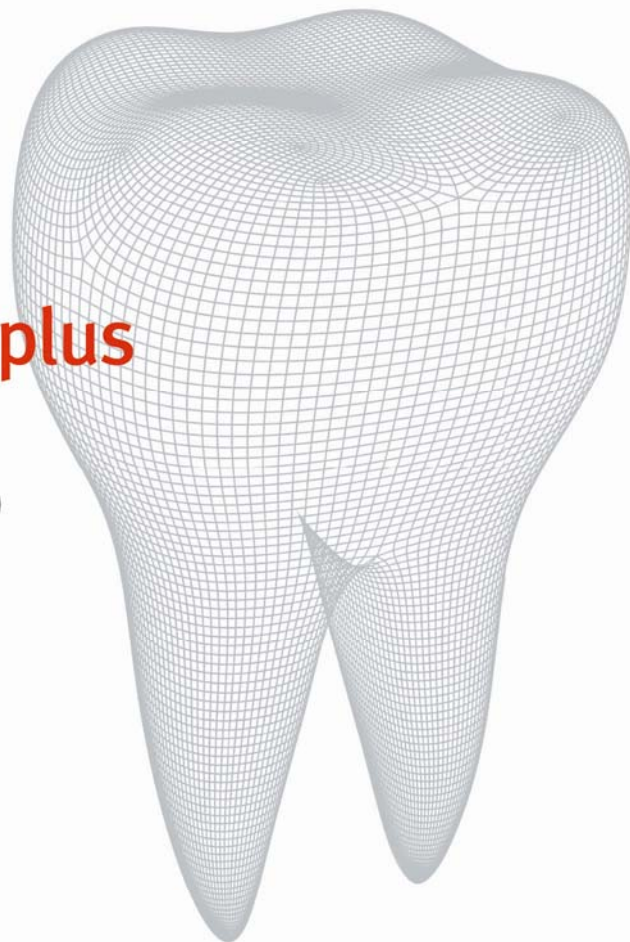




EZ 3D plus

User Manual Version 1.2.6.0



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This manual provides detailed information on how to use **Ez3D plus**. This document may not be reproduced in any manner without the prior written consent from the Publisher.

The manual distributed along with the product may not include contents specific to the latest version of the product. Please refer to the software disk or contact your supplier for the latest version. For additional information pertaining to this manual and the product, please contact at:

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User Notice

1. Read this guide carefully before you use the program.
2. Follow strictly all procedures and instructions, as directed in this manual.
3. For optimal use of Ez3D plus, make sure that your system meets the requirements set by VATECH Co., Ltd.
4. Check the specifications of your Lock Key to meet the requirement for software operation

This manual is originally written in English.

| | |
|--------------------------|----------------|
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1 Introduction

1.1 Ez3D plus Overview

Ez3D plus is a dental imaging software for PCs that provides accurate and fast diagnosis through 3D visualization, 2D analysis, and various MPR functions to manipulate CT images in DICOM format. The Professional version of **Ez3D plus** includes more diverse functions, including canal tracing, implant simulation, and bone density profiling of the area surrounding the implant.

Ez3D plus makes 3D image analysis easier through a simple and convenient user interface. The following are the major functions of Ez3D plus.

- Convenient 2D and 3D image observation with the ability to access all the functions of **Ez3D plus** with a single click of the mouse.
- Quicker image analysis using Cross-Sectional View, which processes vertical images of the dental arch.
- Implant simulation tools provide accurate treatment planning and make for effective patient consultations.
- Convenient and accurate confirmation of bone density profiles for the areas around an implant site. Combined with canal tracing, a user can also easily locate the ideal implant site in relation to its distance with the mandibular canal.
- Easy access to various rendering methods, including VR (Volume Rendering), MIP, miniIP, and X-ray.
- Accurate 3-D image diagnosis through the use of rendering functions like MPR Rotating Axes, Curve, and 3D zoom.
- **Segmentation** allows users to easily remove unnecessary parts of an image or extract areas that meet a specific data value.
- A range of Utilities including Reports, Counsel, and Free Draw.
- Ability to easily control user settings such as for default windowing and sectional gap/thickness.
- Convenient management and addition of objects, color maps, and fine tuning presets.

1.2 End User License Agreement

All rights of this software program, data files, data, manual, and other documentary contents included in the **Ez3D plus** product are reserved by the Copyright Laws and the Computer Programs Protection Law of Korea.

You must read the details relevant to the copyright enclosed in the installation CD, or confirm the details in accordance with the **End User License Agreement** that will appear on the screen during program installation.

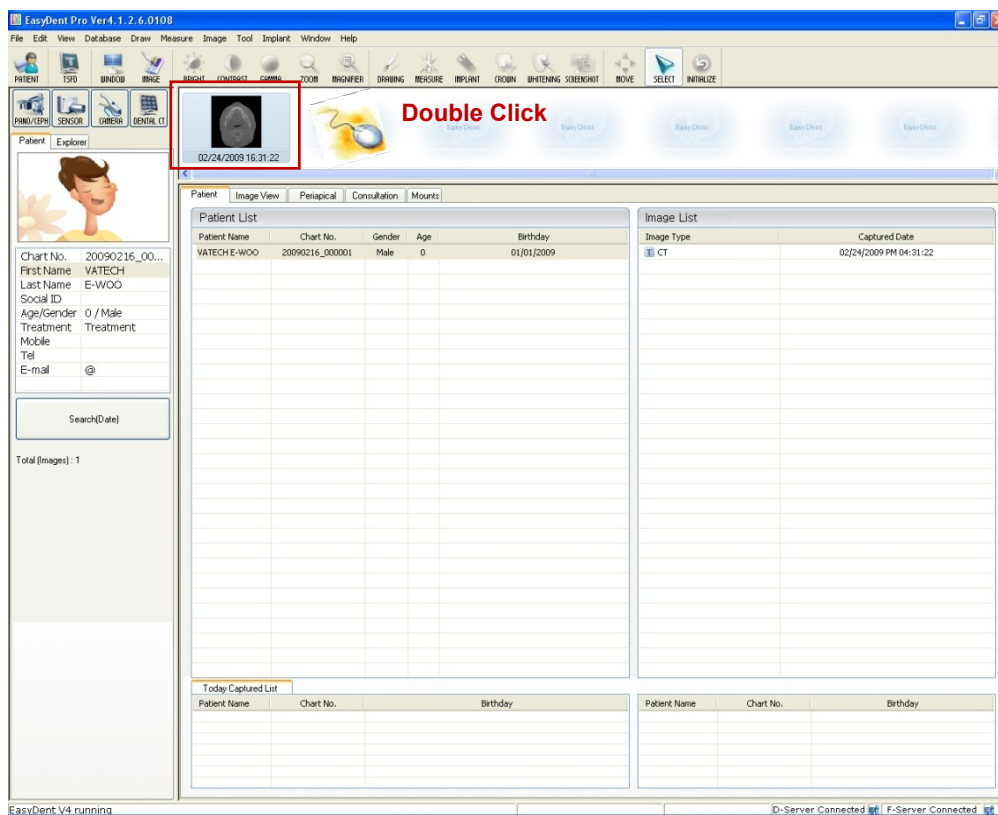
| | |
|--------------|--|
| INFO. | Windows XP and Windows Vista are products of Microsoft. |
| | DICOM is the standard for medical images that has been issued by the ACR/NEMA. |


2 Main Screen Description

2.1 Ez3D plus Start-up

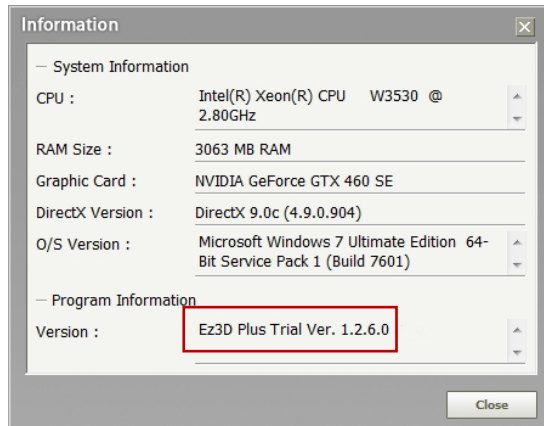
A user may access **Ez3D plus** through EasyDent or direct local execution and importation of DICOM images.

- Execution through **EasyDent**: Ez3D plus will automatically start up when you double click a CT image within EasyDent V4.

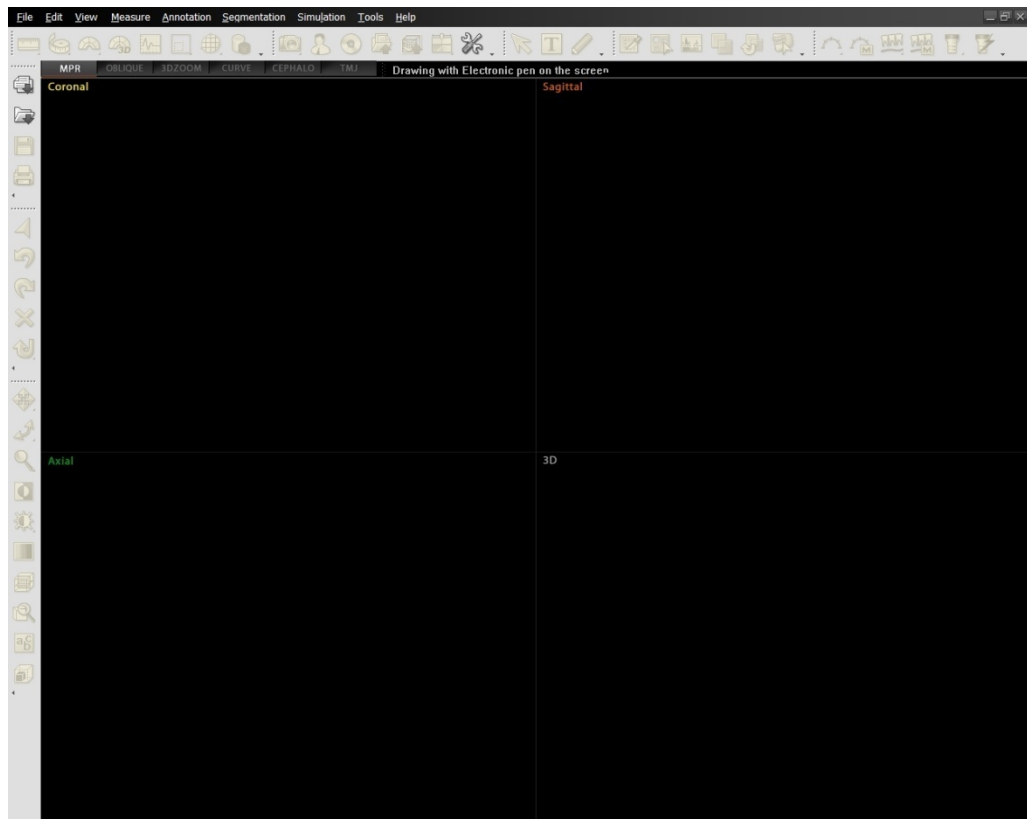


- Execution locally: When **Ez3D plus** is successfully installed, the **Ez3D plus icon**  will be created on the desk top. Double click this icon to run Ez3D plus. You may also execute **Ez3D plus** by browsing **C:\Ez3D2009\Ez3D2009.exe** using Windows Explorer.

Ez3D plus is executed with automatic version detection according to the hardware security license key setting. To verify the current program version information, click **Help** → **About** on the menu bar from the main window.



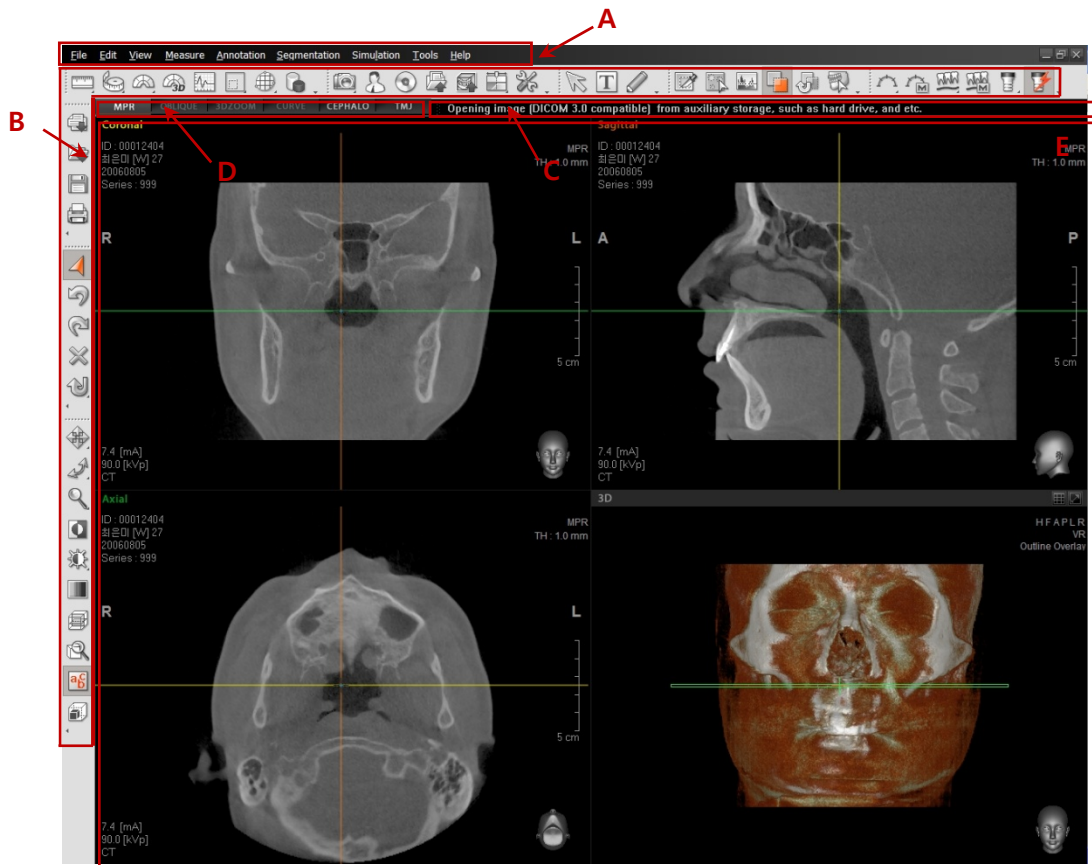
When **Ez3D plus** is executed normally, the main window will open as below. This means that **Ez3D plus** is ready for file import or case loading.



2 Main Screen Description

2.2 Main Screen

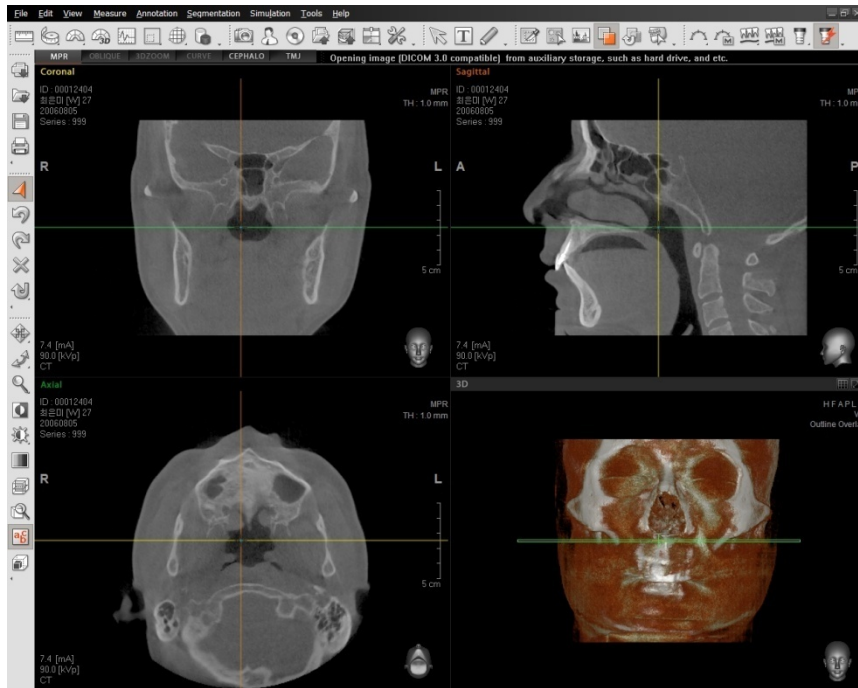
2.2 Main Screen



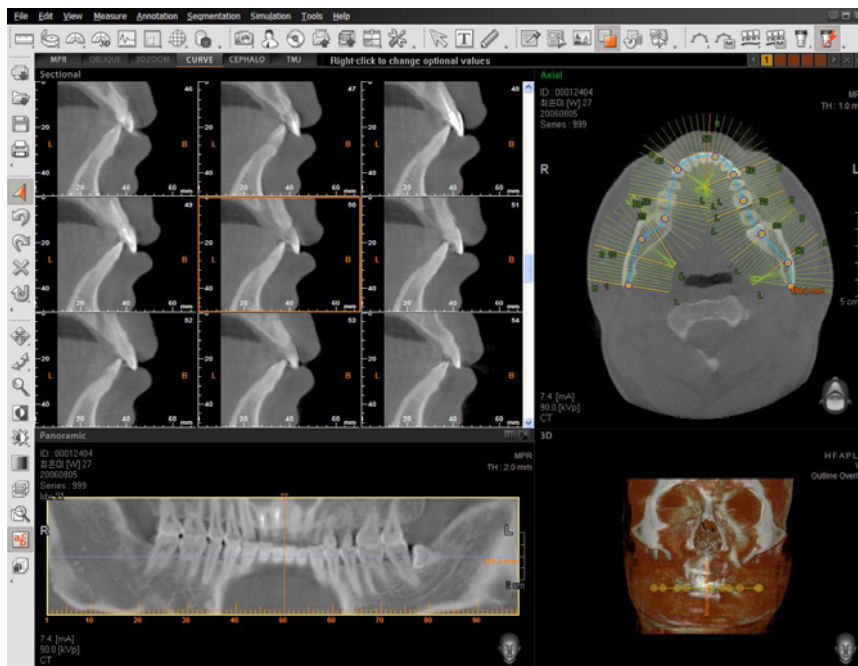
- A. **Menu Bar:** All functions of Ez3D plus are provided in a pull down menu classified by category. The menu bar is comprised of File, Edit, View, Measure, Annotation, Segmentation, Simulation, Tools, and Help. The user can select an applicable category and function as necessary. For more detailed information about the function of each tool within the menu bar, please refer to Chapters 3 through 8.
- B. **Tool Bar:** The tool bar provides the user with the most commonly used tools among the menu functions. The tool bar may be reorganized according to the user's preference. It is possible to **dock** or **float** tool bars and rearrange their orientation. For more information on how to manage the tool bar, please refer to **3.3.2 Tool bar Floating and Docking** and **3.3.3 Tool bar Customizing**.
- C. **Instructional Guide:** When using a specific application, this guides mouse operation and provides guidance on tool operation procedure.
- D. **View Mode:** View Mode consists of **MPR, Oblique, 3D Zoom, Curve, Cephalo, and TMJ Mode**.

The current screen view mode tab is activated, as highlighted herewith in red lines. The **MPR**, **Cephalo**, and **TMJ** View mode tabs are activated by default as opposed to **Oblique**, **3DZoom**, and **Curve**, which have basically inactive view mode tabs that require inputting of specific values in order to activate.

<MPR View Mode>



<Curve View Mode>



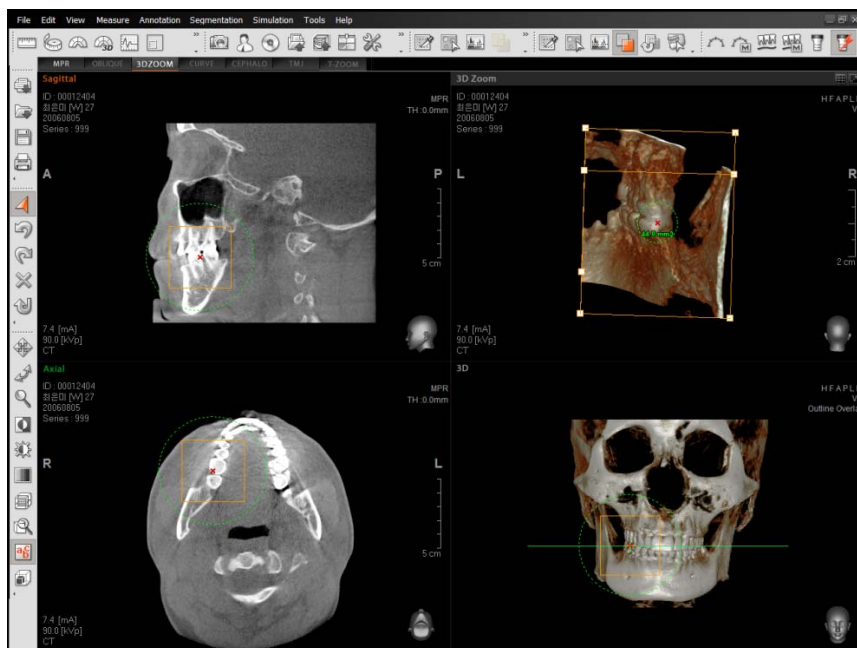
2 Main Screen Description

2.2 Main Screen

<Oblique View Mode>



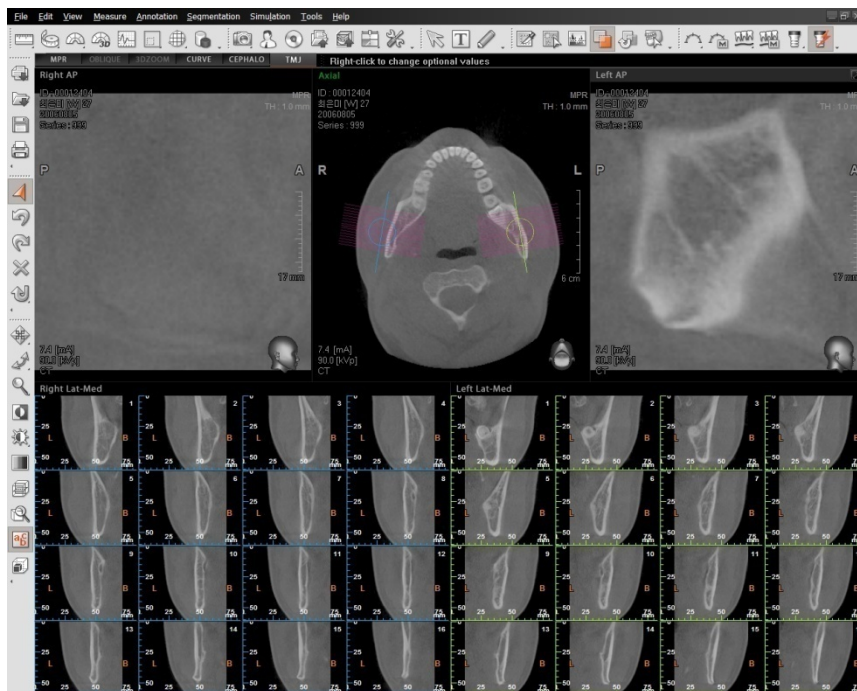
<3D Zoom View Mode>



<Cephalo View Mode>



<TMJ View Mode>



E. Main Window

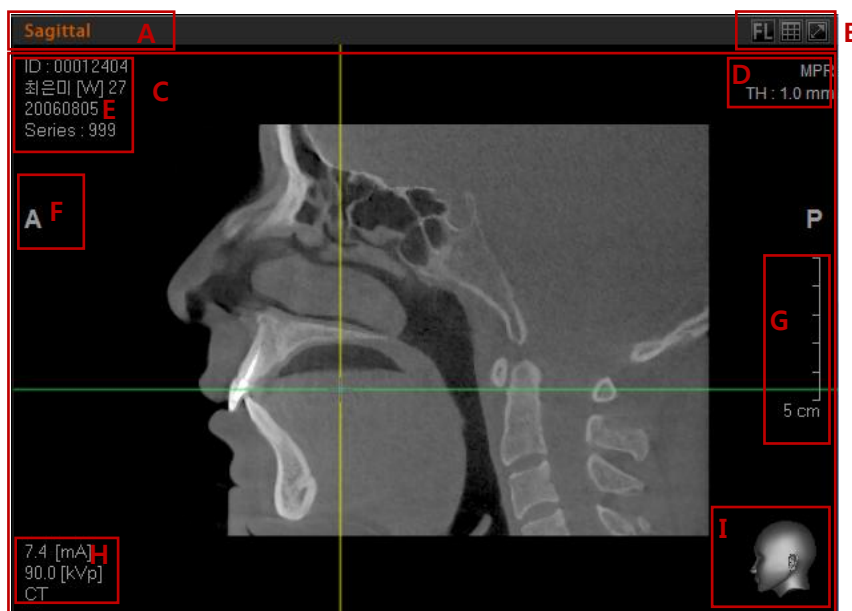
The main window is composed of Multi-Planar Reconstruction (MPR) panes such as Axial, Coronal, and Sagittal panes along with the 3D pane. For more detailed description, refer to **2.3 Main Window**.




2.3 Main Window


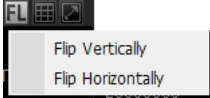

The Main Window Image view within **Ez3D plus** utilizes 3 or 4 partitions of the screen area. Each partition is called an image window or pane. The main window is composed of two views, MPR and 3D. MPR View Mode is composed of three sub windows (Coronal, Sagittal, and Axial). Each window has its own functions to modify the various features of each view.

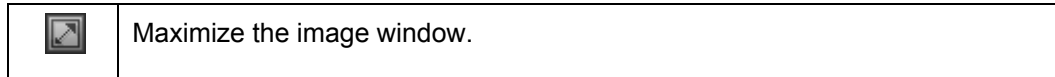
2.3.1 Main Window - MPR

Below is the composition of an MPR image window. As all three MPR windows have the same functions, the Sagittal sub window is used as reference to explain each functions.



- A. **Title Bar:** The title bar represents the direction of the current cross sectional image being displayed.
- B. **Sub Tools:** These buttons (  ) allow you to flip the image, enter Multi-Slice View, and Maximize the image.

| | |
|---|--|
|  |  <p>Flips image vertically or horizontally.</p> |
|  | Create and indicate Multi Slice Image. |

**<Flip Image>**

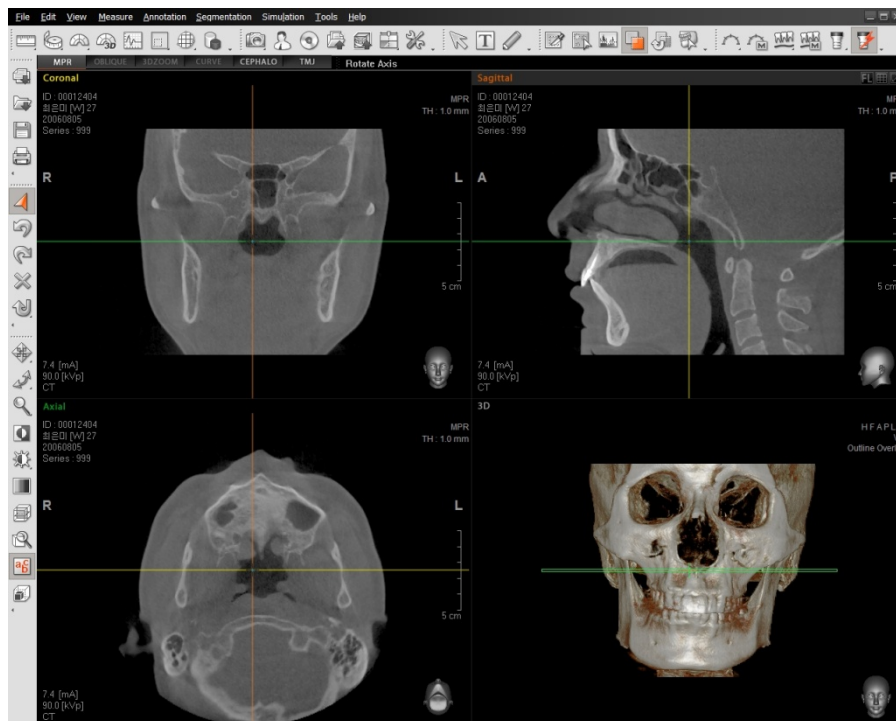
Flip Vertically: Flip the image vertically.

Flip Horizontally: Flip the image horizontally.

<Multi Slice View>

Multi-Slice View allows you to create images of a selected view in a specified slice thickness, interval, and number of slices.

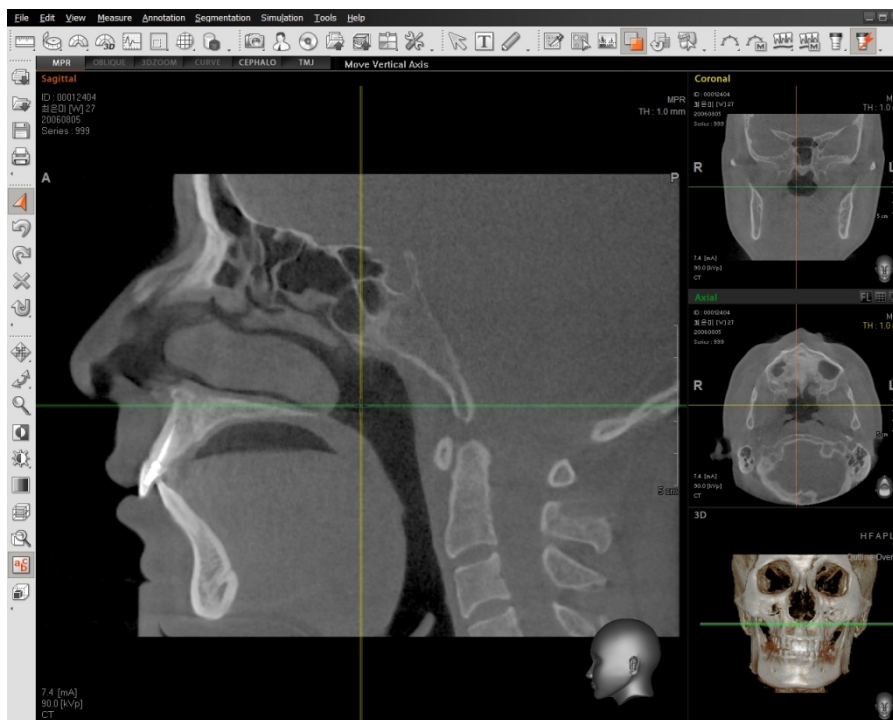
For more information on Multi Slice View, Please refer to **3.2 Multi Slice View**.

<Maximize (Normal) Image>


Pre-enlargement Image Pane

2 Main Screen Description

2.3 Main Window



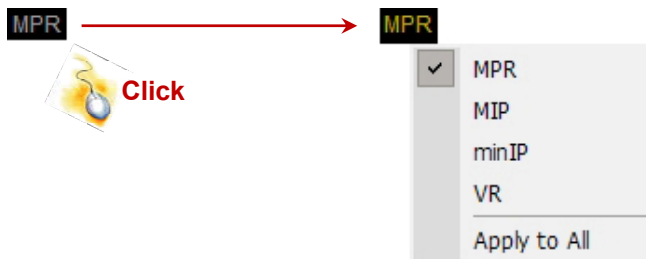
Post-enlargement Image Pane

You can always restore the enlarged image to default size by clicking the  (Normal View) button.

- C. **Image View:** An area on the middle of the window where the image is displayed.
- D. **Rendering Mode / Thickness Adjustment:** MPR has a rendering mode that provides various image analysis methods and a function to set the slice thickness.

<Rendering Mode Adjustment>

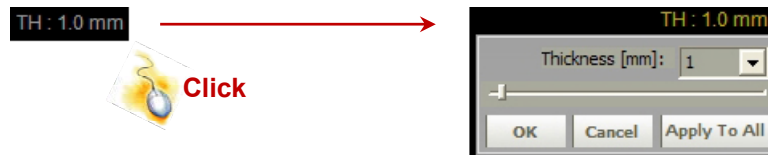
When you put the mouse on the **MPR** on the top right side of an image, the color of letters will change from white to yellow. When you click **MPR**, the following sub-menu will appear.



You may select the desired rendering mode for an individual pane or all MPR windows. For more information on Rendering Mode, please refer to **2.3.2 Main Window - 3D**.

<Thickness Adjustment>

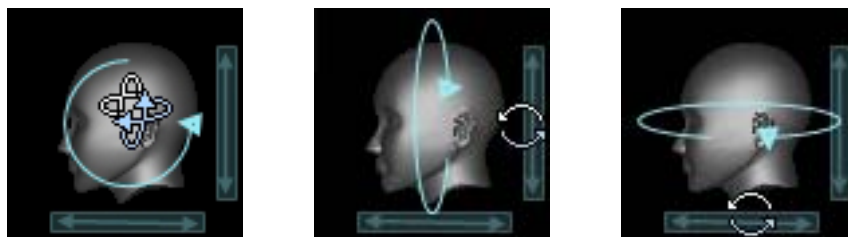
When the mouse pointer is positioned over the white text shown below, the color will change to yellow. When you click this text, the following sub-menu will appear.



Set the MPR's thickness of the axis by sliding the bar or entering the desired values (0~30mm).

- E. **Patient information:** Displays the patient's name, sex, age, and date when the image was captured.
- F. **Directional information:** Indicates the direction of an image.
- G. **Grid:** Indicate the length of a marked area.
- H. **Capture environmental variables information:** Display image capture information like mA, kVp values at the time of image taken.
- I. **Guide for patient orientation:** Used to indicate the direction of an image. For more intuitive directional information, a model of a 3D human head is shown. By using this visual tool, users can easily confirm the orientation of the current view.

When you position the mouse on the 3D human head model, you can verify the direction of the image rotation according to the placement of the cursor as shown below.

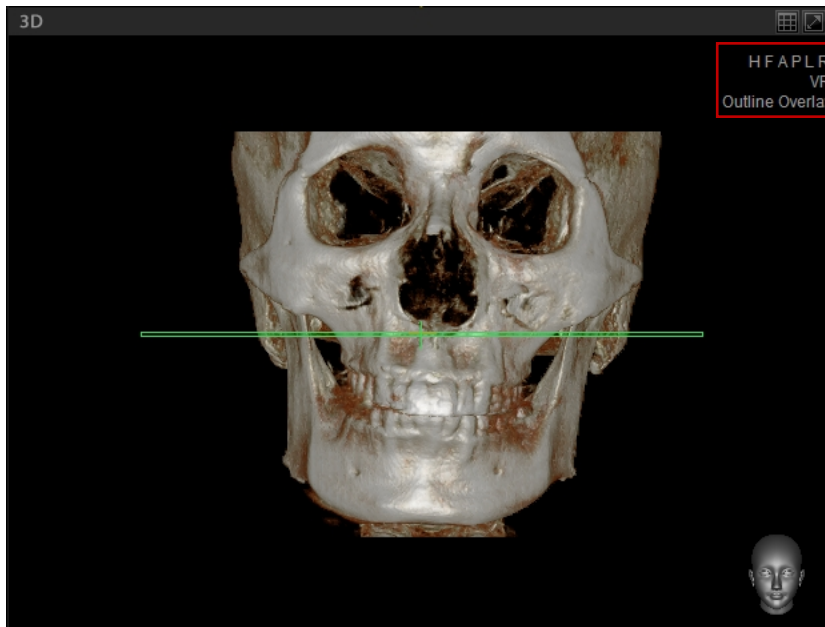


2 Main Screen Description

2.3 Main Window

2.3.2 Main Window - 3D

Explain the configuration of 3D screen. The primary configuration of 3D view window is the same as MPR view window. But the 3D view window has additional tools such as image orientation initialization setting and overlay setting.



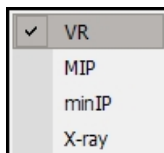
<3D Image Direction Initialization>

To initialize the image's direction, select one of the preset directions (H, F, A, P, L, and R) located at the top right of the 3D image window. Each preset represents the following.

| | |
|---|-------------------------|
| 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 |

<Rendering Mode Set-up>

When selecting **VR** on right upper side of 3D screen, a sub-menu will be displayed as follows. Then select your choice of the Rendering Mode from VR, MIP, minIP and X-ray.



| | |
|--------------------------------------|--|
| VR | 3D Stereoscopic Image |
| MIP (Maximum Intensity Projection) | Angio Image |
| MinIP (Minimum Intensity Projection) | Aero-section like bronchus inside human body |
| X-ray | Reset to Posterior View(as X-Ray Image) |

<MPR Overlay Set-up>

According to the frequency of pushing **Outline Overlay** in 3D window, you can see Plane Overlay, MPR Overlay, and Overlay Off in sequence.

The options are as follows:

| | |
|-----------------|---|
| Outline Overlay | Mark the selected MPR plane with Outline Overlay |
| Plane Overlay | Mark the selected MPR plane with Overlay |
| MPR Overlay | Mark the selected MPR plane with applicable MPR image |
| Overlay Off | Turn Overlay Off |

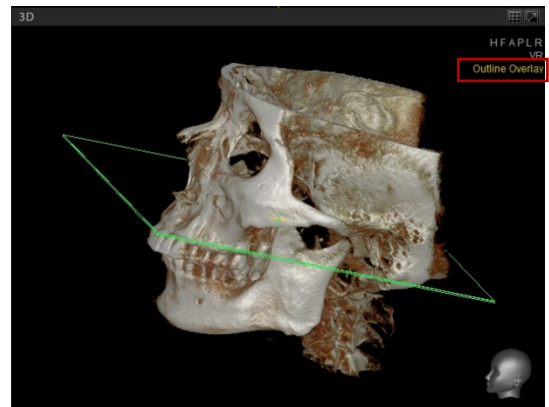
2 Main Screen Description

2.3 Main Window

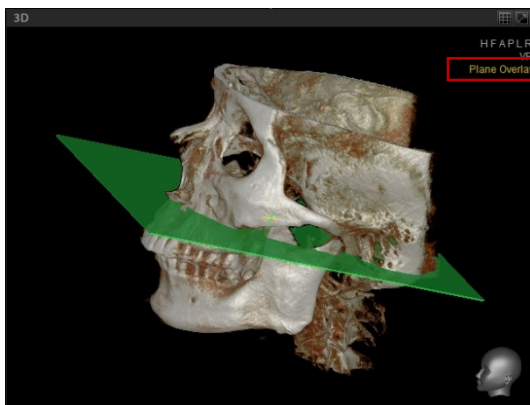
Below are examples of each Overlay option on 3D View when the Sagittal axis has been selected.



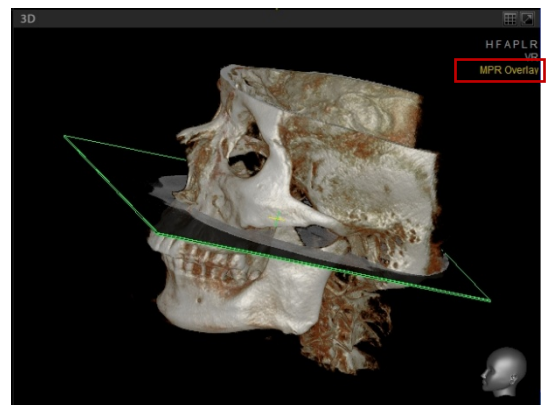
Overlay Off



Outline Overlay



Plane Overlay



MPR Overlay

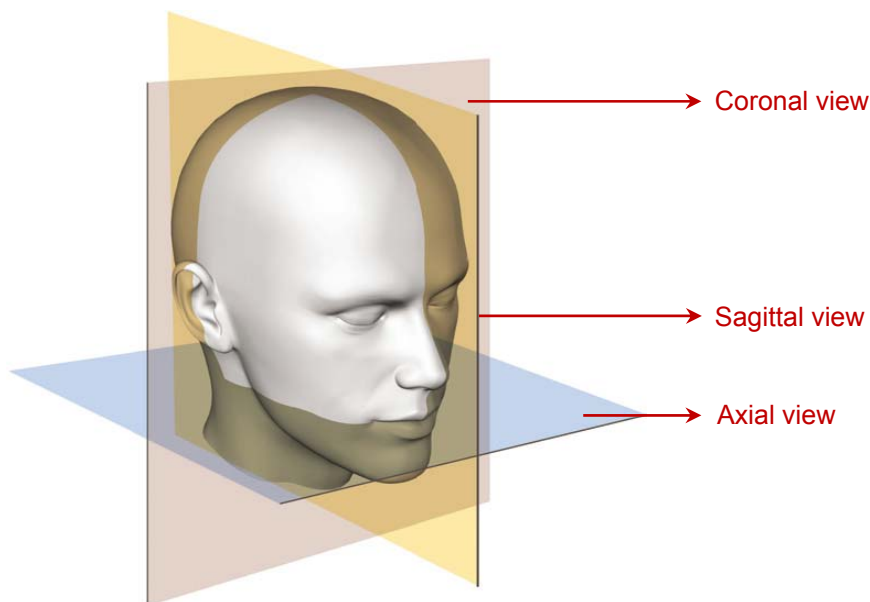
3 Utilization of Basic Functions

3.1 MPR Mode – Rotating Axes

MPR (Multi Planar Reconstruction) allows users to view cross-sectional images at desired locations and angles (frontal, lateral, and horizontal) by reconstructing Z axial slice data acquired during imaging.

MPR view allows confirmation of cross-sectional images from various angles through Coronal, Sagittal, Axial, and 3D image windows. MPR view is also used to set up the axes to a significant area before you use Curve and 3D Zoom tools, as well as to convert Cross-Sectional and Oblique Slice Views back to the initial image view.

3.1.1 Understanding Axis

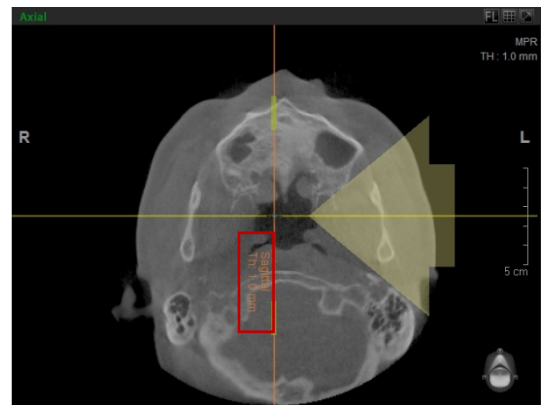
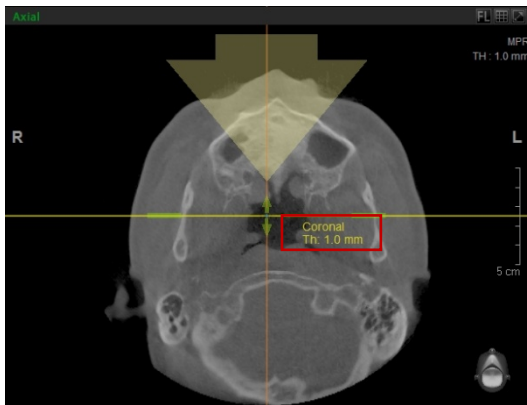


In the illustration above, the pink slice is the vertical cross-section viewed from the front (Coronal View). The yellow slice is the vertical cross-section viewed laterally (Sagittal View). The blue is Axial View, the horizontal cross-section viewed from bottom to top. Each of the MPR image windows will adjust according to the position of three axes applicable to three cross-sections.

3 Utilization of Basic Functions

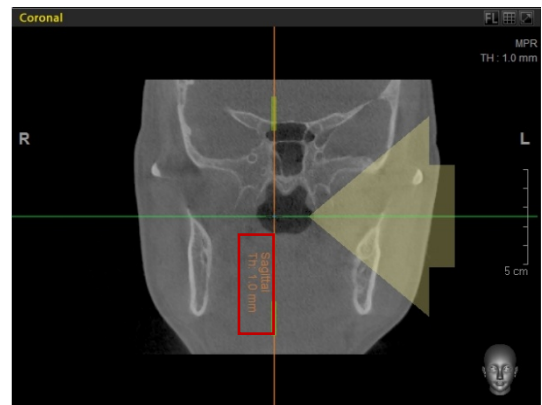
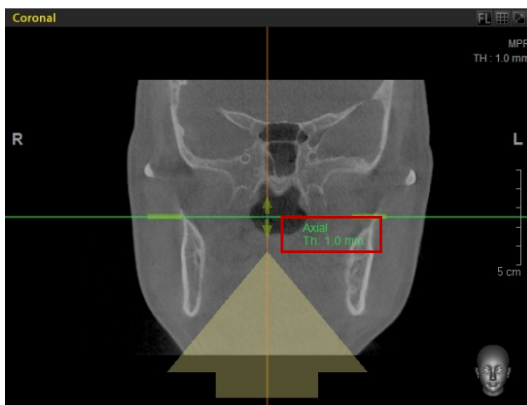
3.1 MPR Mode – Rotating Axes

<Axial View>



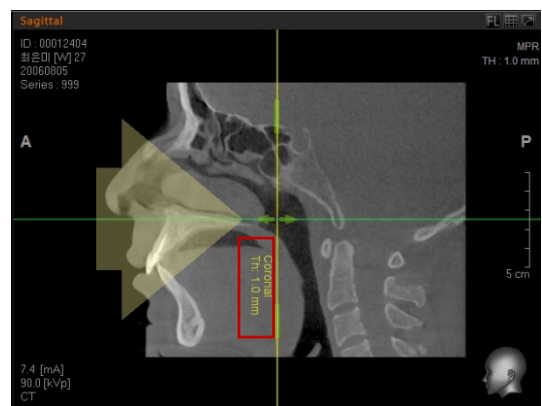
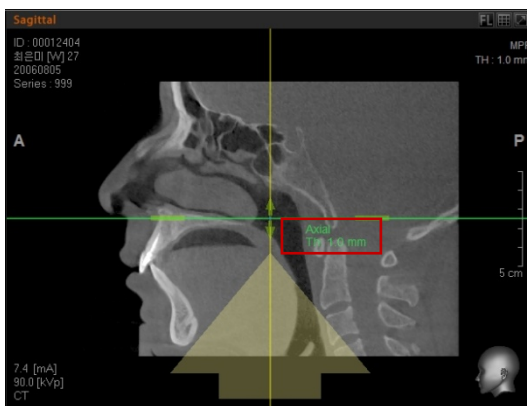
When the mouse pointer is positioned over an axis, the name of the axis will appear. When adjusting the Coronal or Sagittal Axis, you will notice the change in the Coronal and Sagittal views. The arrow on the screen indicates the viewing angle.

<Coronal View>



It is possible to adjust both the Axial and Sagittal Axes at Coronal View. When controlling the 2 axes, you will notice the changes in Axial and Sagittal View, respectively.

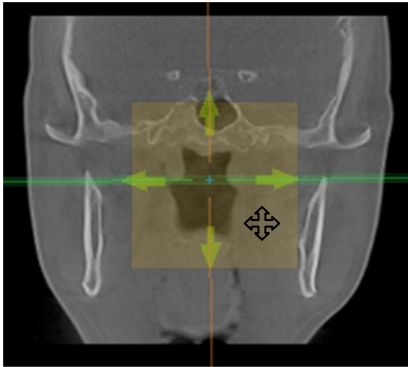
<Sagittal View>



In Sagittal View, both the Axial and Coronal axes are available. When adjusting these axes, you will see the result in both the Axial and Coronal view, respectively.

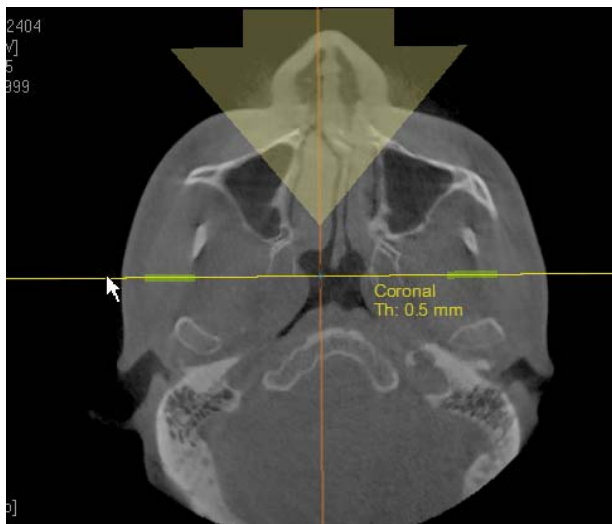
3.1.2 Moving the Axes

You can move origin of the axes to a desired location when four arrows appear, by clicking and dragging the mouse pointer in the square area which is made by four tips of arrows. Each axis corresponds to the cross-section of image in each MPR pane.



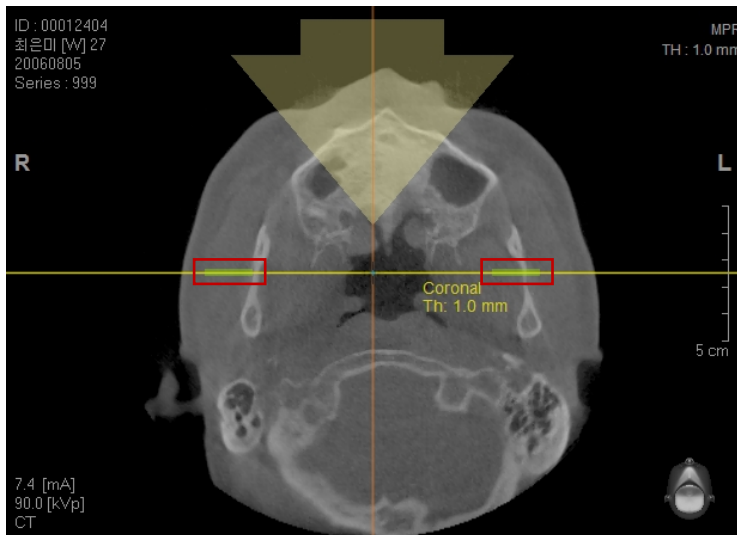
3.1.3 Rotating the Axes

When the mouse pointer is positioned on the line beyond the point of segment, not only a thick arrow and thickness information appear, but the regular mouse pointer's shape turns into the other. This implies that you may rotate now. Note that the arrow indicates a viewing angle.




3.1.4 Axial Thickness Adjustment

The **Thickness** function allows you to overlap the viewed image, as thick as set. To adjust thickness, enter the thickness value directly in the dialogue box that appears when you click **TH: 0.0 mm** or simply click the thick portion near the center of the axes and drag up/down.

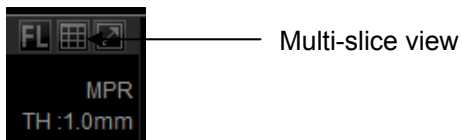


You can adjust the thickness by scrolling the mouse wheel after placing the mouse on the thickness adjustment segment.


| | |
|---|---|
|  <p>NOTE</p> | <ul style="list-style-type: none">✓ In general, the dental CT image's slice interval is 2mm and its thickness is set at 1mm. If the thickness is set too low, some portions of the image may not be viewable. If the value is too large, the image will look hazy.✓ The 3D human head model located at the right lower corner will help you to confirm at a glance direction of which the image is being viewed. |
|---|---|

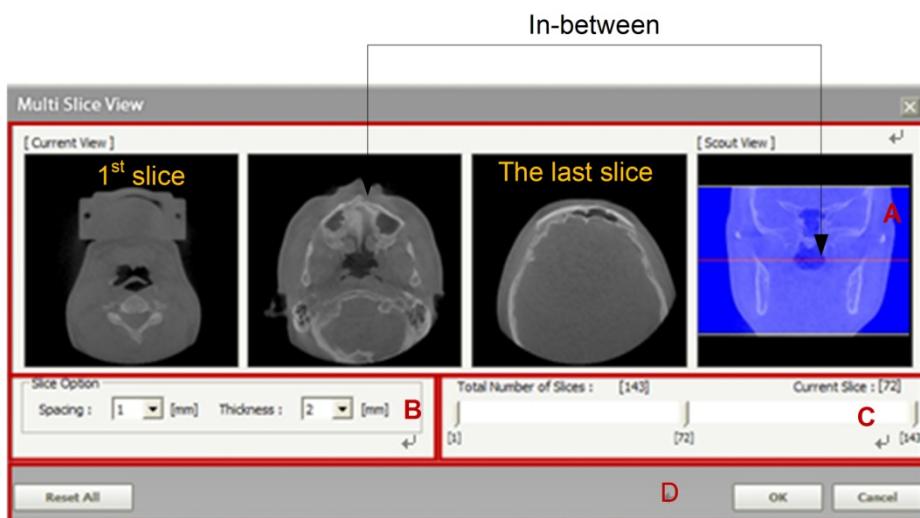
3.2 Multi-Slice View

Multi Slice View allows you to produce image slices with a certain interval from the selected image view. Its related menu is located at the upper right corner of each image view.



3.2.1 Executing the Multi-Slice View

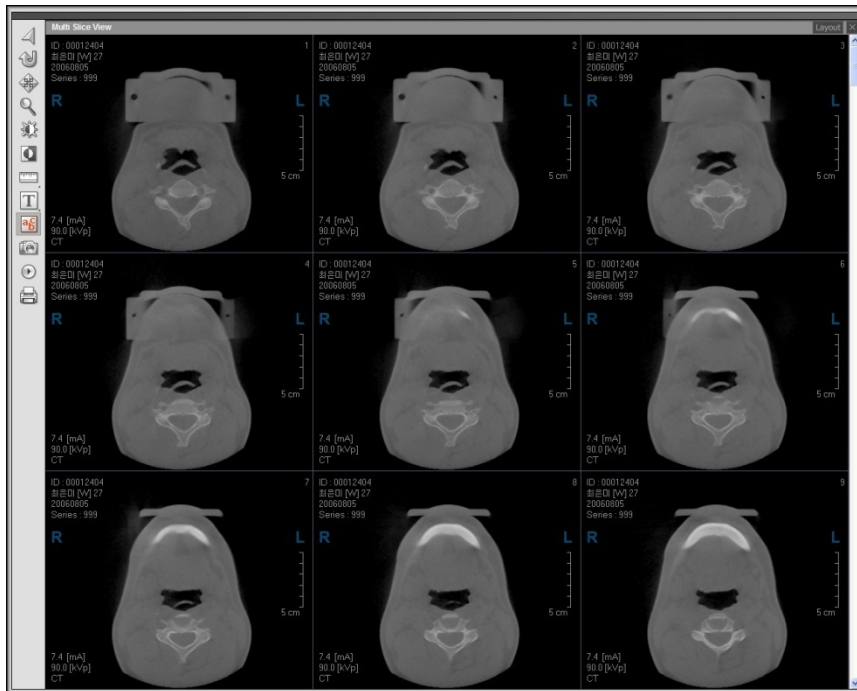
When you select the **Multi Slice View** () button, its set-up screen will open, as shown below. Options are provided for user customization.



- A. **Cross-sectional Image View: Current View** shows the cross-sections of three views of the 1st, in-between and the last. **Scout View** displays the location of each **Current View**.
- B. **Slice Option**: Sets the thickness and the slice interval of the image.
- C. **Slice selection**: Selects and scout the slice of interest by scrolling the location.
- D. **Setting**: click **OK** to create the Multi Slice View image. Click **Reset All** to set the cross-sectional view back to its default state. Click **Cancel** to exit without creating multi-slices.

3 Utilization of Basic Functions

3.2 Multi-Slice View




The above figure shows the result generated from 3x3 layout by default.

You can change the layout setting value in the View tab of the Setting window.

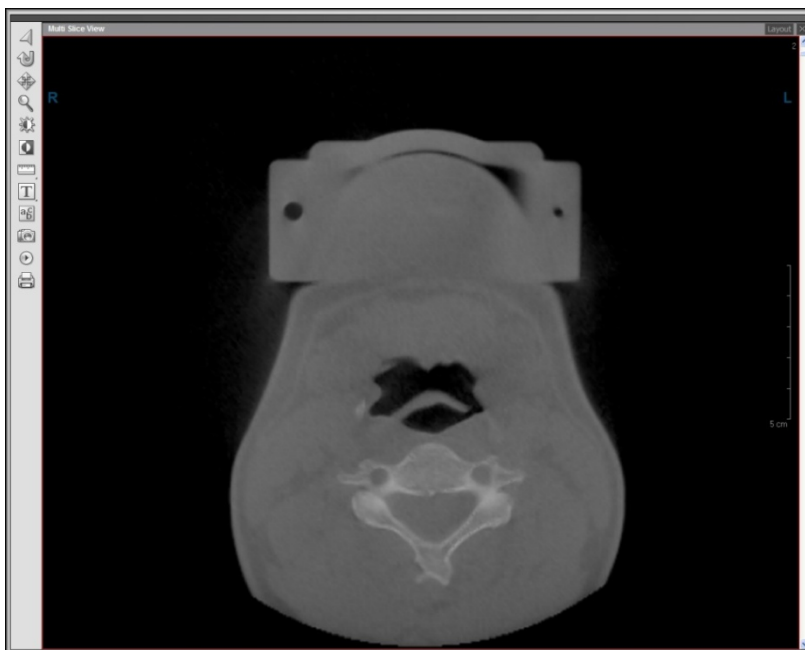
3.2.2 Using Multi Slice View

When an image of interest is selected in Multi Slice View from the figure above, it will be indicated with a red outline.

To change layout for slice view, click the **layout** () button on the top right of the Multi Slice View window, then a new layout will be created with the selected image as its base.



If an image is double-clicked, it will be displayed, with its size maximized.



To return to the Multi Slice View(previous view), just double-click anywhere on the enlarged image.

3.2.3 Multi Slice View Tools

The Multi Slice View Tools include Select, Reset, Panning, Zoom, Windowing, Invert, Measure, Annotation, Study Info, Capture, Cine player and Print. By clicking the **Layout** button, you can customize the number of displayed images (1x1 to 4x4). To exit Multi Slice View, click the **X** (Finish) button

- **Select**

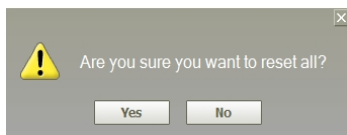


After using general tools like Pan, Zoom, or Windowing; it sets back the mode and mouse cursor shape to default setup.

- **Reset**



Restore Multi Slice View to initial default.



- **Panning**



Move the image.

- **Zoom**



Enlarge or reduce the selected image.

- **Windowing**



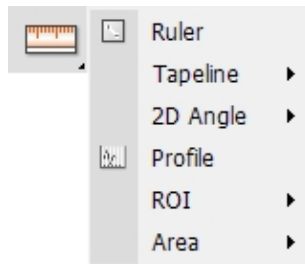
Control brightness/contrast.

- **Invert**



Invert all images displayed on the screen.

- **Measure**



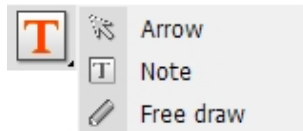
Measure various values related to length, area, angles and so forth.

- **Study Info**



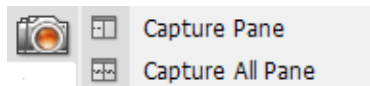
Show/Hide a patient's information on the image view screen

- **Annotation**



Allows the user to input information on an image by using arrows, notes, and free draw

- **Capture**



Capture an image of a single image view pane, all panes, or full screen with or without overlay and save it to the file.

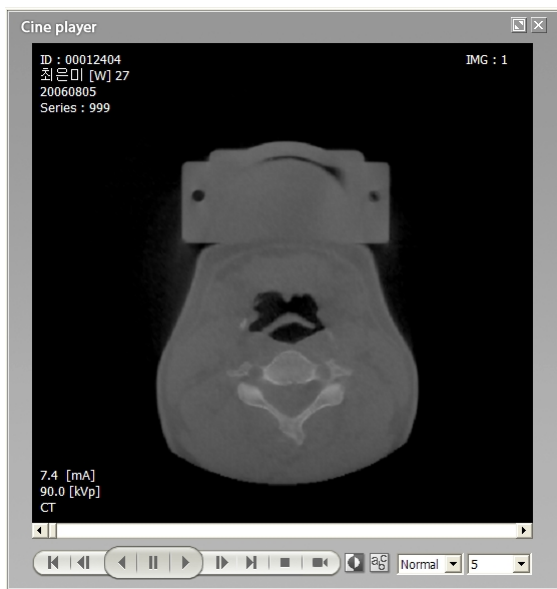
- **Cine player**



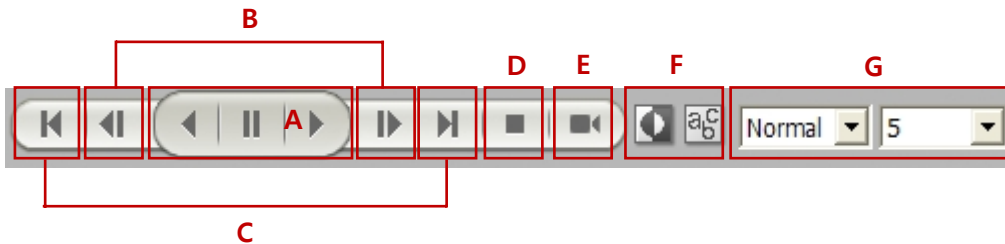
Converts Multi-Slice View to video-like presentation

Cine Player offers the ability to play images displayed in Multi Slice View continually. This feature is useful for the academic presentation and the hospital's PR material for CT when this is played in 3D view with vertical/horizontal rotations.

When the **Cine Player** button is selected, the Cine player window will appear, as shown below.

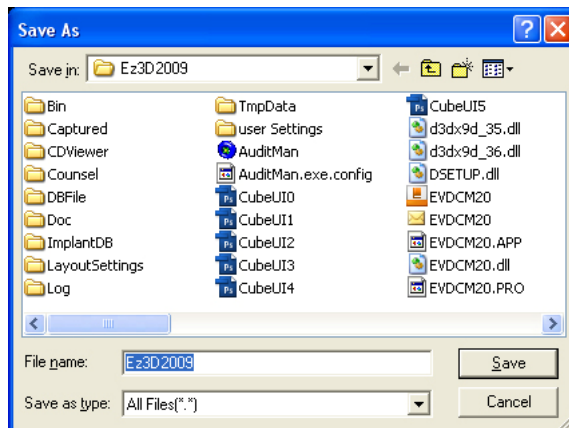


Each button functions as follows.

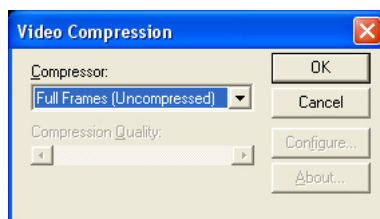


| | |
|----------|---|
| A | Reverse Play, Pause, and Play. |
| B | Rewind or Forward one frame at a time. |
| C | Move to the first or the last frame |
| D | Stop and return to the initial position. |
| E | Export video as AVI file. |
| F | Toggle on or off overlays such as patient data, x-ray setting, etc. |
| G | Specify play speed and method |

When the video production button is selected, the video will be saved as an AVI file. Specify the file name and path to be saved.



After selecting your path and file name, click the **Save** button and then compression set-up dialog box will appear. In general, the picture quality is not affected by compression. But without compression, playing speed will decline significantly, so it is recommended to compress it



The **Microsoft video 1**(Microsoft MPEG-4 Video Codec v2) is preferred, as it is universally accepted in the Windows operating system. Other option may be selected, but this requires some technical knowledge before using it.

- **Print**



Prints according to the user specification

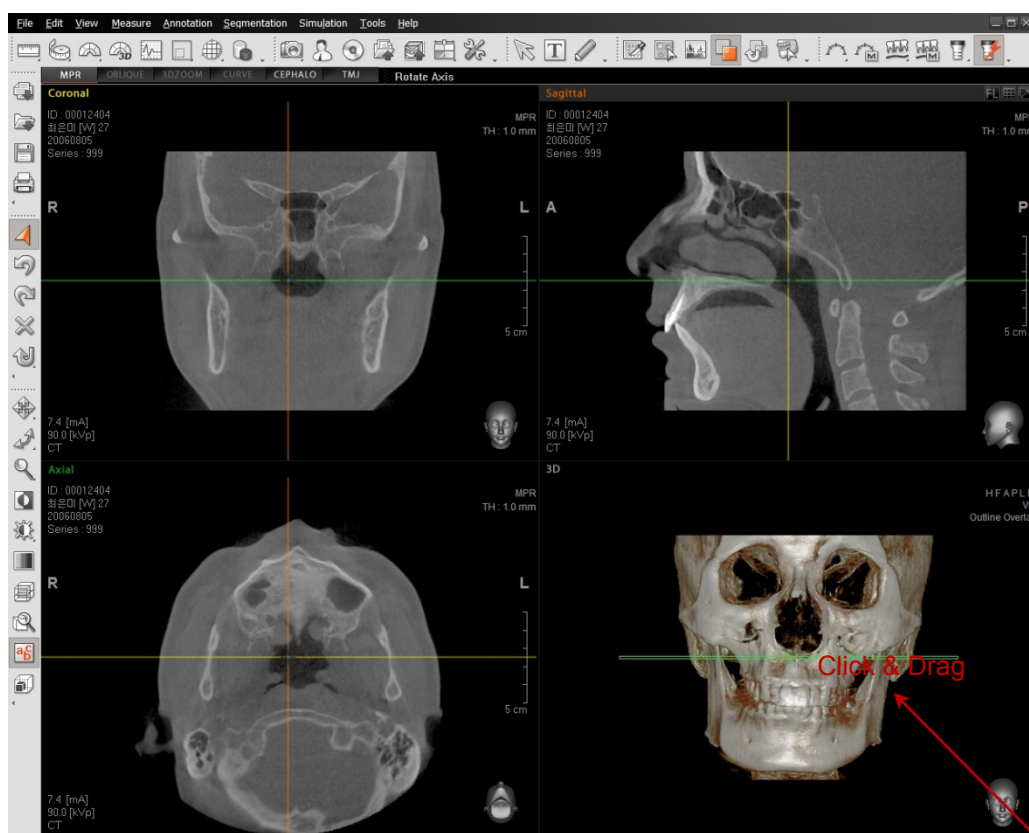
For more details, refer to section **4.4 Print**.

3.3 Layout Customization

3.3.1 Resizing Window

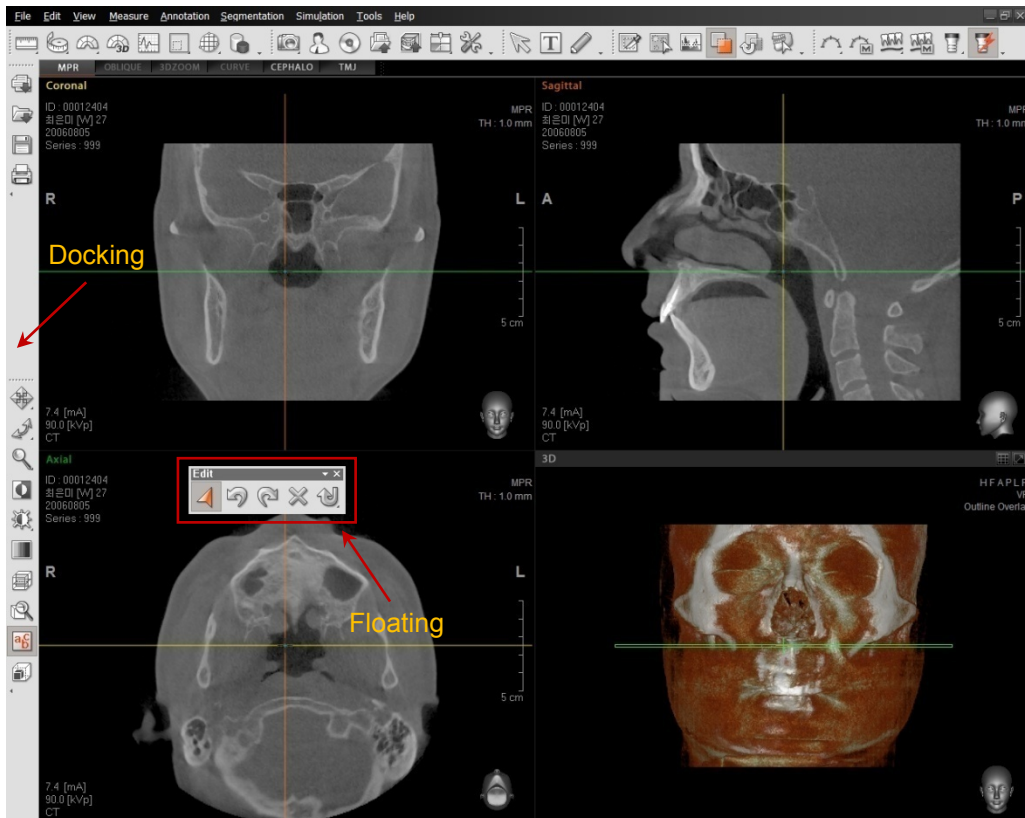
Ez3D plus initially launches in full screen mode. The screen configuration and operation are the same as Microsoft Windows. When the menu bar is double-clicked, the screen mode changes from full screen to partial screen mode, which can now be dragged and dropped.

In partial screen mode, you can resize the window by clicking on any side of the window screen and dragging it to expand or contract.



