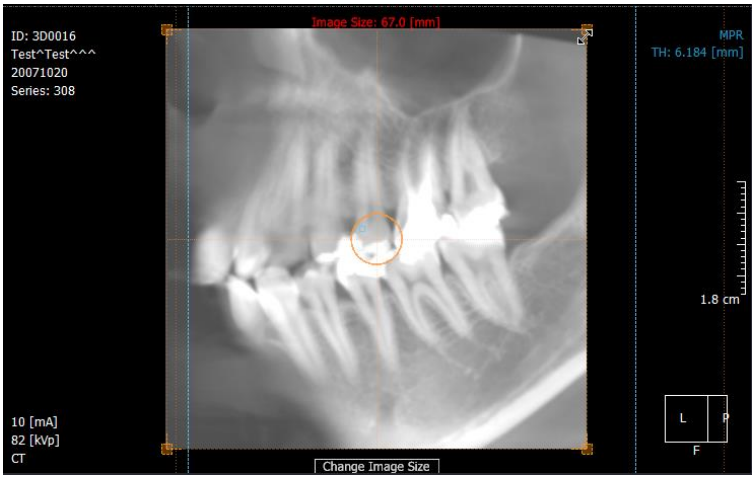


▪ Plane Adjustment

Oblique Slice plane adjustment is done the same as in MPR by clicking on the line that represents the plane to adjust the thickness and clicking outside the line to rotate the axis. Make the slice in the direction desired by adjusting the axis. The length of the Oblique line section viewed can be adjusted using the boxes at each end of the line.

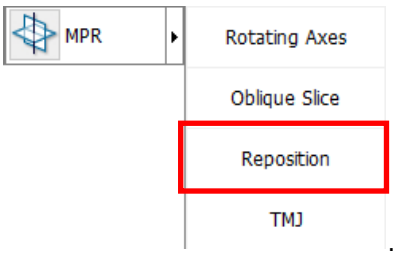


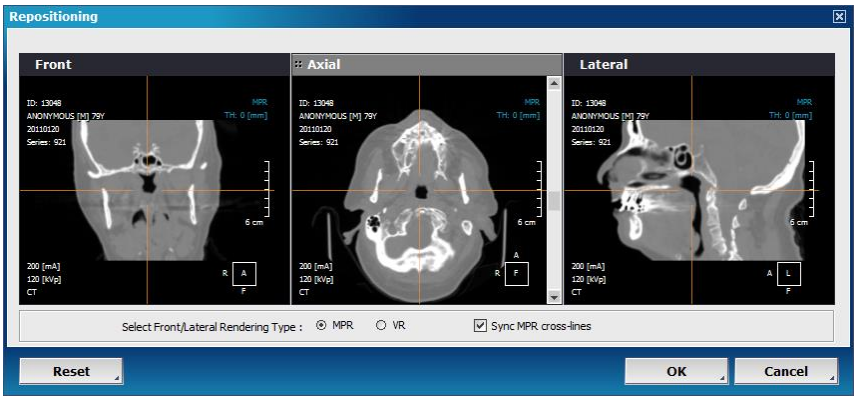
When the cursor is placed over a plane image, the squares at the corners of the image are activated. The section of the image viewed can be adjusted by clicking and dragging these squared. The section of the image viewed can be moved by clicking on the image and dragging the mouse.



4. Reposition

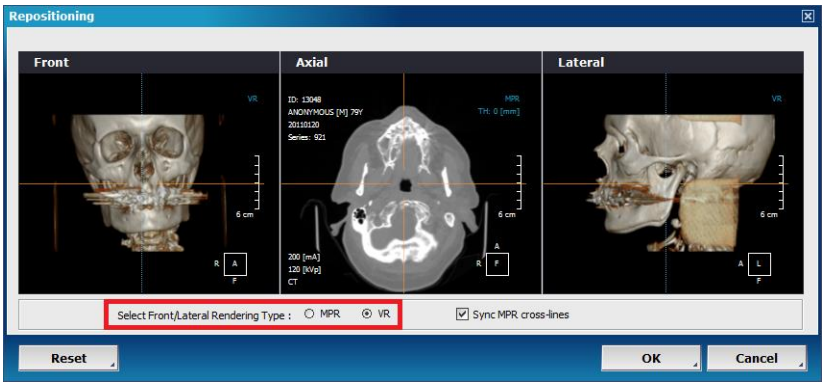
Patient orientation is very important for make panoramic image or TMJ view. If you want to change orientation along the occlusal plane, Reposition can be adjusting orientation of the CT data as desired.





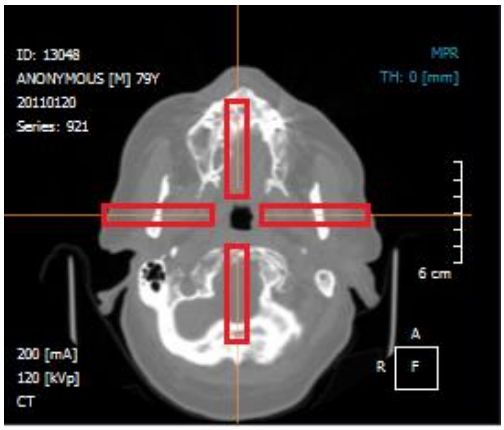
(1) Rendering Type

Select rendering type for front/lateral images.

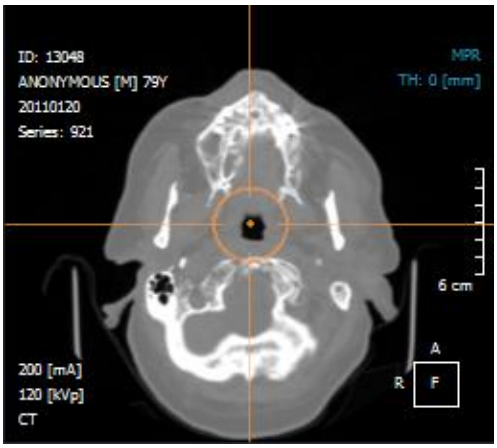


(2) Moving axis

The selected axis can be moved along the vertical or horizontal axis by drag on the red area.

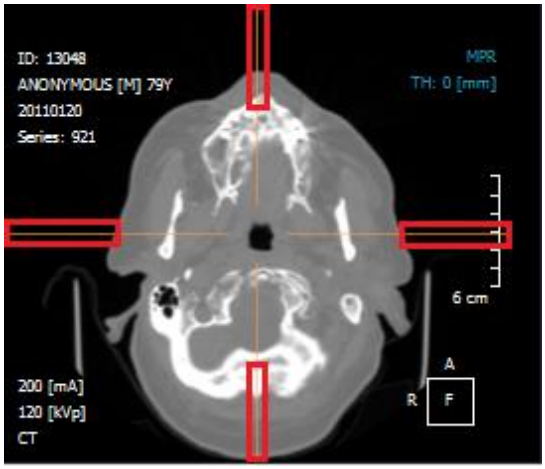


The axis can also be moved freely to the desired location by drag in the middle circle of the cross-line.



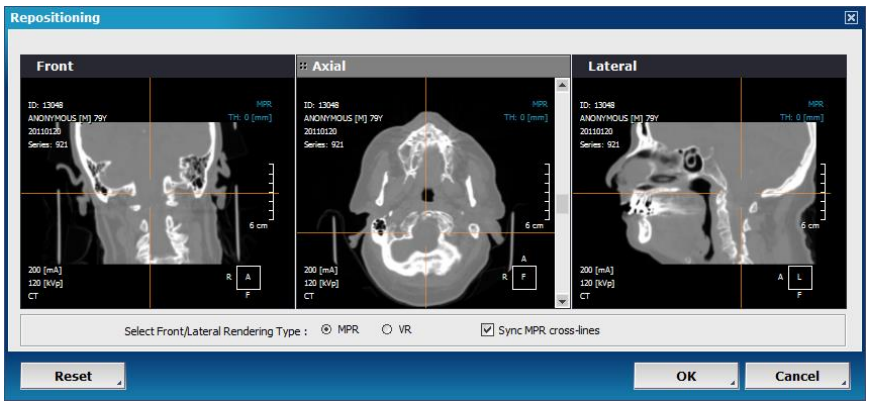
(3) **Rotating Axis**

The axis can be rotated by clicking on the area outside of the blue axis section (red area).



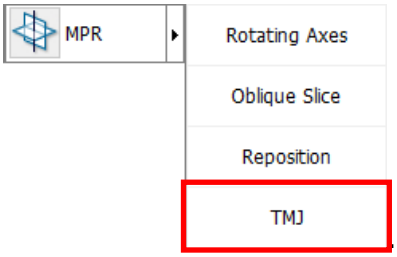
(4) **Sync MPR cross-lines**

If an axis moved, related axis is moved and image is changed in other planes.



5. TMJ

MPR's TMJ is button for return to TMJ view again when switching to other layout after drawing the TMJ line.



Chapter 5-5. Curve

1. Introduction

Curve straight or curved lines can be made in 3D on the 3D Pane or MPR Pane. Reconstructed images can be viewed easily by configuring the path for continually making 3D planes in the desired location and direction in Xelis-Dental. Configured Curves can be created easily by using the Select Latest Item function.

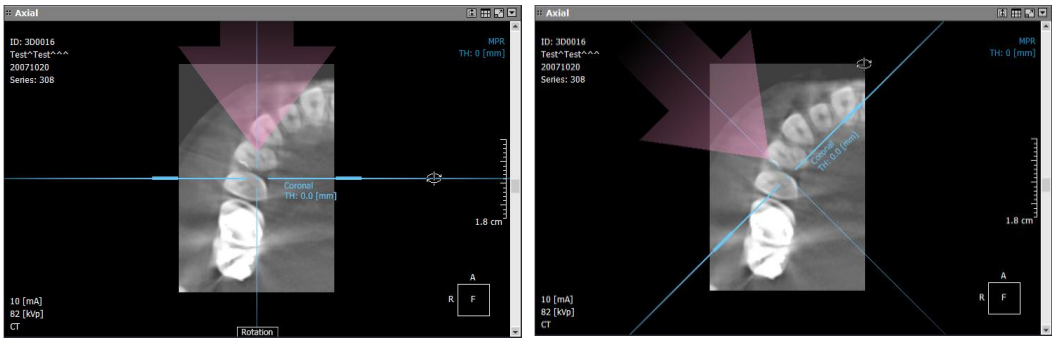
2. Curve – Cross-Sectional

(1) Making Cross-Sectional View

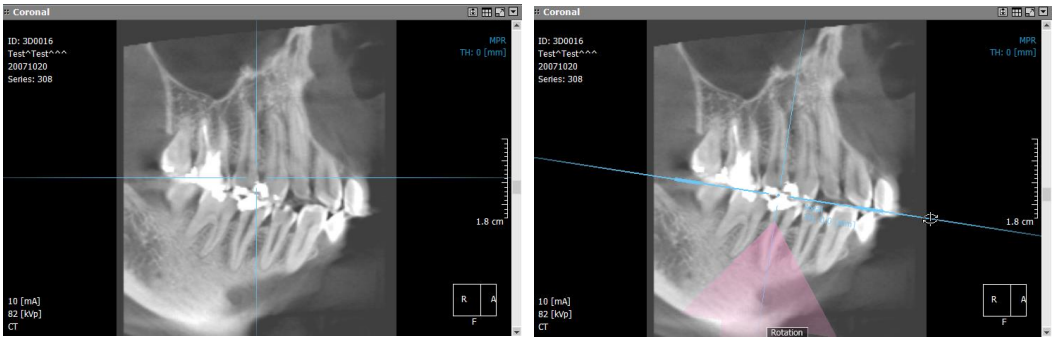
Images can be analyzed by making a Cross-Sectional View setting the vertical plane along the curve of the arch. Cross-Sectional View can be made along a short section of the arch or along the entire arch.

- Example

Because it is not possible to immediately know the direction of the occlusal, the teeth or the apical, the X (Coronal) axis should be made parallel to the plane of the arch in the Axial window.

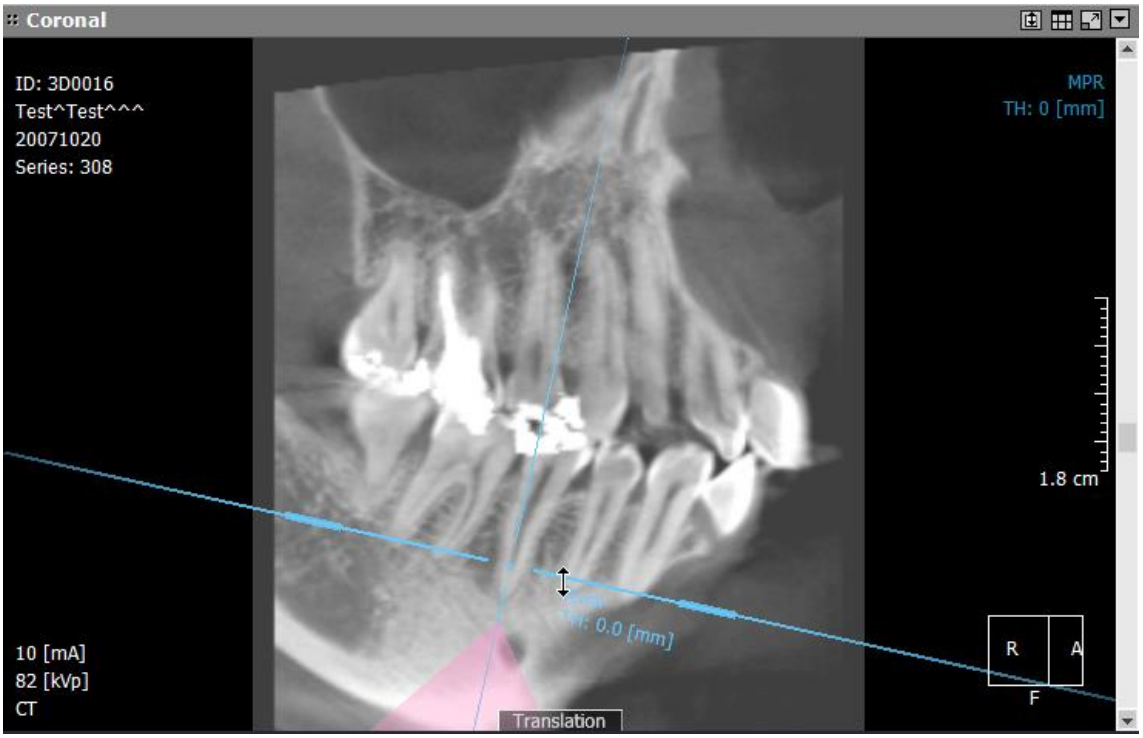


When analyzing the entire arch if viewing the Coronal window in panorama, the X (Axial) axis should be rotated to be parallel with the occlusal plane.

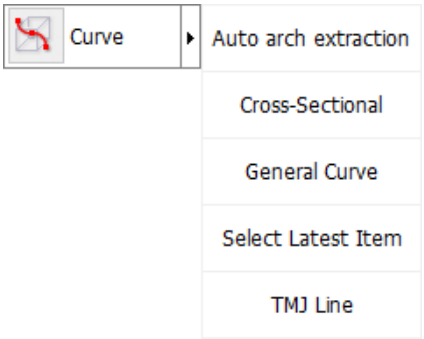


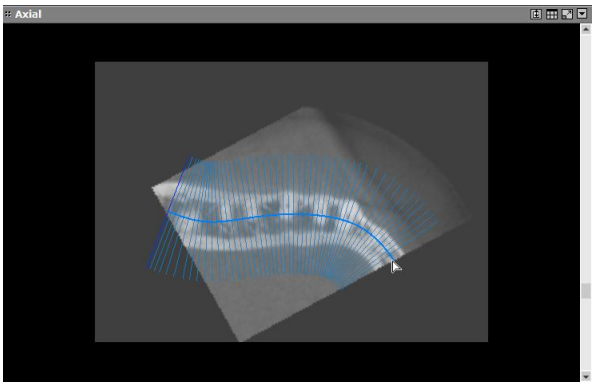
When viewing individual teeth, the X (Axial) axis can be rotated to be parallel with the tooth of interest.

The X (Axial) axis in the Coronal window can be moved to the apical location for exact arch configuration



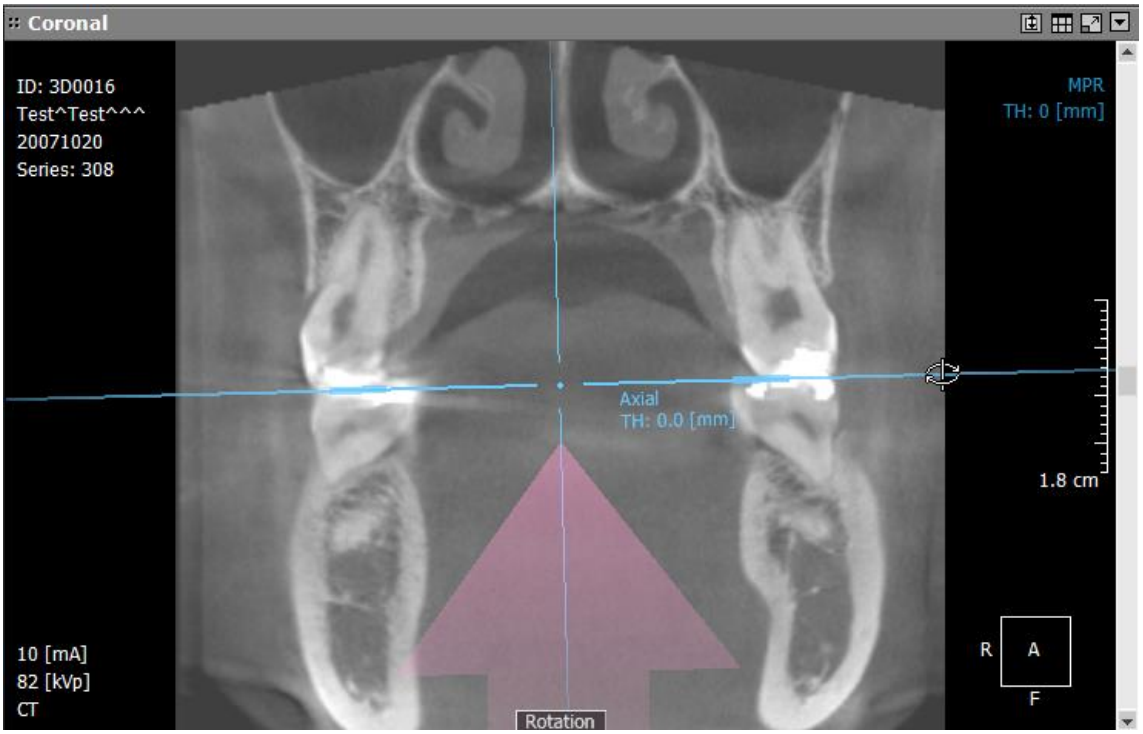
The line can be configured along the center of the arch by selecting the Curve → Cross-Sectional option from the toolbar and clicking along the desired line. The line is completed by double clicking or right clicking the mouse.



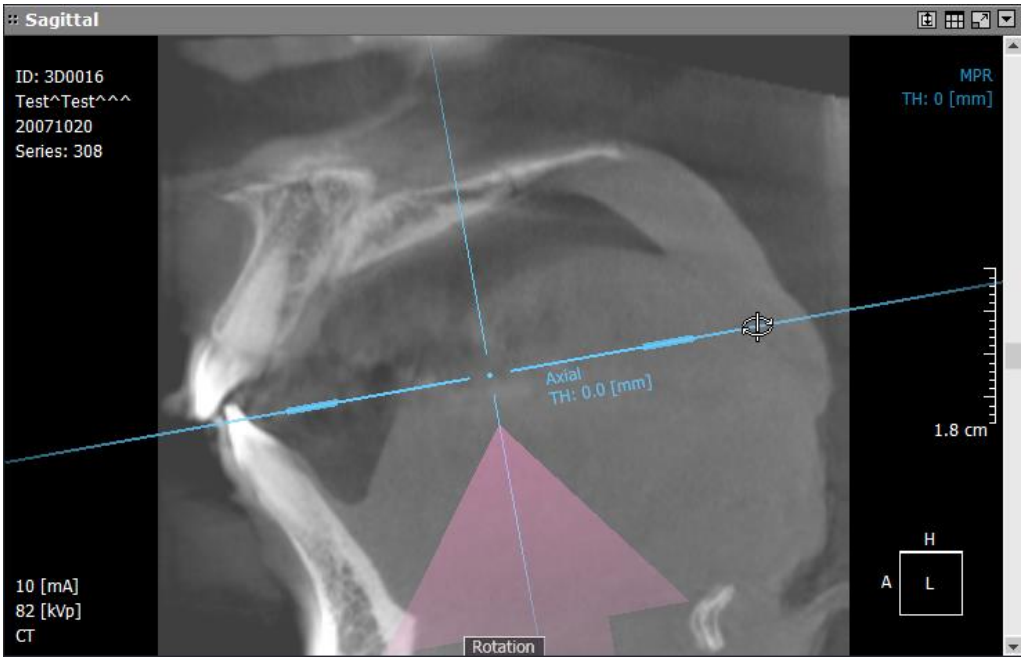


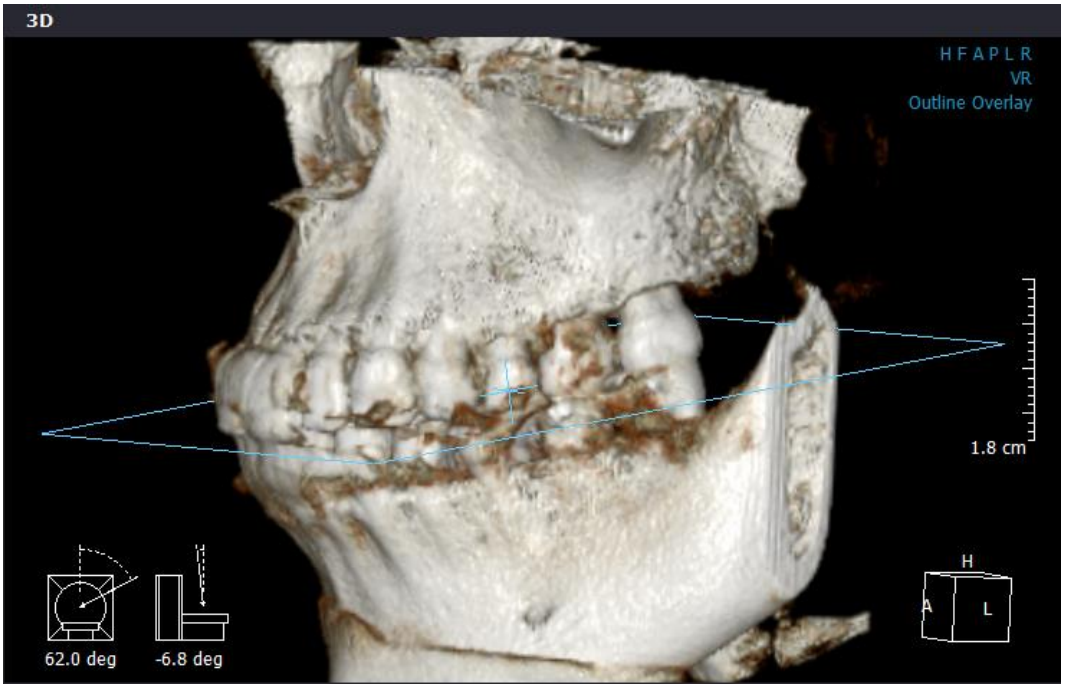
■ Viewing Entire Arch

The X (Axial) axis can be rotated to be parallel with the occlusal plane in the Coronal window.

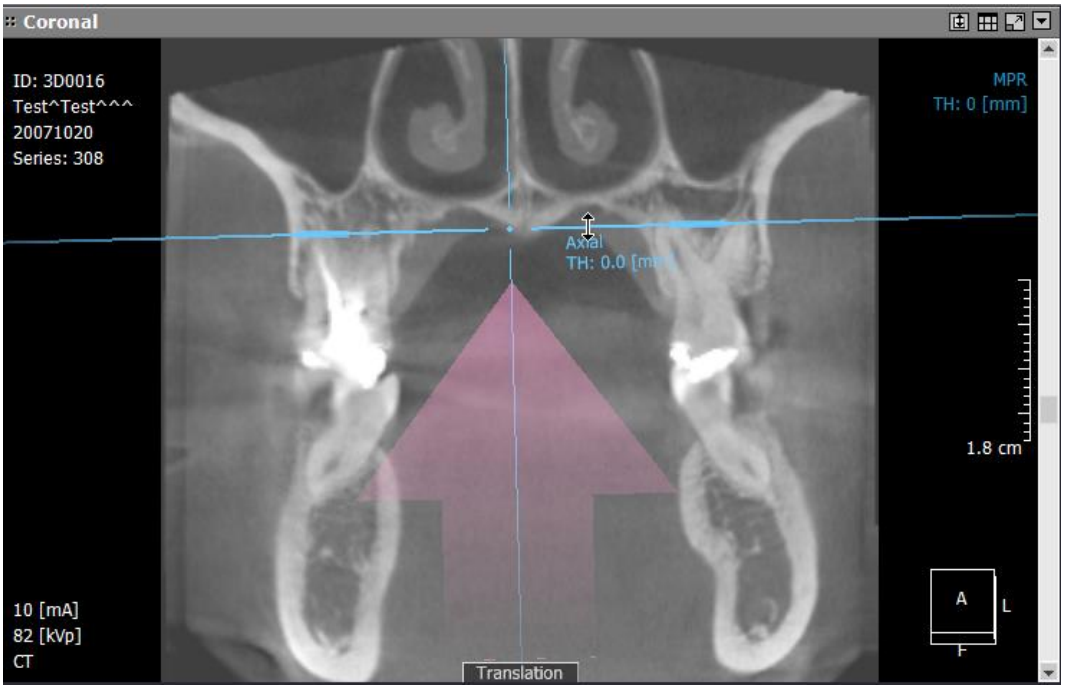


The X (Axial) axis can be rotated to be parallel with the occlusal plane in the Sagittal window.

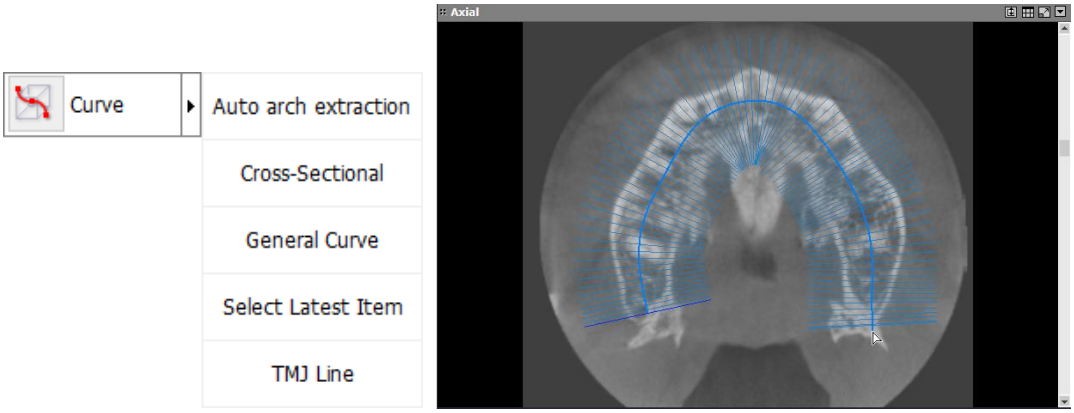




The X (Axial) axis can be moved to the apical position in the Coronal window.



The line can be configured along the center of the arch by selecting the Curve → Cross-Sectional option from the toolbar and clicking along the desired line. The line is completed by double clicking or right clicking the mouse.

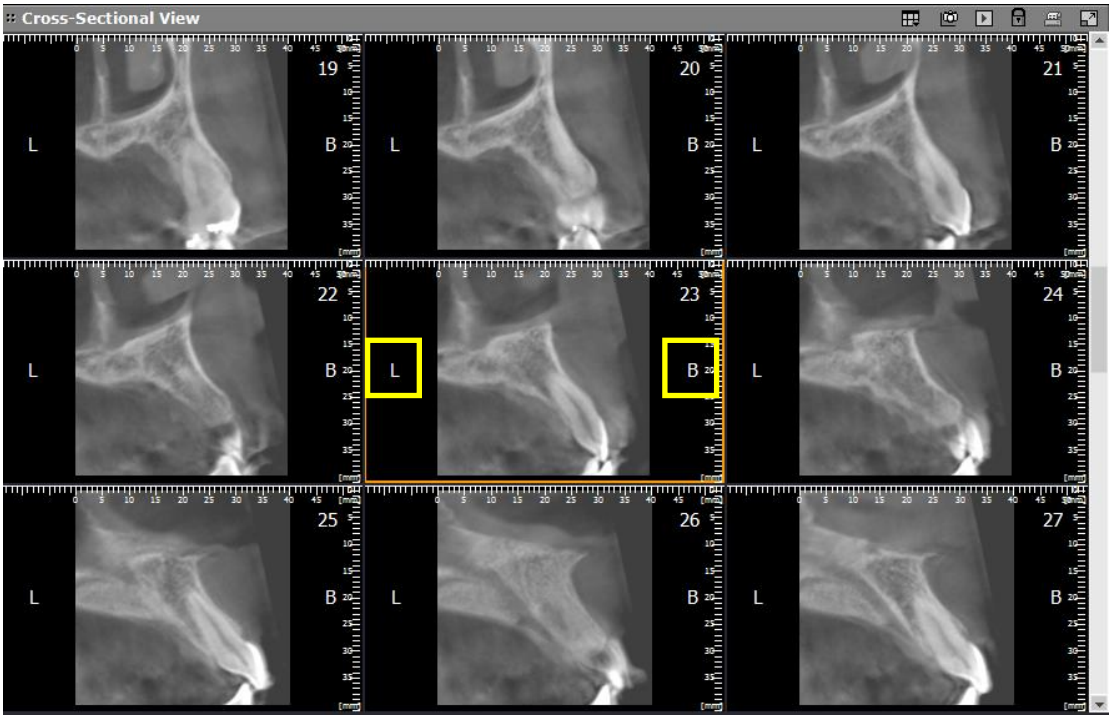


(2) **Cross-Sectional View**

Cross-Sectional View is made up of Cross-Sectional View, Axial View, Panoramic View and 3D View. Cross-Sectional View and Panoramic View locations can be seen in Axial View for more intuitive viewing of Cross-Sectional View.

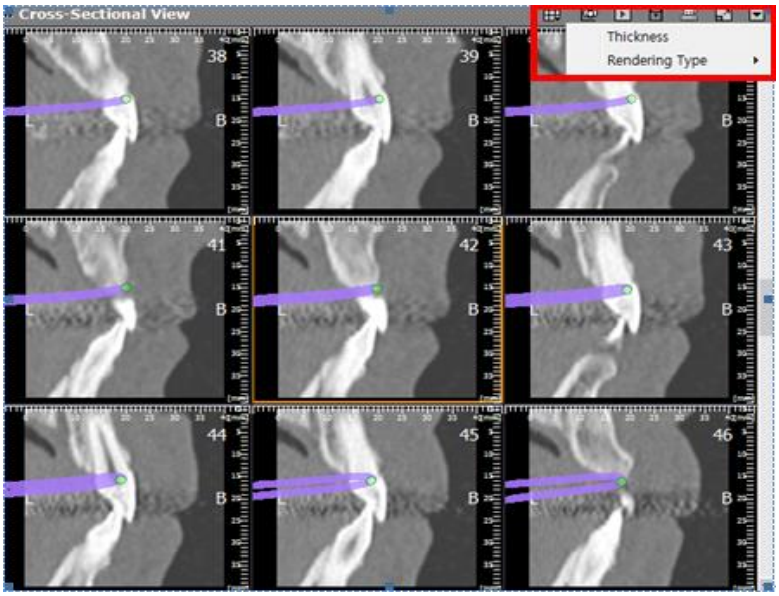
■ Cross-Section View

Cross-Sectional View is a function for viewing consecutive vertical arch planes. Cross-Sectional View structure is the same as shown in the sample below. In the border of each pane in Cross-Sectional View L (Lingual) and B (Buccal) are displayed. These are for switching the direction between right and left.



① Functions

There are 7 functions button in Cross-Sectional View.



Layout	Changes View Layout
Capture All	Captures all Cross-Sectional images. Sharpen Filter will be applied when inserted in Report.
Movie	Shows Cross-Sectional series images as video.
Lock	Locks Cross sectional view (Unlock: When the orange line is moved, Cross-Sectional View location is also moved.)
Print	Prints Cross-Sectional images
Maximize	Maximized images to full screen
Thickness, Render type	Function for modifying Cross sectional image Rendering Type and Thickness.

② Selecting Images

There are 3 methods for moving Cross-Sectional View images.

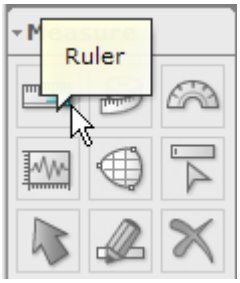
First, select the image to be viewed in Cross-Sectional View. Move the selected image to the center of the layout and the display location is changed in Axial View and Panoramic View.

Second, place the mouse over Cross-Sectional View and scroll. The images are scrolled forward and backward.

Third, drag the Panoramic View vertical axis with the mouse.

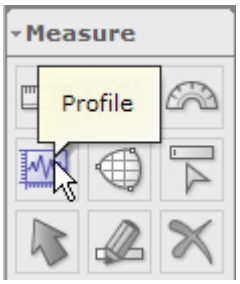
INFO.	Double click on an image to make it full screen. Click the Maximize button to maximize Cross-Sectional View images in the viewer.

③ Measuring Distances



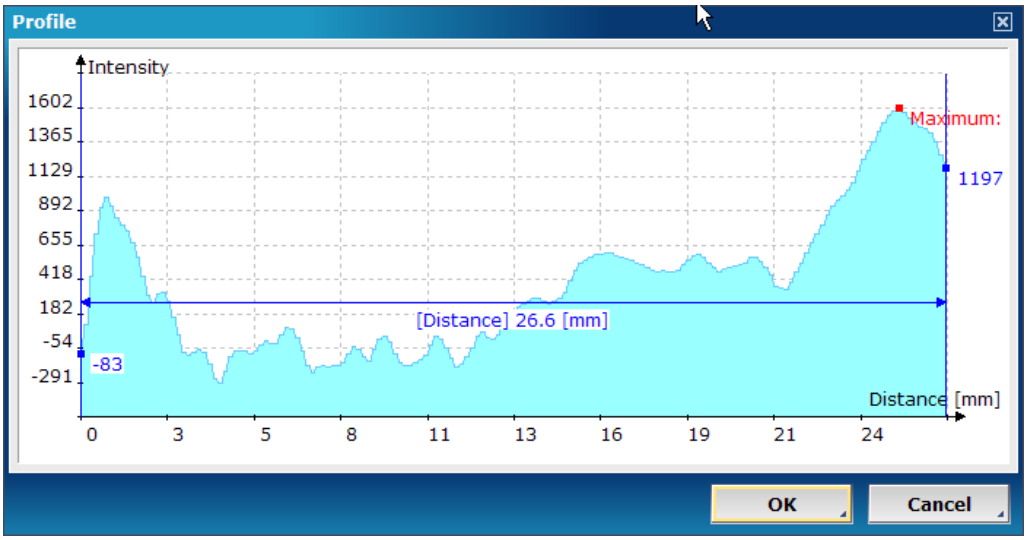
Select Measure → Ruler from the toolbar. Select 2 points to measure the distance between them.

④ Measuring Profiles

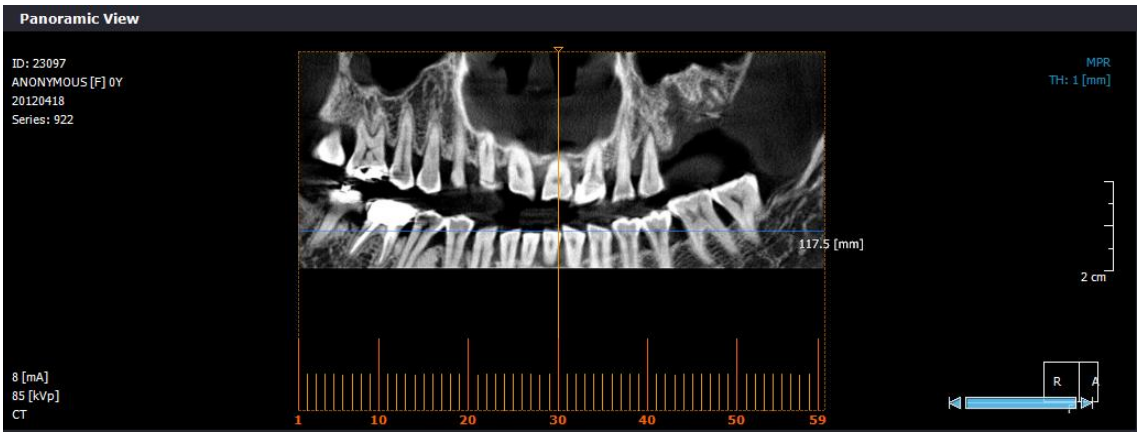


Measure bone density using the Profile measurement function to improve the success of implant surgeries. Select Measure → Profile from the toolbar. Enter 2 points to measure the distance between them.

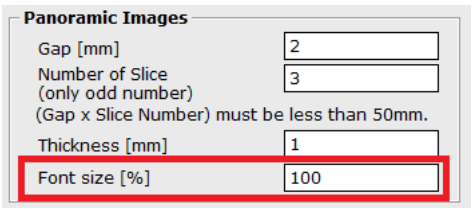
The X axis shows the length of the selected section and the Y axis shows the Hounsfield unit value.



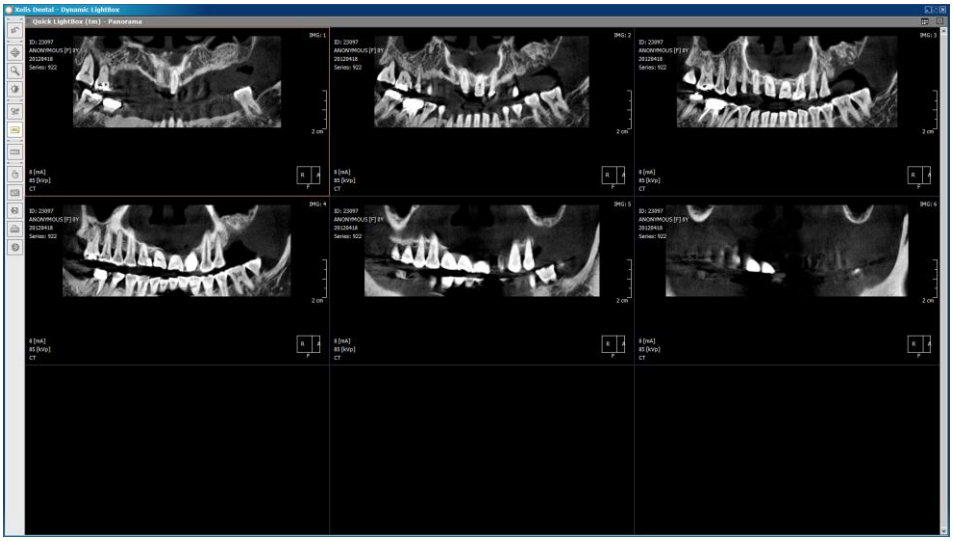
■ Panoramic Screen



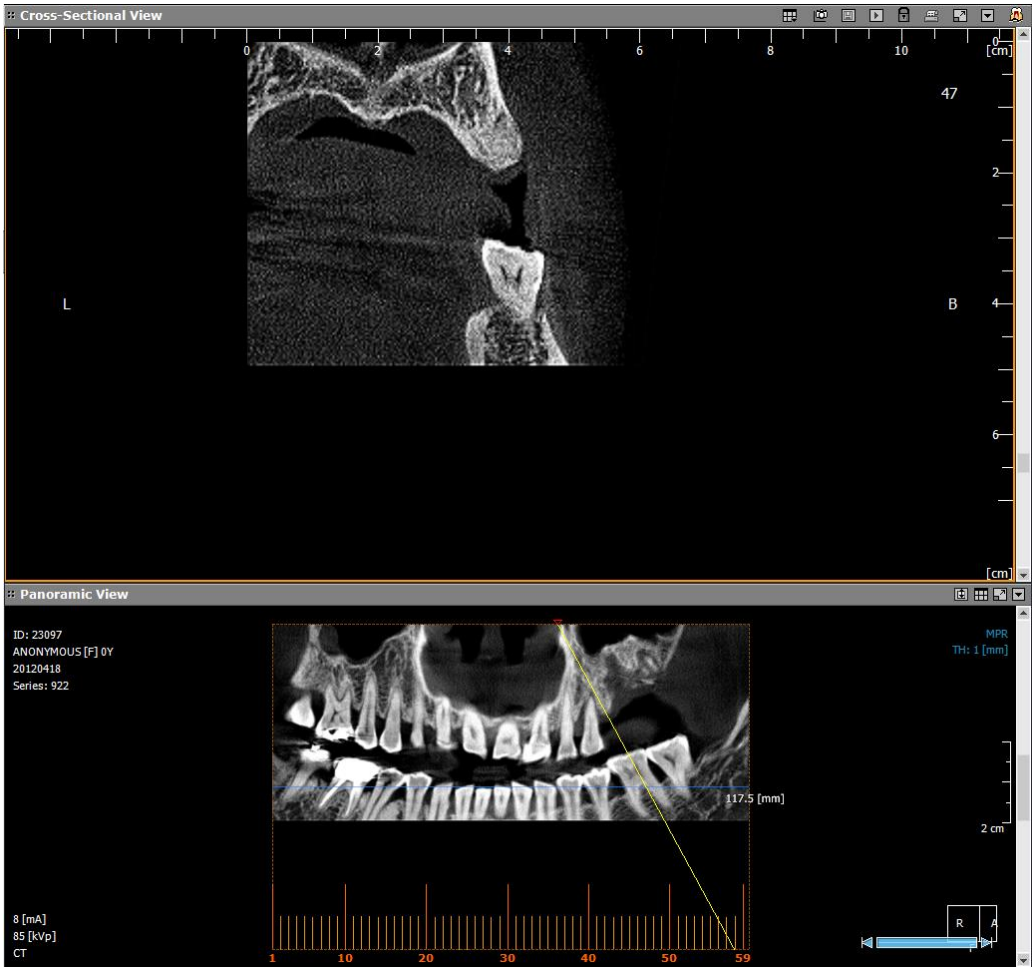
Shows a Panoramic image of the configured line. If analyzing images by using the mouse wheel to move along the arch, teeth and objects in the image can be viewed in sequence. Orange lines come up on each Cross-Sectional View. These lines are numbered at every 10th line. Size of the numbers can be changed in Settings. Click and move the axis to move the location of the Cross-Sectional View.



Objects in the images can be compared easily using the Panoramic View Quick-Light Box.

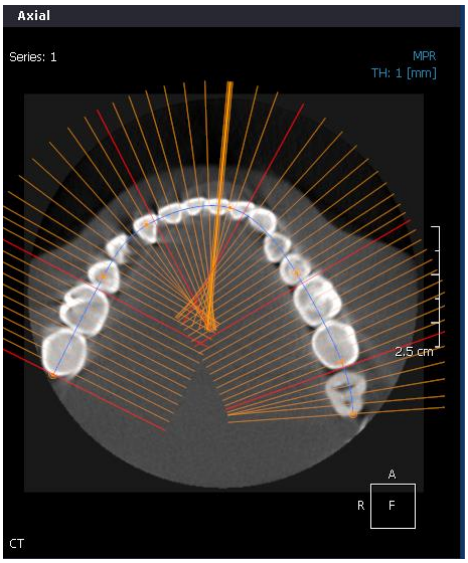


If Layout is 1 by 1 in Cross-Sectional View, you can rotate current slice with handle(red line) in Panoramic View.

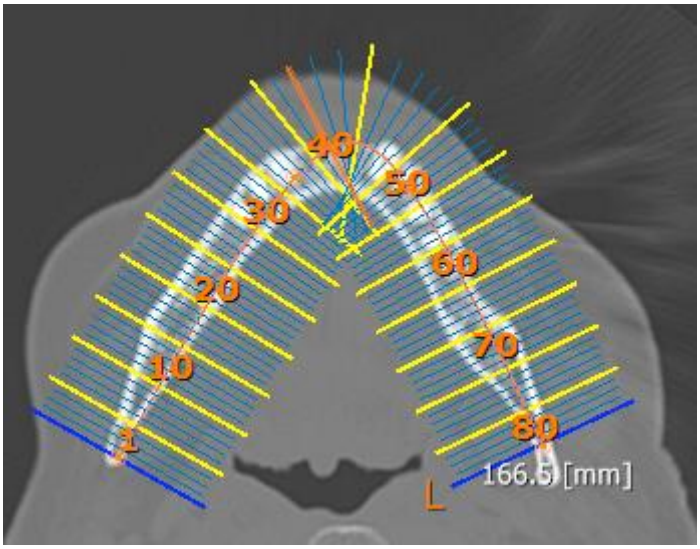


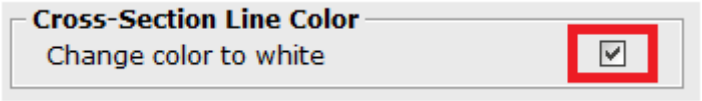
■ Axial Screen

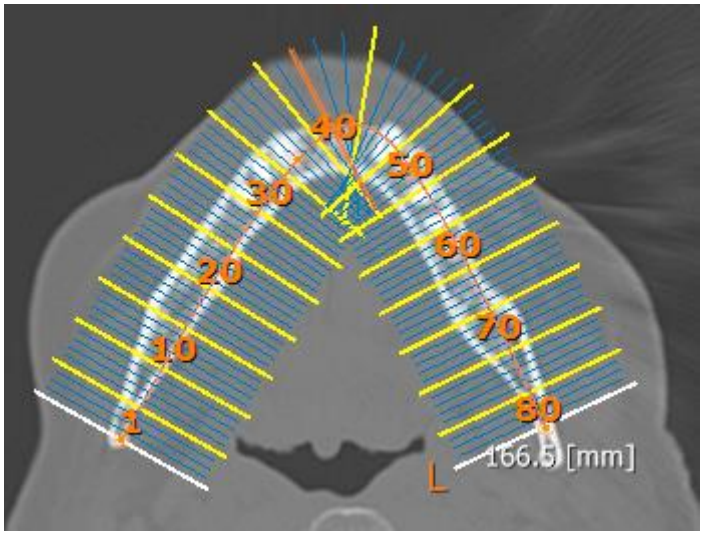
Cross-Sectional View and Panoramic View can be viewed from the Axial window. Also, by using the mouse wheel, the planes are scrolled and displayed in the Axial window.



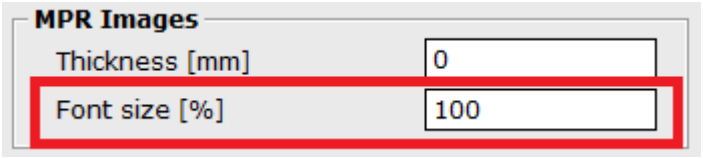
Tip. By default, the color of the ending and starting cross-section lines is blue. However, you can change to white by checking in the Change color to white check box from the setting window.





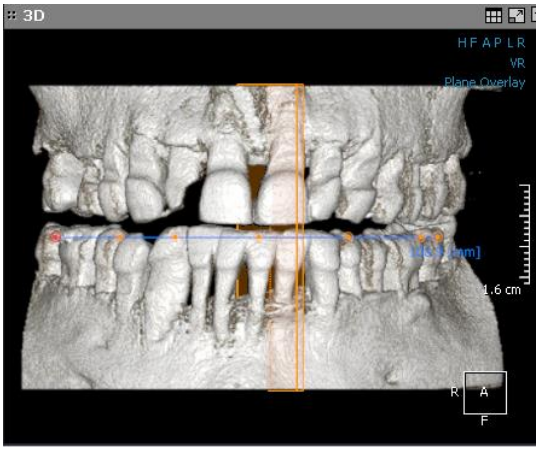


Also, Size of section numbers can be changed in Settings.



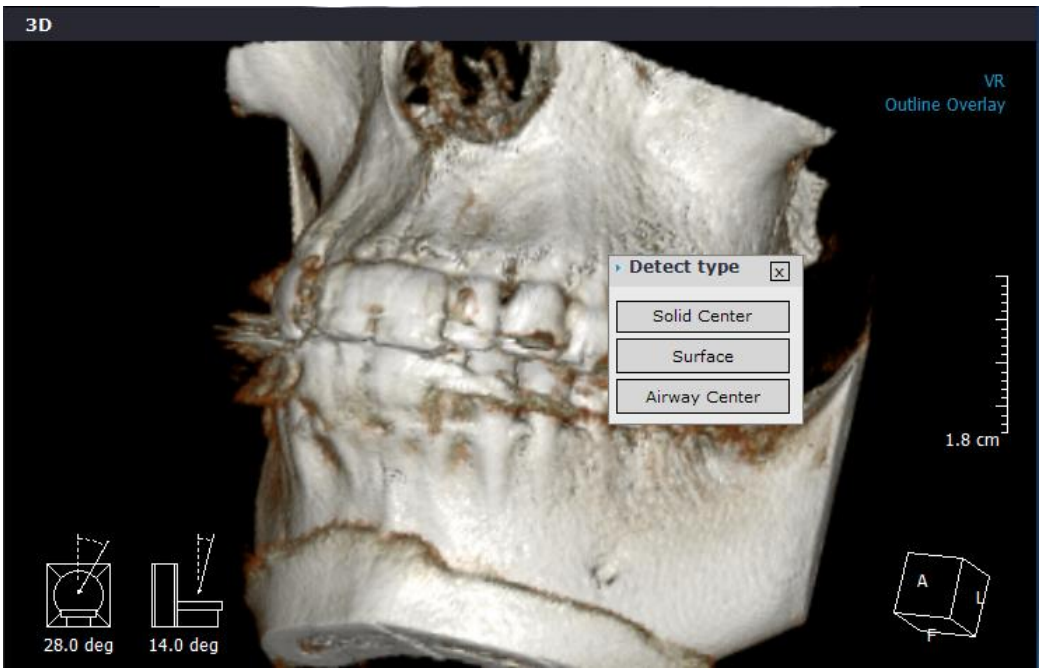
- **3D Screen**

Cross-Sectional View and Panoramic View can be more intuitively analyzed in the 3D window. Images can be rotated by clicking the right mouse button as in MPR. 3D Zoom and Endoscope View mode can also be accessed.



3. Curve-General Curve

Create the path by selecting the desired unit with the mouse. The General Curve path can be selected in MPR and in the 3D window.



Solid Center	Select for viewing objects where solid substance is found, such as in blood vessels.
Surface	Select a point on the object represented in the 3D window
Airway Center	Select for viewing objects when air is found such lungs or trachea.

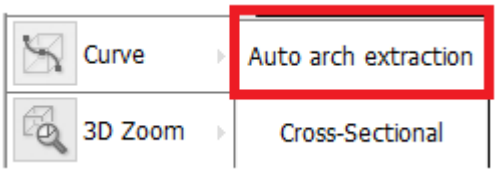
Designate the points along the desired path and then double click to end the line.

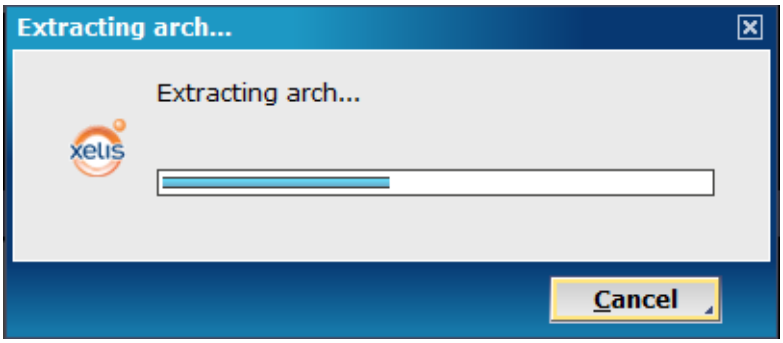
When General Curve is configured, Panoramic, 3D and Perpendicular View are displayed as

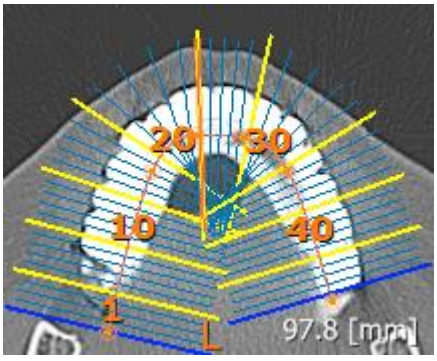
shown in the example above. Perpendicular images can be viewed from any position by grabbling and moving the axis in Panoramic View. In Perpendicular View, the size of the region being viewed can be modified by moving the corners of the image, and the image can panned by grabbing and moving the center of the image.

4. Auto arch extraction

The cross-section lines in the axial image are drawn automatically.





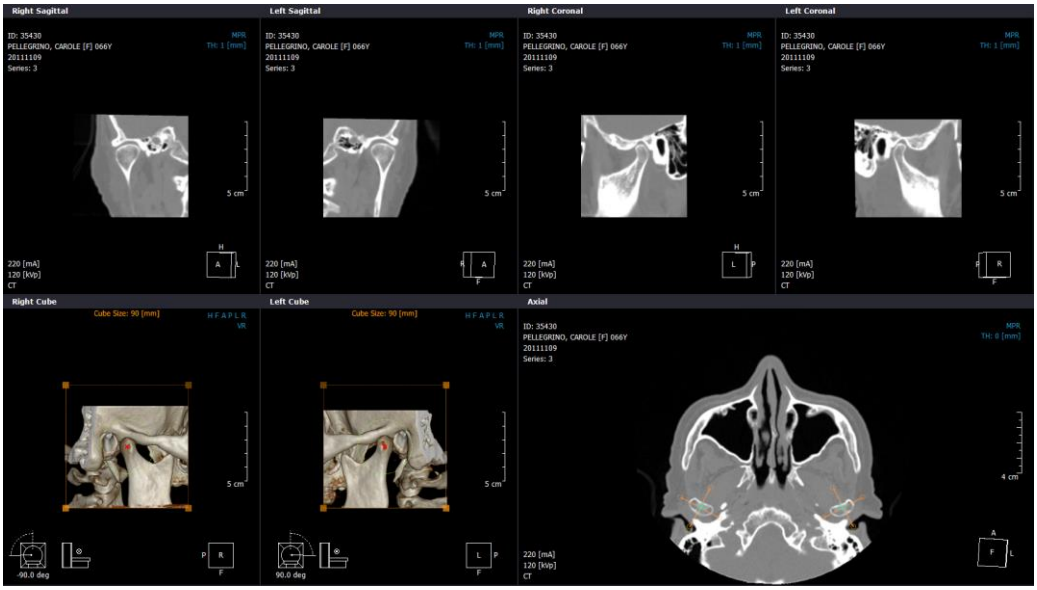


5. Curve-Select Latest Item

Images can be viewed using the most recently configured Curve item. Using Local Tools, others Curves can be used and unneeded Curves can be deleted

6. TMJ Line

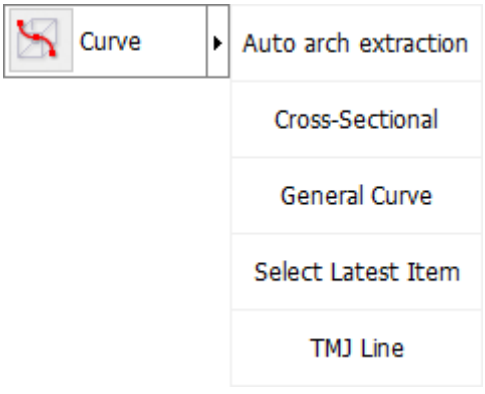
TMJ Line is for reconstructing both TMJs at the same time. If you make a TMJ line on Patient's right side, a mirroring TMJ line is automatically made on the patient's left side. A user can then modify the TMJ curve.



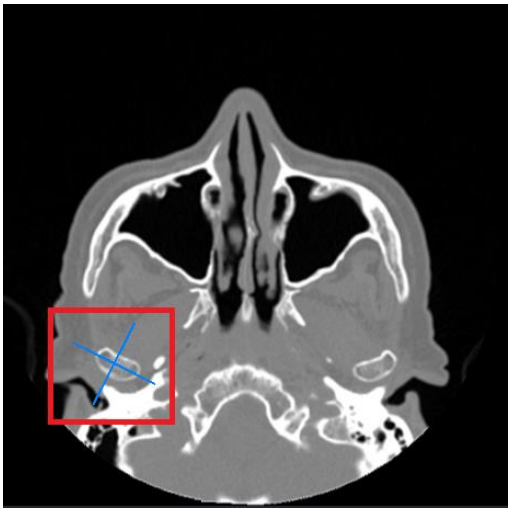
To Create a TMJ line

① The axial image move to the TMJ position

② Click the TMJ line button is Task Tools

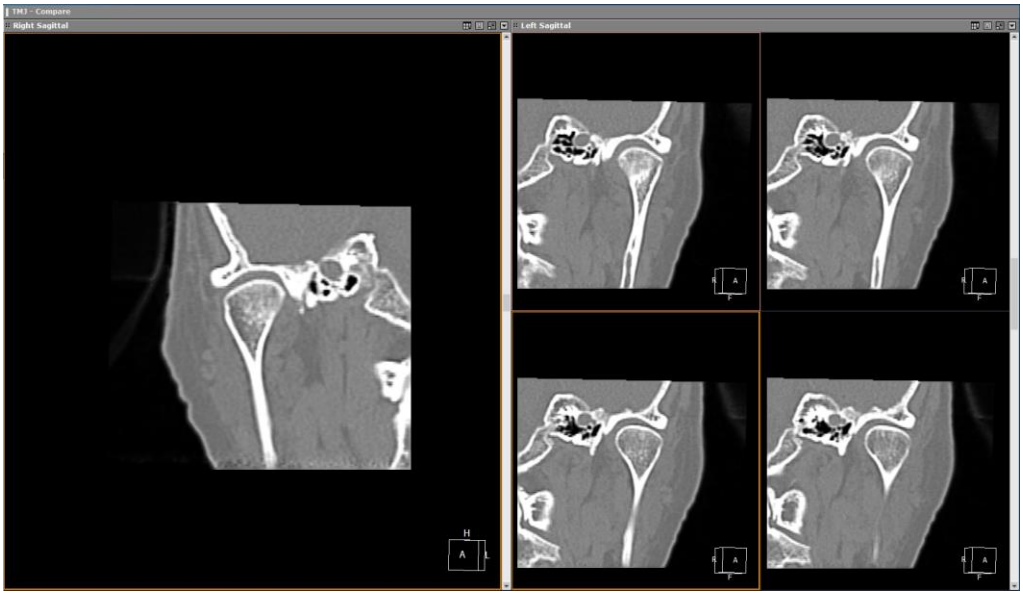


③ Draw the line over the TMJ section on the Axial image. You can create a line by defining 2points.

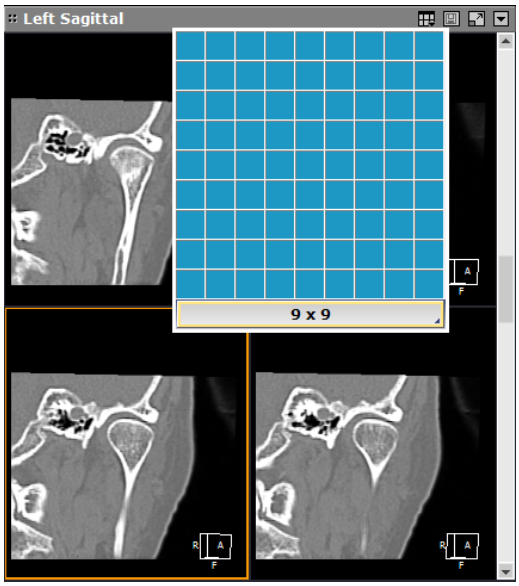


■ Sagittal, Coronal

Cross-link function is on the TMJ viewer. If you scroll the right sagittal image by mouse wheel on the TMJ viewer, the left sagittal image will be scrolled same time. Also, If you maximize the right sagittal image, the left sagittal image will be maximized.

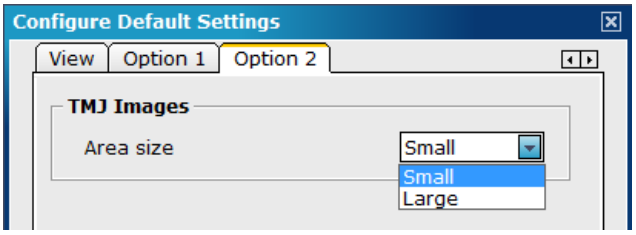


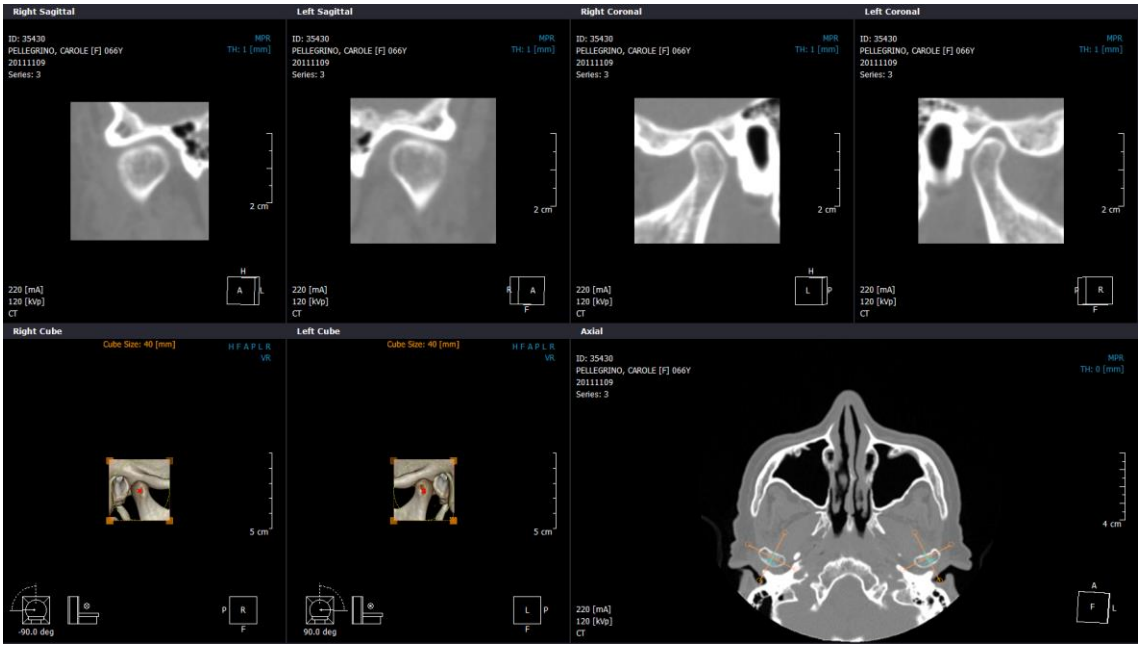
Layout is changed to 9x9.



- Cube

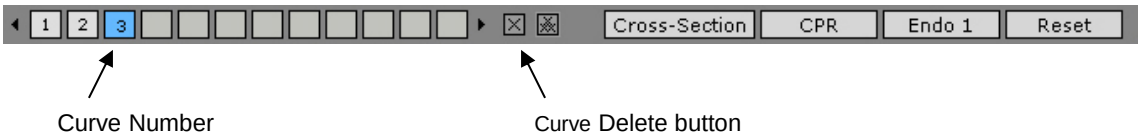
If you want expand TMJ part, set TMJ area size in setting window. After set TMJ area, draw TMJ line again.





7. Local Tools

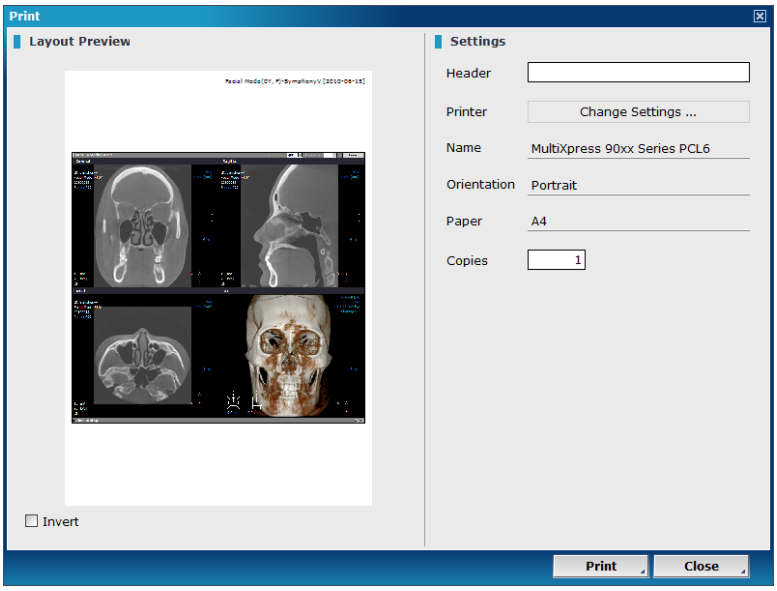
A Curve can be deleted by selecting the Curve number can clicking the Delete button. The x button deletes just one item and * deletes all items. Different path information can be viewed using the functions to the right.



Cross-Section	Displays Cross-Sectional view, Panoramic view, Axial, and 3D windows.
CPR	Displays standard CPR, 3D and Perpendicular windows.
Endo 1	Endoscope Screen. 1. Vessel – Vascular Endoscope : Used for viewing vessels with virtual endoscope. 2. Normal – Airway, Vertebra, Colon : Used for viewing all other regions besides vessels with virtual endoscope.

8. Printing

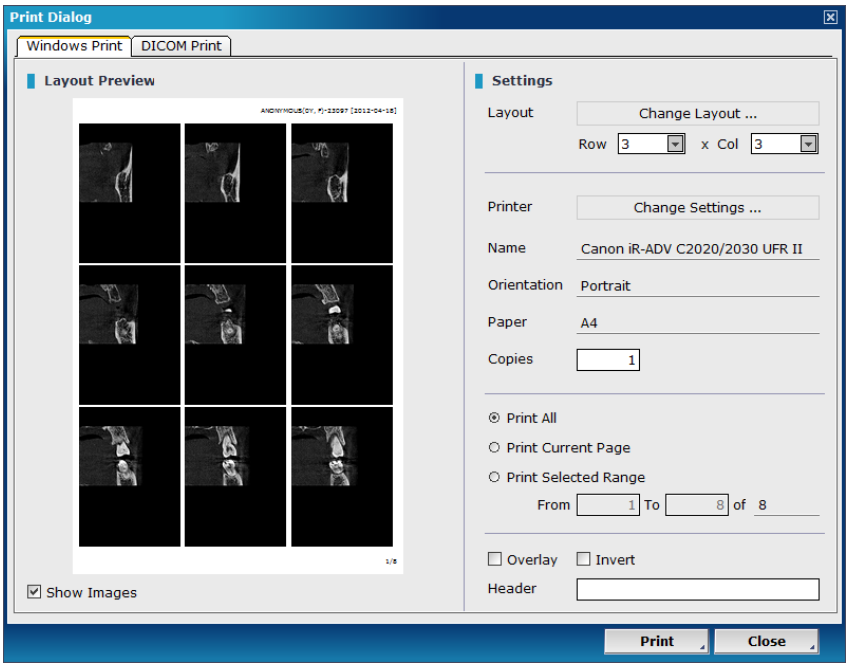
(1) Printing the MPR Screen



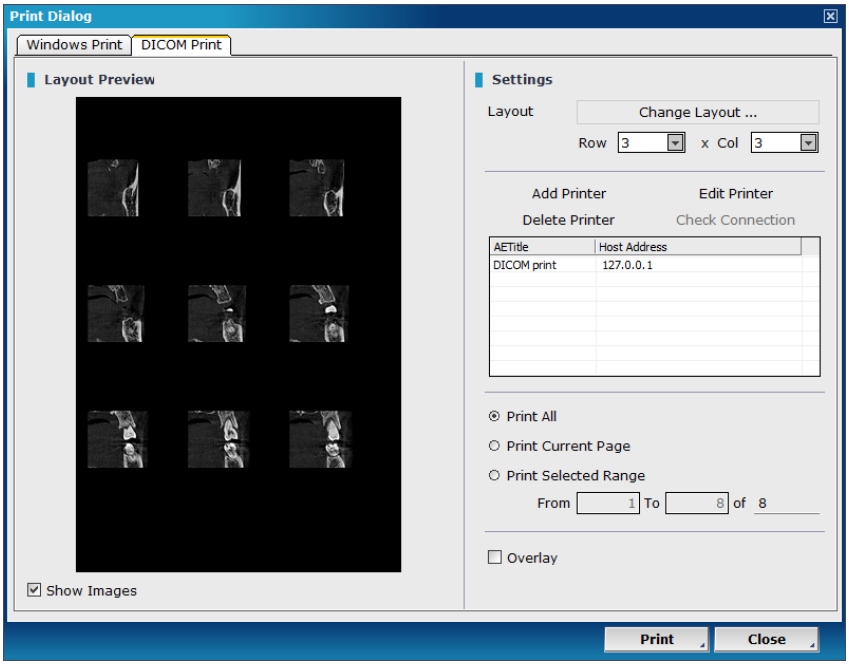
MPR images can be inverted using the 'Invert' button. Enter a header into the Header field and enter the number of copies then click the Print button.

(2) Printing the Cross-Sectional Screen

Click the Print button at the bottom right of Cross-Sectional View.

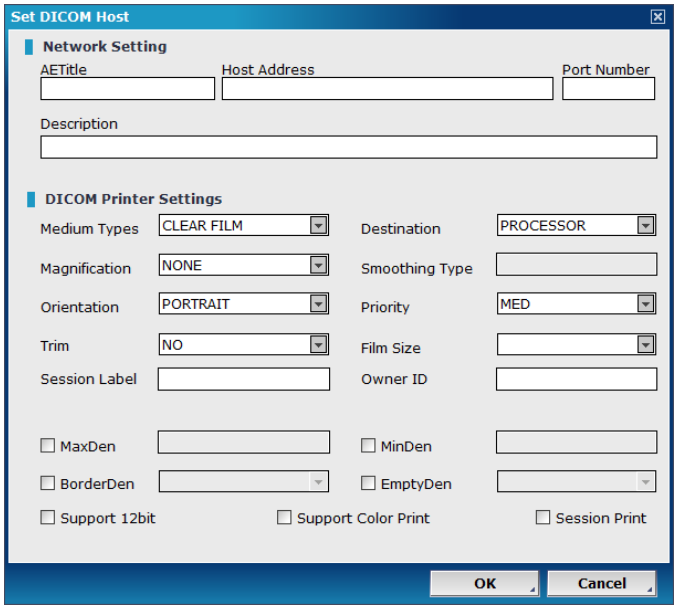


Images can be printed as desired using the ‘Show Images’, ‘Overlay’ and ‘Invert’ functions and the print option. Also, DICOM print is available.



■ Add Printer

Add DICOM printer. Input the network information and set conditions of DICOM printer.



■ Edit Printer

Edit information of selected DICOM printer.

■ Delete Printer

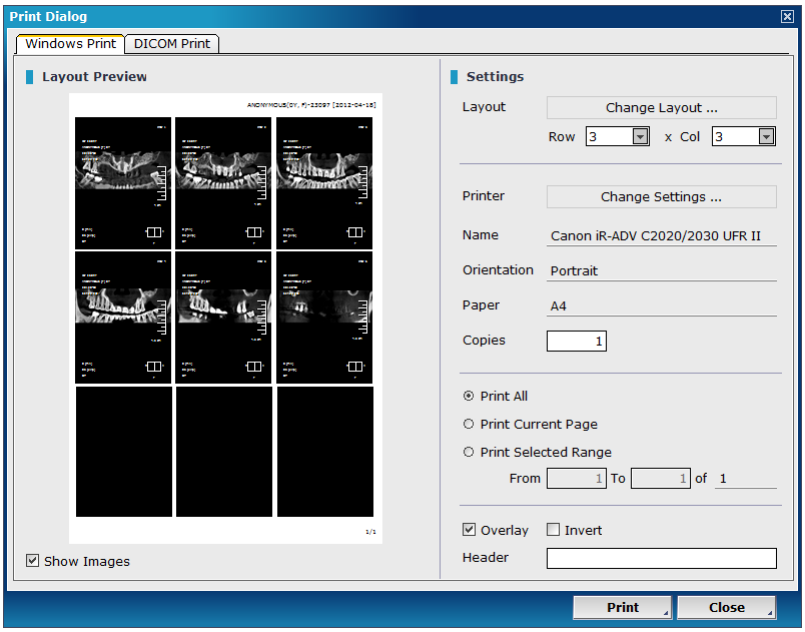
Delete selected DICOM printer.