3.3.2 Tool Bar Floating and Docking

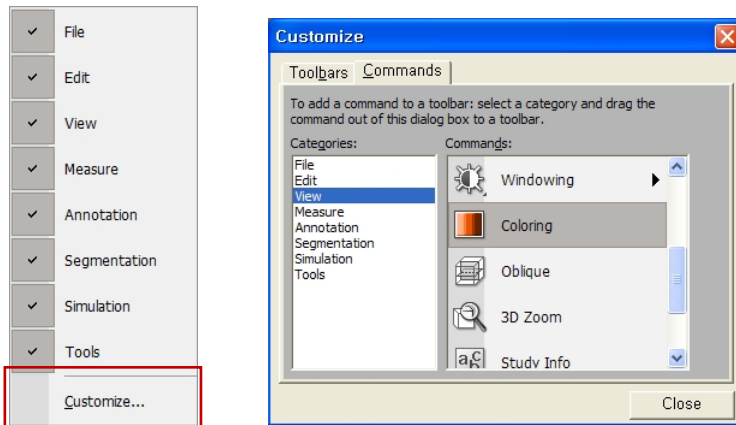
The overall appearance of the tool bar and its customization method is very similar to those used in Microsoft Office. It supports functions like Drag, Float, and Dock. It can be separated into multiple tool bars and those can be added or removed.



3.3.3 Tool Bar Customization

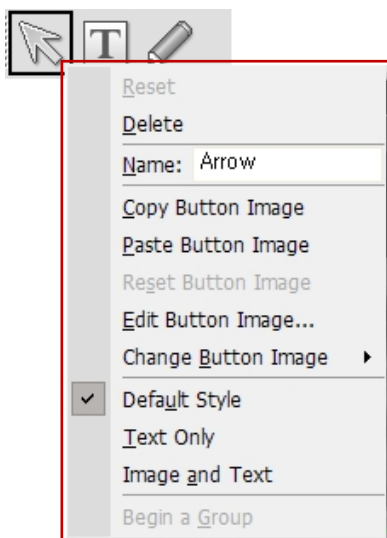
On the any part of toolbar, click the right mouse button to add, delete, or rearrange the buttons of the applicable tool bar.

When you click the **Customize** button, the **Customize** window will appear. You can add tool bar buttons by dragging and dropping the applicable button to the desired location in each tool category.



In addition to this method, any buttons on the tool bar can be quickly moved to where it is to be. To move the button, drag the selected tool button to any location, while holding down the **Alt** key. To remove the button from the tools bar, just click and drag it away— while holding down the **Alt** key— from the tool bar and release the mouse. To show or hide toolbar(s), click **View** → **Toolbar** and check/uncheck the item(s).

The style or image of the toolbar icons can be modified. To modify icons on the toolbar, you have to open first the **Customization** window in the same sequence as the illustration above. Then position the mouse pointer on the icon to be modified and right click and then the sub-menu will appear.

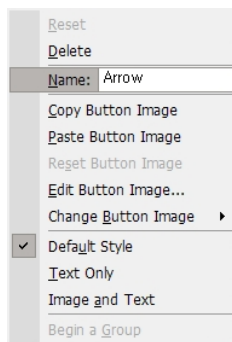


- **Reset:** Restore the modified name and image of the icon to its default.
- **Delete:** Deletes a selected tool bar icon.

Icons can be removed from each group of the toolbars by dragging and dropping them on the screen, while holding down the **Alt** Key.

Restore Icon(s): Click the right mouse button on the docking area. From there check the names of toolbars to be restored.

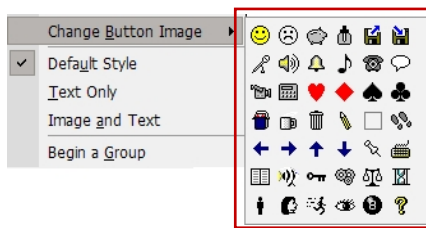
- **Name:** Arrow: Shows the name of a selected tool bar icon. You may change the name of the icon by clicking **Name**. The mouse cursor will flicker, enabling you to modify the name.



- **Copy Button Image:** Copy the selected icon image.
- **Paste Button Image:** Paste another icon image to the selected icon.
- **Reset Button Image:** Restore the modified icon to its default setting.
- **Edit Button Image:** Edit the selected icon image. Click **Edit Button Image**, and the **Button Editor window** will appear. You may change the color, shape, and orientation of the icon.



- **Change Button Image:** Changes the image of the selected icon. When you click the **Change Button Image**, various **button images** will be shown in the sub-menu. Select your preference.



- **Default Style:** Set icon as the default style.
- **Text Only:** Shows only the text name of the icon.



- **Image and Text:** Shows both image and text name of an icon.



3.4 Using the Mouse

The mouse can be used to point, select objects, and often perform tasks much faster than selecting tools from the toolbar.

| Action | Operation |
|---------------------------|-------------------------------|
| Click Left Button | Select an Object |
| Click Right Button | Show a Context Menu |
| Double-click Right Button | Reset Mouse Mode(Select Mode) |

3.4.1 Clicking the Right Button

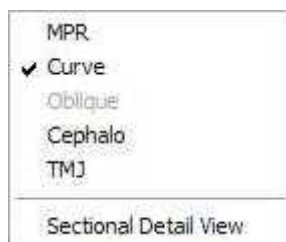
By clicking and dragging the right mouse button in MPR view pane, Windowing will be activated. You can rotate the image by clicking and dragging the right mouse button in 3D or 3D Zoom view. When you click the right mouse button in the MPR view, various optional menus will appear according to the location of the mouse or the view mode.

- **Changing View Mode**

When the right mouse button is clicked in the empty space of a view pane, a menu that changes the view mode will appear, as shown below. Curve view mode is only available when a curve has been drawn.

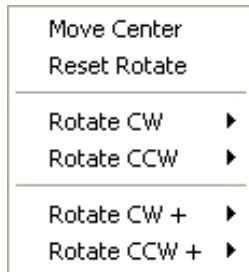


In Curve View Mode, the Sectional Detail View option will appear as well.



- **Moving and Rotating Axis**

When you right-click the mouse in the middle of the axes, you will be able to move the axes to its center position or rotate it to a specific angle either clockwise or counterclockwise.



Move Center: Move the axis to the center of volume.

Reset Rotate: Reset the rotated axes to the initial angle.

Rotate CW: Rotate by a certain angle clockwise. (10~90)

(Rotate with reference to 0 degree that is the initial rotation angle)

Rotate CCW: Rotate by a certain angle counterclockwise. (10~90)

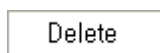
(Rotate counterclockwise starting at 0 degree that is the initial rotation angle)

Rotate CW+: Rotate by a certain angle clockwise based on the current axis rotation angle. (1~10)

Rotate CCW+: Rotate by a certain angle counterclockwise based on the current axis rotation angle. (1~10)

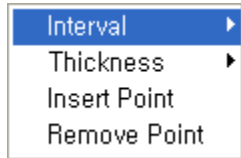
- **Delete Overlays**

When you would like to delete overlays such as Measurements and Annotations, right click on the object to delete the selected overlay.



- **Changing Curve View Option**

In Panoramic Curve Cross-sectional View Mode, right clicking the mouse provides optional menu that will allow you to modify the image slices.













Interval: Modify sectional image slice interval.













Thickness: Modify sectional image's thickness.

Insert Point: Add control point on curve line.

Remove Point: Delete control point on curve line.















3.5 Menu and Tool Bar













| Main Menu | Sub Menu | Icon | Description |
|-------------|--------------|---|--|
| File | DICOM Import |  | Read and import DICOM 3.0 compatible images saved in auxiliary memory device such as Hard Disk |
| | Open Project |  | Open an existing Project |
| | Save Project |  | Save the current Project |
| | Print |  | Output displayed screen through printer |
| | Load Layout | | Load the saved screen configuration and Tool bar Layout |
| | Save Layout | | Save Tool bar Layout |
| | Volume Info | | Shows the information of loaded volume |
| | Exit | | Exit the program |
| Edit | Select |  | Initialize the mouse function |
| | Undo |  | Undo the last action |
| | Redo |  | Redo the last cancelled action |
| | Delete All |  | Delete all added items except images from screen |
| | Reset |  | Reset the image to initial state |
| View | Panning |  | Move the image up/down and left/right |

| Main Menu | Sub Menu | Icon | Description |
|----------------|--------------|---|--|
| | Rotating |  | Rotate the image to the left and right |
| | Zooming |  | Enlarge/Reduce the image |
| | Invert |  | Invert color of the image |
| | Windowing |  | Adjust Windowing of the image |
| | Coloring |  | Adjust Coloring of the image |
| | Oblique |  | Show the cross sectional view of selected image from Image Pane |
| | 3D Zoom |  | Enlarge/Reduce 3D image of selected area |
| | Cephalo | | Shows the reconstructed Cephalometric image |
| | TMJ | | Shows the reconstructed TMJ image |
| | Study Info |  | Shows/Hides a patient's information on the image view screen. |
| | VOI |  | Show the volume information of selected area |
| | Apply Filter |  | Provides three different filtering capability to 2D image: Smooth, Sharpen and Unsharpen |
| | Toolbar | | Reset the Tool bar |
| Measure | Length |  | Measure the length between two points in the image |
| | Tapeline |  | Measure the length between continuous points |

3 Utilization of Basic Functions











3.5 Menu and Tool Bar

| Main Menu | Sub Menu | Icon | Description |
|-------------------|------------|---|---|
| | 2D Angle |  | Measure arbitrary angle in 2D image |
| | 3D Angle |  | Measure arbitrary angle in 3D image |
| | Profile |  | Measure Bone Density between two points in the image |
| | ROI |  | Measure Bone Density of selected area |
| | Area |  | Measure the size of selected area |
| | Volume |  | Show the volume information of selected area |
| Annotation | Arrow |  | Draw an arrow in the image |
| | Note |  | Input memo in the image |
| | Free Draw |  | Perform arbitrary drawing in the image |
| Segment | Polygon |  | Draw arbitrary polygon and partition the image |
| | Opacity |  | Specify Opacity value and partition the image |
| | Threshold |  | Specify Threshold value and partition the image |
| | Apply Mask |  | Apply the performance result of Segmentation to Axial, Sagittal and Coronal Image |
| | Reset Mask |  | Cancel all result of Segmentation |

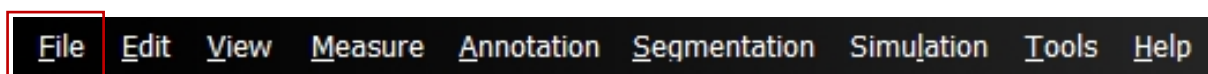
| Main Menu | Sub Menu | Icon | Description |
|------------|-------------------------|---|--|
| | Maxillary /Mandible |  | Automatically separates the Maxillary and Mandible areas of the 3D image |
| Simulation | Manual Curve |  | Draw curve and show Panorama View |
| | Auto Curve |  | Create curve automatically |
| | Curve Manager |  | Save and Manage the curve drawn |
| | Draw Canal |  | Draw canal |
| | Draw Auto Canal |  | Automatically draws the canal path |
| | Canal Manager |  | Save and Manage curves drawn |
| | Insert Implant |  | Insert single implant |
| | Multiple Insert |  | Insert Implant multiple times |
| | Implant Manager |  | Save and manage implant inserted |
| | Implant Library |  | Manage Implant list |
| | Bone Density |  | Show Bone Density Graph focused on placed Implant |
| | Import CAD/CAM Data | | Imports the CAD/CAM data into image |
| | CAD/CAM Data Manager... | | Manages the CAD/CAM data imported to image |

3 Utilization of Basic Functions

3.5 Menu and Tool Bar

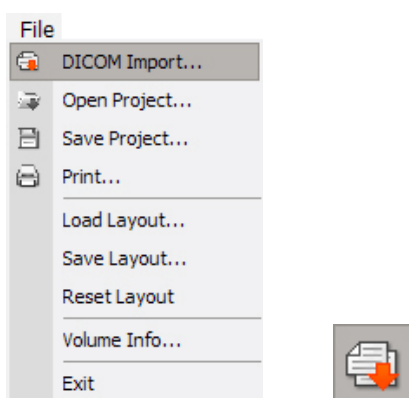
| Main Menu | Sub Menu | Icon | Description |
|--------------|------------------------------------|---|--|
| | Collision Detection |  | Detects collision between implants or between implants and canal |
| Tools | Capture |  | Save Image Pane/Whole Image as image file |
| | Counsel |  | Prepare a report on simple image analysis and treatment planning |
| | CD/DVD Burning |  | Save current image/case to CD/DVD |
| | Memory Export |  | Export the patient's data using CD, etc. |
| | Export: Reformatted Volume |  | Export the volume reformatted. |
| | 3 rd Party SW: Simplant | | Enables Ez3D plus to communicate with Simplant. |
| | STL Export |  | STL Export function enables the Volume data, which makes up the 3D image, to form a Mesh data (STL file) that can be uploaded to other 3D Viewers. |
| | Panorama Import |  | Import a panoramic image from EasyDent |
| | Fine Tuning |  | Adjust Opacity for 3D image observation |
| | Knowledge Info | | Enables the users to search for information about implant placements |
| | Setting |  | Manage various kinds of settings for the program |
| Help | Contents | | Show the Program Help |
| | About | | Show the System information |

4 File Management

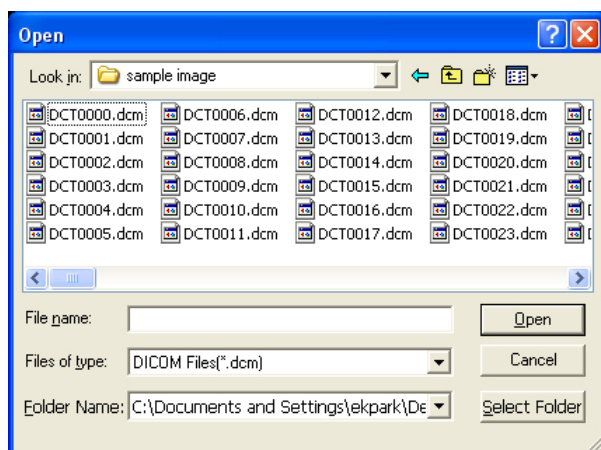


4.1 DICOM Import

Ez3D plus has the ability to import **DICOM** files.



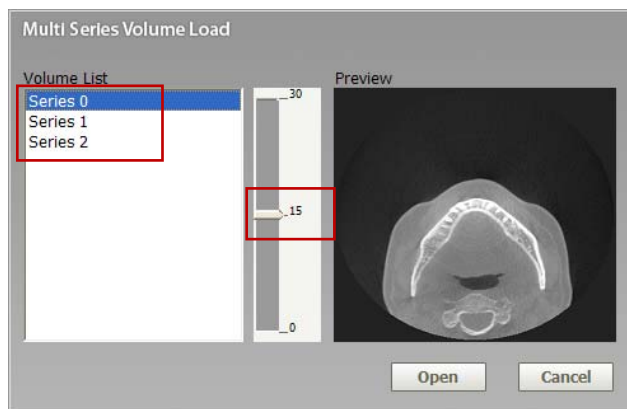
Click **File** → **DICOM Import** on the menu bar or click the **Import** button from the tool bar.



As shown above, when the **Open** dialog box appears, select the desired DICOM image to import and click **Open**. To load all images within a folder, click the **Select Folder** button. When you select a **Multi Series DICOM file**, the **Multi Series Volume Load window** will pop up as shown below.


4 File Management

4.1 DICOM Import



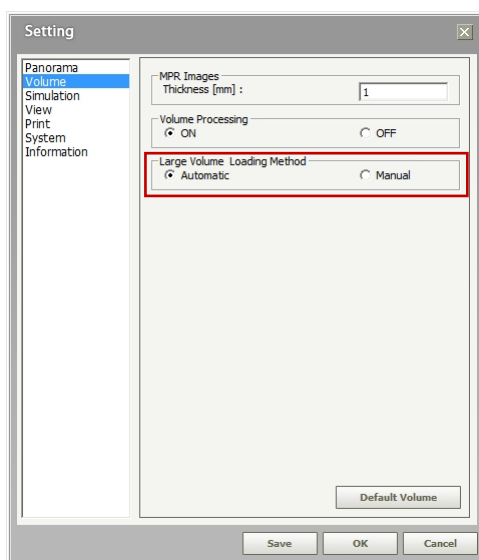
The **Series Numbers** of the **Volume List** will be displayed. The numbers displayed on the scroll bar signifies the number of slices of a selected series. You can view any of the slice images of the selected series on the **Preview** pane by using the scroll bar.

Click the **Open** button after selecting a **Series**, and then the image will be displayed on the main screen.

| | |
|---|--|
|  <p>NOTE</p> | <p>When an image is on display on the main screen, you may click 'File' → 'DICOM Import' in order for the Multi Series Volume Load window to pop up. You may open an image by selecting the 'Series No.' → 'Open' on the Volume List.</p> <p>If you want to import the whole DICOM file (not just the Multi Series), click the 'Cancel' button and then click 'File' → 'DICOM Import'.</p> |
|---|--|

4.1.1 Opening a large image file

When the volume of a CT image is too large, the program may fail to load it, due to insufficient memory. In Ez3D plus, the mass volume data can be loaded using the following method: On the menu bar, click **Tools** → **Setting**. The **Setting** window will appear. Select the Volume category. The default set-up will be displayed.



Loading after automatic adjustment of volume size

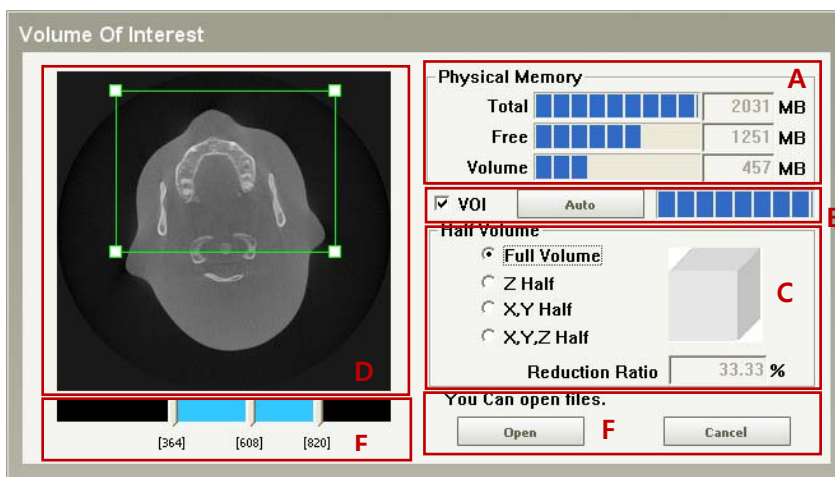
When loading a large data is performed automatically, a process of memory calculation is performed in the following sequences.

- A. When the size of file to be loaded is less than 80 % of the currently usable memory from the calculation of the total volume and memory usage after loading, load the entire original image volume.
- B. When the file size is bigger than 80% of A, apply one step reduction —reduce the image size of Z axis by half. Then, when the data to be loaded is within the level of 80% of the remaining memory, load the reduced image of half the size of z axis. For example, load 50 DCM (Data Collection Manager) from among the 100 DCM.
- C. When it is more than 80% at B, apply two level reduction algorithm— reduce the images of X and Y axes by half. When it is within the level of 80% of the remaining memory after this application, load the reduced image of half the size of x and y axes respectively (1/4 of the original image).

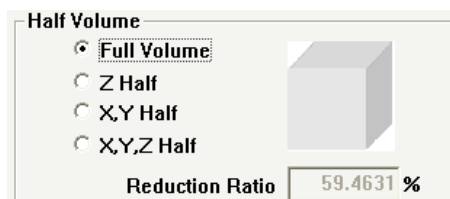
- D. When it is more than 80% at C, apply three level reduction algorithms (all of X, Y and Z axes are to be reduced by half, respectively). When it is within the level of 80% of the remaining memory after this application, load the reduced image of 1/2 of x, y, and z axes respectively, which is equivalent to one-eighth of the original image size.
- E. When D fails, a message saying that the image is unloadable will appear.

Loading after manual adjustment of volume size

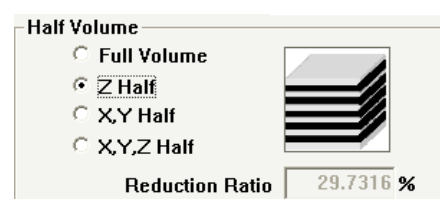
When the memory space is not sufficient enough to load the file in the mode of manual setting, the following **Volume of Interest** window will appear.



- A. Indicates the total memory capacity of the current system and its free memory, as well as the memory space required for volume loading.
- B. When checking VOI, you can specify the area to be loaded by using the mouse in the image area described in D.
- C. The **Auto** button will automatically find the ROI of the head Image minus the aerial part of the volume. Speed may decrease depending on the size of the image.
- D. Manual setting for volume reduction.



Selection of the full volume of image



Data reduction by half along the Z axis



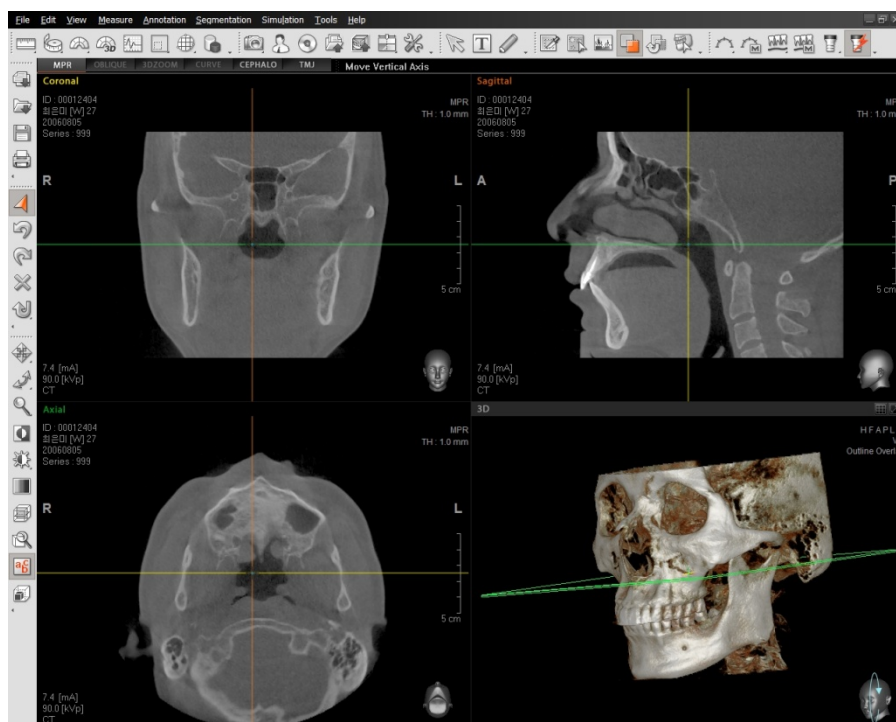
Reduction by half along X and Y axes



Reduction by half along X, Y, and Z axes, respectively

- E. The slider bar at the bottom indicates the number of total images to be loaded. The first slider thumb represents the number of the first image, while the last one does the last image slice, when the images are loaded. Using two slider thumbs, it is possible to specify the range of images to load from the total images. The slider thumb in the middle shows the image of the applicable location in order to confirm whether VOI is correctly set. When moving the slider, the axial image of applicable location will be displayed.
- F. The **Open** button will be activated if the memory usage volume satisfies the mass data loading conditions (within 80 % of the free memory).

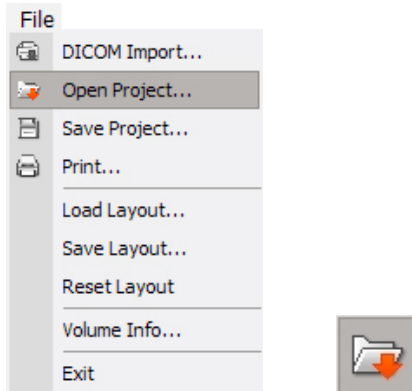
Click the **Cancel** button to cancel the image loading process.



The picture above shows the rendered result from loading the images of the applicable area when VOI is set and **Open** button is activated.

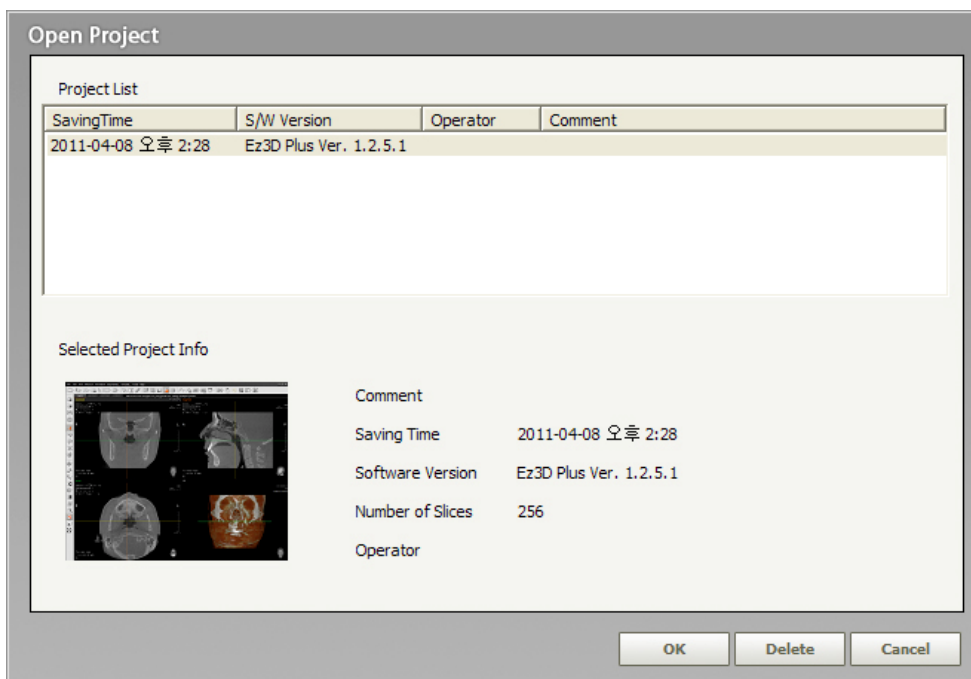
4.2 Open Project

The method of opening a saved project is described below.



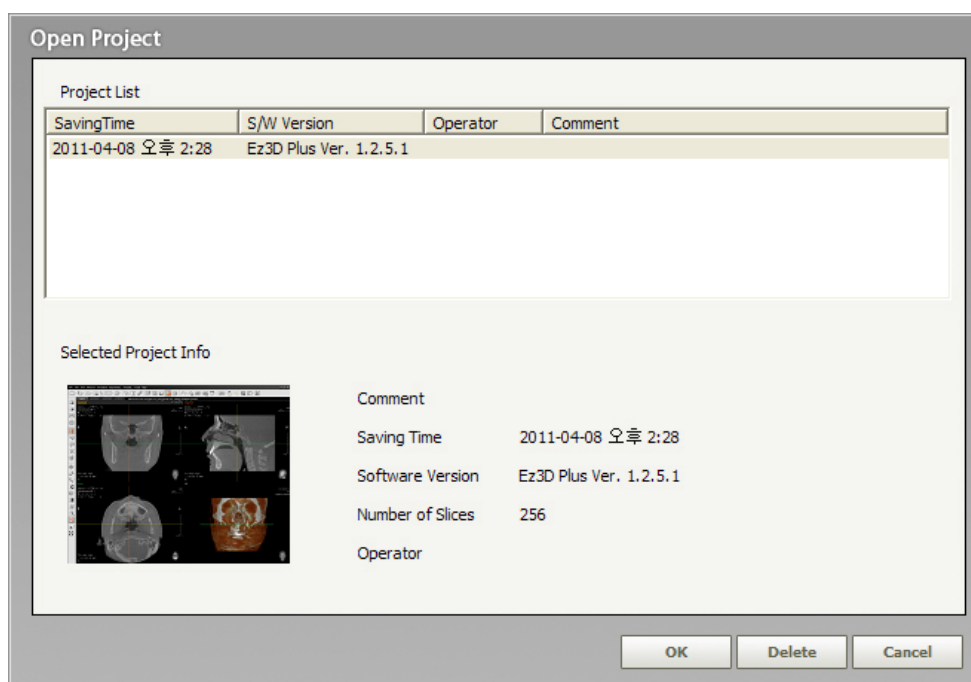
Click **File** → **Open Project** on the menu bar or click **Open Project** from the tool bar.

When you click a project from the **Project List** in the Open **Project dialog** box, you can see a screenshot and summarized information of the project. Select the project then click **OK** button.



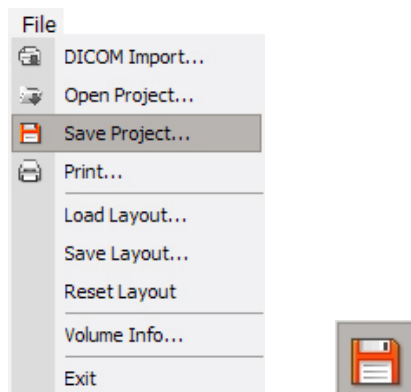
4.2.1 Automatic Recovery of Project

When **Ez3D plus** program is in use, it performs automatic data back up periodically. In case the program abnormally shuts down and is re-executed, an **Open Project** window will appear to ask whether to recover the previous work. Click **OK** to recover the previous project or click **Cancel** to start a new project.

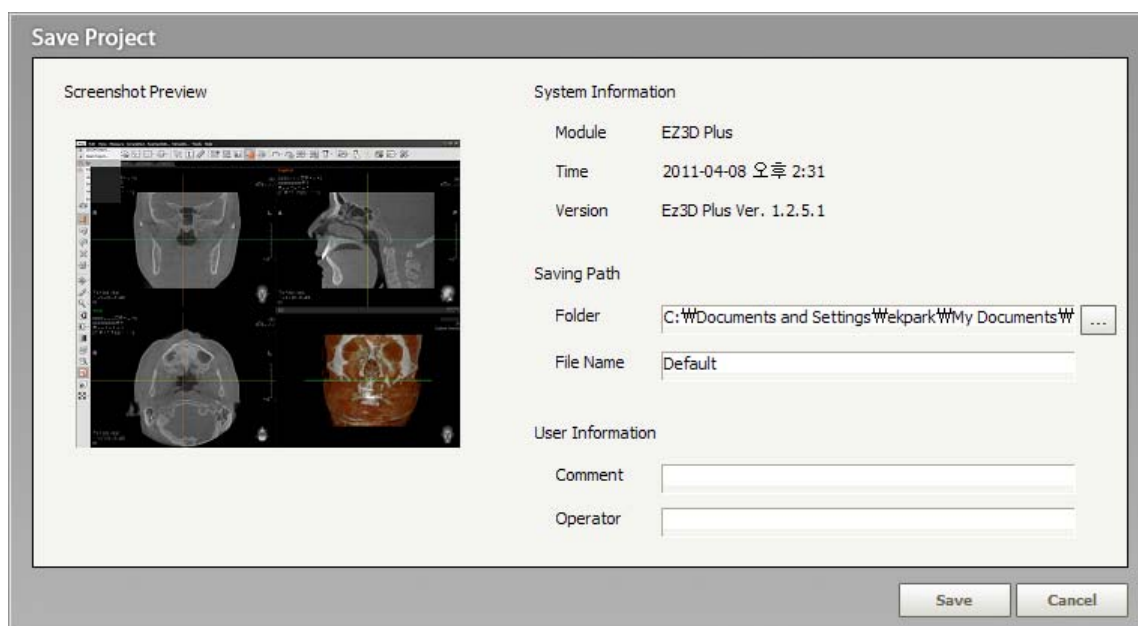


4.3 Save Project

The process of saving projects is described below.



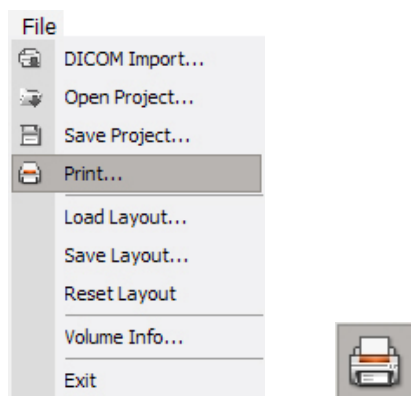
On the Menu bar Click **File** → **Save Project**, or click **Save Project** from the tool bar.



When the **Save Project** dialog box appears, choose a path and file name for the project. Input **Comment** and **Operator** under **User Information** and click the **OK** button to save.

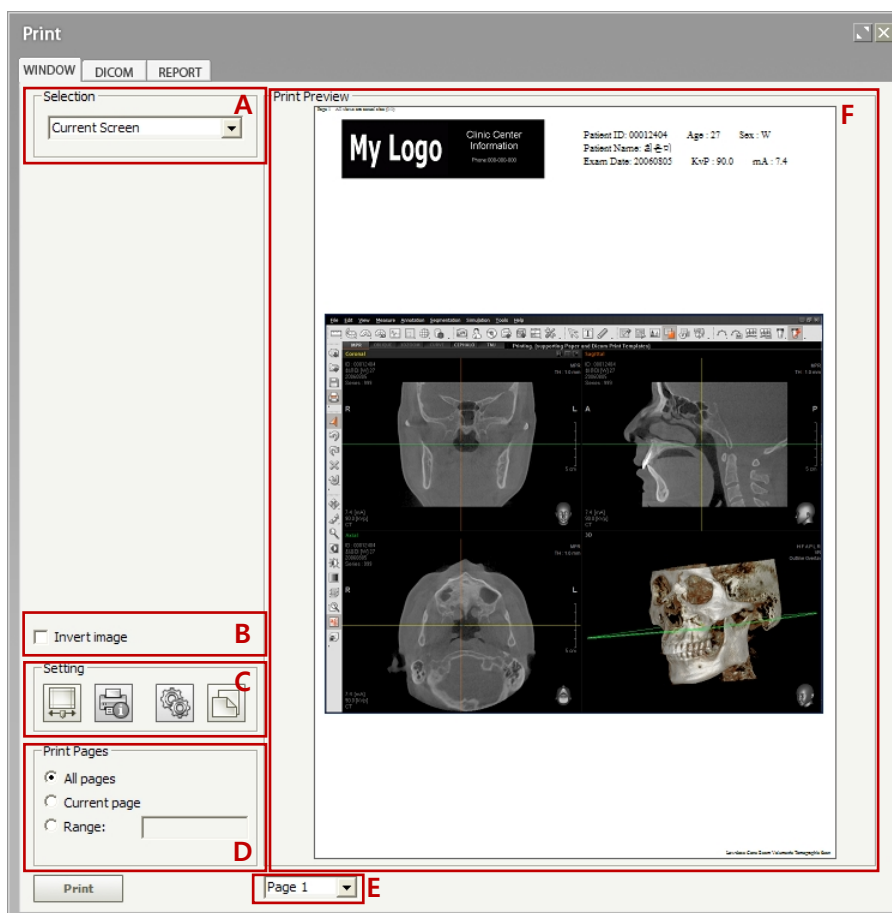
4.4 Print



Ez3D plus supports three different printing modes, which are Window Mode, DICOM Mode, and Report Mode. Window and DICOM Modes create print forms automatically, while Report Mode is customizable by the user. Output is the actual size set at 1:1.



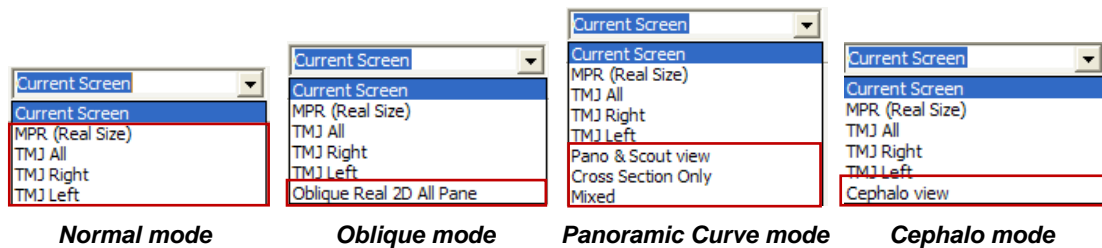
Click **File** → **Print** on the menu bar or click the **Print** button on the tool bar.

4.4.1 Window Print



As shown above, a print window will appear. To maximize the print preview window, click the  button. if the  button is clicked, it returns to the previous preview window.

A. **Selection:** Print menu changes according to the view mode created in **Ez3D plus**.



- **Current Screen** : Prints full screen of current view
- **MPR (Real Size)**: Prints the MPR image in actual size after the form is created automatically.
- **TMJ All View**: Prints all images of the TMJ View mode.
- **TMJ Right View**: Prints the **Right AP** and **Right Let-Med** images, as well as the **Axial** image of the TMJ View mode.
- **TMJ Left View**: Prints the **Left AP** and **Left Let-Med** images, as well as the **Axial** image of the TMJ View mode.
- **Oblique Real 2D All Pane**: Prints 2-D Oblique images in actual size and in an automatically created form. It is created when selected by sequence of **View** → **Oblique** on the menu bar.
- **Pano & Scout view**: Prints image of Axial (or Sagittal, Coronal) along with Panoramic view in original size and in an automatically created form. This print function is only available when a Panoramic Curve has been created. It applies data of up to the last slice of the Panoramic curve.
- **Cross Section Only**: Prints only the 2-D Cross-Sectional sliced Images of a Panoramic curve in original size and in an automatically created form. This print function is only available when a Panoramic Curve has been created. It applies data of up to the last slice of the Panoramic curve.
- **Mixed**: Prints 2-D images of the Panoramic Curve, Panoramic Image, and Cross-sectional sliced images in one. This print function is only available when a Panoramic Curve has been created. It applies data of up to the last slice of the Panoramic Curve.

- **Cephalo View:** Prints Cephalometric image in original size and in an automatically created form. The Cephalometric image is reconstructed when you click **View** → **Cephalo** on the menu bar.

B. **Invert Image:** When this box is checked, only the image will be inverted.

C. Print Setting



- **Calibration:** In case of incorrect scales on the image print out, this function enables the user to calibrate them to correct a scale with a test page.

To use this feature, print out a calibration test page by clicking the **Test Page Print** button in the **Calibration** window. The vertical and horizontal axes with the metric scales of 1mm are printed on that test page. These metric scales may be incorrect, which means they don't reflect the real length. To measure and adjust them, the real ruler is required.

You should get one mark on which both ruler and test scale coincides *exactly*. At this time, read carefully these scales on both sides: *test paper* and *ruler*

In the **Reference** fields, enter the scale on the test page. In the **Real** fields, enter the scale on the ruler. Both numbers should be in the millimeter unit. And these procedures are to be carried out vertically and horizontally

Then click the **OK** button and the calibration will be performed automatically.

Calibration

A Test page for calibration will be printed out from your printer. Horizontal and vertical boxes having 10mm x 10mm size are shown on the page. Please measure actual length of some boxes on the printed page and compute the corresponding reference length all

| | Reference | / | Real |
|--------------|-----------|---|------|
| Horizontal : | 0 | / | 0 |
| Vertical : | 0 | / | 0 |

Test page print OK Cancel



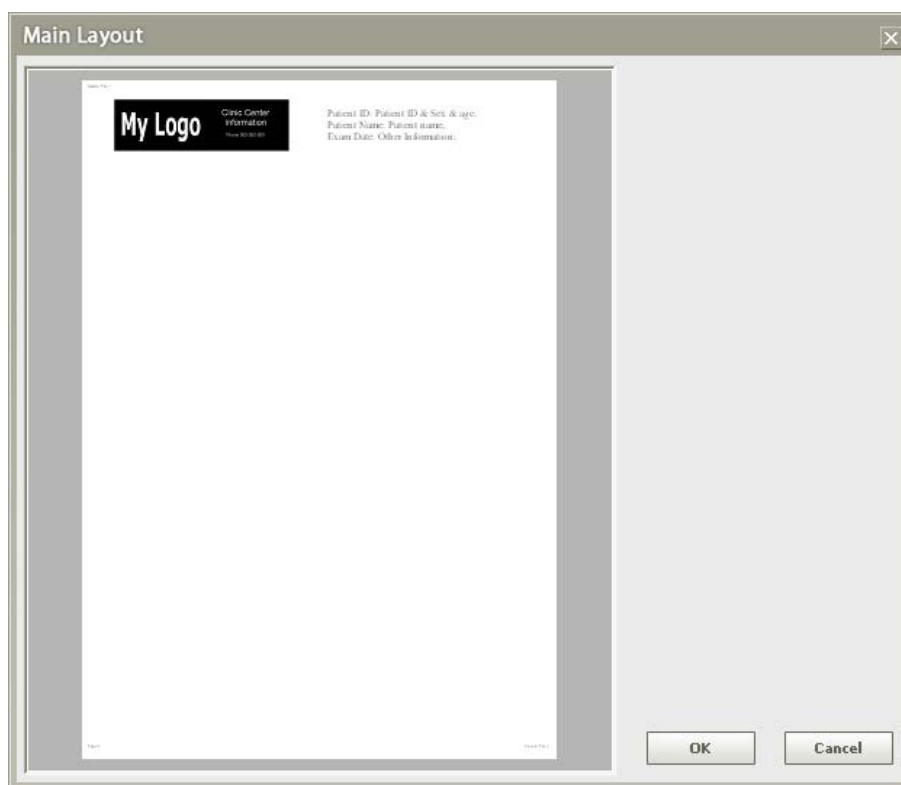
- **Print info:** Input the user information, clinic, doctor-in-charge, and header and footer information for printing.



- **Print Setup:** Modify printing paper and direction. After selecting **OK**, the form will be initialized. In case of Windows, only printers with their windows drivers installed and registered will be shown.



- **Page Setup** : Basic print layout form



When you click **Tools** → **Settings** → **Print**, you can verify the Print Setting window.

You can change the clinic/hospital logo by clicking the **Layout** button on the **Paper** print provision. For more details, refer to the <Clinic/Hospital Information and Patient Information> in section **4.4.3. Report Print**.

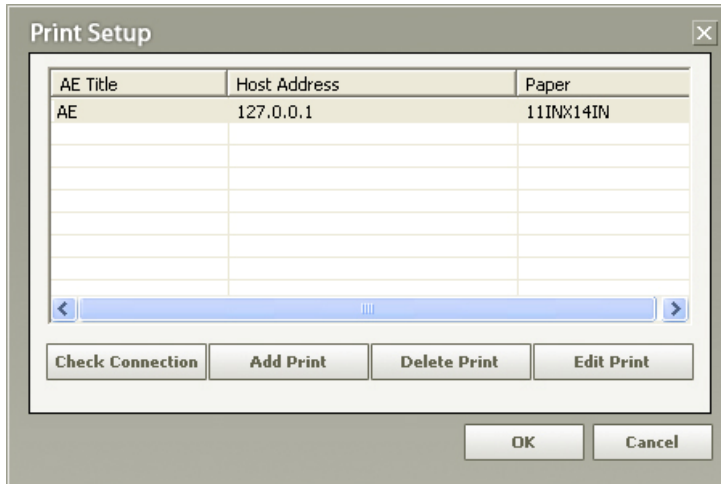
You cannot make changes the patient's information in **Window Print and DICOM Print** provisions.

- D. **Print Pages**: You can set the print as All pages, Current page, or Range to be printed.
- E. **Page**: It shows the pages that can be viewed on the Print Preview.
- F. **Print Preview**: User can preview the print set-up before printing.

4.4.2 DICOM Print

The method for DICOM Printing is similar to printing within Windows, except for the set-up.

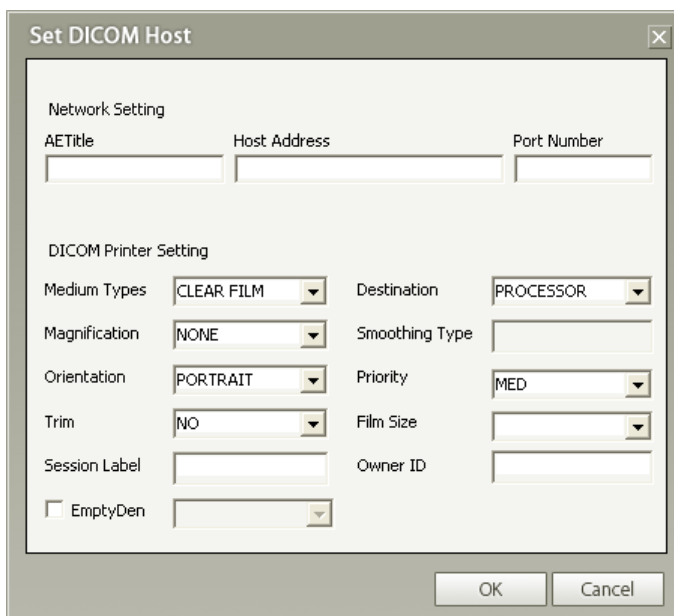
When using DICOM print, a DICOM printer should be installed.



You can verify the status of the DICOM print connection by clicking the **Check Connection** button.

<Adding DICOM Printer>

In order to add DICOM Printer, click **Add Printer**. Input the AETitle(Application Entity Title) of the DICOM printer, as well as printer port and IP address.



***AETitle** : Application Entity Title for the DICOM printer

An explanation for each field in the '**Set DICOM Host**' window is provided below.

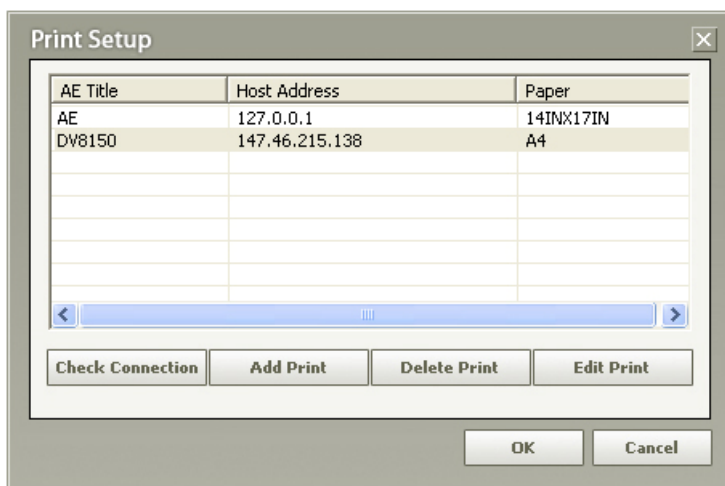
| | |
|-----------------------|--|
| Host Address | IP address or Host Name |
| Medium Types | Media to be printed (Clear Film, Paper, Blue Film) |
| Destination | Magazine, Processor |
| Magnification | Indicates Interpolation type. None, Replicate, Bilinear, Cubic |
| Smoothing Type | Available only when Magnification is Cubic |
| Orientation | Set print orientation to either Portrait or Landscape. |
| Priority | Print Priority, High, Med, Low |
| Trim | Trim box, Yes, No |
| Film Size | 8INX10IN, 8_5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 14INX17IN, 24CMX24CM, 24CMX30CM, A4, A3 |
| Session Label | Label for a particular film. |
| Owner ID | Identification Number of Patient |
| EmptyDen | Density outside image box, Black, White |



When the DICOM printer is used for various sizes of film, it is strongly recommended that the size be registered individually to keep its own information about compensated length which otherwise is reset when film size changes.

<DICOM Output Set-up>

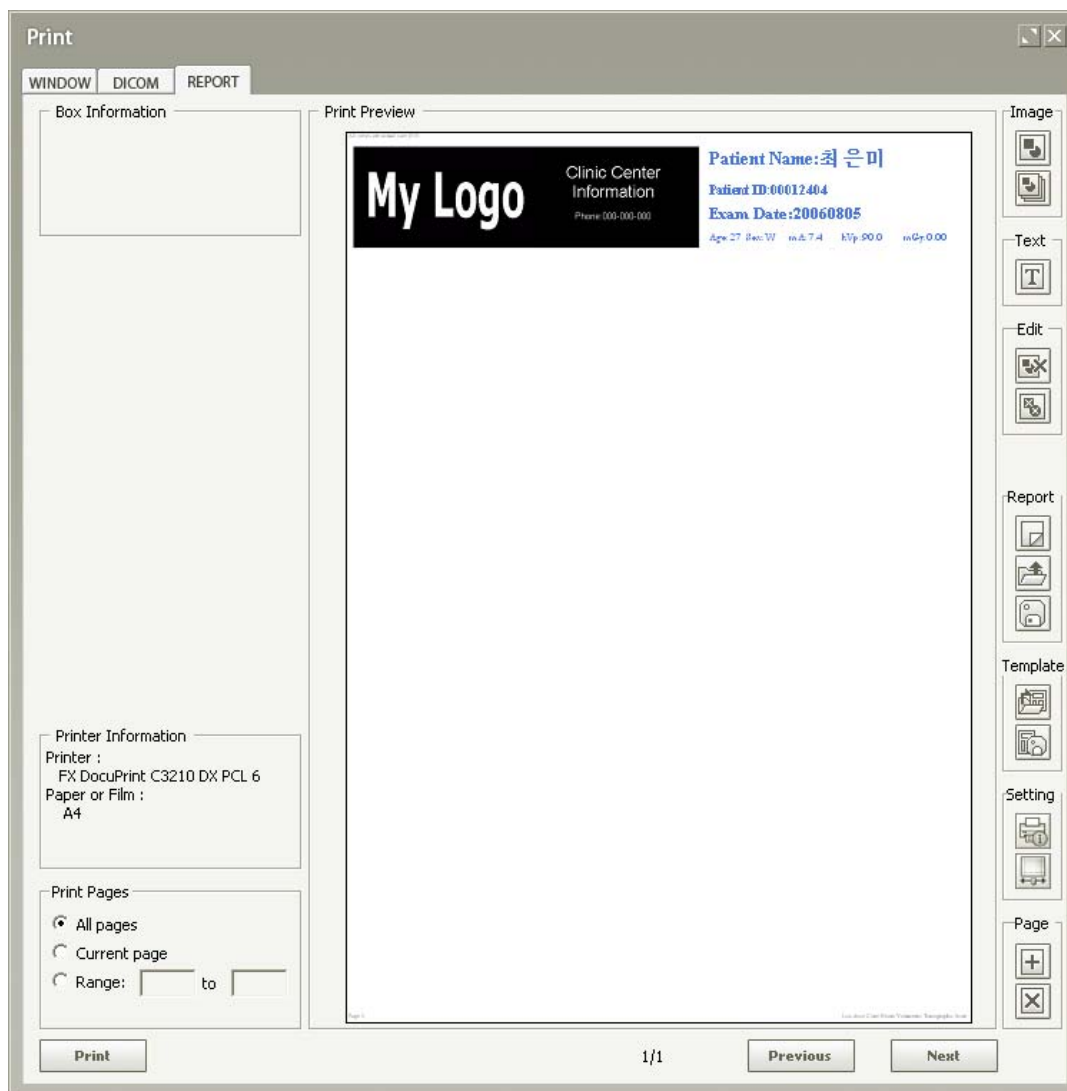
After selecting the DICOM tab and clicking **Print Setup**, the following **Print Setup** dialog box will appear. If a DICOM printer is available, select the applicable remote SCP as shown in the figure below and click the **OK** button.



4.4.3 Report print

Report Print allows the user to write a report on simple image analysis and treatment plan. In the report, users can arrange the images based on their preference.


To use Report Print, the analyzed image in **Ez3D plus** needs to be captured then it should be loaded on the report. After which, the images within the report may be rearranged to the user's preferences.

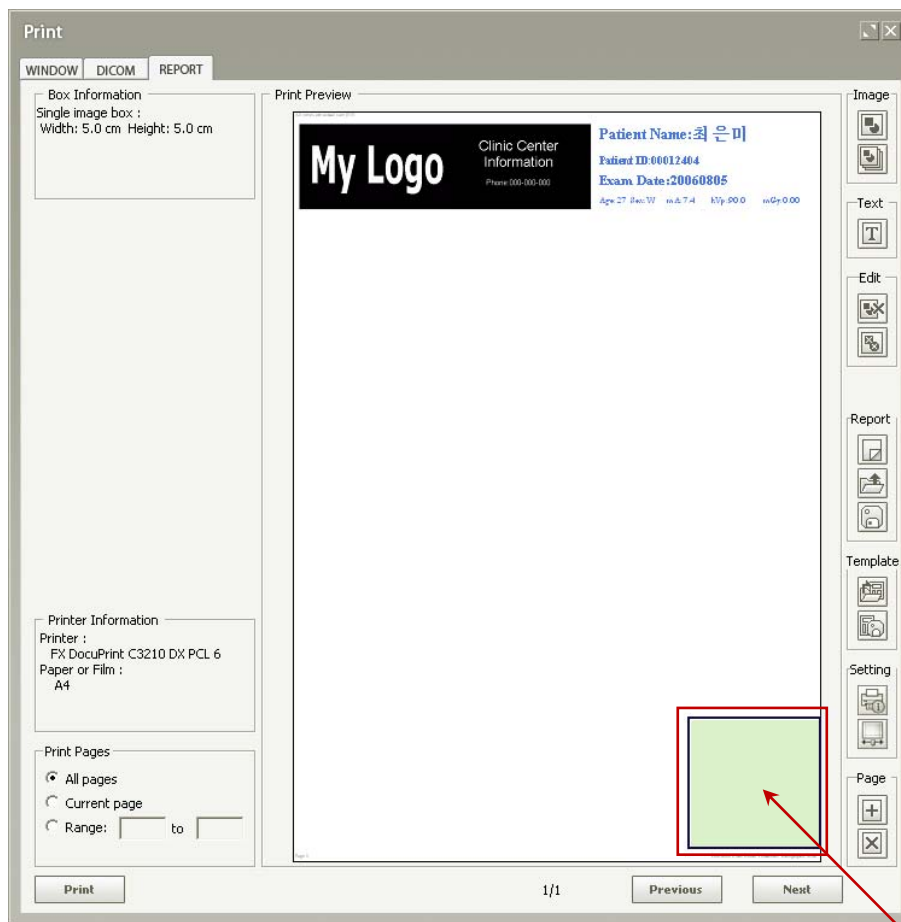


For the Report, you must select the printer and paper setting first to ensure that the report will be printed properly. Print Preview will automatically acquire and arrange captured images from **Ez3D plus**.

User can also click  or  button to create image boxes and text layers.

<Single Image Acquisition>

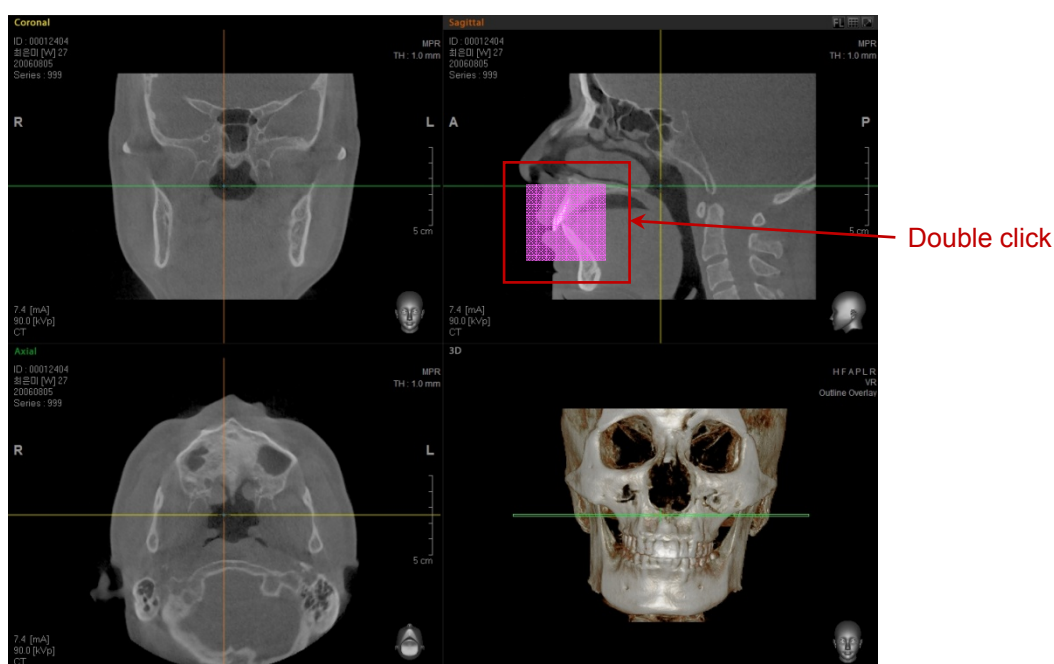
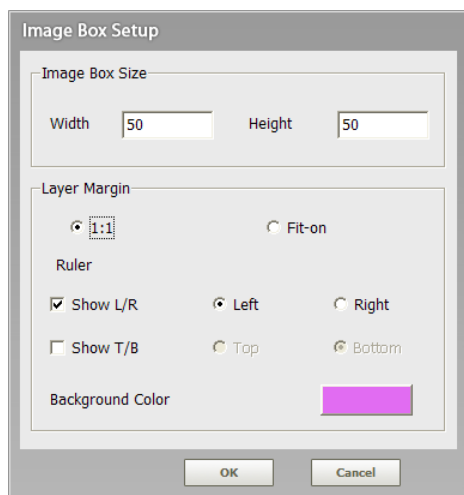
Click this new image box  button and one image box will be created in Print Preview, as shown below. You can click and drag this image box within the print preview window using the mouse. You can also click and drag any of the rectangular edges of the image box frame to change its size. Once you have placed the image box on your preferred location within the Print Preview, you may also double-click the box in order to minimize the print preview window and take you back to the **Ez3D plus** screen where you will see the mouse cursor hovering over an image with its corresponding selection box.



Double click

You can open the **Setup** menu by clicking the right mouse button within the image box created. If you click **Setup**, the Image Box Setup window will appear as shown below. You can set the image box size, ruler's location, and background color.

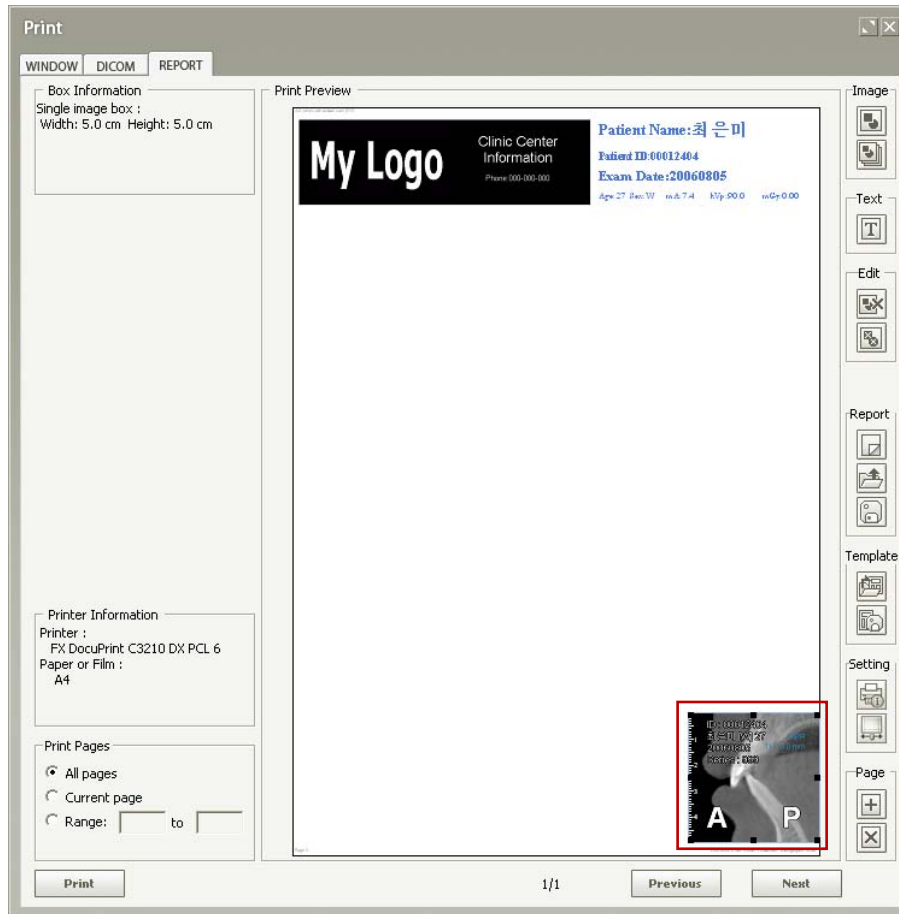
Select **1:1** if you want to print the image in actual size. Otherwise, select **Fit-on** if you want to adjust the image size before printing the image. The ruler is not displayed when you select Fit-on.




This box will move along with the mouse cursor. When you double-click the box, the area covered by it will be captured and placed in the report. A captured image box in the print preview window can be moved but cannot be modified.

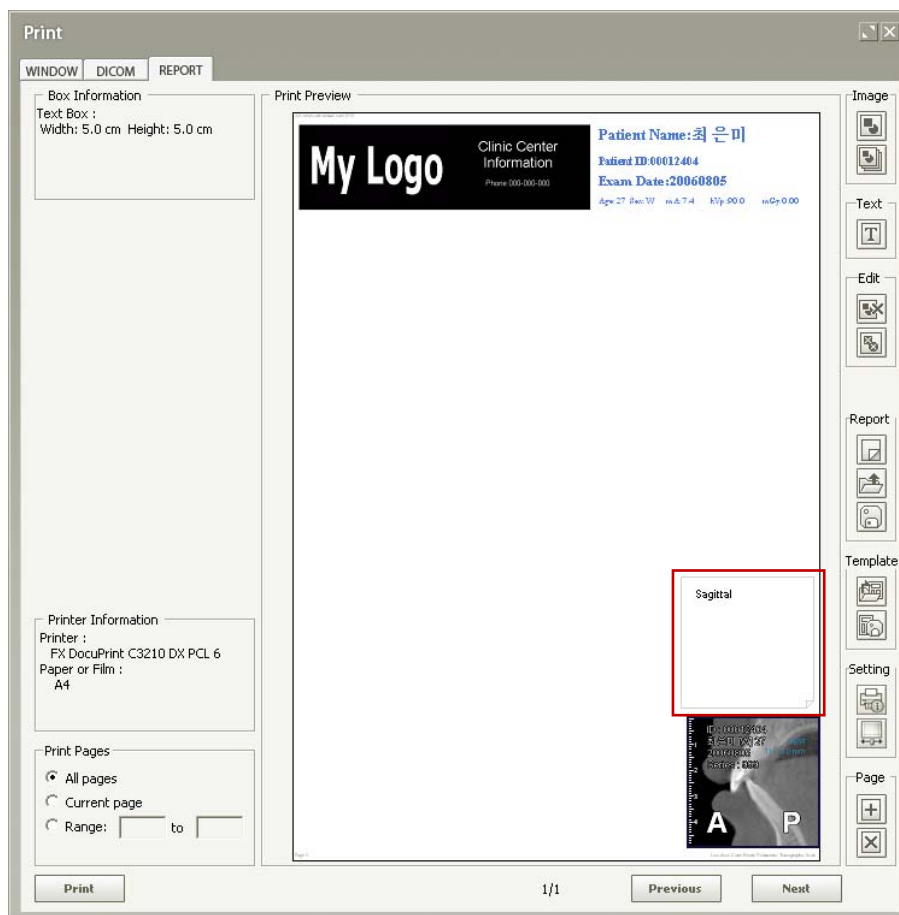
4 File Management

4.4 Print

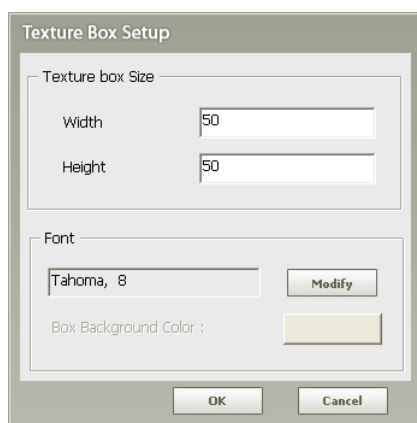


<Text Insert>

When you click the  button, a box to insert text will appear in the preview window. Adjust the size and specify the location, then click the text box and input text information.




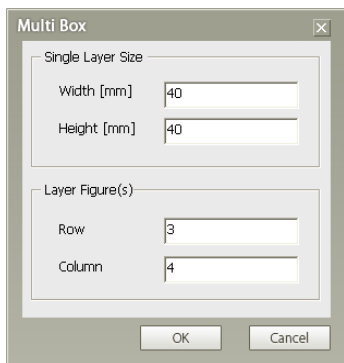
You can open the **Setup** menu by clicking the right mouse button within the text box. If you click **Setup**, the **Text Box Setup** window will appear as shown below.



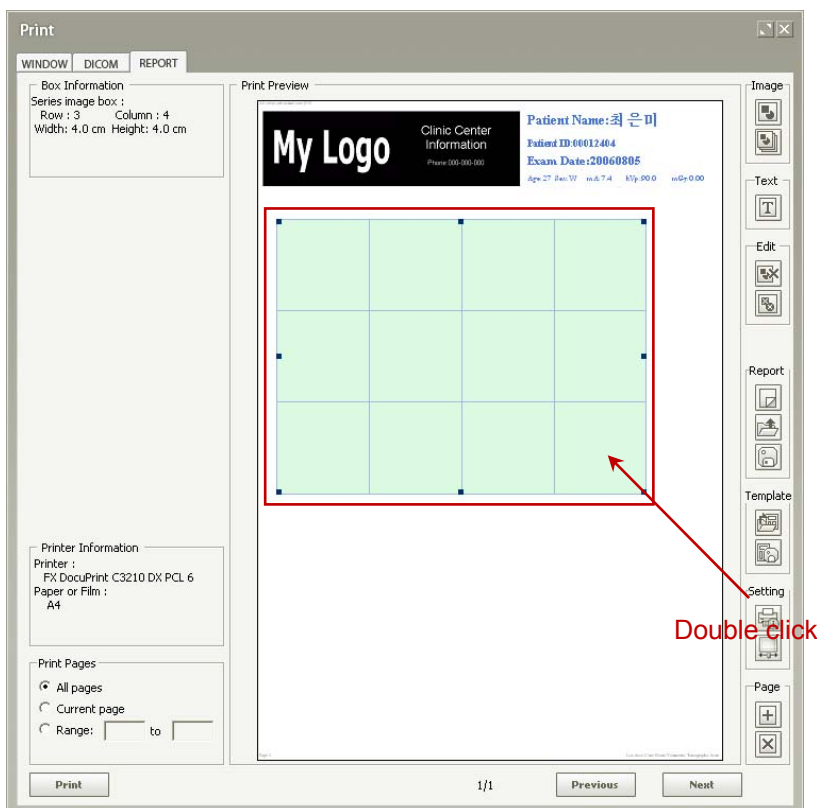
The box size, font size and color of text can be modified.

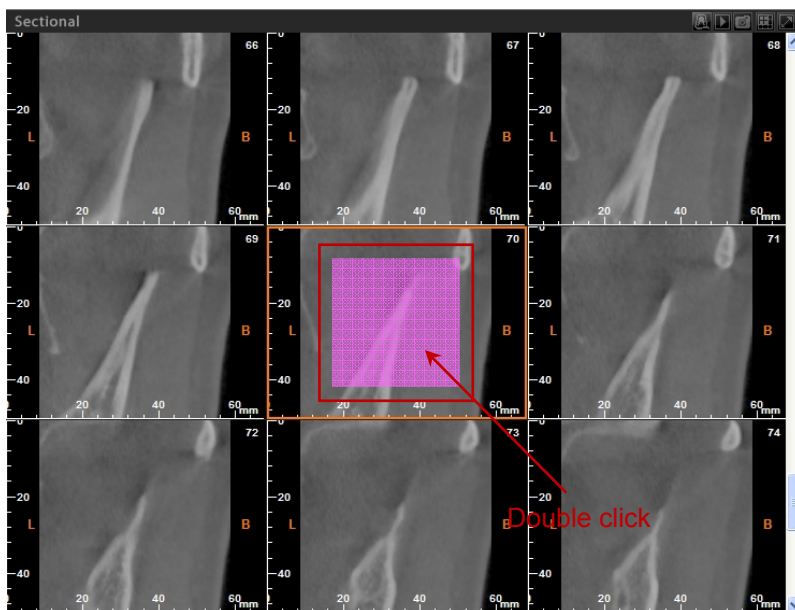
<Consecutive Image Insert>

When you click the new series image box  button, a window to specify the number of image boxes to be created in a group will open. Upon entering the width and height and the number of rows and columns in the corresponding fields, click **OK** and the image boxes will be created in the Report Print preview window.