■ Check Connection

Check the connection between computer and DICOM print.

(3) Printing the Panoramic Screen

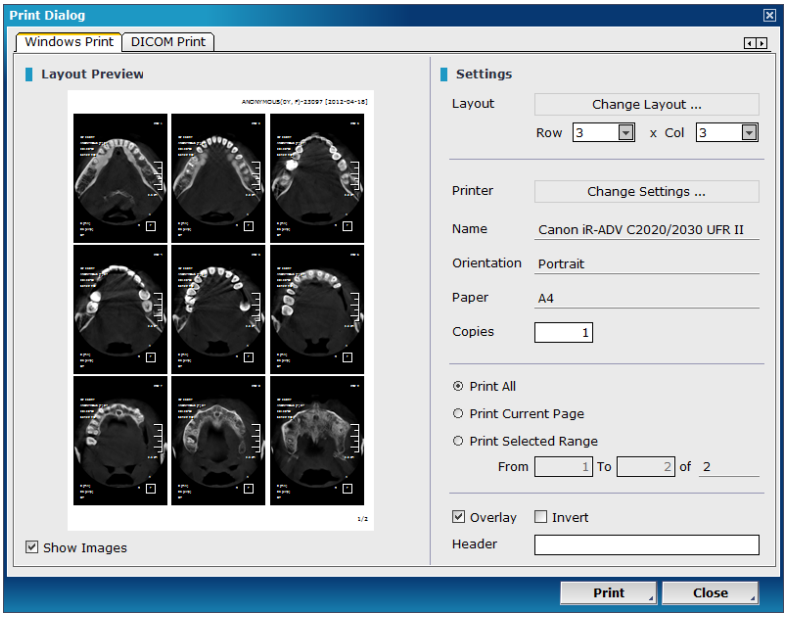
After creating images using the Quick-LightBox, print the images.



Images can be printed as desired using the ‘Show Images’, ‘Overlay’ and ‘Invert’ functions and the print option. Apply the configured Layout before clicking the Print button. Also, DICOM print is available.

(4) Printing the Axial Screen

After creating images using the Quick-Light Box click the Print button.



Images can be printed as desired using the ‘Show Images’, ‘Overlay’ and ‘Invert’ functions and the print option. Apply the configured Layout before clicking the Print button.

(5) **Batch Print (Real-size Print)**

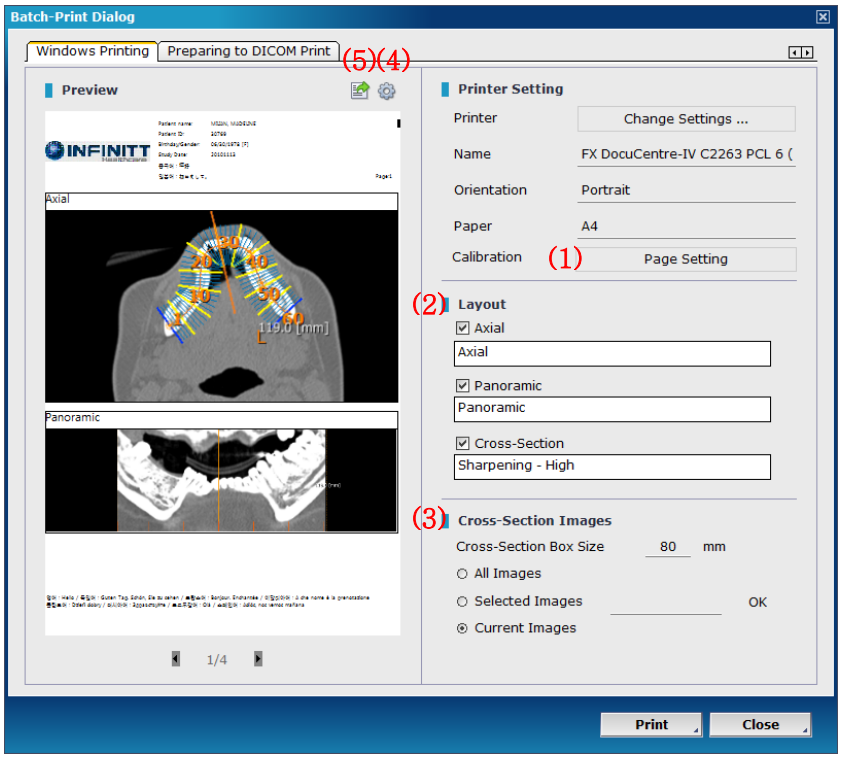
Xelis Dental supports Real-size Printing mode. It is “Batch Print” on the Cross-sectional view. Batch Print output is set at 1:1

You can show or hide text overlay on the Print Preview. You can apply the sharpen feature in your Print Preview.

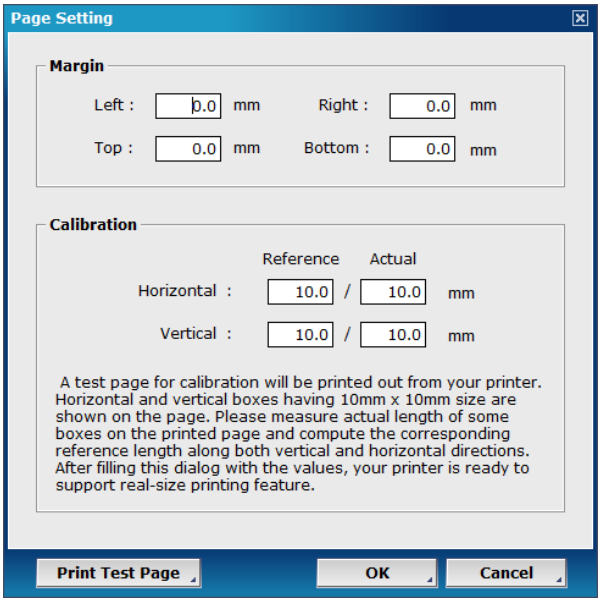
- Click the Batch Print button

  Click the Batch Print button on the Right top menu bar

- Batch Print



- **(1) Calibration**



To start printing a Calibration Test page, Click the “Print Test Page” button in the page setting window. In the test page, Horizontal and vertical boxes having 10mm x 10mm size are shown. Measure actual length of some boxes on the printed page and compute the corresponding reference length along both vertical and horizontal directions. After filling this dialog with the values, your printer is ready to support real-size printing feature.

- **(2) Layout**

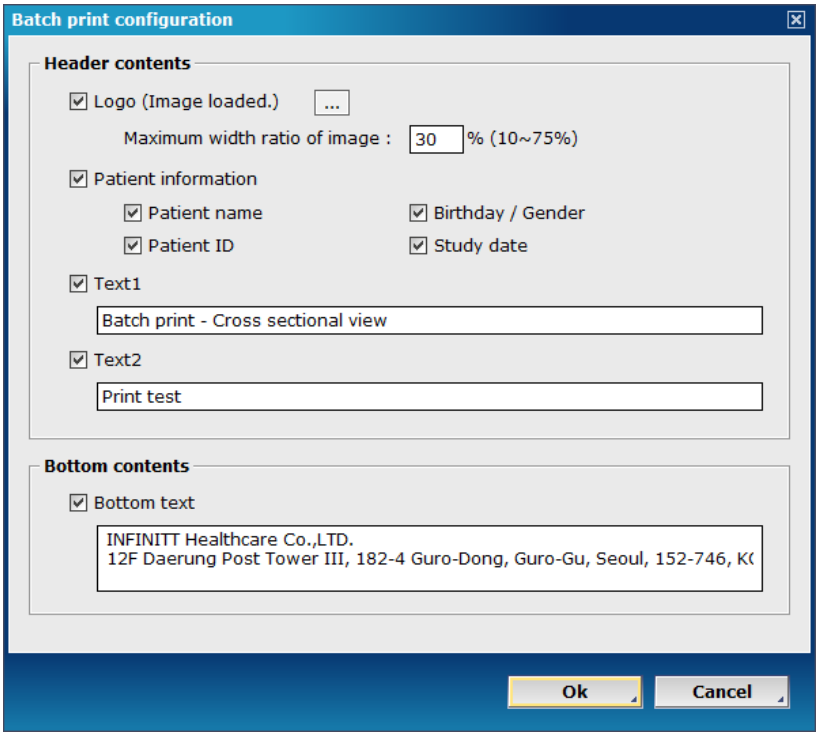
  The program remembers your settings.

- **(3) Cross-sectional images**

  User can set the page to print as All pages, Current page or Range to be printed

- **(4) Header/Footer configuration**

  Set header and footer contents. Just checked contents are printed. To load logo image, press ‘…’ button. The width of logo image is limited to a percentage of the width of the paper.



- **(5) PDF export**

  It can be output to a PDF file, not a handout.

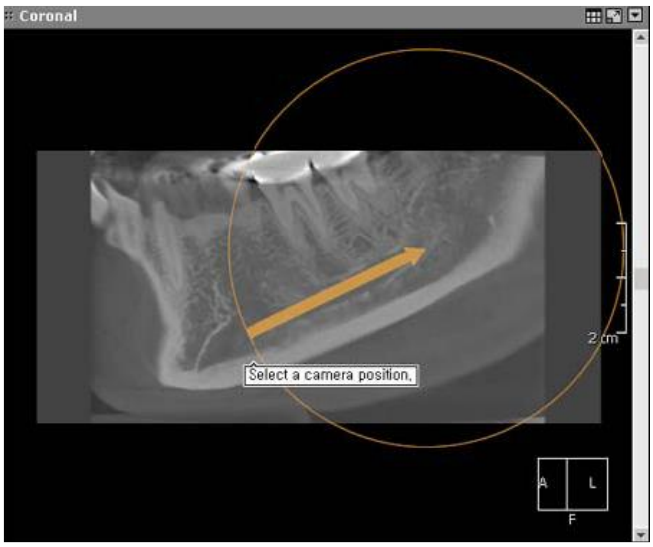
Chapter 5-6. 3D Zoom

1. Introduction

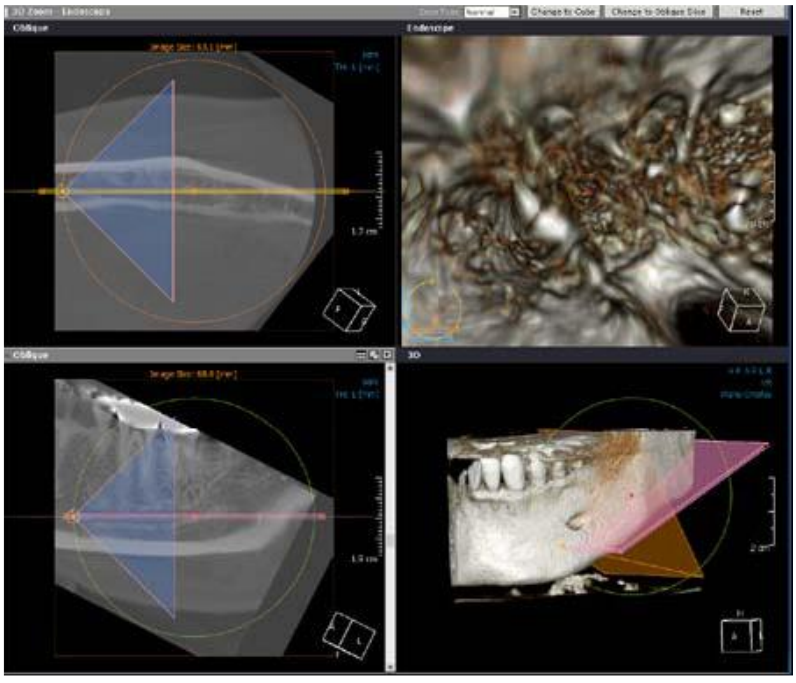
Endoscope, Cube and Plane functions are included in 3D Zoom. 3D Zoom allows for more intuitive viewing of images.

2. 3D Zoom-Endoscope

Click on the area of the screen to be viewed and rotate the endoscope camera to use the virtual endoscope.



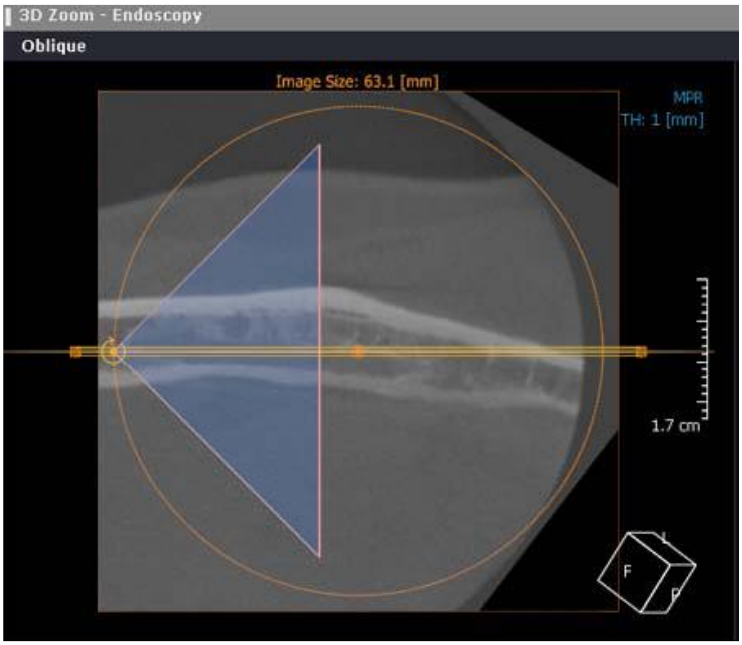
Use the left mouse button to designate the range of the endoscope.



The selected camera location and endoscope window can be viewed in the Oblique and 3D windows. The camera location and angle can be controlled from the Endoscope and Oblique windows.

(1) **Adjusting the Range of the Camera View**

The radius of the camera view can be expanded and reduced by moving the borders of the circle around the Endoscope camera area.

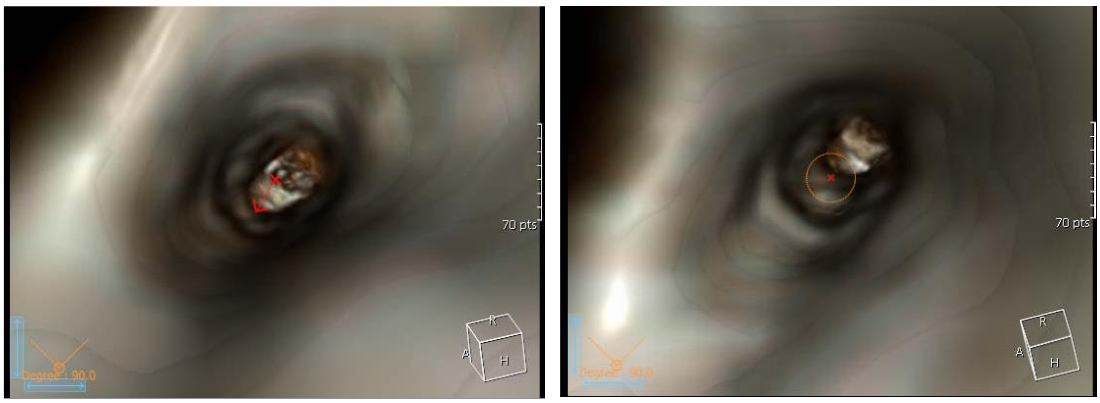


(2) **Moving the Camera**

- Moving the Target Point

The image is moved in the direction designated by the arrow when the x at the center of the window is moved as shown in the example below.

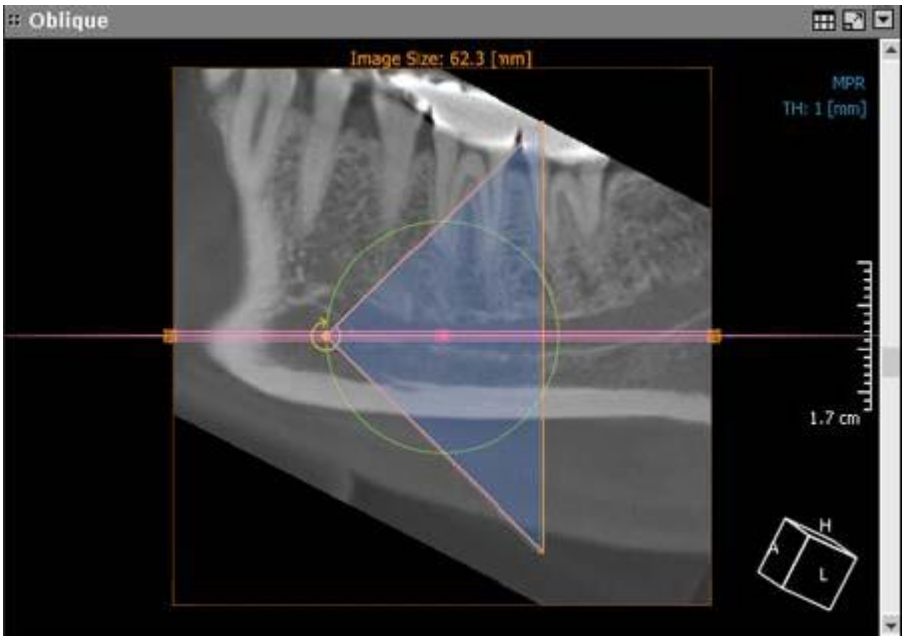
The Target Point can be moved more precisely when viewing x-ray images on the Oblique window.



■ Moving the Point of View

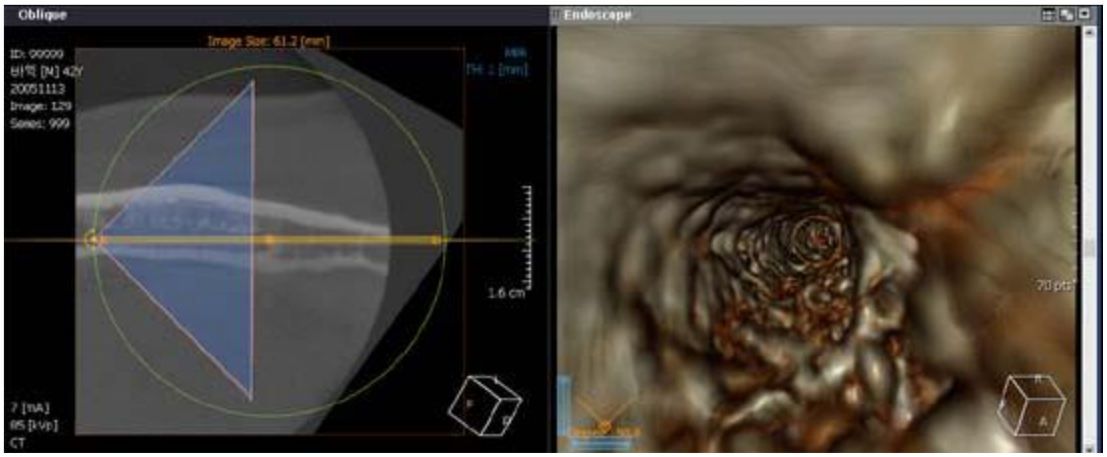
When the cursor is moved inside the perimeter of the circle at the center of the window, an arrow comes up showing the direction of movement. The point of view of the image can then be moved up/down and left/right by pressing the left mouse button and moving the mouse.

The location of the camera can be easily determined when moving the point of view using Oblique Slice images. The location of the point of view can be moved by clicking on the x, and the camera can be rotated by clicking on the rotation symbol.



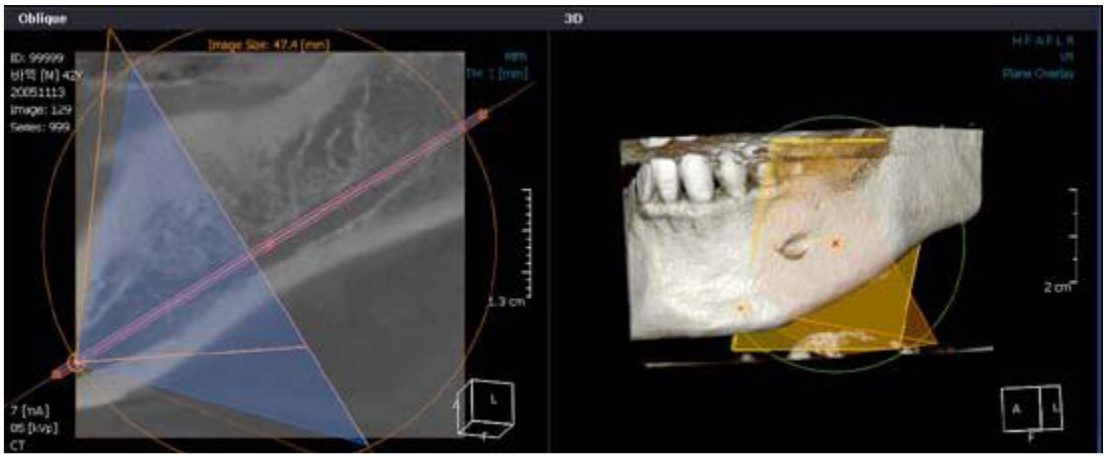
(3) **Moving the Oblique Camera**

< Oblique 1 >



The location of the camera can be changed by dragging the mouse and rotating the point of view within the radius.

< Oblique 2 >



The camera location can also be changed by rotating the angle on 3D images.

(4) **Rotation**

■ Rotating the Center of the Viewing Scope

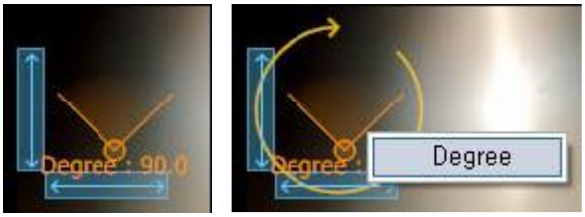
The image can be rotated at the center of the viewing scope by right clicking and moving the mouse on the image at the bottom left of the Endoscope window as shown in the example below.

- Rotating at the Center of the Point of View

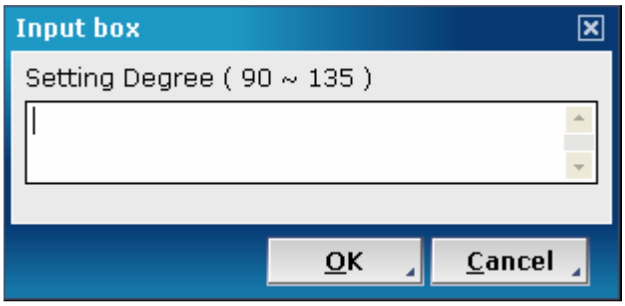
The image is rotated at the center of the point of view by right clicking and dragging the mouse at any point on the Endoscope window. Using the Rotation tool or moving the rotation point on the Oblique window also rotates the image.

(5) Adjusting the Viewing angle

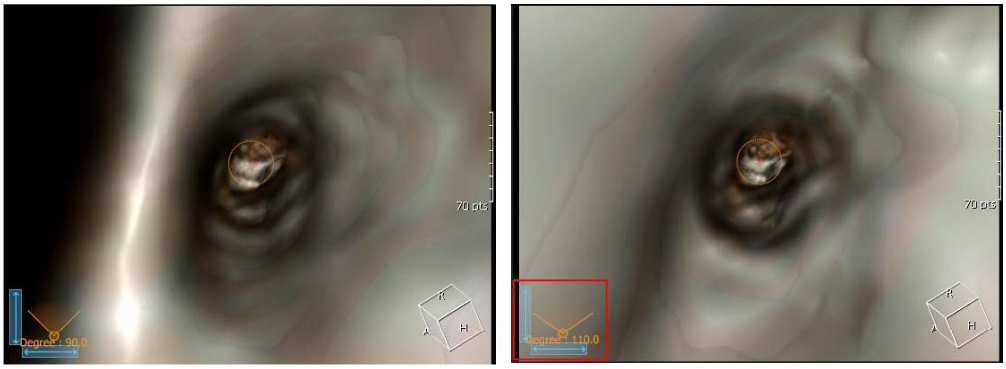
A context menu like the one shown in the example below comes up when the user right clicks on the angle display section of the image shown at the bottom left of the Endoscope window.



The angle degree settings dialog box shown in the example below comes up when Degree is selected from the menu.



The angle entered into the dialog box is immediately applied to the image.



(6) **Local Tools**

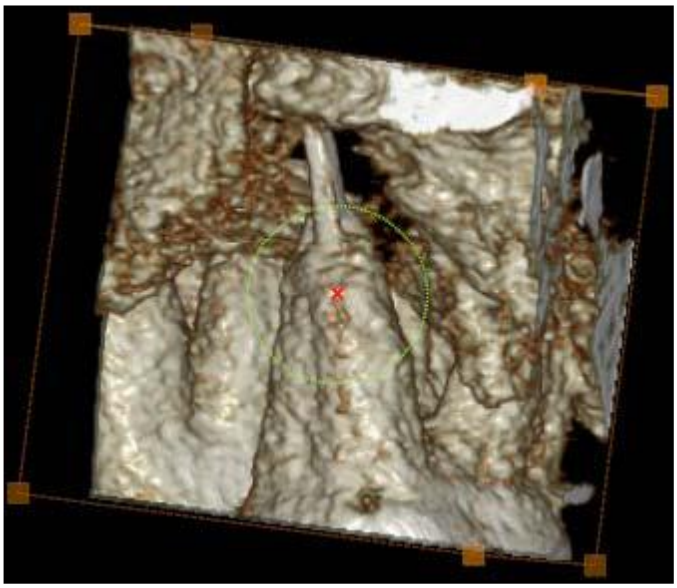
Endo Type	1. Normal – Select for viewing any region except for vessels. 2. Vessels –Select for viewing inside vessels using the Endoscope camera.
Change to Endo Change to Cube Change to Oblique Slice	Converts to Endoscope window. Converts to Cube window. Converts to Plane (Oblique Slice) window.
Reset	1. Reset – Resets MPR, Curve, AutoFit and VOI. 2. Auto fit – Sets image to proper size. 3. Reset MPR – Resets MPR window. 4. Reset VOI – Resets VOI window. 5. Reset All – Resets all MPR, Curve and AutoFit windows.

3. 3D Zoom-Cube

3D-Zoom Cube provides a function for viewing images that have been enlarged with the 3D Zoom function, at high resolution.

(1) **Moving Images**

There are 2 ways to move images, selecting the center and moving the image or free movement.



- Selecting the Center

Drag images by clicking and dragging the x at the center of the image.

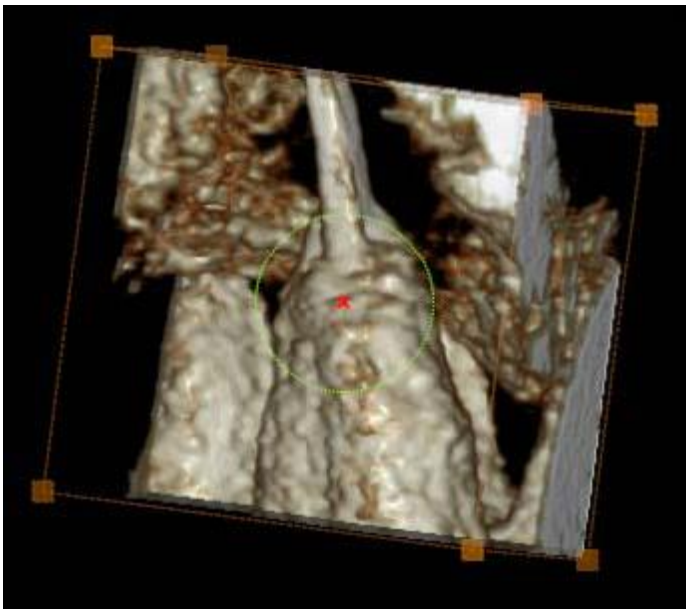
- Free Movement

Move the mouse into the circle at the center of the image and click and drag to move image freely.

(2) Rotation

Rotation works the same as 3D rotation.

(3) Adjusting Size



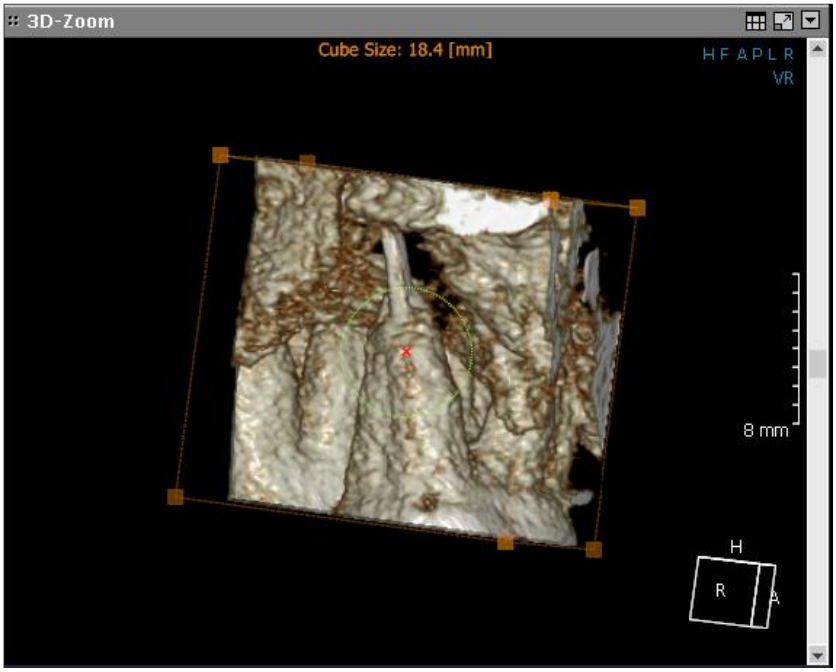
Click and drag the orange boxes at the corners of the 3D image to adjust image size. If the x the center of the screen is too far away, make the image larger. If the x is too close, make the image smaller.

(4) Resetting Angle

Click on the letter at the right of the screen to reset the angle of the image. The meaning of each of the letters is as shown below.

H	Reset To Head View
F	Reset To Foot View
A	Reset To Anterior View
P	Reset To Posterior View
L	Reset to Left View
R	Reset To Right View

(5) Adjusting Rendering Mode



The Rendering Type context menu come up when the user clicks on VR displayed at the top right of the screen.

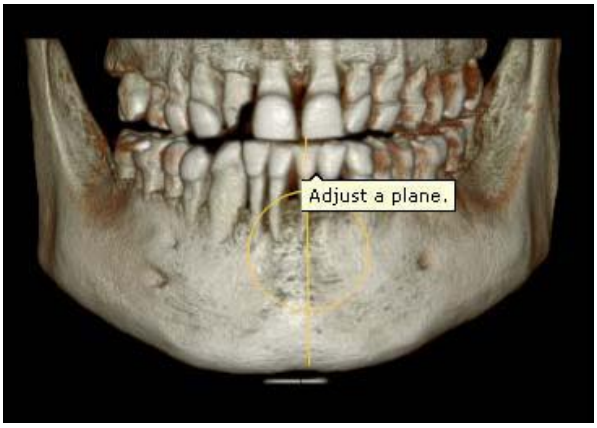
The selected Rendering Type is immediately applied to the image.

4. 3D Zoom-Plane

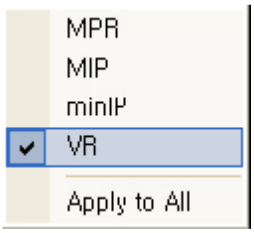
3D images can be expanded and viewed by configuring the directional plane as in Oblique Slice.

Select '3D Zoom → Plane' from the toolbar.

Click on the plane to be viewed, and then click on the region of interest.

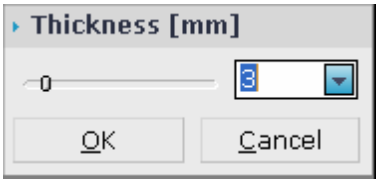


Click on MPR at the top right of Oblique View and select VR from the menu.

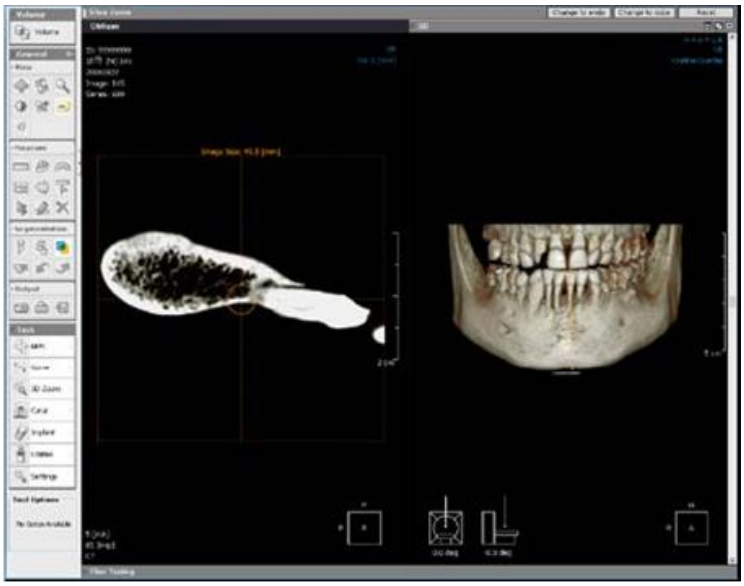


Clicking on Thickness at the top right of Oblique View brings up the dialog box as shown below.

The thickness can then be adjusted using the slide bar or by entering the desired thickness.



Oblique View comes up in 3D. Images can be scrolled though using the mouse wheel.



Chapter 5-7. Canal (Nerve Drawing)

Introduction

The Nerve Drawing function is useful when consulting patients. Xelis-Dental offers Canal Draw and Canal Manager functions. Canal functions can only be used on Professional version.

1. Canal Drawing

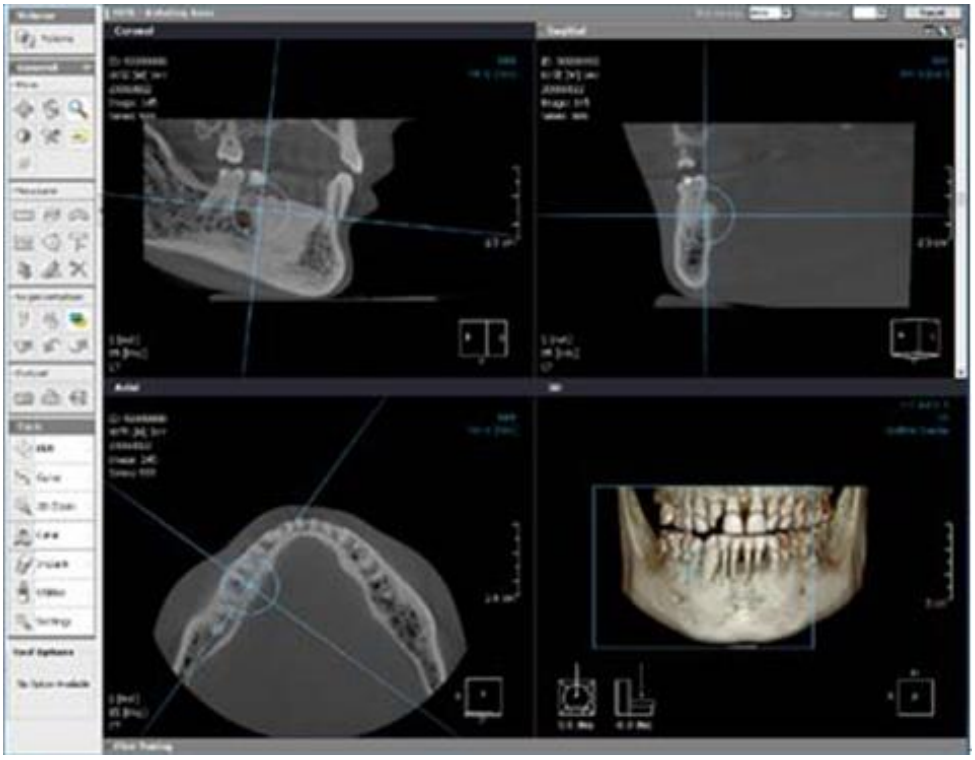
Nerve canals can be easily drawn using Coronal View and Cross-Sectional View.

(1) Drawing Canal in Coronal View

Before drawing the canal, the axis must be adjusted so that the canal can be clearly viewed. Once this is done, the canal can be traced clicking along the canal and then double clicking or right clicking to end the line.

- Adjusting the Axis

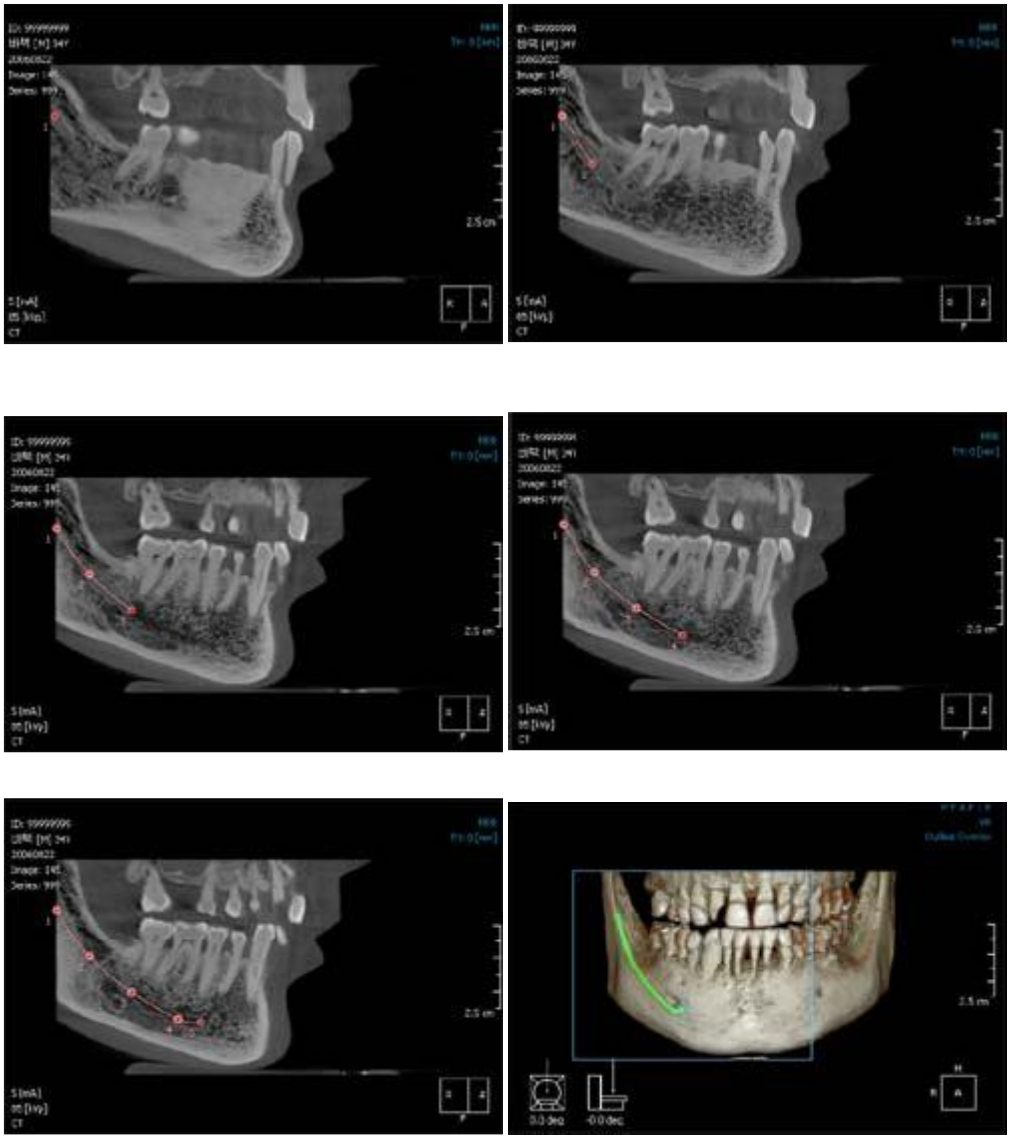
Adjust the Coronal axis in the Axial window so that it is parallel with the arch. To more accurately find the position of the arch, make the Axial axis in the Coronal window parallel to the occlusal. Then readjust the Coronal axis in the Axial window.



■ Drawing Canal

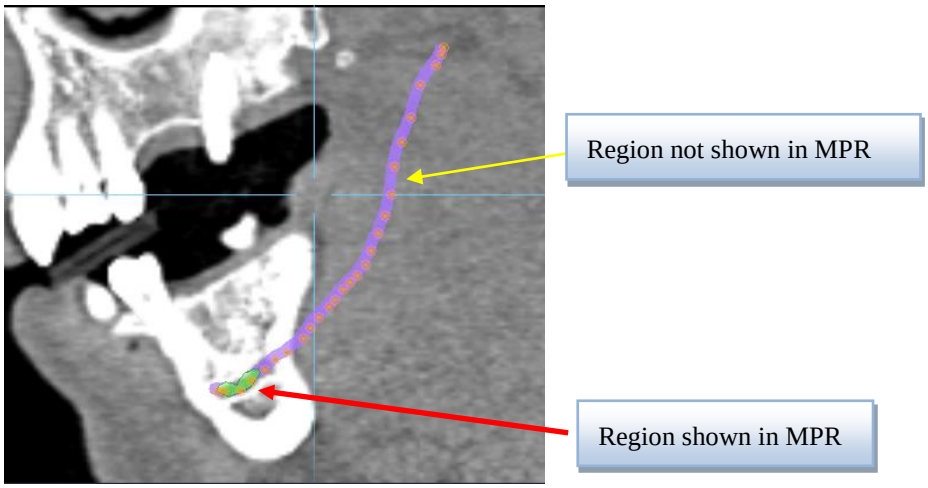
Select Canal → Draw from the toolbar.

Configure the path of the canal along the canal in the Coronal window as shown below. Double click to end the path.



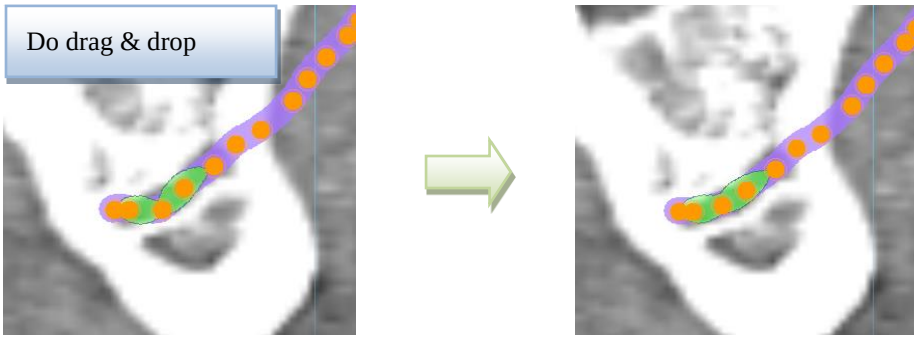
The canal path can be viewed in MPR, 3D and Cross-Sectional View.

- Planes that cannot be shown in flat images can be viewed in MPR images.



■ Modifying Canal

Adjust control points by dragging and dropping them, in order to modify the nerve canal.



First context menu is shown when clicking the right mouse button on the green areas (region shown in MPR), and the second context menu is shown when clicking the right mouse button on the purple areas (region not shown in MPR).

Figure 1 Context menu on the green area

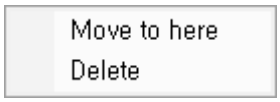
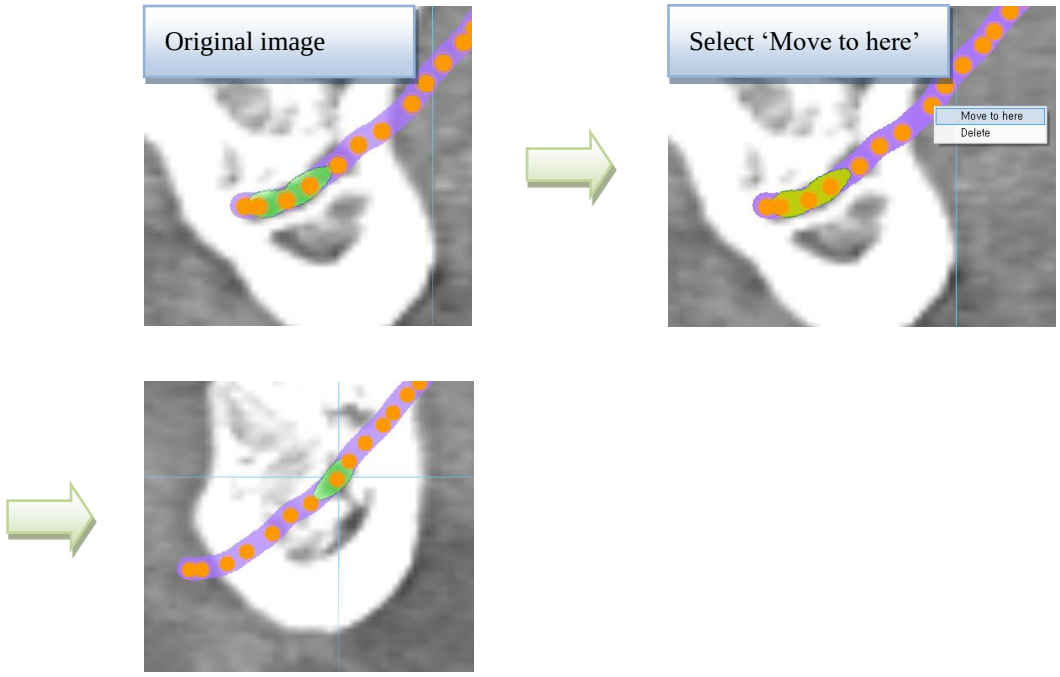


Figure 2 Context menu on the purple area

Insert point	Insert a control point on the canal.
Delete point	Delete a control point, only if the mouse cursor is on the point.
Move to here	Move to the MPR image overlapped with the control point.
Delete	Delete the canal

An example for the ‘Move to here’ function



(2) **Drawing Canal in Cross-Sectional View**

Create Cross-Sectional View for drawing canal. Configure the path of the canal by moving through Cross-Sectional images. Double click to end path.

- Creating Cross-Sectional View

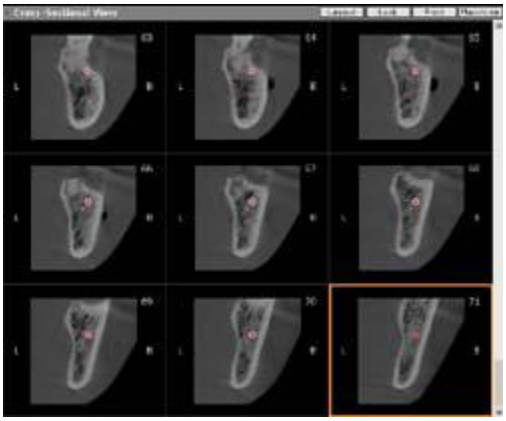
Refer to “Chapter 5-5 Curve – Cross-Sectional – Creating Cross-Sectional View” to create the Cross-Sectional View.

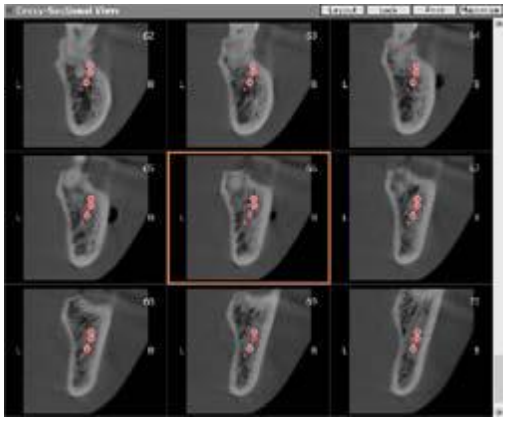
■ Drawing Canal

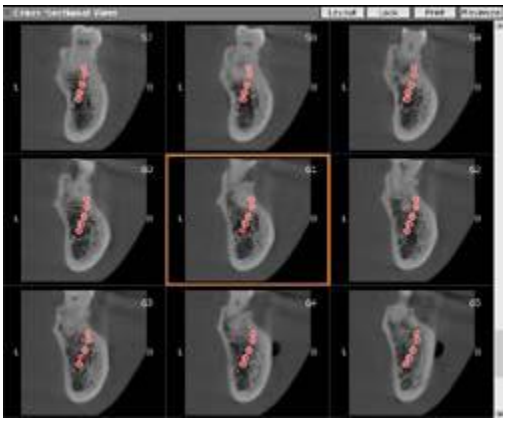
Move to the location of the image when the canal is to be drawn in Cross-Sectional View.

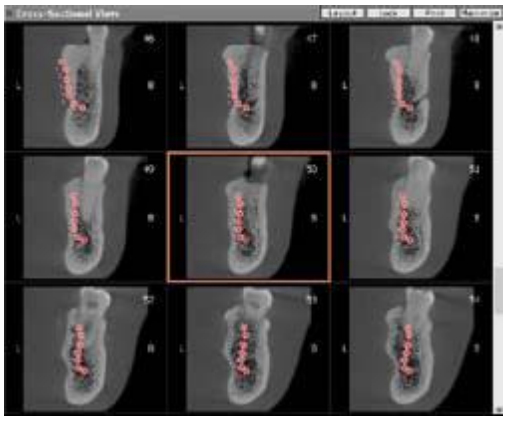
Select Canal → Draw from the toolbar.

Configure the canal path by moving through Cross-Sectional Images and clicking along the path. Double click to end the path.









Once the path is finished, the canal can be viewed as in the example below.

When the canal path is configured in Cross-Sectional View, the path can be more easily and clearly drawn in the Coronal window.

■ Drawing Canal

Control points are visualized only if they are on the MPR image.

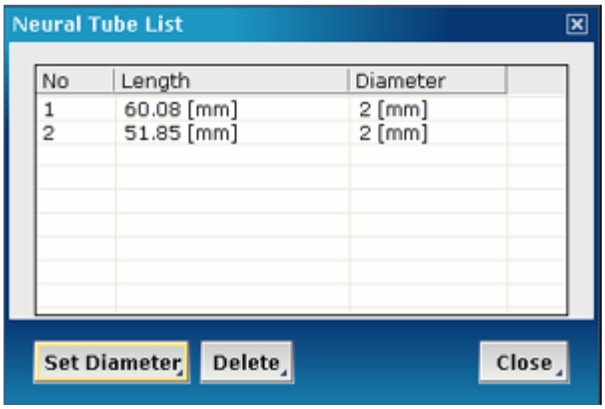
Same context menus appearing in the ‘Coronal view’ are showing when clicking the right mouse button, however ‘Move the here’ function is disabled.

2. Canal Manager

Canal Manager offers functions for correcting canal thickness and deleting canals.

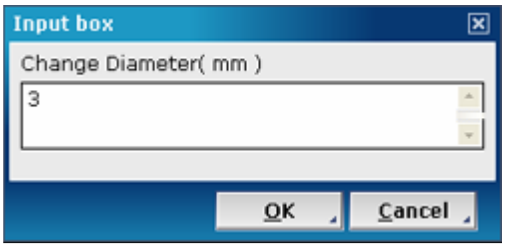
Select Canal → Canal Manager from the toolbar.

Canal thickness corrections and canal deletion can be done from the dialog box that comes up as shown below.



■ Correcting Canal Thickness

The dialog box shown below comes up when the user selects a Canal from the list and selects Set Diameter.



Enter a value in mm and click OK

■ Removing Canals

Select a canal to be deleted and click Delete.

Chapter 5-8. Implant Simulation

1. Introduction

Implant includes an Insert, Multi Insert function for simulating implant insertion, an Implant Manager function for managing implants, and Implant Library function and a Show Bone Density. The Implant Simulation tool allows for more precise planning of procedures and improves success rate of implants.

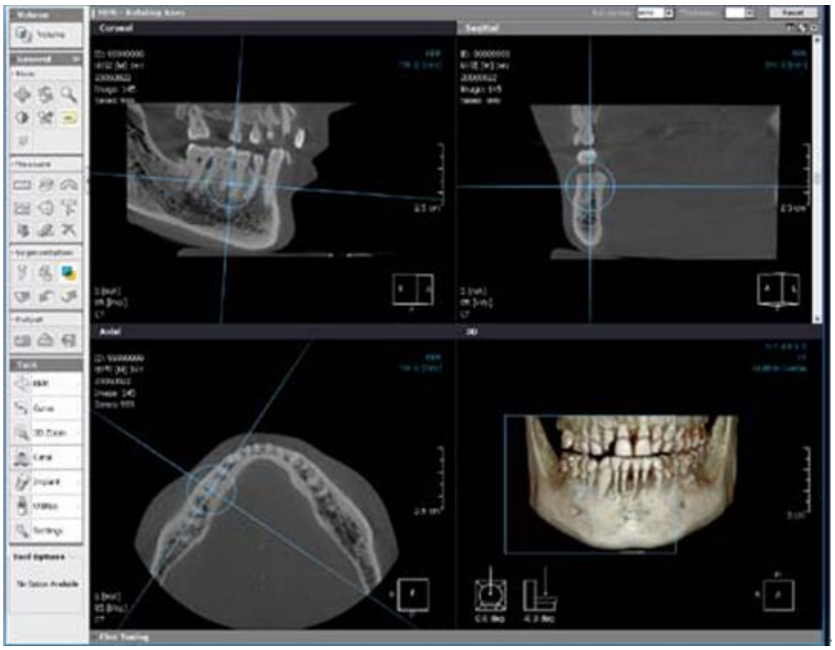
2. Implant Simulation

Implant Simulation increases the success rate of procedures and helps the patient make more informed decisions when giving consent for treatment. Implant Simulation provides User Defined Implant and Real Implant Model which uses STL data. Functions are provided for inserting, editing and removing implants.

(1) Implant

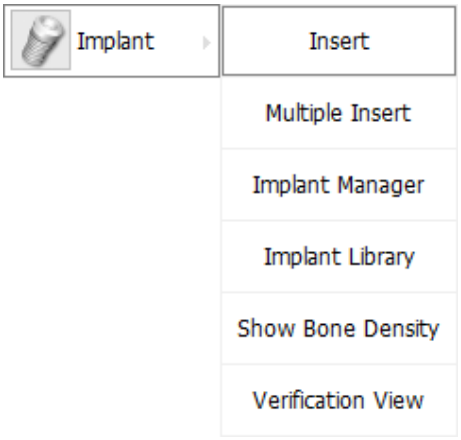
The Axis must first be adjusted to clearly see the location of implant.

Rotate the Coronal axis in the Axial window so that the Coronal window is shown in Panorama. Then make the Axial axis parallel to the arch in the Coronal window and move the Sagittal axis to the position where the implant is to be implanted.

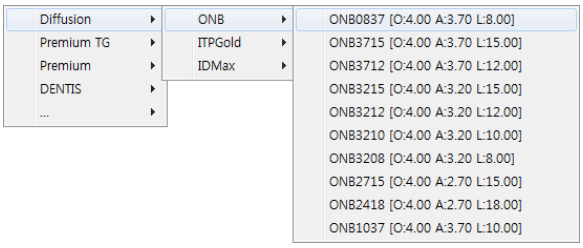


■ Implant (Single)

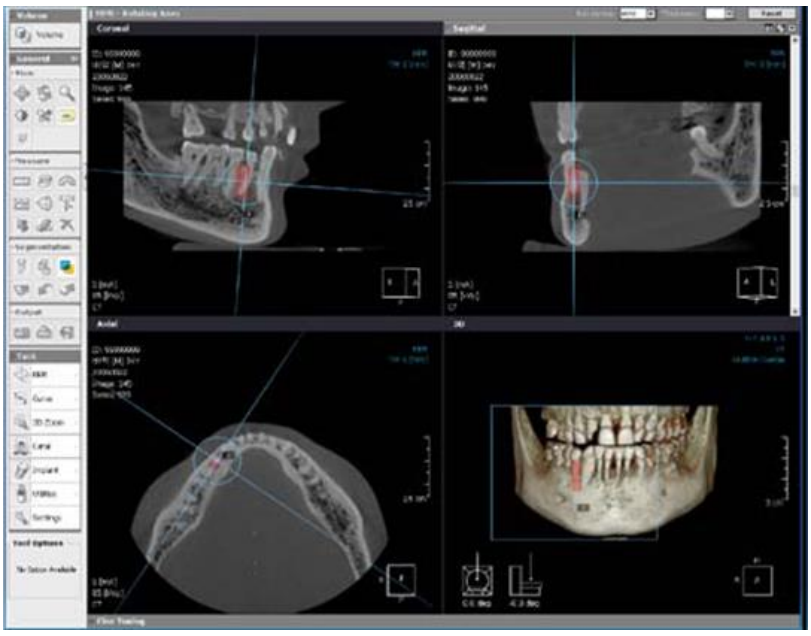
Select ‘Implant → Insert’ from the toolbar.



The menu shown below will come up when the user clicks Implant → Insert. Select the necessary implant from the list.

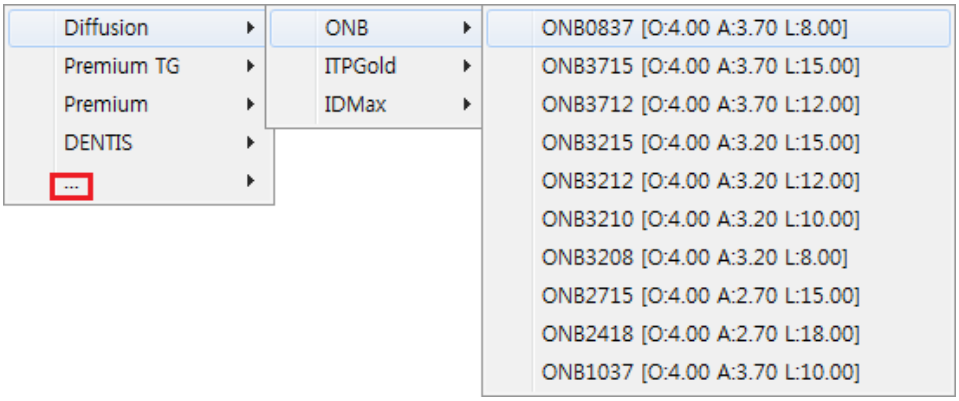


Click on the proper location to implant the implant. The implant can then be viewed in MPR and VR as shown below.



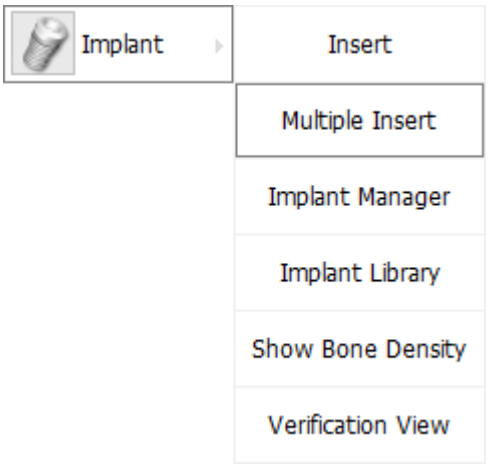
■ Select an Implant Model

Implant information from various implant manufacturers can be used. This information can be managed using the Implant Library DB. A menu is provided which shows the 5 most recently used implant manufacturers. If the manufacturer needed is not in the 5 listed, click '…' and select the desired manufacturer from the list.



■ Implant (Multiple)

Select 'Implant → Multiple Insert' from the toolbar.



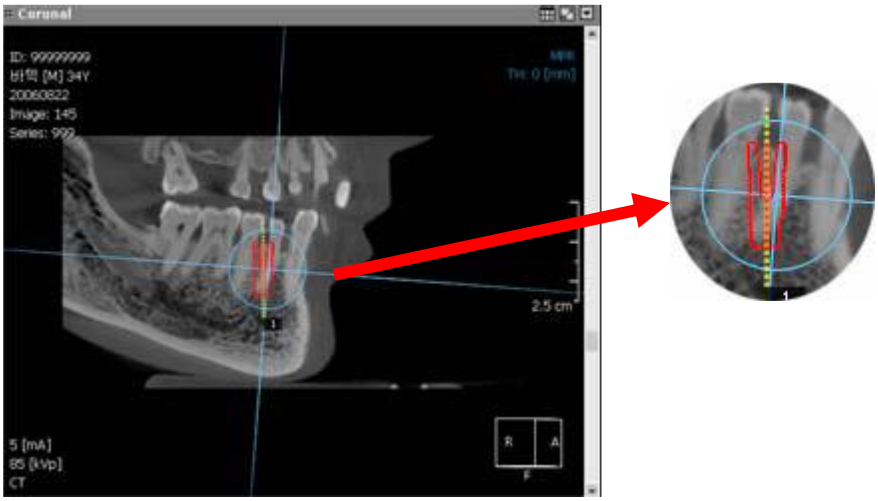
Click on the proper location to place the implant. Implants can then be continually placed on the image by clicking on the proper locations. Double click to end implant insertion.

(2) **Editing Implants**

Various functions are provided on the pop-up menu for moving and rotating implants.

■ Moving/Rotating Implants

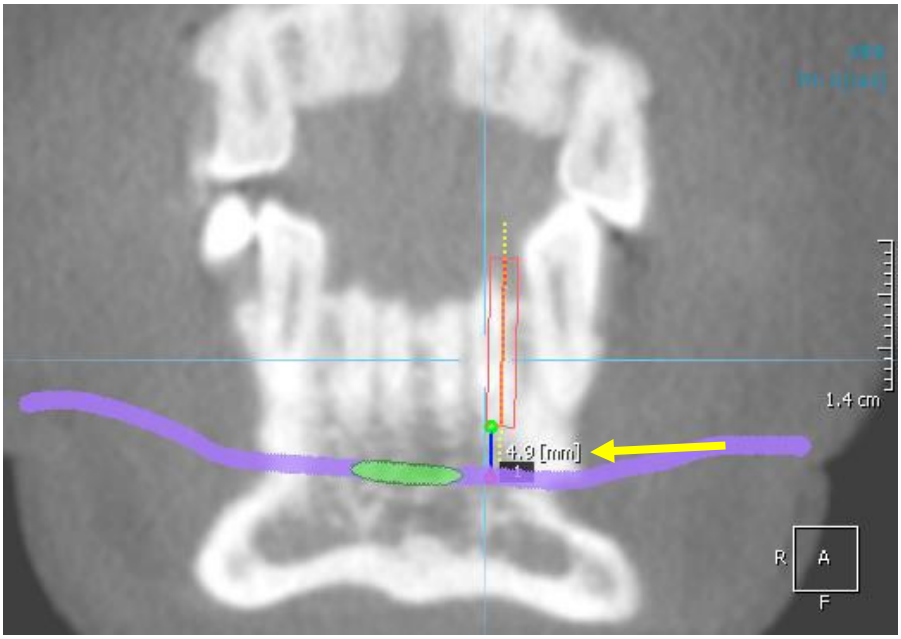
The axis of the implant can be rotated with the mouse as shown in the example below.



Click and drag the mouse on the orange section to move the implant, and click and drag the mouse on the yellow section of the implant to rotate the implant.

■ Measuring the Implant and Canal

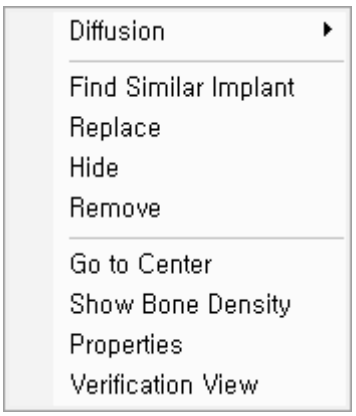
When an implant is inserted in the image, the distance from the outer edge of the implant to the canal is displayed. If the implant and the canal overlap, the text is displayed in red.



■ Implant Function Menu

Right click on an inserted implant to bring up the Implant Function menu.

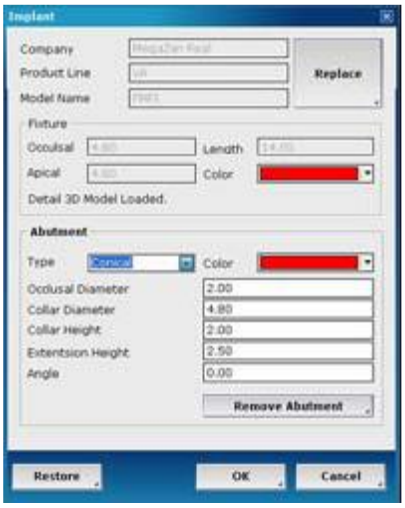
The Implant Function menu is shown below.



The option shown at the very top of the menu is for quickly selecting implant products. The remaining functions on the menu are described below.

Find Similar Implant	Lists implants with similar length and width.
Replace	For select another implant from the library.
Hide	Hides selected implant.
Remove	Removes selected implant.
Go to Center	Moves the MPR axis to the center of the implant.
Show Bone Density	Shows the bone density at location of implant.
Properties	Property configurations.
Verification View	Shows the MPR orthogonal to the implant axis..

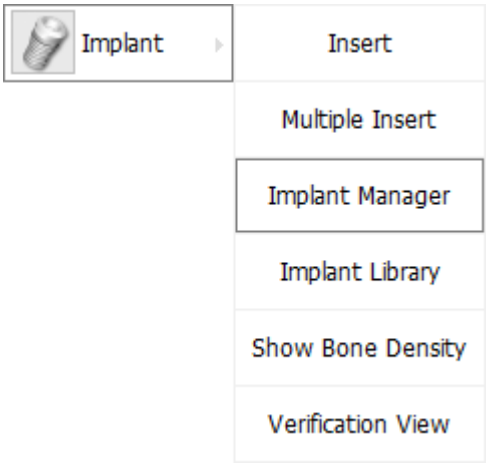
Color and size can be changed from the Properties option. Abutment properties can also be configured by clicking the Abutment button.



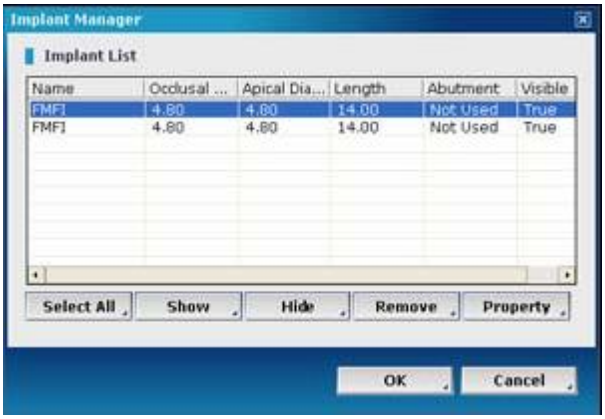
3. Implant Manager

Implants can be shown/hidden, deleted and edited using Implant Manager.

Select ‘Implant → Implant Manager’ from the toolbar.



The following ‘Implant Manager’ dialog box will come up.



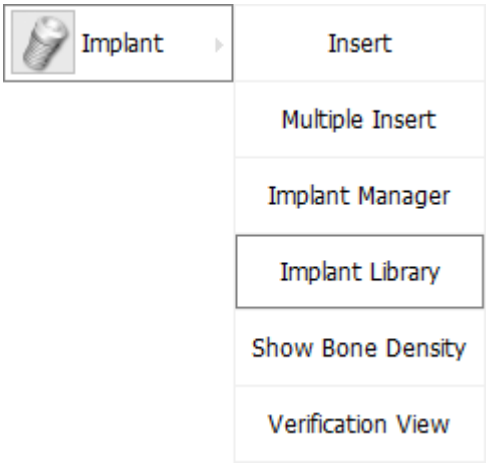
After selecting an implant, the following options can be applied.

Select All	Shows all implant.
Show	Shows only selected implants.
Hide	Hides selected implants.
Remove	Removes selected implants.
Property	Brings up properties of selected implants.

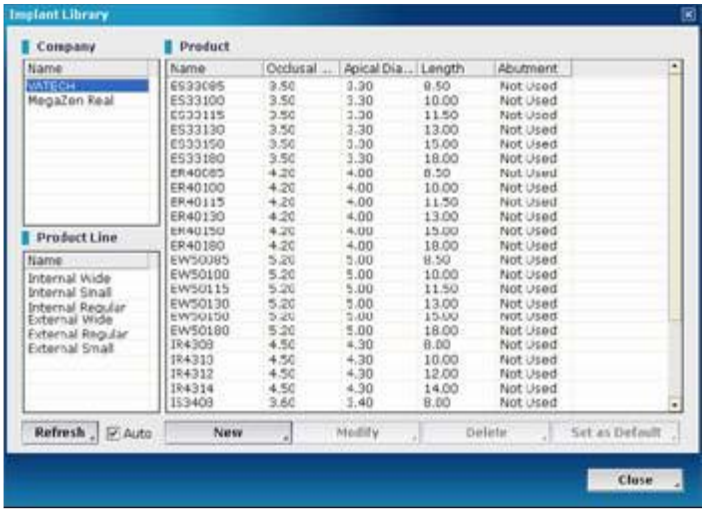
4. Implant Library

Implant Library includes User Defined Implant and Real Implant Model (STL data) functions. Real Implant Model is provided when installing or updating Xelis-Dental and User Defined Implant can be used for adding items outside the provided library. Implant Library provides function for adding, modifying and deleting User Defined Implant items

Select 'Implant → Implant Library' from the toolbar.



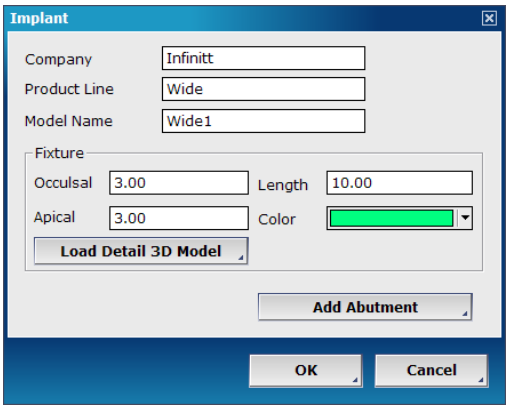
The following 'Implant Library' dialog box will come up.



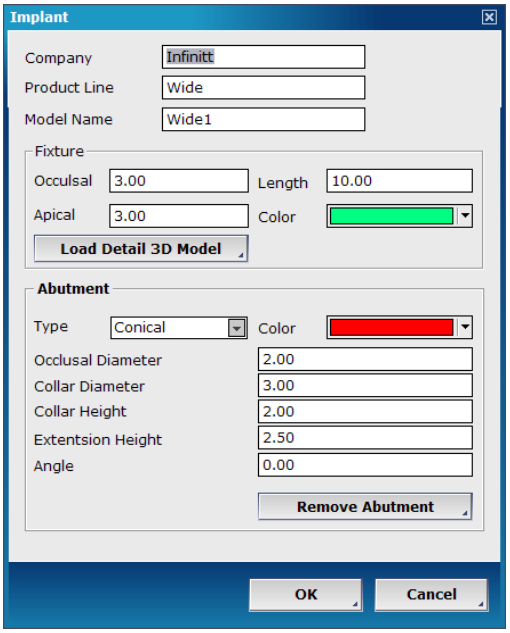
(1) Adding User Defined Implants

After opening Implant Library, click New to open the Add Implant dialog box. Enter Company, Product Line, Model Name and Occlusal/Apical width and length. Implant color can be selected using the Color button.

The Add Implant dialog box is as shown below.



Click the Add Abutment button to add an Abutment.



INFO.	Click the 'Load Detail 3D Model' button to add and STL to add a 3D Implant Design file (STL file). Contact the customer support center if a problem occurs when adding Real Implant Models.

(2) Modifying User Defined Implants

Select an implant and click the Modify button to bring up the properties for that implant.

Click OK to applied properties to implant. Click the Restore button to restore implant to originally saved status

(3) Removed User Defined Implants

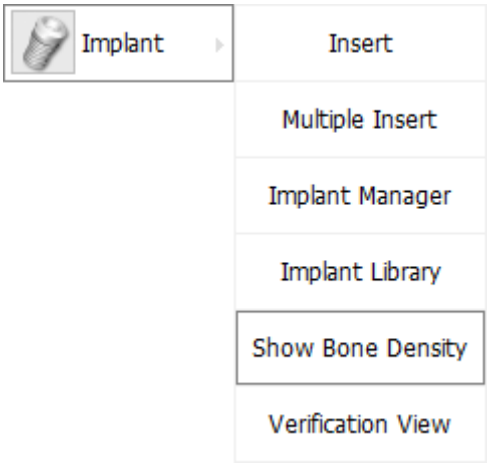
Select an implant to be removed and click the Delete button.

Click Yes when the 'Do you want to remove this item, really?' message comes up.