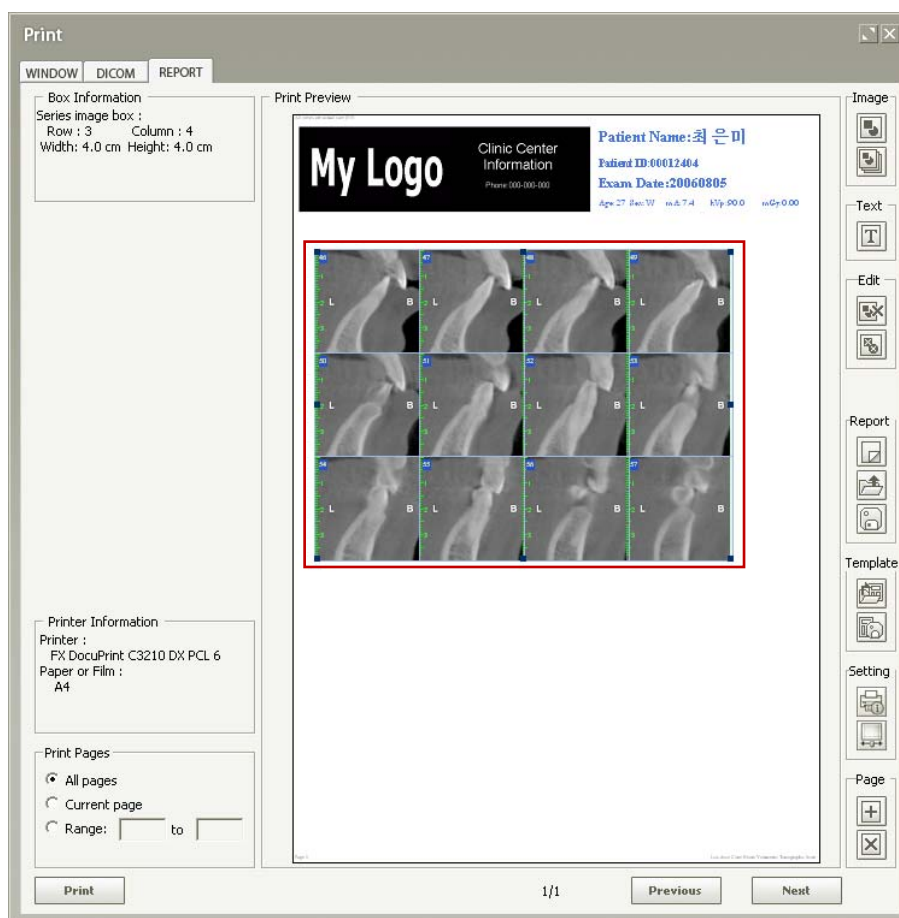


For example, the above parameters would create 12 image boxes with each 4cmx4cm in size. Double-click the Multi Layer box and the report window will be minimized. An image capturing box will appear along with the mouse cursor in view area.





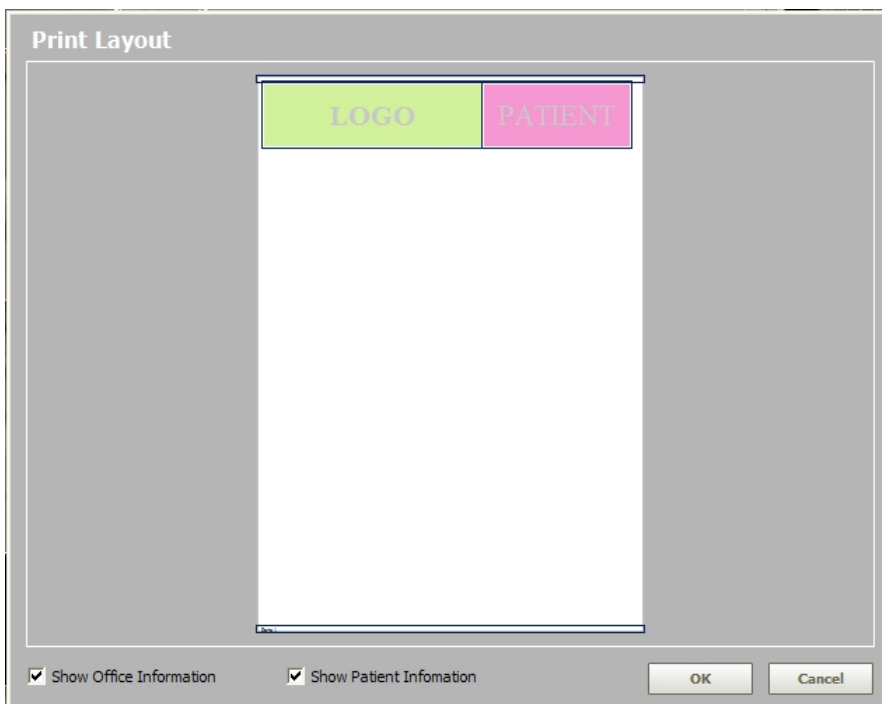
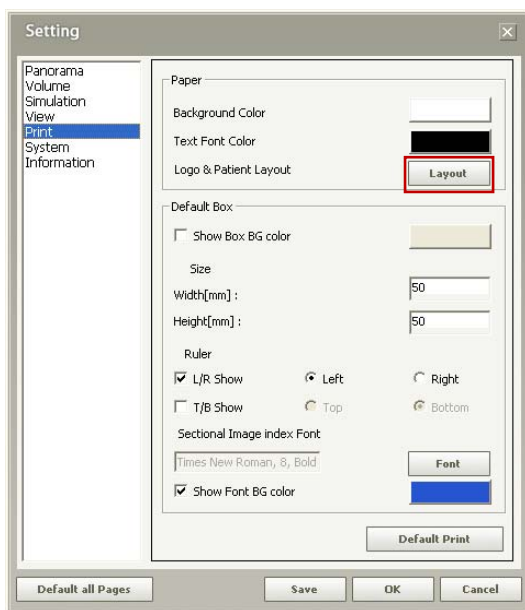
This box will move along with the mouse pointer. When you double-click the box, the area covered by it will be captured and placed in the report. Although the captured images in the multi-box of the print preview window can be moved in a group, their sizes cannot be modified.



<Setting the Clinic/Hospital and Patient Information>

You can set the clinic/hospital, patient information and font size, etc.









To do those, click **Tools** → **Setting** → **Print** → **Layout** to open the Print Layout, as shown in the following figure. You can modify the clinic/hospital and patient information by double-clicking the **LOGO** and the **PATIENT**, respectively.



You can change the individual box size, where the clinic/hospital and patient information are to be inserted. If you uncheck the check boxes, their corresponding information will be hidden.

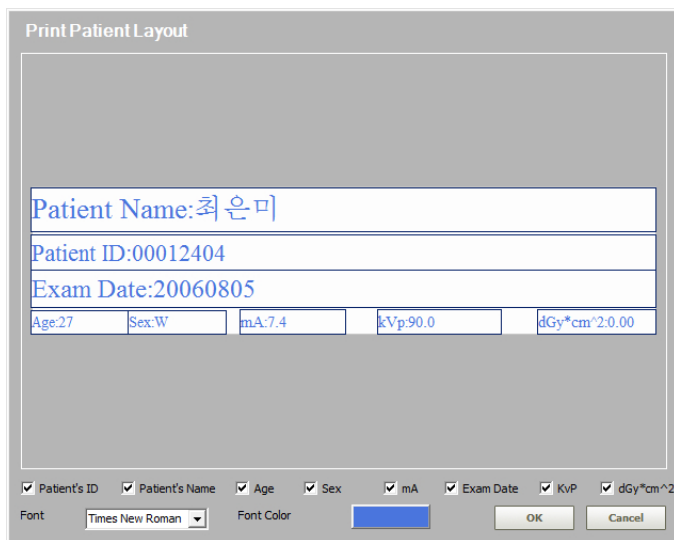
When you double-click the **LOGO** box or the **LOGO** box in the Report window, the editable window will appear. You can upload the image file on the **My Logo** Box at the left, and insert its pertinent information in the **Clinic Center Information** Box on the right. You can change the font size and color, and background color according to your preference.











| Icons | Descriptions |
|---|--|
|  | Background color setting |
|  | Image file upload. Double click the My Logo section in order to upload an image file. |
|  | Erase the loaded Logo image |
|  | Font type setting |
|  | Delete the entered text |
|  | Left alignment |
|  | Center alignment |
|  | Right alignment |







When you double-click the **PATIENT** box in the Print Layout window or the **Patient** box in the Report window, a window as shown below will appear.

You can modify the patient information or the image capturing information. You can set the font type and color of the text. If you uncheck any of the check boxes at the bottom of the window, its corresponding information will disappear in the window.



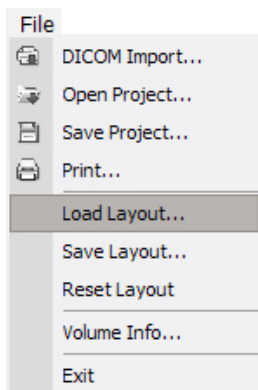
<Button description>

| | | |
|---------------|--|---------------------------------------|
| Image |  New image box | Create a single image box |
| |  New Series image box | Make image boxes in numbers of N x M |
| Text |  New Texture Box | Insert Text Box |
| Edit |  Box Delete | Delete an image box from the template |
| |  Image Clear | Erase an image in the image box |
| Report |  New Report | Create a new report |
| |  Report Load | Open an existing report |
| |  Report Save | Save current report |

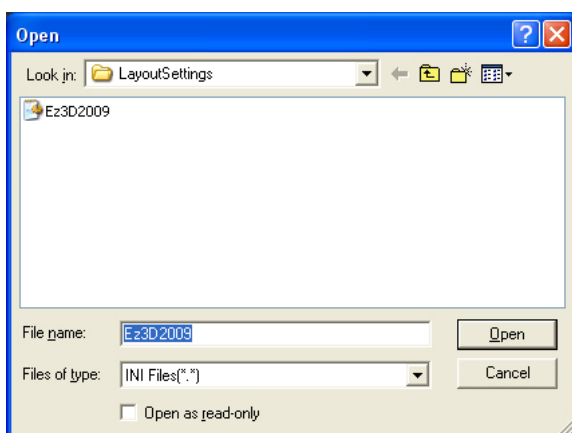
| | | |
|-----------------|---|--|
| Template |  Template Load | Open existing template |
| |  Template Save | Save the current work as template |
| Setting |  Print Information | Input the user information, clinic, doctor-in-charge, header and footer information for printing. For more details, refer to section 4.4.1 Window Print. |
| |  Print Calibration | The program is set to correct the error by printing a test page. For more details, refer to section 4.4.1 Window Print. |
| Page |  Insert Page | Insert page |
| |  Delete Page | Delete page |

4.5 Loading the Layout Template

In **Ez3D plus**, a user have the ability to customize the tool bars. This can be done through the use of **add, edit, or save** buttons on the tool bar. Using this capability, a saved template layout can be reloaded and applied without having to restart the program.

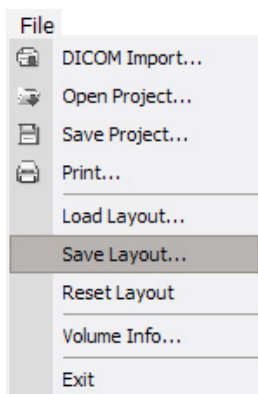


On the menu bar, click **File** → **Load Layout**. When the **Open** dialog box appears, open the **Ez3D 2009.ini** or other name but the same extension **.ini**.

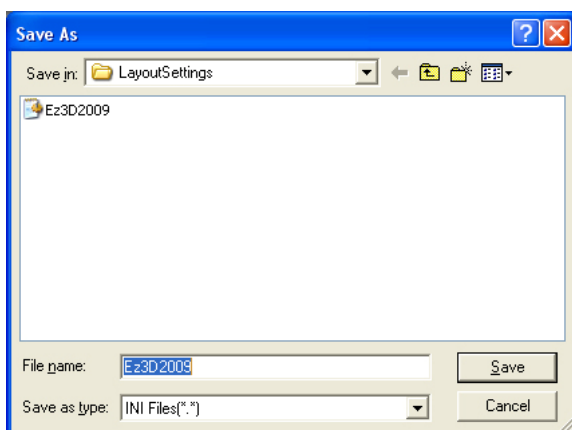


4.6 Saving the Layout Template

When you exit Ez3D plus, the template manager automatically saves the latest arrangement of your tool bar and will load this configuration the next time when the program is executed.

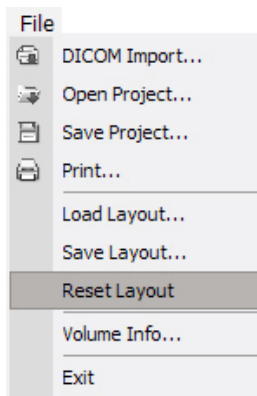


On the menu bar, click **File** → **Save Layout**. When the **Save As** dialog box appears, save the file as **Ez3D2009.ini**.



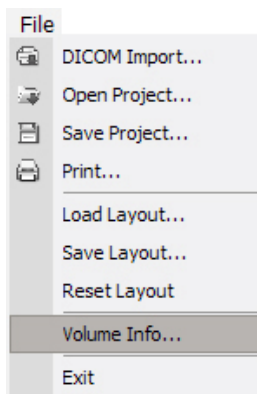
4.7 Reset Layout

When this is clicked, the toolbar of Ez3D plus is reset to an initial state (default) of when it is installed for the first time.

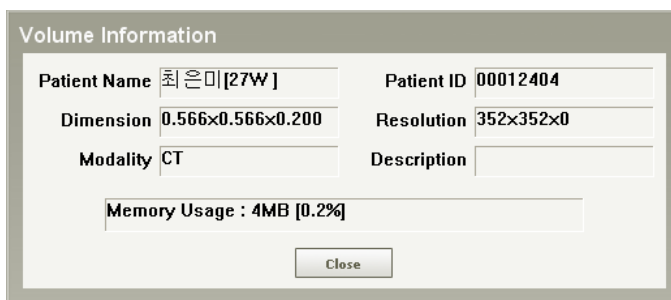


4.8 Volume Information

Volume Info allows you to see the information of the currently loaded volume.



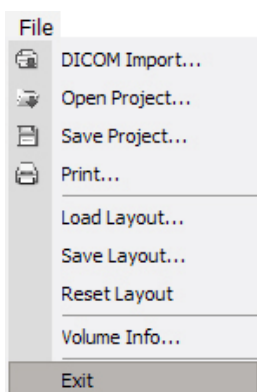
On the menu bar, click **File** → **Volume Info...** Then the **Volume Information** window will be appears.



- Patient Name: Name of the patient
- Patient ID: Identification number of the patient
- Dimension: Per VOXEL size (Width x Length x Height)
- Resolution: Measurement of the dimensions (Width x Length x Height) of the total volume
- Modality: Type of imaging mode used
- Description: Additional explanation
- Memory Usage: Quantity of memory used by the currently loaded volume.

4.9 Exiting Ez3D plus

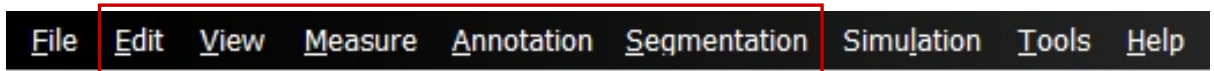
To exit Ez3D plus, follow this process.



On the menu bar, click **File** → **Exit** or click the **X** button on the top right side of the menu bar.

5 Image Processing

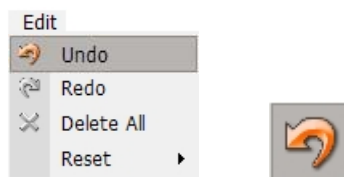
The Image Processing Tools of **Ez3D plus** offer a variety of functions and sub tools. This portion of the manual segregates each function by menu items: **Edit**, **View**, **Measure**, **Annotation**, and **Segmentation**.



5.1 Edit

5.1.1 Undo

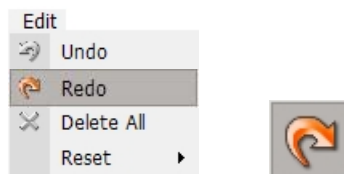
Undo the last action performed.



On the menu bar, click **File** → **Undo** or click **Undo** from the tool bar.

5.1.2 Redo

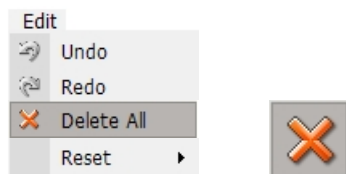
Redo the last action performed.



On the menu bar, click **File** → **Redo** or click **Redo** from the tool bar.

5.1.3 Delete All

Delete all overlays on the images.



On the menu bar, click **File** → **Delete All** or click **Delete** from the tool bar.

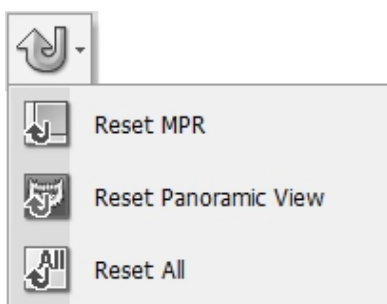
To delete a selected overlay, right-click on the overlay and click delete; or simply press the **delete** key on your keyboard.

5.1.4 Reset

Initialize the images.



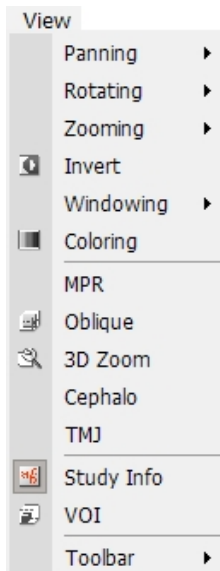
On the menu bar, click **Edit** → **Reset** or click the **Reset** button from the tool bar. For Resetting, there are three sub tools: **Reset All**, **Reset Panoramic View** and **Reset MPR** as shown below.



- **Reset MPR:** Initialize the MPR image view pane only.
- **Reset Panoramic View:** Initialize the imported panoramic image.
- **Reset All:** Initialize the applications made to all image view panes (MPR and 3D).

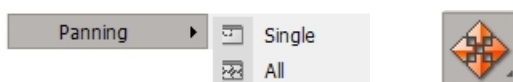
5.2 View

The **View** menu offers a variety of features including Panning, Rotating, Zooming, Invert, Windowing, Coloring, as well as Oblique and 3-D Zoom viewing. You can access these tools via the tool bar or menu bar.



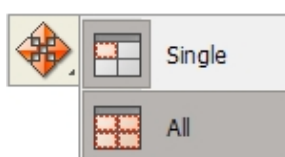
5.2.1 Panning

The **Panning** tool is used to move an image within the view window. After selecting the tool, click on the image and drag to your preferred location.

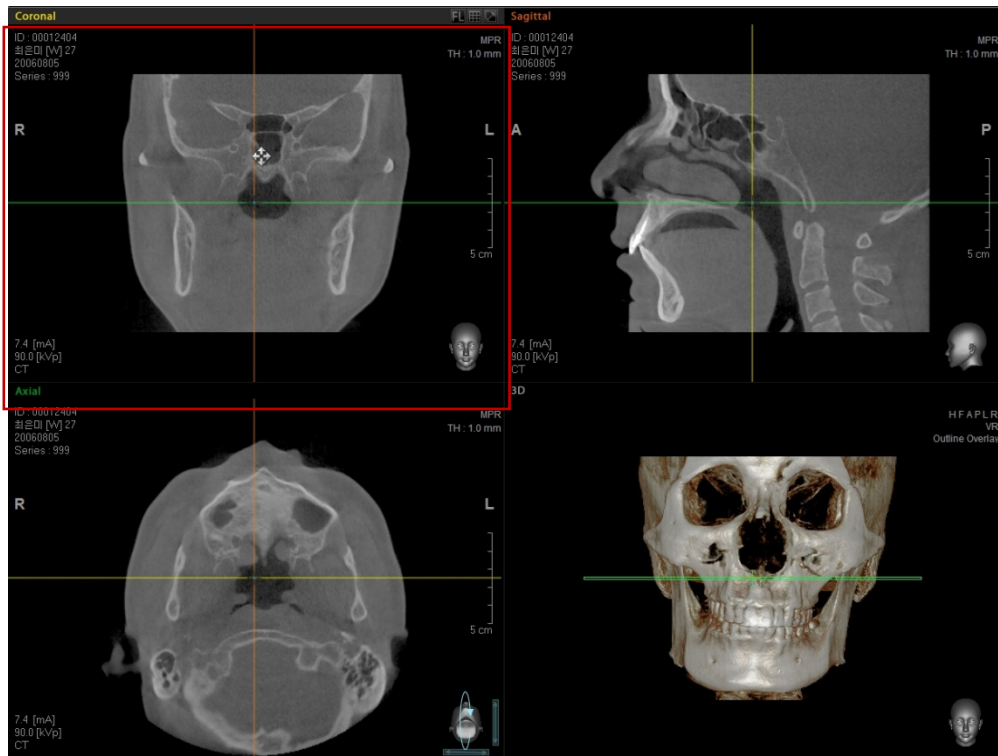


To access the **Panning** utility on the menu bar, click **View** → **Panning** or click the **Pan** icon on the **View** tool bar.

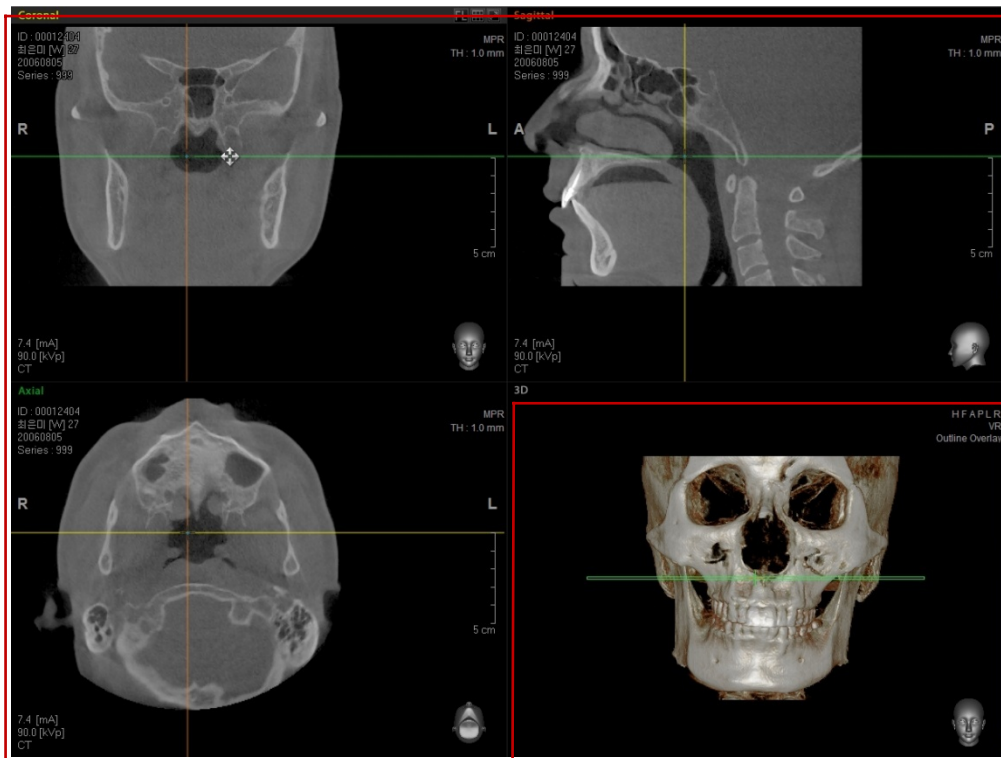
After doing this, two sub tools (Single and All) will appear, as shown below. **Single** pans the image within the current view window, while **All** pans the images in all MPR view windows at the same time.



<Single Mode>

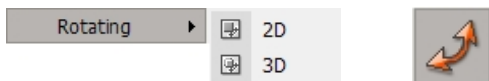


<All Mode>



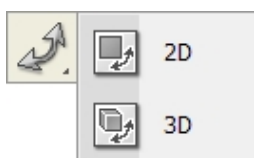
5.2.2 Rotating

Used for doing 2D or 3D image rotation within the view windows. After clicking the **Rotate** button, point the mouse cursor in your preferred view window then do a 2D or 3D image rotation.

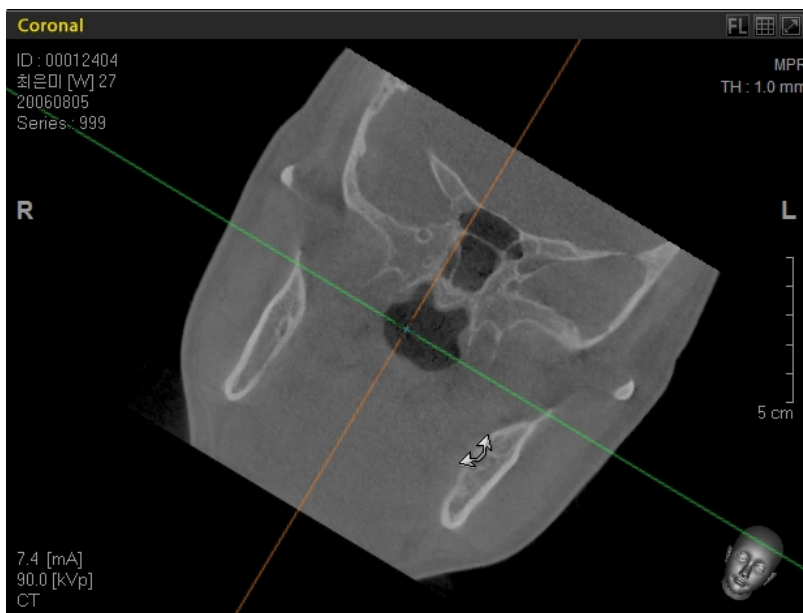


To access the tool on the menu bar, click **View** → **Rotating** or click the **Rotate** icon on the **View** tool bar. Then the 2D and 3D sub tools will appear, as shown in the following figure. 2D performs two-dimensional rotation within the view window, while 3D does three-dimensional rotation.

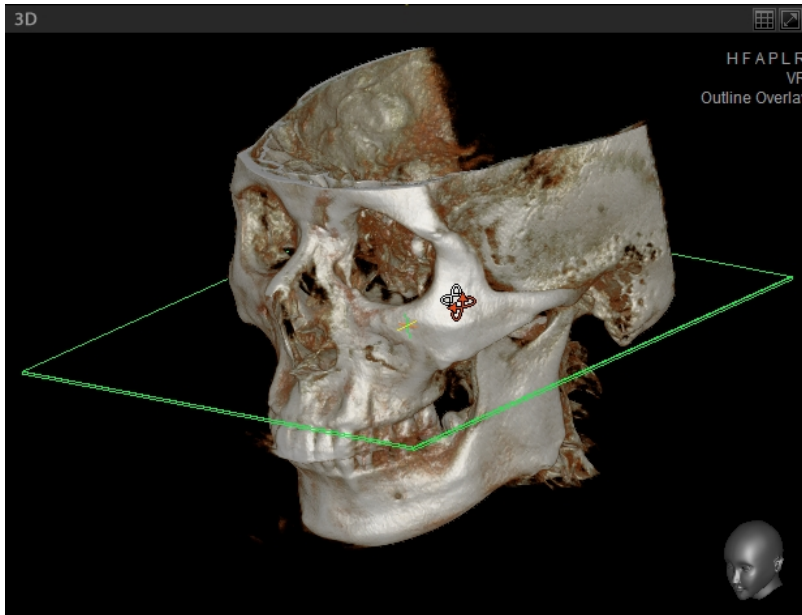
If 2D rotation tool is clicked in the specific MPR view window, only the image in that view is rotated. But if 3D rotation tool is clicked, the images in three view areas —Axial, Coronal and Sagittal—rotate all together.



<2D Mode>

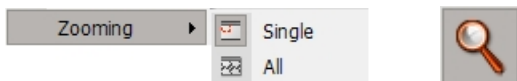


<3D Mode>

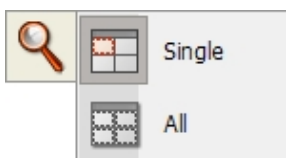


5.2.3 Zooming

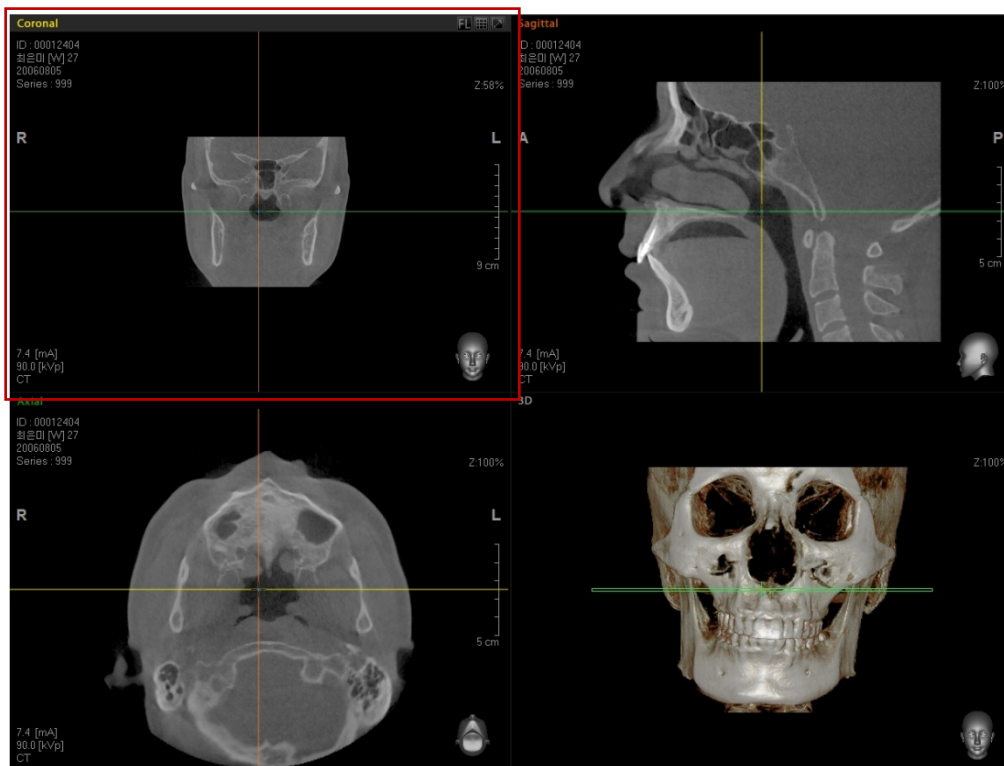
Zooming is used to enlarge or reduce the size of a selected image. After selecting the **Zoom** tool, click the image and drag the mouse right or left to enlarge or reduce the image.



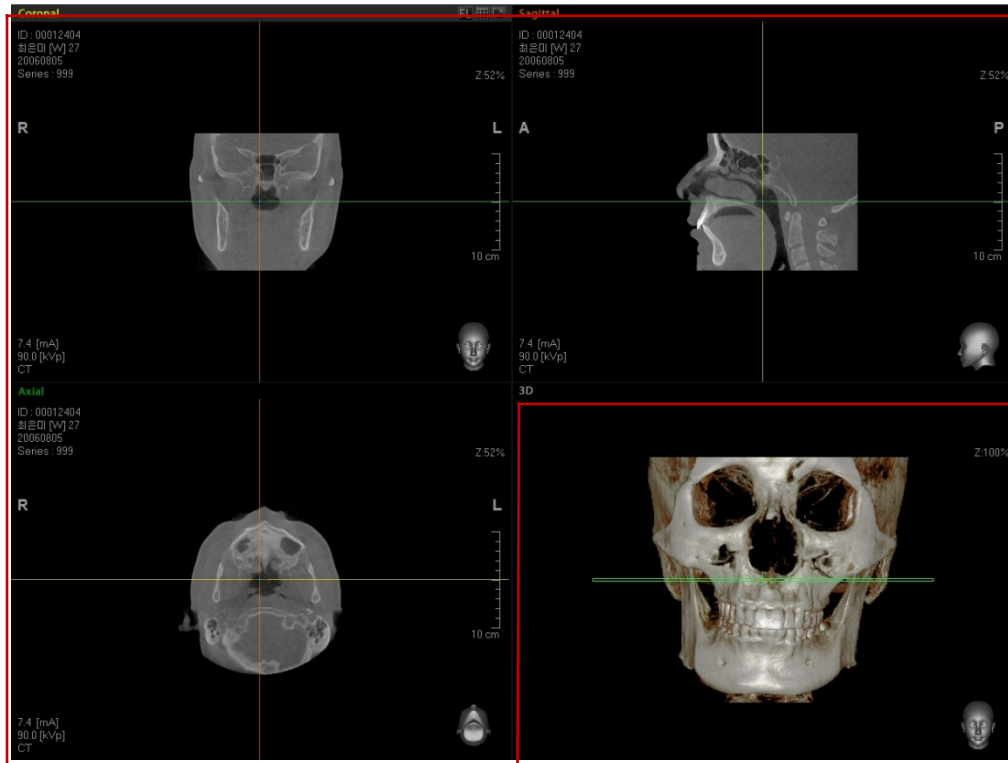
To access the Zoom tool on the menu bar, click **View** → **Zooming** or click the **Zoom** icon on the **View** tool bar. Then two sub tools will appear, as shown below. **Single** allows the user to select an MPR or 3D image to zoom in or out. **All** allows the user to zoom MPR images in all window panes simultaneously.



<Zoom Out - Single Mode>



<Zoom Out - All Mode>

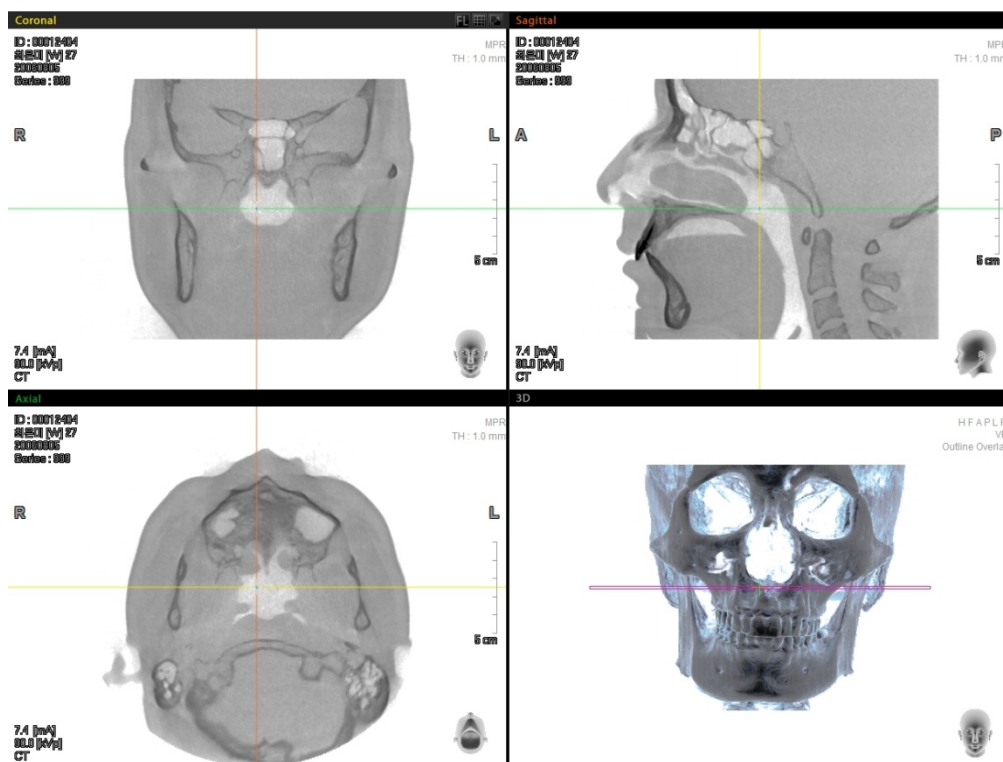


5.2.4 Inverting

Invert allows you to invert images of all view window panes on the screen. When you select the **Invert** button, images will be inverted. Click the button again to revert the images to their original state.

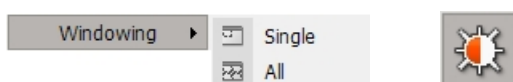


To access the tool on the menu bar, click **View** → **Invert** or click the **Invert** icon on the **View** tool bar.

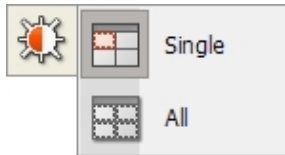


5.2.5 Windowing

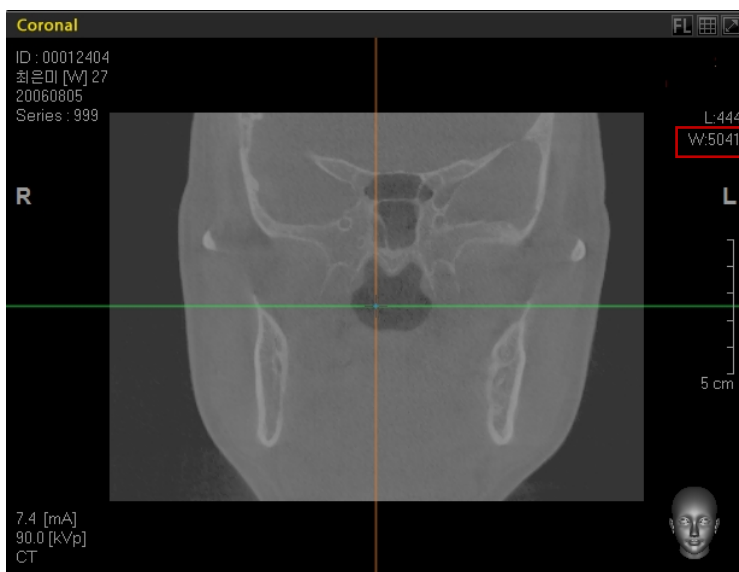
This function allows you to control the width and level of brightness and contrast of an image. After selecting the **Windowing** tool, click the image and drag it left or right to control the width. Drag the mouse up or down to control the level.



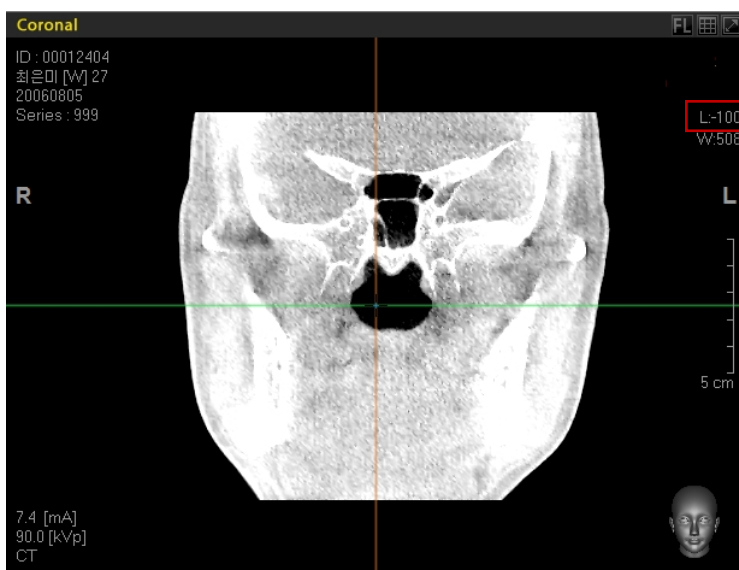
To access the Windowing tool on the menu bar, click **View** → **Windowing** or click the **Windowing** icon on the **View** tool bar. Two sub tools: **Single** and **All** will appear, as shown below. **Single** is for Windowing on the current image window, while **All** is for Windowing on all MPR image view panes simultaneously.




<Windowing Single>



Width



Level

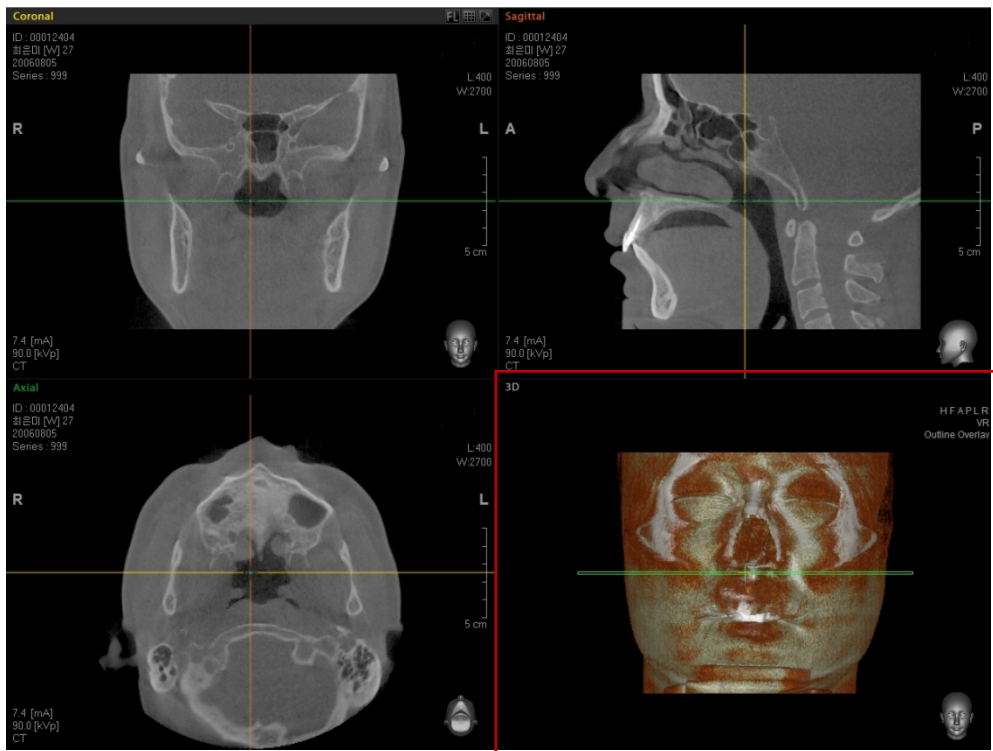
| | |
|---|---|
|  | <p>The Windowing functions can be accessed through Fine Tuning as well. For more information, refer to '8.7 Fining Tuning'.</p> |
|---|---|

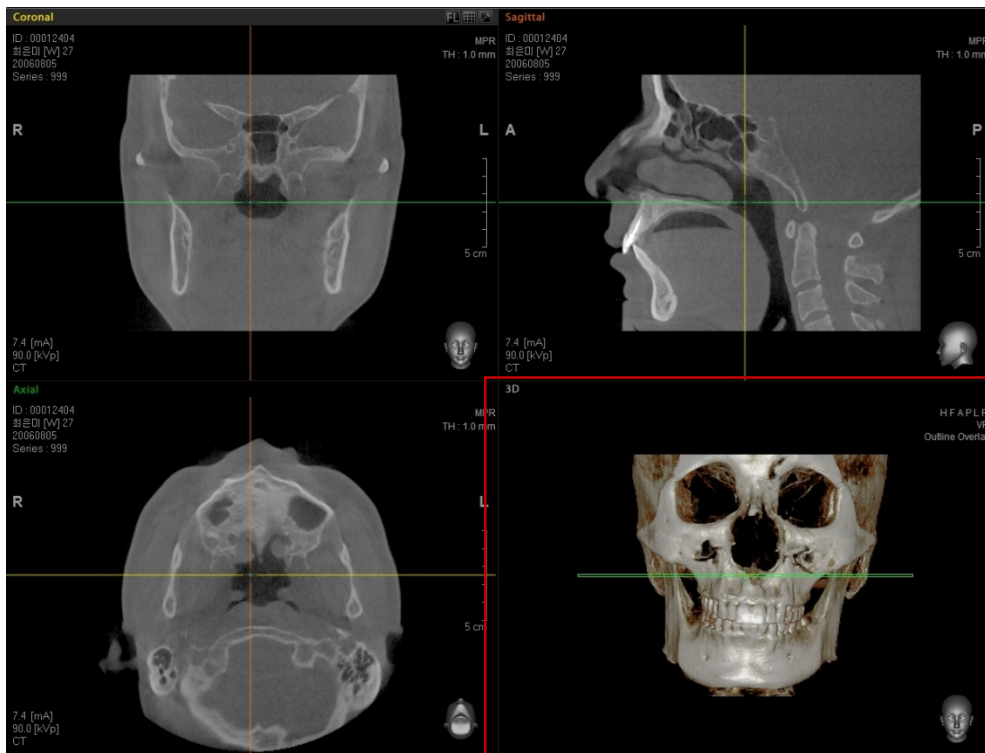
5.2.6 Coloring

An Opacity Transfer Function (OTF) is a tool that is used to control the color value of a 3D image. After selecting the **Coloring** tool, click the image and drag the mouse left or right to adjust the color value.



To access the tool on the menu bar, click **View** → **Coloring** or click the **Coloring** icon on the **View** tool bar. Click on the 3D image then drag the mouse left or right to adjust the color of the 3D image, as shown below.





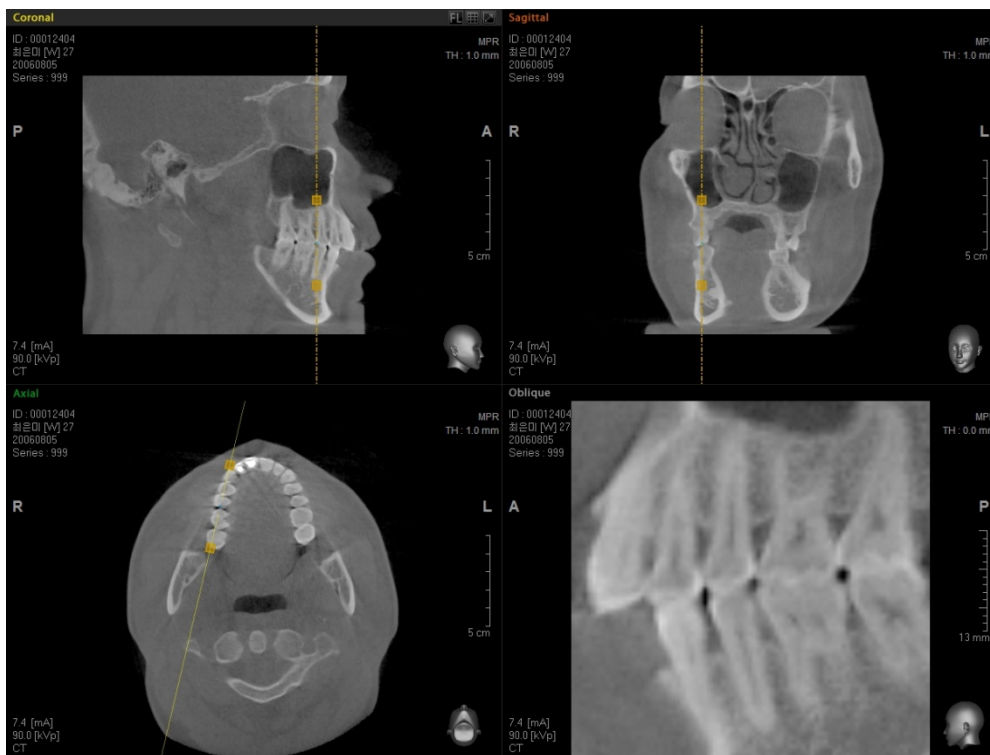
To **Undo** the Coloring function, double click the right mouse button within any image view window. The **No Action** notifications on the MPR view windows will disappear.

5.2.7 Oblique

Oblique View is a function for viewing the cross sectional image of a specific area in an MPR view window.



To access the tool on the menu bar, click **View** → **Oblique** or click the **Oblique** icon on the View tool bar. Click on the area within an image that you would like to see. Then move the mouse to desired size to see and click once again, the View mode will be converted to Oblique mode on the screen.



In Oblique mode, users can modify the size of the view area, do center panning, change the view direction, or adjust thickness.

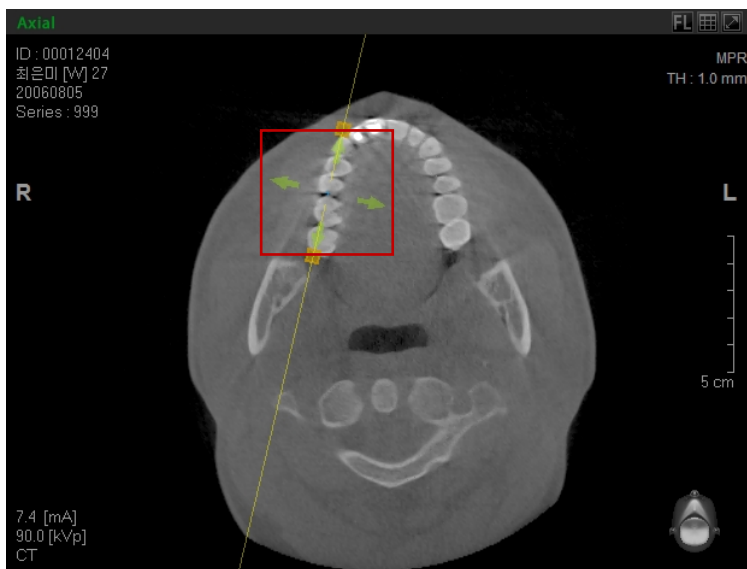
<Size of View Area>

The Oblique image area focus can be enlarged or reduced by adjusting the two yellow boxes that appear on the image in the MPR window. The image on the Oblique view window will be enlarged as the boxes get closer and become smaller as they get further apart.



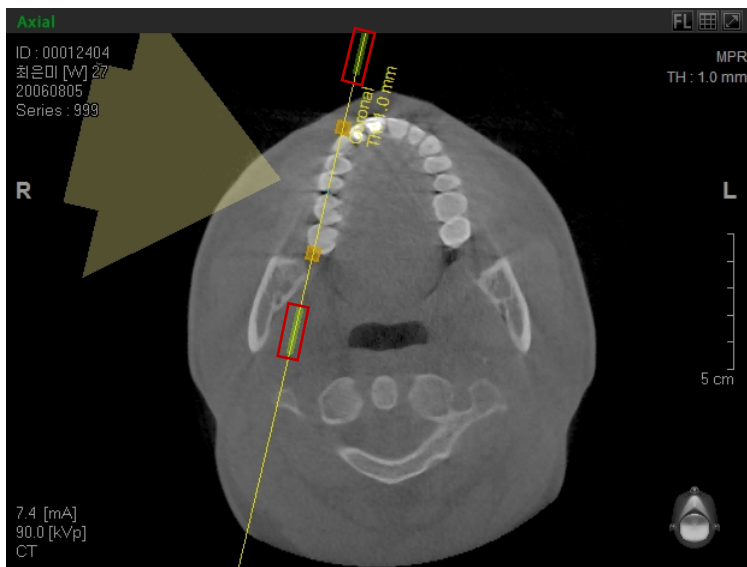
<Moving the center of Oblique Rotating Axis>

When you place the mouse on the center of the Oblique rotating axis, arrows will appear, which indicates that the axis is ready to move. Using the mark, move the axis to the desired cross-sectional view.



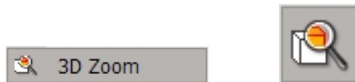
<Changing the Thickness of Oblique Rotating Axis>

You can change the thickness of the axis using two thick segments on the Oblique axis.



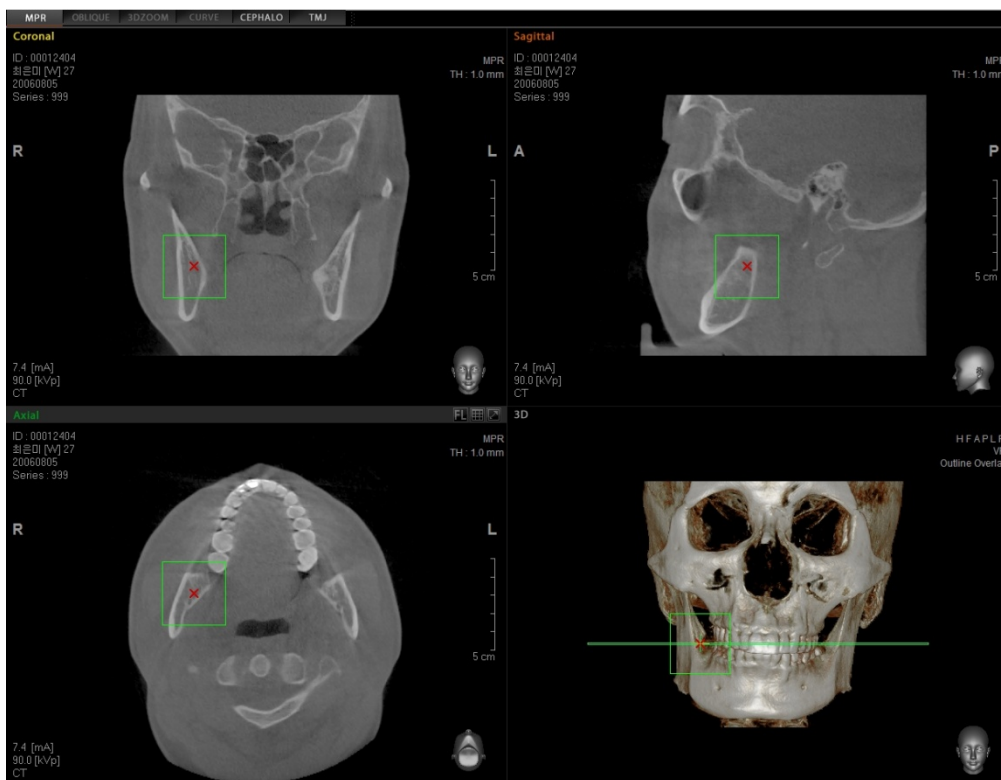
5.2.8 3D Zoom

Using the **3D Zoom** function, users can easily assess images and is very useful when trying to obtain patient consent for treatment.



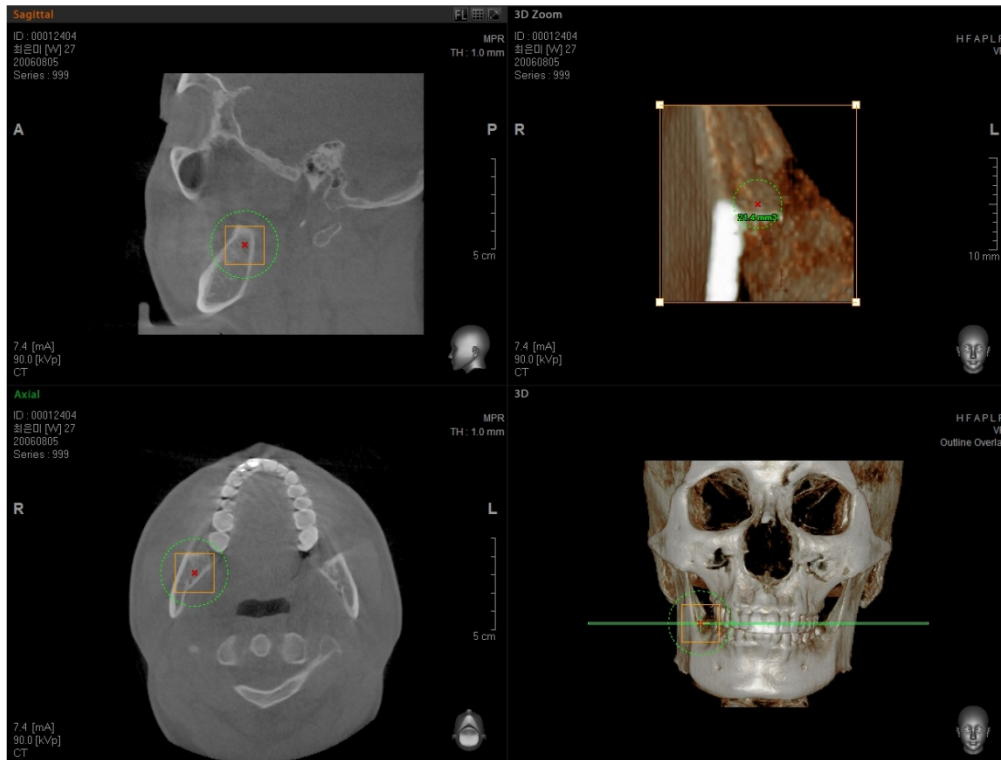
On the Menu bar, click **View** → **3D Zoom** or click the 3D Zoom icon on the **View** tool bar.

Select the area on the image where you want to perform 3D zooming. Once you click on the area, an **X** mark will appear. Using the square area indicator, you can set the size of the area to be zoomed in three dimensions.



5 Image Processing

5.2 View



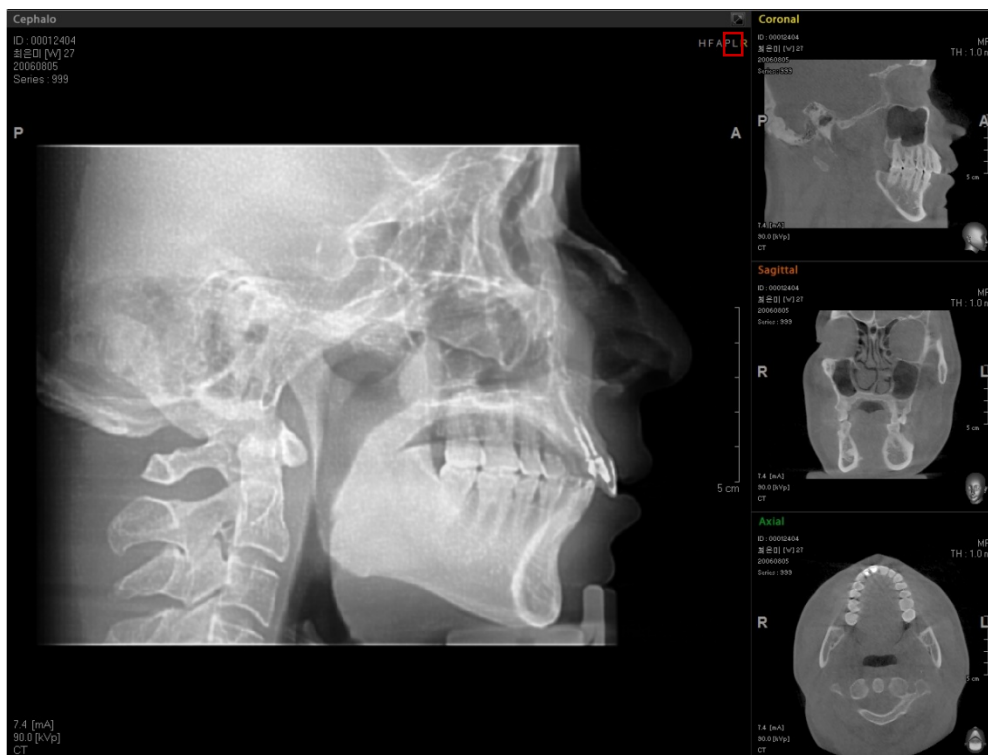
By clicking and dragging the dotted circle on the image of the 3D or MPR view windows, you can adjust the size of the zoomed area. Also, if you click the **X** mark at the center, it can be moved to another location within the same image view.

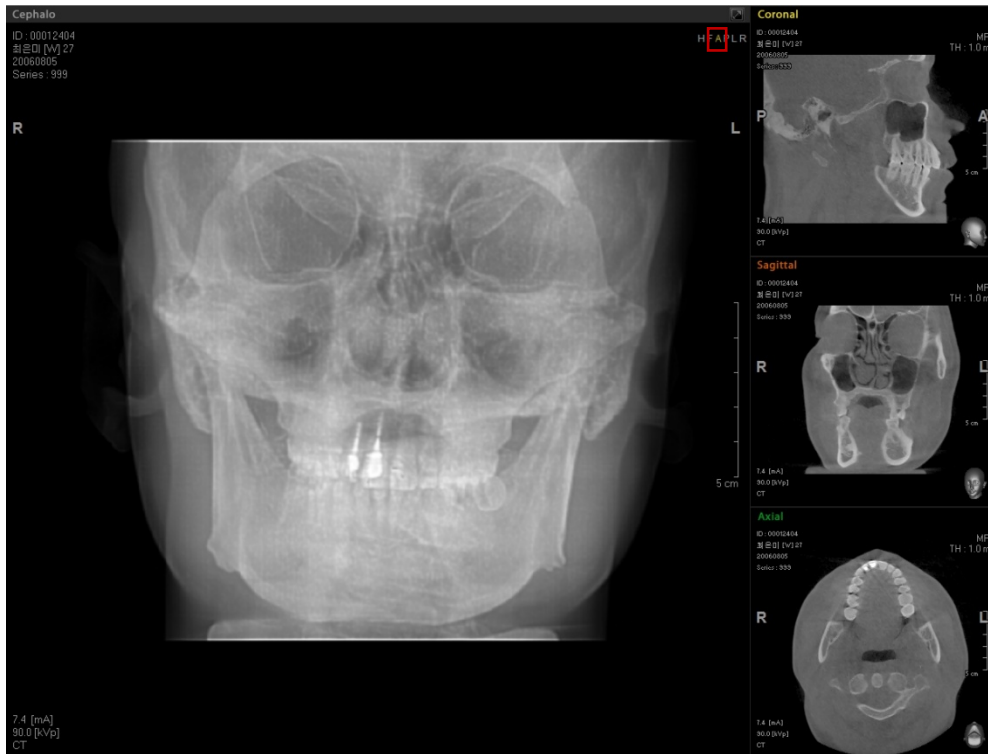
5.2.9 Image Reconstruction of a Cephalo Image View (Premium Version Only)

Cephalo image View is a view mode that displays the Cephalo image from a reconstruction of the CT image.



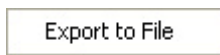
To use this feature, on the menu bar, click **View** → **Cephalo** or click the right button of the mouse on the MPR screen and select **Cephalo**, or click the **CEPHALO** tab at the view mode located on top of the main window. The screen layout will change to Cephalo View. By using H F A P L R orientation guide on the Cephalo screen, you can check the image view orientation.



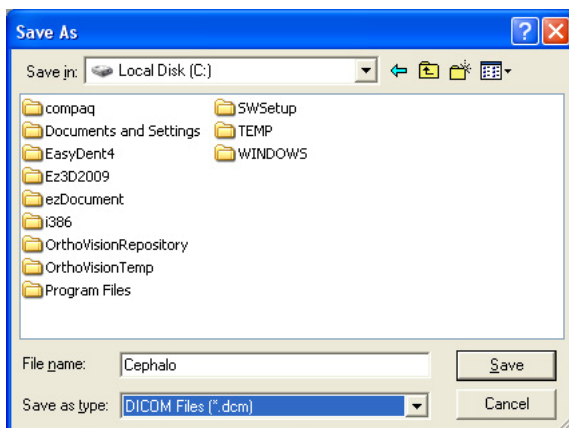


<Saving of CEPHALO Image>

To save the Cephalometric image, click the right button on the image. Then select **Export to File**



→ Export to File. Then the **Save As** window will appear. Enter the file name and save the Cephalometric Image as a DCM File.



You can adjust the Cephalo Image with tools of the **Windowing Tool**, **Measure tools**, and **View tools** such as Zoom, Pan, and 2D Rotate which are used in the manipulation of MPR image.

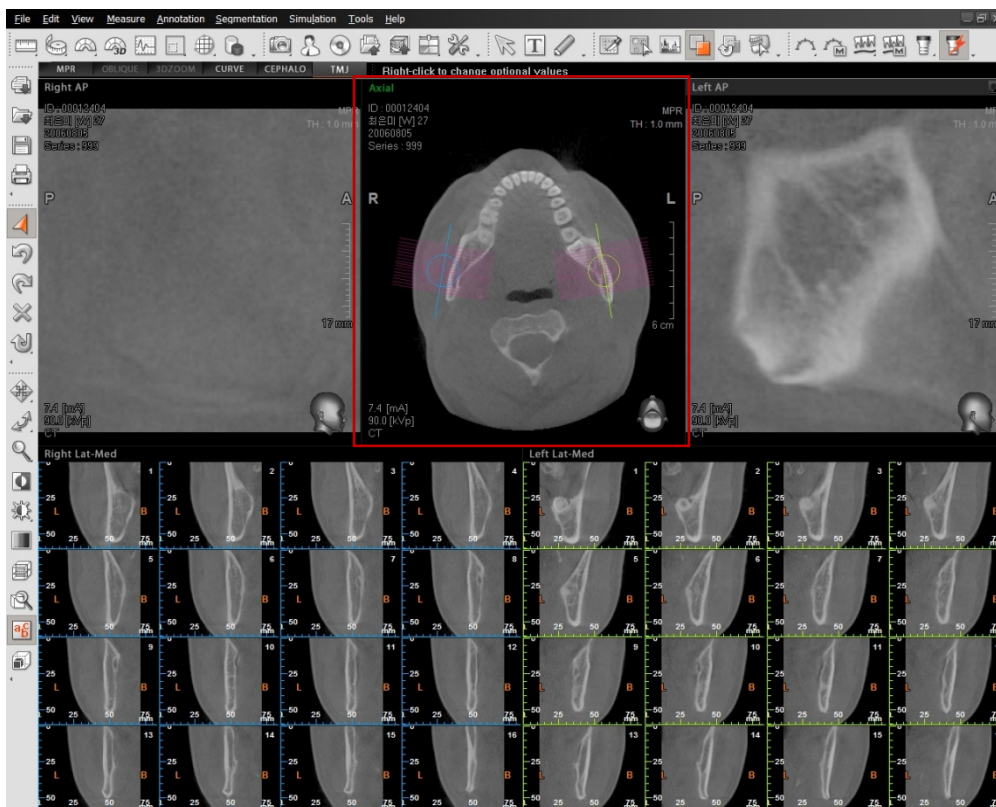
5.2.10 TMJ View

TMJ View is a tool for performing comparative analysis on the Left TMJ and Right TMJ of the mandible area.

If you select the **TMJ** tab at the top of the view mode screen, all images on the view areas will be reconstructed to be displayed in the TMJ View mode.

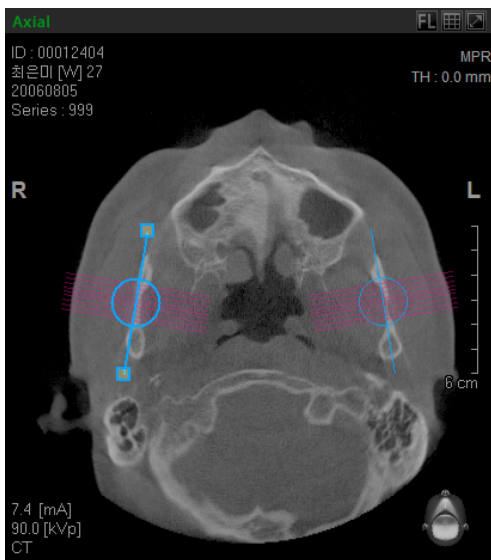


The **Axial image** located at the upper central area of the screen functions as the **Scout View**, while the **Left/Right AP View** located at the upper right and left sides of the screen display the slices in accordance with the tool location on the Axial Image. The **Left/Right LAT-Med** view located at the bottom of the screen displays the slice images of the **Left / Right AP** at regular intervals.

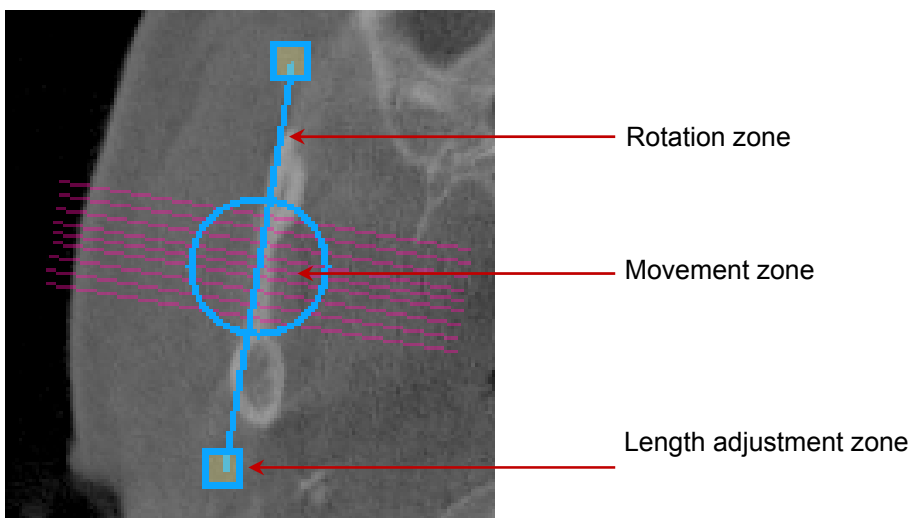


The **TMJ tool** on the Axial view area can be moved, rotated, and length-adjusted.

<TMJ tool on Scout View>



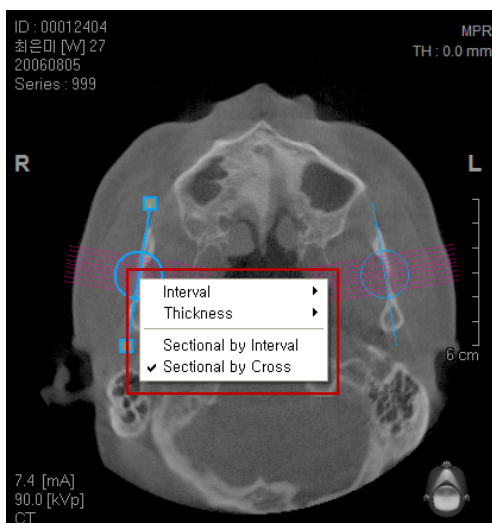
<Tool Usage>



- **Rotation Zone:** Position the pointer on the rotation zone, then a rotation icon will appear. You can rotate the image to the direction you wish by clicking and dragging the icon.
- **Movement Zone:** Position the pointer on the movement zone, then a movement icon will appear. You can move the TMJ tool on the Axial image (Scout View) to the location you wish by clicking and dragging the icon.
- **Length Adjustment Zone:** Position the pointer on the Length Adjustment Zone, then a Length Adjustment icon will appear. You can adjust the length of the section by clicking and dragging the icon.