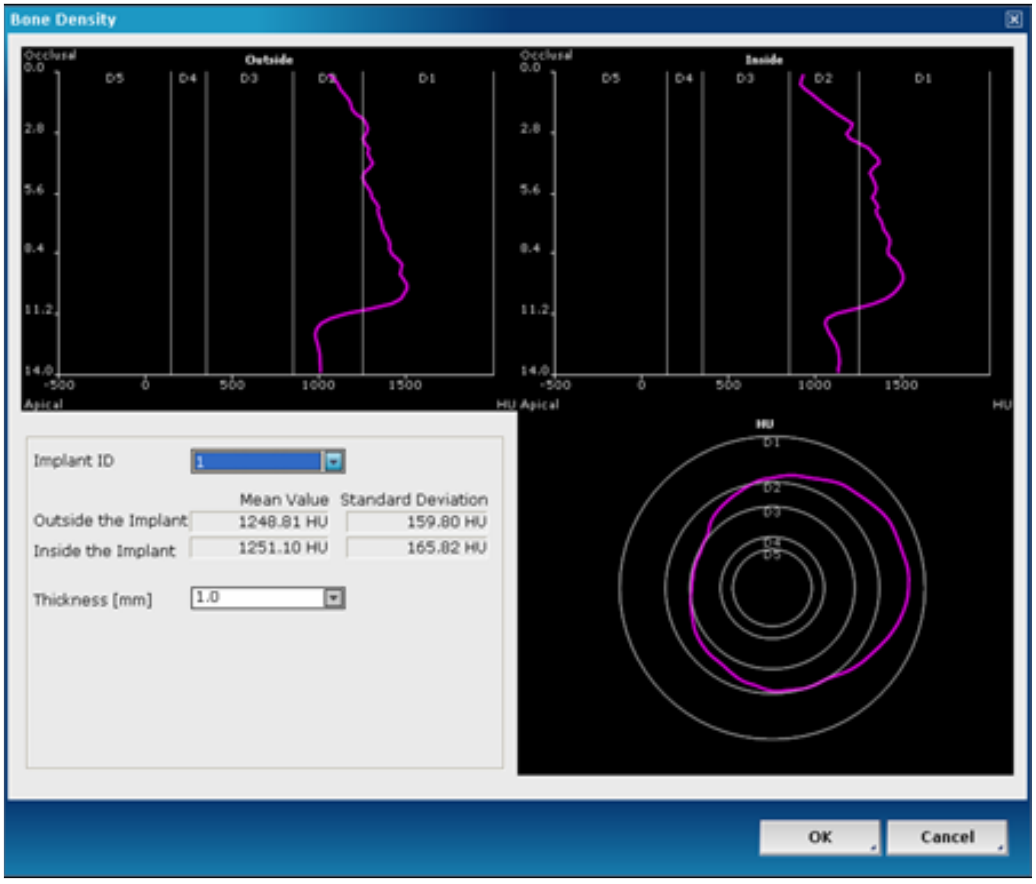
5. Bone Density

The Bone Density function is for viewing the bone tissue density in the area of the implant. The success rate of implant surgery can be improved by verifying the Outside/Inside bone density and Axial plane bone density.

Select 'Implant → Show Bone Density' from the toolbar.



The following ‘Bone Density’ dialog box will come up.



- Outside

Displays mean bone density to the outside of the implant.

- Inside

Displays mean bone density to the inside of the implant.

- Axial

Shows mean bone density on Axial plane.

- Implant ID

For selecting implant ID

- Standard Deviation

Shows standard deviation of bone density

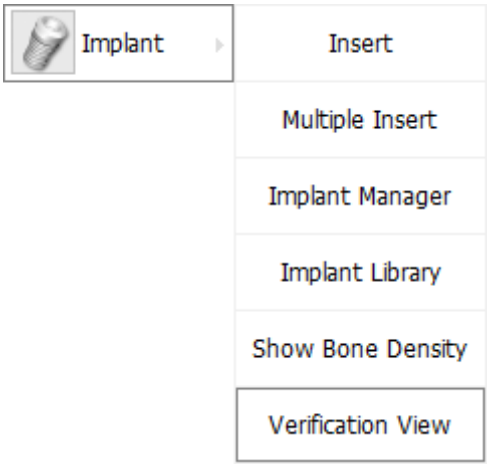
- Thickness

For configuring thickness from implant surface to bone density

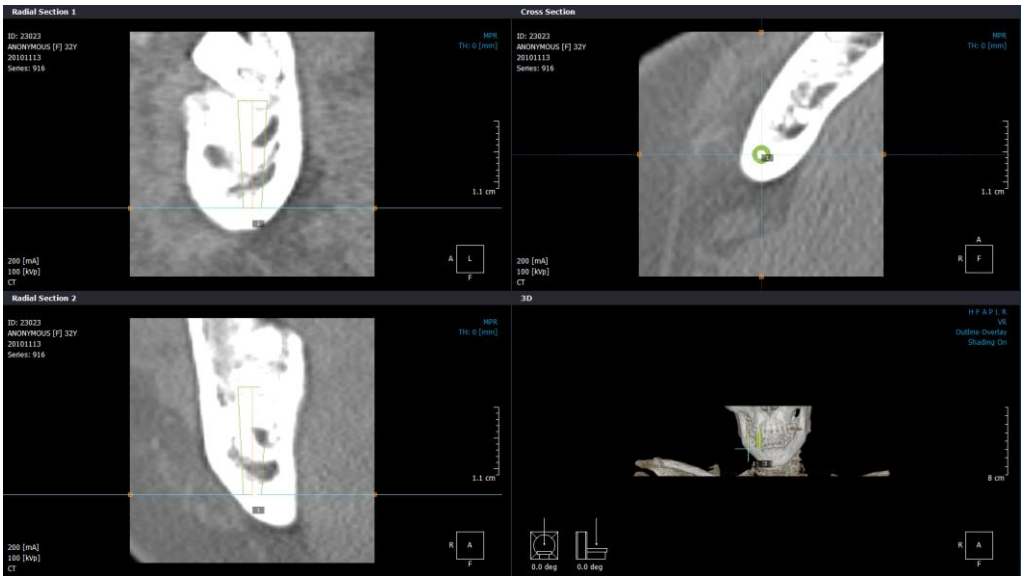
6. Verification view

It shows the MPRs orthogonal to the implant axis. There are two MPRs in different directions and they are always orthogonal to each other.

Select an 'Implant → Verification View' menu from the toolbar.

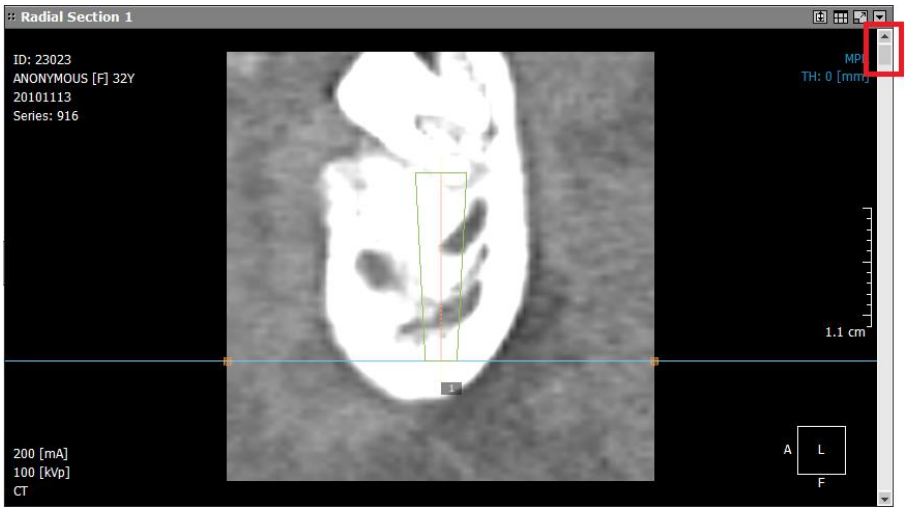


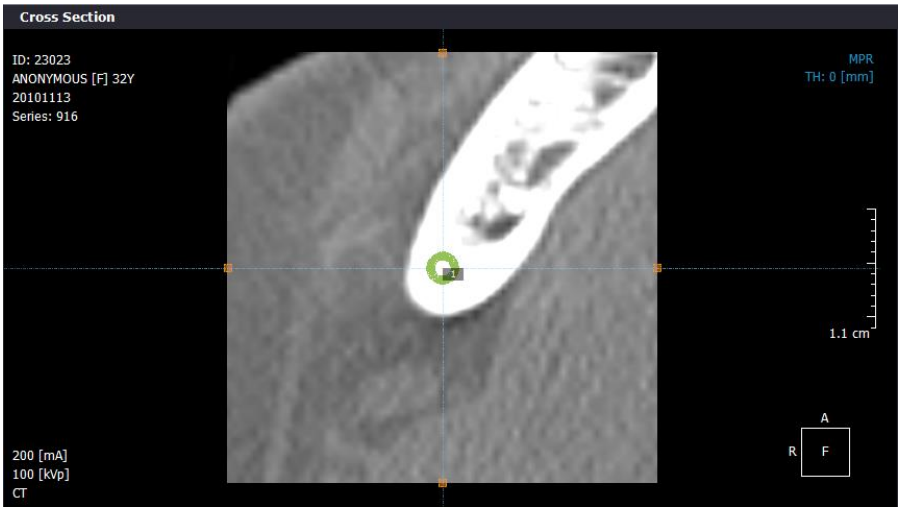
The following dialog box will come up. Different views are created as much as the implants added. Each view is created based on the implant axis user chosen.



■ Rotation

The image can be rotated by the blue line outside the image, the scroll bar at the ‘Radial Section’, and the mouse wheel. Mouse wheel can rotate the image in degrees which are multiples of five.





Down the mouse wheel

Down the mouse wheel

Chapter 5-9. Utilities

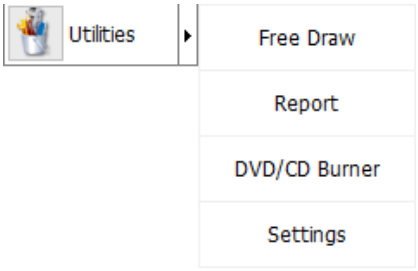
1. Introduction

The Free Draw function can be used for presentations or patient consultation.

The Report function can be used for keeping record of patient treatment and treatment planning by saving captured images.

2. Free Draw

Select Utilities → Free Draw from the toolbar.



WARNING!	When using the Free Draw function, other programs cannot be used. In order to use other programs the Free Draw function must be exited.

3. Report

The Report function allows the user to establish treatment plans and perform basic image analysis. Captured images can be attached to reports for images analysis.

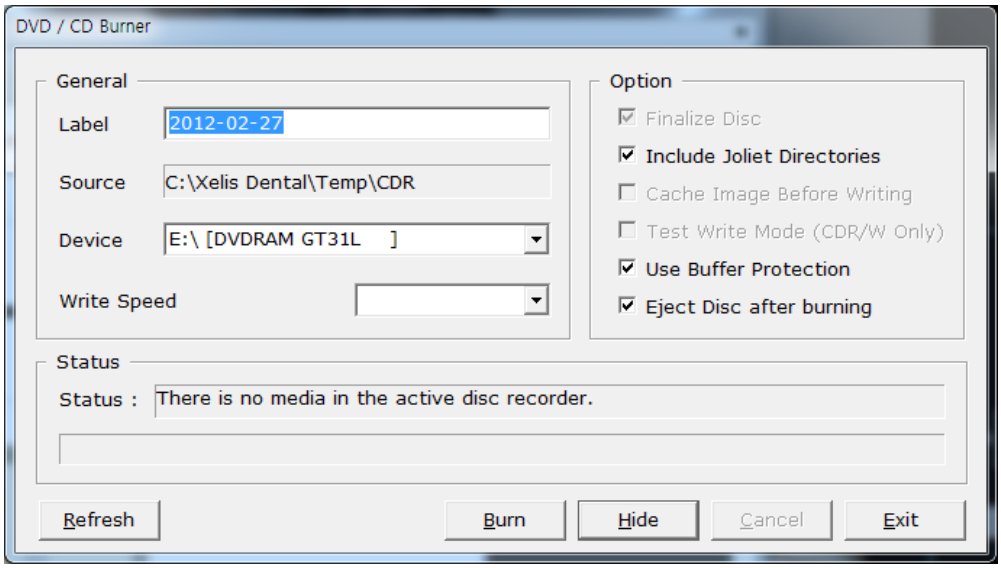
INFO.	Refer to ‘Chapter6.Report’ for detailed instructions on using the tools.

4. DVD/CD Burner

The DVD/CD Burner function allows a user to burn CT image including the 3D viewer to a DVD or CD.

(1) Recording

For convenience, put an empty CD/DVD in the CD/DVD Rom Drive before click the DVD/CD Burner button, When the click the DVD/CD Burner button, DVD/CD Burner is in progress automatically.



When CD/DVD Burning is complete, the CD will be ejected automatically.

- CD Viewer

Burned data can be checked by using ‘CD Viewer’ in the CD/DVD. Only ‘Dental3D’ and ‘Report’ are available.

(2) USB Burning

The user can install the Xelis dental viewer and image data in the USB by using ‘project save with viewer’ function.

In addition, it is possible to store the multi exams on one USB.

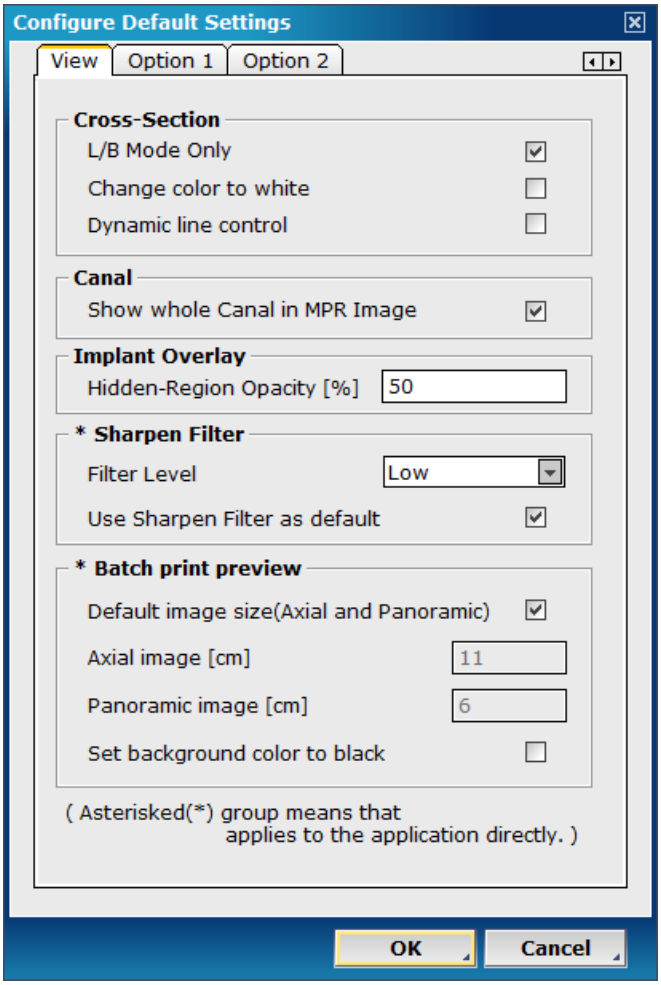
It offers same features such as CD viewer.

INFO.	Refer to ‘Chapter 5-1: 1. (4) Image Output tools’ for detailed instructions on using the tools.

5. Settings

Cross-Sectional Image, Panoramic Images, MPR Images, MPR Zoom, Default Windowing and Implant Transparency configuration functions are all offered. When environment configurations are changed, they are applied the next time the program is started.

(1) View



- Cross-Section L/B Overlay

  Set the direction of cut section of Cross-sectional view

- Cross-Section Line Color

  Configure the ending or starting cross-section lines to white.

- Cross-Section Dynamic line control

  Draw cross-sectional curve closer to the linear fitted curve.

- Canal

  Set the canal opacity about the invisible MPR slice

- Implant Overlay

  Real implant model transparency configurations. Values from 0~255 can be entered. 0 is completely transparent, while 255 is opaque.

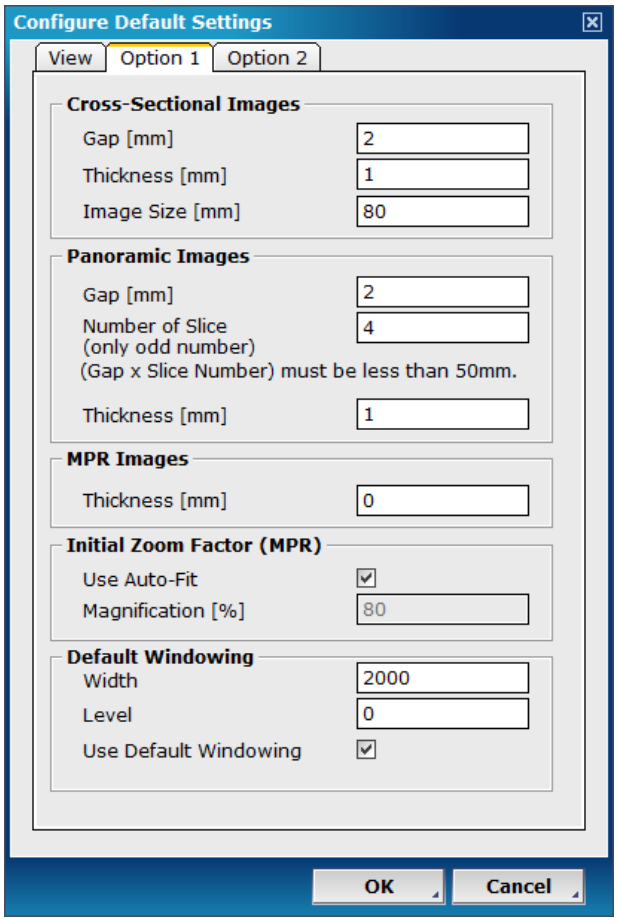
- Sharpen Filter

  Filter Level can be control intensity of sharpness of MPR image.
  After data loading, sharpen filter can be applied automatically

- Batch print preview

  A default size of axial or panoramic Print Preview is configured. By checking in the Set background color to black check box, the background color is set to black.

(2) **Option 1**



■ Cross-Sectional Images

Standard Cross-Sectional image property configurations

Default Gap	Cross-Sectional View plane segmentation
Default Thickness	Cross-Sectional View plane thickness
Image Size	Cross-Sectional View image size

Enter Image Size in mm.

(Ex. An 8x7cm image should be entered as 70)

■ Panoramic Images

Standard Panoramic image property configurations

Default Gap	Cross-Sectional View plane segmentation
Default Thickness	Cross-Sectional View plane thickness

■ MPR Images

Configure standard thickness for MPR images when the program is started.

■ Initial Zoom Factor (MPR)

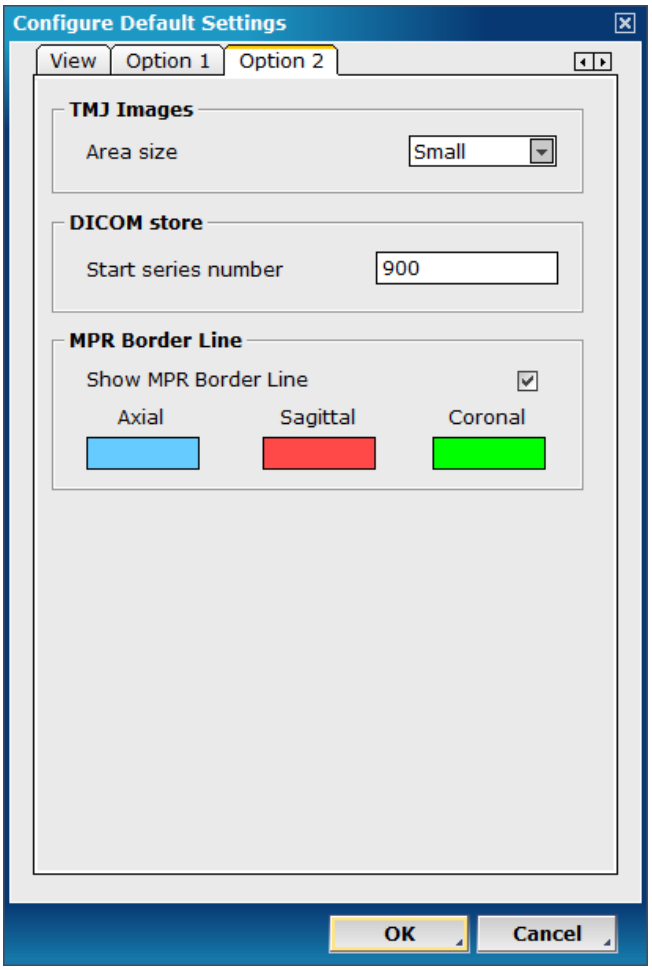
Images are shown in standard Fit-on format. When images that are 8x7cm or smaller are expanded, they can appear blurry. In this case, turn off the Use Auto-Fit configuration and adjust the expansion rate.

■ Default Windowing

Select Use Default Windowing and enter the appropriate Width and Level values. When Use Default Windowing is not used, the Windowing value recorded in DICOM files is used.

WARNING!	The program should be restarted after changing configurations Changes are not applied until the program is restarted.

(3) **Option 2**



- TMJ Images

Select TMJ Area size. If you select ‘small’, 3D cube size is smaller but 2D image is more expanded.

- DICOM store

When using DICOM store, user set start series number. The series number is increased by one from start series number.

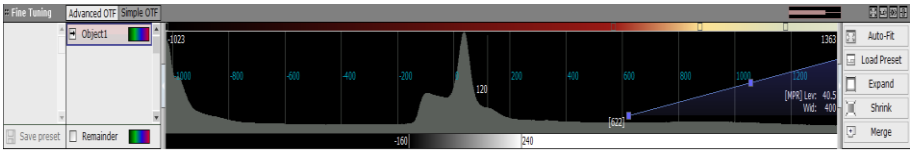
- MPR Border Line

Select border line color. If you want use color border line, check ‘Show MPR Border Line’.

Chapter 5-10. 3D Image Management

1. Introduction

The Fine Tuning screen provides a function for controlling the Opacity of 3D image data using the Volume Rendering window. Fine Tuning presets can be saved for individual users in Xelis-Dental. The specific object (S3 object) is shown on one-click..

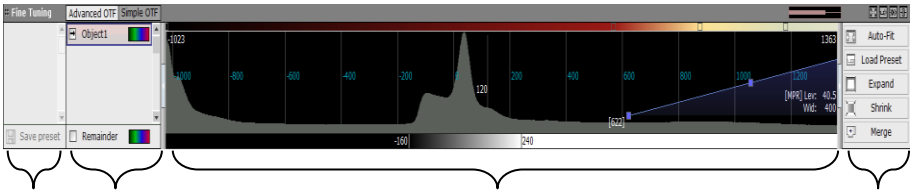


The Object button, Opacity OTF display, and Windowing bar and scroll bar for adjusting and displaying Windowing are in the Local Tools to the left. When the Opacity is corrected on the OTF chart using the small square control boxes at the top, the Volume Rendering image and other images are updated.

It can have a variety of effects in the Volume Rendering image. Volume data is on right side.

2. Fine Tuning GUI

When each module is started, Fine Tuning is minimized at the bottom of the module. Click on Fine Tuning to bring up the Fine Tuning window as shown below. Click on Fine Tuning again to minimize the window.



Object preset / Object List / Color Bar•OTF Graph•Windowing Bar•Scroll Bar / Local Tools

(1) Object preset

Lists presets of S3 object.

(2) Object List

Lists objects.

(3) **Color Bar**

The OTF graph can be changed by clicking and dragging the control boxes. Each box has a limit to how far it can be used according to its location. The graph changes according to the direction the boxes are moved in with the mouse. Use the context menu for OTF management functions.

(4) **Windowing Bar**

The Windowing values for the images currently being viewed are displayed and the user can adjust these values in the Windowing Bar. The lines representing the border values at each side of the bar can be clicked and dragged to change Windowing values.

(5) **Scroll Bar**

(6) **Local Tools**

▪ **AutoFit**

Automatically applies histogram which best displays the OTF currently being used.

▪ **Load Preset**

Brings up the preset window.

▪ **Object Tool**

Brings up list of Object Tools.

▪ **Expand**

Expands selected 3D objects.

▪ **Shrink**

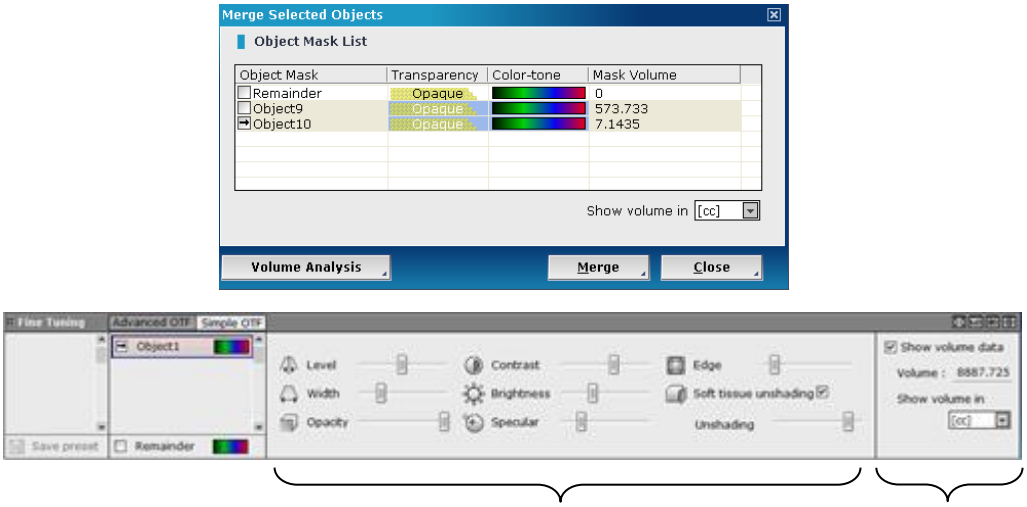
Reduces selected 3D objects.

▪ **Merge**

Merges several selected objects into on single object.

- Explanation

  The user can select multiple objects using the Shift or Ctrl button. And then it can be merged as single object by clicking the merge button.



3D effect window Volume data

(7) **3D effect window**

▪ **Level**

Adjust the part to be shown. It shows the same effect as moving the OTF graph to the left or right.

▪ **Width**

Adjust the range to be shown. It shows the same effect as changing the width of OTF graph.

▪ **Opacity**

Adjust the transparent. It shows the same effect as changing the height of OTF graph.

▪ **Contrast**

Adjust the contrast effect.

▪ **Brightness**

Adjust the brightness.

▪ **Specular**

Make more polish.

▪ **Edge**

Make edge stand out.

▪ **Unshading**

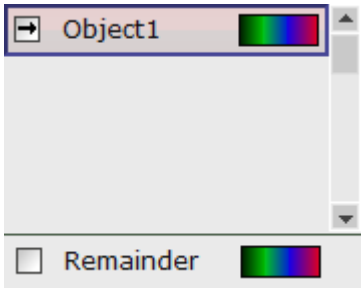
Make soft tissue stand out.

(8) **Volume data**

It shows volume of 3D data. After using segmentation function, volume data is changed.

3. Object Managing

Select an object from the image window and change the object properties.

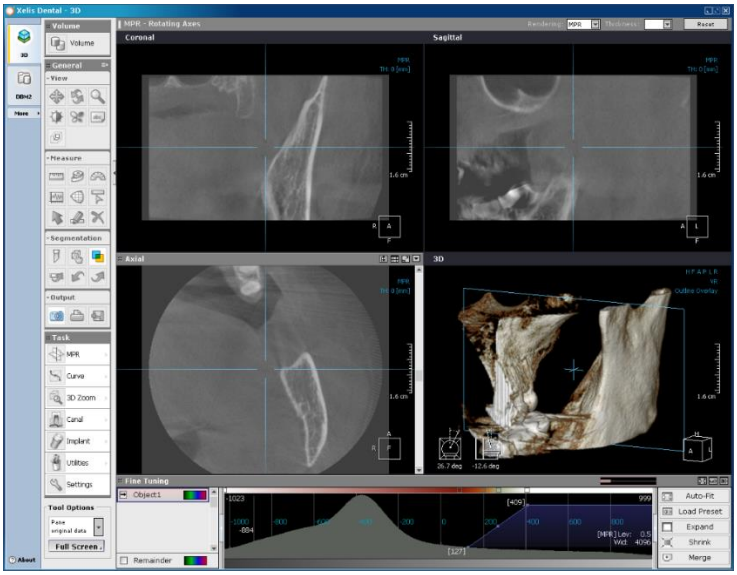


(1) **Object 1**

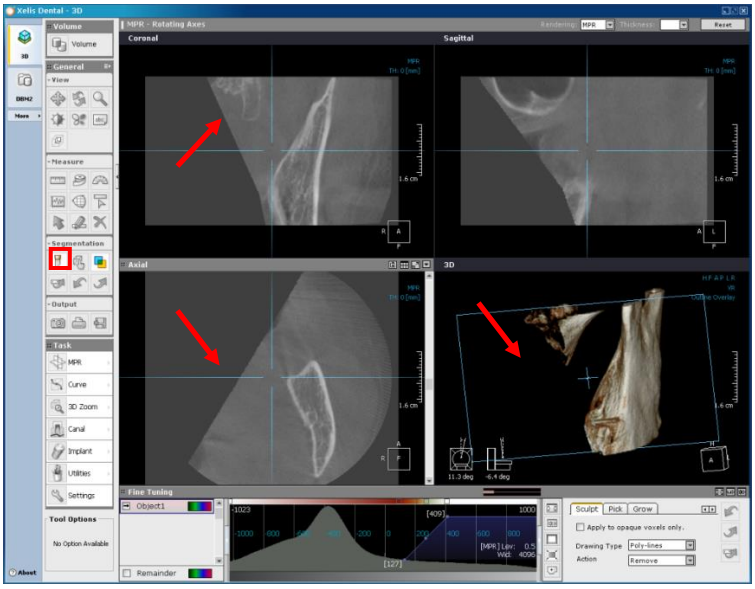
Multiple objects can be created using the segmentation function (Sculpting, Picking and Region Grow) on one volume. If there is at least one object, when volume is first loaded, the entire volume can be designated as an object (Object1).

(2) **Remainder**

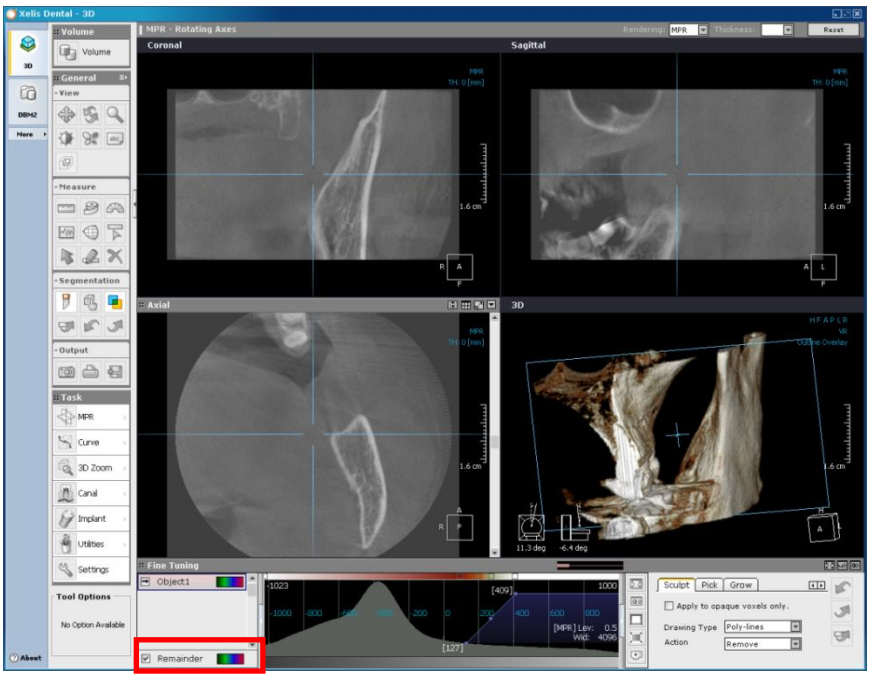
Refers to the regions of a volume that have not been designated as an object, Using the Segmentation Tool (Sculpting, Picking and Region Grow), regions of the volume that are deleted can be saved as Remainder.



< Volume Loading >



< Remove items by Sculpting >



< Remainder Check (Display removed regions) >

(3) Object menu

Right click on other area without S3 object.

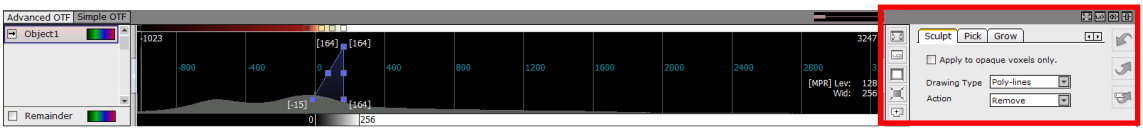
Right click on the remainder.

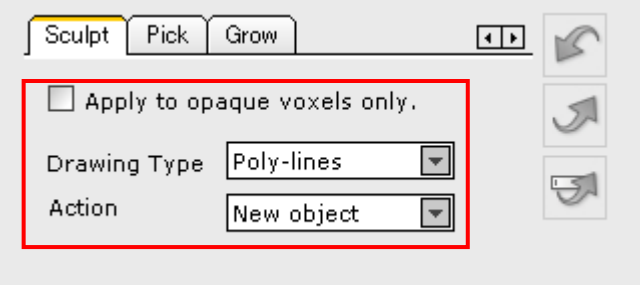
Delete Object	Delete object.
Change Name	Change object name.
Revive	Make a new object with remainder data.

4. Segmentation

Sculpt

Click on 3D Picker on the toolbar brings up the Segmentation function menu.



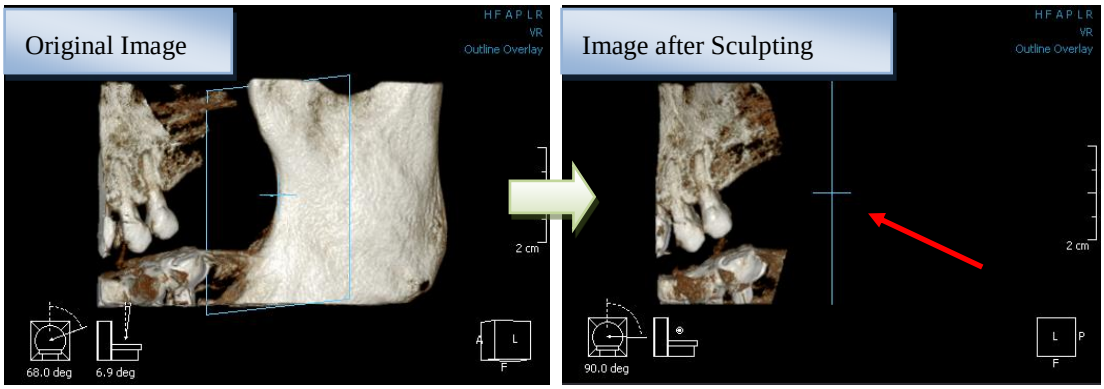


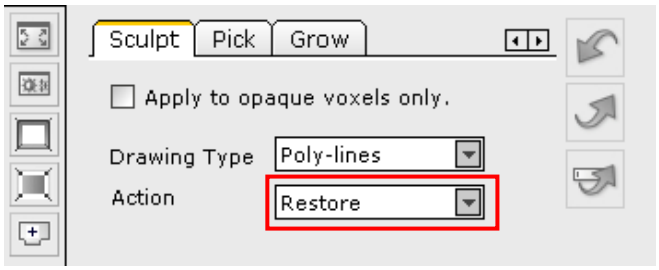
1) Apply to opaque voxels only: Only applies to Remove / Restore functions.

(1) If checked: Only applied OTF.

(2) If unchecked: Designated to transparent and opaque regions.

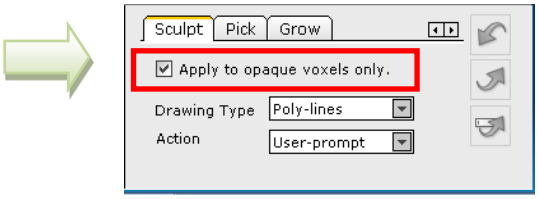
Remove / Restore functions applied to selected regions.