<Optional functions of the TMJ Tool>

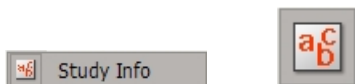
If you click the right mouse button on the TMJ tool area, the optional functions will appear.



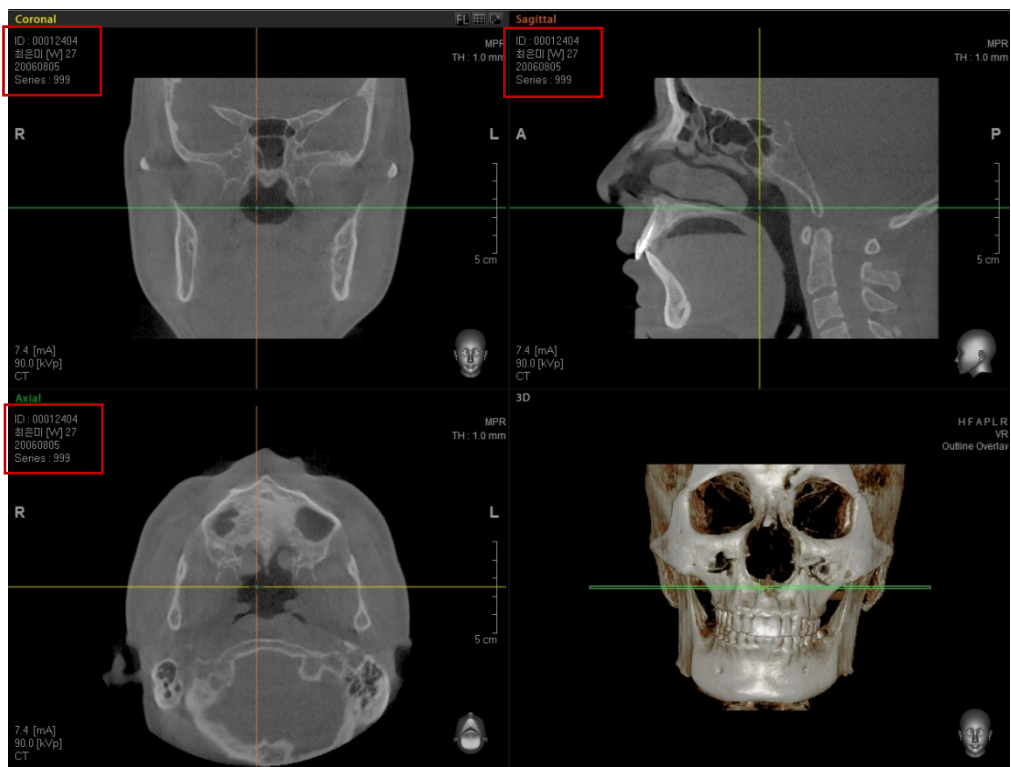
- **Interval:** Enables you to set the interval of the cross-sectional slices.
- **Thickness:** Enables you to set the thickness of the cross-sectional slices.
- **Sectional by Interval:** Based on the AP View, it enables you to set the slices to horizontal direction.
- **Sectional by Cross:** Based on the AP View, it enables you to set the slices to vertical direction.

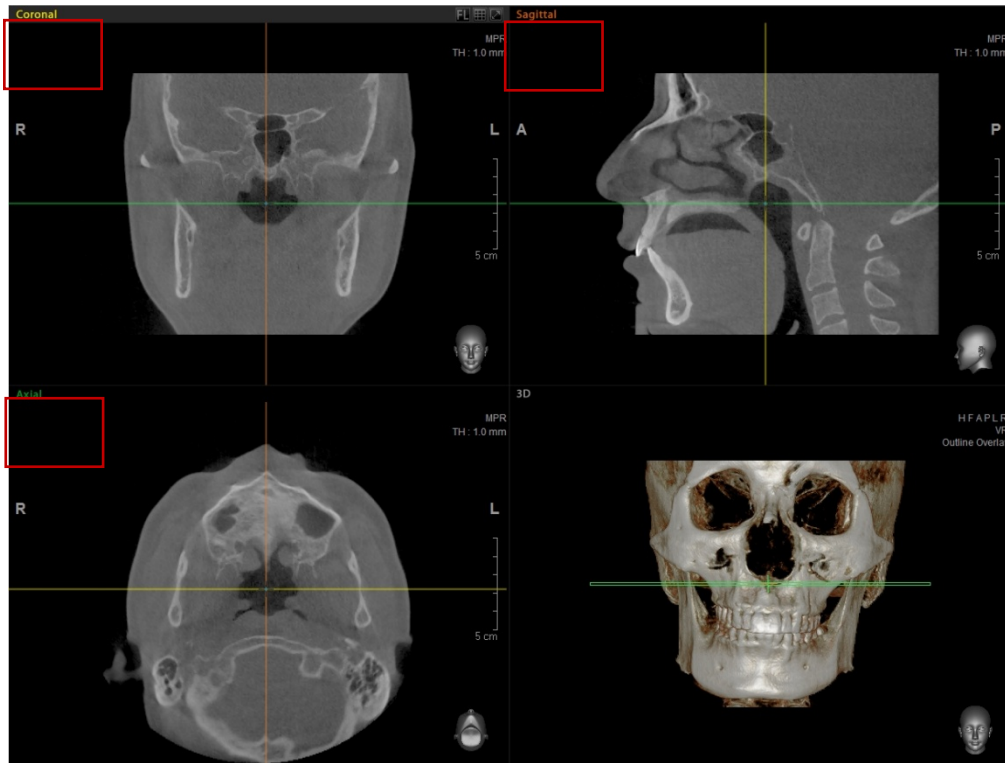
5.2.11 Study Information

You have the option to turn text displays (patient information, radiation dosage, etc.) on or off. Text will be displayed by default. If the **Study Info** tool selection is unchecked, text information will not be displayed. Even though the **Study Info** tool selection is unchecked, the ruler and direction will still be indicated.



On the menu bar, click **View** → **Study Info** or click the **Study Info** icon on the View tool bar.





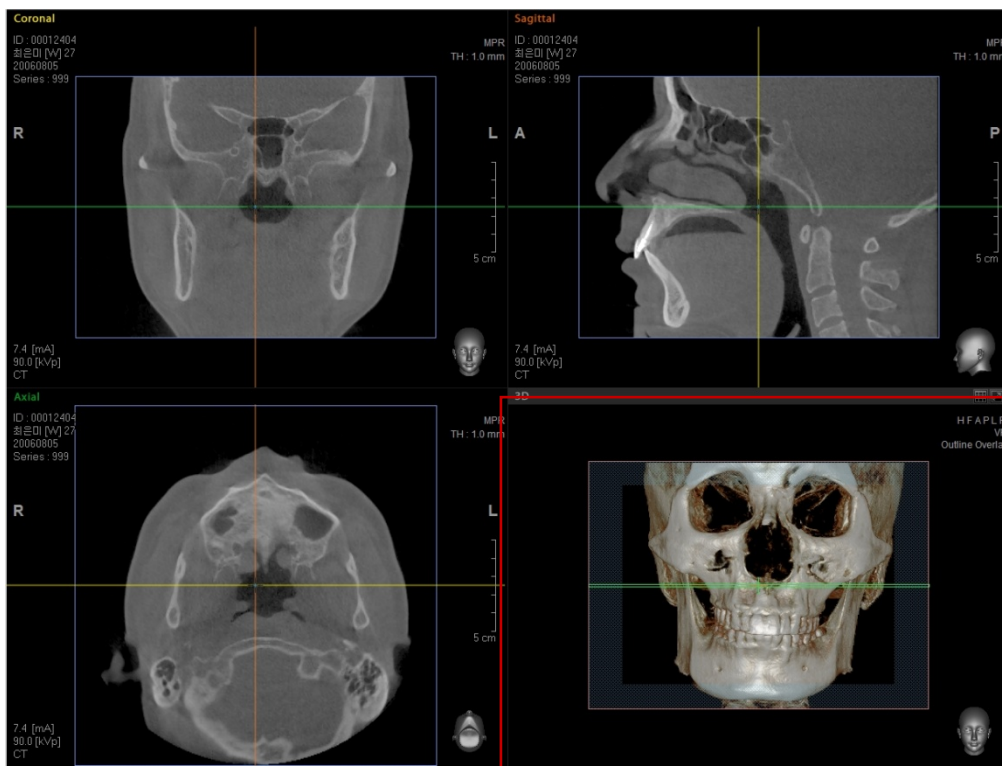
5.2.12 VOI Overlay

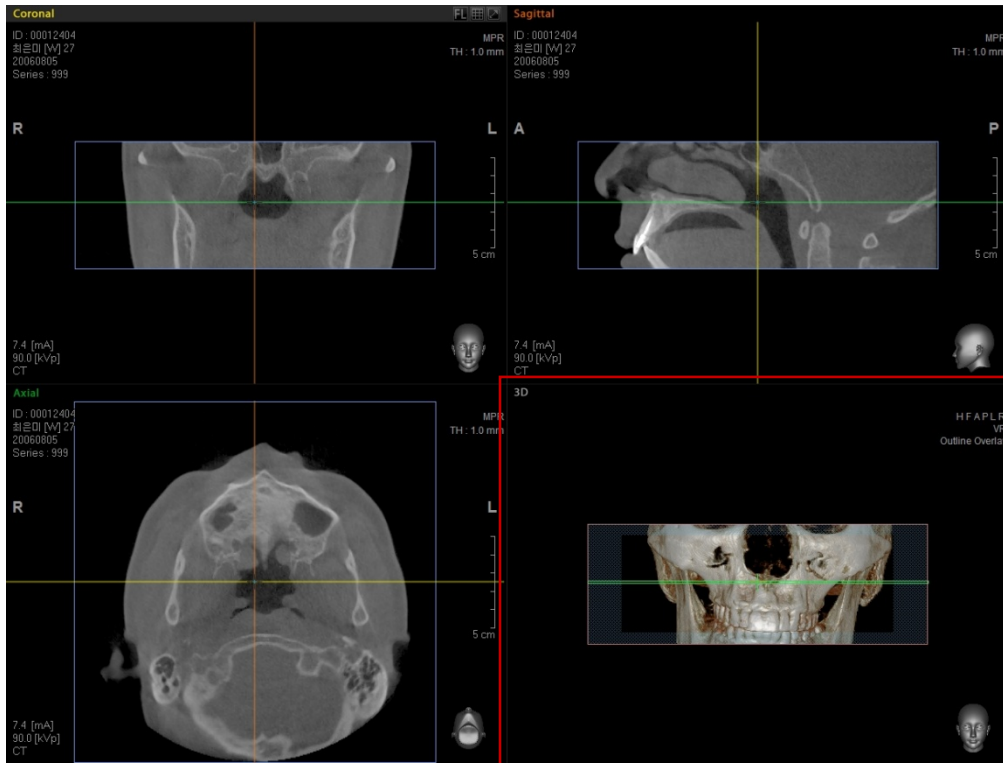
By marking VOI View of Interest box on image, it is possible to control the location and size.



On the menu bar, click **View** → **VOI** or click the **VOI** icon on the View tool bar. A control box will appear in the 3D image view pane as well as in all MPR image view panes.

<Application VOI>

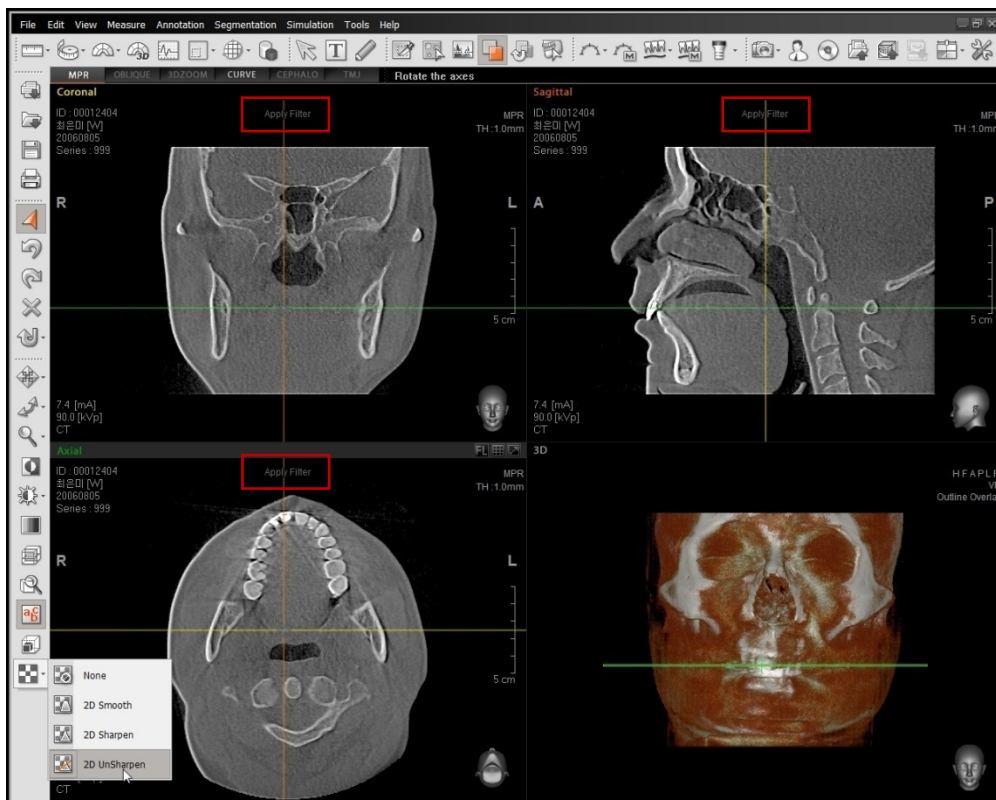




5.2.13 Apply Filter

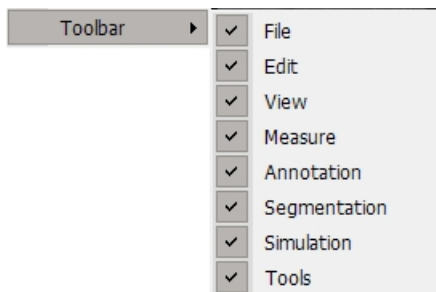
There are four filtering modes to apply for the 2D image processing: **None**, **Smooth**, **Sharpen**, and **Unsharpen**. When each filter is applied to 2D image, the message “**Apply Filter**” is displayed on each window.

- **None**: None of the filters are applied to the image, which returns to the initial state.
- **2D Smooth**: enables the 2D image to become smooth after this filter is applied
- **2D Sharpen**: enables the 2D image to become sharper after this filter is applied
- **2D UnSharpen**: enables the 2D image to have the sharpest after this filter is applied.



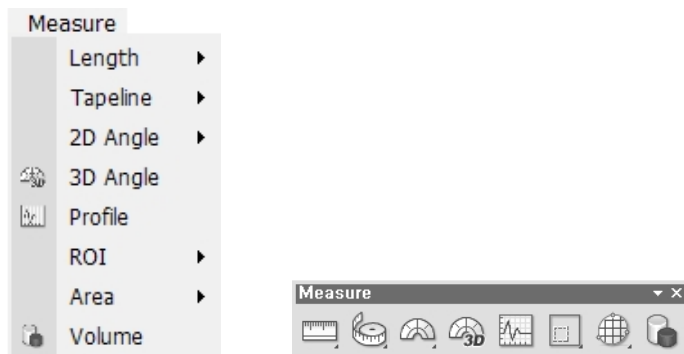
5.2.14 Tool Bar

The tool bar menu enables you to add or remove a tool bar on the main screen, as shown below.



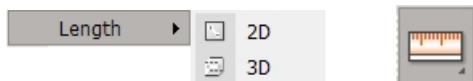
5.3 Measure

The Measure menu provides Image Analysis Tool collection that makes image analysis easier through the use of its several of tools such as Ruler, Tapeline, Angles, Profile, ROI (Region of Interest), Area, and Volume.

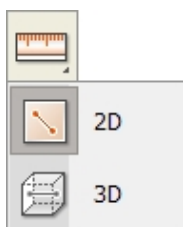


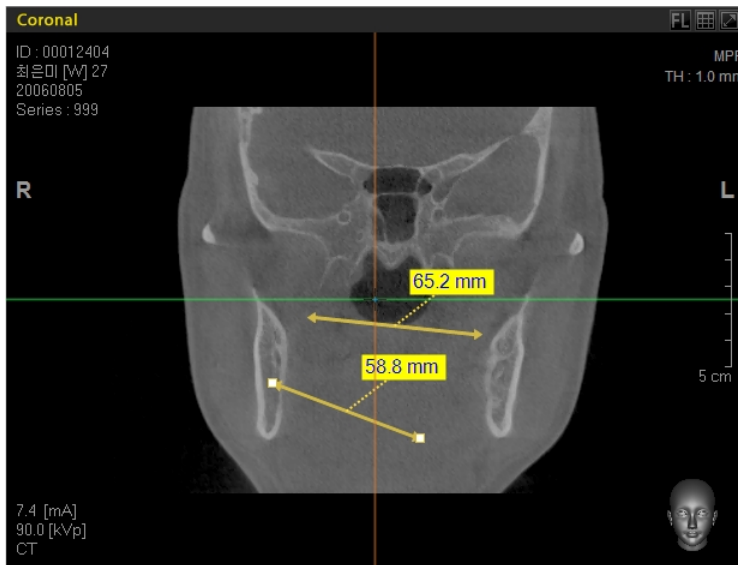
5.3.1 Length

Measure the distance between two selected points in [mm] on the image. After selecting the **Length** tool, click the mouse on your initial point. Click on a second point and a line will be drawn. Then the measurement will be displayed.

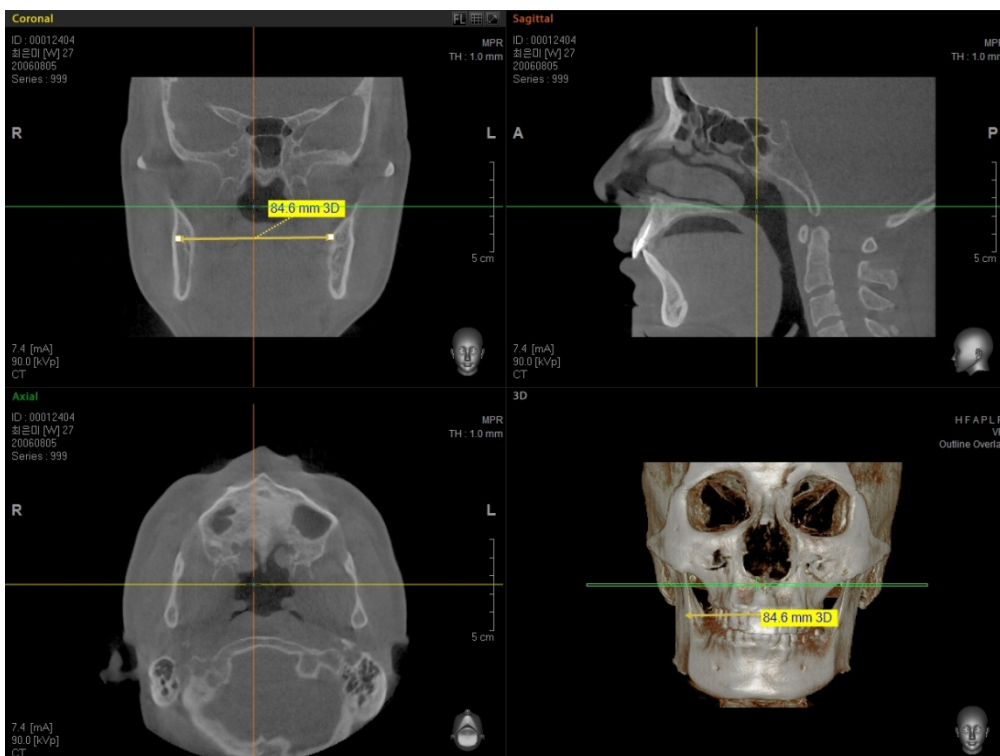


On the menu bar, click **Measure** → **Length** or click the Length icon from the Measure tool bar. Two sub tools will appear, as shown below. **2D** will display the measurement on the current 2D window, while **3D** will display the measurement on both the 2D and 3D image windows.



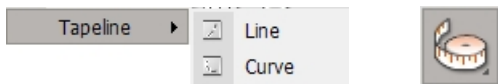
<Measuring Length in 2D>**<Measuring Length in 3D>**

When you do 3D Length measurement on a 2D image, the measurement overlay will also appear on the image in the 3D view window, as shown below. If the initial measurement is done on the 3D window, its overlay will only appear on the image in the 3D window pane.

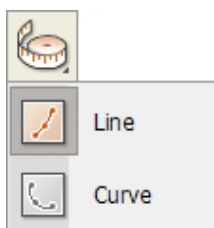


5.3.2 Tapeline

Measure the length of a straight or curved line in [mm].

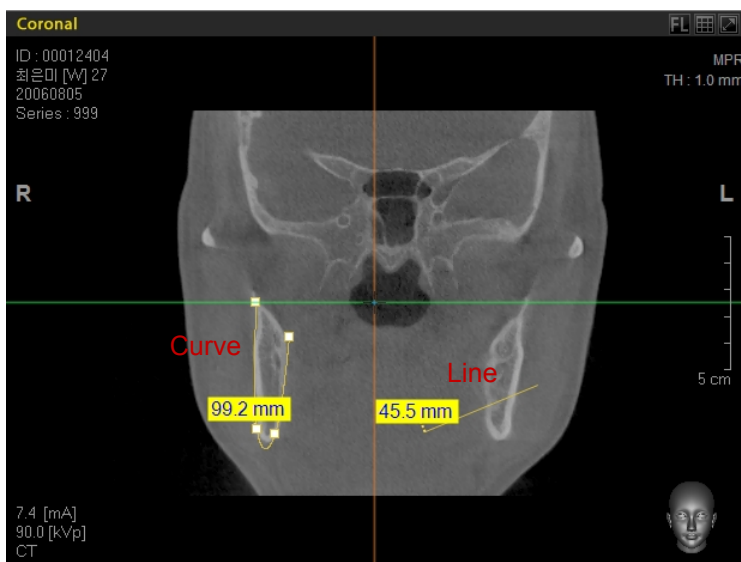


On the menu bar, click **Measure** → **Tapeline** or click the **Tapeline** icon on the Measure tool bar. Two sub tools will appear, as shown below. **Line** is used for drawing straight lines connected by several points, while **Curve** is used for drawing curved lines connected by several points.



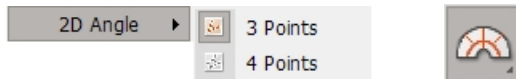
Click once to place your initial point followed by consecutive clicks in order to draw a tapeline.

Finish line drawing by double clicking on the end point. If you click and drag the points of a line, you can change the direction of the points or change the length of the line. Also, the measurement text box can also be dragged and dropped to any area within the view window you prefer.

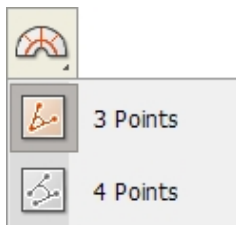


5.3.3 2D Angle

Measure the angle of two line segments in degrees. After clicking the **2D Angle** tool, measure the angle by clicking 3 or 4 points to make the two line segments.

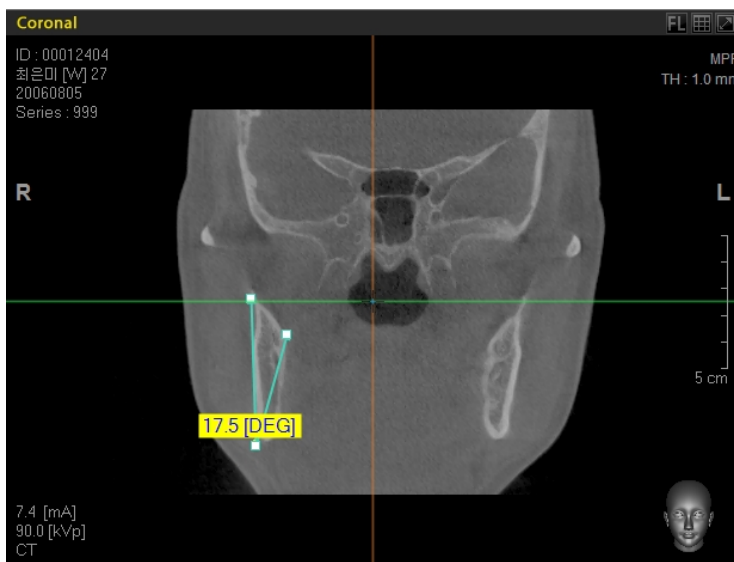


On the menu bar, click **Measure** → **2D Angle** or click the **2D Angle** icon from the Measure tool bar. Two sub tools will appear, as shown below. **3 Points** tool will measure the angle between two lines, while **4 Points** tool will measure the angle of two isolated line segments.



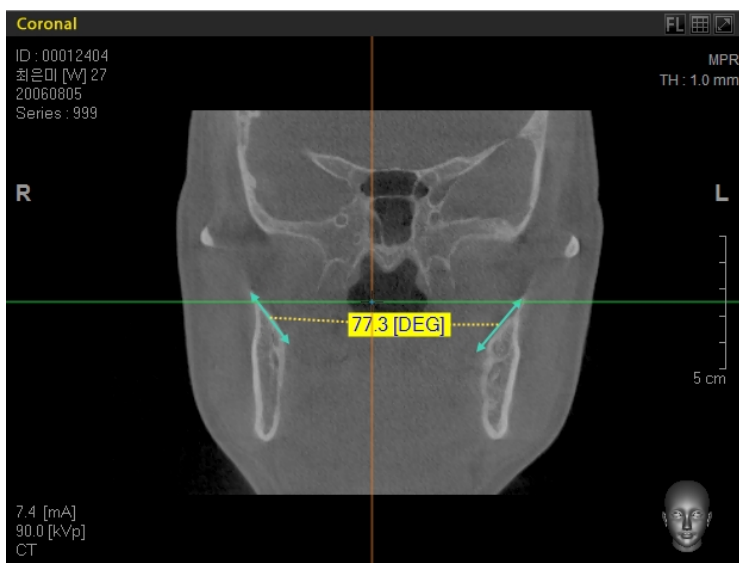
<3 Points Angle>

Measure the angle between two connecting line segments, based on the initial point.



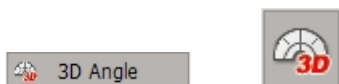
<4 Points Angle>

Measure the angle between two isolated line segments.



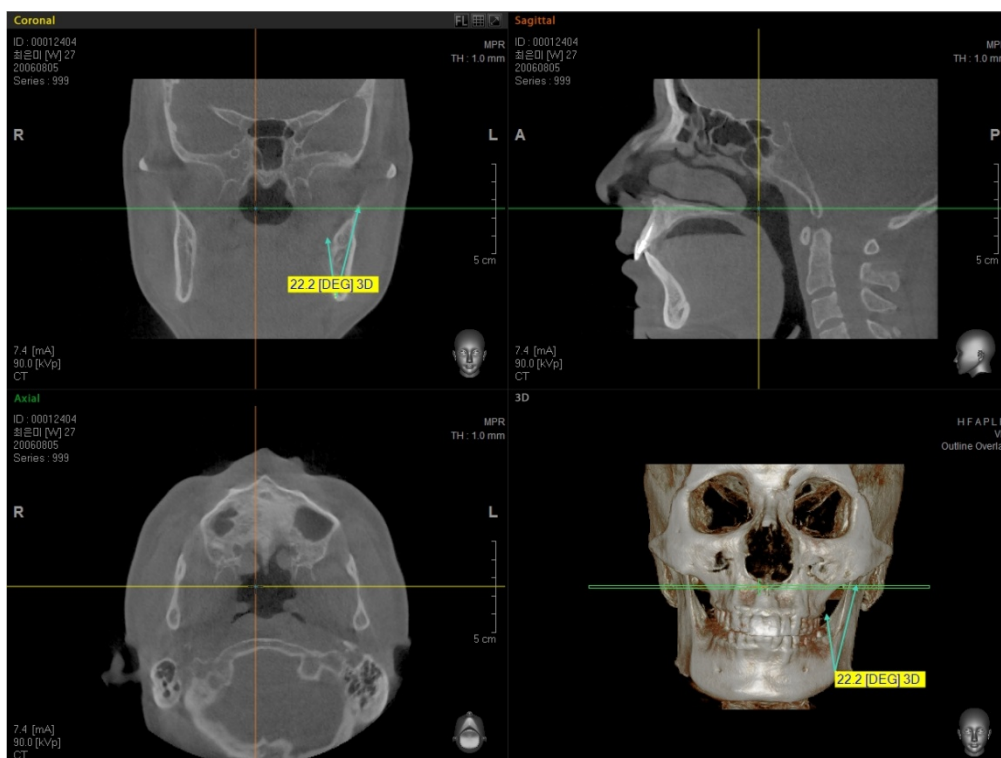
5.3.4 3D Angle

3D Angle is used to get an angle measurement on a 3D image.



On the menu bar, click **Measurement** → **3D Angle** or click the **Angle** icon on the Measure tool bar to measure the distance on the 3D window. Follow the same method as 2D 3-point angle measurement.

If you use 3D Angle measurement on a 2D image in an MPR window, the measurement will also appear on the 3D image view window. If 3D Angle measurement is done on a 3D image, the result will only be displayed on the 3D image view window.



5.3.5 Profile

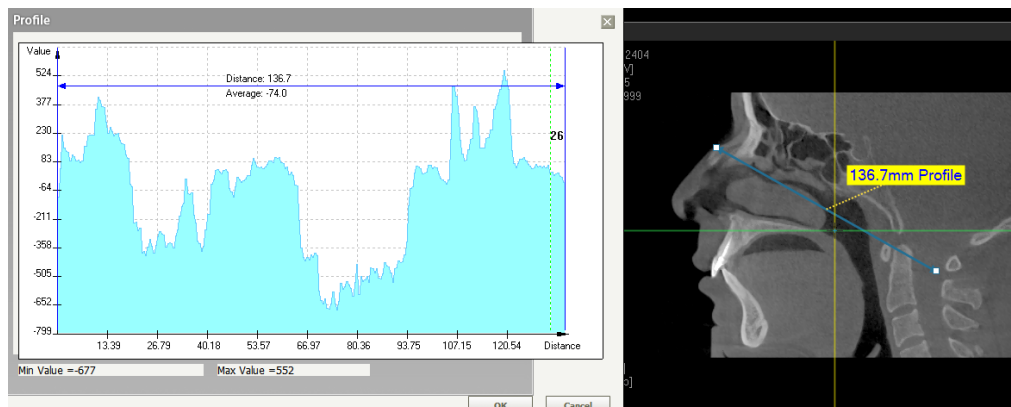
This feature graphically displays pixel values between two selected points. This feature is applicable only for 2D image.



This feature is not applicable to the 3D view area.

On the menu bar, click **Measure** → **Profile** or click the **Profile** icon in the Measure tool bar and then select two points.

The following figure shows the typical example of profile for the sagittal view.



In the graph the parameters are

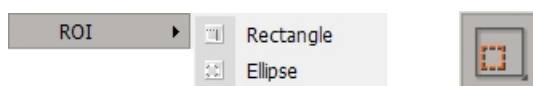
Distance: the length of line segment

Value(Y-Axis): level of gray of each pixel

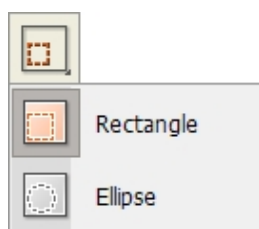
Average: gray level averaged over the entire line segment

5.3.6 ROI (Region of Interest)

This utility provides the user with statistics on a specific region of interest. General information such as Area, Perimeter, Pixel Value, Mean Value, Maximum Value, Minimum Value, and Standard Deviation can be measured by drawing an ROI on an image in the 2D view pane. Point and click on the initial point and drag to expand the area and then click on the second point.



On the menu bar, click **Measure** → **ROI** or click the **ROI** icon on the Measure tool bar. Two sub tools will appear, as shown below.

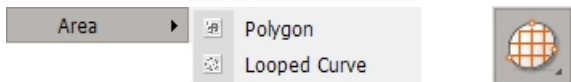


<ROI - Rectangle, Ellipse>

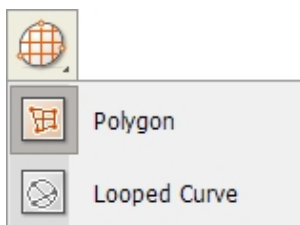


5.3.7 Area

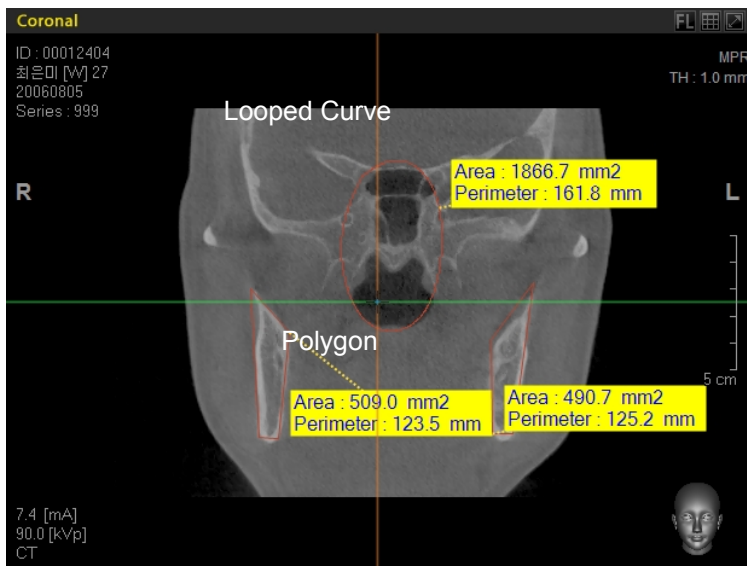
Measure a selected area on an image. Click and drag on several points until the area of interest is covered and then double-click on the last point. The measured (calculated) area and its perimeter will be displayed.



On the menu bar, click **Measure** → **Area** or click the **Area** icon on the Measure tool bar. Two sub tools will appear, as shown below. **Polygon** tool allows you to measure a polygon-shaped area by forming multiple straight line segments, while **Curve** tool allows you to measure a curve-shaped area by forming curved lines.



<Area Polygon, Looped Curve>

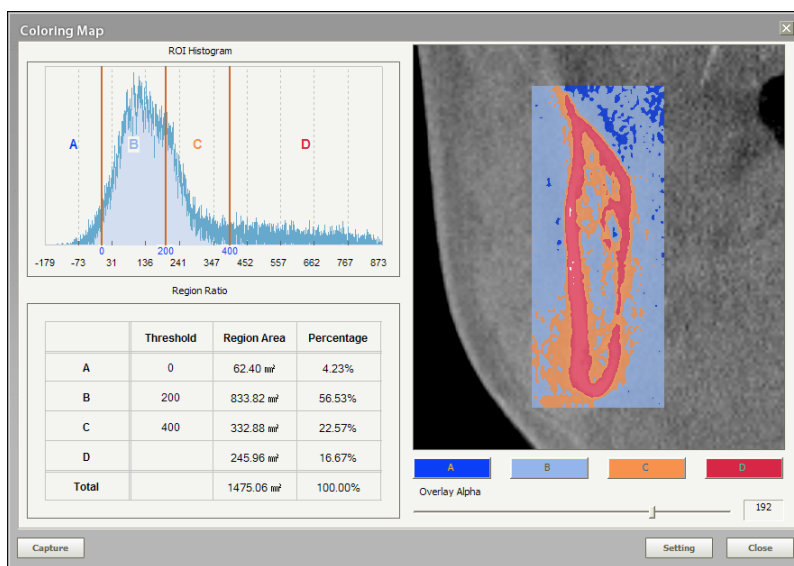


- **Coloring Map**

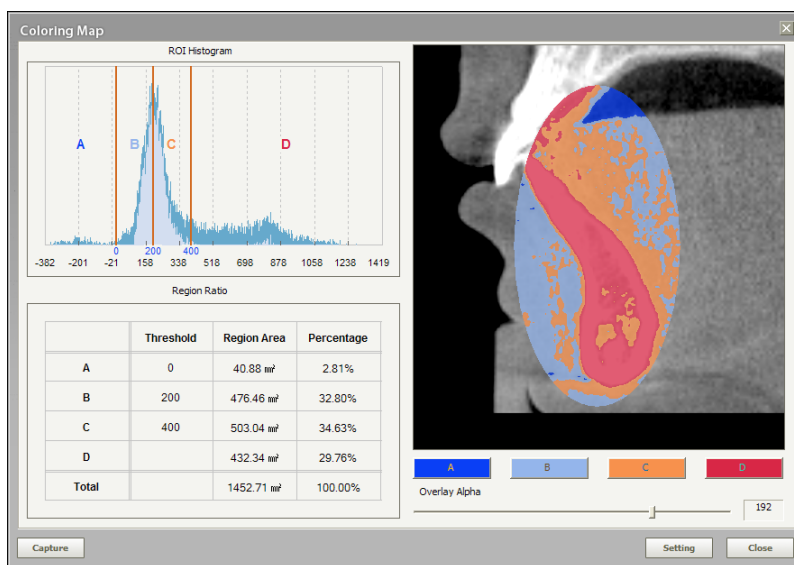
This feature is used to represent the level of bone density in user-defined ROI/Area in terms of color.

On double clicking the left mouse button on the yellow box in ROI / Area, the Coloring Map will open. It has data, including the histogram with the threshold levels. Furthermore, its corresponding areas and ratio are also displayed. On the right, the ROI region is displayed in terms of four corresponding colors.

<Coloring Map- Rectangle>



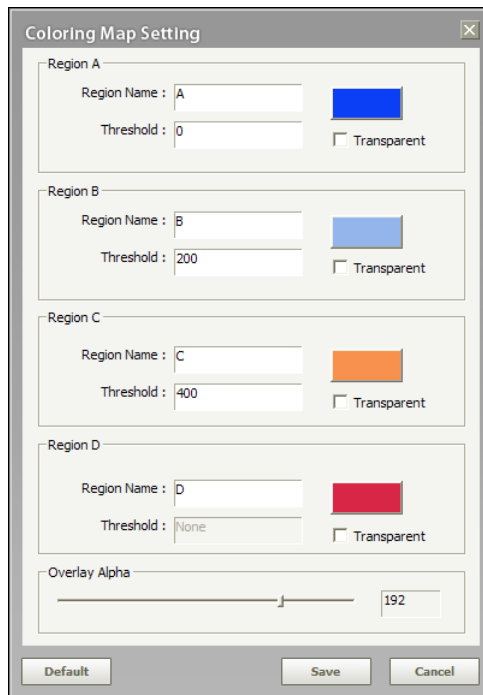
<Coloring Map- Ellipse>



Clicking the **Captured image** enables the Coloring Map screen to be captured easily.

You may configure the threshold levels and color display of the bone density ROI in the color map setting screen by clicking the **Setting** button, as follows.

<Coloring Map Setting>



The dialog box titled "Coloring Map Setting" contains the following fields and controls:

- Region A:** Region Name: A, Threshold: 0, Color: Blue, Transparent
- Region B:** Region Name: B, Threshold: 200, Color: Light Blue, Transparent
- Region C:** Region Name: C, Threshold: 400, Color: Orange, Transparent
- Region D:** Region Name: D, Threshold: None, Color: Red, Transparent
- Overlay Alpha:** A slider and a text box showing the value 192.
- Buttons: Default, Save, Cancel

- Region Name: To name the region
- Threshold: To set the threshold levels to obtain the best display

After data for these fields are entered, click **Save** to reflect the new values.



Since it is used for the MPR analysis, the Coloring Map feature can't be used for VR (3D).

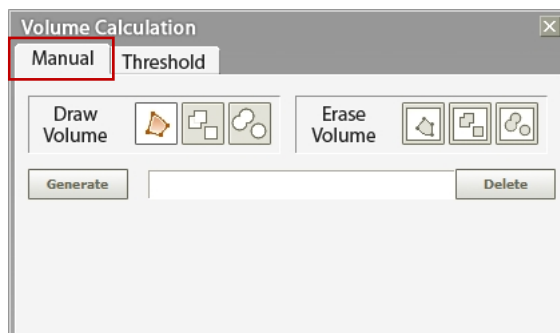
5.3.8 Volume (Professional Version Only)

Volume Generation is used to obtain the volume of a specified area. Ez3D plus provides two methods to get the volumetric value of a specific region of interest.






<Manual Volume Generation>

To generate the volume manually, specify the area of interest by slicing an area in the Axial view pane.






After you have completed marking the area within each slice, click the **Generate** button. The calculated result for the selected area will be displayed.

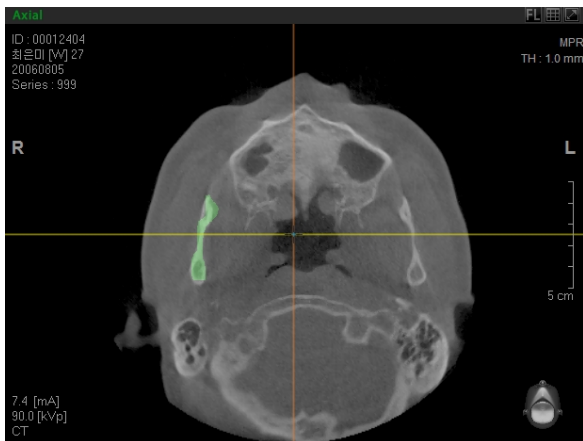
Draw Volume is a group of tools in varying volumetric shapes, to be used when selecting a particular area.

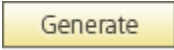
-  Use a Polygon form to draw the area to be measured. Click and drag to draw the polygon. Release the mouse button when finished.
-  Use a Rectangular Draw tool to draw the area in Rectangle form.
-  Draw the area to be measured in the form of an Ellipse.

Erase Volume is a group of tools to be used when deleting a particular area. Click, drag, and release to erase the drawn area.

-  Delete the drawn area in Polygon form.
-  Delete the drawn area in Rectangular form.
-  Delete the drawn area in Elliptical form.

To change the area of Axial view, browse the image using the wheel button on the mouse.

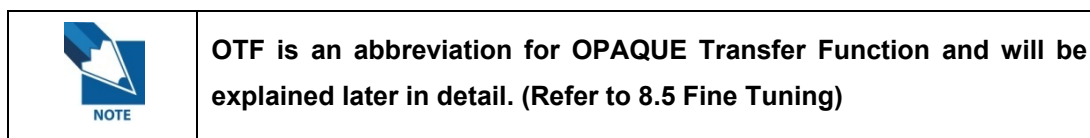


When the area to be measured has been set in, click the  button to create the volume.



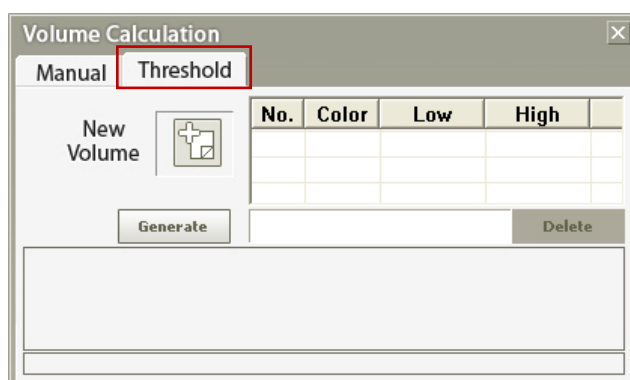
Note that after the execution of **Generate** function, the volume displayed in 3D view pane may look different from that of the volume selected in the Axial view. This phenomenon is caused by incorrect OTF settings of 3D image view.

To correct this, go to the menu bar then click **Tool** → **Fine Tuning** → **Coloring** and change the OTF area. After which, you will be able to view the entire volume of the set area in the 3D view.





<Threshold Volume Generation>

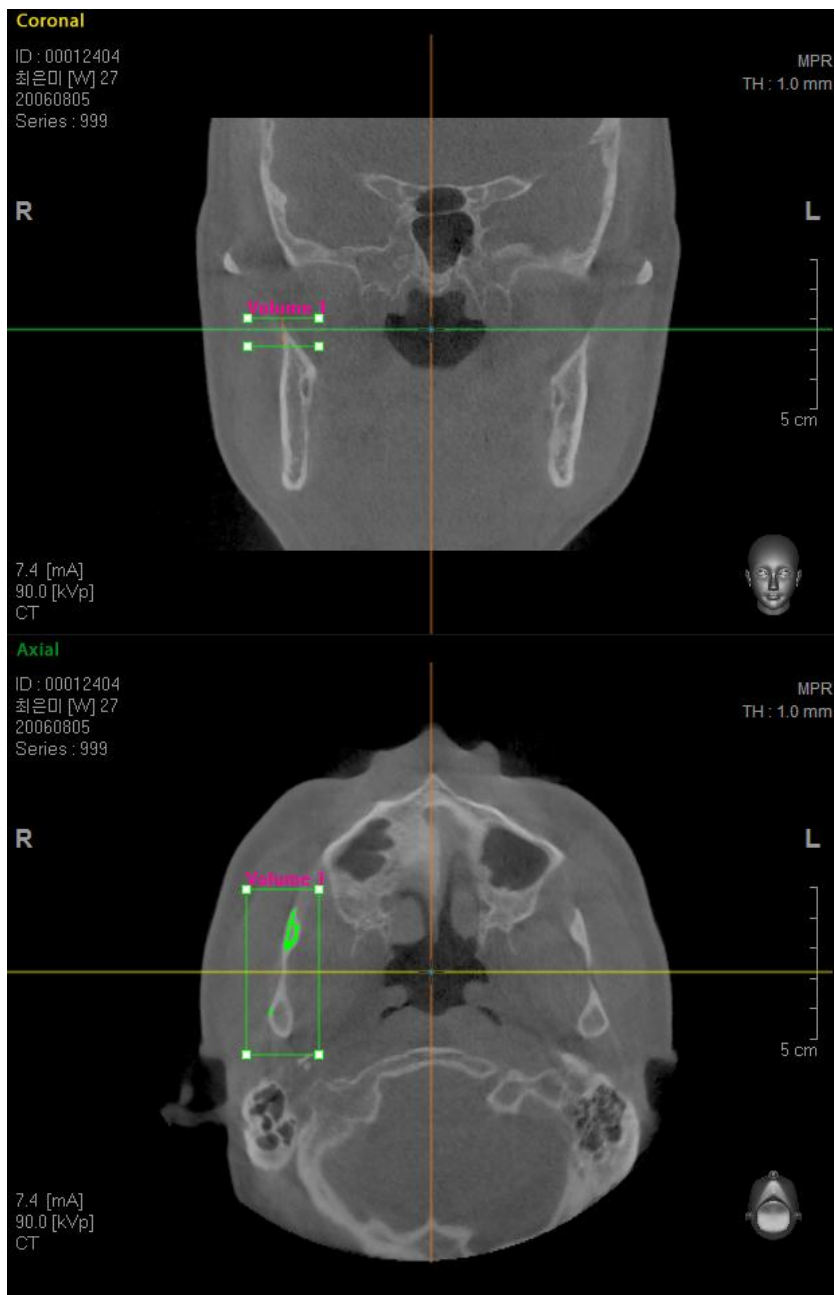
Volumetric value generation using threshold allows you to set the range to be calculated from both Axial and Coronal views, as well as the range of CT Value in order to measure the volume.



- **Setting Area**

Click the **New Volume** button  and set the areas on both Axial and Coronal views. The set area on the Axial image can be seen with rectangular borders.

After clicking **New Volume** () , set the volume measurement range on the **Axial** or **Coronal** image. When you set the volume measurement range on the Axial image, the height of the volume will be displayed automatically on the Coronal View and vice versa.



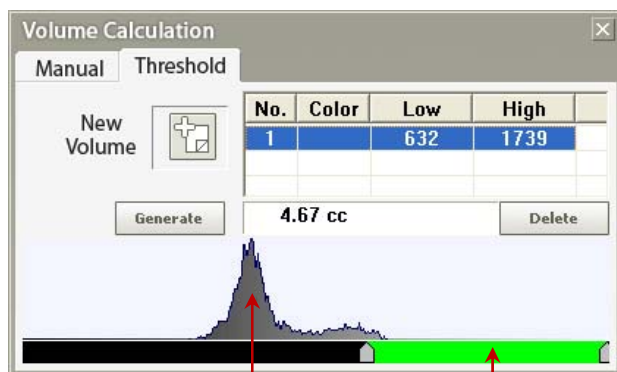
Range for volume calculation

It is possible to set the Axial Slice Scale in Coronal View. By dragging the borders of the slice scale (■) with the mouse, the slice scale can be modified.

The image scale in Axial View can also be set. Modify the area by dragging the square- shaped (■) borders with the mouse.

- **Threshold Setting**

When area setting is completed, set the Threshold scale for volume calculation using the slider beneath the Histogram. When you drag the slider, the selected area will be shown in Axial view with a modified color application. Checking this will enable the user to properly set the Threshold value.

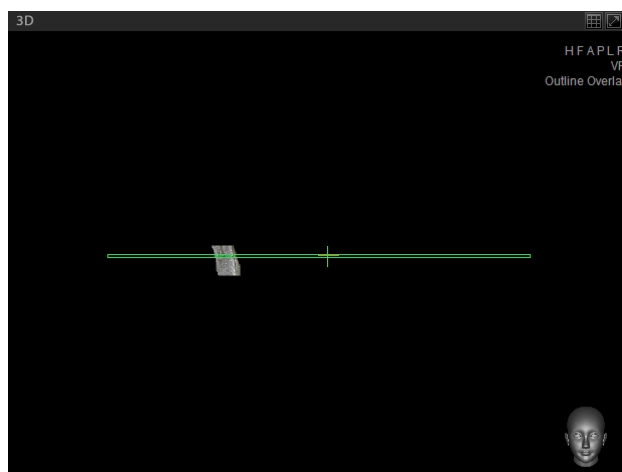
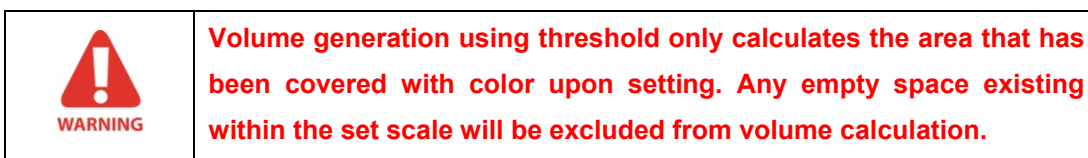


Histogram – shown in
Axial View inside a
Rectangular frame

Threshold Area set to
measure volume

- **Volume Generation**

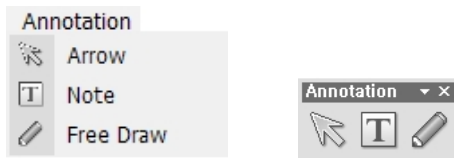
After clicking the **Generate** button, the resulting volume will be displayed in the 3D view window. If the set area in 3D view does not look correct, modify the OTF by clicking **Tool** → **Fine Tuning** → **Coloring** on the menu bar.



3D image of generated volume

5.4 Annotation

Annotation allows a user to put indicators on the image using Arrow, Note, and Free Draw utilities.



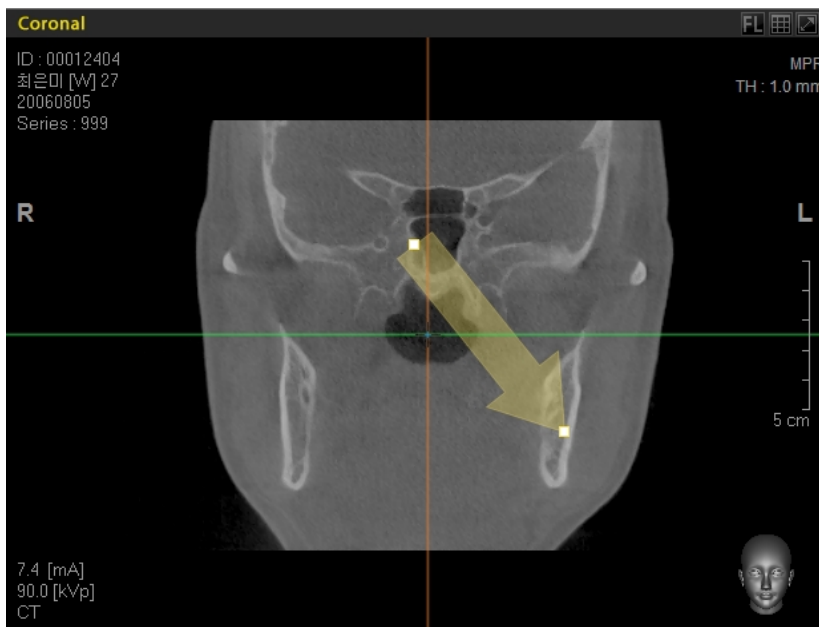
5.4.1 Arrow

To draw an Arrow, click on the initial point on the image then drag and click to the next point to complete the arrow.



On the Menu bar, click **Annotation** → **Arrow** or click the **Arrow** icon in the Annotation tool bar.

<Arrow Drawing>



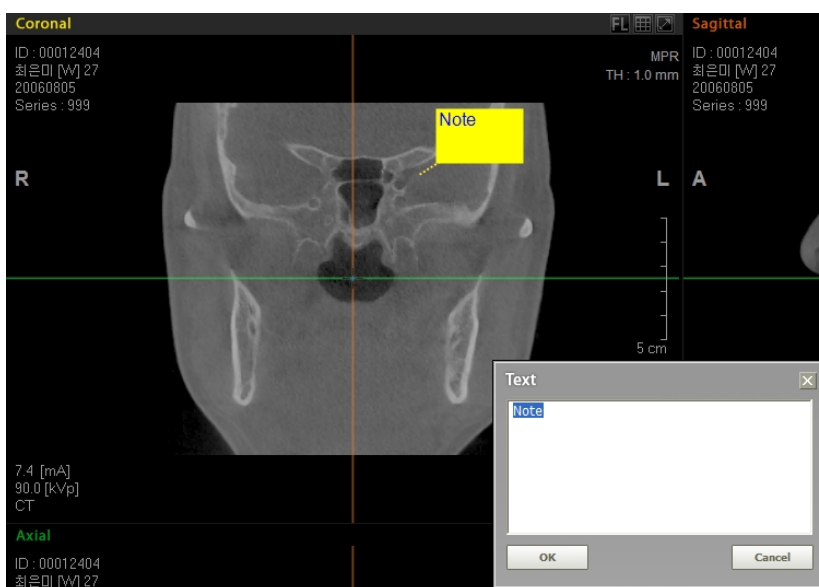
5.4.2 Note

To input a note on the image, click on the area where you want to insert the note. Then, a dialog box for inputting a note will appear, as shown below.



On the menu bar, click **Annotation** → **Note** or click the **Note** icon on the Annotation tool bar.

<Note Writing>



5.4.3 Free Draw

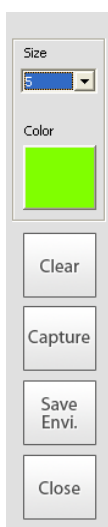
The Free Draw function can be utilized for both presentations and patient consultations. You can use this feature via the mouse or an electronic pen.




On the menu bar, click **Annotation** → **Free Draw** or click the **Free Draw** icon on the Annotation tool bar.

Upon clicking the Free Draw utility, a menu will appear on the left side of the screen.

<Menu Description>



- **Size:** Select a specified pen size.
- **Color:** Select a color for your Free Draw. User can customize the color according to preference.
- **Clear:** Erase all current Free Draw content
- **Capture:** Capture the current Free Draw content and save as file.
- **Save Envi:** Save the current Free Draw settings.
- **Close:** Close Free Draw.

| | |
|--|--|
|  <p>WARNING</p> | <p>When using this Free Draw feature, Ez3D plus runs at the highest level within Windows operating system, which means that no other program will run concurrently. If you attempt to use another tool within Ez3D plus or try to open another program, a message to confirm that you would like to close Free Draw will appear. Click the 'OK' button to exit.</p> |
|--|--|

5.5 Segmentation

Segmentation Tools enables a user to select, segment, and view specific areas.

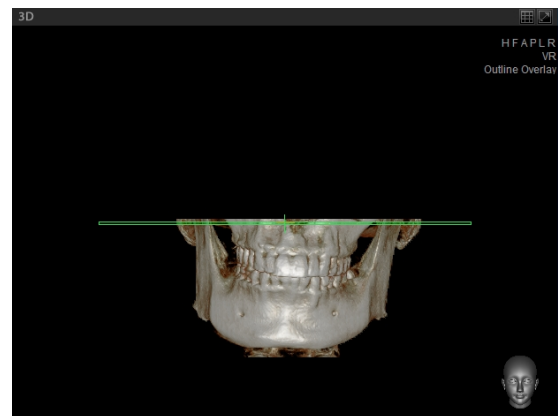
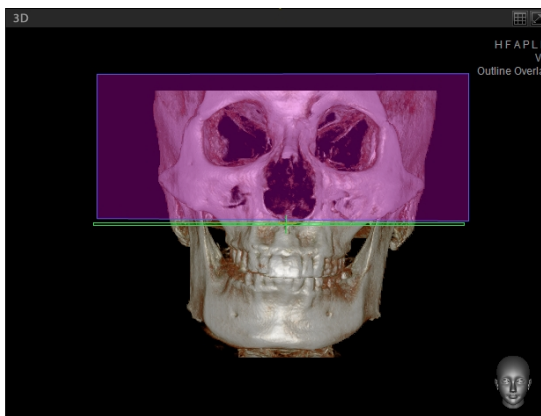


5.5.1 Sculpt

Allows the user to segment and delete areas of the image by drawing an arbitrary polygon.



On the menu bar, click **Segmentation** → **Sculpt** or click the **Sculpt** icon on the Segmentation tool bar. First, create two points by clicking the mouse cursor over the image. Move the cursor to another point and a polygon will be created. By dragging the mouse cursor, the polygon can be resized. Double click on the final point to complete area selection.



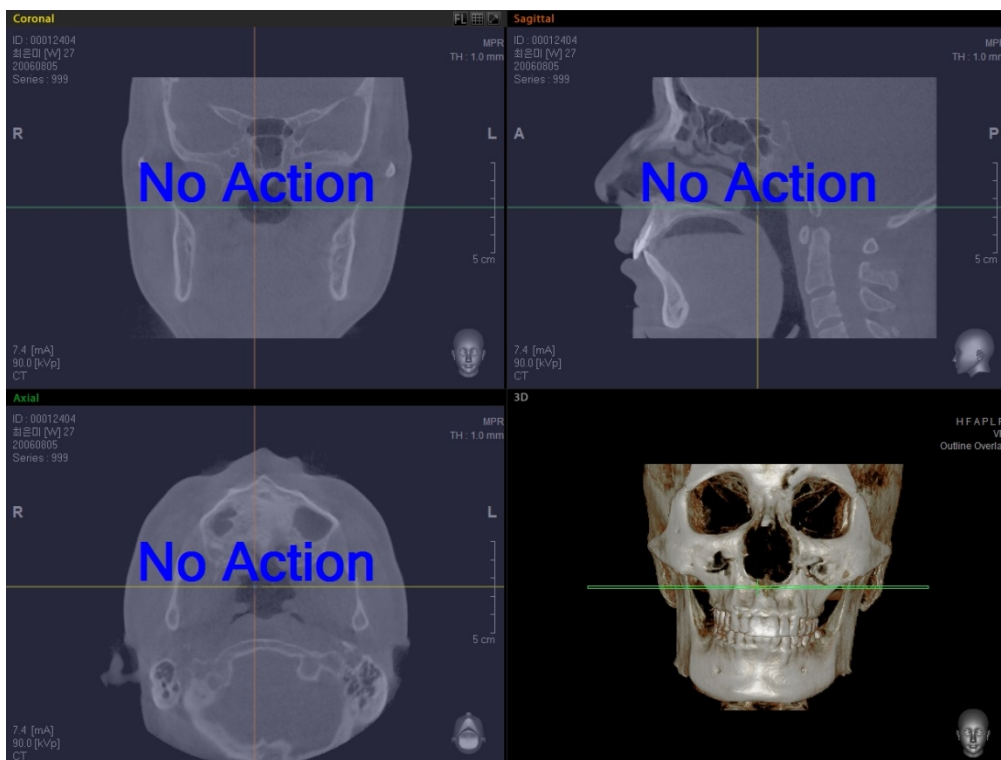
5.5.2 Opacity

By specifying the Opacity value for a particular region, it is possible to extract it from the image.



On the Menu bar, click **Segmentation** → **Opacity** or click **Opacity** on the Segmentation tool bar.

Click a point of region to be extracted from the image.





As shown above, the Opacity value has been extracted.

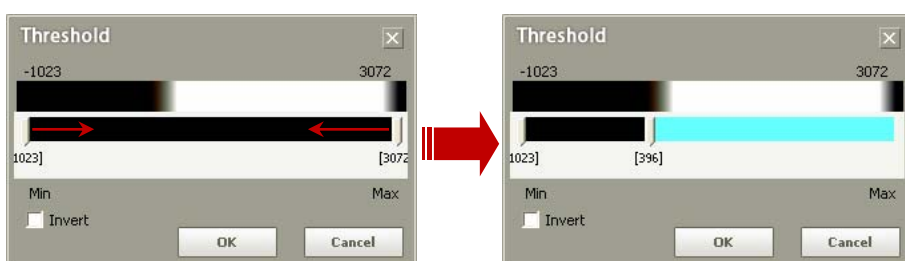
5.5.3 Threshold

This function is used to extract images using a threshold value.



On the menu bar, click **Segmentation** → **Threshold** or click the **Threshold** icon on the Segmentation tool bar.

The Threshold input window will be displayed, as shown below. Set the maximum and minimum values by moving the slider with your mouse cursor.





You can see that only the set value of the Threshold is extracted, as shown in the above image.


5.5.4 Apply Mask

During image segmentation, users are able to set simultaneous applications to both the 3D and MPR images.



To use this feature, on the menu bar, click **Segmentation** → **Apply Mask** or click the **Apply Mask** icon on the Segmentation tool bar.

By default, when **Apply Overlay** is selected, the MPR image will be modified as well. If it is not selected, only the 3D image will be removed and the MPR image will remain unchanged.

| | |
|---|---|
|  <p>NOTE</p> | <ol style="list-style-type: none"> 1. To set the Apply Mask OFF which is ON by default when running Ez3D plus, move to “View” in the “Setting” menu and set the Apply Mask OFF. 2. Then rerun Ez3D plus to apply the change. |
|---|---|

5.5.5 Reset Mask

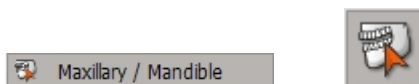
Restore the image segmentation to the default value.




On the menu bar, click **Segmentation** → **Reset Mask** or click the Reset Mask icon on the Segmentation tool bar.

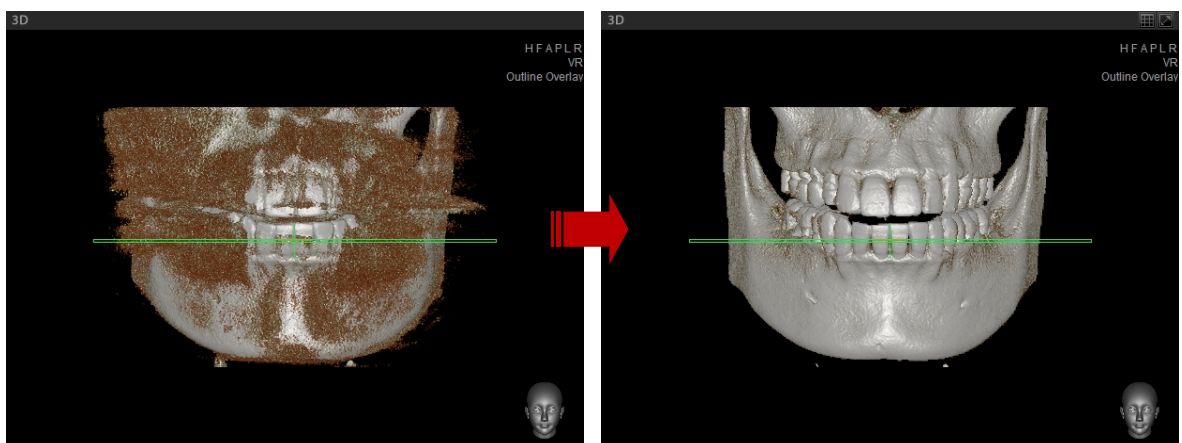
5.5.6 Maxillary / Mandible (Premium Version Only)

This function enables you to separate the Maxillary and Mandible of a 3D image.

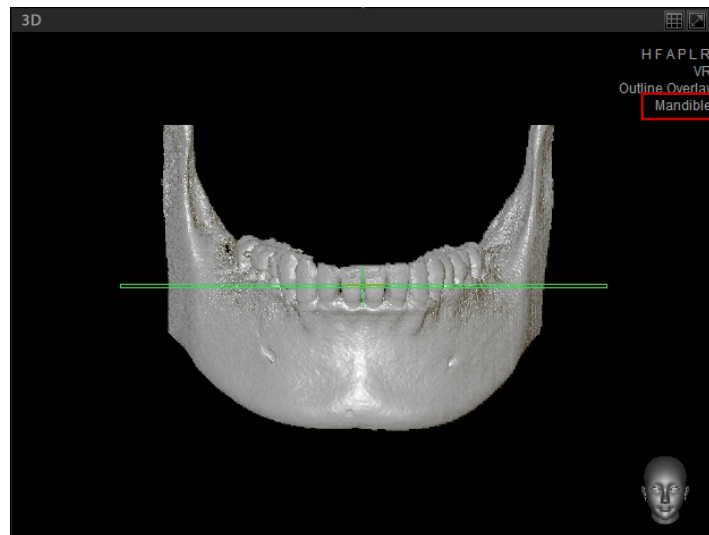
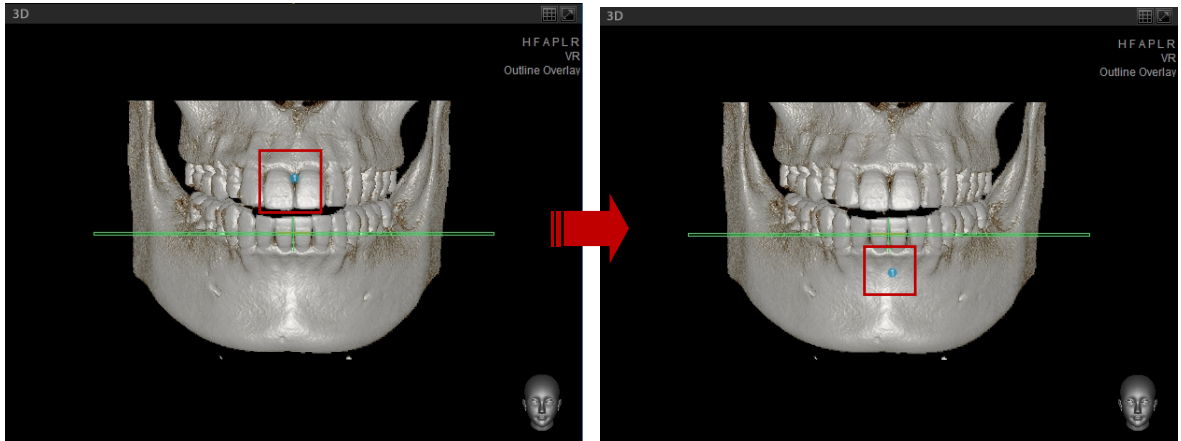


| | |
|---|---|
|  WARNING | <p>If you want to separate the Maxillary and the Mandible regions, you should use a CT image that was captured using a Bite. The Bite is necessary to create space in between the teeth's occlusal area, which will be the basis for the separation of the Maxillary and the Mandible.</p> |
|---|---|

First, adjust the OTF of the 3D image.

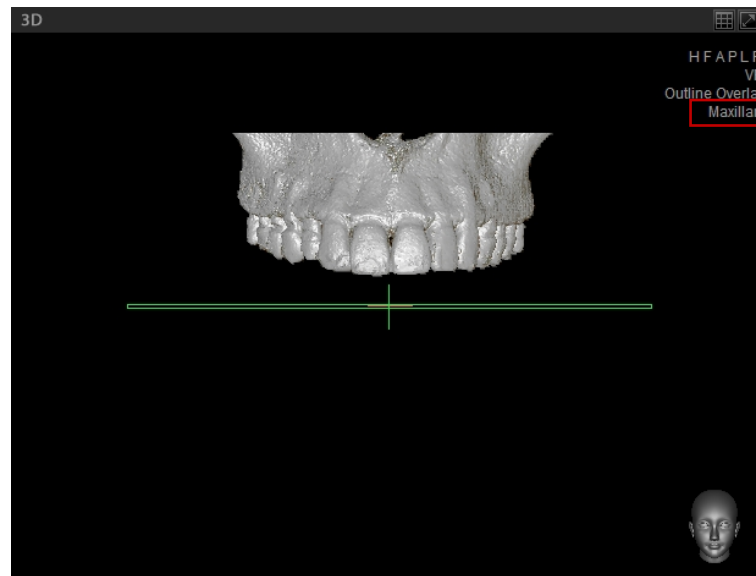


Click **Segmentation** → **Maxillary/Mandible** on the menu bar, or select **Maxillary/Mandible** icon on the Segmentation tool bar. Once the OTF of the image has been adjusted, select a point each on the **Maxillary** and **Mandible** area. The latter part selected will be shown.



Mandible

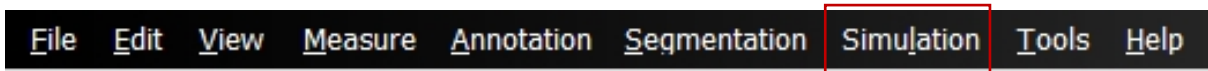
If you click **Maxillary** prior to **Mandible**, only the **Mandible** area will be shown. In reverse, if you click **Mandible** prior to **Maxillary**, only the **Maxillary** area will be shown.



Maxillary

If you want to change the view mode (Full3D, Maxillary/Mandible), select the view mode on the top right side of the 3D view screen.

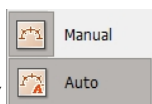
6 Curve Use



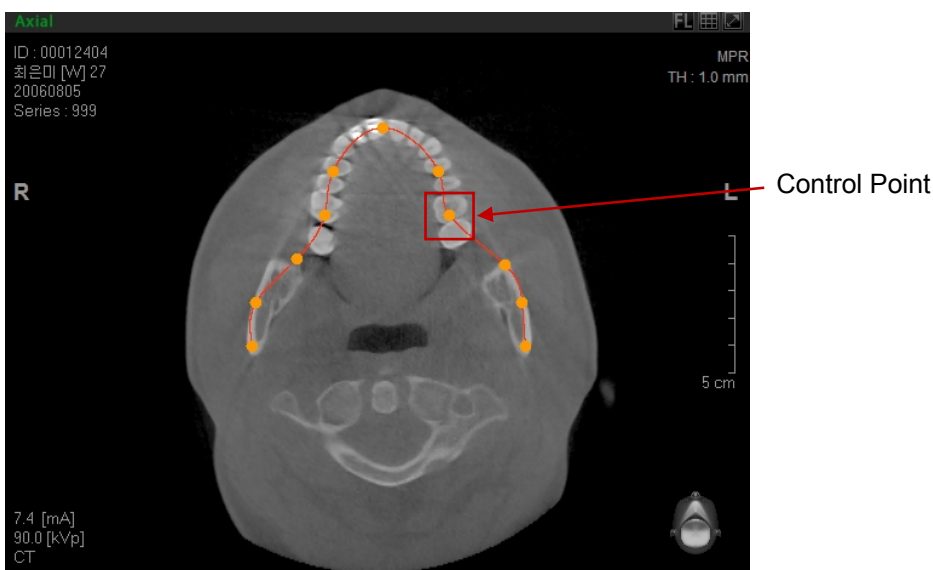
Curve refers to straight or curve lines defined in the 3D or MPR view pane.

6.1 Auto Curve (Premium Version Only)

The auto-curve can be run by either selecting from menu bar **Simulation** → **Panoramic Curve** →



Auto () or clicking **Curve** Tab. Then the curve is drawn in the Axial View automatically and cross-sectional images are generated.



<Curve line manipulation>

You can manipulate the drawn curve in the following ways to acquire the managed results.

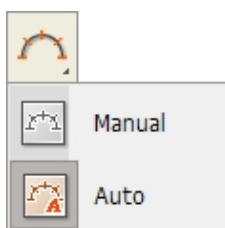
- **Moving the control point:** changes the curve shape by clicking and dragging the control point .
- **Moving the Curve line:** moves the entire curve without changing shape when clicking and dragging curve.

- **Removing Control point:** selects **Remove Point** after clicking the right mouse button on the control point.
- **Adding the control point:** adds new control points on the curve by clicking the right mouse button → **Insert Point** and on the curve where new control point is to added, click the left mouse button.

6.2 Manual Curve



On the menu bar, click **Simulation** → **Manual** or click the **Panoramic Curve** icon on the Simulation tool bar. Two sub tools will appear, as shown below.



Select **Manual Curve**. For dental image, its direction varies depending on the position along the dental arch. Generally, the image is analyzed by making cross-sectional views with each of them perpendicular to the arch. There are two ways to make cross-sectional views — partial and full arch

<For Partial Arch image available>

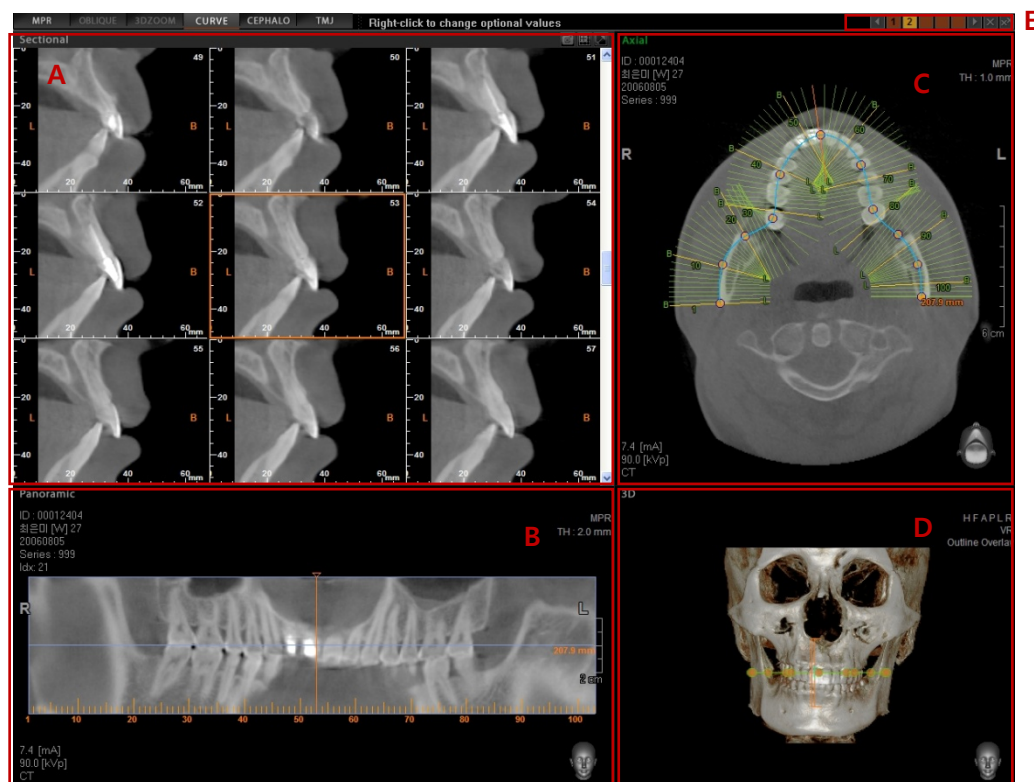
- In this situation, it is not possible to easily see the direction of the occlusion and teeth, as well as the position of the root apex. Rotate the axes in Axial view by positioning the x-axis (Coronal) parallel with the arch.
- Click and drag the inner part of the axes in Axial view pane so that the X-axis (Coronal) will be moved towards the position of the arch.
- The Coronal View Pane will display an image that looks like a Panoramic Image. If you want to analyze the whole dental arch, rotate the X-axis(Axial) of Coronal view so it becomes parallel with the occlusion. But if you want to analyze a specific tooth only, rotate the X-axis (Axial) of Coronal view and position it parallel to the tooth site to be analyzed.
- For accurate arch setting, move the X-axis (Axial) in Coronal view along the root apex.
- Draw the Panoramic Curve.

<For Full Arch image available>

- Rotate the X-axis (Axial) of Coronal view so that it becomes parallel with the occlusion.
- Rotate the X-axis (Axial) of Sagittal view so that it becomes parallel with the occlusion.
- Move the X-axis (Axial) of Coronal view to the position of the root apex.
- The 3D image helps to easily find the occlusion site.
- Draw curve on the Axial view.





6.3 Cross-sectional View

The Cross-sectional View is composed of Cross-sectional, Axial, Panoramic, and 3D image views. The locations of the currently displayed Cross-sectional image views and panoramic image can be checked through the Axial image view, while the positional identification of the Cross-sectional View can be checked through the 3D image view.



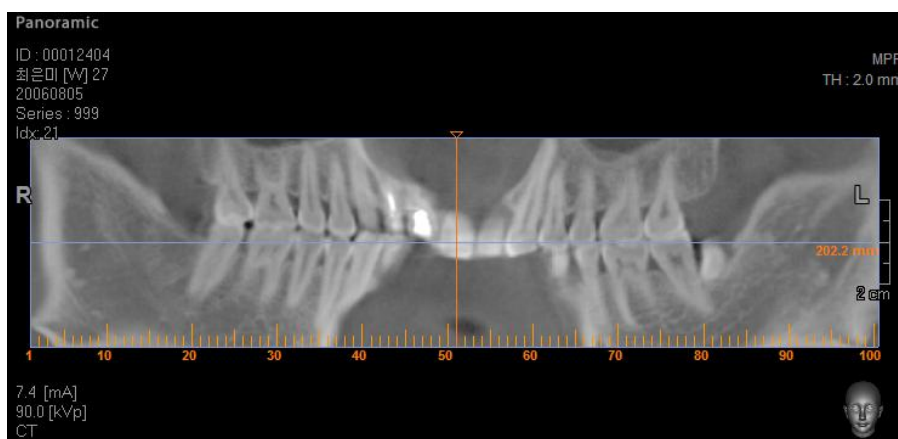
A. Cross-sectional Views

Cross-sectional view allows the user to see consecutive cross-sectional images vertical to the arch. The structure of Cross-sectional View is shown in the above figure. Note that each frame has a ruler, which measures the actual length. Due to directional change of the view, for example, right to left, depending on the positions, the marks **L** (lingual) and **B** (buccal) are used to distinguish the directions.

- Auto Canal Detection ()
- **Cine Player** (): Generate a movie-like presentation of the cross-sectional image slices, which you can also save as a file.
- **Cross-Section all Capture** (): Save the currently created Cross-sectional Images as a file (JPEG, DICOM).
- **Layout Modification** (): Modify the screen composition of Cross-sectional Images to a layout ranging from 1X1 to 4X4.
- **View/Measure Functions**: Users are able to use Windowing, Zoom, and Measure tools. For a detailed description of each of these functions, refer to **Chapter 5 Image Processing**.

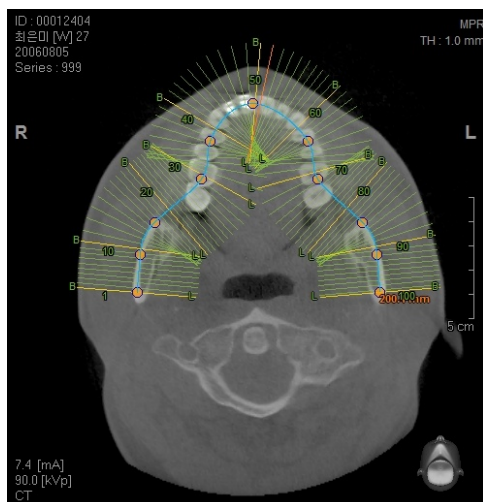
B. Panoramic view


- Displays the Panoramic view of the set curve. In Panoramic view, scroll the mouse to move the arch view and analyze the image. By doing this, you can assess the teeth and their neighboring structures.
- Click and drag the line at the top or at the bottom of the panoramic image frame to modify the view size.
- By dragging the yellow indicator in the middle of the panoramic image, you can modify the currently displayed Cross-Sectional view slices.
- Using the Multi Slice View utility makes pre and post treatment assessment and identification of the teeth in relation to the neighboring structures easy.



C. Axial view

- Using the Axial image view, the location of both Cross-sectional image slices and panoramic image, which are currently displayed, can easily be identified. Using the mouse wheel, scroll to see the Cross-sectional view in Axial image.





- The curve position can be modified through clicking and dragging the curve line using the mouse.
- The curve shape can also be modified by clicking on the control point  of the curve line, then dragging and dropping it.
- A single mouse click on a cross-sectional slice will move the indicator line to the Cross-sectional position of the clicked area.

D. 3D View

Using 3D view, it is possible to identify the position of the Cross-sectional and Panoramic image views in a more intuitive way.

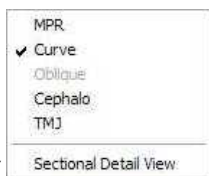
E. Curve – List Manager

You can make up to seven arch curves. The Curve List Manager, which is located on the upper right of the panoramic screen, shows the number of curves made. To delete a curve, select the curve number on the list then click the X button. If you want to delete all curves in the list, click the **XX** button. You can browse the curve numbers by using  and .

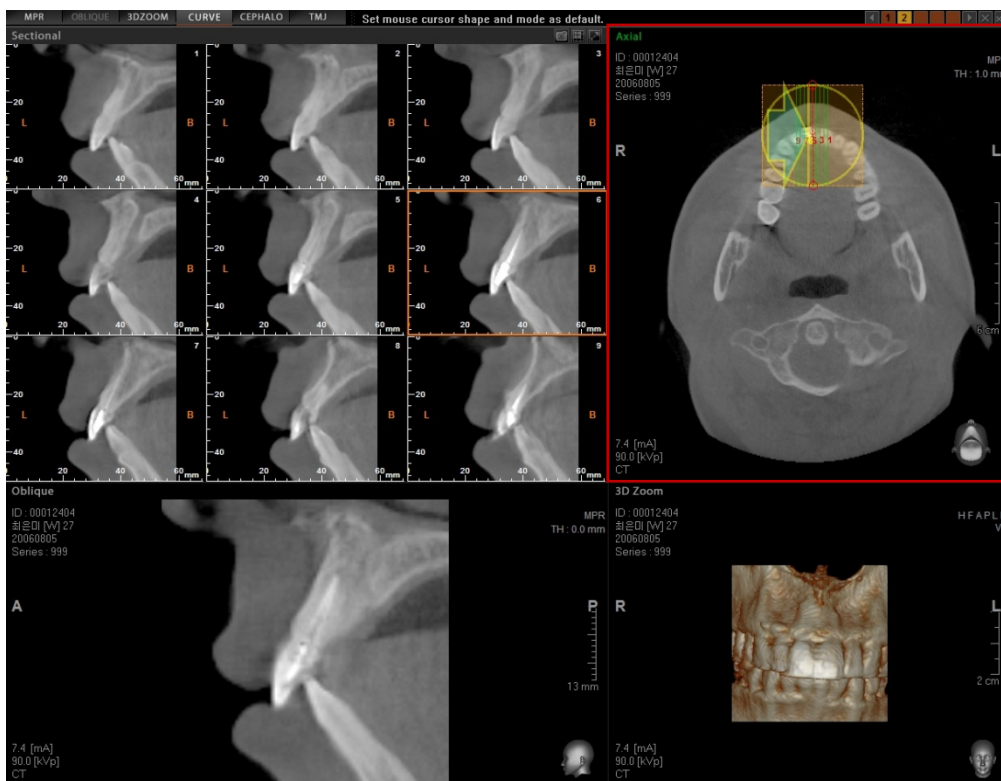


6.4 Sectional Detail View (Professional Version Only)

Sectional Detail View provides detailed information of a specific area when using Curve View mode. Right click the mouse on the Axial View Pane and a sub menu will appear. Select **Sectional Detail**



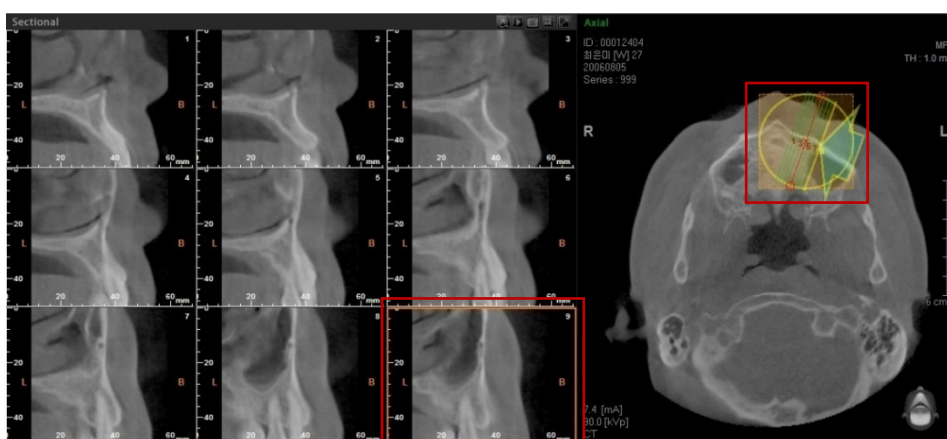
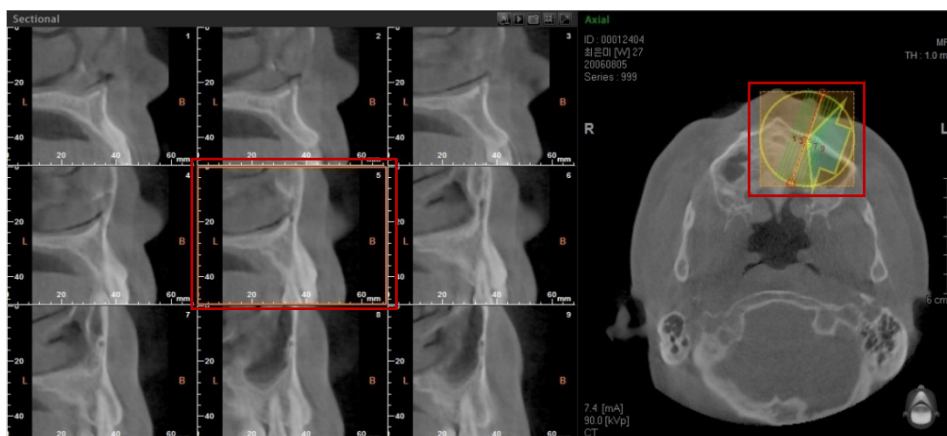
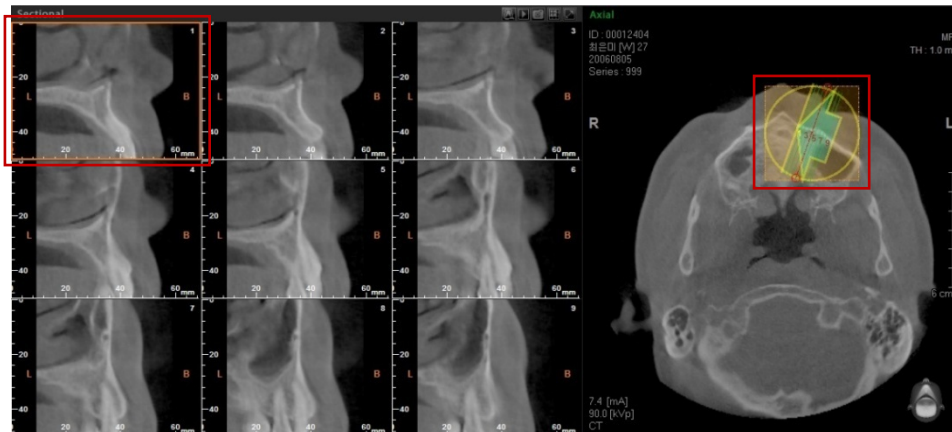
View () from the menu and the Panoramic and 3D image views will disappear and will be replaced with Oblique and 3D Zoom image views.



The Axial view provides the tools that will allow the user to change the location and direction of the focused area on the image for detailed viewing, as well as to zoom in the focused area.

<Sectional View Identification>

This function is used to display 9 image frames of Sectional View. The location of each of these 9 images can be identified using the Sectional Detail View.

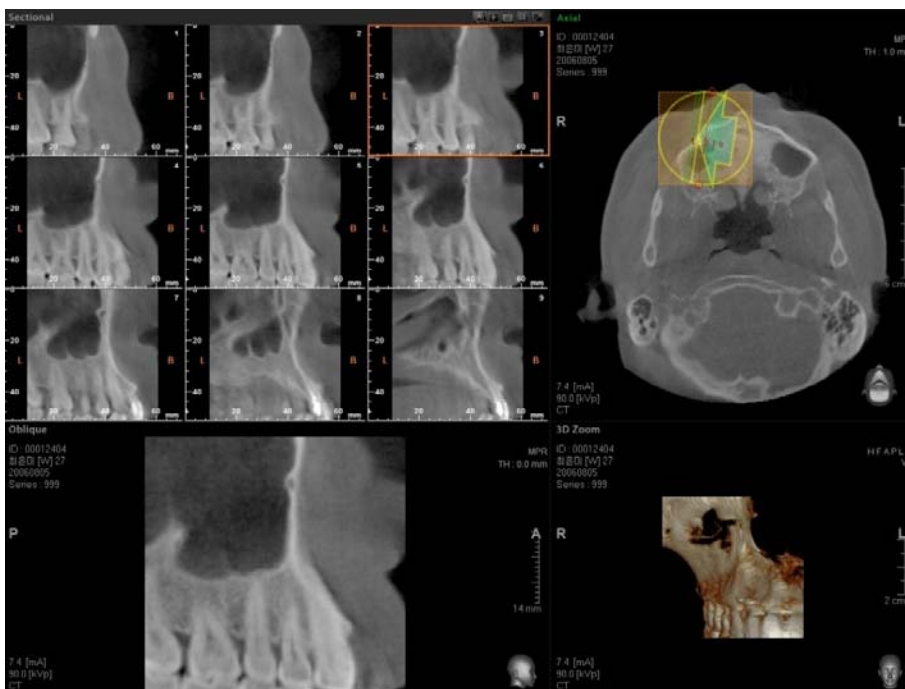
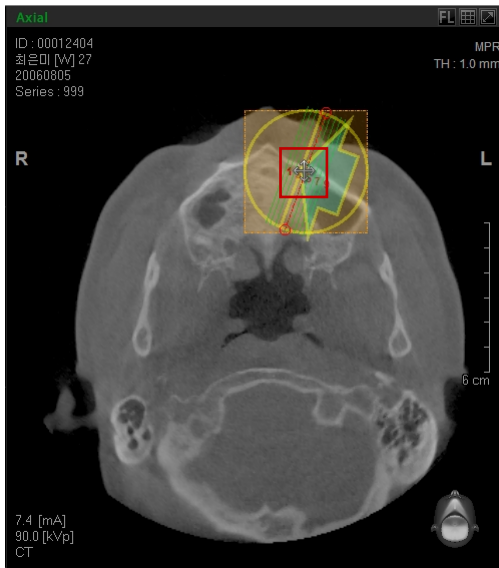


When selecting a specific image from the Sectional View, a yellow outline appears on the selected area. With this, you can identify the location of the sectional image view using the yellow outline, as well as the arrows inside the yellow circle in Sectional Detail view.

<Sectional Detail View Movement>

This Sectional Detail View can be moved or rotated in order to modify the Sectional, Oblique and 3D Zoom.

Place the mouse at the center of the Sectional Detail View, as shown below. Click and move the Sectional Detail View to the desired location, then release the mouse button. At the same instance, the Oblique, Sectional, and 3D Zoom images will also be modified.



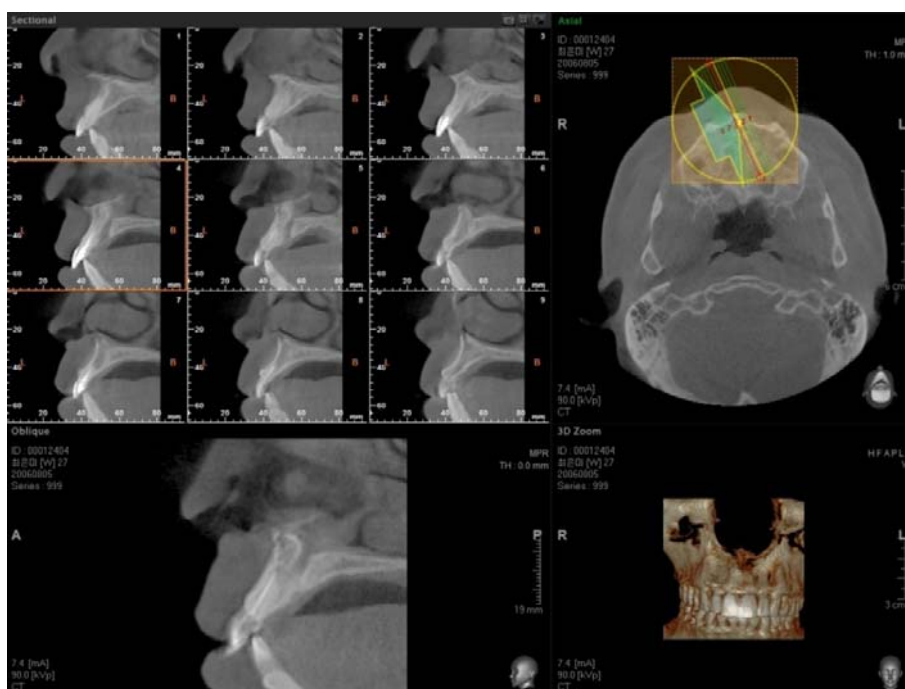
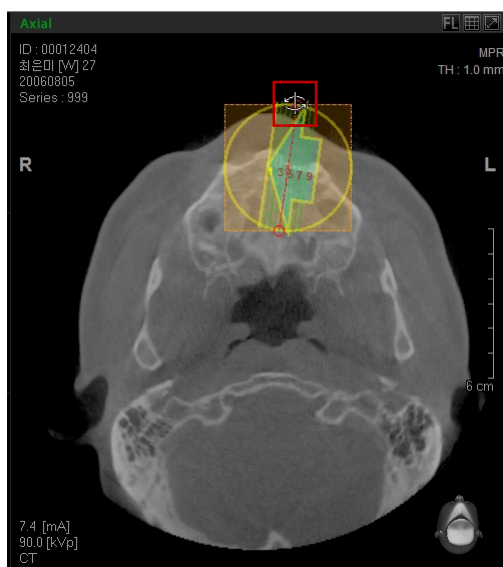
<Sectional Detail View Enlargement /Reduction and Rotation>

Place the mouse cursor on the red-colored circle in order to rotate and enlarge/reduce the Sectional Detail View.

- **Rotation**

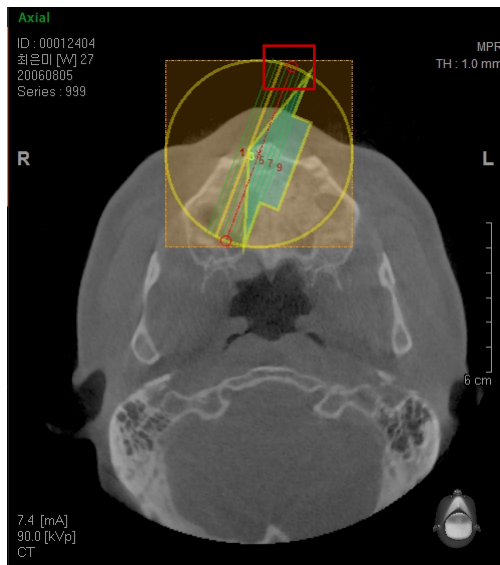
When the cursor is placed on the red-colored circle in Sectional Detail View, the mouse will change shape to show that it is ready to be rotated. After adjusting it to the desired direction of the user and releasing the mouse, the images of Oblique, Sectional and 3D Zoom View will be modified.

If you scroll the mouse wheel in Oblique view, the Sectional Detail View will also be rotated.

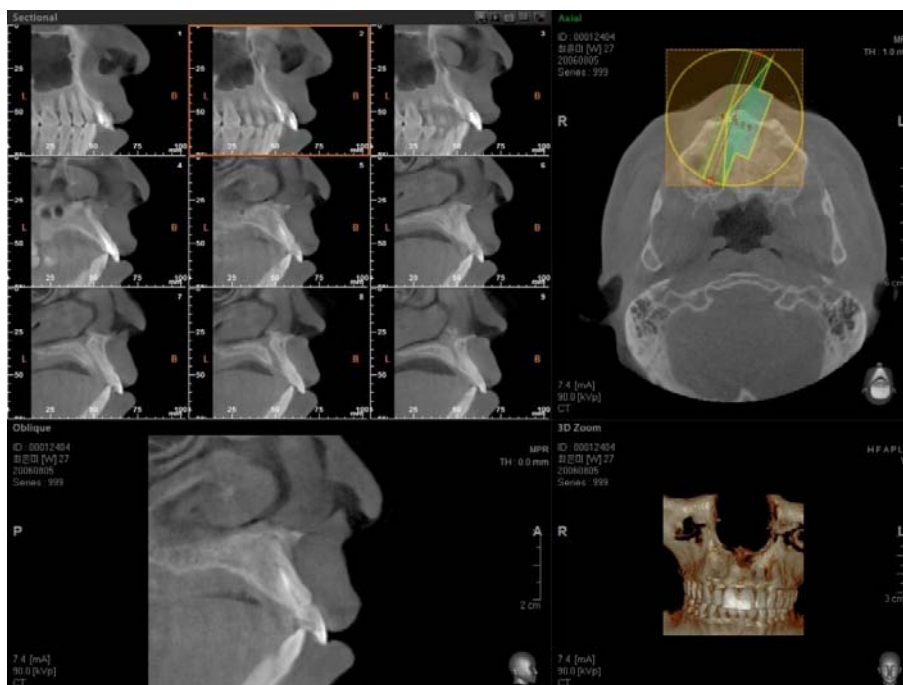


- **Enlargement / Reduction**

As shown in the picture, place the mouse on the small red circle of Sectional Detail View. Drag the mouse and adjust the size of the yellow circle and the square dotted frame. After dragging, release the mouse to see the modified Oblique, Sectional, and 3D Zoom image views.

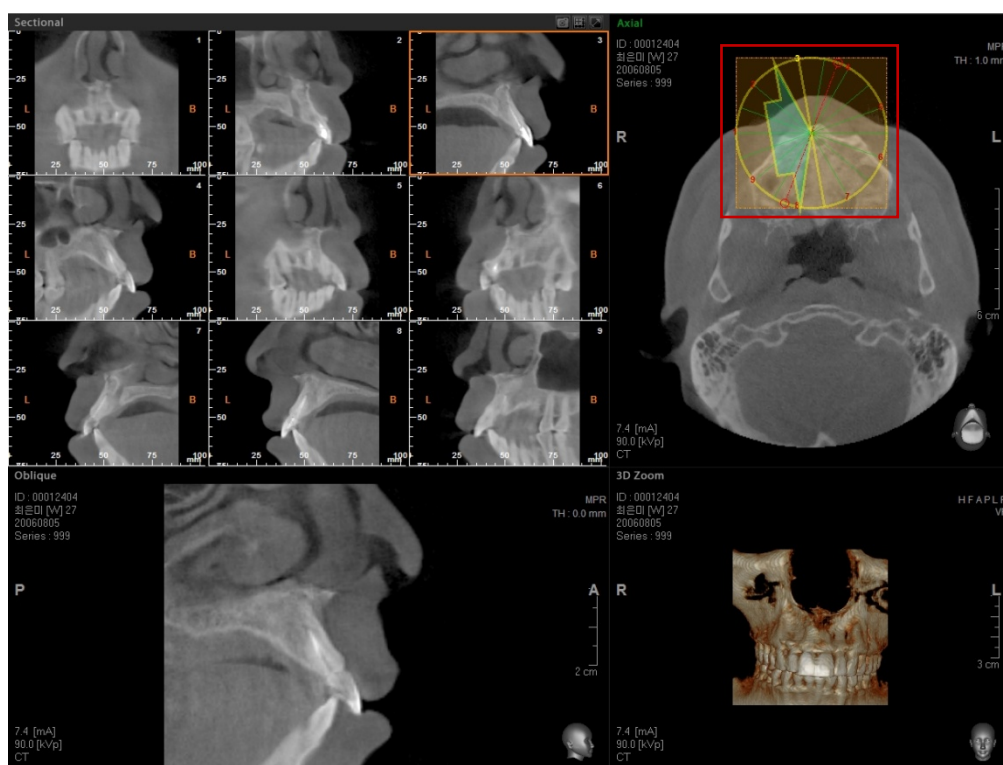
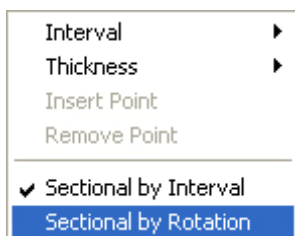


When the yellow circle and the square dotted frame are enlarged, the Oblique, Sectional, and 3D Zoom image views are reduced.



<Sectional View by Rotation>

Click the right mouse button on the Sectional Detail View to display the menu for changing the view mode. Click **Sectional by Rotation**, and the shape of Sectional Detail View changes. By using **Sectional by Rotation**, it is possible to view the Sectional images which are rotated to a certain degree with a center point.

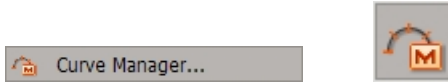


Move the wheel mouse on the Oblique view and you will also be able to rotate the Oblique image, which has the center of the Sectional Detail View as its base. By scrolling the mouse wheel, you can rotate it to an angle of 2 degrees at a time. But if you press and hold the Ctrl key while scrolling the mouse wheel, the image can be rotated at an angle of 10 degrees at a time.

The method used for move, enlarge/reduce, and rotate functions is the same as the method used in sectional by Interval.

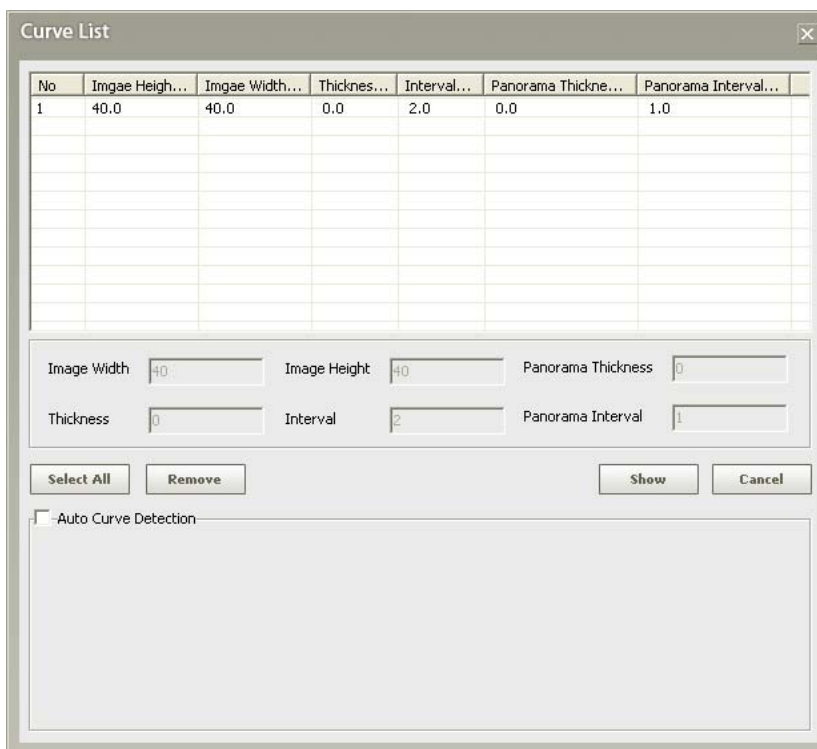
6.5 Curve Manager

A drawn curve can be shown or be deleted using the Curve Manager.

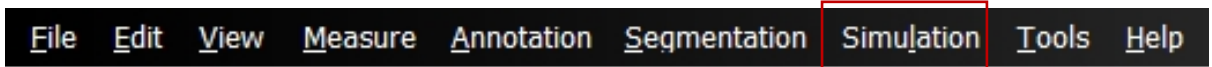


On the menu bar, click **Simulation** → **Curve Manager** or click the Curve Manager icon on the **Simulation** tool bar.

Curve List Window will be displayed as shown below. It is possible to select the desired curve or all curves for deletion.



7 Simulation



7.1 Canal Drawing

Canal Drawing can be used to explain the relation and proximity of the patient's teeth or implant fixture to the canal during patient consultation. Ez3D plus provides functions of **Canal Drawing** and **Canal Manager** as well as **Auto Canal Drawing**.

7.1.1 Canal Drawing

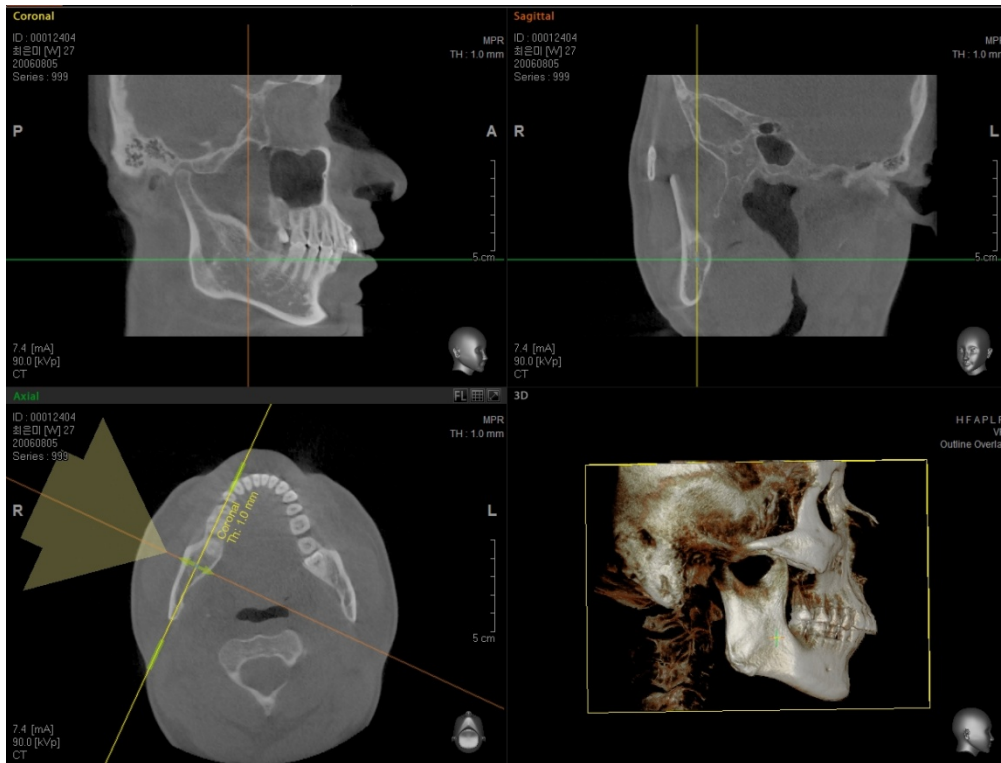
Ez3D plus provides an easy way to draw the path of the canal by using Coronal View and Curve/Cross-Sectional Views. In coronal view, draw the path of the canal by placing points along the canal route after adjusting the axis for good visibility of the canal. Finish setting the canal's path by double clicking to place the final point.

<Axis Adjustment>

Adjust the rotating axis to show the canal in Axial view, as shown in the following picture, and rotate the Coronal Axis so that it becomes parallel to the arch where the canal will be drawn. To find a more accurate arch position, adjust the Coronal Axis in Axial view again after rotating the Axial axis in Coronal View so it will be parallel to the occlusion.

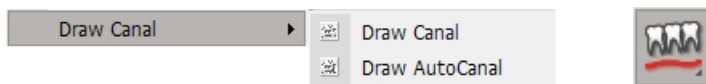
7 Simulation

7.1 Canal Drawing

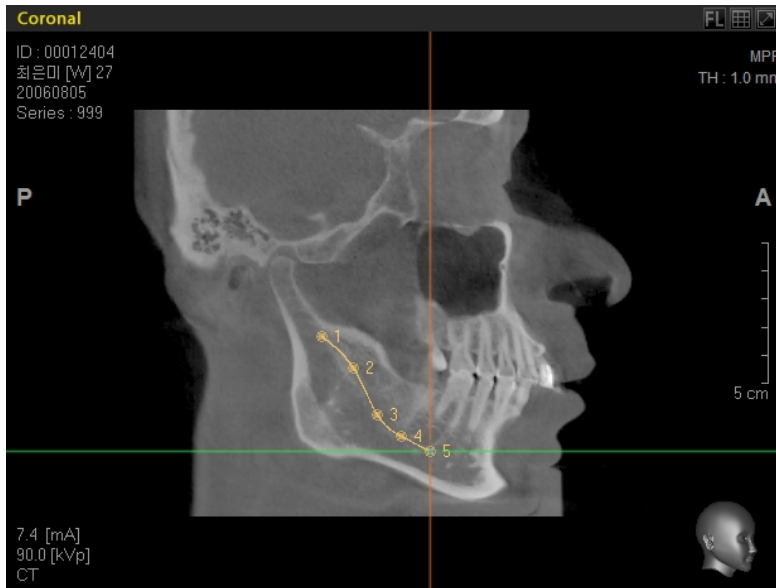


<Canal Drawing>

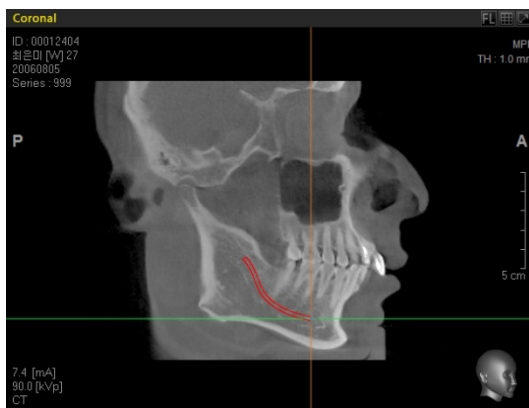
On the menu bar, click **Simulation** → **Draw Canal** or click the **Draw Canal** icon on the Simulation tool bar.



In coronal view, draw the path of the canal by placing points along the canal route, as shown below, after adjusting the axis for good visibility of the canal. Finish setting the canal's path by double clicking to place the final point.



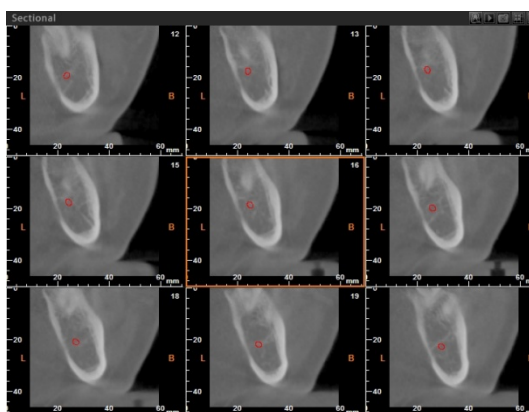
You can check the path of canal in MPR, 3D, Panoramic View.



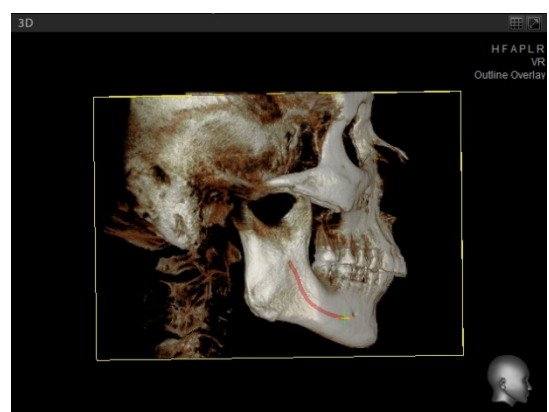
Canal Path at Coronal Image



Canal Path at Axial Image



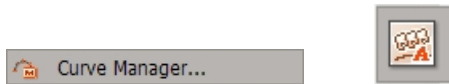
Canal Path at Sectional Image




Canal Path at 3D (VR)

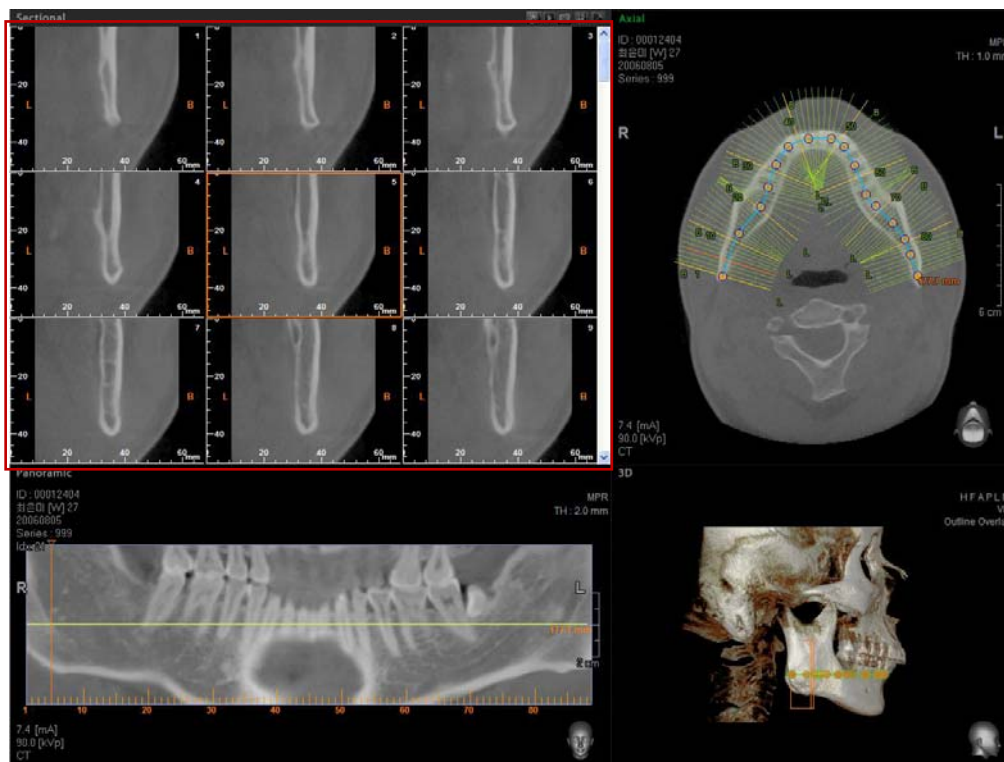
7.1.2 Auto Canal Drawing

Draw Auto Canal function enables you to detect the canal path automatically just by clicking the initial point and the end point of the path.




Generate Cross-sectional View using the **Curve** tool.

| | |
|---|---|
|  NOTE | For more details on plotting the Curve, refer to 'Chapter 6 Curve Use'. |
|---|---|




Adjust the **Panoramic View** image in order to visibly show the canal path, and then check the canal location by magnifying the Sectional Image View.



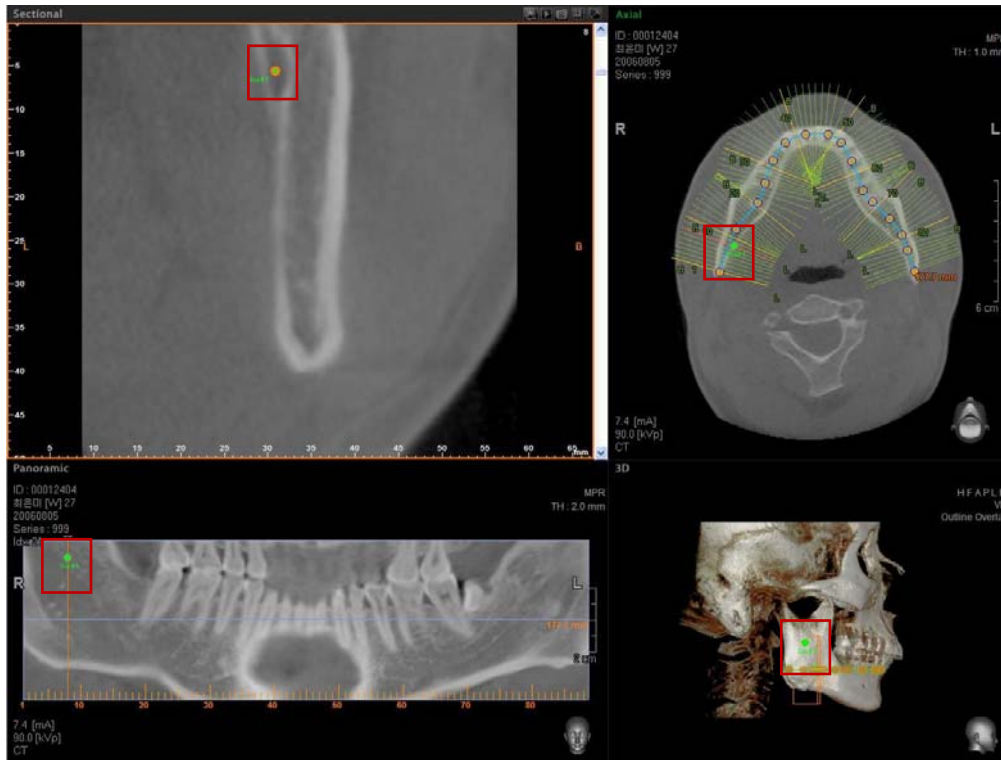
Click **Simulation** → **Draw Canal** → **Draw AutoCanal** on the menu bar, or click **Auto Canal Icon** on the tool bar. Another way to execute the Auto Canal Function is by clicking () **Auto Canal Detection** button in the sub tool of the Sectional View.

When you click on the initial point of the canal path in the Sectional View, **Seed1** will be shown on the selected canal.

| | |
|---|---|
|  <p>NOTE</p> | <p>When you draw a canal path using Draw AutoCanal function, an image that shows the clean canal is needed. It will automatically draw the canal. After automatic drawing, you should check the drawn canal.</p> |
|---|---|

7 Simulation

7.1 Canal Drawing



Use the scroll bar to check the end point of the canal path on the sectional image. Then click on the final point, and the canal path will be detected automatically.



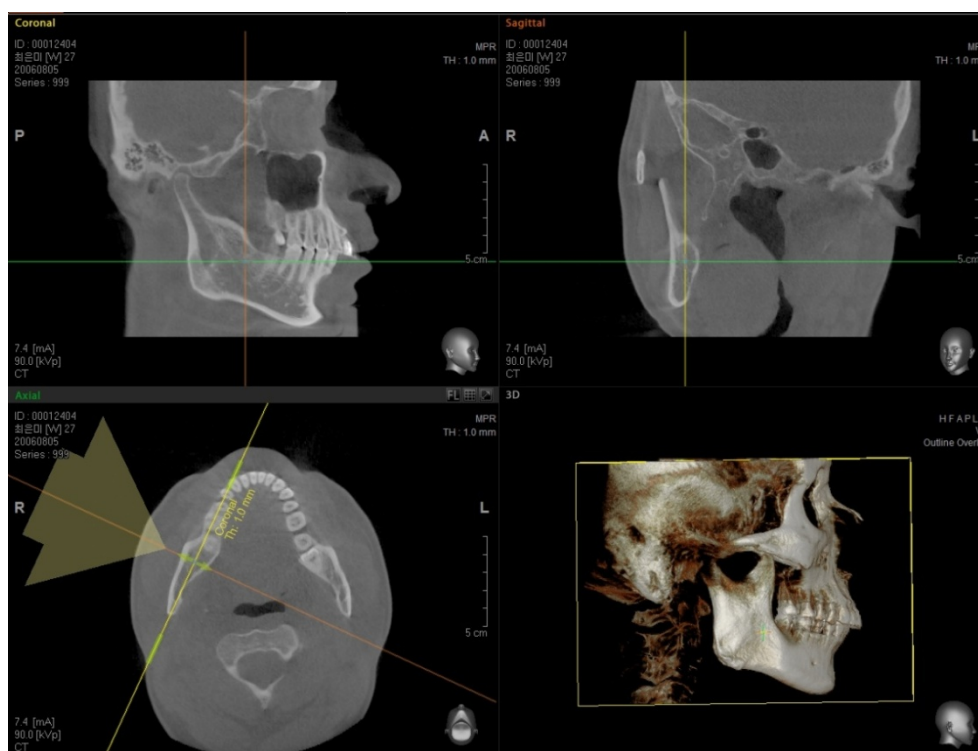


7.2 Implant

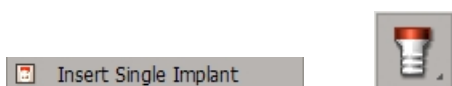
The functions provided for implant simulation are Implant Insert (Single, Multiple), Implant Manager, Implant Library Manager, and the ability to show bone density for the area surrounding an implant. Users are able to establish more accurate treatment plans and increase their patient consent ratio for treatment by using the simulation function. Implant Simulation provides **Customized Implant** and **3D Fixture Implant**, which uses 3 dimensional implant design data. The Implant Library allows user to input, edit, or delete implant fixtures.

7.2.1 Insert Single Implant

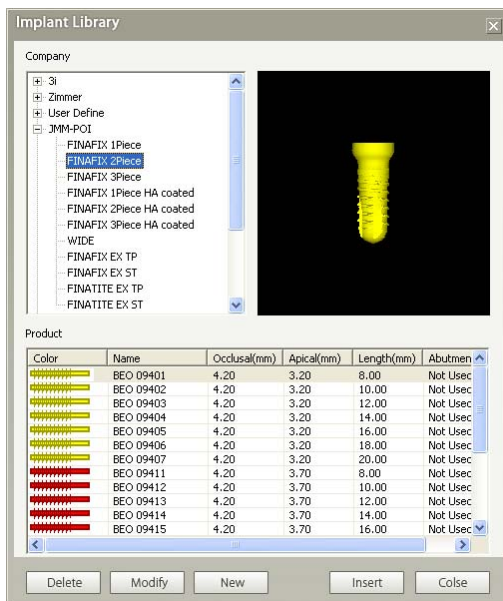
When inserting an implant, the axis for implant placement should be adjusted so it would be perpendicular to the arch, as shown below. Rotate the Coronal axis on the Axial image view. When the Coronal view resembles that of a panoramic image, rotate the Axial axis in Coronal view to be parallel to the arch and move the Sagittal axis to the implant placement position.



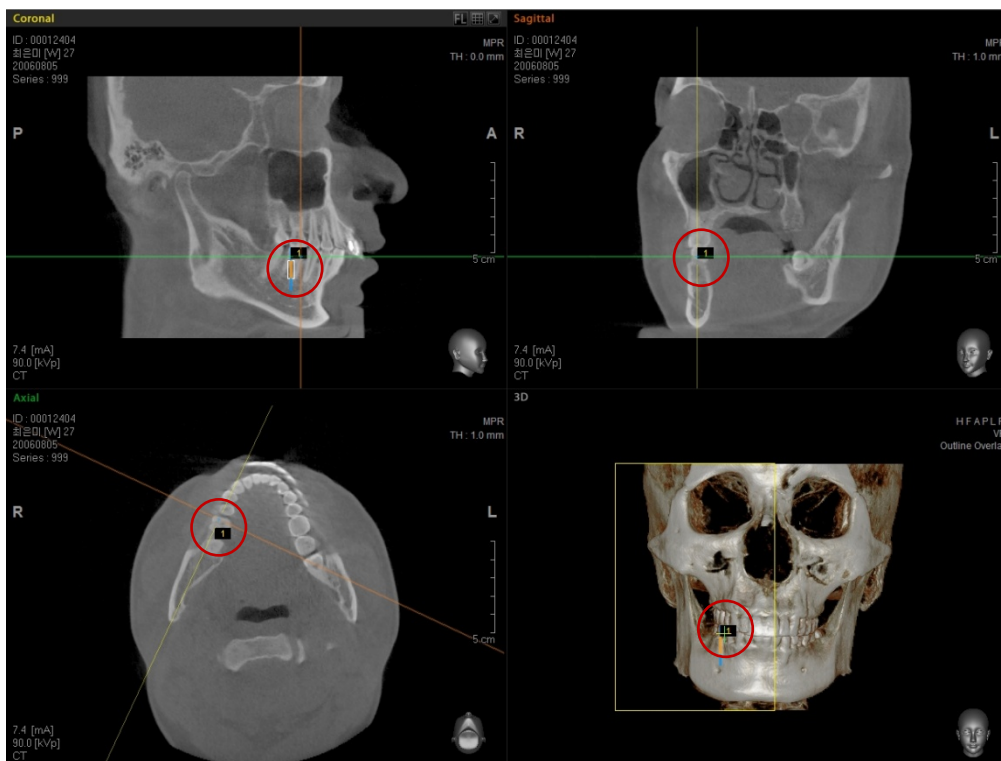
On the menu bar, click **Simulation** → **Insert Single Implant** or click the Insert Implant icon on the Simulation tool bar.



The Implant Library window will appear, as shown below. Select the desired implant.

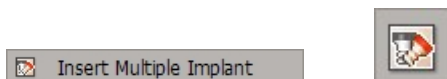


After selecting the implant, click the **Inset** button to activate the implant. Click the mouse on the image where the implant is to be placed. Users will be able to identify the Implant in both MPR and 3D window views, as shown below.



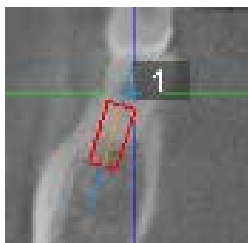
7.2.2 Insert Multiple Implant

In the menu bar, click **Simulation** → **Insert Multiple Implant** or click the **Multiple Implant** icon on the Simulation tool bar.



Follow the same method as **Insert Single Implant** after choosing your preferred implant fixture. Place the implant on the implant site by clicking the mouse. If you click again, another implant of the same type will be placed again. Double click to end the implant placement process.

<Implant Move/Rotation>



By dragging an inserted implant, you can move it to its proper location.

By dragging the rotating axis as shown above, the implant can be rotated.

<Implant Context Menu>




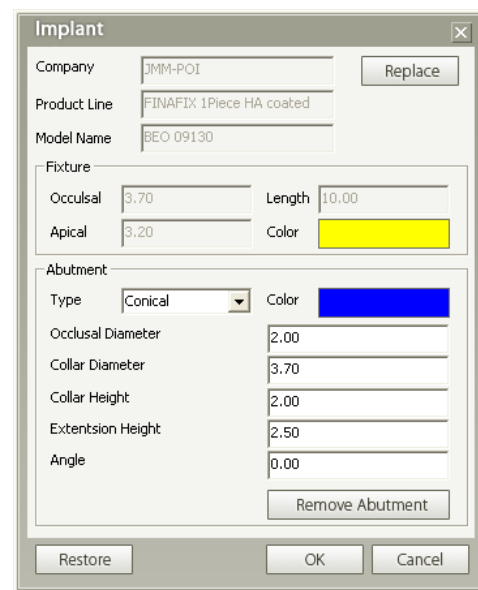
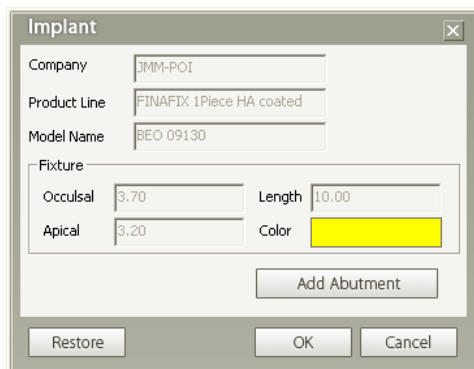
| | |
|----------------------|--|
| Find Similar Implant | Display implants of similar length and width. |
| Replace | Replace the implant with another from the Library. |
| Hide | Hide Implant. |

| | |
|-------------------|---|
| Remove | Delete Implant. |
| Go to Center | Move MPR axis to the center of Implant. |
| Show Bone Density | Show Bone Density for the area surrounding the implant. |
| Property | Set/View Implant properties. |

Using the Property setting, the implant’s color, length, or abutment property can be modified. And can be replaced with a new implant.

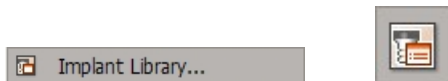
Also, you can adjust the angle of abutment towards Lingual/ Buccal by entering angle in the range of -20 to +20° in the Angle field of Abutment property.

| | |
|---|---|
|  <p>NOTE</p> | <p>To make use of this abutting feature, select first the “Angled” in the Type field of Abutment property.</p> |
|---|---|

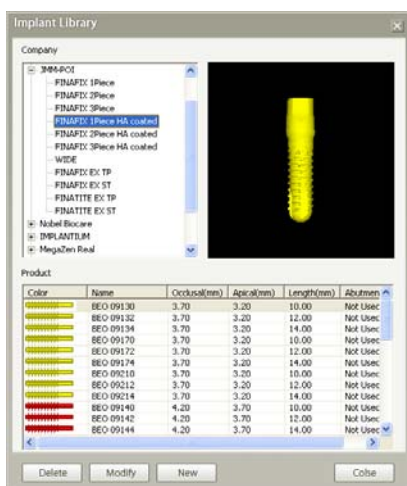


7.2.4 Implant Library

Implant Library provides **Customized Implant** and **3D Fixture Implant**, which uses a 3 dimensional design file (STL). **3D Fixture Implant** will be provided at installation and may be upgraded in the future. **Customized Implant** can be used in addition to the **Library** supplied at the time of installation. Implant Library provides add/modify/delete functions for Customized Implants.

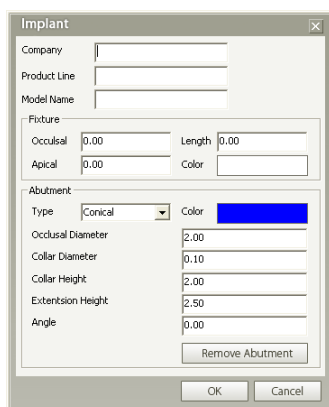


On the menu bar, click **Simulation** → **Implant Library** or click the **Implant Library** icon on the Simulation tool bar.



<Adding Customized Implant>

Click **New** on the Implant Library window. The **Implant** dialog box will appear, as shown below.

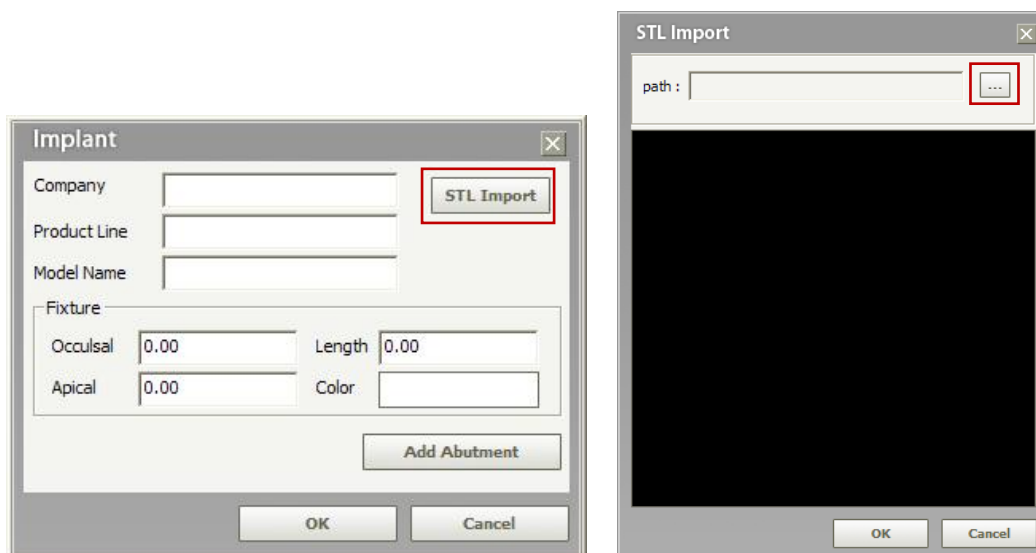


Enter the implant information and click **OK**. The new implant will be added to the library.

<Implant STL Insertion>

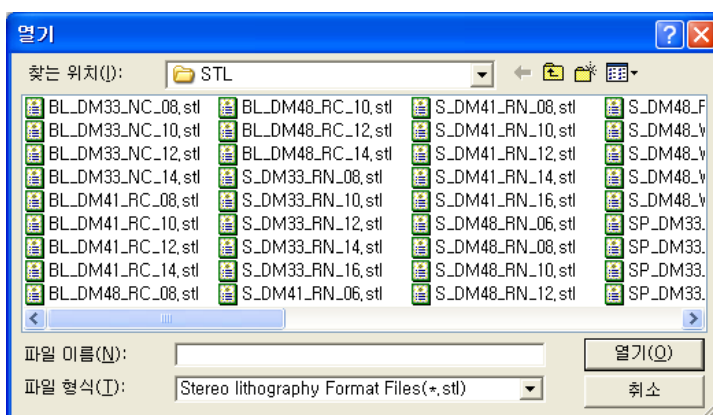
You can add a new Implant STL file (Simulation → Implant Library → New → STL Import) or modify the existing Implant STL file (Simulation → Implant Library → Modify → STL Import) as you wish.

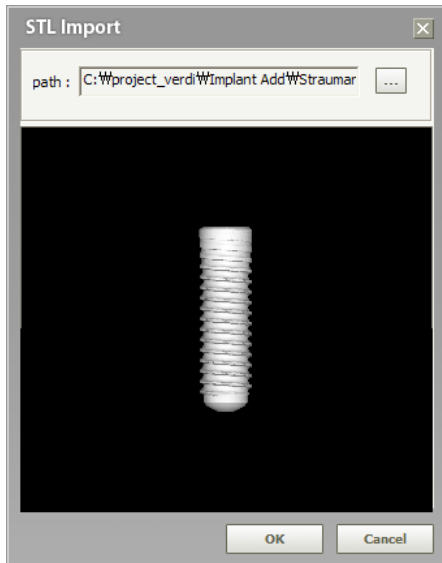
STL file is a mesh data type of file that constitutes a 3D image.




When you click the New or Modify button on the Implant Library window, the Implant property window will pop-up. If you click the STL Import button, the STL Import window will appear as shown


above. Click the  button → **STL file** folder → select **a file** → then click **Open**.





Check the image on the Preview window, and then click the **OK** button.

| | |
|--|--|
|  | <p>Upon adding an Implant STL file, check that the Company name, Product line, Model name, OCCLUSAL, Length, and Apical data are the same as those of the data from the product manufacturer. Please be aware that the result of simulation from inaccurately added STL information is the responsibility of the user.</p> |
|--|--|

| | |
|---|---|
|  | <p>The STL files come into two formats: ASCII and Binary. Only the Binary format can be added in Ez3D plus.</p> |
|---|---|

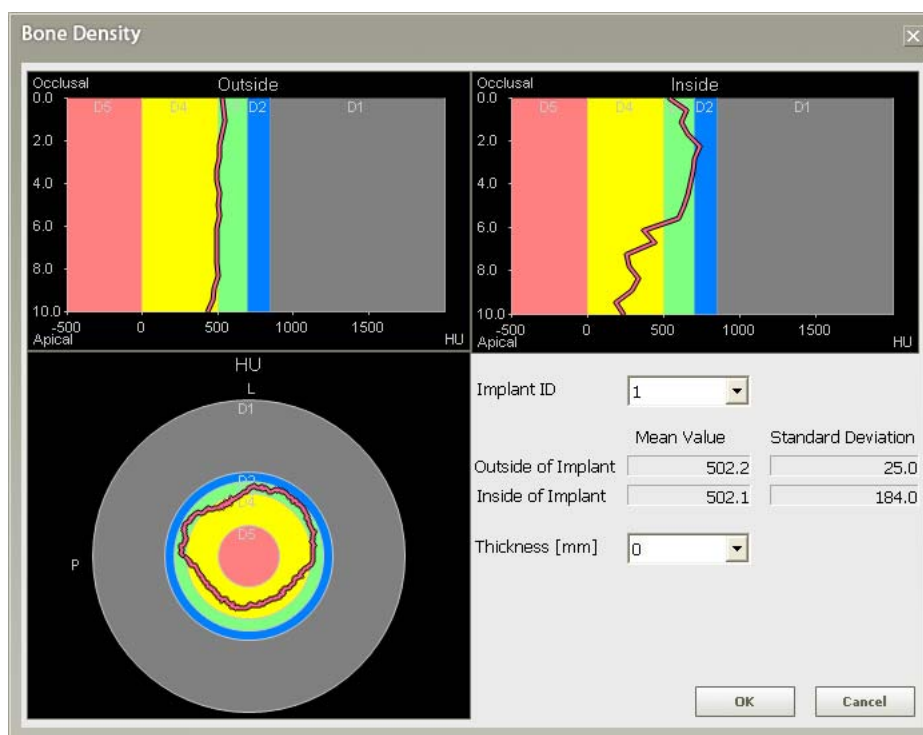
7.2.5 Bone Density

The **Show Bone Density** function is used to identify the bone tissue density of the area surrounding the implant. By identifying the bone density of inside/outside of the implant and the cross section of the Axial —to the height of the implant, the implant placement success rate increases.