Restore Selected Region


Region is restored
H F A P L R
VR
Outline Overlay
2 cm
90.0 deg
L
P
F


Sculpt
Pick
Grow
Apply to opaque voxels only.
Drawing Type
Poly-lines
Action
User-prompt

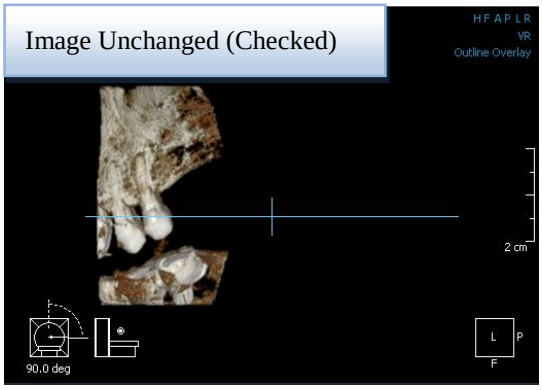
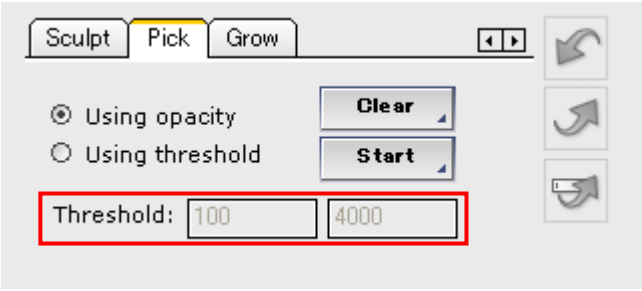


Image Unchanged (Checked)
H F A P L R
VR
Outline Overlay
2 cm
90.0 deg
L
P
F

- **Picker**



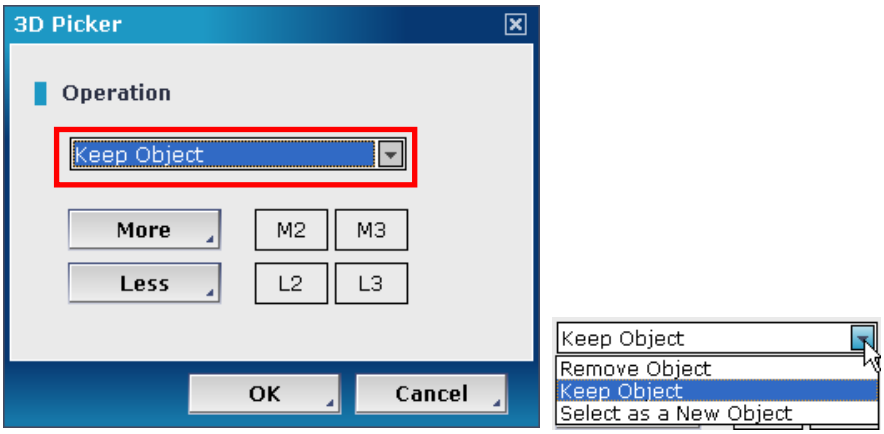
1) Using Opacity

Growing is only done on the OTF regions of tissue attached to the location where the mouse is clicked.

2) Using Threshold

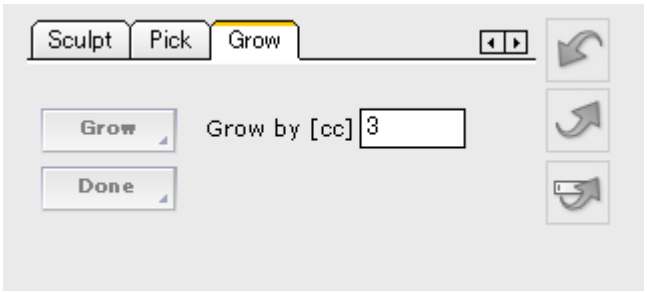
Select all tissue regions that are within the Threshold.

※ Use More/Less to expand and reduce selected regions.



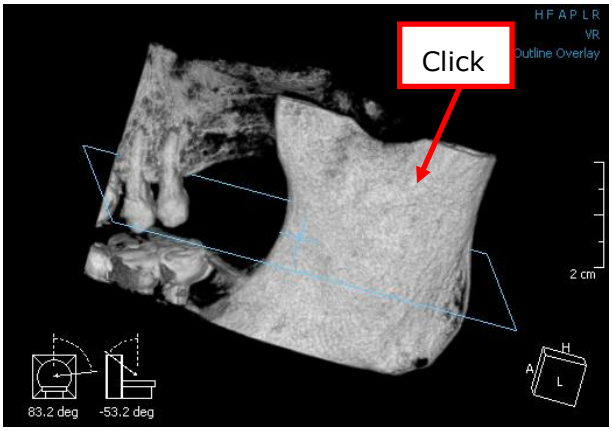
- Select a new object: Save a new object.
- Keep object: Only selected regions remain.
- Remove object: Applied after Ok button is clicked.

- **Grow:** Grows region according to the size (Grow by cc) designated by the user.

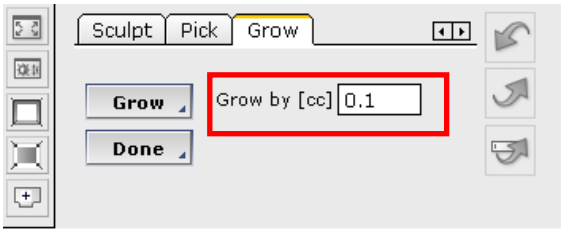


Ex)

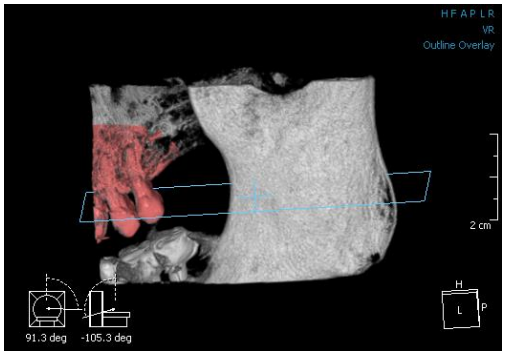
Click on the location from which Growing should start.



Enter an amount by which to increase region.



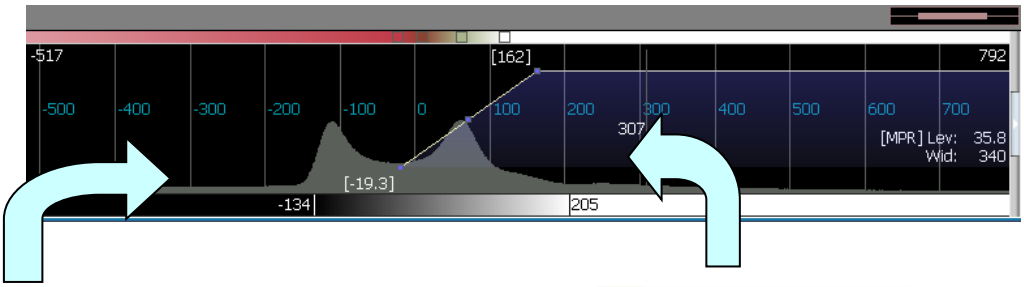
Click the Grow button and the region selected is increased.



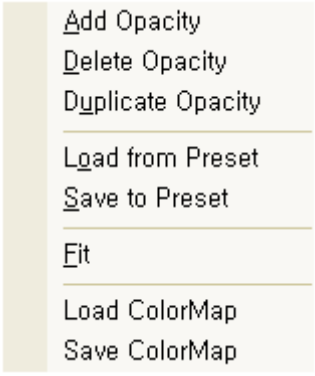
Select the Done button and the selected object can be created, removed or kept as a new object.

5. Adjusting OTF Graph

Right click on the OTF graph to bring up the context menus as shown below.



Fine Tuning Window Menu



Opacity Menu

(1) Adding and Selecting OTFs

Select the Add Opacity option from the menu and a new OTF is added at the location of the cursor. It is standard that OTFs are added using one white control point.

(2) Removing OTFs

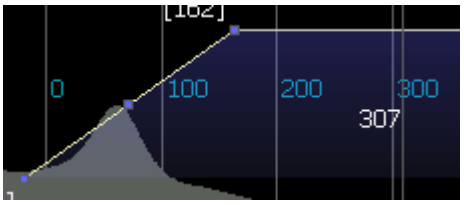
Right click on the OTF to be removed to bring up the OTF menu. Click Delete Opacity to remove the OTF.

WARNING!	Selected OTFs are designated by a bold outline. (In the image above, the selected OTF is located to the right.)
	The OTF menu can only be used when the mouse is over the OTF, and only one option can be applied from the menu at a time.

(3) **Adjusting OTFs**

▪ **Moving OTFs**

Move the mouse to the red activated section of the OTF to be moved.



Click on the OTF to be moved and drag the mouse in the desired direction.

▪ **Adjusting OTFs Using the Control Boxes**

OTF uses 4 slope control boxes and 3 size control boxes. The 4 slope control boxes can be moved right to left within the range of motion allowed, the one box cannot be moved past another box. The 3 size control boxes adjust the range of the OTF. The box in the middle controls the size and opacity of the OTF.

6. Adjusting Windowing

Adjusting the Windowing can be done by dragging the Windowing bar.

7. Scroll Bar

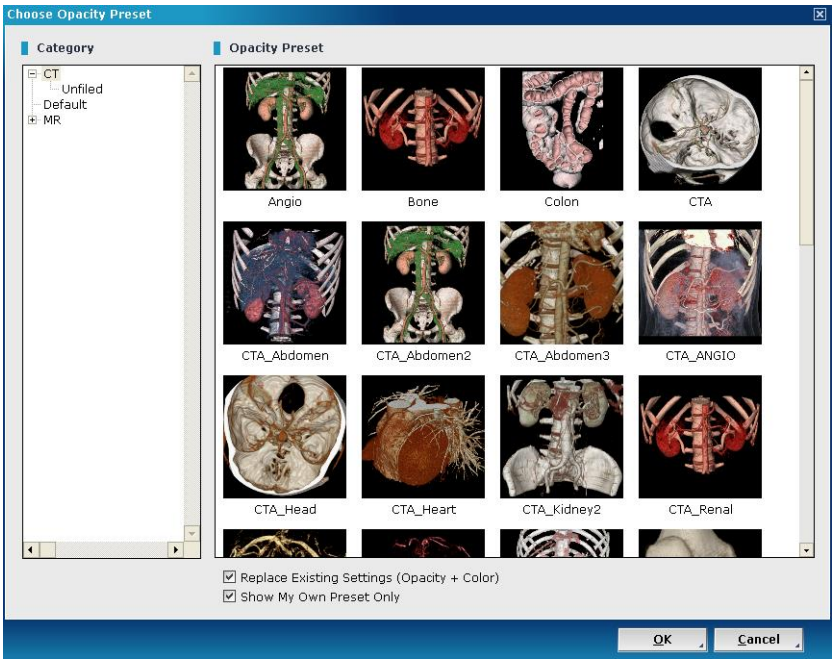
The OTF currently being viewed is shown. By scrolling left and right, all OTFs can be seen.

Use Auto-fit to make all OTFs come up in the window.

8. Saving and applying Presets (not S3 objects)

(1) **Presets**

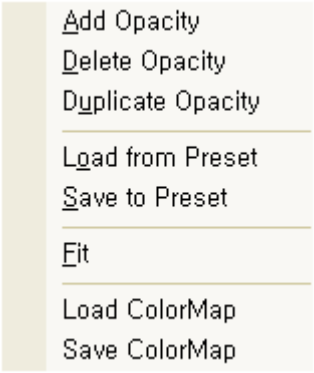
Click the Preset button in Local Tools, and all presets can be changed to new presets or new presets can be added.



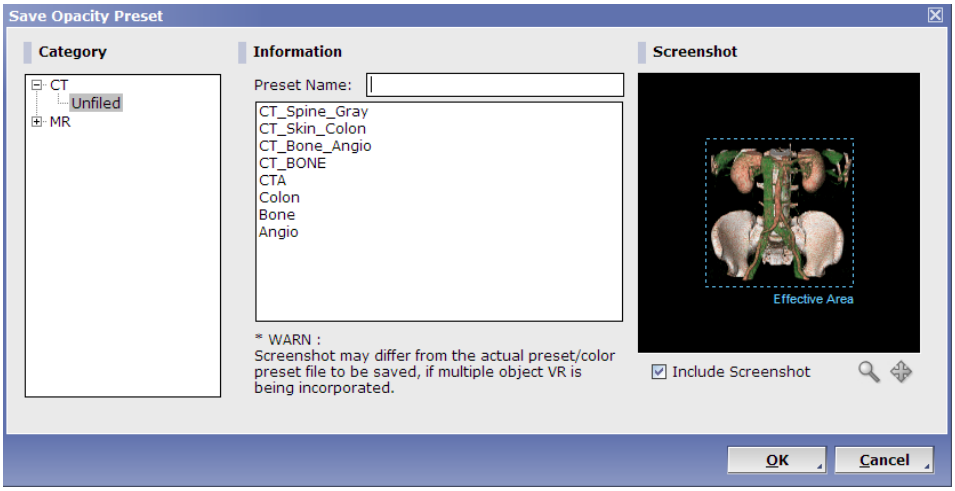
When the Replace Existing Settings option is checked, all previously used OTFs are removed and only the selected OTFs are applied. When this option is unchecked, all existing OTF presets are applied together.

(2) **Saving Presets**

In order to save the currently applied VR OTF configuration and Color Map configuration as a new preset file, right click on the histogram window to bring up the menu. The histogram menu is as shown below.



If the Save to Preset option is selected, the following window will come up.



▪ **Saving Presets**

Select a category in which to save the presets.

Zoom/Pan image In the Screenshot section to the right of the window so that the image can be seen clearly in the preset file screen. The area within the blue dotted lines is the area saved.

Enter a preset name and click OK. If a preset with the same name already exists in the selected category, a warning message will come up.

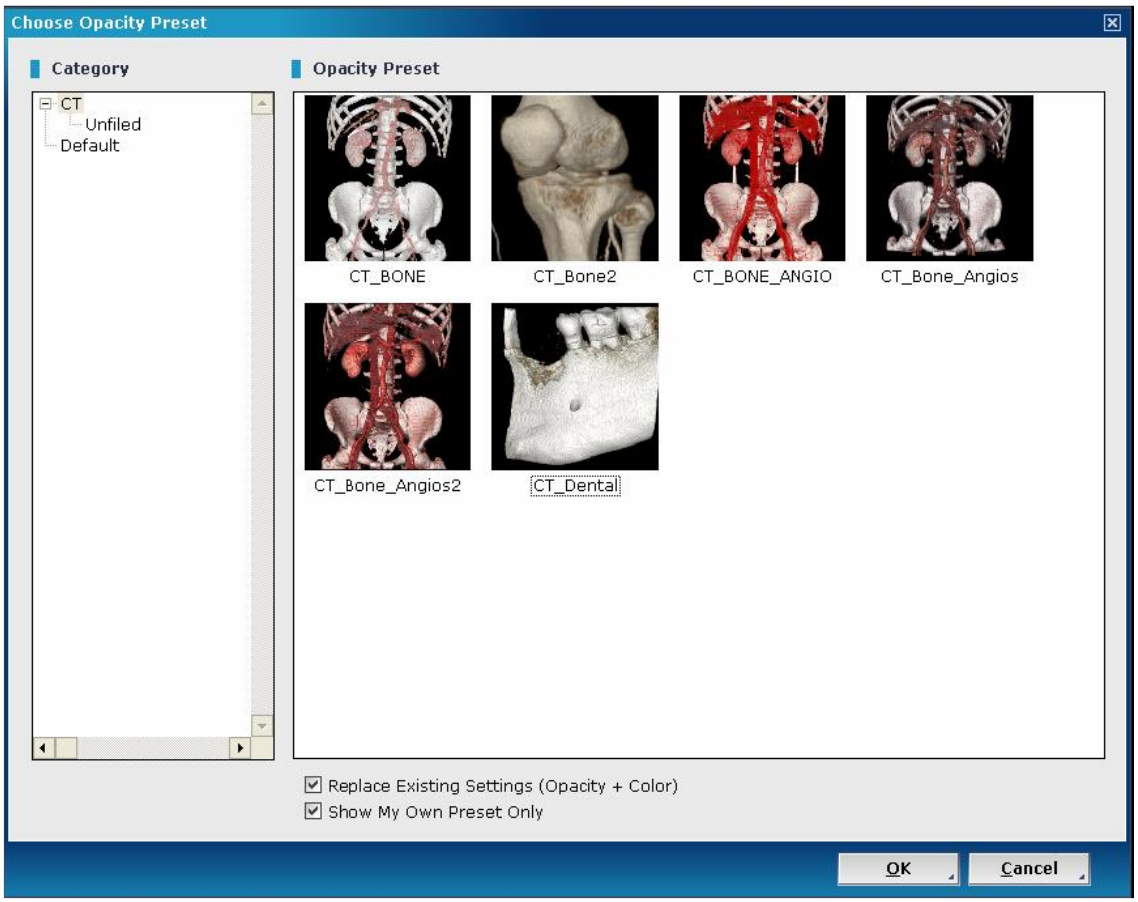
(3) **Default Presets**

Default presets can be used for configured modalities. Presets can be designated for each category.

▪ **Saving Default Presets**

Click the Preset button in Local Tools on the Histogram window to bring up the Choose Opacity Preset dialog box.

Select a category.



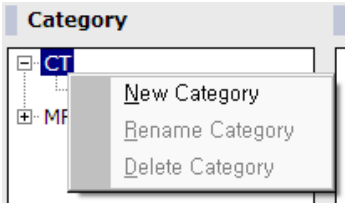
Right click on a preset to bring up the menu.

Select Set as Default to make the preset the default preset. If a default preset has already been configured, a message will come up to verify the change. Click Yes to change the default preset.

WARNING!	Click on the Root Category to view presets. The punctuation at the bottom left of the preset image is the default modality preset.

(4) Category Configuration

Right click on the Category section of the window to bring up the menu shown below. Presets can be added, renamed, removed and efficiently managed using this menu.



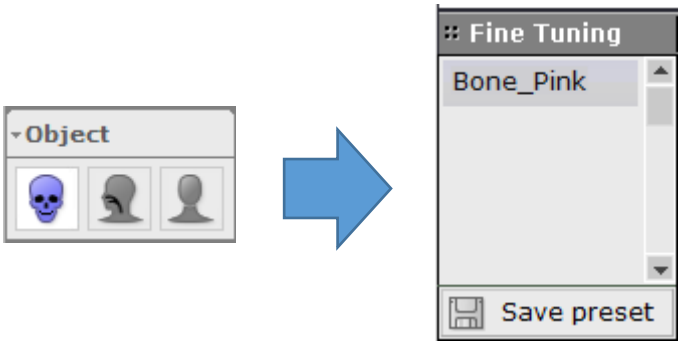
Drag and drop selected items from the preset list to the Category tree to put presets in categories.

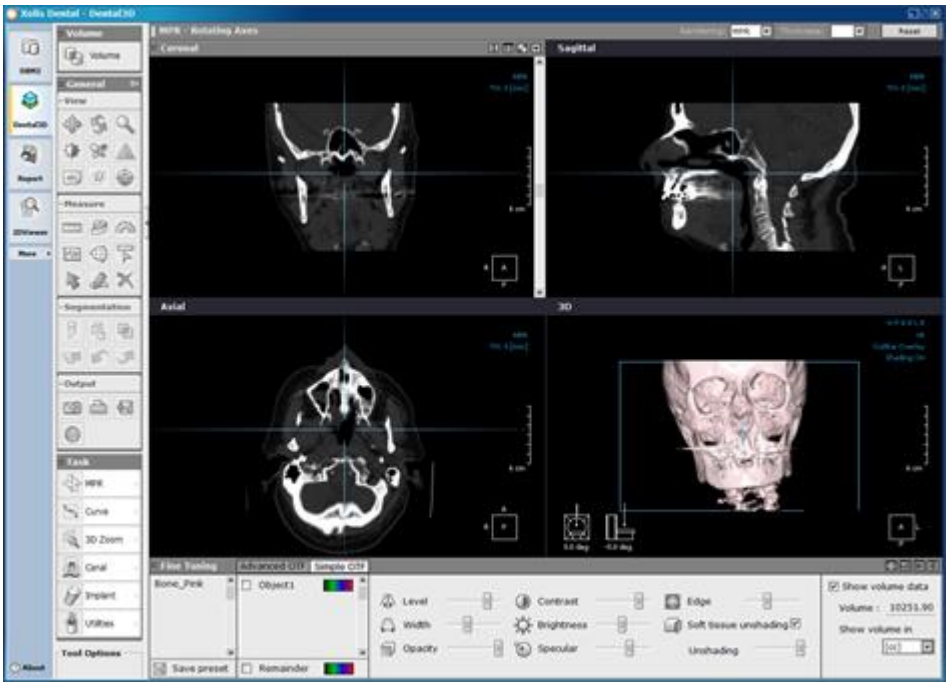
WARNING!	In order that Unfiled categories and presets of deleted categories are protected, these categories and presets cannot be renamed or removed.

9. Saving and applying Presets (S3 objects)

(1) Presets

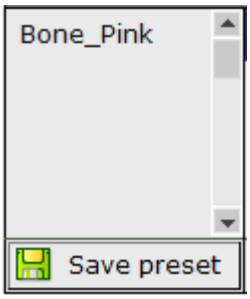
Click the preset at the preset list. User can save the preset. There are no default preset.

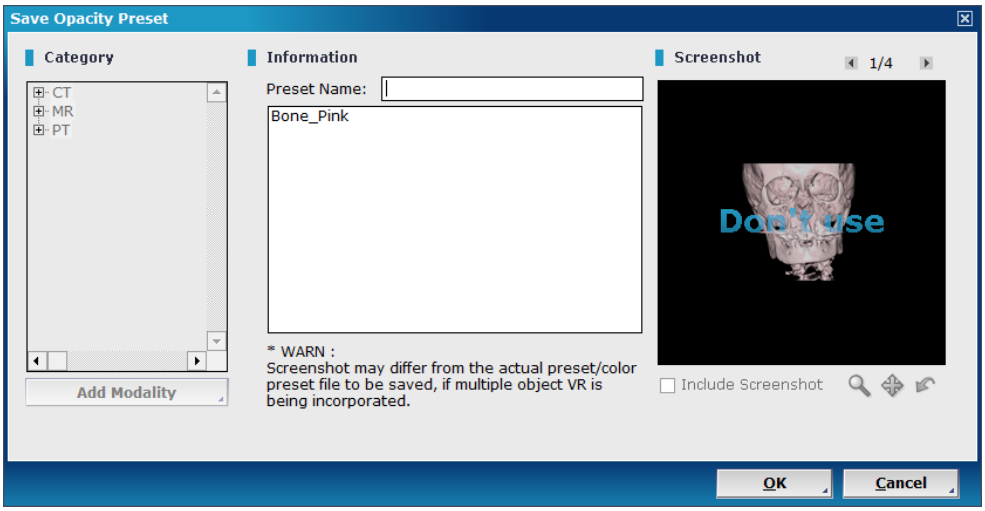




(2) **Saving Presets**

Press the ‘Save preset’ button. Just enter a preset name.

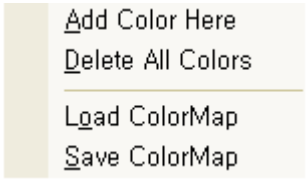




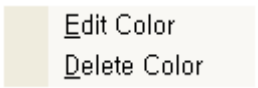
10. Color bar

User defined Color Maps and previously saved Color Maps can be applied to the OTF currently in use.

The Color Bar menu is as shown below.



Right click on the Color Bar anywhere except for on the Control Point to bring up the menu.

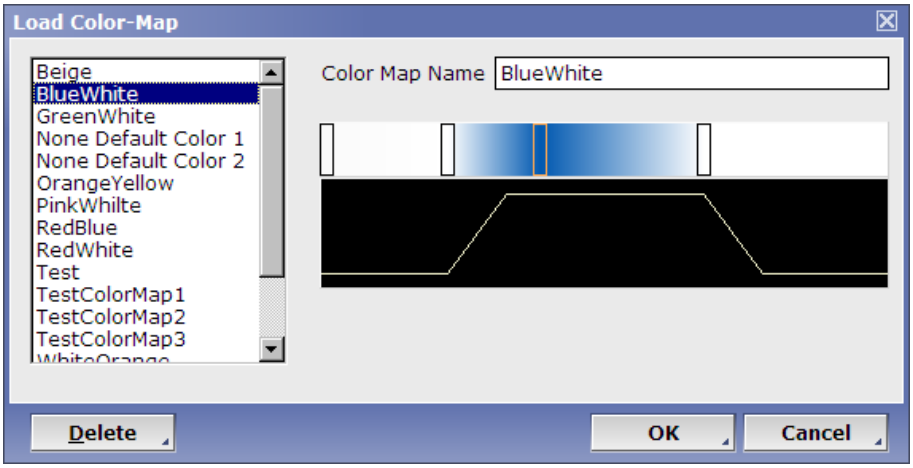


Right click on the Color Control Point to bring up the Control Point menu.

Add Color Here	Add a Control Point.
Delete All Colors	Delete all Control Points.
Load Color Map	Apply Color Map.
Save Color Map	Save current Color Map.
Edit Color	Edit selected Control Point.
Delete Color	Delete selected Control point.

(1) Color Map

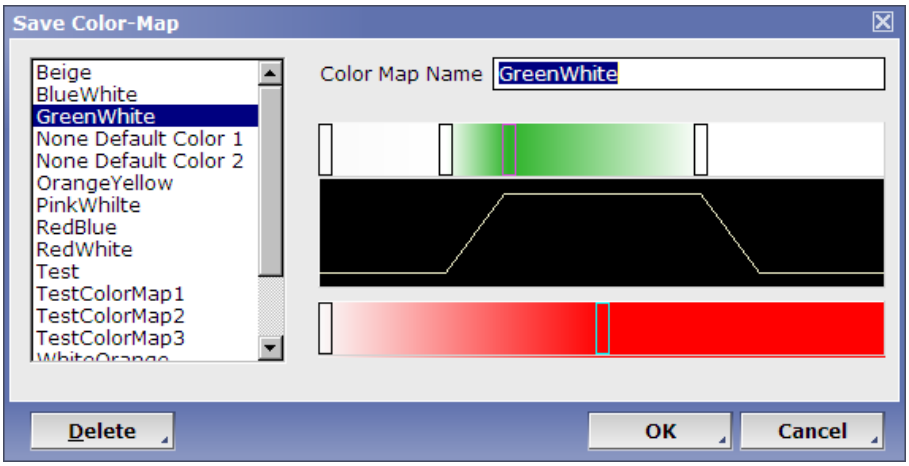
Select Load Color Map from the Color Bar menu to bring up the following window.



Delete	Delete Color Maps selected from the list on the left.
OK	Apply selected Color Maps.
Cancel	Cancel operations and close window. Any changes made will not be applied.

(2) Saving Color Maps

Select Save Color Map from the menu to bring up the Save Color Map window as shown below.



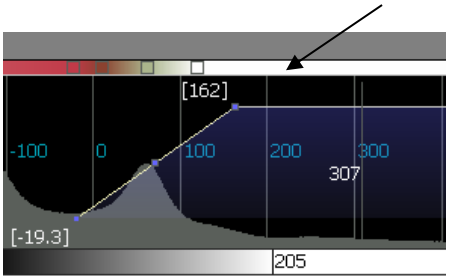
The Color Bar at the top of the window is the preset Color Map selected from the left, and the Color Bar at the bottom of the window is the Color Map currently applied.

WARNING!	Be careful not to overwrite an existing Color Map by entering a name in a new Color Map that is the same as the name of an existing Color Map.

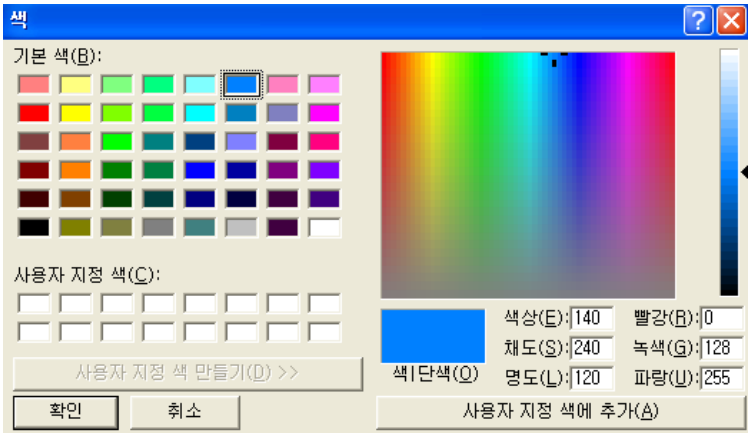
(3) Color control point

Color Control Point a standard position for a color in the OTF. One Color Control point brings up one color, the Color Map includes all colors in between the Control Points.

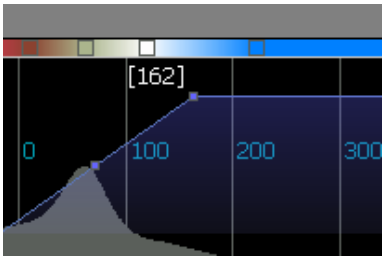
▪ Adding Control Points



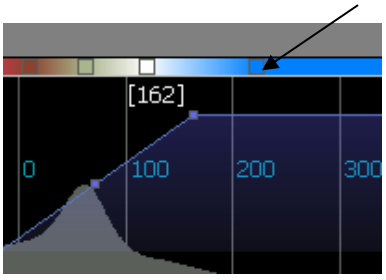
Double click or right click on the OTF, and select Add Color Here from the menu to bring up the following window.



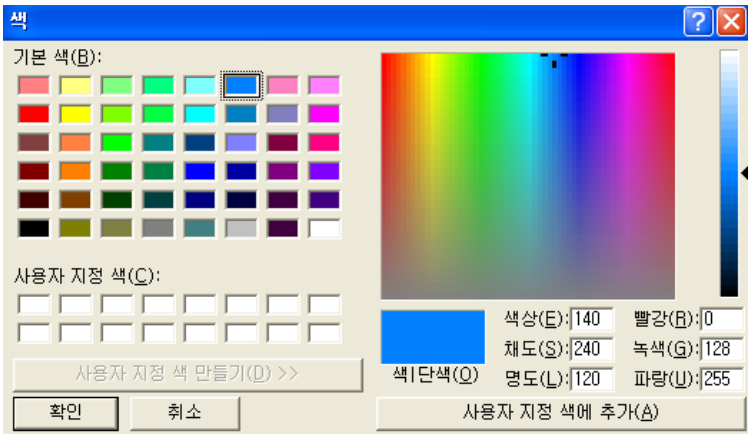
Select a color and click OK and a Control Point for that color will be added.



▪ **Editing Control Points**



Double click or right click on the OTF, and select Edit Curve from the menu to bring up the following window.



Select a color and click OK, and the color for that Control Point will be changed.

Chapter 5-11. APPENDIX

1. Understanding and Application of MPR Images

MPR (Multi Planar Reconstruction) is a function which reconstructs z axis slice data acquired from images and makes it possible to view any plane in any direction.

In the example image shown above, the Coronal view (side) is represent by the yellow plane, the Sagittal view (front) is represented by the red plane, and the Axial view (vertical) is represent by the blue line. Images can be viewed from any direction by moving the images on these three axes, and structures that are not vertical on the axis of coordinates can be viewed vertically using various axis rotation functions.

Since the arch is the main point of interest in a dental environment, the direction from which it is being viewed will vary. Accordingly, images can be analyzed using vertical planar continuous analysis of the arch in Cross-Sectional View, which is easier and more thorough than basic MPR images from a dental CT.

The upper and lower jaws can be separated with images takes from a dental CT. The outer sinus wall can

be examined and the probability of failure in bone transplant surgery can be reduced in the upper jaw.

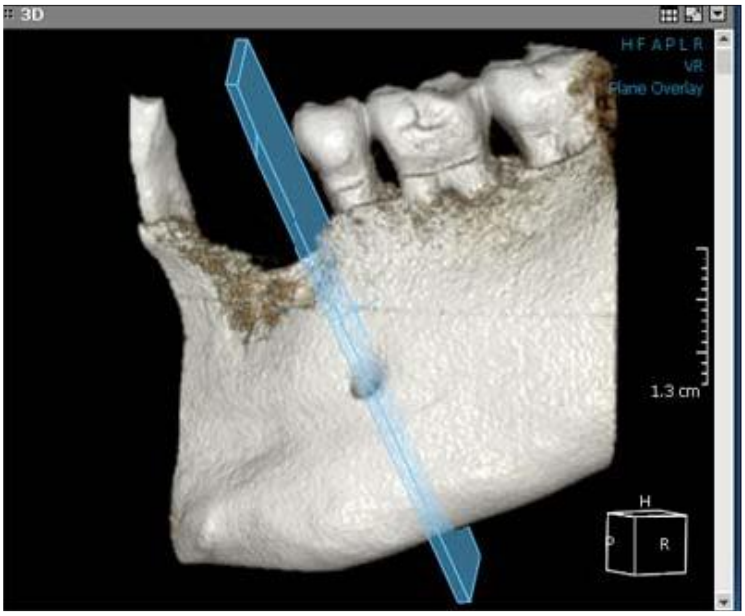
Measurements can be made on the nerve canal of the lower jaw and comparisons can be made in correlation to the positions of the teeth and canal.

2. 3D Image Applications

Images can be reconstructed in 3D using 3D Volume Rendering.

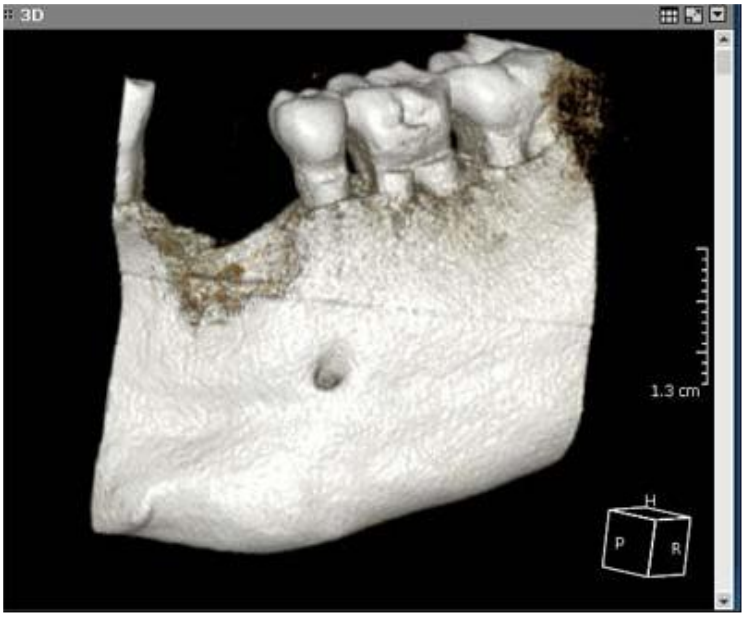
(1) MPR Planar Display

MPR images can be examined more intuitively by being able to see the selected plane as an overlay in 3D images.



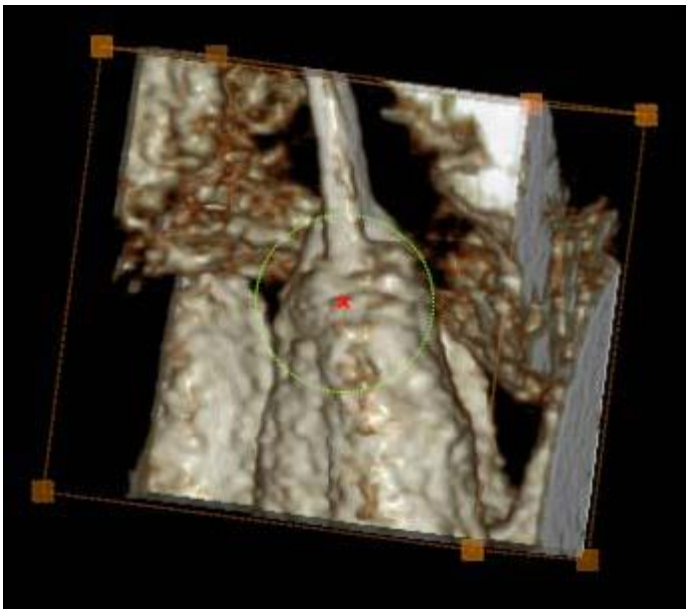
(2) Viewing Bone

Being able to see through the tissue and isolate the bone in images by properly adjusting the opacity is very useful when consulting patients.