On the menu bar, click **Simulation** → **Bone Density** or click the Bone Density icon on the Simulation tool bar.

The **Bone Density** window will appear, as shown below.



| | |
|-------------------|---|
| Outside | Show the mean bone density from the surface of the implant, outward to the set thickness. |
| Inside | Show the mean bone density from the surface of the implant, inward to the set thickness. |
| Apical | Show the mean bone density value of Axial cross section. |
| Implant ID | Select an Implant ID applicable to the shown Bone Density |
| Thickness | Set the preferred bone density thickness. |

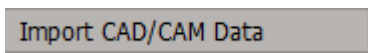
7.3 CAD/CAM Data (Premium Version Only)

The simulation function for CAD/CAM Data is used to simulate or preview the Model and Crown data with Volume in the STL format file. It is classified into **Import CAD/CAM Data** and **CAD/CAM Data Manager**.

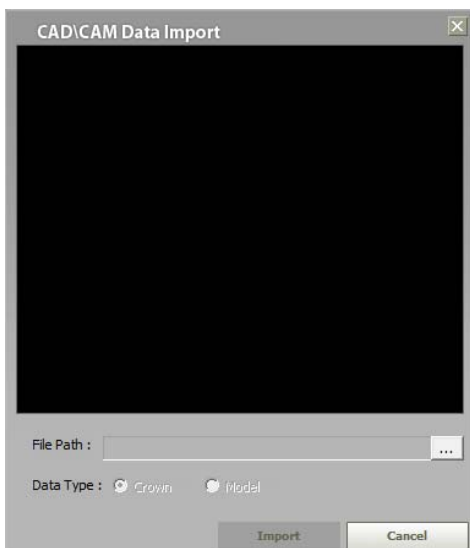
7.3.1 Import CAD/CAM Data

Import CAD/CAM Data functions to provide preview for the Crown and Model in the STL format file and import data into the current image.

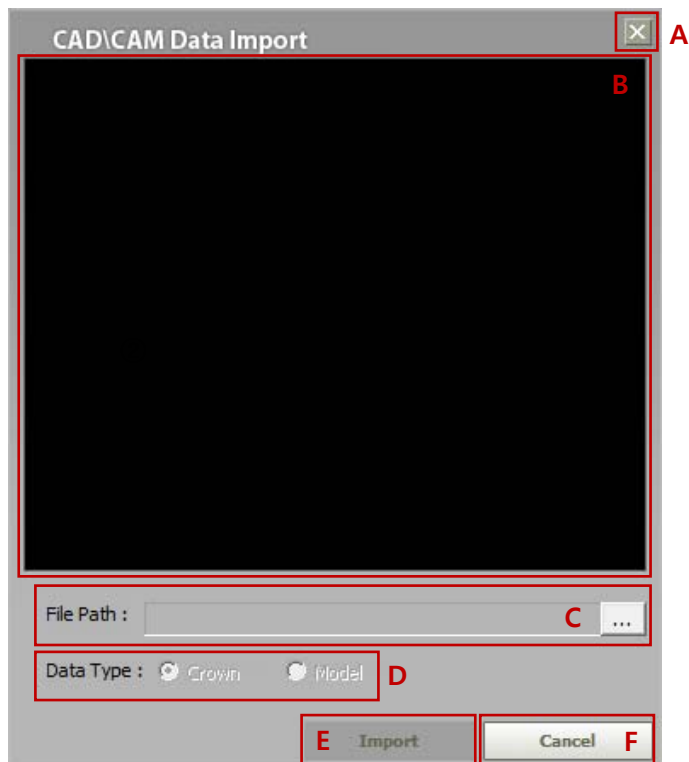
7.3.1.1 Running Import CAD/CAM Data




Click **Simulation** → **Import CAD/CAM Data**. Then the following screen will appear. Refer to the section: **7.3.1.3** for the details on how to import the CAD/CAM data.



7.3.1.2 Screen layout of Import CAD/CAM Data



- A. **Exit button:**
exit the **Import CAD/CAM Data** screen.
is the same function as the **Cancel** button (F).
- B. **Preview area:**
Displays the preview image of the **CAD/CAM Data** which is located through the path (C).
- C. **File path:**
Shows the paths to folder in which image file to be imported is.
 icon can be used to move there.
- D. **CAD/CAM Data Type selection:**
Select the data type to be imported: **Crown** or **Model**.
- E. **Import:**
Starts importing the data when clicked.
- F. **Cancel:**
cancel importing the CAD/CAM Data into image.
is the same function as the **Exit** button A.



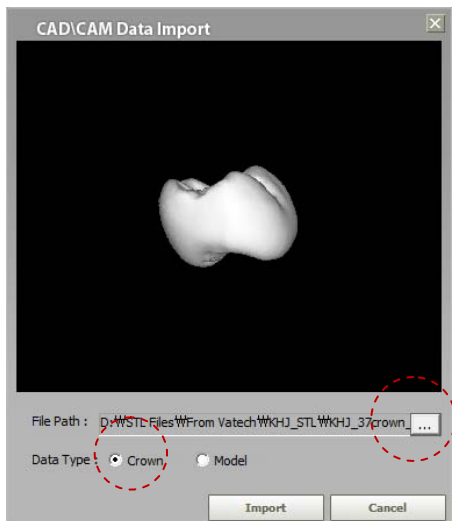
The file format for CAD/CAM Data is the STL, the internal format of which supports binary only.




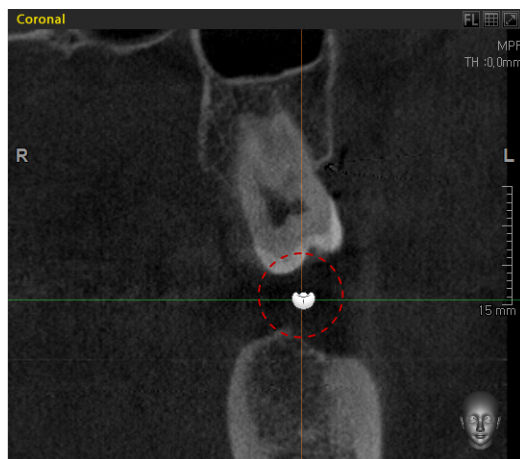
Only one CAD/CAM Data can be imported at a time.

7.3.1.3 Importing CAD/CAM Data

To import the data, do follow the procedures below.



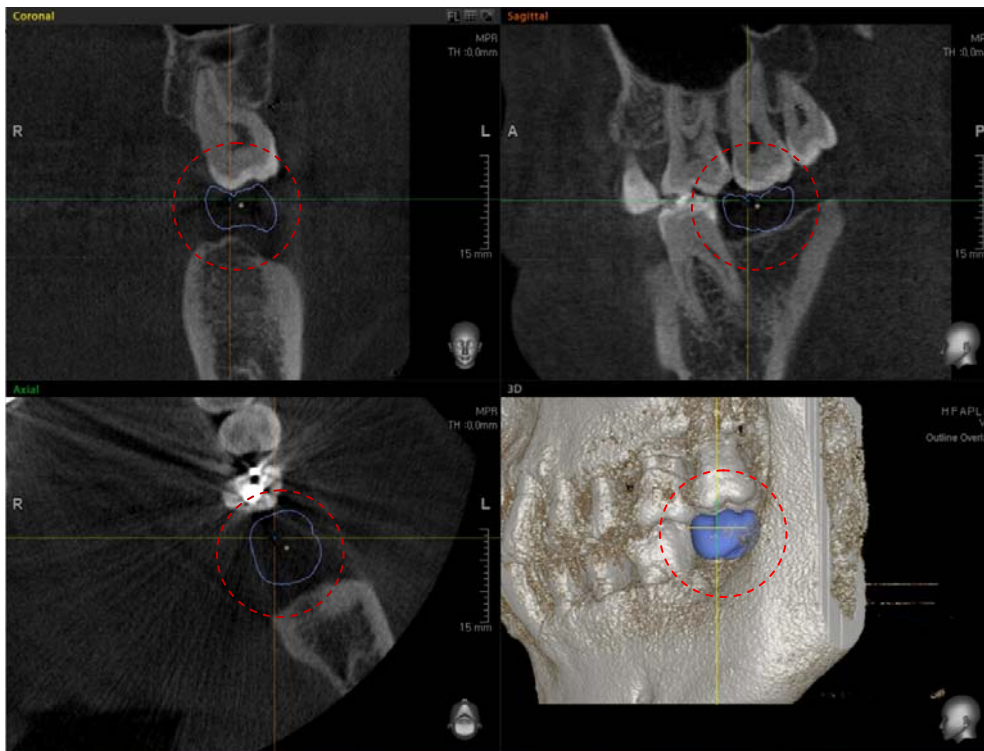
- A. Select the file to be imported after clicking  icon
- B. Select the Data Type: Crown is selected by default
- C. Click **Import** button and the mouse cursor will change to the shape inside circle.



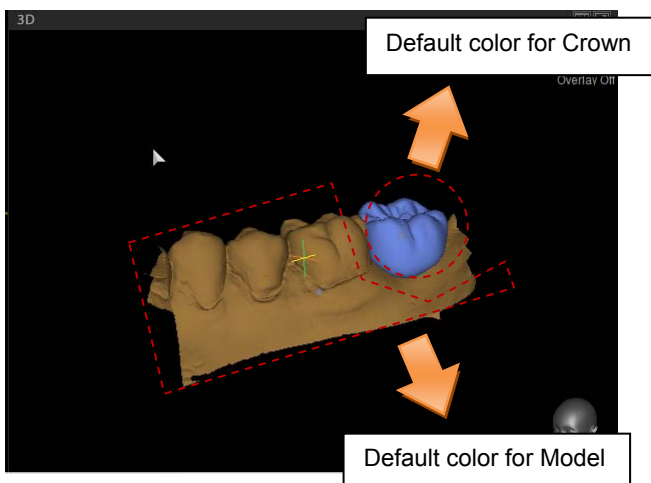
To cancel the data import, press the **ESC key** or double click the right button of mouse.


- D. First locate the position where the data is supposed to be imported and click the left button of the mouse.

Ex): The following figure exemplifies the case when the **Crown** data is imported onto **CAD/CAM Data** on the Coronal screen mode



| | |
|---|---|
|  | <p>Up to 32 data for each of “Crown” and “Model” can be imported, respectively.</p> |
|---|---|

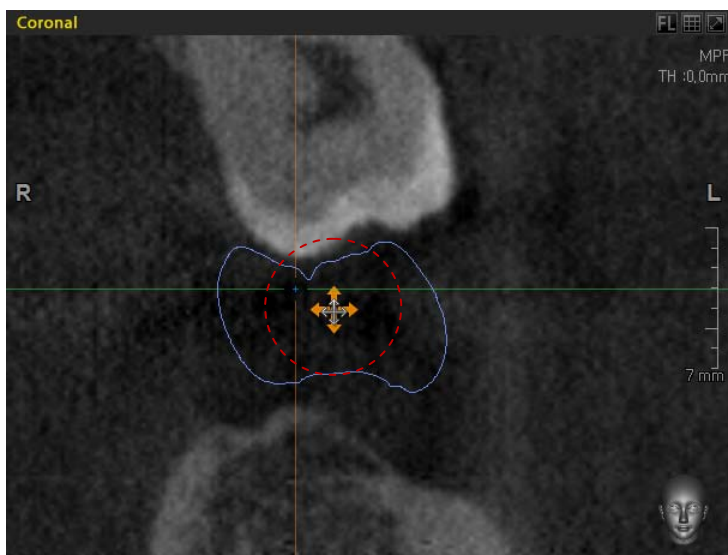


| | |
|---|---|
|  | <p>Default colors for “Crown data” and “Model data” can’t be changed by users. To change their colors, click “Properties” in CAD/CAM Data Manager after importing Crown/Model data.</p> |
|---|---|

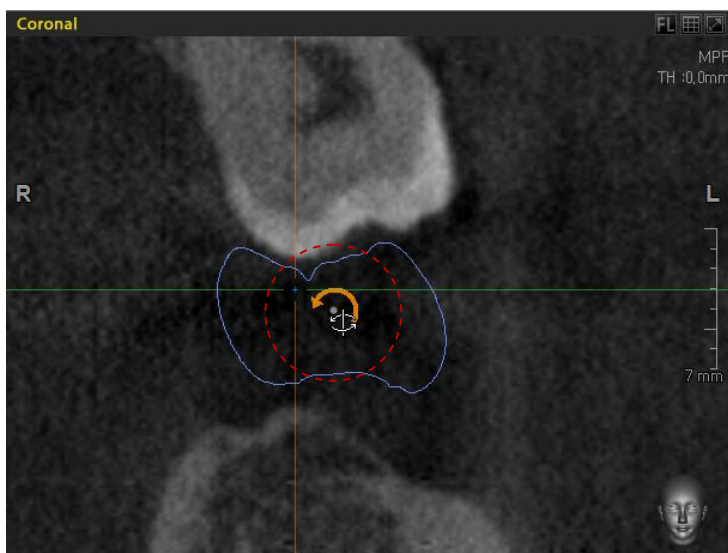
7.3.1.4 CAD/CAM Data Movement & Rotation

To use these functions, the mouse should be positioned in the vicinity of the center point on the CAD/CAM data, in which case four directed arrows will appear.

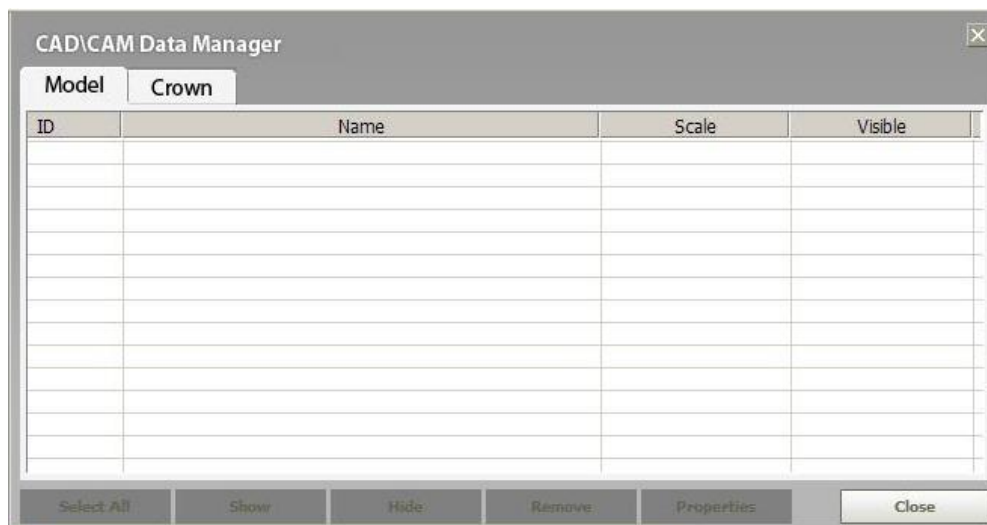
To move the CAD/CAM data, drag the mouse with the left button of mouse pressed.




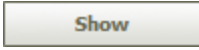
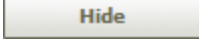
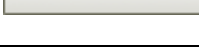
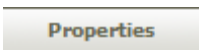
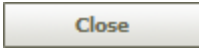

As the mouse pointer moves to near the center point, the symbol of rotation will appear. To rotate the CAD/CAM data, drag the mouse with the left button of mouse pressed.



7.3.2.2 Screen layout of CAD/CAM Data Manager

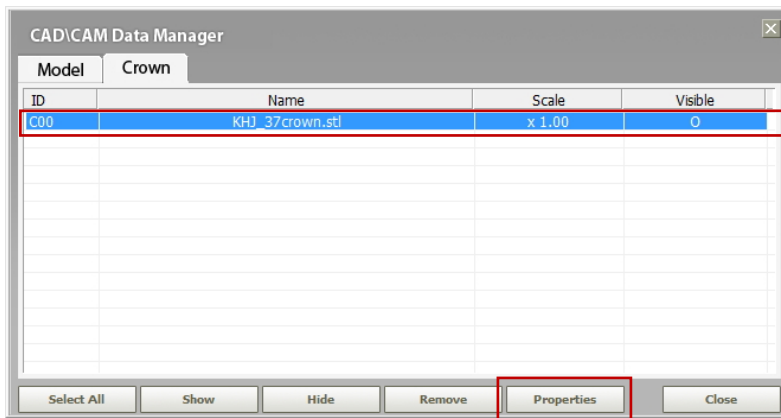


The **CAD/CAM Data Manger** consists of two main tabs: **Model** and **Crown**. Each has four columns: ID, Name, Scale, and Visible.

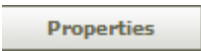
| Button | Detail |
|---|--|
|  | For the selected tab, select all the items in the list. |
|  | For the selected tab, display the item selected from the list on the screen |
|  | Hide the item selected from the screen. |
|  | Remove the item selected from the list. |
|  | Shows Properties for the item selected. if the multiple items are selected, the properties for the last item selected will be displayed. For more about these, refer to the section:“ 7.3.2.3 CAD/CAM Data Properties ” |
|  | Closes the CAD/CAM Data Manager. |
|  | Exit the CAD/CAM Data Manager. |

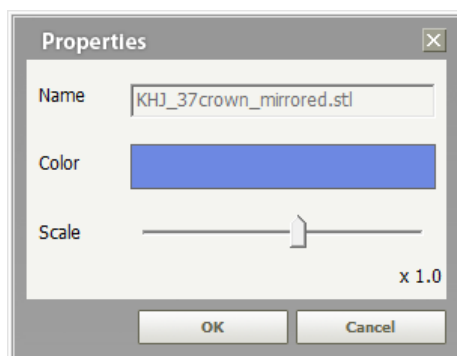
7.3.2.3 CAD/CAM Data Properties

You can configure various parameters for the items selected from the list which belongs to Model or Crown.



To edit the properties for CAD/CAM data.

- Import the CAD/CAM data.
- Click **Simulation** → **CAD/CAM Data Manager**.
- From the CAD/CAM Data Manager, select an item.
- Click  button. Then the following figure will show up.



Name: file name selected in the STL format (can't be changed)

Color: can edit the color of item selected

To change color, position the mouse pointer on the rectangle area and click the left mouse button. Then you will have the color palette, from which color can be changed.

Scale: the scale for the item selected can be modified.

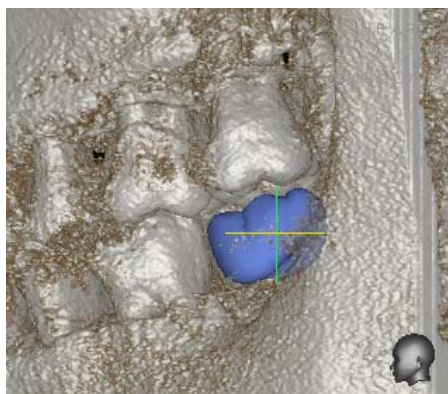
- A. On importing CAM/CAD data, it is set at scale x1.0 (100%)
- B. It can be changed in the range of x0.5 (50%) to x5 (500%) with increment of 10%

OK: apply changes.

Cancel: cancel property modification.

As the following figures show, Color and Scale are changed after their properties are reconfigured.

Color

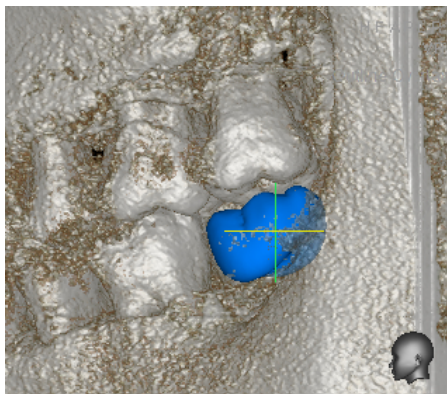


Before

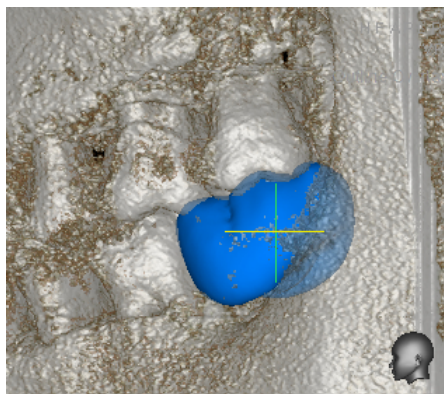


After


Scale(x1.0 → x1.50)




Before



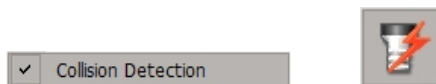
After

| | |
|---|---|
|  <p>NOTE</p> | <p>The change of color and scale for Crown Data and Model Data is possible only within CAD/CAM Manager.</p> |
|---|---|

| | |
|---|--|
|  <p>NOTE</p> | <p>The CAD/CAM data import feature is not supported to Project Save/Load, CD/Memory/STL Export, due to its interface with external STL data.</p> |
|---|--|

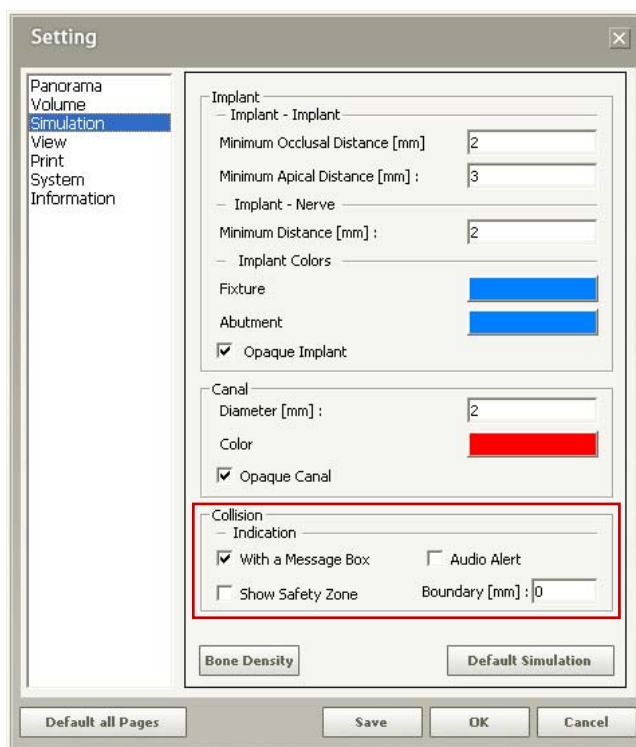
7.4 Collision Detection

This function is used to check any collision between the implant and another implant, as well as between implant and canal. When you insert or move an implant simulation within an area where there is another implant placed or an area near a drawn canal, the Collision Detection function will tell you to avoid collision.



On the menu bar, click **Simulation** → **Collision Detection** to use the collision checking function.

There are 3 ways to inform the user about collision detection. On the menu bar, click **Tools** → **Setting**, as shown below. Then check the options to indicate collision.

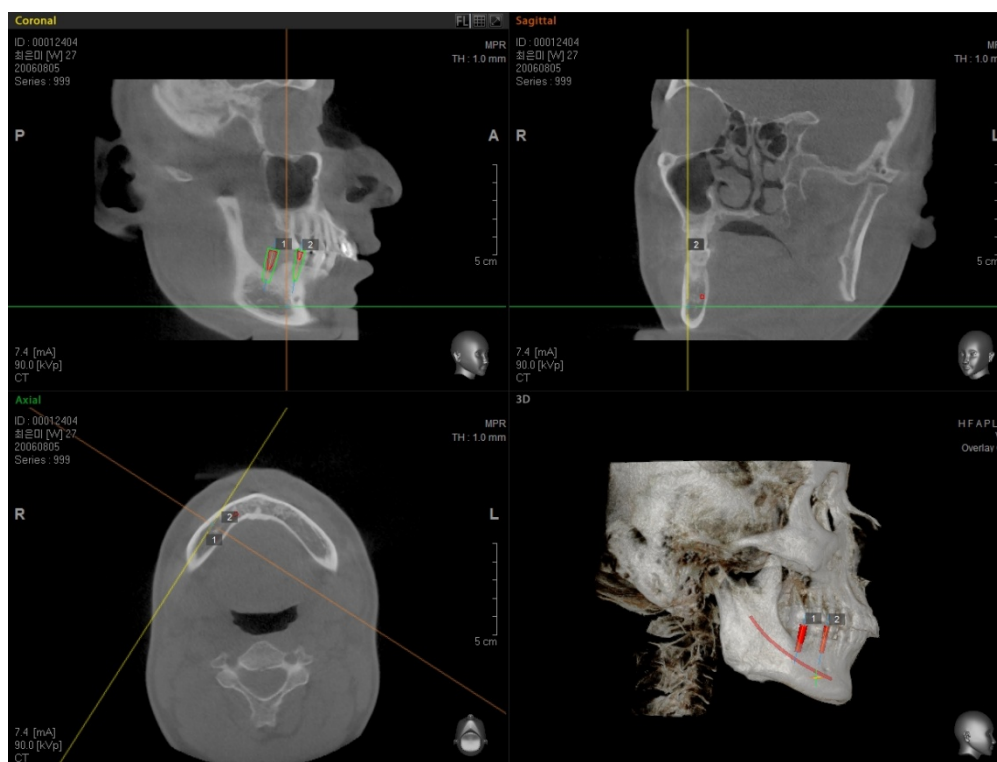


| | |
|---------------------------|--|
| With a Message Box | Informs the user of any collision detected through a message box. |
| Audio Alert | Informs the user by producing a sound with a message box on any collision detected. |
| Show Safety Zone | Checked: When a collision is detected, the Safety Zone shown in green will turn into red. Not checked: If the Safety Zone is not set, a red Safety Zone will appear when a collision is detected. |
| Boundary | Specifies the boundary for collision detection. |

The Collision Detection tool informs the user with a message box, Safety Zone, or sound to alert the user of a detected collision, as shown below.

<If the Show Safety Zone is checked>

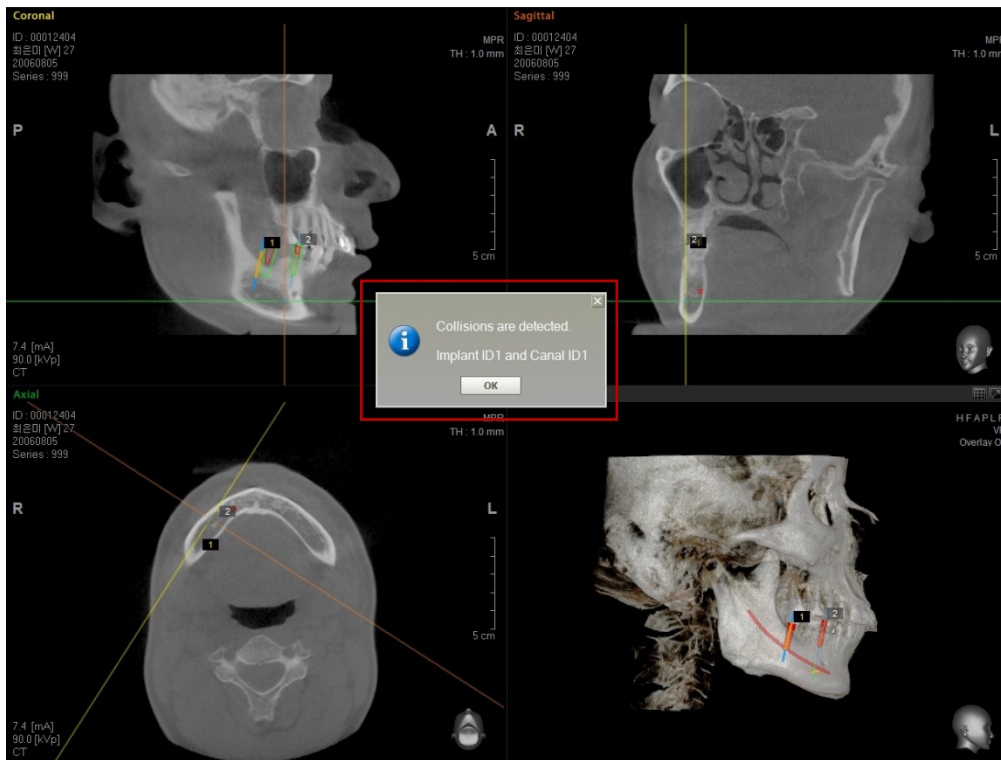
If **Show Safety Zone** is checked, the **Safety Zone** is shown in green before any collision. You can confirm the green Safety Zone on each MPR image views before any collision is detected.



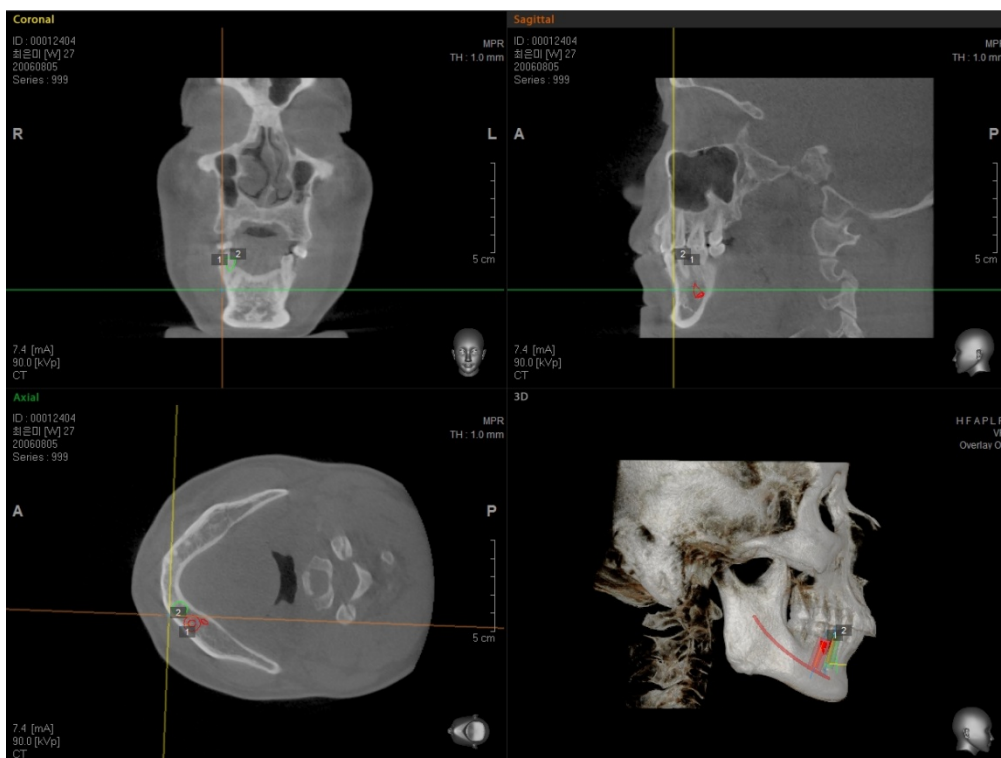
7 Simulation

7.4 Collision Detection

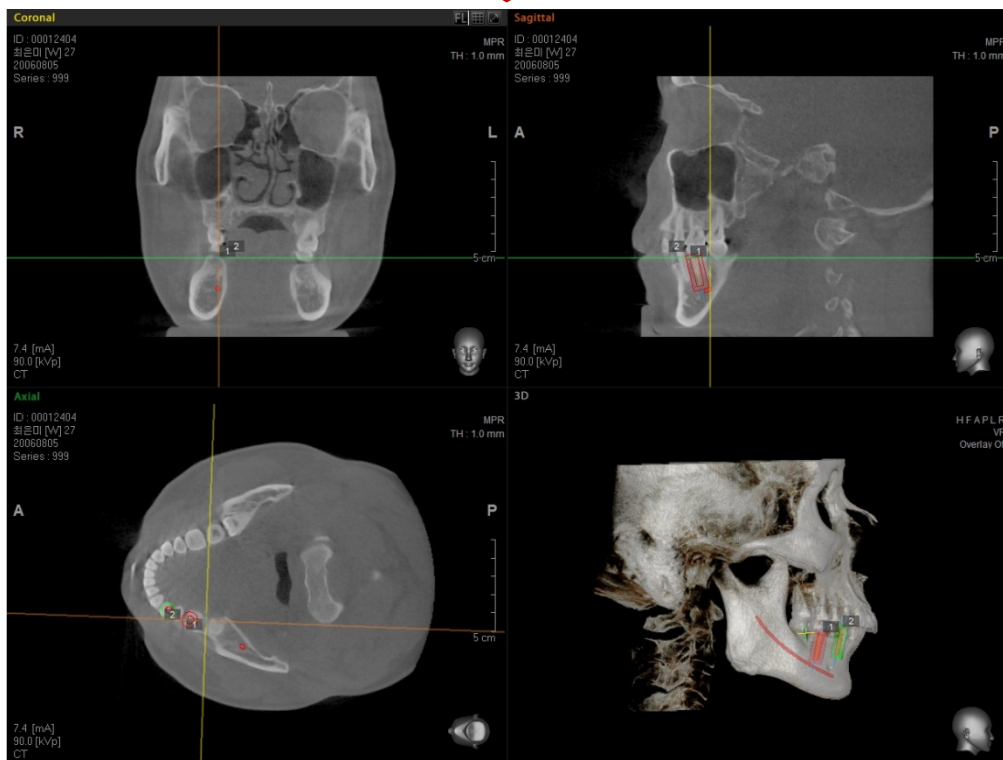
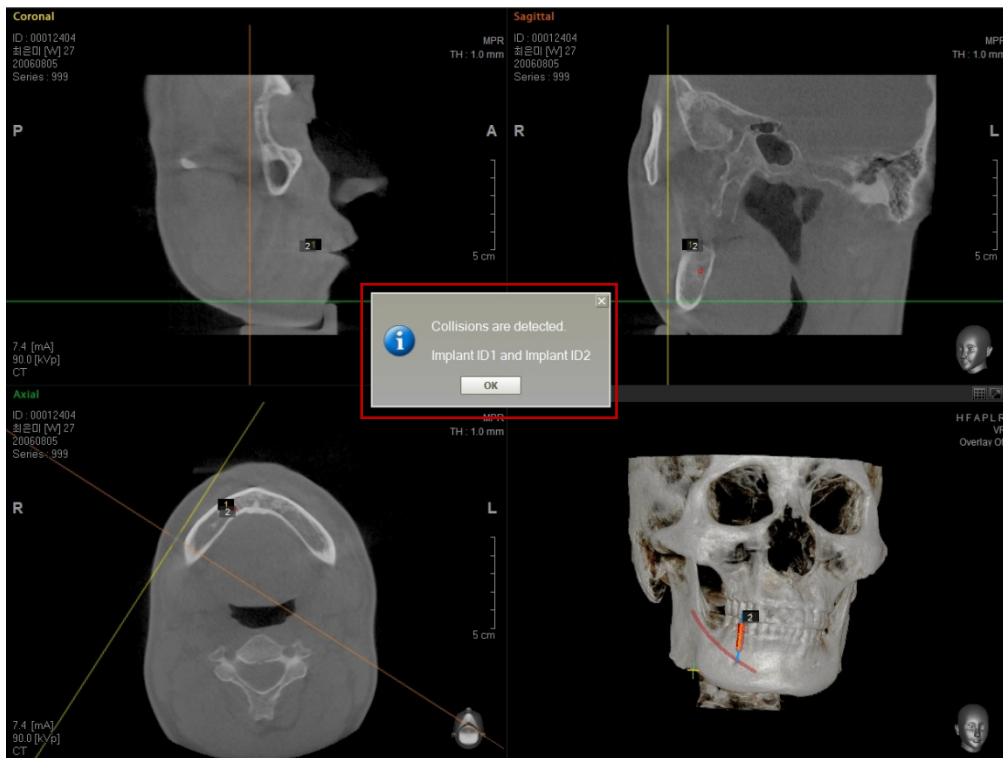
But when the collision between Canal and Implant is detected, Safety Zone in green turn into red showing message **“Collisions are detected”**.



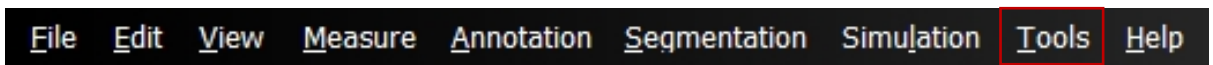
An implant on collision is shown in red on each MPR View Image and 3D Image. While an implant with no collision detected is shown in green.



When the collision between Implant and Implant is detected, Safety Zone in green turn into red showing message “Collisions are detected”.

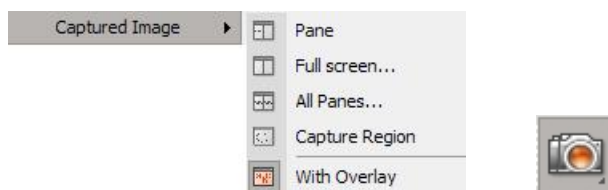


8 Special Functions

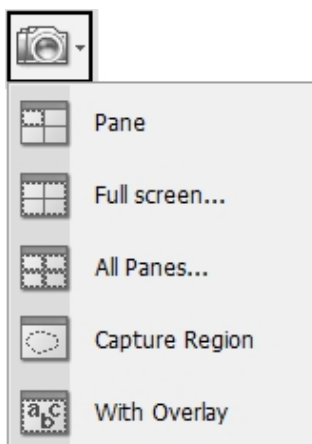


8.1 Captured Image

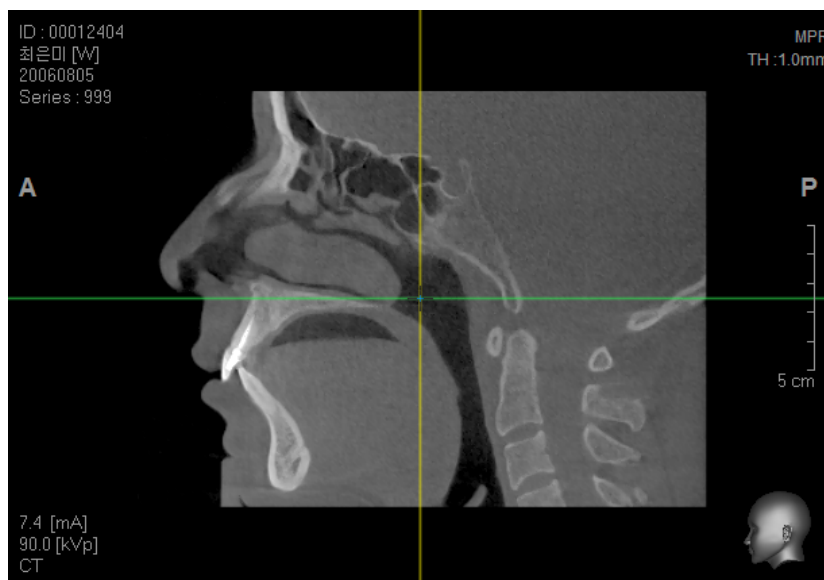
The **Captured Image** function allows users to save images they are currently viewing to a desired location. According to the configuration (refer to 8.9: Setting), images can be saved as JPEG or DICOM files in a local folder. The images can also be transmitted to DICOM Storage SCP (PACS) by using the **DICOM Storage SCU** function. When using Ez3D plus with EasyDent, the images can be saved to the EasyDent database.



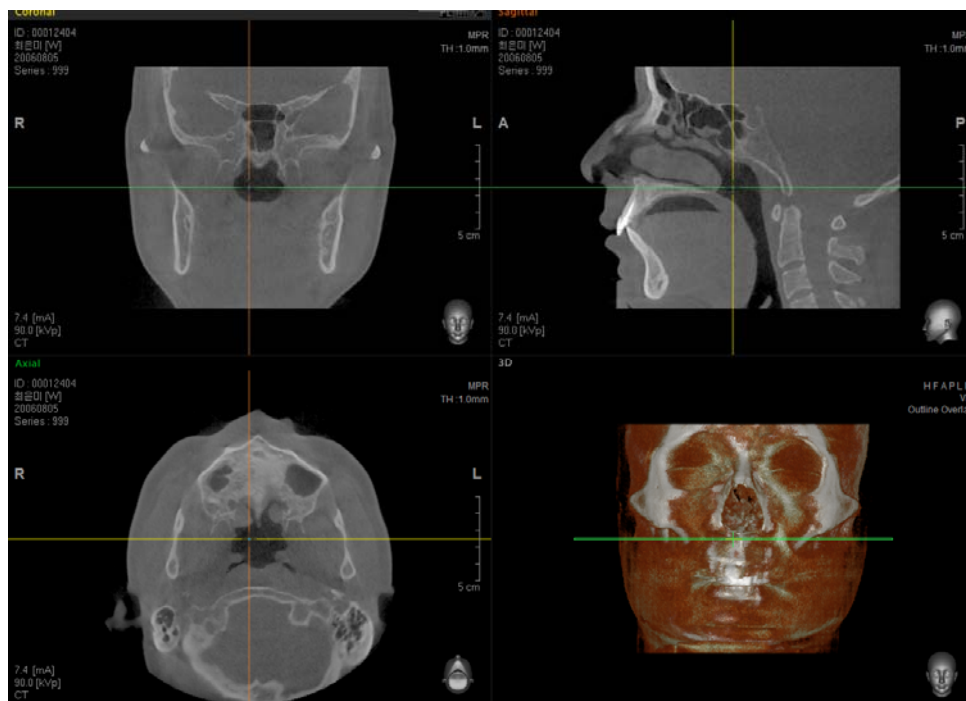
On the menu bar, click **Tools** → **Captured Image** or click the **Captured Image** icon on the tool bar.



- By selecting in sequence from the menu bar, click **Tools** → **Captured image** → **Pane**. Once you clicked **Pane**, the mouse cursor will be changed to that of a camera. Click on a preferred image view pane and save the image to file.



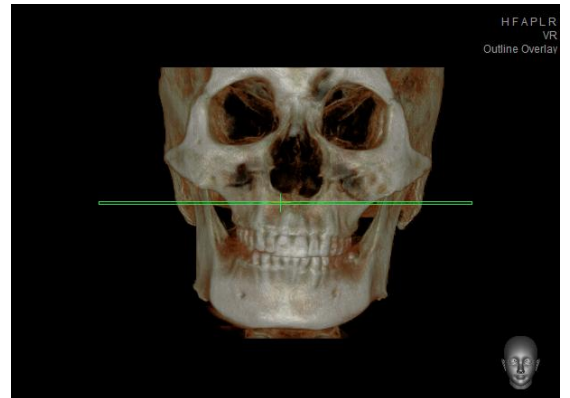
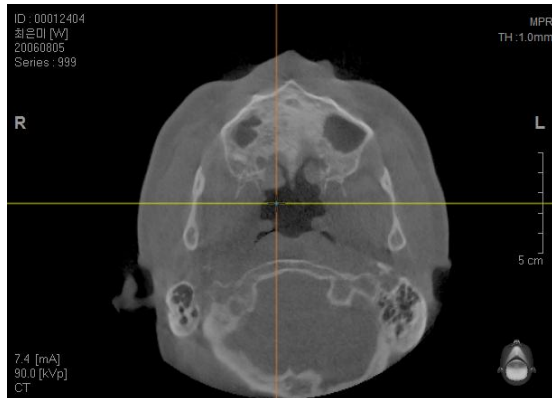
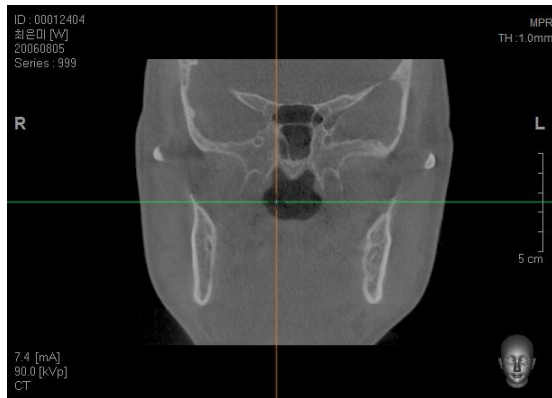
- On the menu bar, click **Tools** → **Capture** → **Full screen** and the full screen currently viewed will be saved as an image file.



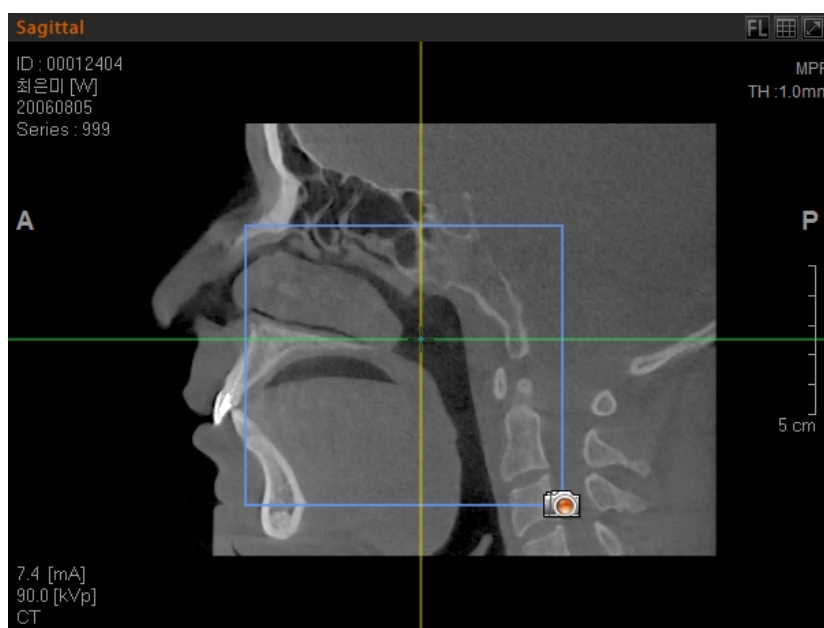
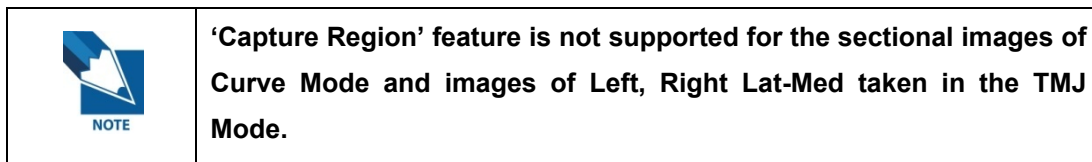
8 Special Functions

8.1 Captured Image

- On the menu bar, click **Tools** → **Capture** → **All Panes** and the current image views of all view panes will be saved *individually*.



- **Capture Region:** this function is used to capture and save only the area of interest in View area. To do this, move to **Tools** → **Captured Image** → **Capture Region**, and select the area to be captured. It is saved in the folder: **C:\Ez3Dplus\Captured**.



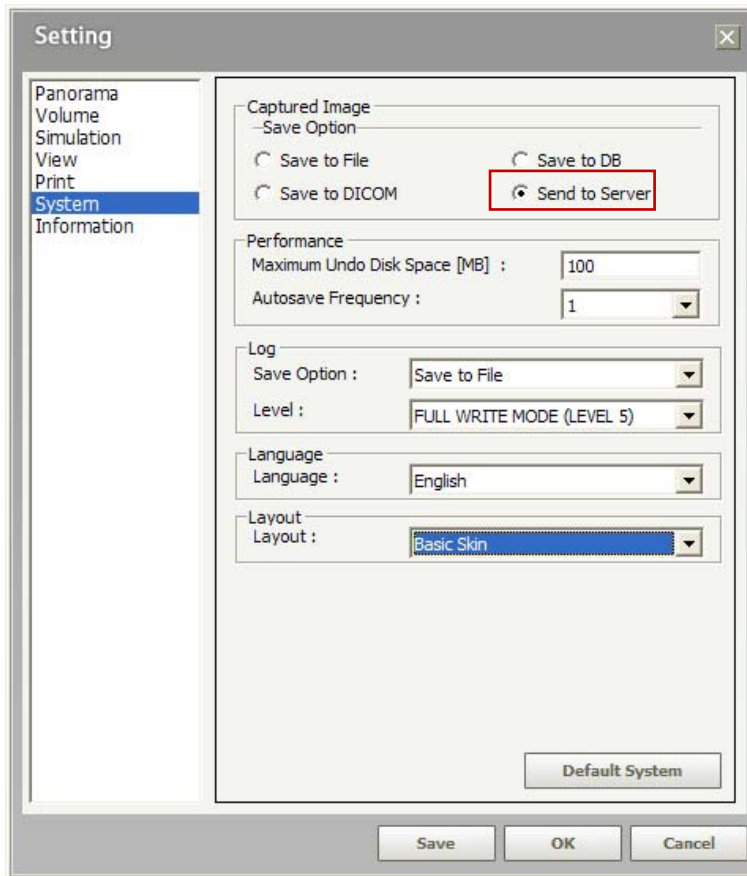
- **With Overlay:** this feature is used to capture the **Overlay** with image together.



<Send to Remote DICOM Server/SCP>

It is possible to transmit the captured image to a Remote DICOM Server.

From Save Option of Menu bar, **Tools** → **Setting** → **System**, select **Send to Server** to set.



<Remote Server Registration Option>

When capturing an image, the **DICOM Send** dialog box can be viewed.

After configuring the AETitle, IP Address, and Port, click the **Insert** button.

The Setup functions of the above **DICOM Send** dialog box window refers to the following.

| | |
|-------------------------------|--|
| AETitle | Specific application name of a DICOM printer. |
| IP | IP Address or Host Name |
| Port | Port |
| Patient ID | Patient ID |
| Patient Name | Patient Name |
| Patient Birth Date | Patient Birth Date |
| Patient Sex | Patient Sex |
| Use Original Study UID | If you want to merge the DICOM image that is to be transmitted with the original Study , check its configuration. |
| Series Number | This number is necessary for the Series Instance UID configuration and created automatically. This number is reconfigurable by the user. |
| Series Description | The user can make descriptive comment. |

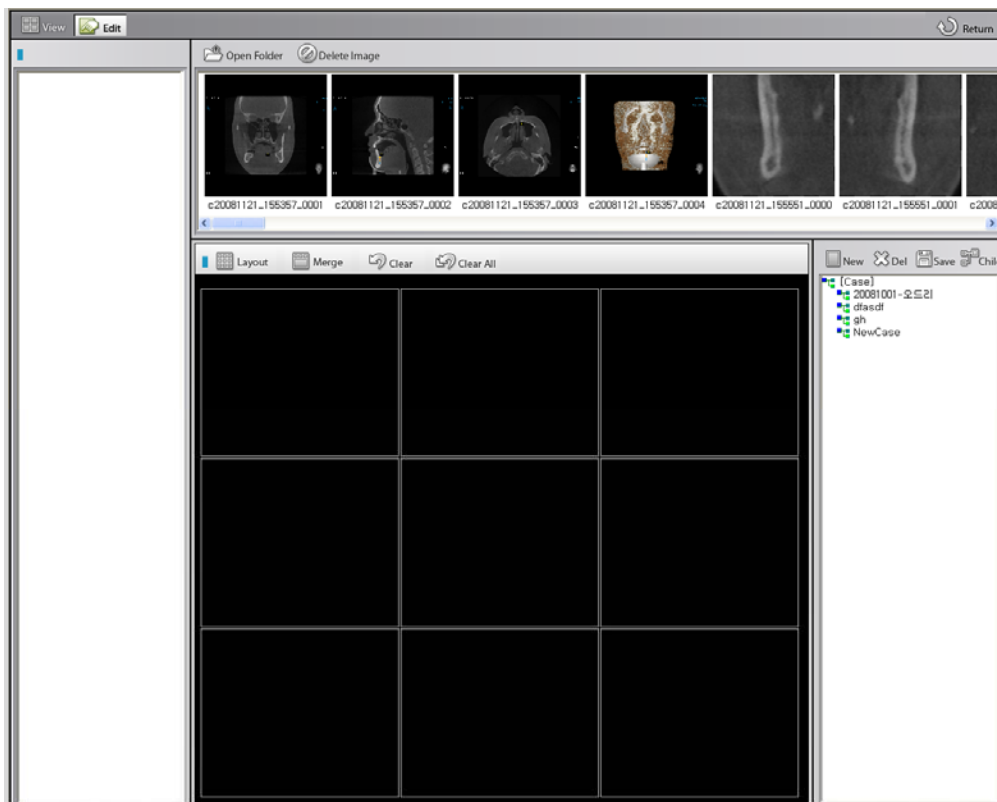
8.2 Counsel

Counsel is a function for writing a report on simple image study and treatment plan. After capturing images on the screen to be studied and launching **Counsel**, a user can arrange the images in the desired pattern.




8.2.1 Counsel Execution








On the menu bar, click **Tools** → **Counsel** or click the **Counsel** icon on the tool bar. The following screen will appear. Counsel screen is composed of view mode and edit mode.












<Mode Tool Bar>

| | |
|--|--|
|  View | Mode to insert letters or pictures in the created Counsel. |
|  Edit | Mode to create a new Counsel or to edit the layout. |
|  Return | Finish Counsel and return to Ez3D plus . |

<View Mode Tool Bar>

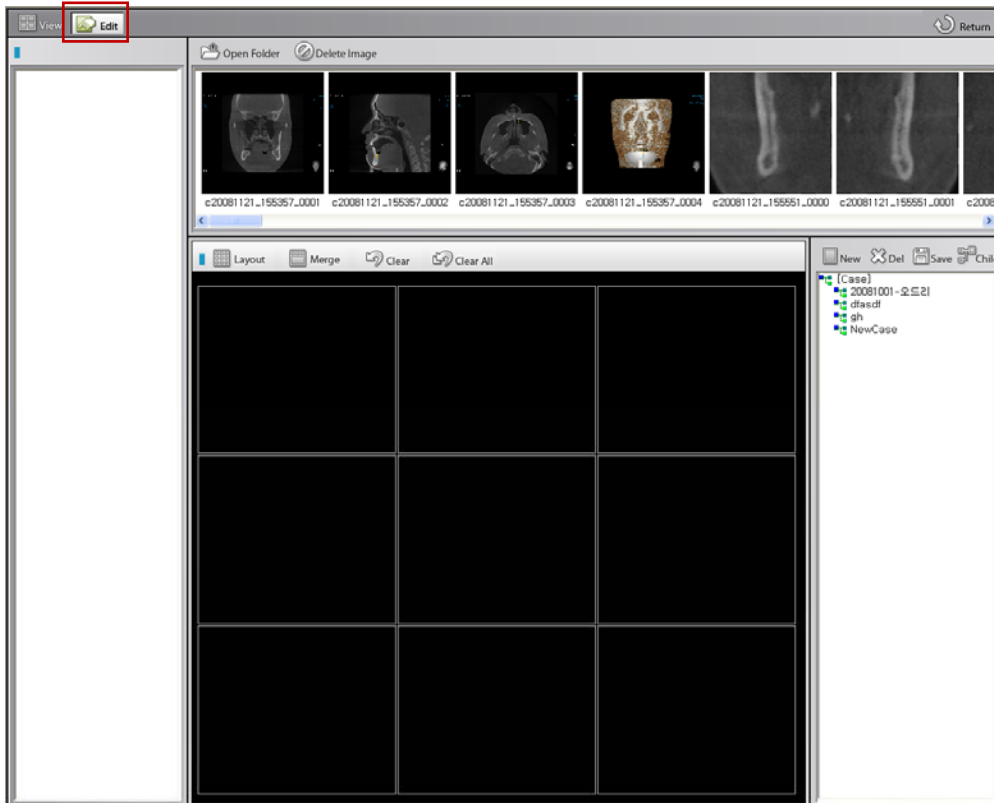
| | |
|--|---------------------------------------|
|  Draw | Freely draw on Counsel image. |
|  Arrow | Input arrow on Counsel image. |
|  Text | Input text on Counsel image. |
|  Erase | Erase content drawn on Counsel image. |
|  Print | Print out the Counsel image. |

<Edit Mode Tool Bar>

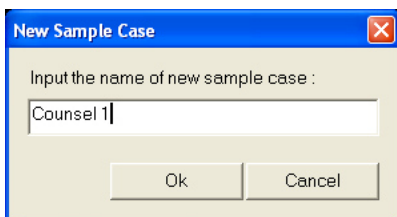
| | |
|---|---|
|  New | Create a new Counsel. |
|  Del | Delete a selected Counsel. |
|  Save | Save changes in the selected Counsel. |
|  Child | Create a new Counsel as sub item of a selected Counsel. |
|  Open Folder | Select the folder of image to be inputted to Counsel. |
|  Layout | Set the Counsel layout. |
|  Merge | Merge selected cells into one. |
|  Clear | Delete the input image of selected cell. |
|  Clear All | Delete images inputted to all cells. |

8.2.2 Image Insert

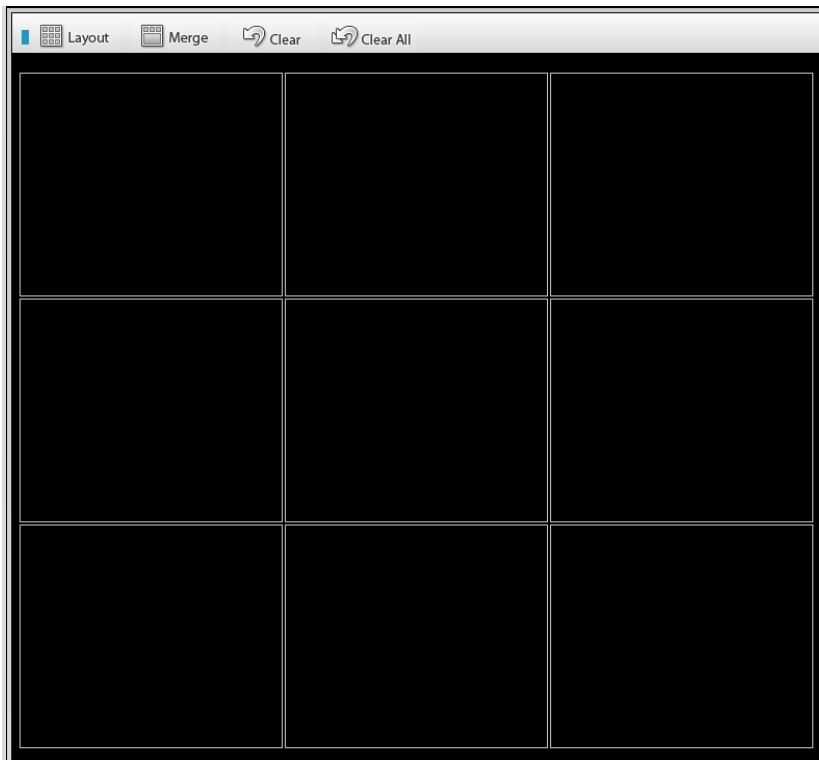
When the **Edit** button is clicked, a **Counsel Edit** window will appear, as shown below.



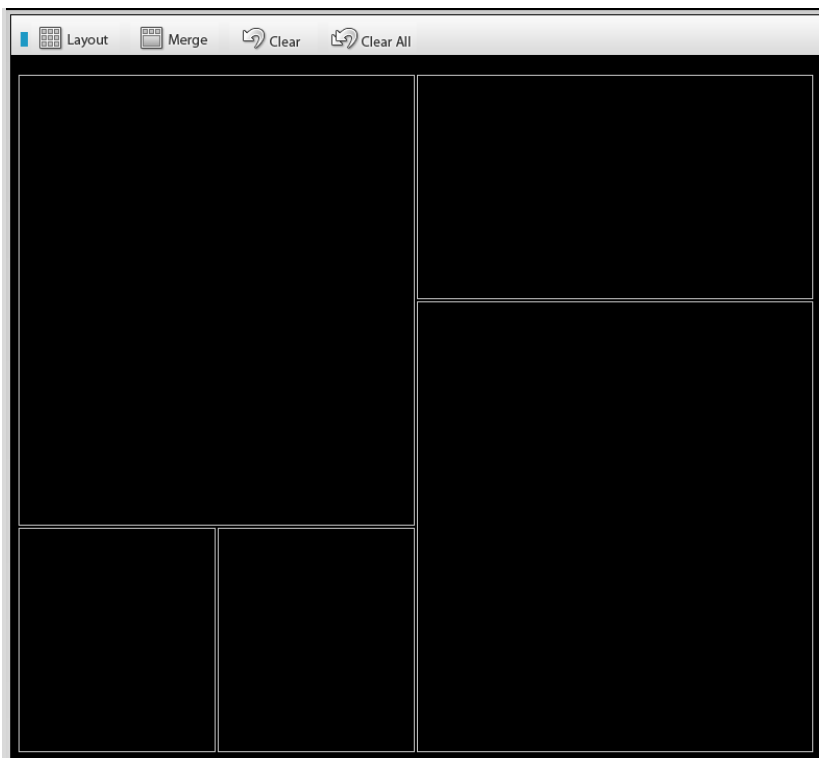
Click the **New** button and type the name of the Counsel.



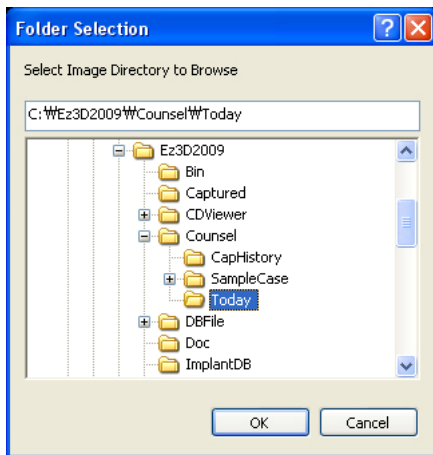
Click the **Layout** button and specify the Counsel layout.



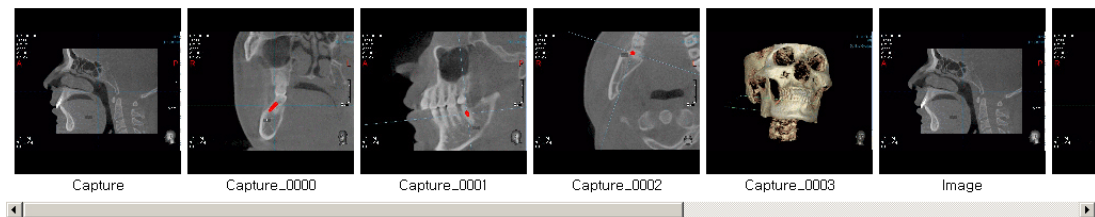
It is possible to merge cells using the **Merge** button.



Click the **Open Folder** button and select the folder containing the images to be inserted into the Counsel.



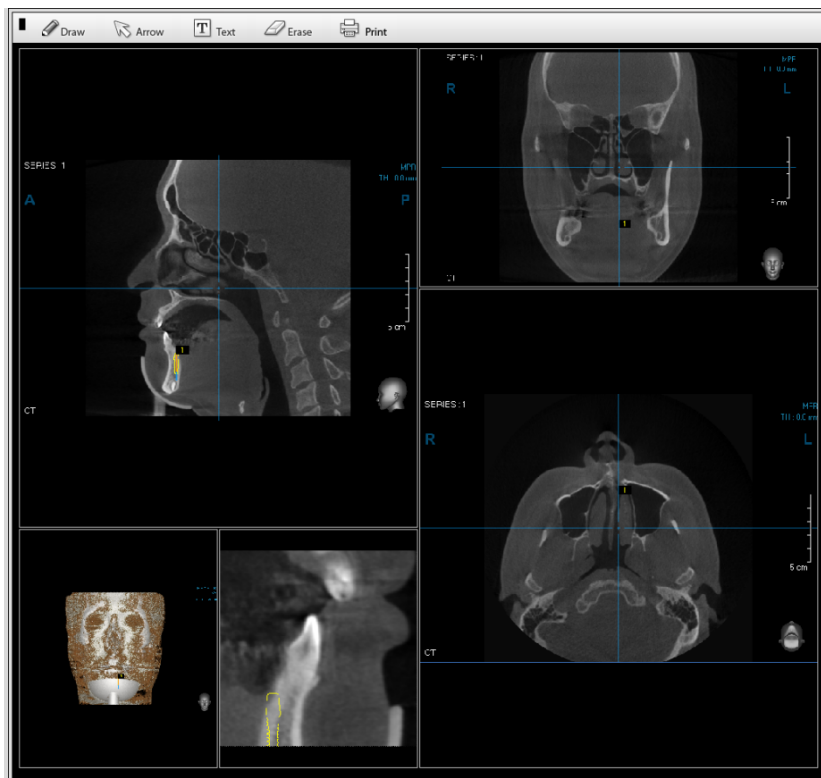
Images in the selected folder will be shown in the preview screen.



Drag the preferred image(s) into the cell to insert.

8.2.3 Counsel Insert


Click the **View** button to change to View mode. Select the preferred Counsel.



Utilize the **Free Draw**, **Arrow**, and **Text** tool to insert data for treatment. When complete, click the **Print** button if you would like to print the completed Counsel.

8.3 CD/DVD Burning (Professional Version Only)

The CD/DVD Burning function allows a user to burn CT image data to a CD or DVD.

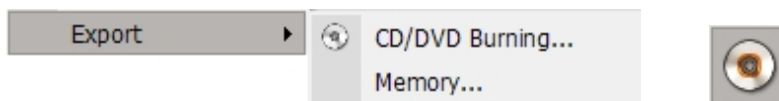
| | |
|---|---|
|  WARNING | <p>CD/DVD Burning function only work automatically if you are using Windows Vista Operating System. For proper operation of the CD/DVD Burning tool in Windows XP or Windows 2003, a separate program is required. For installation, please refer to 'Appendix: 1. Installation of Ez3D plus'.</p> |
|---|---|

8.3.1 Burning the Image Data

For convenience, put an empty CD/DVD in the CD/DVD Rom Drive before using the DVD/CD Burner.


If you place the video files or photo files for clinic/hospital PR at the **Logo** folder of the Ez3D plus Program path, it will appear automatically when opening the CD Burner.

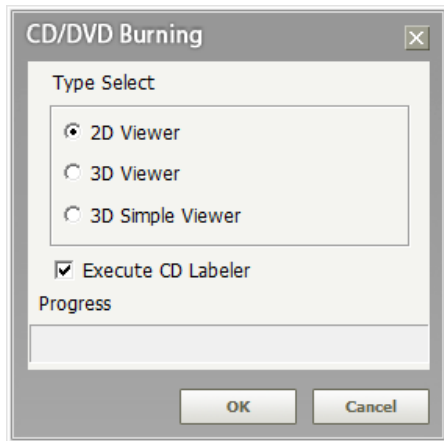
The filename must be **logo.avi** or **logo.jpg**, and AVI files must be with **basic AVI Codec**. If it is not with basic AVI Codec, the PR video cannot possibly work properly.



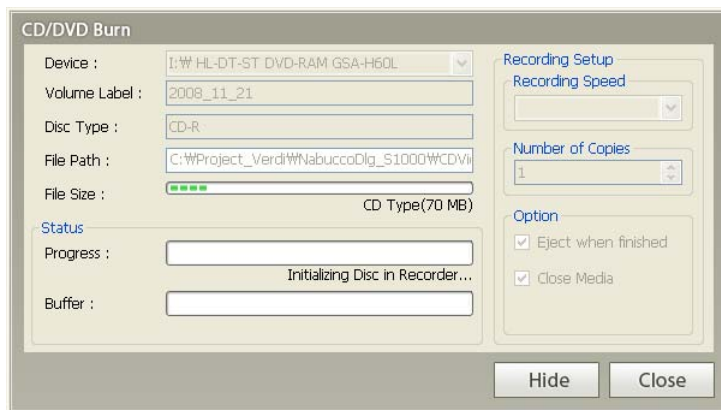
On the menu bar, click **Tools** → **Export** → **CD/DVD Burning** or click the CD/DVD Burning icon on the tool bar. Insert a blank CD/DVD, select the type of viewer and then click **OK**.

If the **Execute CD Labeler** is checked, the CD Labeler will be activated after CD/DVD Burning has completed.

| | |
|--|--|
|  NOTE | <p>Only the 'LightScribe Template Labeler' is supported. You can download the LightScribe Template Labeler' at the homepage: LightScribe.</p> |
|--|--|

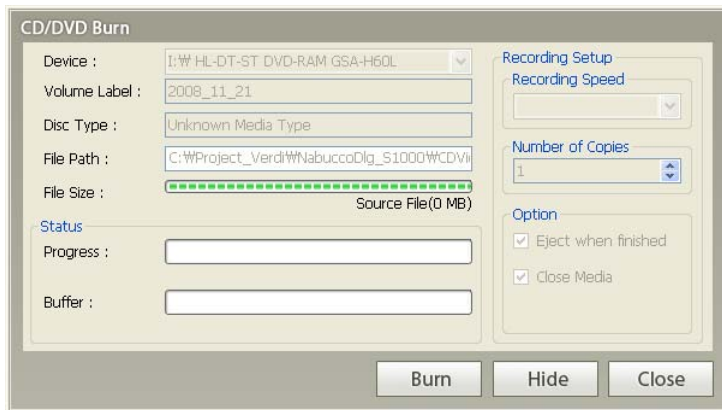


When burning is in progress, a window will appear, as shown below. Users are able to check the file size, progress, and options of the current process.

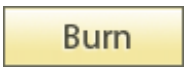
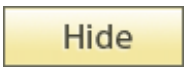




When CD Burning is complete, the CD will be ejected automatically. Click **Yes** to exit the CD/DVD Burn utility. Select **No** to burn an additional disc.





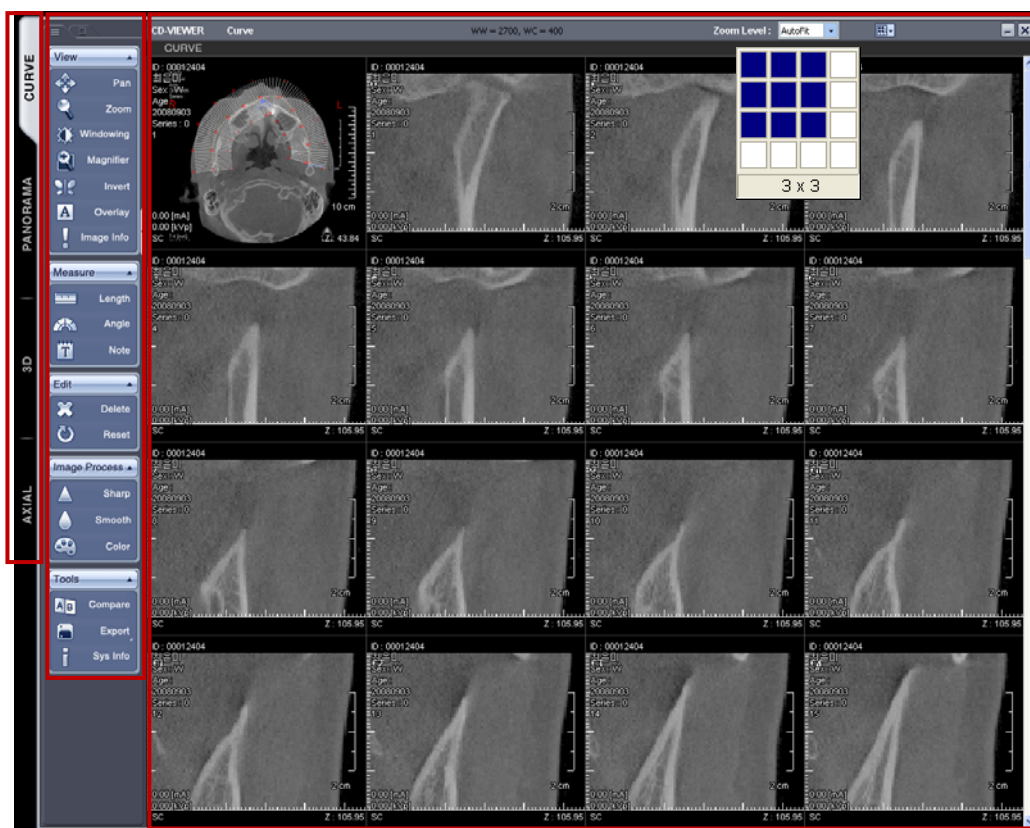
<Button Description>

| | |
|---|--|
|  | Burn image data on empty CD or DVD. Button will only appear if you are burning an additional disc. |
|  | Hide CD/DVD Burn window and create Tray icon. |
|  | Finish CD/DVD Burn. |

| | |
|---|--|
|  <p>NOTE</p> | <p>If you insert the CD with CD Burned DICOM Data to the PC, which has not enough memory, a pop up window with the message “You cannot open the project file. Do you want to open the DICOM file without project information?” will appear. Because the CD is lacking of available memory, it will delay the opening of files.</p> <p>If you click “Yes”, the DICOM data will be opened with no overlays. But if you click “No”, you will not be able to open the Project files.</p> |
|---|--|

8.3.2 Image Data Viewing – CD-Viewer (2D Viewer)

To view the CD's data, the 2D Viewer can be executed without a separate installation. For 3D viewing, a CD Viewer installation program must be installed. When the CD is inserted, the CD Viewer will be executed automatically. The CD Viewer can only read images that have been burned to a CD using Ez3D plus's CD/DVD Burn function.



A. View Mode Composition















View Mode is composed of Curve, Panorama, 3D and Axial Mode. Click the **View Mode** tab on the left to change the view mode.









- **Curve Mode:** Image acquired from Curve function executed in **Ez3D plus**.
- **Panorama Mode:** Panoramic Image acquired from Curve function executed in **Ez3D plus**.
- **3D Mode:** 3D Image acquired from 3D Rendering in **Ez3D plus**.
- **Axial Mode:** Original picture image imported from **Ez3D plus**.

B. Image Pane Composition

The Image Pane can be changed to its maximum layout of 4x4.

C. Description for Tool Bar

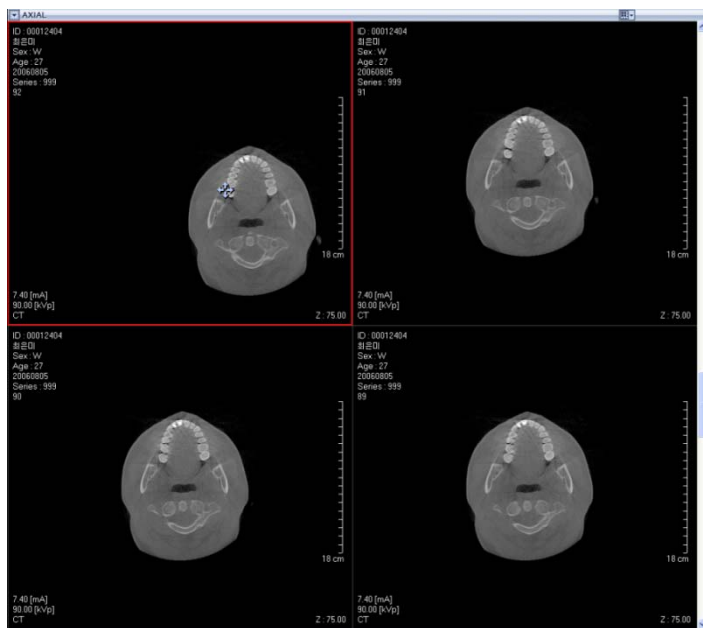
| Main Menu | Sub Menu | Icon | Description |
|----------------------|------------|---|--|
| View | Pan |  | Move image up/down and left/right |
| | Zoom |  | Enlarge/reduce image |
| | Windowing |  | Control Windowing of image |
| | Magnifier |  | Enlarge specific part of image |
| | Invert |  | Invert the color of image |
| | Overlay |  | Show or Hide image information |
| | Image Info |  | Show the header information of image. |
| Measure | Length |  | Measure the length between two points in the image |
| | Angle |  | Measure arbitrary angle in the image. |
| | Note |  | Insert Memo to image |
| Edit | Delete |  | Delete all added items from screen except pictures |
| | Reset |  | Reset the image to the initial state of import |
| Image Process | Sharp |  | Sharpen the image |
| | Smooth |  | Smoothen the image |

| Main Menu | Sub Menu | Icon | Description |
|--------------|----------------|---|--------------------------------------|
| | Color |  | Give color to the image (Axial) |
| Tools | Compare |  | See two Views on comparison board |
| | Export |  | Export the image |
| | Singled Pane |  | Export a single pane as an image |
| | Displayed Pane |  | Export all panes as an image |
| | Full Screen |  | Export the whole screen as an image. |
| | To Sever |  | Send the image to server |
| | System Info |  | Show the current system information |

<View Tools>

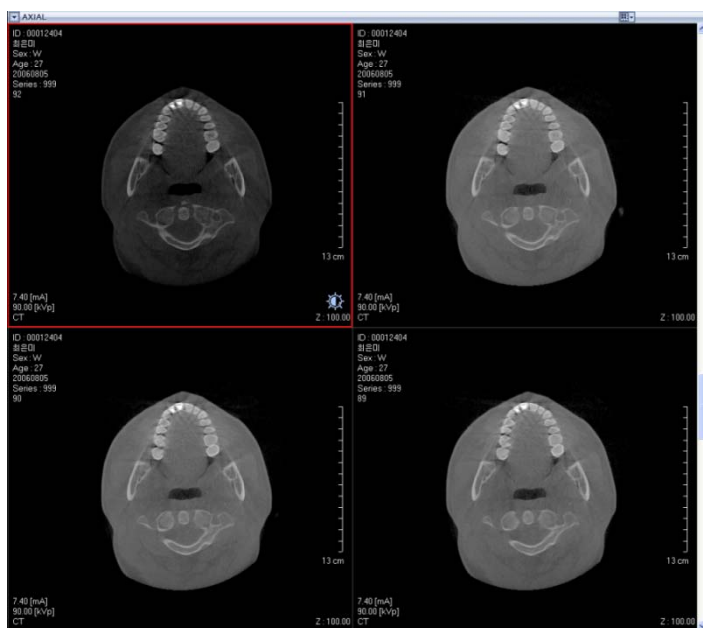
- **Pan**

After selecting **Pan**, user can control the image position within a pane by dragging the mouse left and right or up and down. When moving the image position in the one pane, the image position in other panes changes as well.



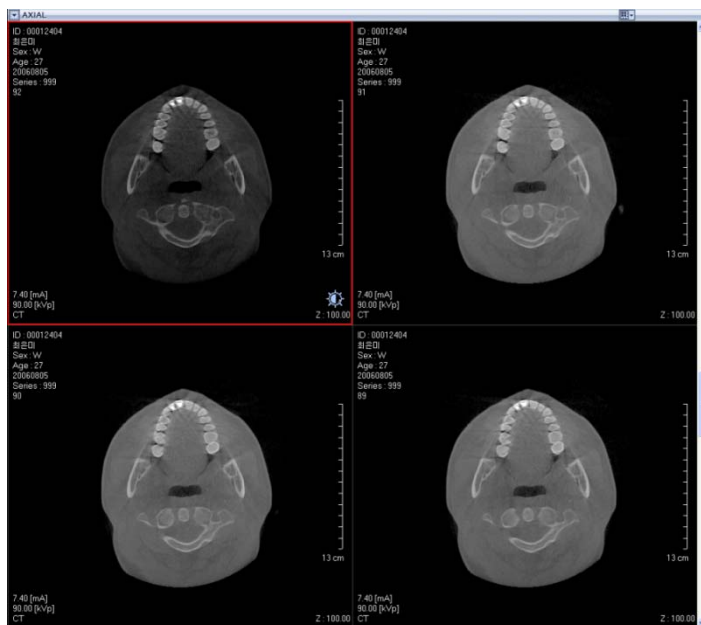
- **Enlargement (Zoom in)**

After selecting the **Zoom** tool, user can zoom in or out by moving the mouse left and right or up and down. When zooming on a pane, the rest of the panes are modified as well.



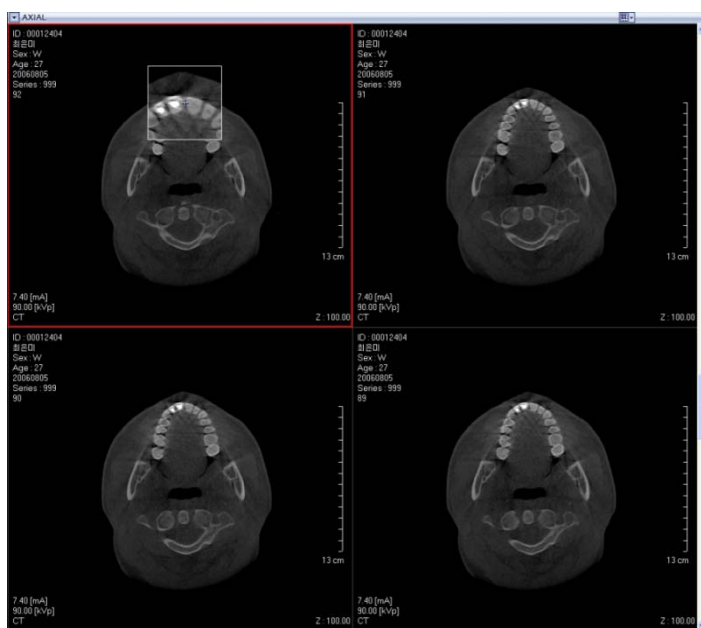
- **Brightness Control (Windowing)**

After selecting the **Windowing** tool, user can control the brightness by moving the mouse up, down, left, or right. When modifying one pane, the remaining panes will be adjusted as well.



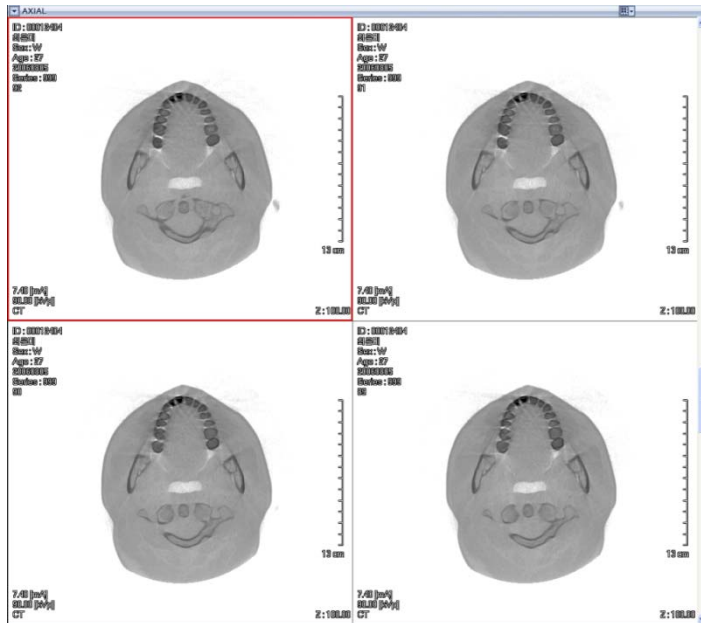
- **Partial Enlargement (Magnifier)**

After selecting the **Magnifier** tool, a partially magnified image will be displayed.



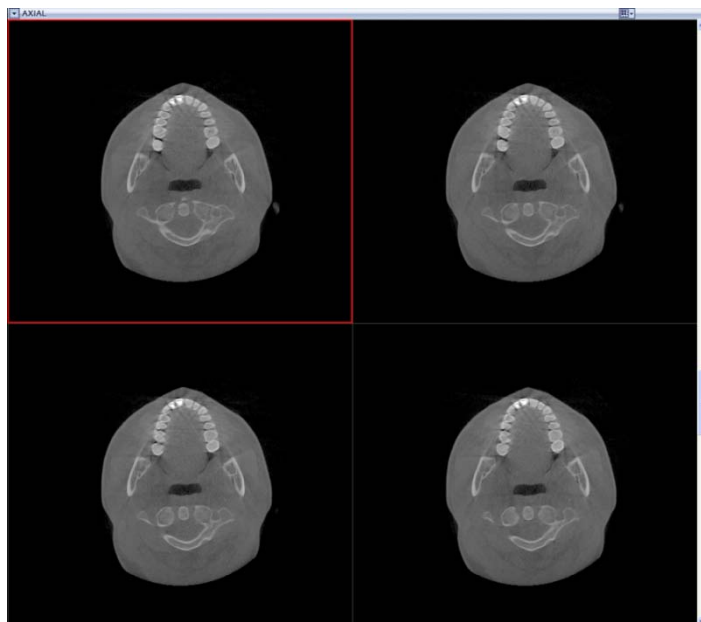
- **Color Inversion (Invert)**

Click the **Invert** tool to invert the colors of the image



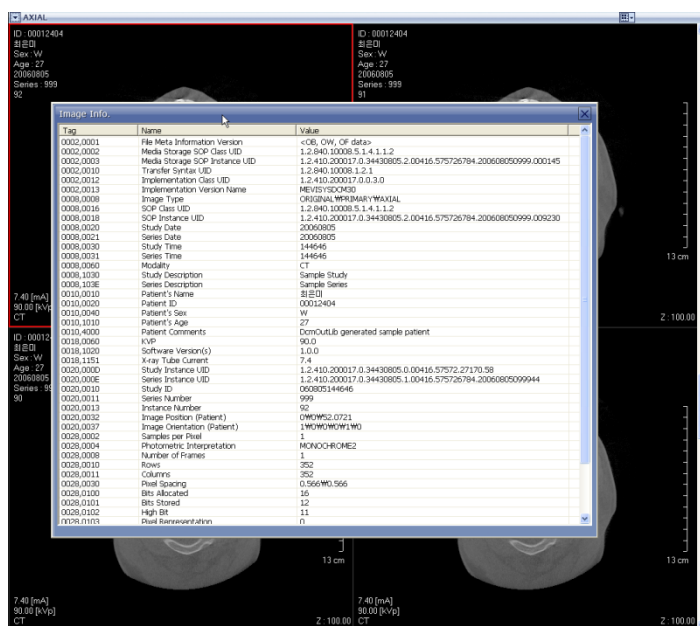
- **Image information display (Overlay)**

The Overlay function allows you to toggle patient information, x-ray dosage values, and ruler information on or off.



- **File information viewing (Image Info)**

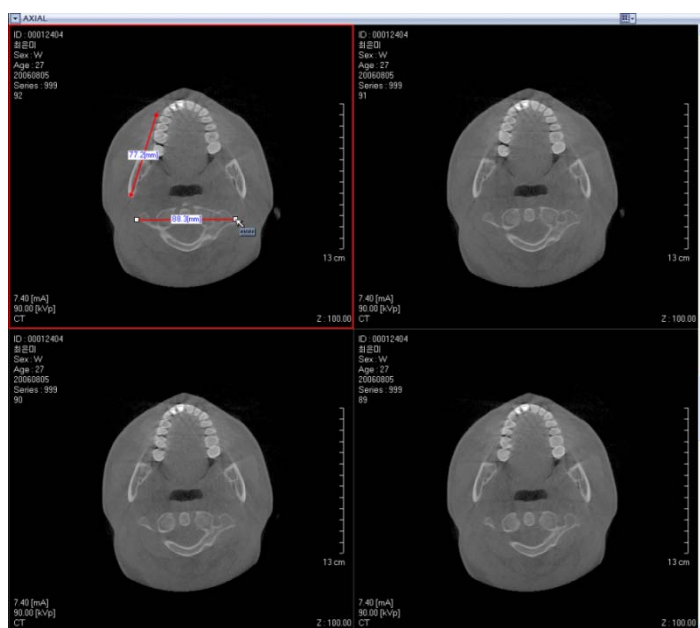
This allows the user to view the image's header information.



<Measure Tool>

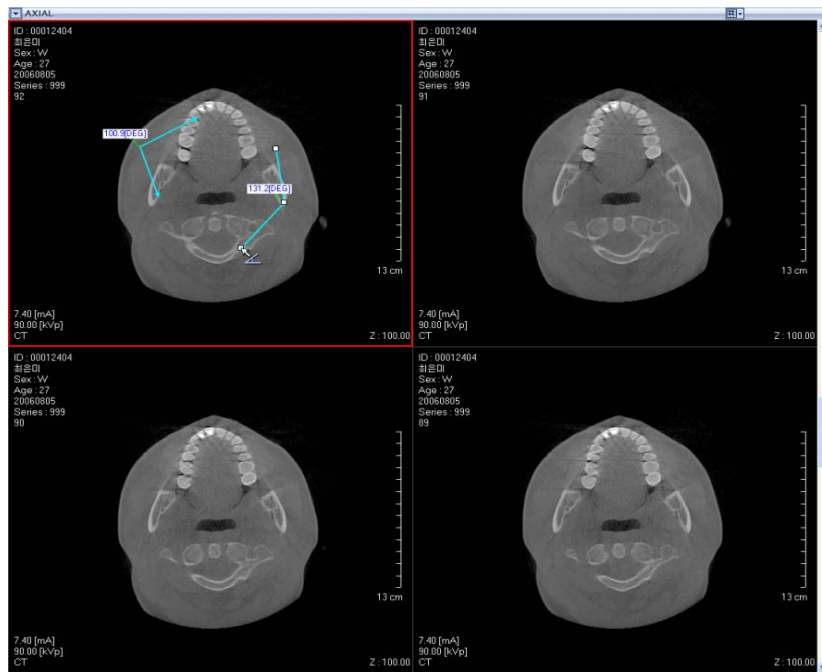
- **Measuring Length (Length)**

Click two points on the image and measure its distance.



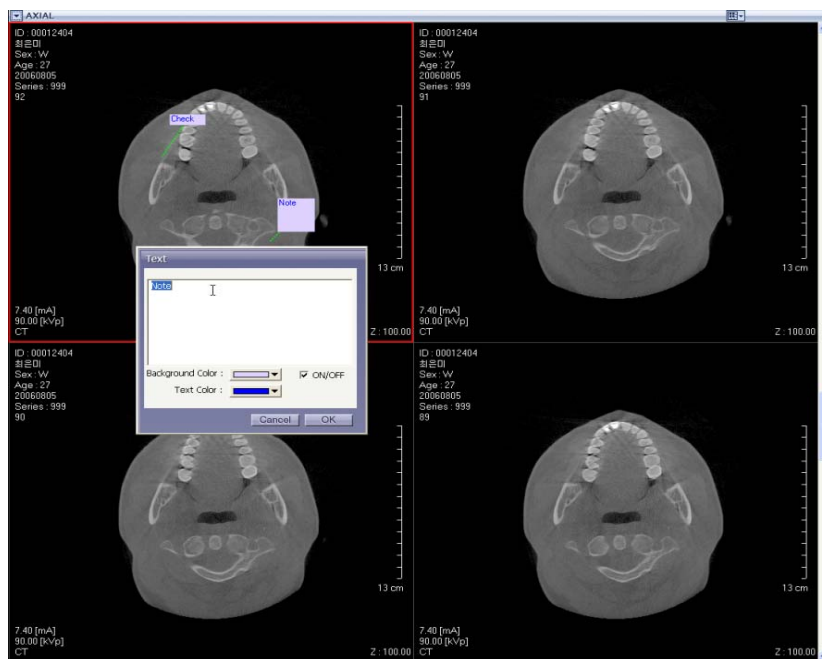
- **Measuring Angle(Angle)**

Click on three spots on the Image and measure its arbitrary angle.



- **Writing Memo (Note)**

By clicking on the Image Pane, it is possible to use the Memo function.



<Edit Tool>

- **Delete (Delete)**

The Delete tool is used to erase drawn overlays such as Length and Angle measurements, Notes, etc.

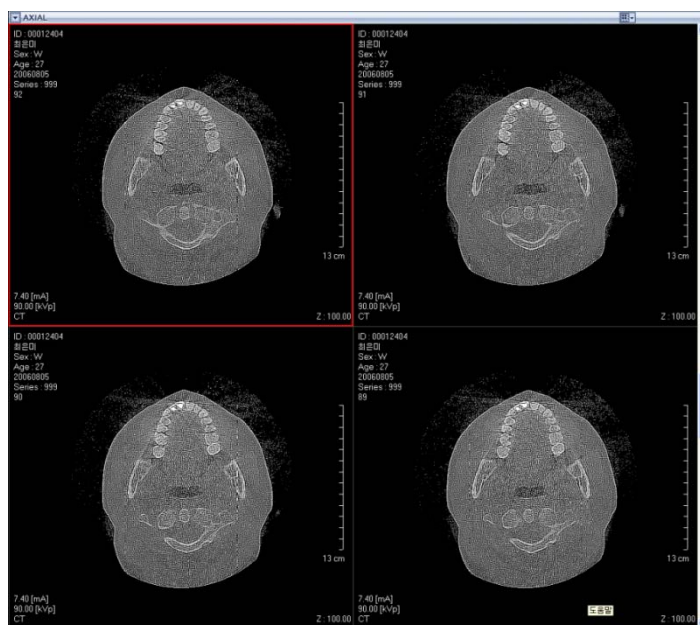
- **Reset**

This put the image back to its initial state.

<Image Process Tool>

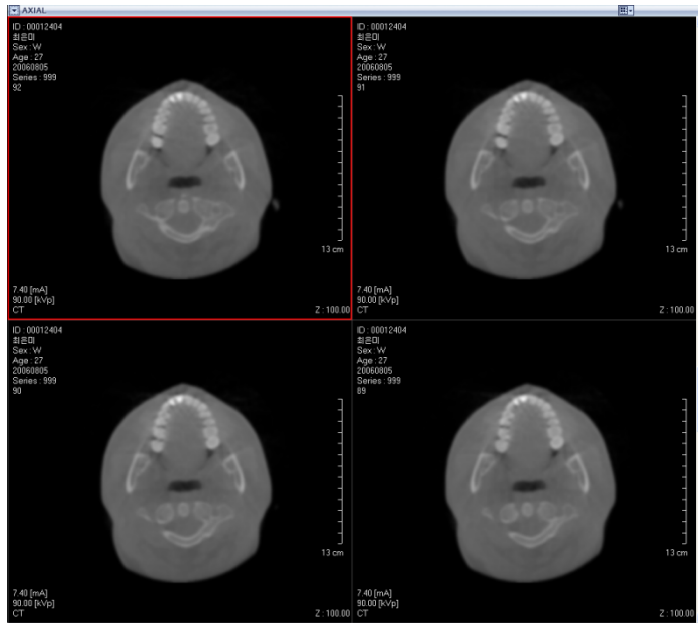
- **Sharp**

Sharpen all images.



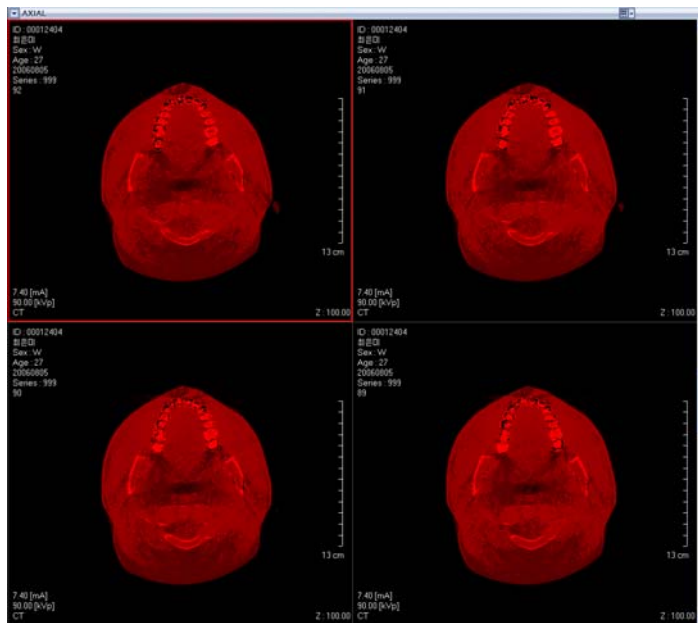
- **Smooth**

This smoothen all images.



- **Color**

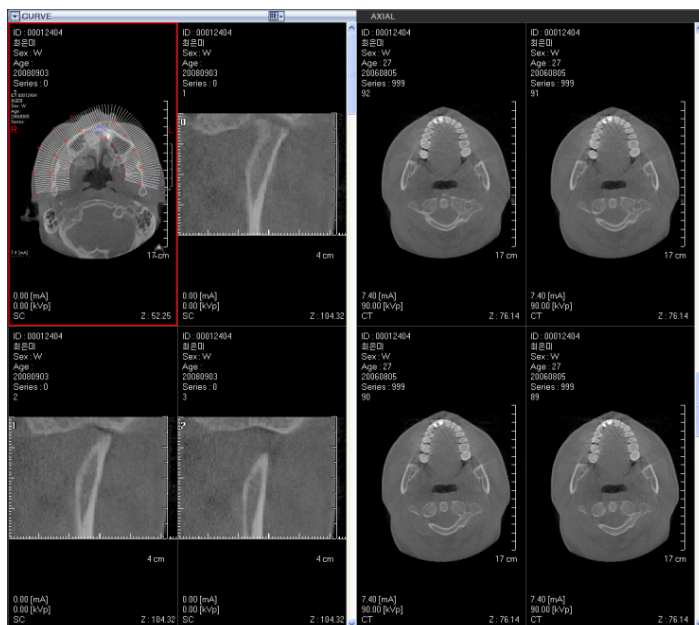
Color the images in Axial Mode.



<Tools Tool>

- **Compare Mode**

Allows the user to compare 2 images among Curve, Panoramic, 3D, and Axial modes.

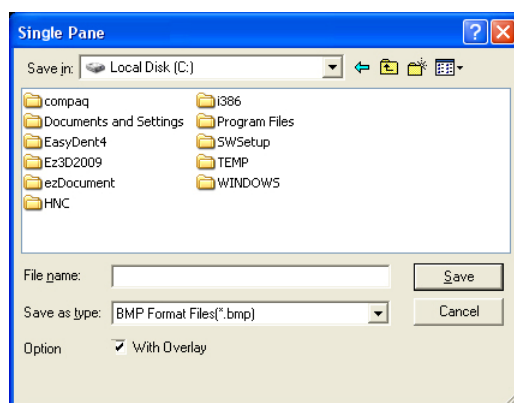


- **Export**

This allows the user to export the images in the image panes as file.

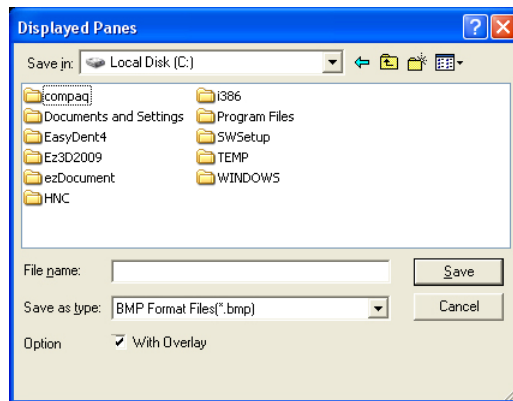
- **Single Pane**

One Image view pane can be exported in bmp, jpg, or DCM file type.



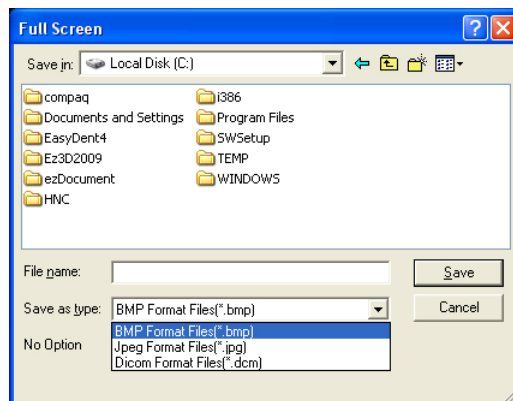
- Displayed Panes

Currently displayed images in the panes can be exported in bmp, jpg, or DCM.



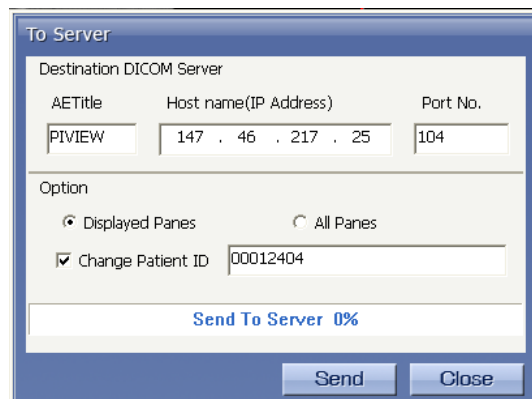
- Full Screen

It is possible to export the full screen by capturing in 3 file types of bmp, jpg, DCM.



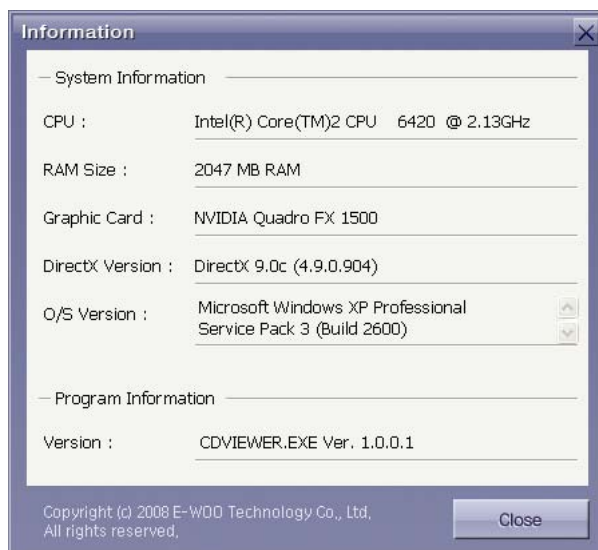
- To Server

Transmit DICOM file to Server.



- **System information**

Display system information currently in use.



8.3.3 Image Data Viewing-CD-Viewer (3D-Viewer)

The 3D CD-Viewer function allows the user to export the Simple Viewer of **Ez3D plus** through the CD/DVD installation program, which will enable the user to see images and treatment details.

<When Ez3D plus is installed>

- If the 2D/3D Viewer is of higher version than the installed **Ez3D plus** program version, Ez3D plus program should be installed with upgrades to the same version as the 2D/3D Viewer. When the installation is finished, the program will start with an automatic image loading.
- When the installed program is of the same version or of higher version than the 2D/3D Viewer, the program and image will be loaded automatically.

<When Ez3D plus program is uninstalled>

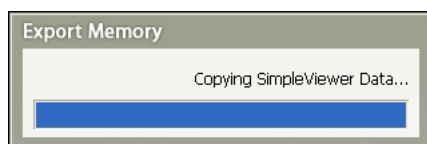
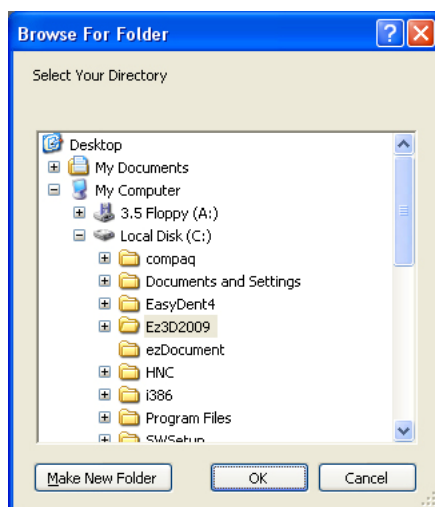
Install the **Ez3D plus** program. When installation is completed, the program will start by automatically loading an image.

8.4 Memory (Simple Viewer-Professional Version Only)

Memory (Simple Viewer) allows users to export the patient's images and treatment details by saving it on the user's PC.



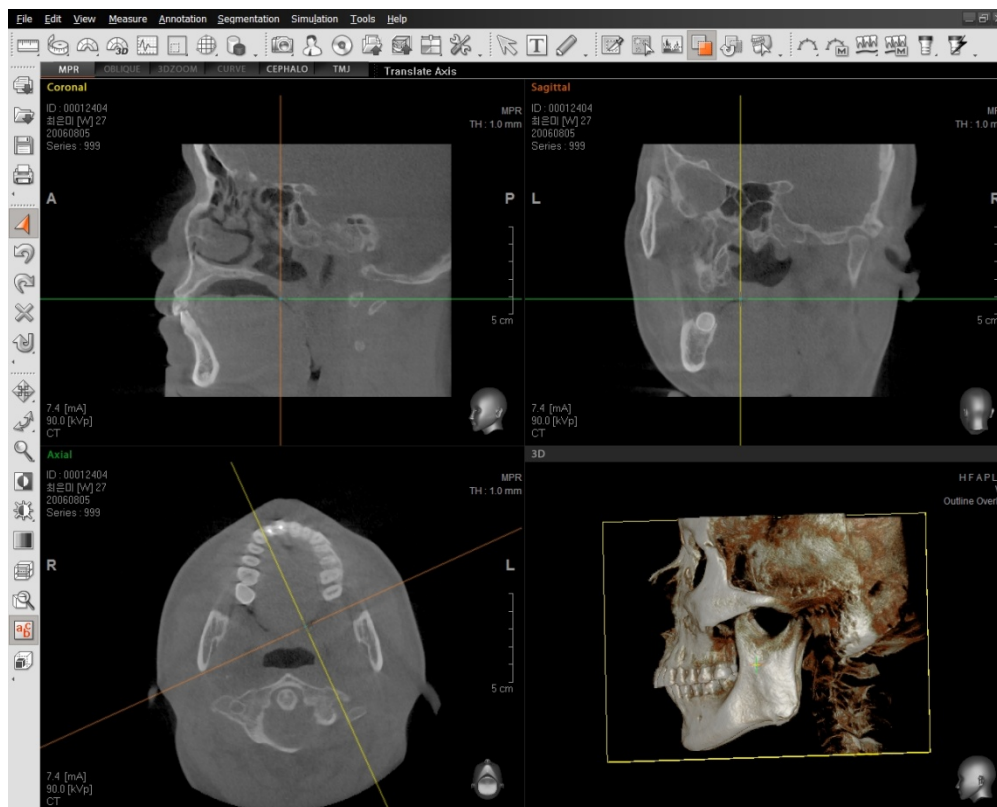
On the menu bar, click **Tools** → **Export** → **Memory...** and a window to designate a folder will be displayed.



When the path of folder to save is set, a shortcut icon **Launcher.exe** will be created to the designated folder for the file.

Double click the **Launcher.exe** to execute the Ez3D plus Simple Viewer.





Simple Viewer allows users to use tools like in **Ez3D plus** except for Simulation.

<When Ez3D plus program is installed>

If the Simple Viewer is of higher version than the installed **Ez3D plus** program version, **Ez3D plus** program should be upgraded to the same version as the Simple Viewer. When the installation is finished, the program will start with an automatic image loading.

When the installed program is of the same or of higher version than the Simple Viewer, the program will start automatically by loading an image.


<When Ez3D plus program is uninstalled>

Install the **Ez3D plus** program. When installation is completed, the program with loading an image automatically will be started.

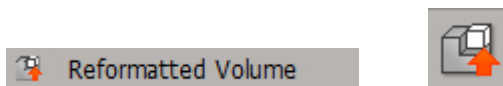
8.5 Reformatted Volume

Reformatted Volume Export functions to save the image file after modification for image properties and area in the user designated folder (Hard Disk, USB Memory). Note that only Image Bit, Voxel Size and Resolution (Row, Column) can be modified.

The image size and capacity produced from the property change can be viewed in the **Reformatted Volume Information**.

| | |
|---|--|
|  <p>NOTE</p> | <p>All the files created by Reformatted Volume Export are a DICOM format which meets DICOM v3.0 standard.</p> |
|---|--|

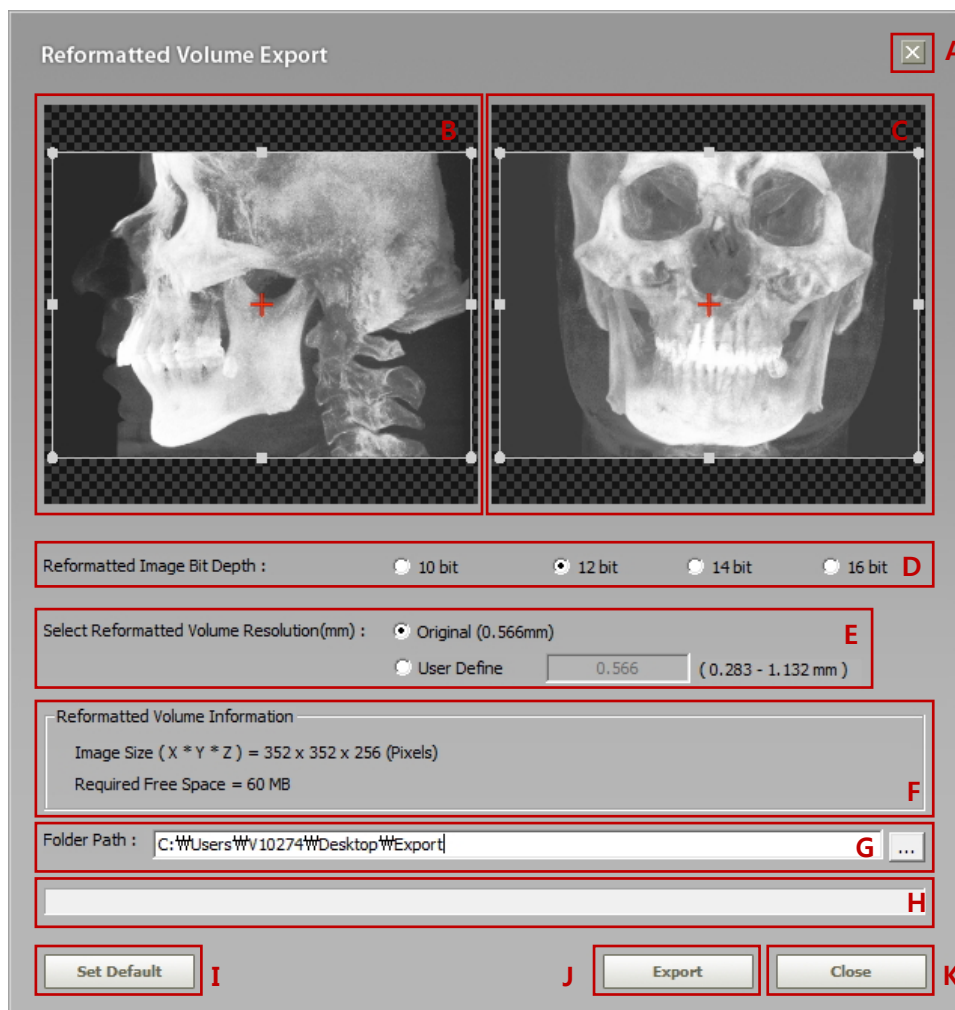
8.5.1 Running Reformatted Volume



Click either **Tools** → **Export** → **Reformatted Volume** or **Reformatted Volume** icon of toolbar.

Then **Reformatted Volume Export** screen will appear.

8.5.2 Screen layout of Reformatted Volume Export

A. **Exit (Close):**

: exit the **Reformatted Volume Export** screen.

: is the same function as the **Close** button (Ⓚ).

B. **Preview and Y-Z axis area set:**

Configure an area along the Y-Z axis for the image to be exported. For the details, refer to the section: **8.5.3 Defining the ROI**.

C. **Preview and X-Z axis area set:**

Configure an area along the X-Z axis for the image to be exported. For the details, refer to the section: **8.5.3 Defining the ROI**.

D. Reformatted Image Bit Depth:

Set the bit depth for each slice from the volume (image) to be exported.

- Supports 10, 12, 14 and 16 bits
- The default bit refers to one from the original volume.
- For other than 10, 12, 14 and 16 bit depth, 12 bit will be selected by default.
- The DICOM Tag is changed as well

E. Select Reformatted Volume Resolution(mm):


Set the resolution (VOXEL size) for each Axis: X, Y, Z of the image to be exported.

- If “original” is selected, the resolution of the original image is chosen
- If “User-defined” is selected, user can enter the resolution in the range of x0.5 (50%) to x2.0(200%) of the original voxel size.

F. Reformatted Volume Information:

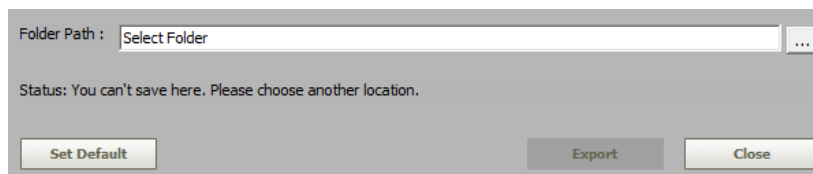
- Shows the volume size selected in the unit of pixel and disk space required in the unit: **bytes, KB, MB** or **GB**.
- In case of lack of the physical space: Hard disk or USB, the **Export** button (J) will become inactive. Then the text message “**Unable to save or export!!**” will appear.
- DICOM Tag is changed as well

G. Folder Path: Define the folder in which the file is to be exported.

- To set the path, either manual input or  button can be used.
- In case of wrong folder name or lack of the physical space, the **Export** button (J) will become inactive. Then the text message “**Unable to save or export!!**” will appear.

H. Status & Progress bar:

- For some reasons, in case of export failure, the following screen with text message will pop up. Note that the **Export** button is inactive



- When the export is in progress successfully, the progress bar will appear, with the Export button being active.



I. Set Default:

Reset the B, C, D, and E to initial states.

After reset,

- B and C return to the entire area (original size).
- D returns to the bit depth of the original image.
- E returns to the **Original**.

J. Export:

Starts exporting the image file reconfigured. This button will be inactive when the parameters are set incorrectly or conditions are not met correctly.

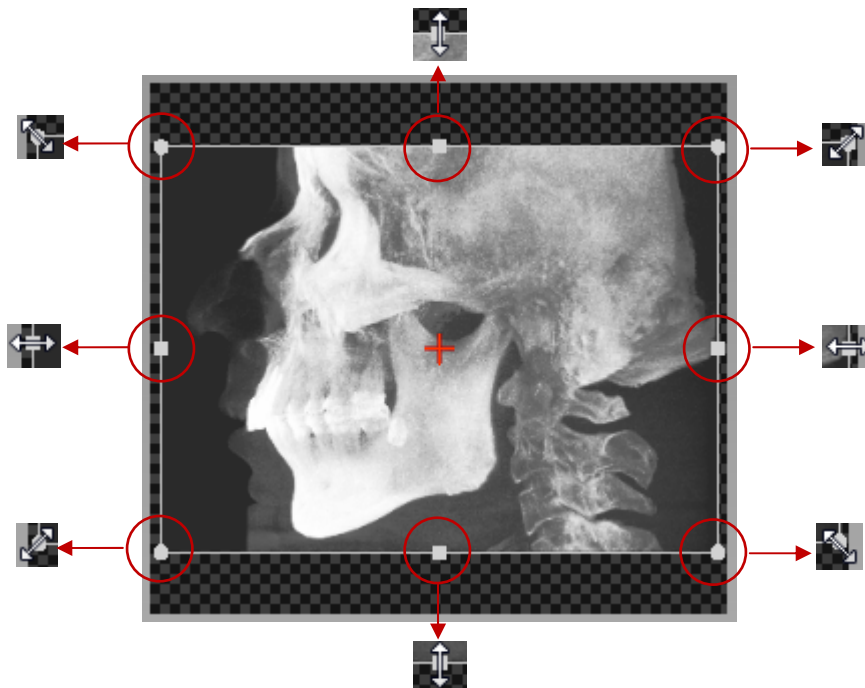
K. Close:

Exit the **Reformatted Volume Export** screen.

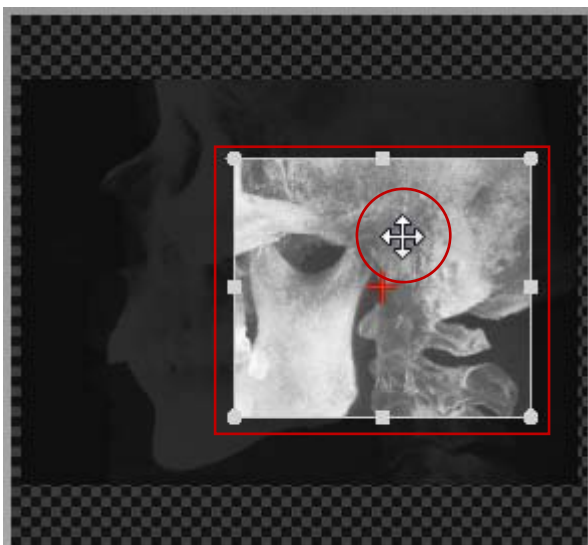
8.5.3 Defining the ROI (Region of Interest)

You can define the ROI in the preview area of Reformatted Volume Export, with dragging the mouse while holding down the left button.

The ROI can be resized by moving the mouse pointer while holding down the left button at the 8 points.

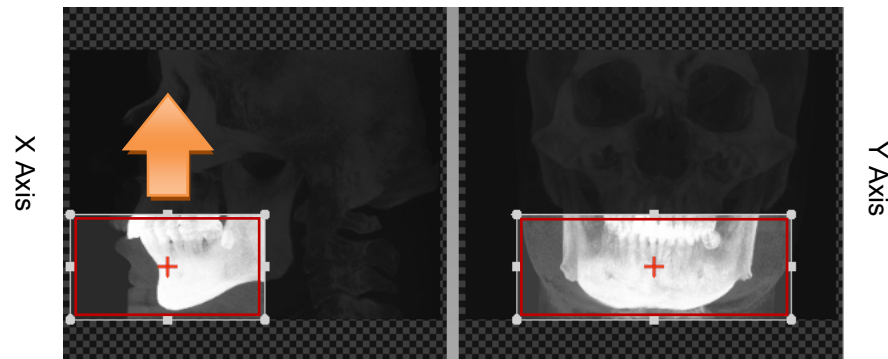


To move the ROI image, position the mouse pointer in the ROI and drag it with the left button pressed, as illustrated in the figure below.



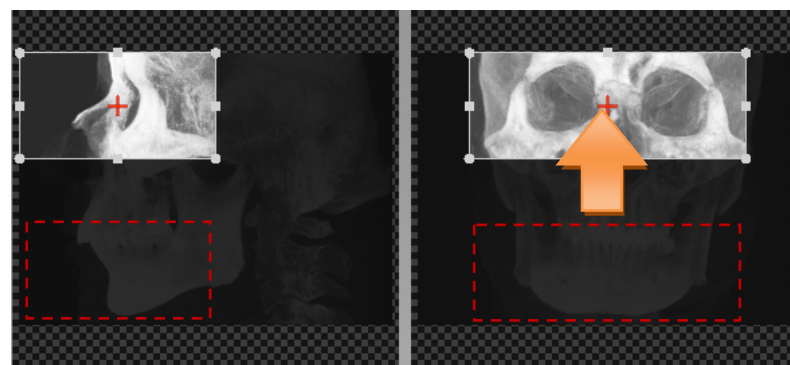
As two ROIs in preview areas are synchronized each other, their changes when the common axis: **Z** changes are noticeable along each axis: X, Y, and Z.

The following example demonstrates the previous statement: move the ROI up in Y-Z plane and then you will notice the same thing in X-Z plane.



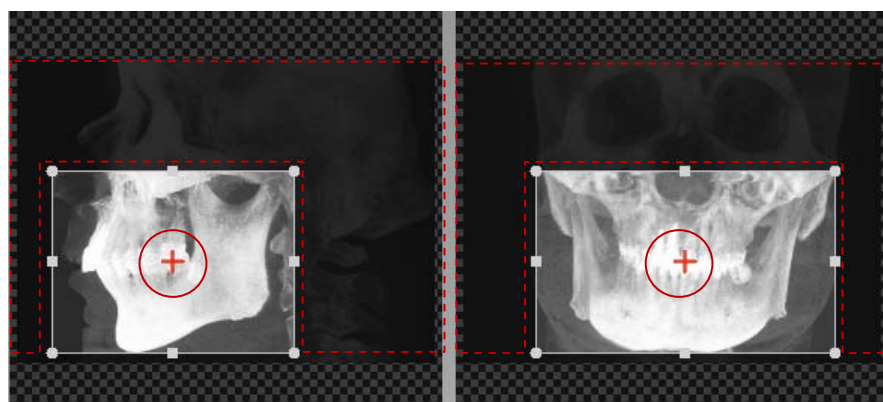
Z Axis

Before



After

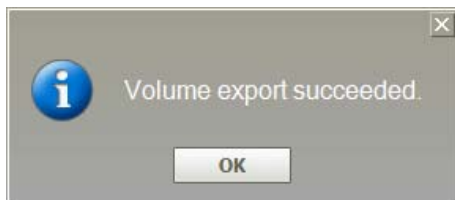
Lastly, as shown in the figure below, after setting deep contrast between the ROI and non-ROI, you will observe, with ease, the symmetry along the center lines formed through the center points marked with “+” in each ROI.



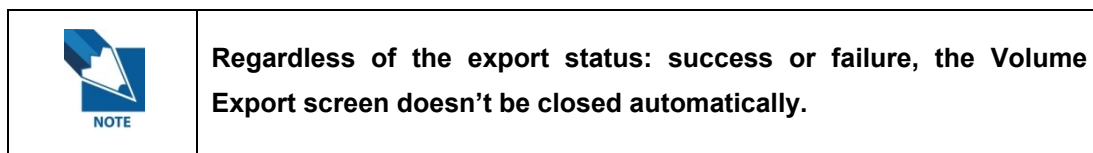
8.5.4 Exporting volume

Click the **Export** button after configuring the parameters in Reformatted Volume Export screen to start exporting volume data.

Then the progress bar comes up, followed by the following message box if it is successful.



To save the volume with other option, change the parameters first and then click **Export**.



8.6 3rd Party SW (Premium Version Only)

Interfacing with the 3rd party software, like Simplant, can be carried out through the function: **Reformatted Volume**.

8.6.1 Starting interfacing with Simplant

Simplant

Click **Tools** → **3rd party SW** → **Simplant** on the menu bar.

Then select the executable file for Simplant after clicking



Once the path for the executable file is set, it is not required to do it again from the next time on.



Once the **Export** button clicked after the ROI is defined, the export of image data begins. Shortly after completion of export, the 3rd party software: Simplant is called

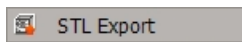
For more details, refer to “8.5 Reformatted Volume”.



The list of the 3rd party software supporting interface.
: Simplant (V.13 or higher)

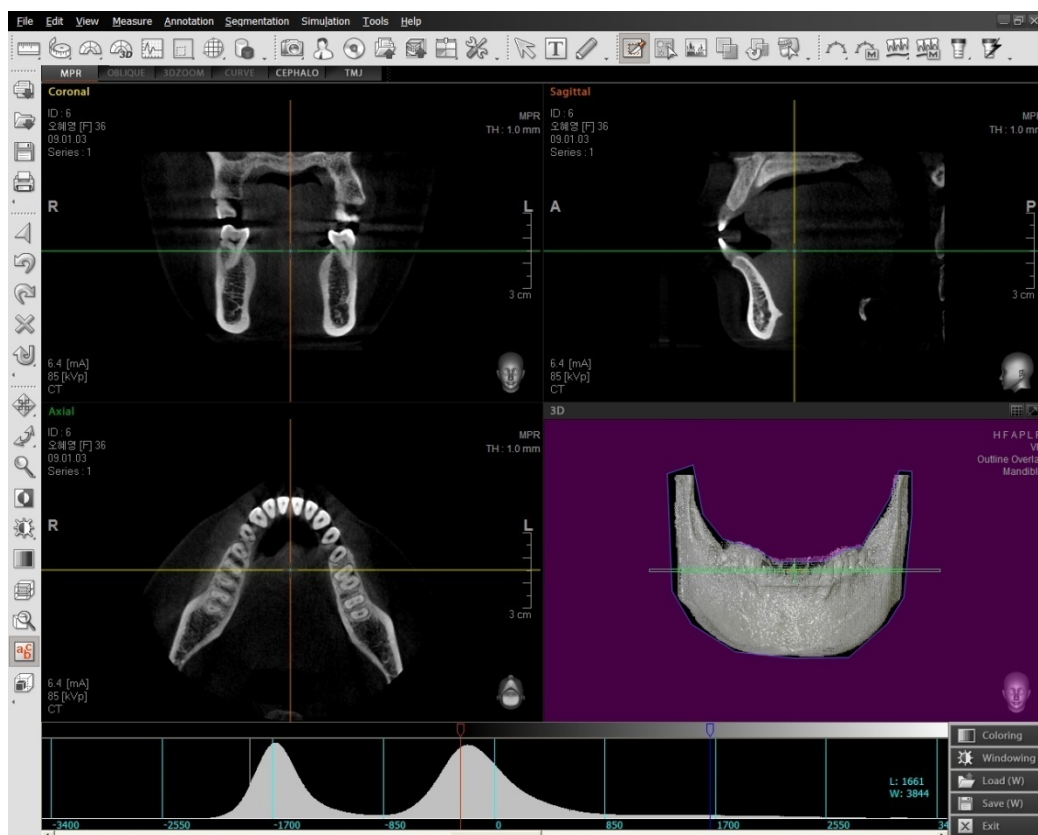
8.7 STL Export

The **STL Export** function enables the Volume data, which makes up the 3D image, to form a Mesh data (STL file) that can be uploaded to other 3D Viewers.

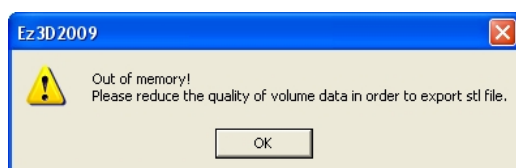


Click **Tools** → **STL Export** on the menu bar.

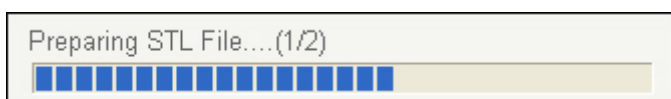
Adjust the OTF, position, and size of the volume (using the Sculpt function) for the region to be exported as your prefer before using the STL Export function.



If a large volume of data is to be exported, a message window will pop-up as shown below. In this case, lower the quality of the volume data using the OTF and Sculpt function then you can use the STL Export function.



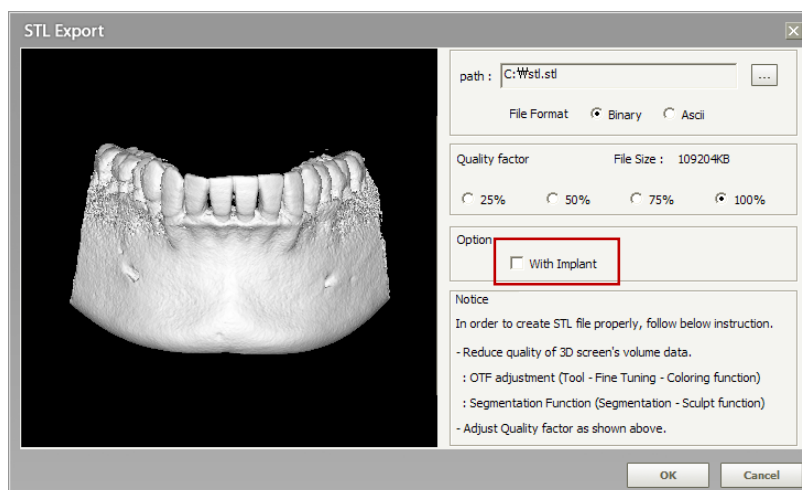
When you execute the STL Export function, you can see the progress bar that shows the conversion status of STL file from the volume data.



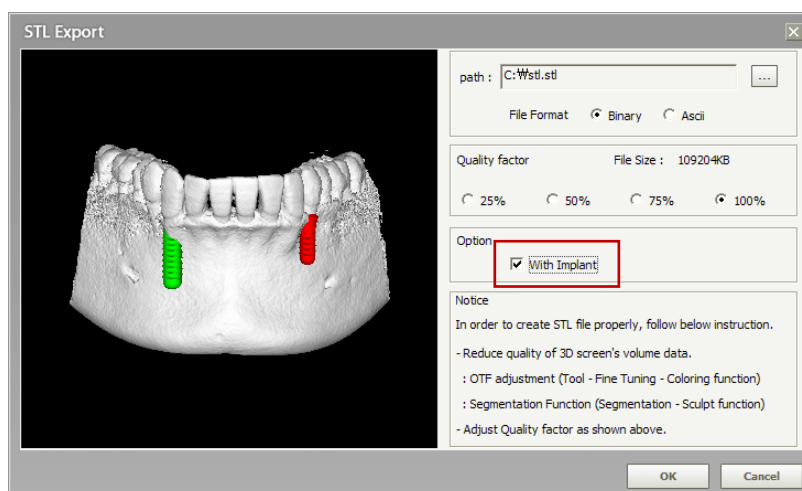
Once conversion is completed; the STL Export window, where you can preview the STL Export result, will appear. You may set the file path and type, as well as the file size to be exported by selecting the quality factor from among the 4 levels (25%, 50%, 75%, or 100%).

When the volume is exported, Implant information can be together by checking **"With Implant"**.

<STL Export – Without Implant>



<STL Export – With Implant>



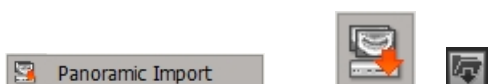
If you click **OK** button after the setting of file path, type, and quality factor is completed, the progress bar that shows the conversion progress of STL Export file will appear. Once the progress bar disappears, you can verify the STL file in the location you specified.




8.8 Panoramic Import


This enables the **Ez3D plus** to read and display the panoramic image which is stored in the File server for EasyDent— this is developed by Vatech Co.,Ltd.

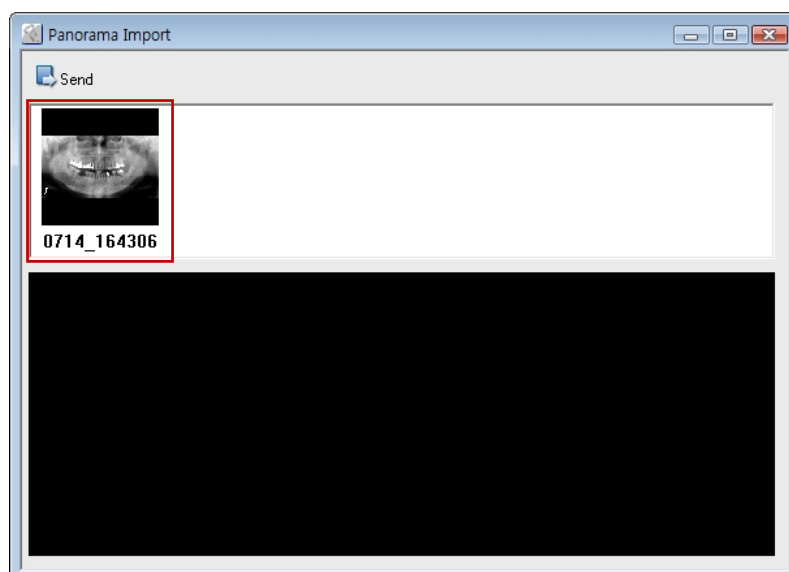
Note that to use this feature, **EasyDent** must be running before **Ez3D plus** starts.



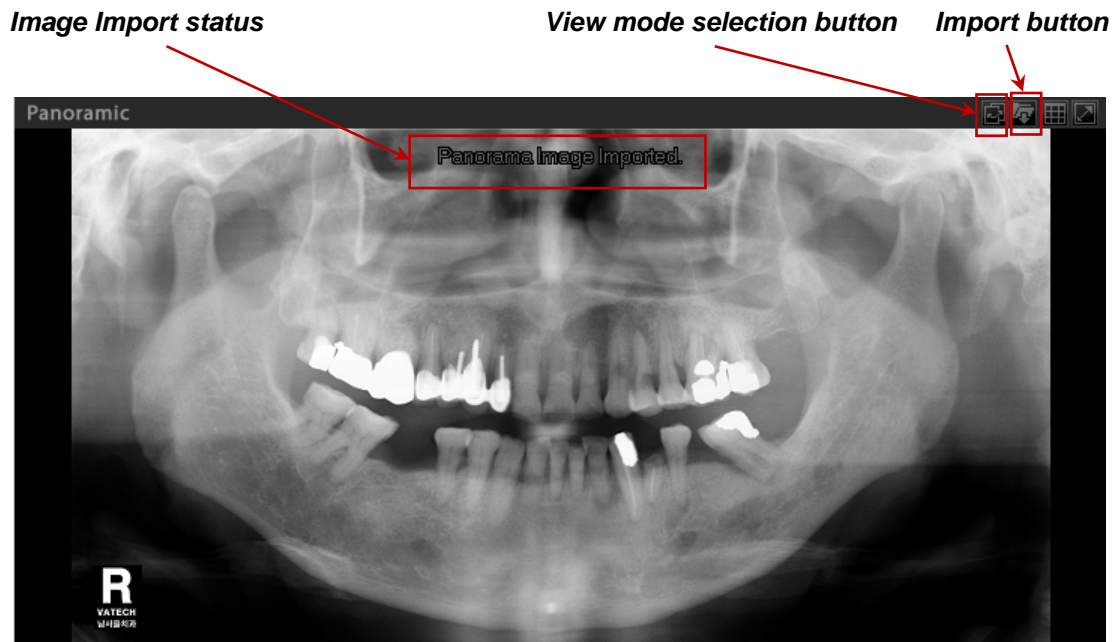
| | |
|---|---|
|  IMPORTANT | <p>Panoramic Import only works in the 'Curve' mode. Therefore move to 'Curve' mode to use this feature.</p> <ul style="list-style-type: none"> ● Standard version: select the 'Curve' mode in View tap after a curve is drawn on the image. ● Professional or higher version: select the 'Curve' mode in the view tap. |
|---|---|

Procedures:


- A. First run EasyDent viewer program.
- B. Run Ez3D plus by clicking the CT image
- C. Move the view mode to the **Curve** mode.
- D. From the menu bar, click **Tools** → **Panoramic Import** or from toolbar, click **Panoramic Import** icon (). Then the following screen will open.




- E. From the thumbnail, select the panoramic image to import and click **Send**. Then it is imported.



If a panoramic image is imported successfully, the message “**Panorama Image Imported**” is indicated.

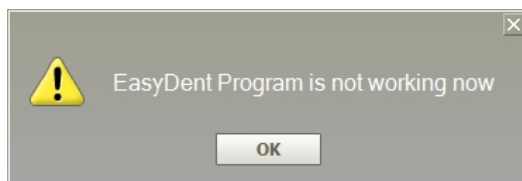
By clicking the view mode selection () icon, you can compare the original image imported from **EasyDent** with that reconstructed in **Ez3D plus**.

| | |
|---|---|
|  | <p>For an imported image, the manipulation like Rotating, Zooming, Panning, and Measure cannot be performed.</p> |
|---|---|

In case of unavailability of the panoramic image in **EasyDent** file serve, the following warning message will pop up.




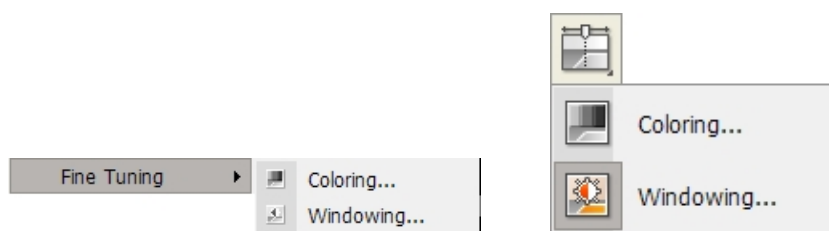
Furthermore, **EasyDent** must be running, in order to import an image successfully. Otherwise the following warning message will pop up.



8.9 Fine Tuning

Fine Tuning is a function to observe the desired parts of a 3D image by adjusting the Opacity on the Volume Rendering (VR) screen.

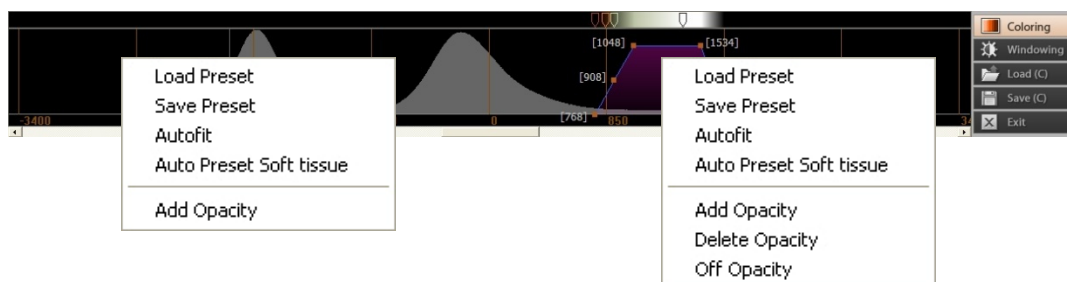
| | |
|---|---|
|  <p>NOTE</p> | <p><u>Relation between a 3D stereoscopic image and Hounsfield Unit</u></p> <p>Value expressed by the units of 100 at Fine Tuning is the image's level and is to be accommodated to the CT No., through adjustment. Hounsfield Unit (HU) is also called CT No. and, in general, has a range of -1000 to +1000. The representative values are based on air (-1000), water (0), and compact bone (+1000) and other tissues are assigned to relative values.</p> |
|---|---|



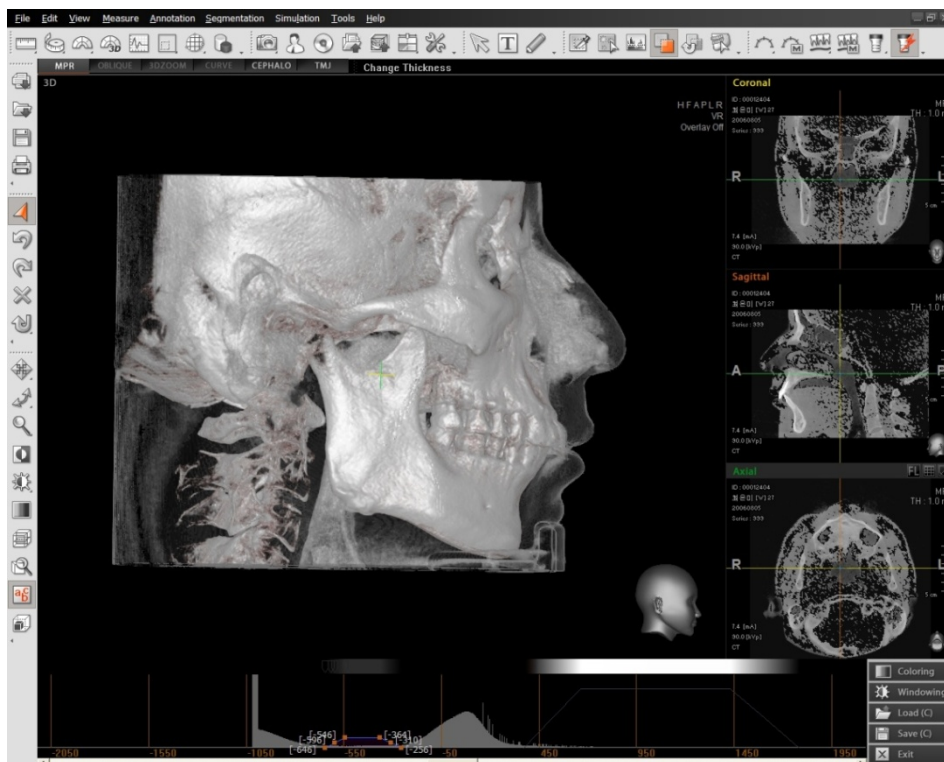
On the menu bar, click **Tools** → **Fine Tuning**. Two sub tools, **Coloring** and **Windowing**, will appear.