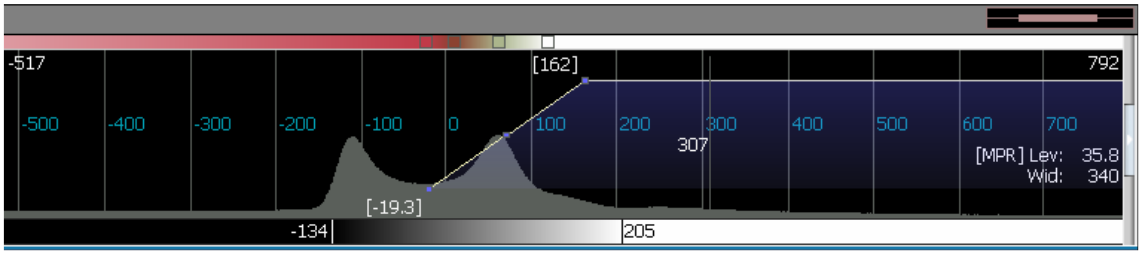
(3) **Examining Surgical Results**

The 3D Zoom function makes examining the bone easier can makes surgical procedures much safer. When a patient complains of pain after treatment to a nerve, 3D Zoom makes it easy to discover the source and make accurate corrections.



3. 3D Images and Hounsfield Units

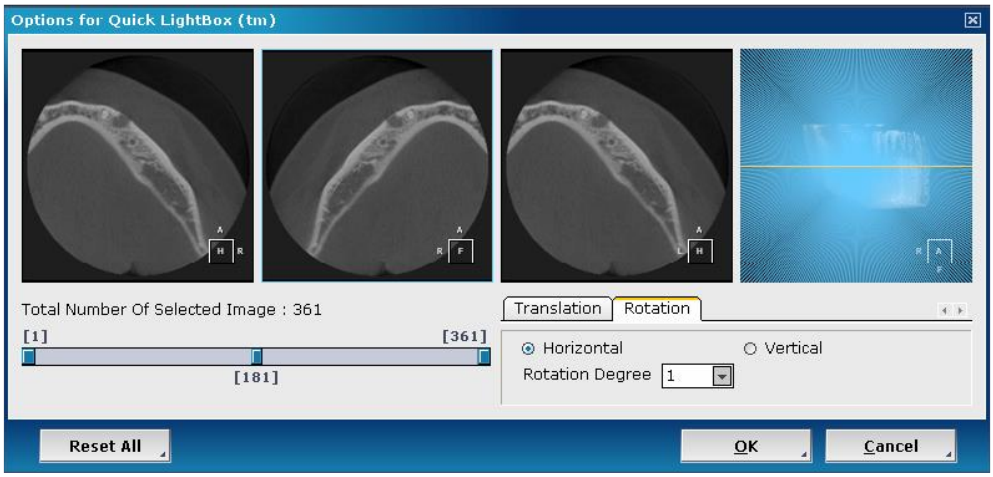
(1) **The relationship between 3D images and Hounsfield Units**



Shown above is Fine Tuning window. The graph is displayed in units of 100 and allows the user to correct the level in order to match the CT Number. The CT number is referred to as Hounsfield Unit (HU) and represents bone density ranging from -1000 to +1000 (-1000 is air, 0 is liquid and +1000 is solid bone). Click within the graph and drag the entire graph to change the data value which is at -19.3 and above in the example above. Right click outside the graph to increase/reduce the range, and left click to change the entire region.

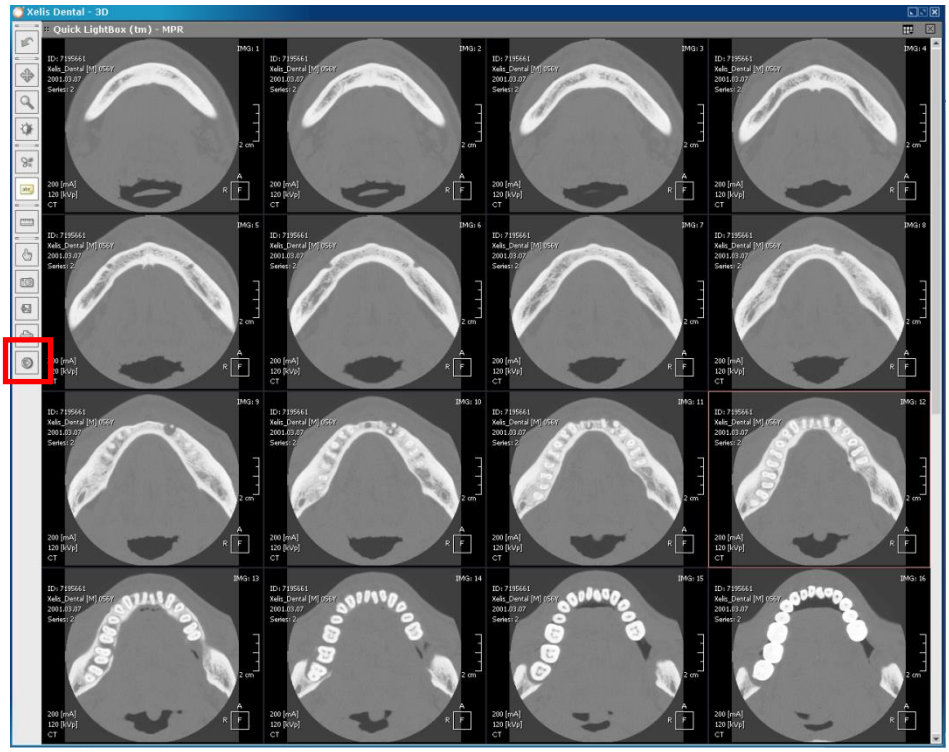
4. Creating Video

(1) **Creating MPR Video**



To create a rotating video file, select the Rotation tab at the bottom right of the window, select a rotation direction (Horizontal/Vertical), select the degree of rotation, and click the OK button.

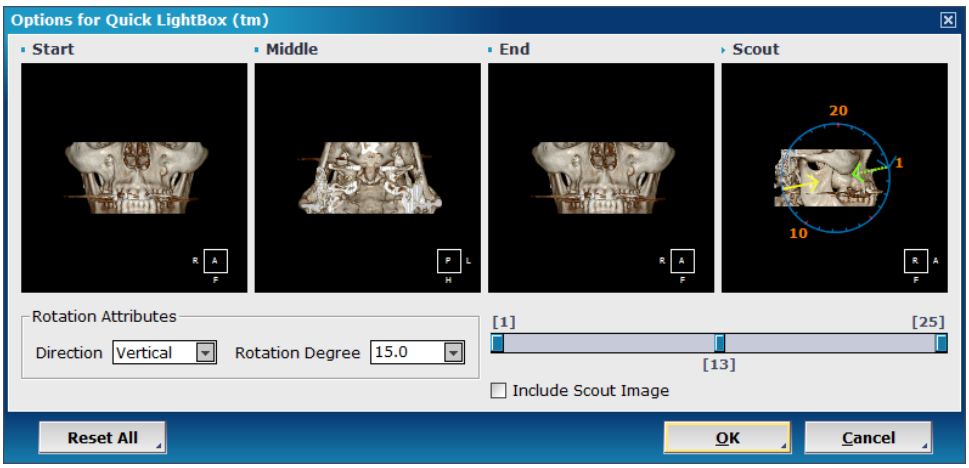
Select the Cine Player option  from the left side of the Quick-Light Box window.



Use this button  to play and pause video. Use this button  save video. Refer to Chapter 3 Tools: Cine Player for detailed information.

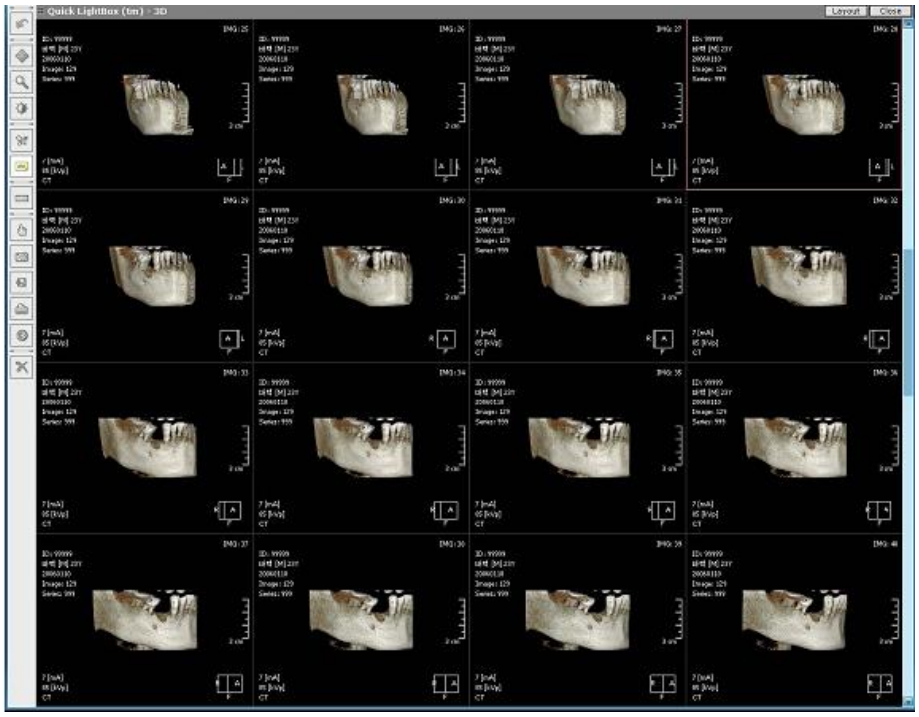
(2) **Creating 3D Video**

Click this button  to bring up the Quick- Light Box dialog box as shown below.



Select the direction and degree and click OK.

Click the  (Cine Player) button to the left of the Quick-Light Box window.



Refer to Chapter 5-1 Tools: Cine Player for detailed information.

Chapter 5-12. Key Map

1. Common

Key Operation On Image Pane In Common

Key	Operation
Enter	Overlay On / Off
ESC	Cancel or Stop
Delete	If selected annotations exist, delete it.

2. General

Key Operation On “MPR” Image Pane

Key	Operation
SPACE	Next Slice
Arrow ↓	Next Slice
Arrow ↑	Previous Slice
Arrow ←	Previous Slice
Arrow →	Next Slice
Page Up	Previous Slice(Moving 1/10 of the whole)
Page Down	Next Slice(Moving 1/10 of the whole)
Home	First Slice
End	Last Slice

Key Operation On “3D-Zoom” Image Pane

Key	Operation
SPACE	Toggle Status for PreIntegration

Key Operation On “Endoscopy” Image Pane

Key	Operation
SPACE	Toggle Status for PreIntegration

Key Operation On “Fine Tuning”

Key	Operation
Delete	Delete Current Opacity

Mouse “LButton” Operation on Image Pane

	Mouse LButton			
	Standard	+Shift	+Ctrl	+Alt
MPR	-	Zoom In	Pan	Windowing
3D/3D-Zoom	-	Zoom In	Pan	VR : MIP/minIP/X-Ray – Windowing
Endoscopy	-	Zoom In	Pan	

Mouse “RButton” Operation On Image Pane

	Mouse RButton			
	Standard	+Shift	+Ctrl	+Alt
MPR	Windowing	Zoom Out	Zoom	Auto Windowing
3D/3D-Zoom	Object Rotation	Zoom Out	Zoom	VR : MIP/minIP/X-Ray – Auto Windowing
Endoscopy	Rotation	Zoom Out	Zoom	

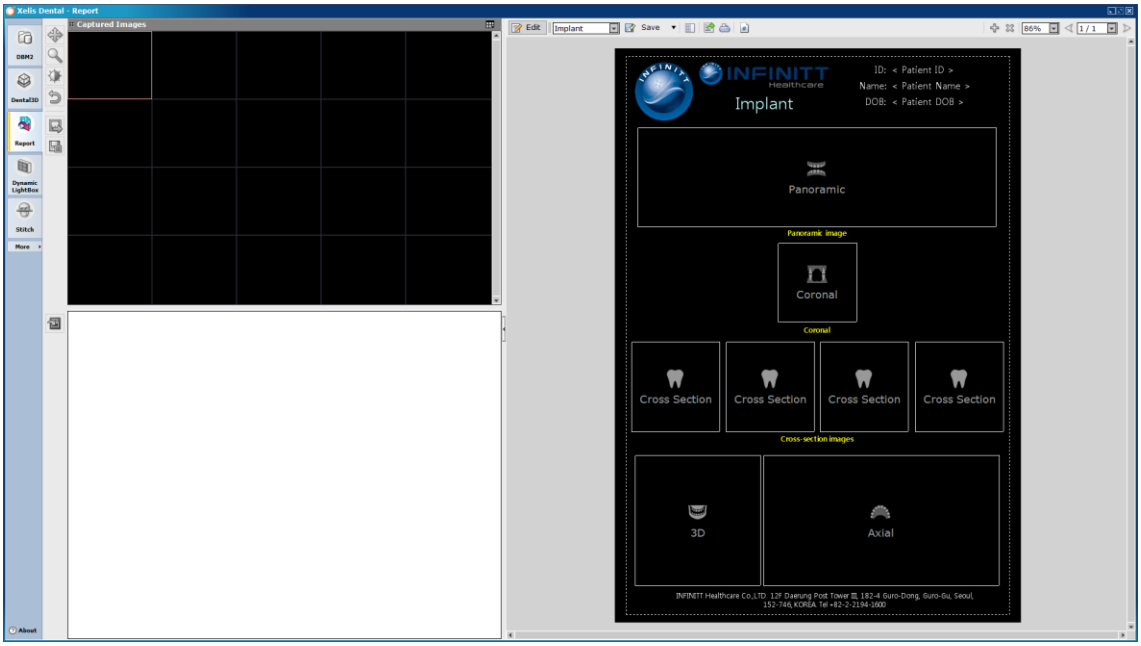
Mouse “Wheel” Operation On Image Pane

	Mouse Wheel			
	Standard	+Shift	+Ctrl	+Alt
MPR	Next / Previous Slice	Next / Previous Slice(each 1/10)	Same as Shift	-
3D/3D-Zoom	Rotation Around View Vector(Rotating each 3 degree)	Rotation Around View Vector(each 30 degree)	Same as Shift	-
Endoscopy	Backward and Forward movement(Moving Each 3 times of minimum Resolution value)	Backward and Forward movement(Moving Each 3 times of minimum Resolution value)	Same as Shift	-

Chapter 6. Report

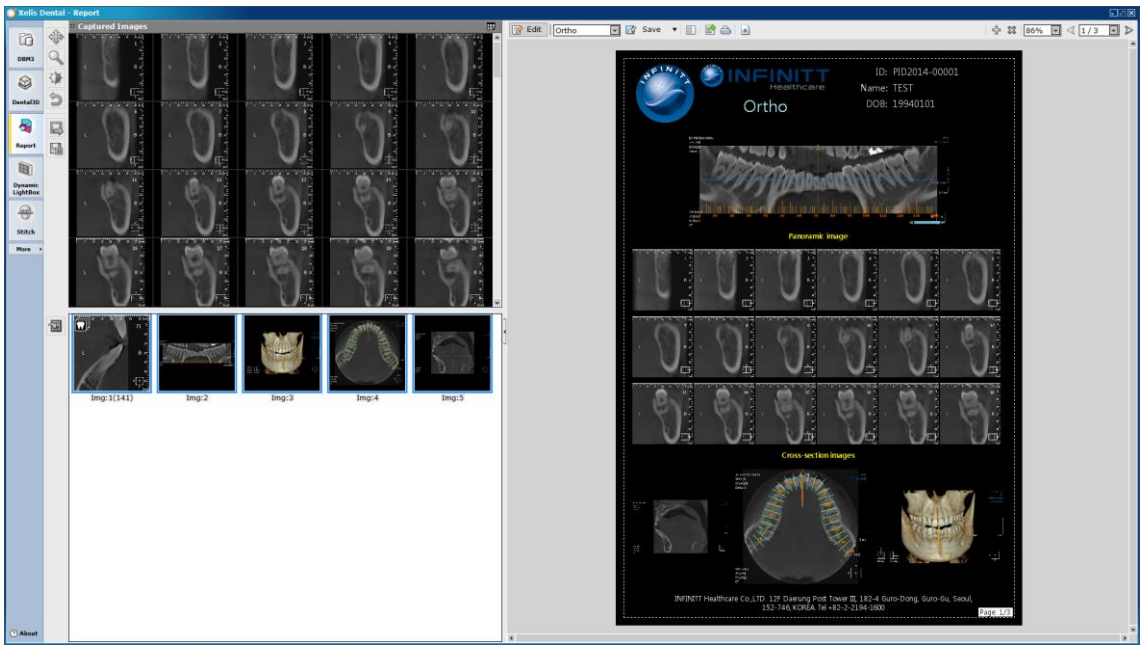
The Report function allows the user to establish treatment plans and perform basic image analysis.

Captured images can be attached to reports for images analysis.



Chapter 6-1. Introduction

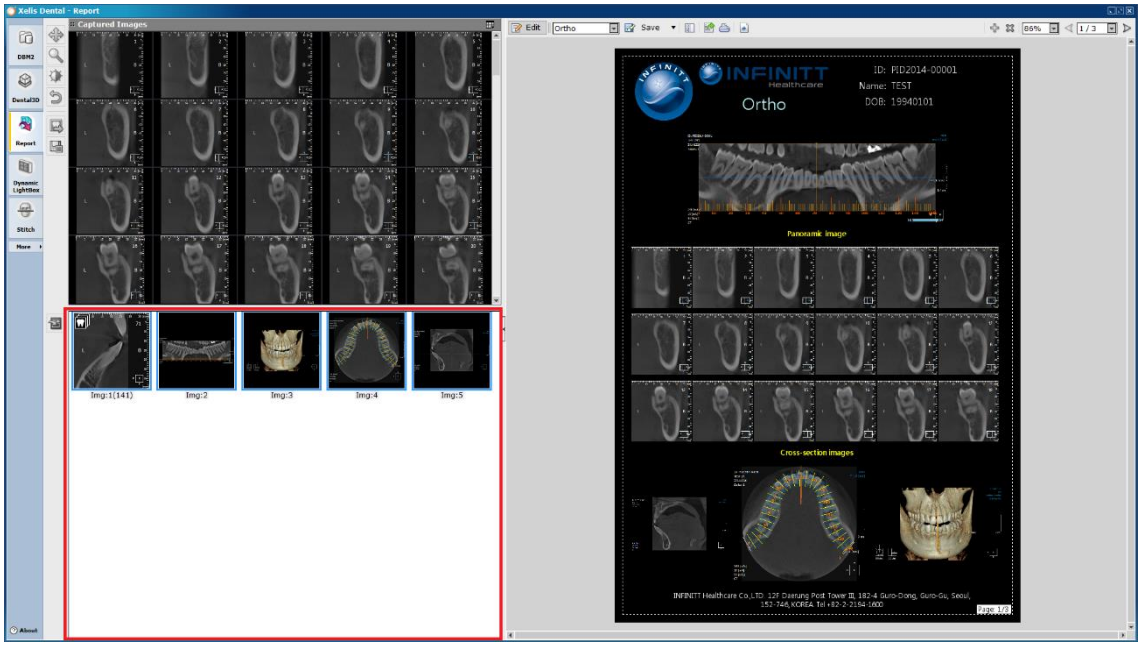
Users can create their own report templates, and write reports using them. Created templates can be shared with others. Users can add hospital logo, captured images, texts and patient information. Boxes are created when user tries to add this information and information will be filed in the boxes. These boxes will be referred as “**objects**” from now on.



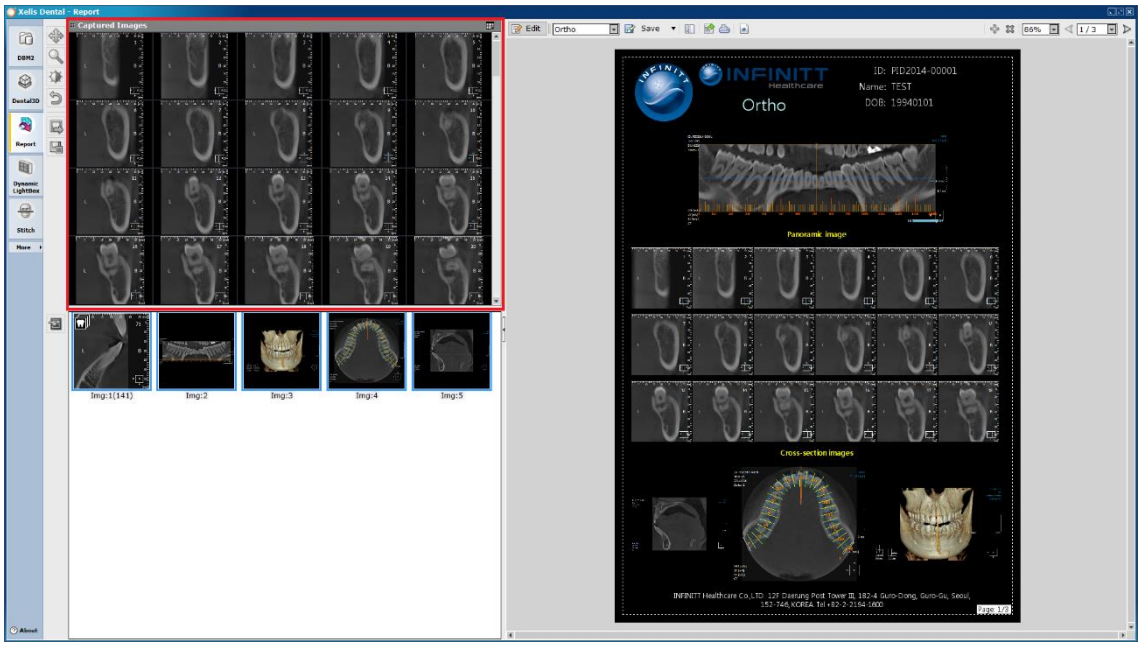
Chapter 6-2. Layout

The report module has three major regions: Thumbnail, Captured Images, and Template.

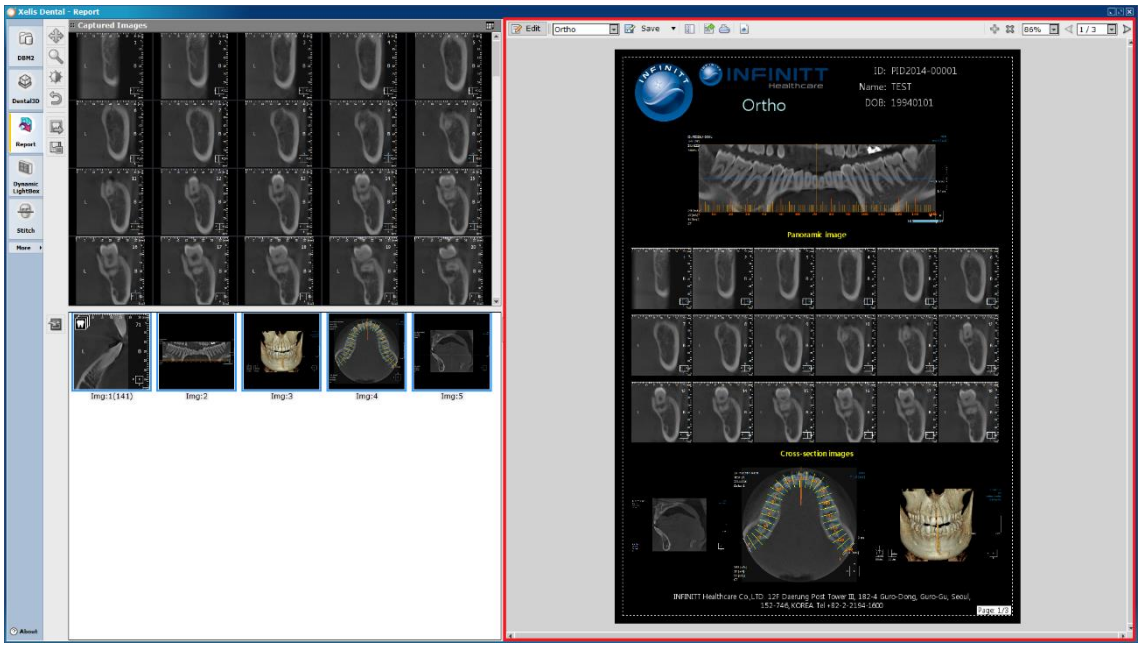
Thumbnail



Captured image

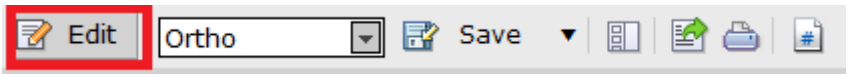


Template


Xelis Dental - Report
Captured Images
Edit
Ortho
Save
INFINITT
Healthcare
Ortho
ID: PID2014-00001
Name: TEST
DOB: 19940101
Panoramic Image
Cross-section images
Img:1(141)
Img:2
Img:3
Img:4
Img:5

Chapter 6-3. Common function

1. Normal/Edit mode



There are two modes in report.

(1) **Normal mode**

Normal mode is used when adding, editing texts, or images.

(2) **Edit mode**

Add, edit objects onto page and format the template as the user wants.

2. Pan, Zoom Windowing, Reset

▪ Panning

Tool for panning images. After selecting the tool, click and hold the left mouse button, and then drag the mouse to move the image as needed.

▪ Zooming

Tool for zooming in and out on images. After selecting the tool, click and hold the left mouse button and drag the mouse to zoom in and out on images.

▪ Windowing

Tool for managing image Width/Level. After selecting the tool, click and hold the left mouse button, and then drag the mouse left and right to control Width and up and down to control Level.

Left/Right : Adjust Windowing Level

Up/Down : Adjust Windowing Width

▪ Reset

Reset Pan, Zoom, and Windowing to the initial state.

3. DICOM store, Save Thumbnail

▪ DICOM store

Save the selected images as DICOM format into DB.

▪ Save Thumbnail

Saves selected images with another name.

4. Auto insert

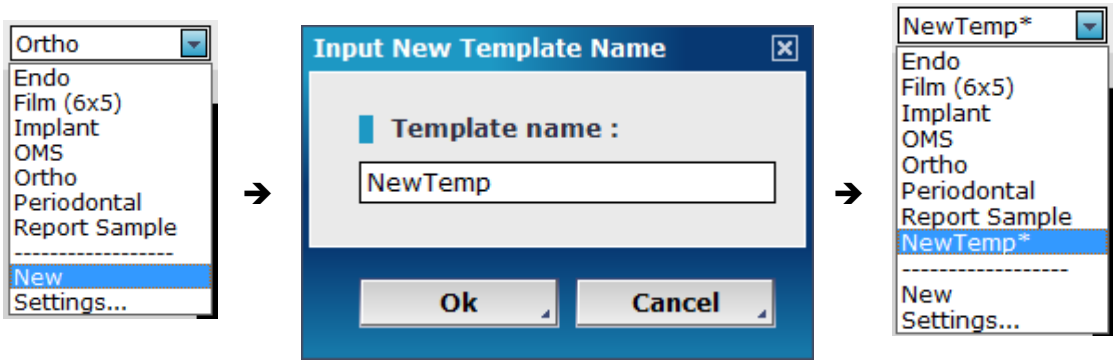
The selected images are inserted automatically into the right object type. (If no image is selected, all of the images in Thumbnail are inserted)

5. Template

(1) Change template

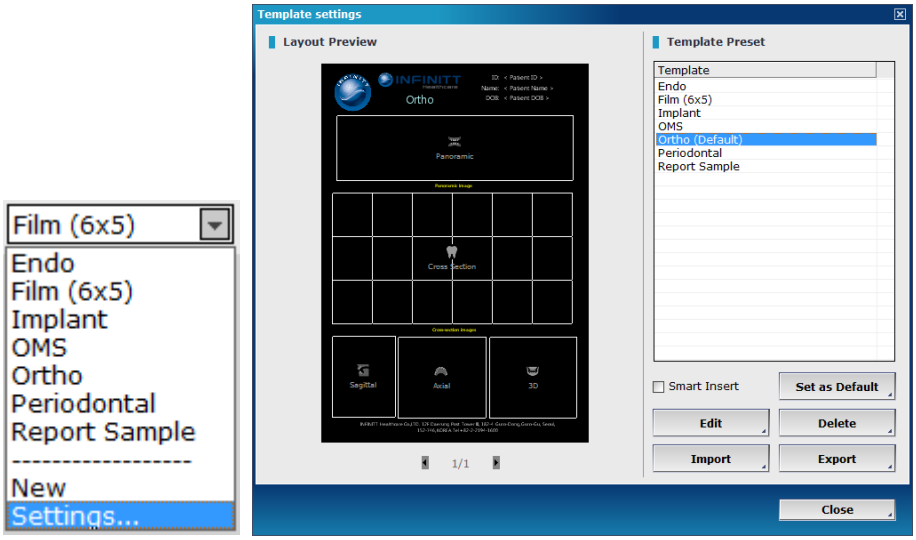
Load the template that has been created previously.

(2) Make new template



Create a new template by selecting “New” in the menu. After selecting “New” in the menu, a window pops up and user should fill in the template name. Newly created template has ‘*’ symbol next to the name until the users save it.

(3) Template settings



Manage the templates by clicking the “Settings”.

- Edit

  Change the template name.

- Delete

  Delete the selected template. An actual template file in the storage is deleted too.

- Export

  Export template files selected in the template list to the location which users want to copy.

- Import

  Import the template form the template file created by other users.

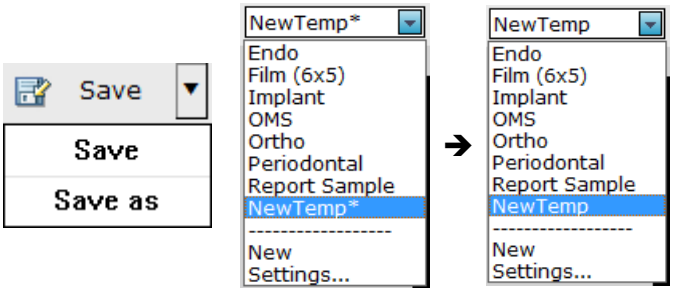
- Smart Insert

  The captured images are directly inserted into the template (to where image type matches)

- Set as Default

  Select the Default template. When the Default has been set, and Smart Insert is checked, when the user enters the Report module, the Default template will be on.

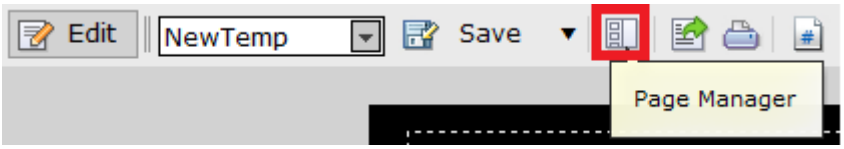
6. Save template



Save changes of the template. When the selected template is saved for the first time, ‘*’ symbol is removed. Templates can be saved regardless of the ‘*’ symbol.

Save changes of the template with new template name by clicking the ‘Save as’ button. Saving contents are differed as the type of the objects.

7. Page manager



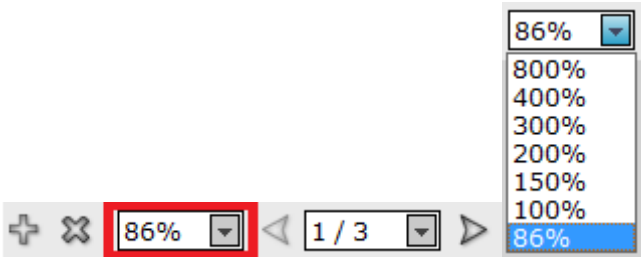
All the pages in the template can be seen in the Page manager. Click on the Page Manager button to open.

With Page Manager, the user can change the order of pages, delete or copy and paste the pages

8. Page management

Add and Delete a page.

Move to another page.



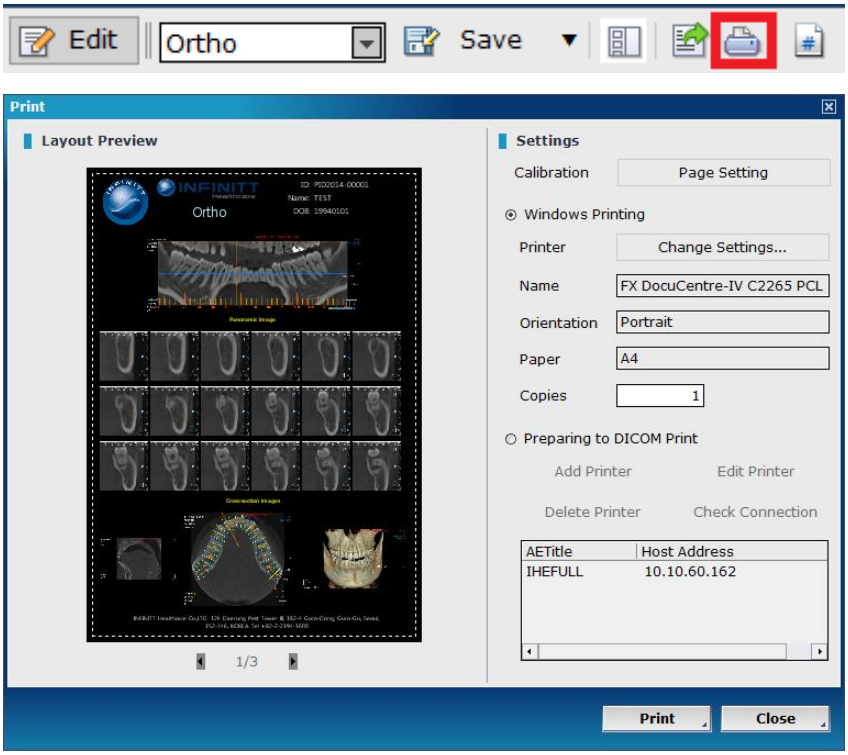
Zoom in or zoom out the template with pre-defined ratio.

Chapter 6-4. Normal mode function

1. Export

Save the report in other format. Currently, It can be output to be a PDF file.

2. Print

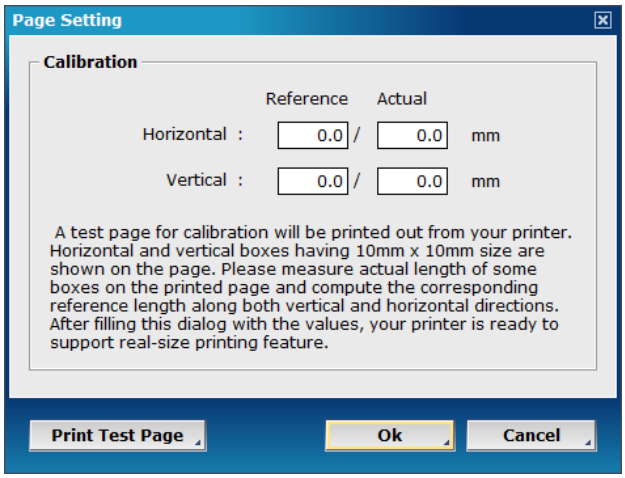


Check the output by the “Layout Preview”, displayed on the left. Printable areas are indicated by the dotted lines. These lines are not printed out.

Choose Windows printer or DICOM printer by the “Settings”, displayed on the right.

(1) Calibration

Click “Page Setting” button to set calibration.



To start printing a Calibration Test page, Click the “Print Test Page” button in the page setting window. In the test page, Horizontal and vertical boxes having 10mm x 10mm size are shown. Measure actual length of some boxes on the printed page and compute the corresponding reference length along both vertical and horizontal directions. After filling this dialog with the values, your printer is ready to support real-size printing feature.

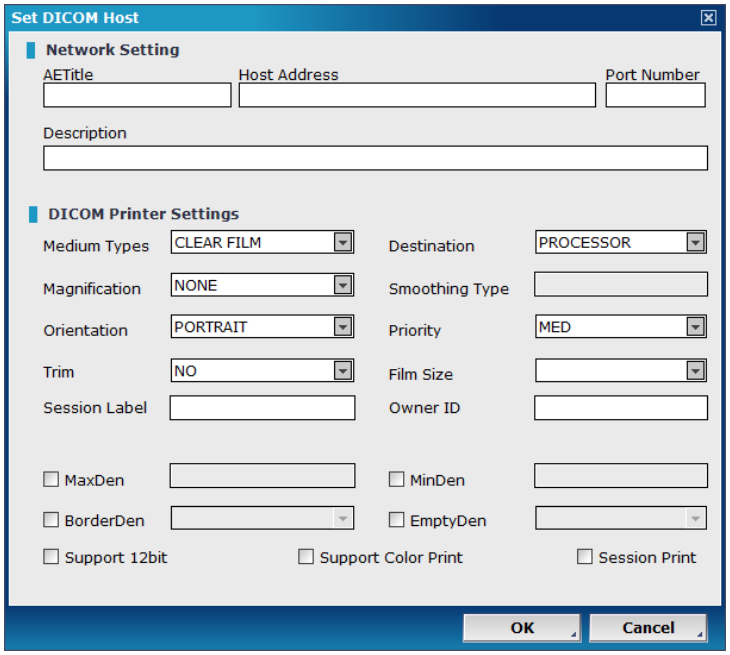
(2) **Windows printing**

Change the printer by clicking the “Change Settings…” button. By changing the integer values in the “Copies” section, print multiple copies of the report.

(3) **Preparing to DICOM print**

▪ Add Printer

Add DICOM printer. Input the network information and set conditions of DICOM printer.



▪ Edit Printer

Edit information of selected DICOM printer.

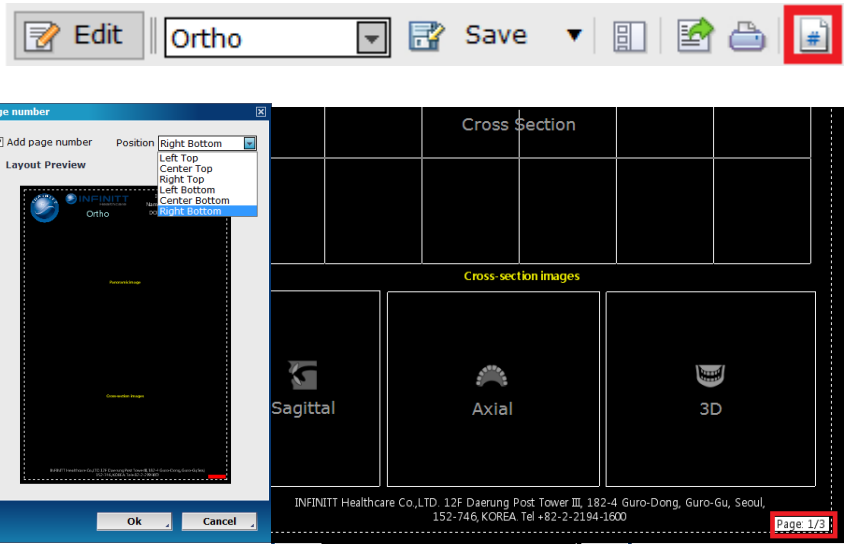
▪ Delete Printer

Delete selected DICOM printer.

▪ Check Connection

Check the connection between computer and DICOM print.

3. Page number



Add Page number. Set position. The Page numbers are added at the end of the Printable region.

4. Mouse operation

(1) **Left click button**

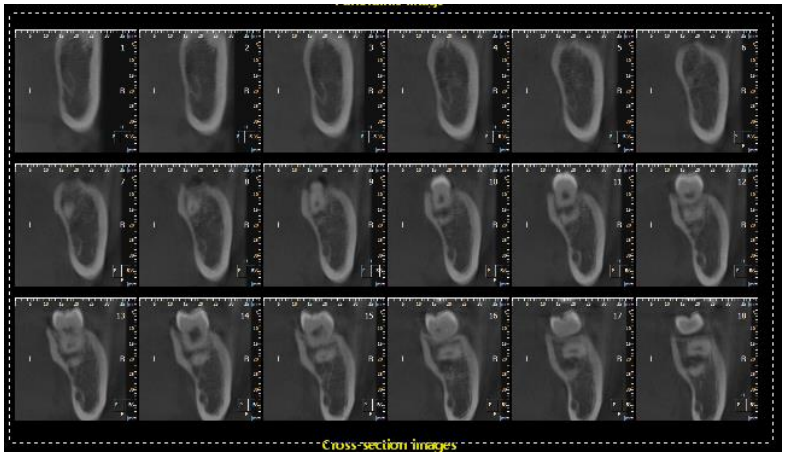
■ Select (Standard, + Ctrl, + Shift)

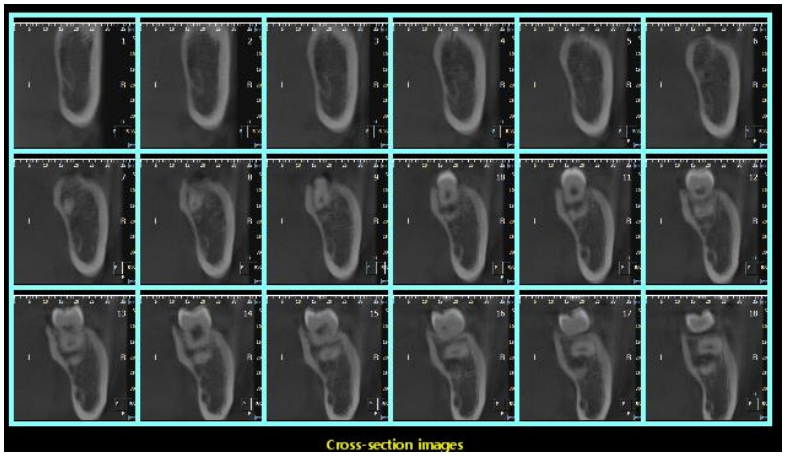
Select an image. By pressing down the “ctrl” or “shift” button and selecting the object, users can select multiple objects.

■ Image move / insert (Drag&Drop)

Change the position of the selected image. (Thumbnail / Captured Image to Template or Template to Template)

■ Area selection (Drag&Drop)





Users can select multiple images by assigning the selection area by dragging and dropping.

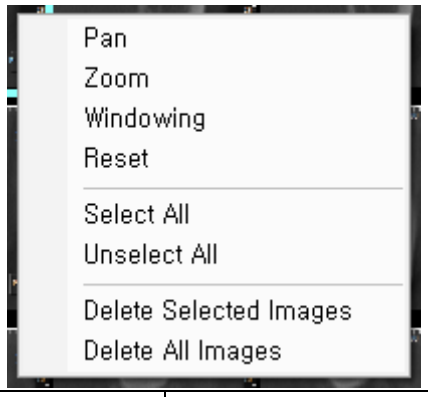
(2) **Right click button**

- Context menu (Single image object – common)

Pan	Panning tool on/off
Zoom	Zooming tool on/off
Windowing	Windowing tool on/off

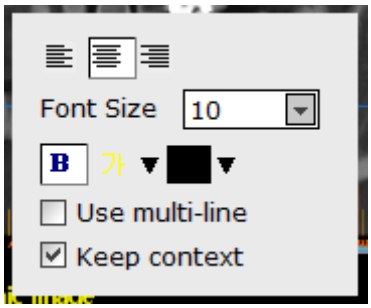
Reset	Return to original Pan, Zoom, Windowing.
Delete Image	Delete images.

- Context menu (Multi image object)



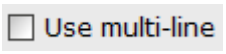
Select All	Select all images in multi image object.
Unselect All	Unselect all images in multi image object.
Delete Selected Images	Delete selected images in multi image object.
Delete All Images	Delete all images in multi image object.

- Context menu (Text object)



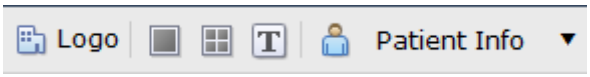
Change the format of the text object.

	Choose align type of the texts.
	Change the font size of the text.

	Change the texts in bold and vice versa
	Change the color of the texts. Users can select colors by clicking the arrow button on the right.
	Change the color of the text objects. Users can select colors by clicking the arrow button on the right.
	Type texts in multiple lines.
	Save contents of the text object when saving the template.

Chapter 6-5. Edit mode function

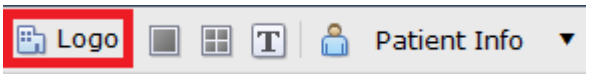
1. Add Object



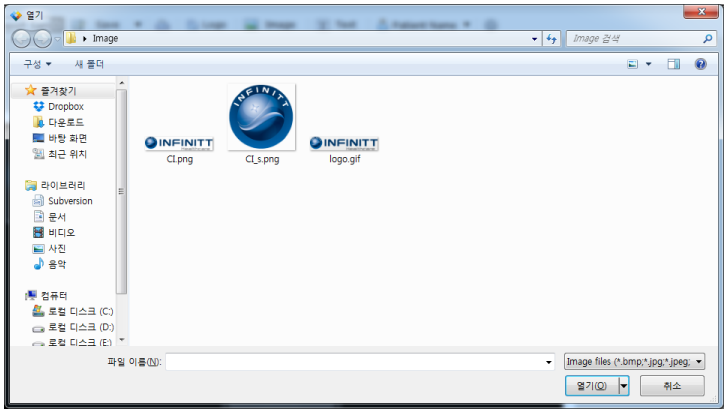
Add objects using 5 buttons above.

2. Object explanation

(1) Logo object



- Add



Users can select logo images to add by opening the image from the pop-up windows created after clicking the “Logo” button. “bmp”, ” jpg”, “tif”, “png” files can be added.

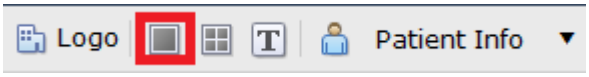
- Change image

Change the existing images by double clicking them.

- Save

Internal images are also saved while saving the template.

(2) Single Image object



- Add

An empty single image object is created by clicking the button.

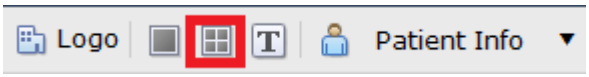
- Insert image

The image is inserted into the single image object by dragging and dropping the image on the “Thumbnail” or “Captured Images” to the single image object. Images are resized or cut (real size) as the image object.

- Save

  Only image objects are saved and inserted images are not saved when saving the template.

(3) **Multi Image object**



- Add

  An empty multi image object is created by clicking the button.

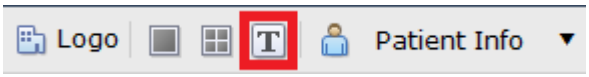
- Insert image

  The images are inserted into the multi-image object by dragging and dropping the image on the “Thumbnail” or “Captured Images” to the multi-image object.

- Save

  Only image objects are saved and inserted images are not saved when saving the template.

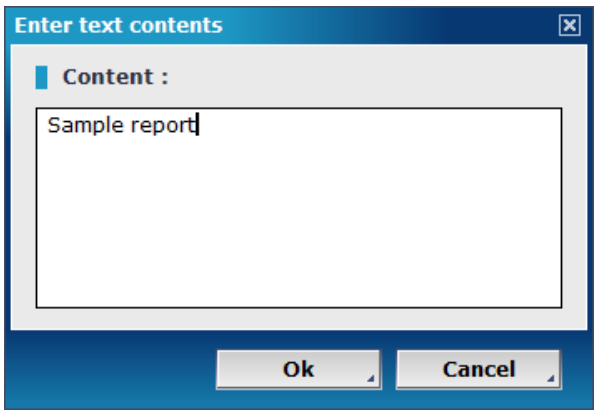
(4) **Text object**



- Add

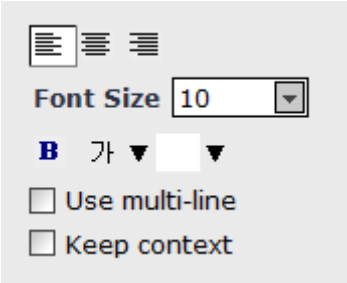
  An empty text object is created after clicking the button. Default settings for the text object are white color for the background and black color for the text.

- Insert context

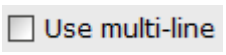


  Fill in the text object by fill in the “Contents” of the pop-up window created by double clicking the text object. By pressing the “OK” button after typing the contents, texts are filled in the text object.

- Text format



Change the format of the text object.

	Choose align type of the texts.
	Change the font size of the text.
	Change the texts in bold and vice versa
	Change the color of the texts. Users can select colors by clicking the arrow button on the right.
	Change the color of the text objects. Users can select colors by clicking the arrow button on the right.
	Type texts in multiple lines.
	Save contents of the text object when saving the template.

- Save

  Only contents of the text objects with the “Keep context” option checked are saved when saving the template.

(5) **Patient info object**

- Add

  An Empty patient info object is created after clicking the button. Information about type of the patient information to be seen is displayed in the “<>”.

- Input context

  Contents are filled in automatically when loading study or series.

- Text format

The patient info object has use same text format with the text object except “Keep context” option.

- Save

Only text format is saved when saving the template.

3. Image type explanation

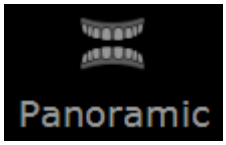
To automatically insert the images, users have to set the image type.

If a captured image type and an image object type matches, the image is inserted automatically.

(1) Single Image Object

- Undefined

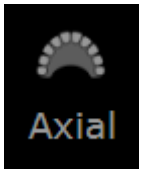
- Panoramic



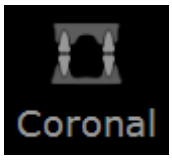
- Cross Section

- 3D

- Axial



- Coronal



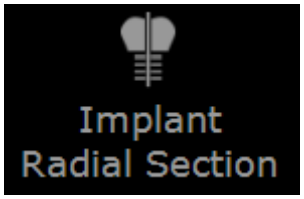
- Sagittal

(2) **Multi Image Object**

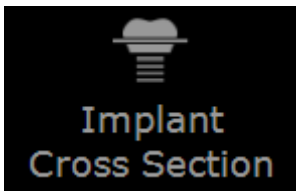
- Undefined

- Cross Section

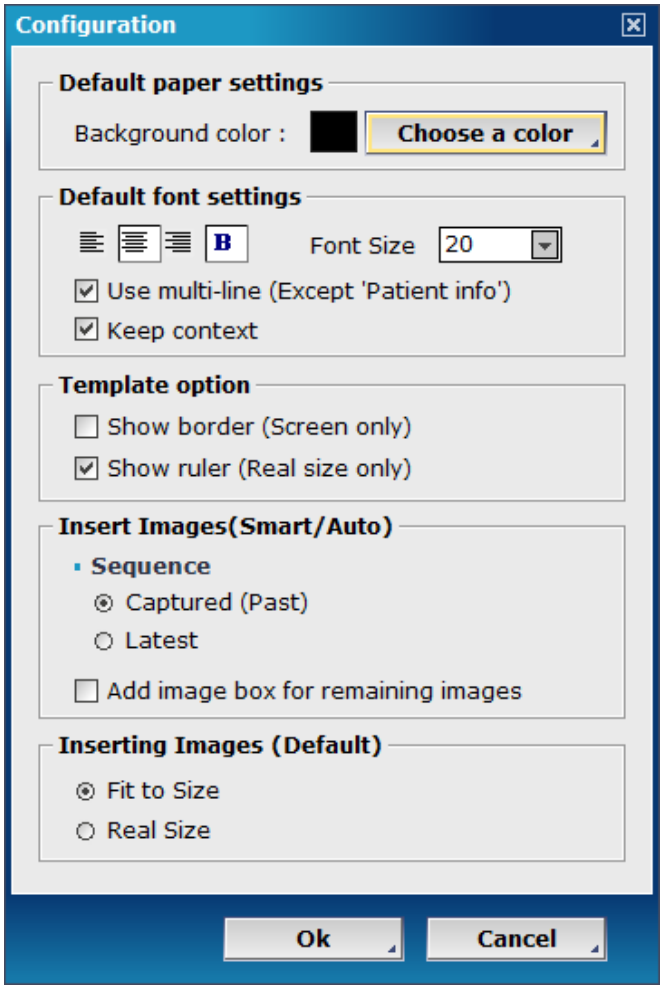
- Implant Radial Section



- Implant Cross Section



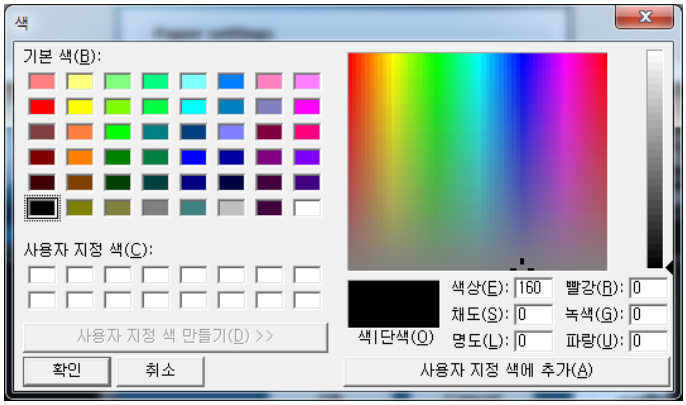
4. Set configuration



Set to environmental configurations.

(1) Default paper settings

Change the paper color by clicking “Choose a color” button. After clicking the button, the window illustrated below pops up. This option sets the default color, so it will be applied to all the newly added pages.



(2) **Default font settings**

Set the default font of the Text object and the Patient Info object. The option is set to default, and is only applied to newly added objects. The font settings are the same as the settings in the Text object.

(3) **Template option**

Change the Template region settings.

- Show border (Screen only)

Show the border line of the Object boxes.

- Show ruler (Real size only)

Show ruler of the Real size image object.

(4) **Insert Images (Smart/Auto)**

The settings of the automatic insertions of images.

- Sequence

Set the order of insertion of auto inserted images.

- Captured (past): Insert in order of the firstly captured images.

- Latest: Insert in order of the lastly captured images.

- Add image box for remaining images

If there are more captured images than the available multi image box spaces, multi-image boxes for the remaining captured images are created, and the remaining captured images are entered into the newly added multi image box.

(5) **Inserting Images (Default)**

Set the size selection of the Image object. The option is set to default, and is only applied to newly added objects.

- Fit to Size

The image is fit inside the selected object.

- Real Size

The image is shown in its real size regardless of the Image object size.

5. Mouse operation

(1) Left click button

- Select (Standard, + Ctrl)

  Select an object. By pressing down the “ctrl” button and selecting the object, users can select multiple objects.

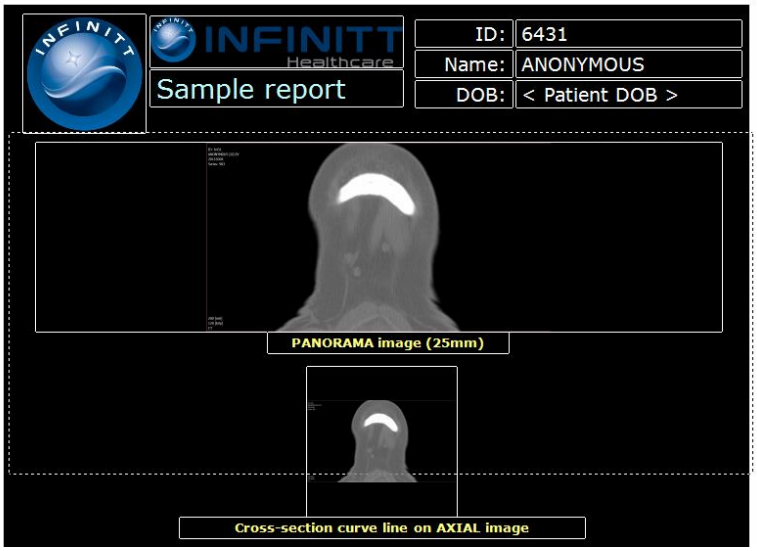
- Image type select

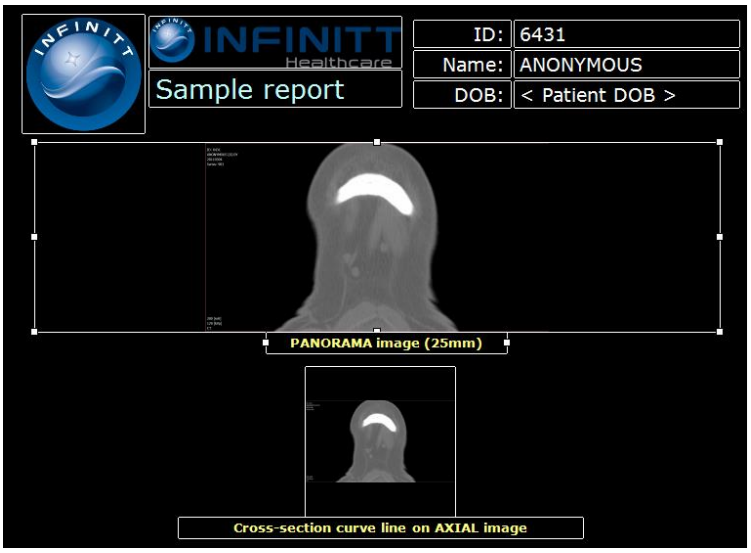
  Click on the Image type icon, and the user can select different image types.

- Resize (Drag&Drop)

  Change the size of the selected object. A horizontal to vertical ratio is maintained.

- Area selection (Drag&Drop)





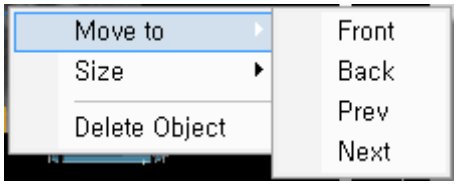
Users can select multiple objects by assigning the selection area by dragging and dropping.

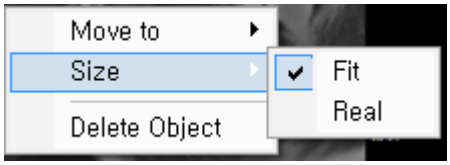
(2) **Right click button**

- Resize (Drag&Drop)

  Change the size of the selected object. A horizontal to vertical ratio is not maintained.

- Context menu





Move to front	Make a selected object as the topmost object.
Move to back	Make a selected object as the bottommost object.
Move to prev	Move forward a selected object to change the order of created objects.
Move to next	Move backward a selected object to change the order of created objects.
Size Fit	The image size is fit into the size of the image object.
Size Real	The real size of the image is shown in the image object.
Delete Object	Delete objects.

Chapter 6-6. Keyboard operation

(1) **Common**

Esc	Deselect the selected objects
Delete	Delete the selected objects. Images are deleted in the image objects instead of the image objects, if they have images inside.

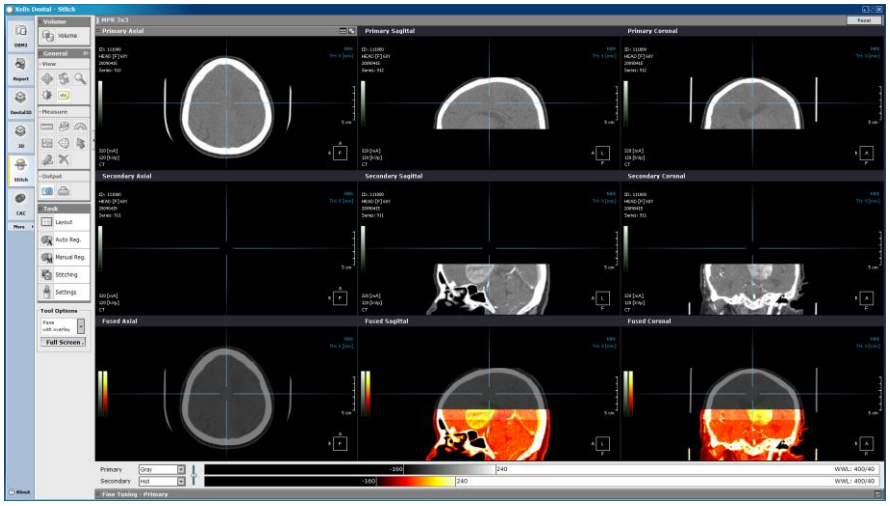
(2) **Edit mode only**

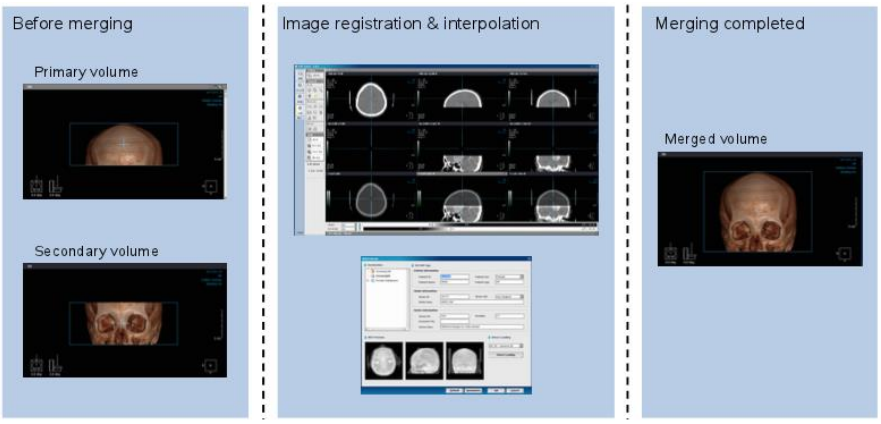
Arrow ↓	Move down selected objects by 1 pixel.
Arrow ↑	Move up selected objects by 1 pixel.
Arrow ←	Move left selected objects by 1 pixel.
Arrow →	Move right selected objects by 1 pixel.
Tab	Select next object.
Ctrl + c	Copy selected objects.
Ctrl + v	Paste selected objects.

Chapter 7. Stitch

1. Introduction

When scanning range of CT machine is not sufficient to capture all body parts interested, body parts should be captured. However those captured body parts are considered as different series, it is impossible to see them as a whole feature. Stitch module can match those partitioned two volumes automatically, merge data, and create a new series. Merged volume can be stored into a designated DB.





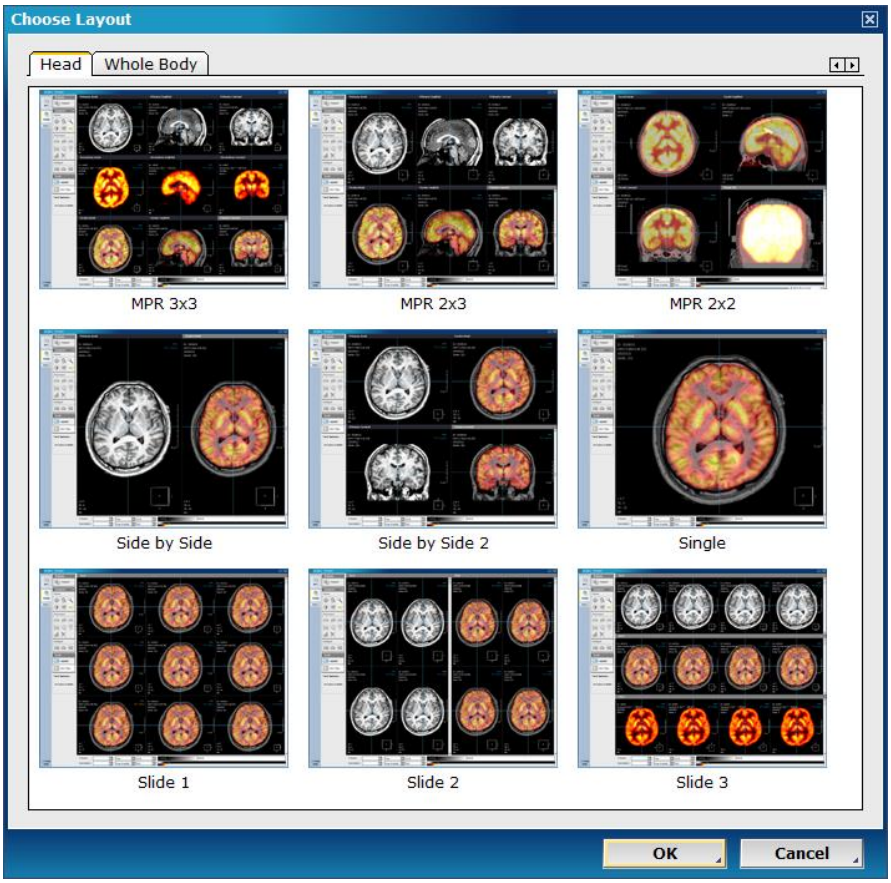
2. Tool functions

 Layout	Changing a current layout
 Auto Reg.	Automatic volume matching
 Manual Reg.	Manual volume matching.
 Stitching	DICOM saving of a merged volume.
 Settings	It provides some settings about auto registration and stitch data.

See the details below.

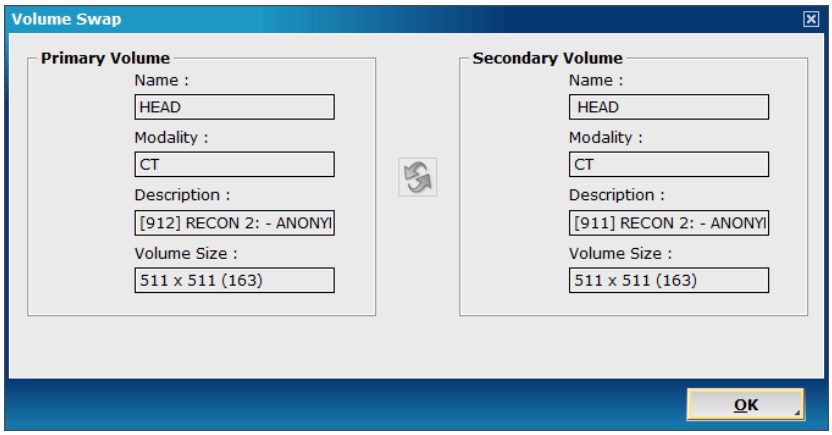
3. Changing a layout

 A current layout of displaying volumes can be changed, by clicking the ‘Layout’ button, and selecting the one want to use.



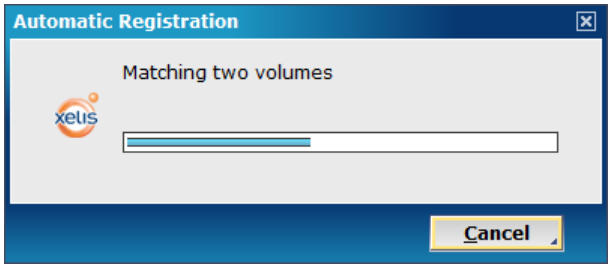
4. Merging volumes

At first select the primary volume at the ‘Volume Swap’ dialog. It pops up when stitch module starts. Merged result will follow all the data such as voxel size (resolutions of the voxel in x, y, z directions) and patient/study/series information by default.

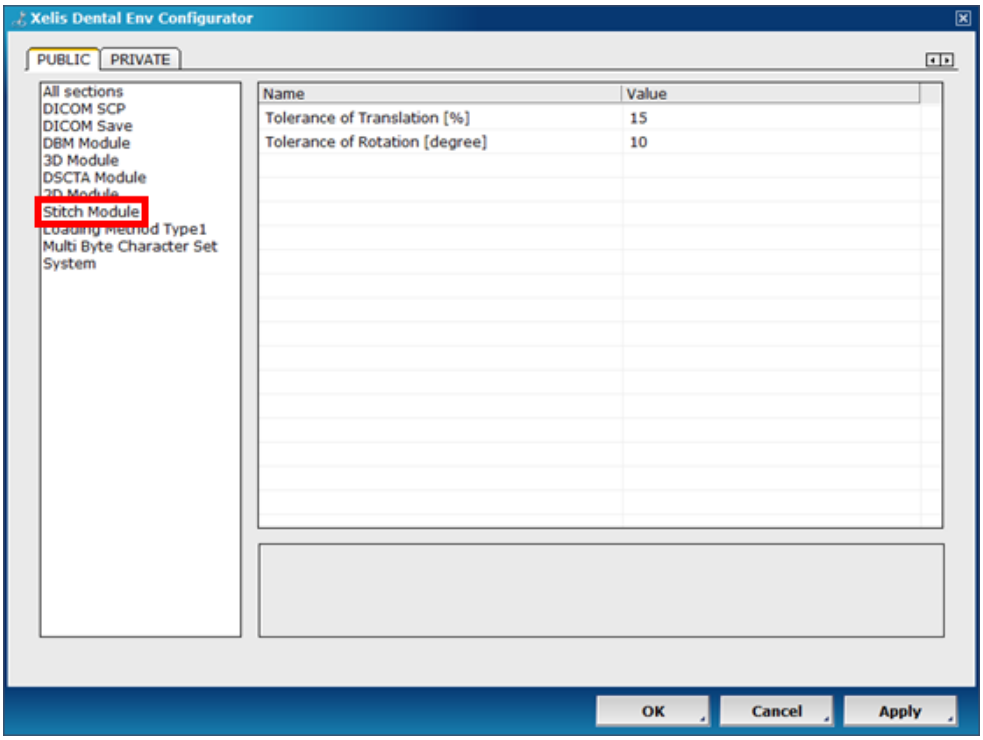


 After clicking the ‘Manual Reg.’ button drag the secondary volume to match the primary volume. This action will reduce the time of ‘Auto Reg.’ process.

 Press ‘Auto Reg.’ button in order to automatically match the two volumes. Progress window will pop-up while matching algorithm works, and disappeared after the process is finished.

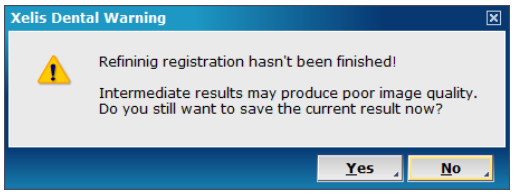


The ‘Auto Reg.’ can be finished when the transformation value was bigger than the tolerance of translation and rotation which is set in Env Configurator.

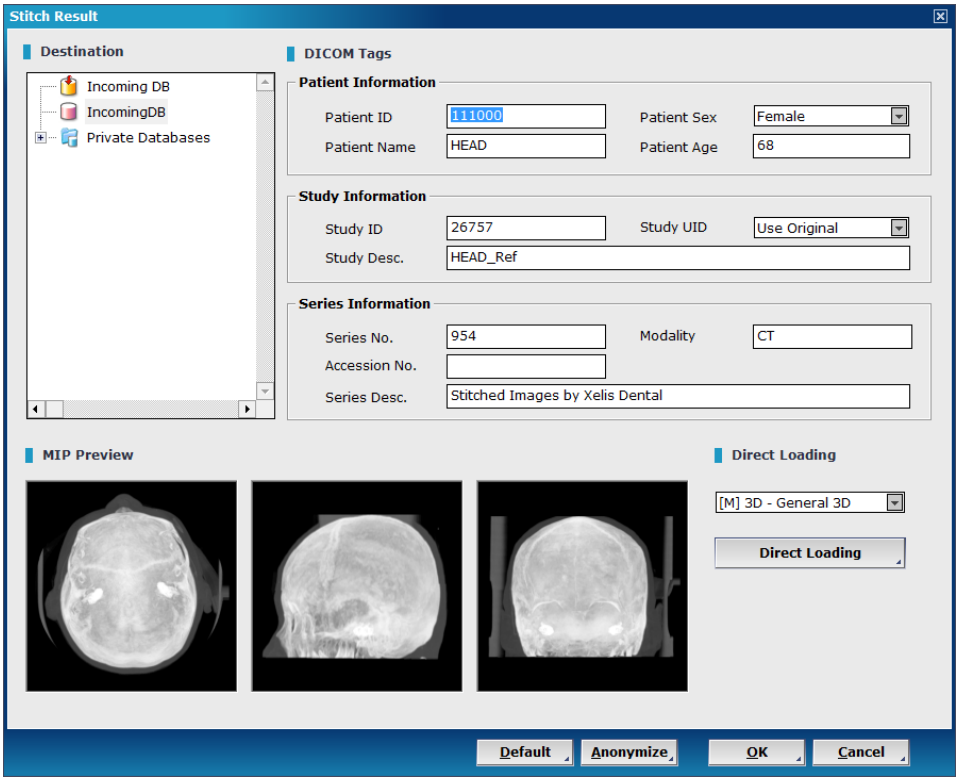


5. Creating a new volume

Press the ‘Stitching’ button in order to merged volume into DICOM. If ‘auto registration’ is not done, warning message will pop-up, press ‘Yes’ to proceed the process, or press ‘No’ to apply the ‘auto registration’.



Stitch Result dialog pops up afterwards, all data are based on the primary volume and DICOM tags can be changed manually, or anonymized by pressing the ‘Anonymize’ button below. By pressing the ‘Default’ button, all information can be initialized. Select the destination by clicking the tree list on the left and press the ‘OK’ button the finish the process.



6. Settings


Press the ‘settings’ button in order to change options. Then the settings dialog will pop up.

In auto registration, there are three radio controls. The controls make a decision the direction of auto-registration. When a gap exists between two volumes, two volume will be stitched by the settings. And the ‘Auto’ control decide the direction by referencing the DICOM information. Stitch Data Type makes user control a new volume data. To make the new volume when two volumes are overlapped, a value in the overlapped region have to be set according the settings.