<Coloring>

When clicking Coloring, you can view the desired parts of a 3D image by controlling the Opacity on the Volume Rendering (VR) screen. Here, coloring is referred as OTF (Opacity Transfer Function).



- **Autofit:** Histogram is automatically adjusted to fit the visible area.
- **Auto Preset Soft tissue:** It automatically searches for soft tissue and bone area to create Opacity.
- **Add Opacity :** To add the transfer function
- **Delete Opacity :** To delete the transfer function
- **Off Opacity (On Opacity):** It reflects OTF (Opacity Transfer Function) area on the 3D.



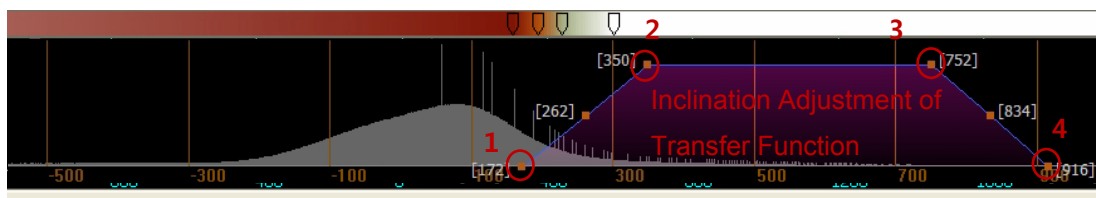
Rendering applied screen by using Multi OTF



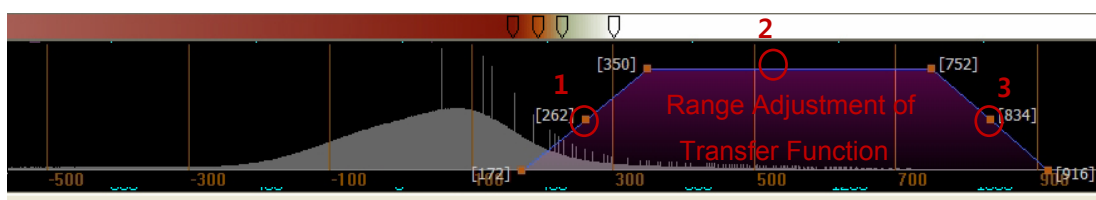
Rendering applied screen by using Multi-OTF for about half of the face with VOI

● **Transfer Function Adjustment**

Transfer function uses 4 points of slope adjustment and 3 points of size adjustment. 4 points of slope adjustment can make adjustment on left and right inclination of transfer function to the point movable from each position. The middle adjustment point's No. 2 and 3 cannot be placed outside the position of adjustment points No. 1 and 4 as the boundary.



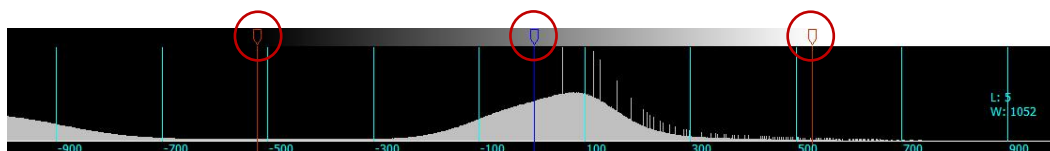
Among the 3 size adjustment points, two points on the left and the right are to be used in adjusting the range of transfer function without changing inclination. The middle adjustment point is used to control the height of transfer function.




<Windowing>

When clicking 'Windowing' a window appears as shown in following picture that enables accurate adjustment of brightness and contrast.

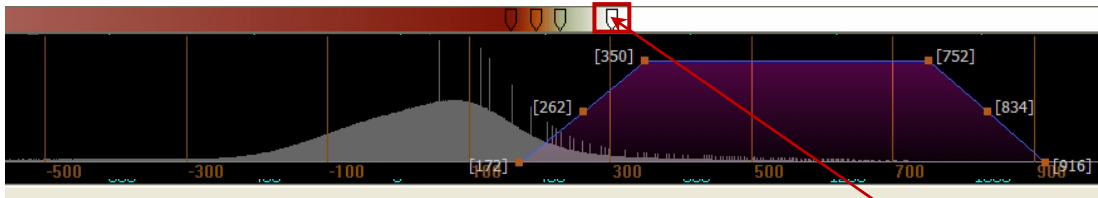
In the following image, when moving the mark in the center of the 3 marks to the left and right, brightness (Center value) will change. When both side marks are adjusted, the contrast value (Width value) is adjusted.



| | |
|---|---|
|  <p>NOTE</p> | <p>Window Width: Refers to the range of CT number marked in CRT and is related to contrast. The Higher the width, the better the contrast.</p> <p>Window Center: Refers to the Central Value for the Window Width range and is related to brightness. The Higher the level, the closer it indicates to the bone, which entails larger X-ray absorption.</p> |
|---|---|

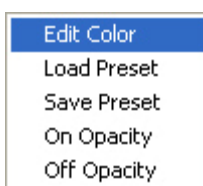
8.9.1 Edit Color

This is used to modify the color of the anchor selected from the Coloring window.

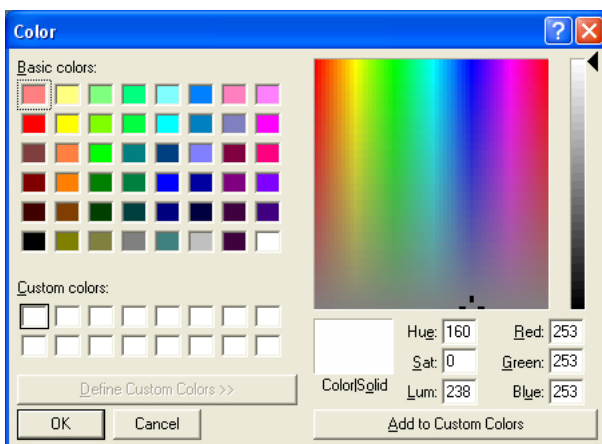


Click

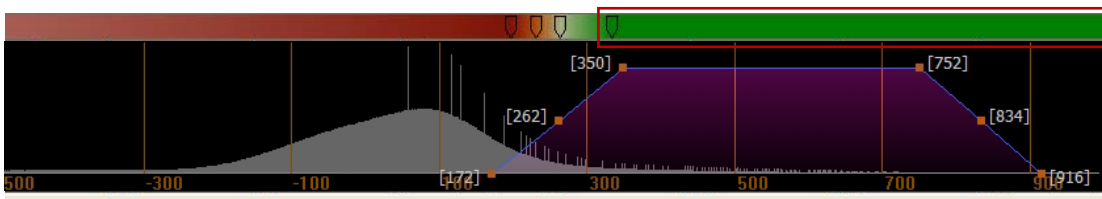
Right click the Color Anchor and select **Edit Color** from the sub menu.



The **Color** window will appear. Select the color.




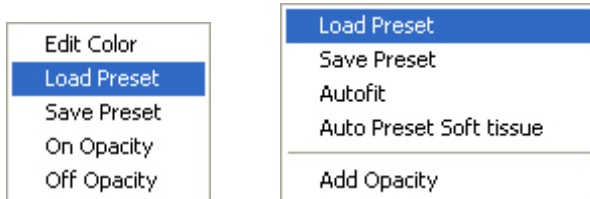
After selecting the desired color, click the **OK** button. You will see that the color of the color bar at the applicable position changes.



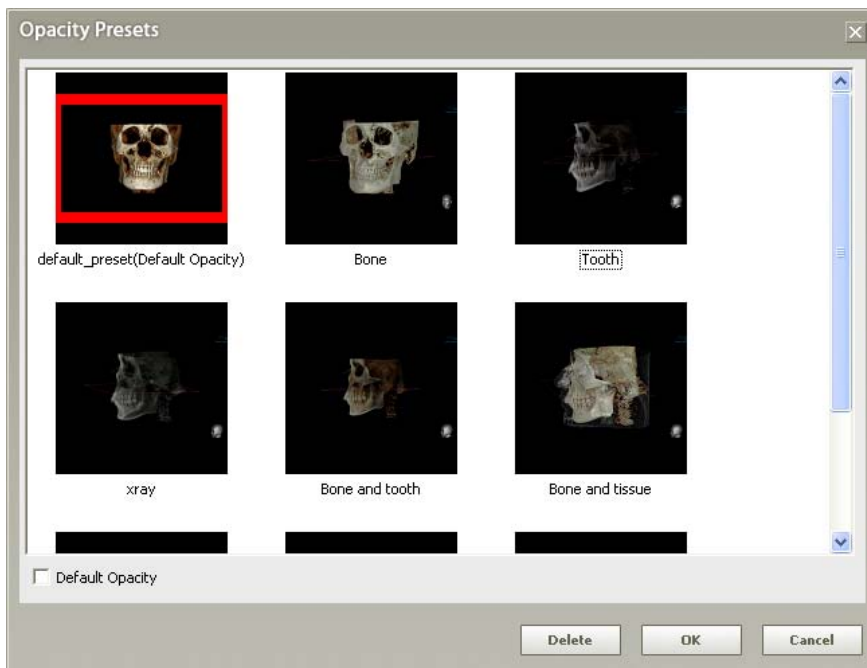
8.9.2 Load Preset

It is used to load a preset or to add new presets.

Click **Load Preset** from the sub menu that appears by clicking the right mouse button on any place in the Coloring window, or by clicking **Load (C)**  from the menu on the right side of the Coloring window.




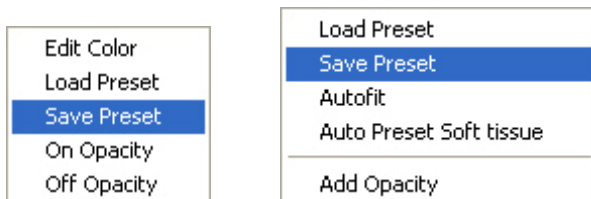
Opacity Presets will appear.



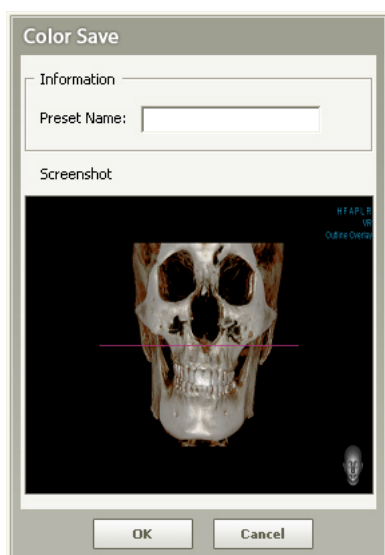
8.9.3 Save Preset

Save the OTF and color map setup value that is applied currently as a new preset file.

Click **Save Preset** from the sub menu that appears by clicking the right mouse button on any place in the Coloring window, or by clicking **Save (C)**  from the menu on the right side of the Coloring window.



After selecting **Save Preset**, the **Color Save** window appears.



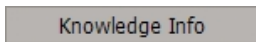
After filling in the name of the preset, click the **OK** button.

8.9.4 Exit

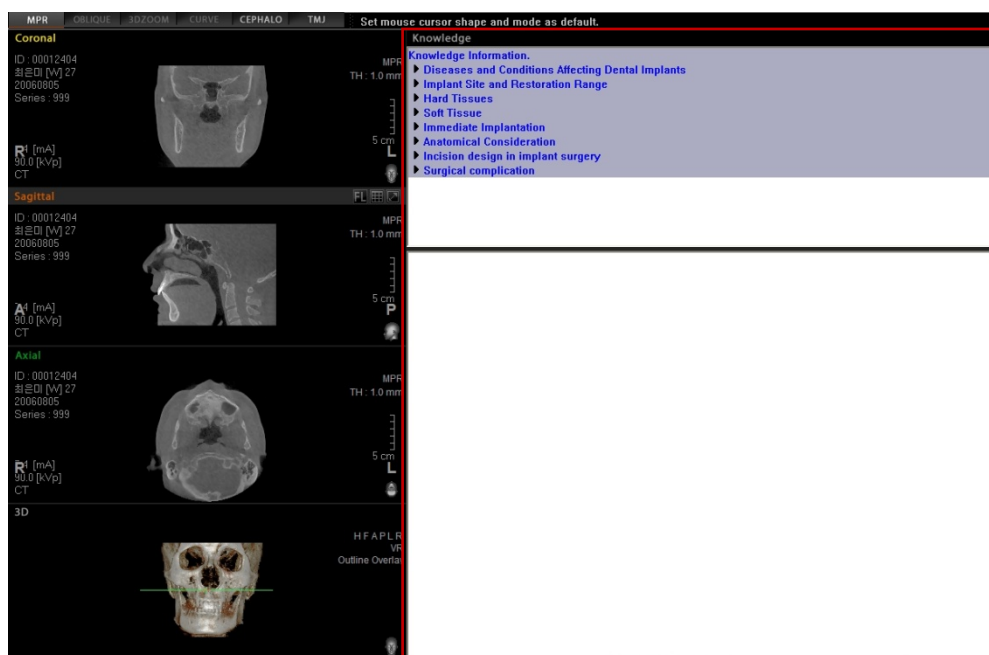
To exit the Fine Tuning window, click  **Exit**, located on the right side of the Coloring window.


8.10 Knowledge Info (Premium Version Only)


Knowledge Info enables you to search for useful information from the Ez3D plus Database about anything associated with implants and implant placements, which can be found in its table of contents.

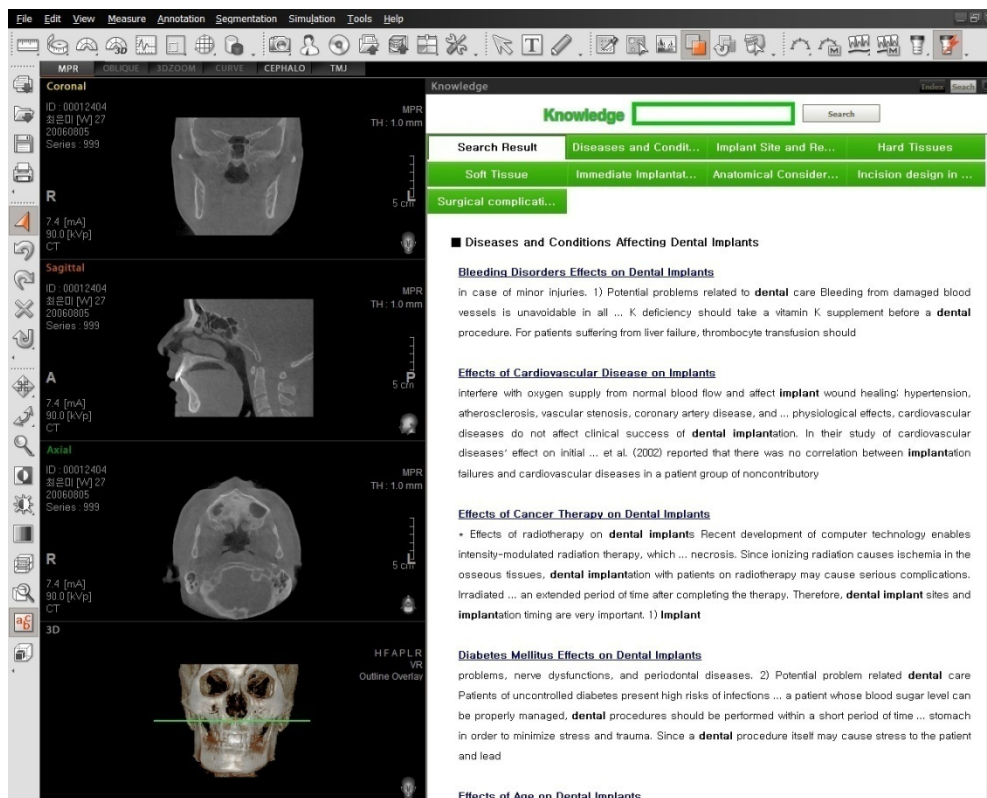


When you click **Tools** → **Knowledge Info** on the menu bar, then Knowledge window displaying table of contents will appear.



You may maximize/minimize the Knowledge Info window by clicking Maximize Button () located on the top right corner of the Knowledge Info window.

You may also search for information you wanted by typing the keywords in the Knowledge Info Search Engine ().



To close the knowledge Info window, change the View Mode on the top left corner of the screen. Along with the change in the view screen by the change in view mode, the Knowledge Info will also be closed.

8.11 RC Viewer

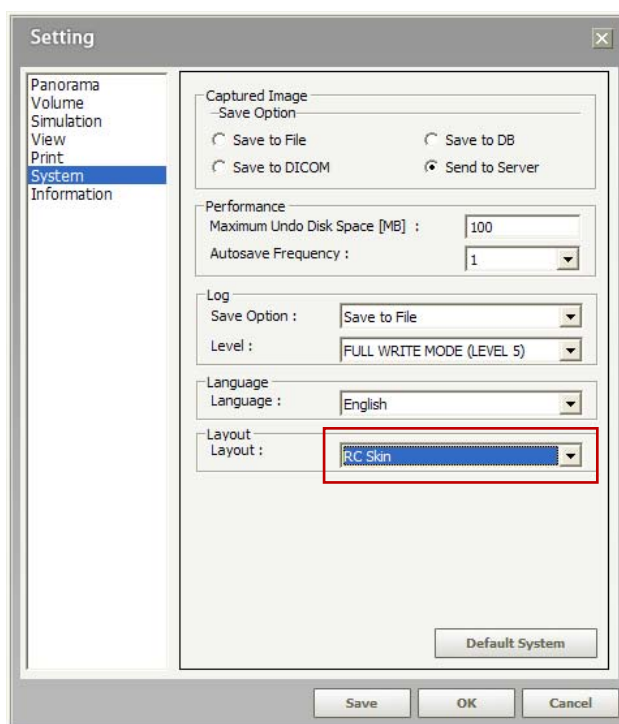
The RC Viewer is made especially for the radiology center in mind for which each user interface specializes in frequent use of functions. In particular, The RC Print and the volume size reduction in CD Export are a few of many features incorporated in the RC Viewer.

8.11.1 Starting the RC Viewer



In order to run the RC Viewer, you are required to configure the RC Viewer.

1. Click **Tools** button, followed by **Setting** button or **Setting** icon from the **Tool bar**. Then the setting screen will open.
2. Select the **System** and **RC Skin** in the Layout field.
3. Click **Save** or **OK**.
4. Exit the **Ez3D plus**.
5. Restart the **Ez3D plus**.

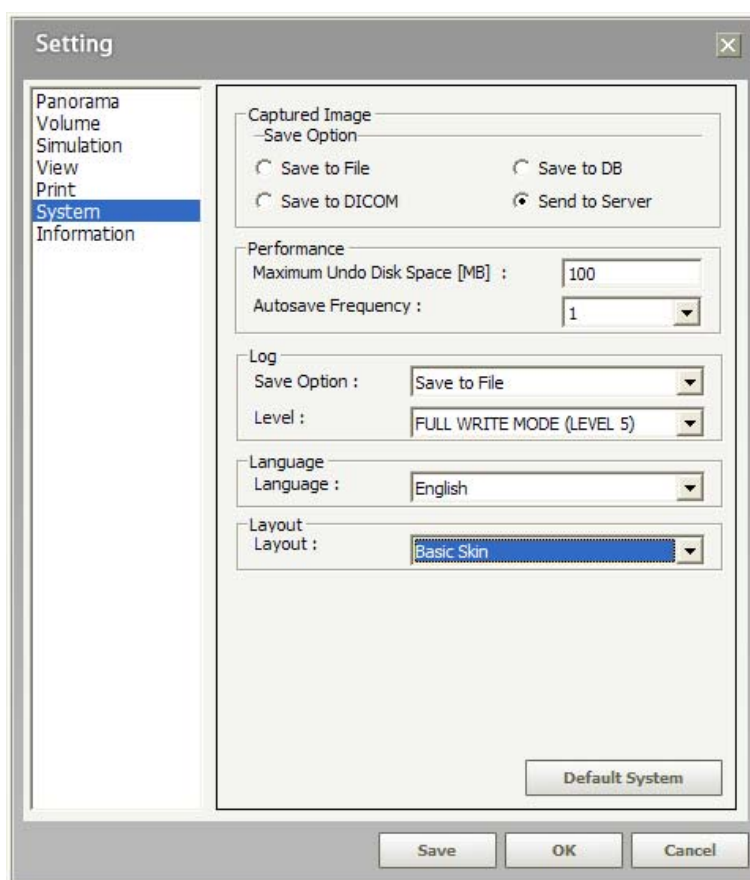




To enable the RC Viewer to run, it is required to terminate and restart Ez3D plus after configuring the RC Viewer.

If the **Basic Skin** in the Layout field is selected, the program will run under its own mode — **Premium** or **Professional** depending on your purchase.

You can also select view mode in the Layout field among **MPR**, **Curve**, **CEPHALO**, **TMJ** and **Basic Skin**, the selected mode is reflected on the RC Viewer's initial main screen.



The RC Viewer is supported under the Premium and Professional version only.

8.11.2 RC Viewer’s main screen

All the functions that the RC Viewer provides can be used through the menu bar and the icons at the tool bar.

Upon the image being loaded, three groups— ADJUST, TOOLS, EXPORT—will change in the expanded views and their composition vary automatically to the view mode selected —**MPR, Curve, Cephalo** and **TMJ**— in the RC Viewer setting.

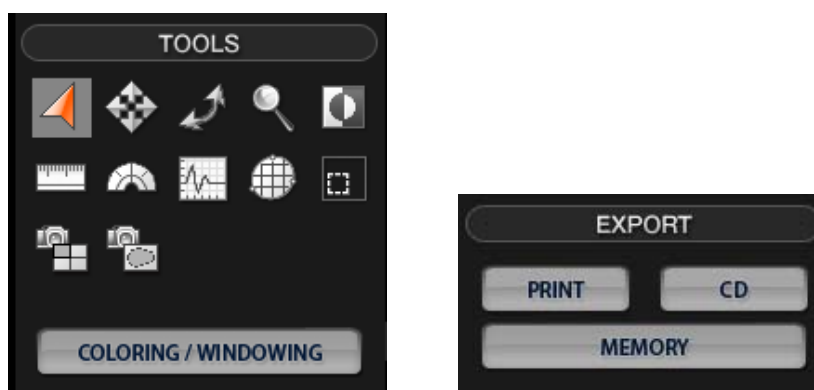
The following represents correspondence by each view mode.

| View mode selected | Displays on the tool bar |
|--------------------|--------------------------|
| MPR | ADJUST, TOOLS, EXPORT |
| CURVE | PANORAMIC, TOOLS, EXPORT |
| CEPHALO | CEPHALO, TOOLS, EXPORT |
| TMJ | TMJ, TOOLS, EXPORT |




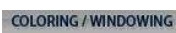





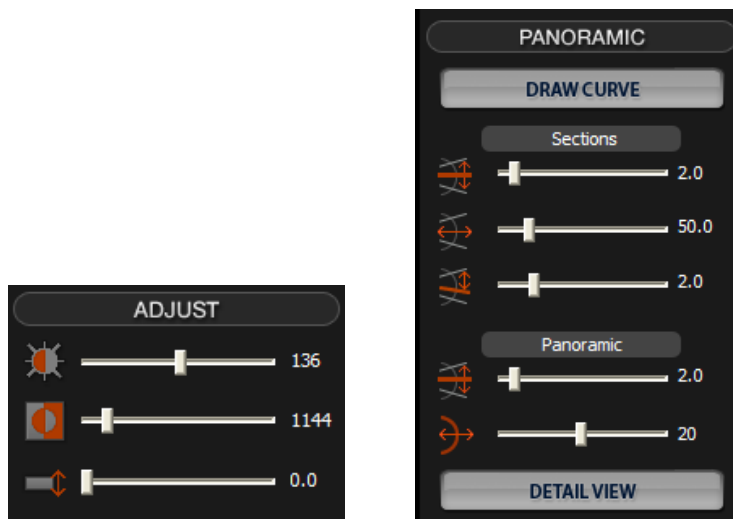
8.11.3 RC Viewer's tool bar

The following table explains functions corresponding to each icon.



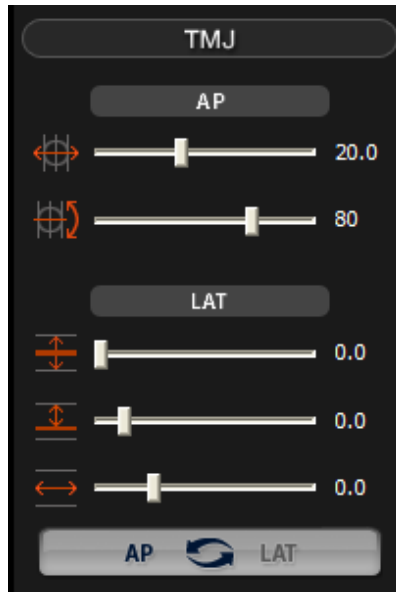
| Group | Tool | Icon | Description |
|--------------------|----------|------|--|
| TOOLS (All Tab) | Select | | Initialize the mouse function |
| | Panning | | Move the image up/down and left/right |
| | Rotating | | Rotate the image to the left and right |
| | Zooming | | Enlarge/Reduce the image |
| | Invert | | Invert color of the image |
| | Length | | Measure the length between two points in the image |
| | Angle | | Measure arbitrary angle in 2D image |
| | Profile | | Measure Bone Density between two points in the image |
| | Area | | Measure the size of selected area |

| Group | Tool | Icon | Description |
|---------------------|----------------------|---|---|
| | ROI |  | Measure Bone Density of selected area |
| | Capture Pane |  | Capture the selected Pane |
| | Capture Region |  | Capture partial area selected on the image |
| | Windowing / Coloring |  | Adjusting Windowing/Coloring of the image |
| EXPORT (All Tab) | RC Print |  | Print the image using the designated RC printer |
| | CD/DVD Burning |  | Save current image/case to CD/DVD |
| | Memory Export |  | Save current image in Memory |



You can adjust the desired value with the slide bars.

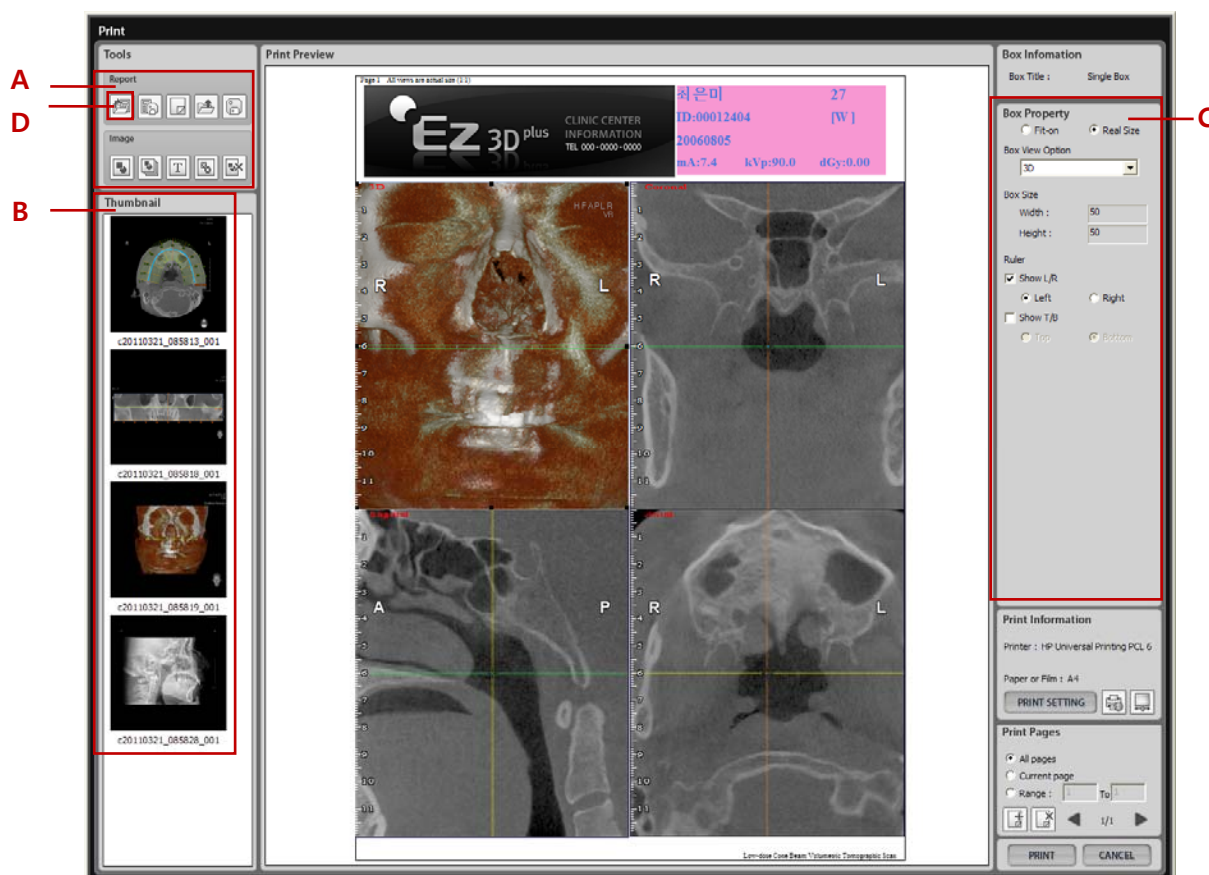
| Group | Tool | Icon | Description |
|---|---------------------------------|------|---------------------------------|
| ADJUST (MPR/ OBLIQUE/ 3DZOOM Tab) | Windowing | | Adjust Windowing of the image |
| | Contrast | | Adjust Contrast |
| | Thickness | | Adjust Thickness |
| PANORAMIC (CURVE Tab) | Sectional View Thickness | | Adjust Sectional View Thickness |
| | Sectional View Size | | Adjust Sectional View Size |
| | Sectional View Interval | | Adjust Sectional View Interval |
| | Panoramic View Thickness | | Adjust Panoramic View Thickness |
| | Panoramic View Position | | Adjust Panoramic View Position |



| Group | Tool | Icon | Description |
|-----------------------------|-------------------------|------|---------------------------------|
| CEPHALO (CEPHALO Tab) | View Position | | Select the View Position |
| | Export to File | | Export to File |
| TMJ (TMJ Tab) | AP Length Adjustment | | Adjust TMJ Left/Right AP Length |
| | AP Angle Adjustment | | Adjust TMJ Left/Right AP Angle |
| | LAT Thickness | | Adjust LAT Thickness |
| | LAT Interval | | Adjust LAT Interval |
| | LAT Size | | Adjust LAT Size |

8.11.4 RC Print

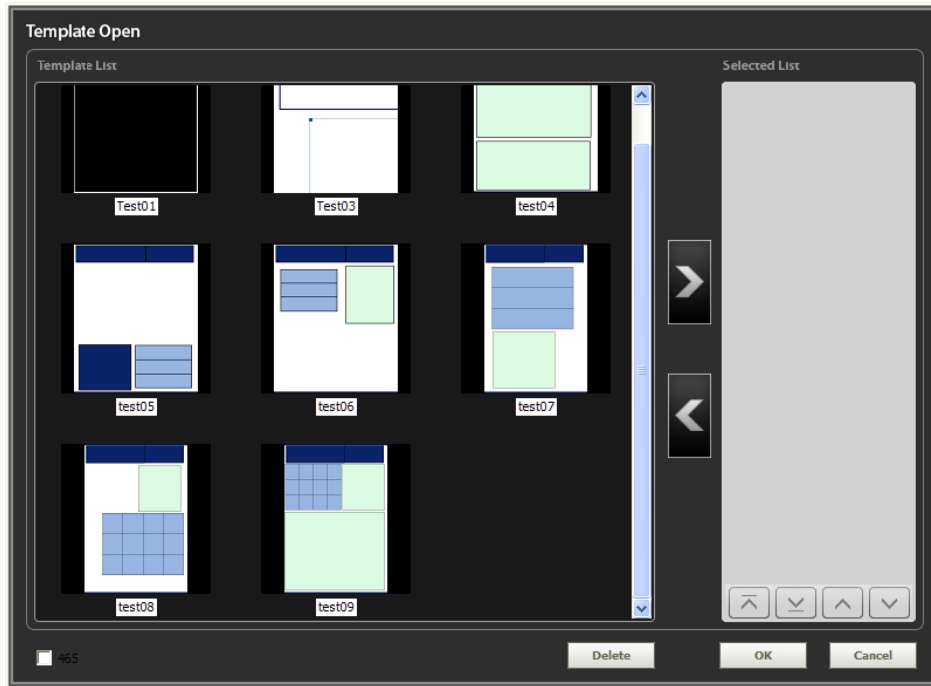
The RC Print is a function that is designated for the radiology center. Through the Report Preview, the user can compose and modify the image box at his or her disposal. For this work, the Box Property is provided on the right and you can drag and drop the thumbnail image on the left into the Image Box area.



- A. **Tools:** consists of the Report and image-related tools.
- B. **Thumbnail:** displays the image captured in **Ez3D Plus**. These can be dragged and dropped into Image Box.
- C. **Box Property:** shows the information about the Image Box selected currently. The user can edit the Image Box property at his or her disposal.
- D. **Load Template:** enables the user to load multiple templates. To do this select the template(s) and click Arrow. Then they are moved to the selected list and click **OK**.

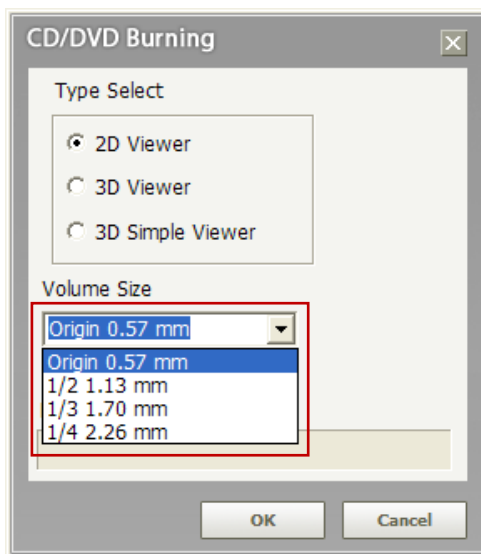
8 Special Functions

8.11 RC Viewer



8.11.5 RC CD/DVD Burning

This enables the RC Viewer to reduce the volume size when CD/DVD is burnt.

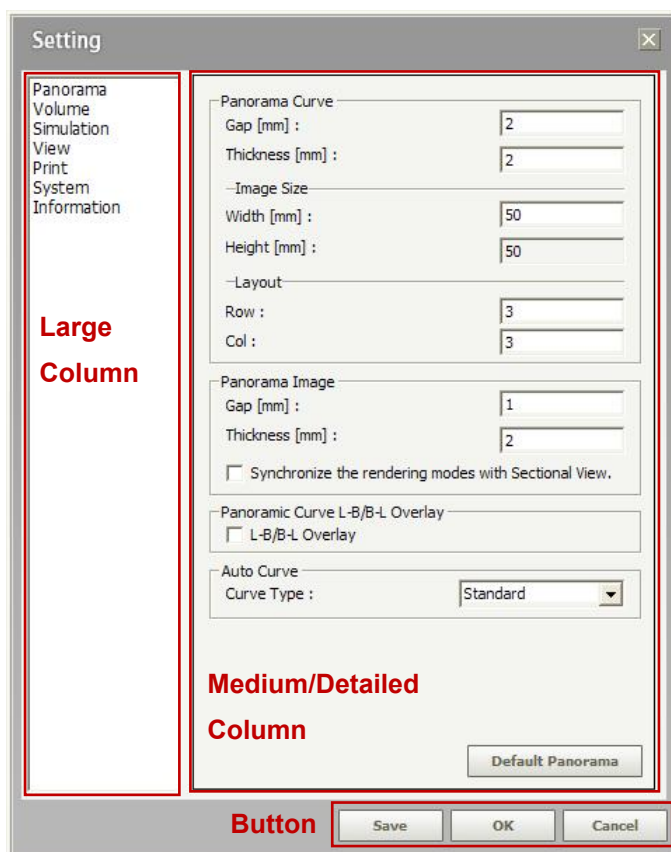


8.12 Setting

Ez3D plus offers a variety of settings for items such as Cross-Sectional, Panoramic Images, and MPR Images, as well as MPR Zoom, Default Windowing, Implant Transparency, View Setup, and Audit Log. **Setting** is composed of large, medium, and detailed categories. It is possible to confirm or modify each detailed column by selecting the large category column. Any modifications made will be applied after the program is restarted. The execution screen is shown below.



On the menu bar, click **Tools** → **Setting**, or click the **Setting** icon on the **Tools** tool bar. The execution screen will appear as shown in following picture.



8.12.1 Configuration

Setting categories are separated by each category column. Click a category and its category column will appear in the window, which consists of setting value tabs that you can reset. Shown below are the category columns of each of the setting categories.

A. **Category Description**

- **Panorama:** Set the options for interval, thickness, and image size used for Panoramic Image/Curve.
- **Volume:** Set the options for the thickness of MPR Image, Image Quality of 3D Volume, Image processing and etc.
- **Simulation:** Set the option for Implant, Canal, Bone Density.
- **View:** Set the light and shade of image, font, and 3D Zoom Factor.
- **Print:** You can set the print function.
- **System:** Set the option for save method, size, run program limiting, log management and etc.
- **Information (Clinic Info) :** Set the hospital or clinic information.

Composition and description of each detailed column in Setting window are as follows.

| Class | | Item | Description | Default Value |
|----------|----------------|-------------------------|--|--|
| Panorama | Panorama Curve | Gap[mm] | Set the interval of section at the time of Cross-Sectional View creation | 2 |
| | | Thickness[mm] | Set the thickness of section at the time of Cross-Sectional View creation | 2 |
| | | Width[mm] (Image Size) | Set the width/height of image at the time of Cross-Sectional View creation | 40 |
| | | Height[mm] (Image Size) | | 40 (Automatic input according to the Width value) |
| | | Row (Layout) | Set the number of row for Cross-Sectional View Layout | 3 |
| | | Col (Layout) | Set the number of column for Cross-Sectional View Layout | 3 |


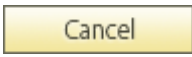
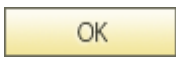
| Class | | Item | Description | Default Value |
|------------|-------------------------|---|---|---------------|
| | Panorama Image | Gap[mm] | Set the interval of section at the time of Panoramic View Cross Section creation | 1 |
| | | Thickness[mm] | Set the thickness of section at the time of Cross-Sectional View creation | 2 |
| | | Synchronize the Rendering modes with Sectional View | Synchronize the sectional window to the change of Panoramic window Rendering Mode | Unchecked |
| | Panoramic Curve Overlay | L-B/B-L Overlay | Set the direction of cut section of Cross-Sectional View | Checked |
| | Auto Curve | Auto Curve Type | Select Standard / Standard V / Standard Box | Standard |
| | Default Panorama | Default Panorama | Set as default of Panorama window | |
| Volume | MPR Images | Thickness[mm] | Set the default thickness of MPR image at the time of program start | 1 |
| | Volume Processing | On/Off | Toggle image processing on or off. | ON |
| | Large Volume | Large Volume Loading Method | Automatic / Manual | Automatic |
| | Default Volume | Default Volume | Set as Default Volume Window | |
| Simulation | Implant | Minimal Occlusal Dist.[mm] | Set the minimum occlusion site distance | 2 |
| | | Minimal Apical Dist.[mm] | Set the minimum cut section distance | 3 |
| | | Minimal Dist.[mm] | Set the minimum distance between implants | 2 |
| | | Fixture | Set the color of Fixture | blue |
| | | Abutment | Set the color of Abutment | blue |
| | | Opaque Implant | Select implant opacity | Checked |
| | Canal | Diameter[mm] | Set the thickness of canal | 2 |
| | | Color | Set the color of canal | red |
| | | Opaque Canal | Select canal opacity | Checked |

| Class | Item | Description | Default Value | |
|-------|--|--|---|------------------|
| | Bone Density | Set bone density option | | |
| | Collision (With a Message Box/ Audio Alert/ Show Safety Zone) | Set options occurring at time of collision at implant simulation | With a Message Box | |
| | Bone Density | Set bone density option | | |
| | Default Simulation | Set as Default Simulation Window | | |
| View | Windowing Value | Select (Auto Fit/ DCM Define/ User Define) | AutoFit | |
| | Action of Measure and Annotation | Select (Single/Several times) | Single | |
| | Annotation | Font (Size/Color) | Set the font size/color | Tahoma, 12, blue |
| | | Background Color | Set the background color of font | yellow |
| | DAP | dGyCm2 / mGyCm2 | Set DAP unit to be displayed | dGyCm2 |
| | Zooming / Panning / Windowing | Apply to all panels | Designate the window option application range (Single, Whole) | Checked |
| | | Use Auto fit | Set the image size | Checked |
| | Multi Slice View | Spacing [mm] | Multi Slice View Image Interval | 3 |
| | | Extend [mm] | Multi Slice View Image Extension length | 6 |
| | | Direction | Multi Slice View Image Direction | Horizontal |
| | | Thickness [mm] | Multi Slice View Image thickness | 2 |
| | | Rotation Degree | Multi Slice View Image Rotation Angle | 15 |
| | | Layout | Multi Slice View Image Layout | 3 x 3 |
| | | Default View | Set as Default View Window | |
| | Apply Mask | ON/OFF | Set Apply Mask ON/OFF upon Ez3D Plus start | ON |

| Class | | Item | Description | Default Value |
|--------|-------------|--|---|-----------------|
| Print | Paper | Background Color | Print background color setting | |
| | | Text Font Color | Text font color setting | |
| | | Logo & Patient Layout | Paper print setting for patient and clinic/hospital information. | |
| | | Canal Color | Define the color for canal | Unchecked |
| | | B/L Mark | Hide/display B/L | Unchecked |
| | | Thickness/Interval | Hide/ display thickness /length | Unchecked |
| | Default Box | Box Background Color | Text box background color setting. | |
| | | Size Width[mm] | Width of the box | 50 |
| | | Size Height[mm] | Height of the box | 50 |
| | | Ruler L/R | Left/right positions of the ruler that will be displayed on the box | Checked (Left) |
| | | Ruler T/B | Top/bottom positions of the ruler that will be displayed on the box | |
| | | Sectional index font | Font of the cross-sectional index | |
| | | Font Background Color | Background color of the cross-sectional index | |
| | | Default Print | Default value setting for Printing | |
| System | Capture | Save Option | Set the image capture save option | Save toDB |
| | Performance | Maximum Undo Disk Space [MB] | Set the maximum reset capacity | 100 |
| | | Auto save Frequency | Set the frequency of Auto Save | 1 |
| | Log | Save Option (Save to File/ Save to Database) | Set the log file save option | Save to File |
| | | Log Level | Set the Log file creation level | Error Only Mode |

| Class | | Item | Description | Default Value |
|-------------|---------------------|---|---|-------------------|
| | Language | Auto/English/France/Germany/China/Japan | Language preference setting If it is Auto, the language will be selected automatically along with checking the OS language. You may choose your preferred language (Chinese, Taiwanese, French, German, Japanese, or Portuguese). Once you are done setting the language, it is necessary to restart the program in order to apply the selected language. | English |
| | Layout | Basic skin/ RC skin | In the Layout field: ✓ Basic skin- Ez3Dplus ✓ RC skin- RC Viewer | Basic skin |
| | | Default System | Set as Default System Window | |
| Information | Clinic Information | | Clinic Information (User Input) | Blank |
| | Browse | | Move to the website of the registered clinic | www.e-wootech.com |
| | Default Information | | Set as Default Information Window | |

B. Basic Button Description

| | |
|---|---|
|  | Change the Setting value and apply the modified value |
|  | Close Setting Window |
|  | Change the Setting value and apply the modified value then close the window |

9 Help

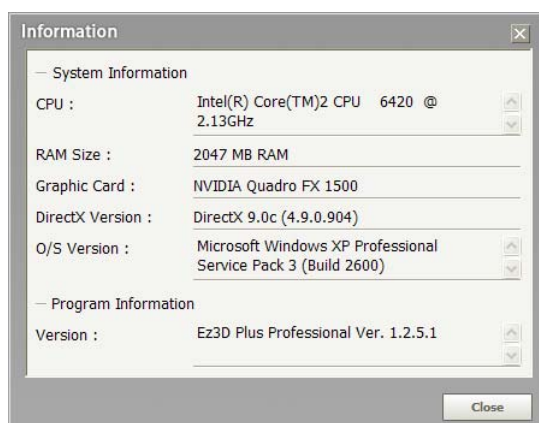
File Edit View Measure Annotation Segmentation Simulation Tools **Help**

9.1 Contents

Provides the **Ez3D plus** User Manual.

9.2 System Information (About)

Shows the current system information.



9.3 USB Lock Key Information

Shows **USB lock key** information.



Appendix 1 Installing Ez3D plus

1.1 System Requirement

1.1.1 Recommended system requirements for display

- Microsoft Windows XP(SP2)/Vista(SP1)/7 32/64 bit
- Processor : Core DUO CPU 1.8GHz or Higher
- RAM : 2GB or Higher
- HDD : 2GB free hard disk space
- Ethernet network card
- Display : 1280 * 1024 * 32bpp

1.1.2 Minimum system requirements for display

- Microsoft Windows XP(SP2)
- Processor : Pentium IV 2.0GHz or Higher
- RAM: 512MB or Higher
- 100 MB free hard disk space
- Ethernet network card
- Display : 1024 * 768 * 32bpp
- Screen resolution of 1024 x 768

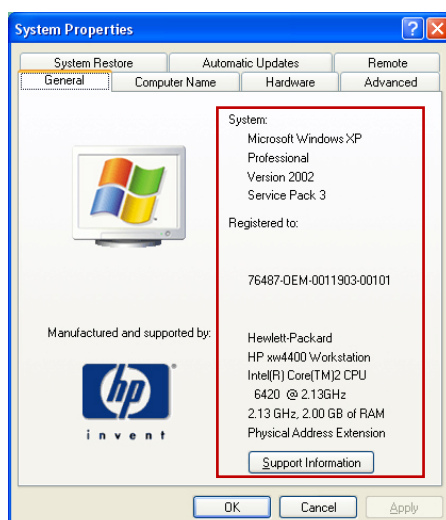
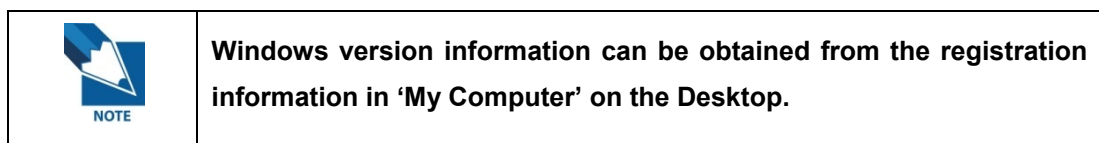
1.1.3 System OS update

In order to use **Ez3D plus** with stability, Window Service Pack and Internet Explorer Update should be installed as follows. Also for smooth operation, we recommend to install Microsoft MDAC 2.7 or higher version.


- **Window Service Pack**
- Windows XP: Service Pack 2 or higher

Internet Explorer: Version 6.0 or higher.

Microsoft MDAC 2.7 or higher.





System Registration Information

| | |
|---|---|
|  <p>NOTE</p> | <p>The version of Internet Explorer can be confirmed by viewing the 'Help' menu within Internet Explorer.</p> |
|---|---|



Internet Explorer Information

| | |
|---|--|
|  <p>NOTE</p> | <p>If Windows or Internet explorer is of a lower version than that required by Ez3D plus, the applicable update files contained in the Ez3D plus installation CD should be installed first. Microsoft MDAC is included in the installation CD as well.</p> |
|---|--|

| | |
|--|--|
|  <p>WARNING</p> | <p>If the languages of the contained files do not match those of the operating system, please visit the Microsoft website to install the proper updates.</p> |
|--|--|

1.2 How to install Ez3D plus

When the **Ez3D plus** CD is inserted, the installation file will execute automatically. For more information, refer to the following procedure.

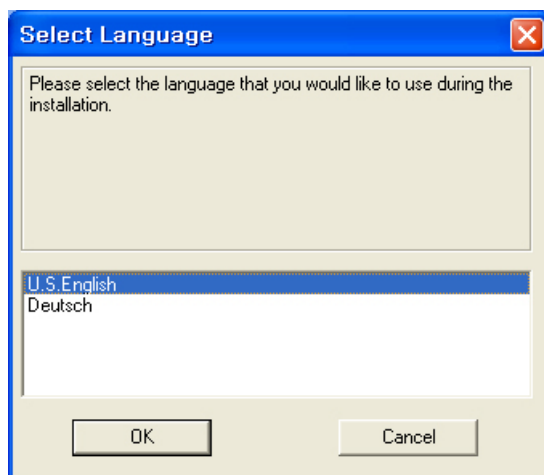
1.2.1 Installation of HASP Key(Lock-Key)

To use **Ez3D plus**, a HASP lock key driver must be installed to the PC or network prior to software installation. **HASP License Manager** must be installed on the PC that has lock key physically connected to it. For all other PC's in the network, install the HASP lock key driver

Below is the installation procedure for USB Lock-Key.

- A. Log in on an Administrator Account (Administrator Group) after freshly booting the system.

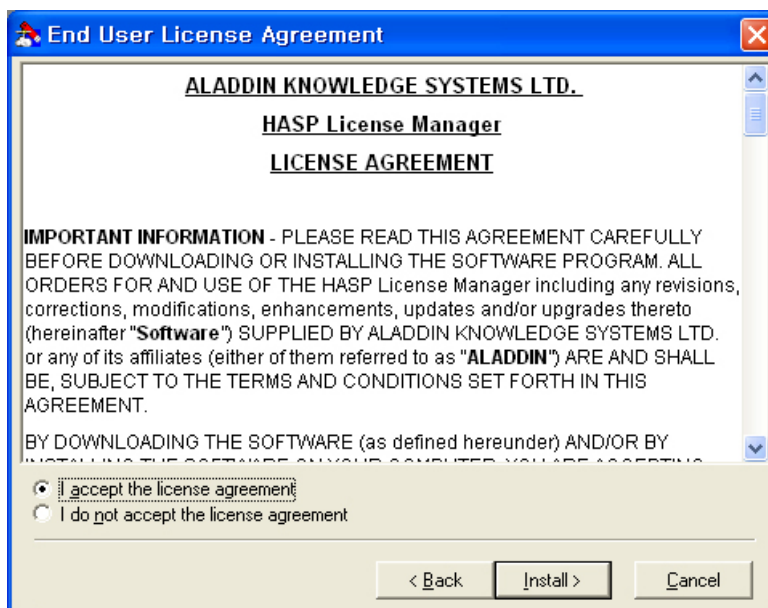
- B. After executing `lmsetup.exe` at HASP License Manager, select **U.S. English** then click the **OK** Button.



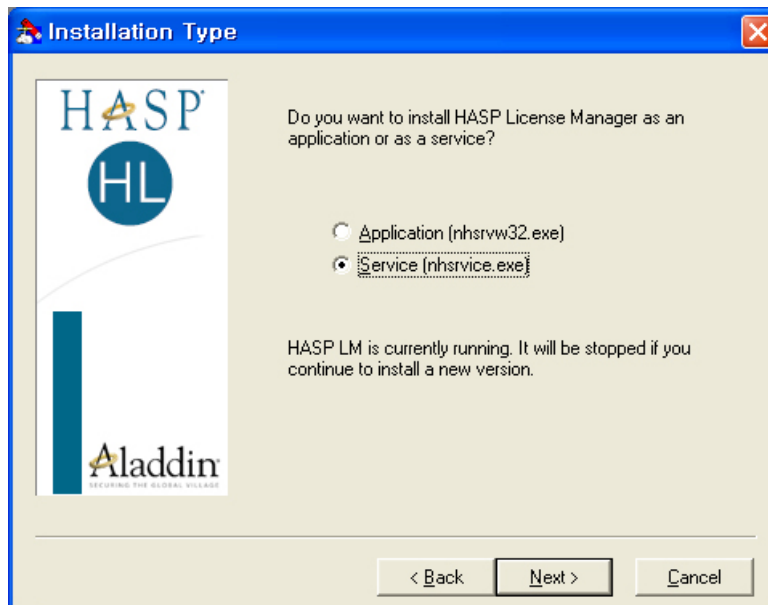
- C. After checking the version information, click the **Next** button to continue the installation.



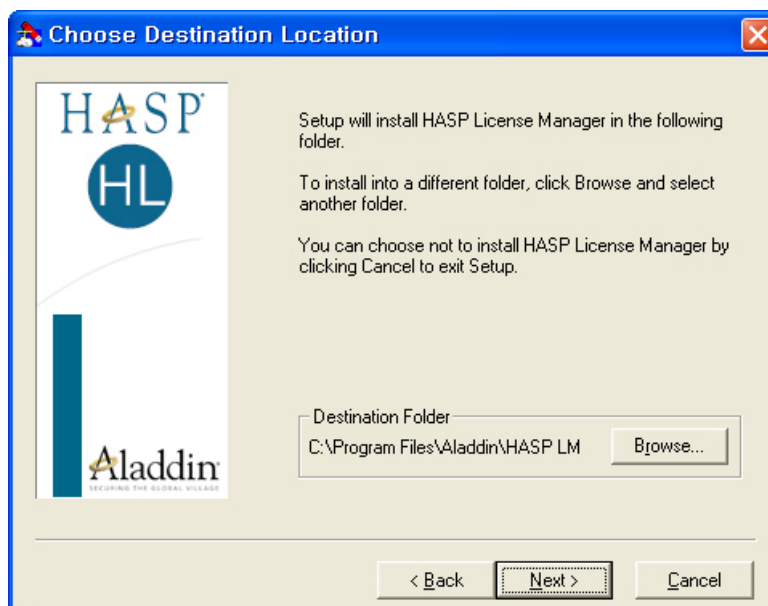
- D. Read the **End User License Agreement** and select **I accept the license agreement**. Click the **Install** button to continue the installation.



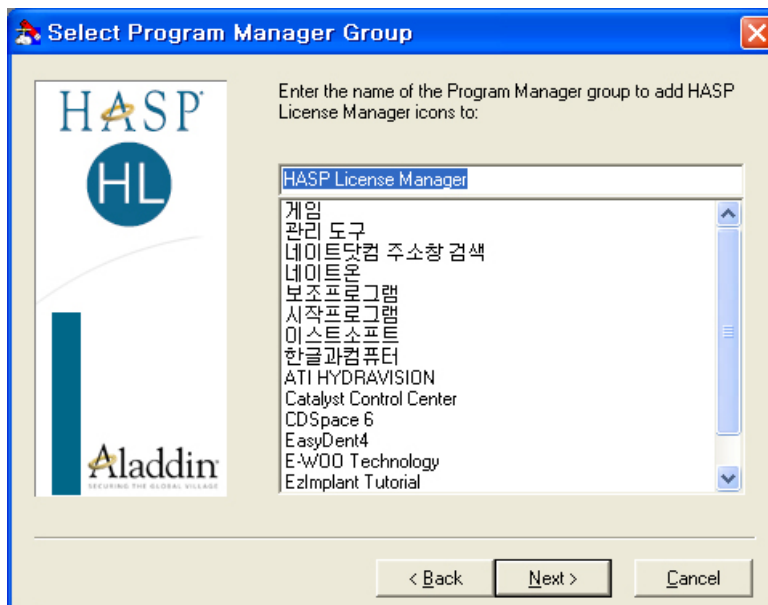
- E. After selecting **Service [nhsrvice.exe]** Installation Type, click the **Next** button to continue the installation.



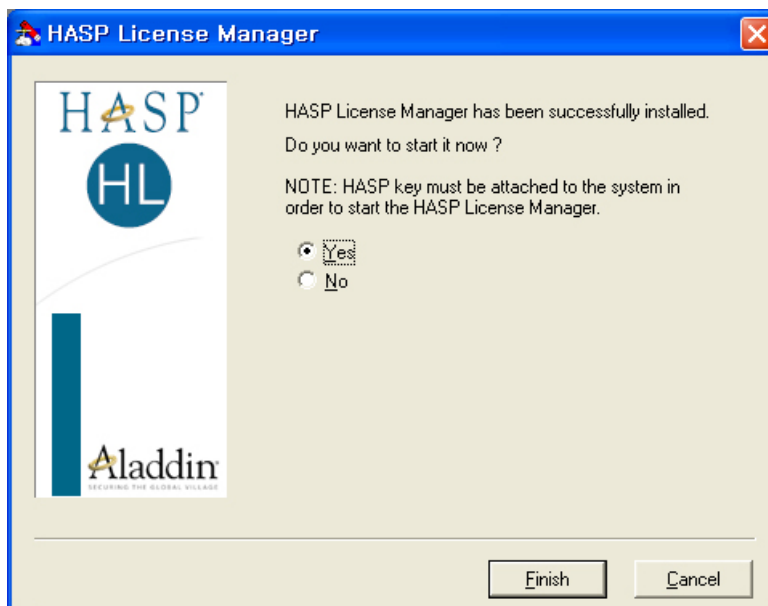
- F. Select the Installation Path, and click **Next** button.




G. Select the name to register on the Start Menu. Click **Next**.



H. After finishing the installation, execute the HASP License Manager.

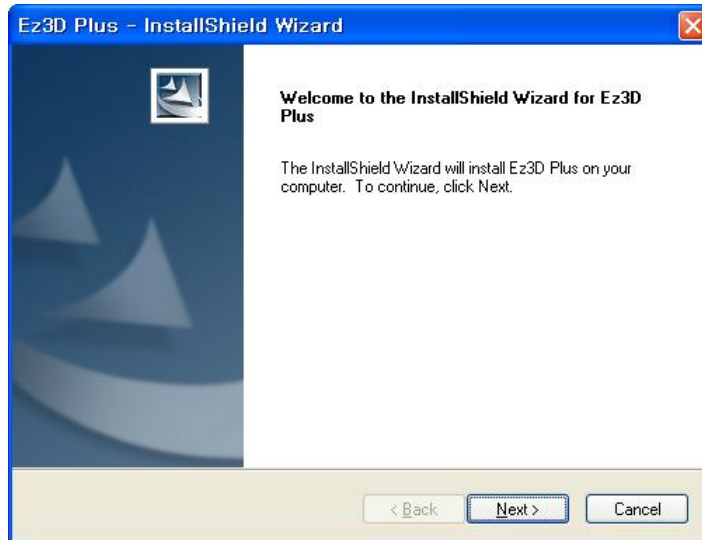


| | |
|---|--|
|  <p>WARNING</p> | <p>Install the HASP License Manager and Driver PRIOR to connecting the USB Lock-Key. If this procedure is not followed, operational errors may occur.</p> |
|---|--|

1.2.2 Installation of Ez3D plus

The installation method for **Ez3D plus** is same for Windows XP/Windows Vista.

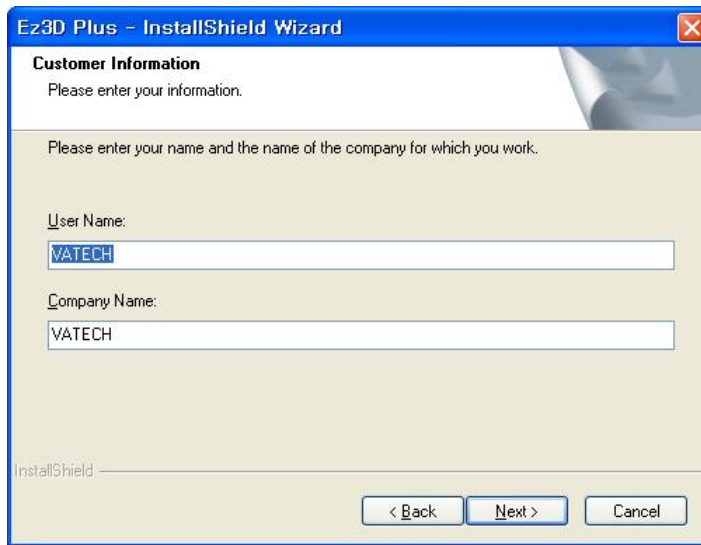
- A. Insert the **Ez3D plus** CD and when the below graphic is displayed, click the **Next** button.



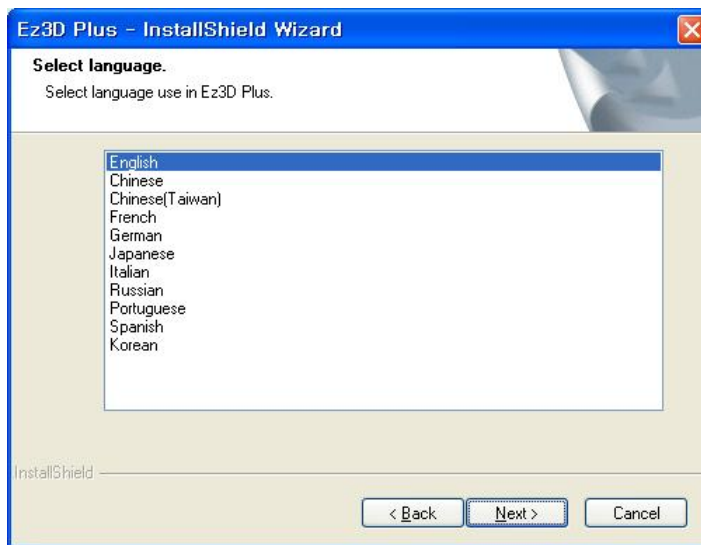
- B. After reading the **End User License Agreement**, select **I Agree**, then click the **Next** button.



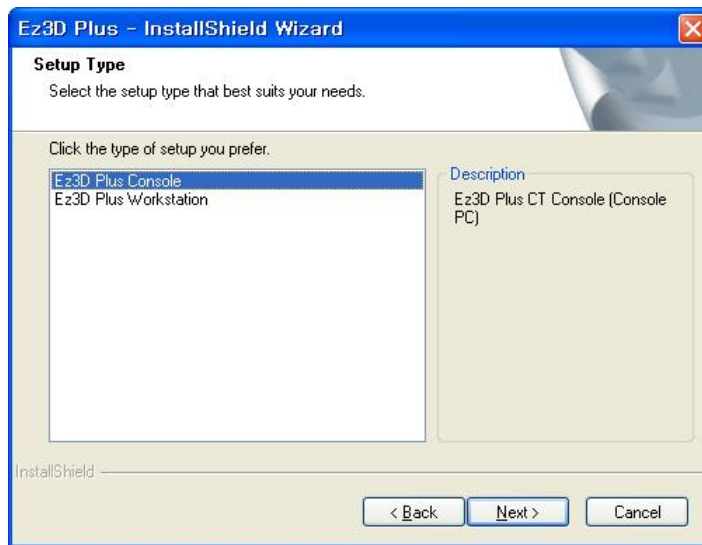
- C. Input User Name and Company Name and click **Next**.



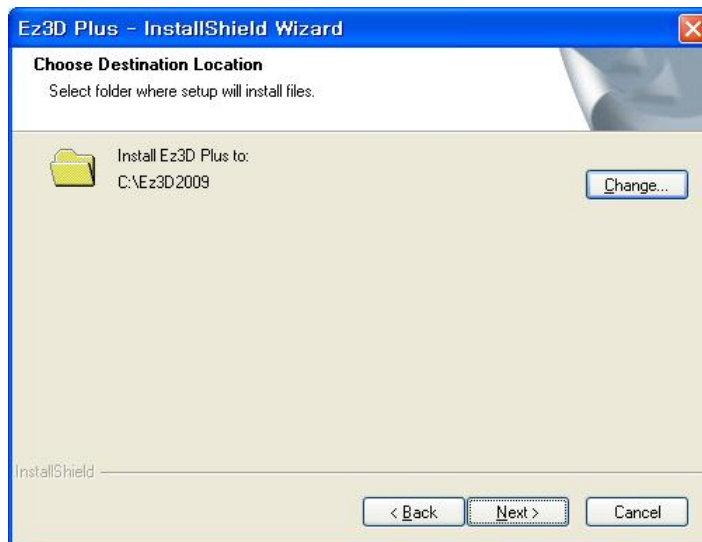
- D. Select the language to be used in **Ez3D plus**.



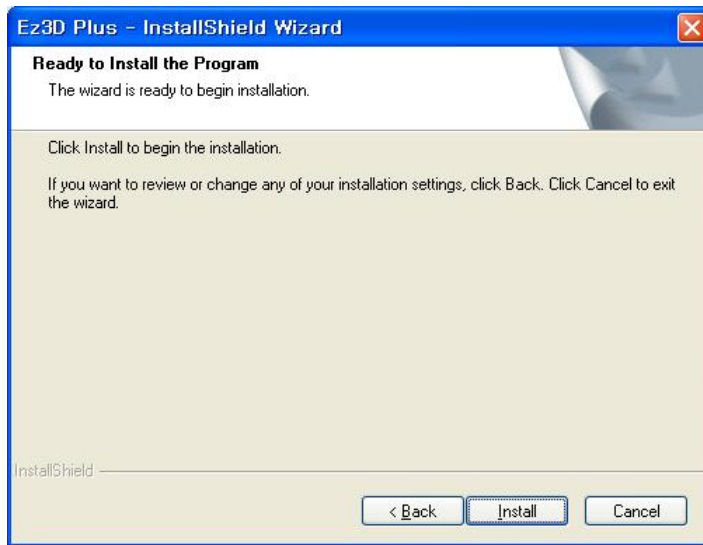
- E. Select the product type. If this PC is connected to the CT imaging equipment, select **Ez3D plus CT Console** Otherwise, select **Ez3D plus Workstation**. Click **Next**.



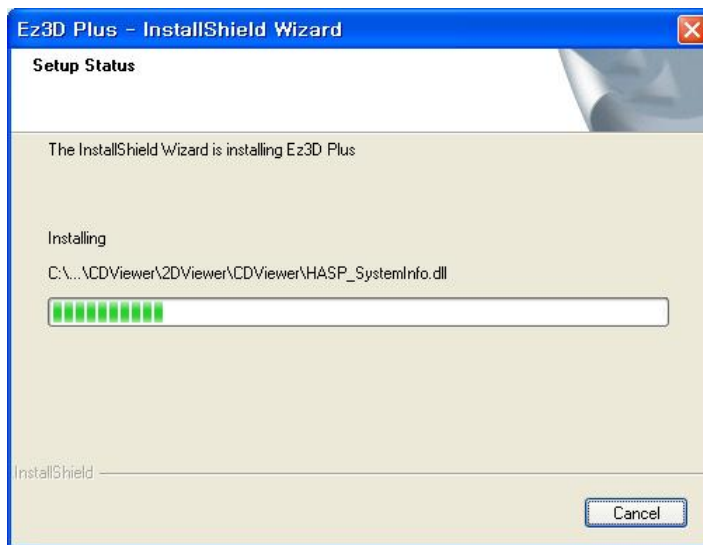
- F. Select the folder to install to **C: \Ez3D2009** is the default.



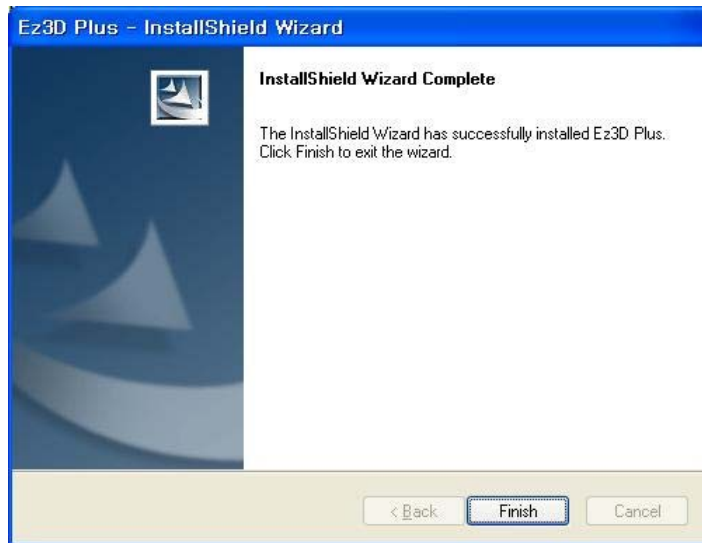
- G. Set-up for **Ez3D plus** installation is completed. Click **Install**.



- H. Wait while the installation is in progress.



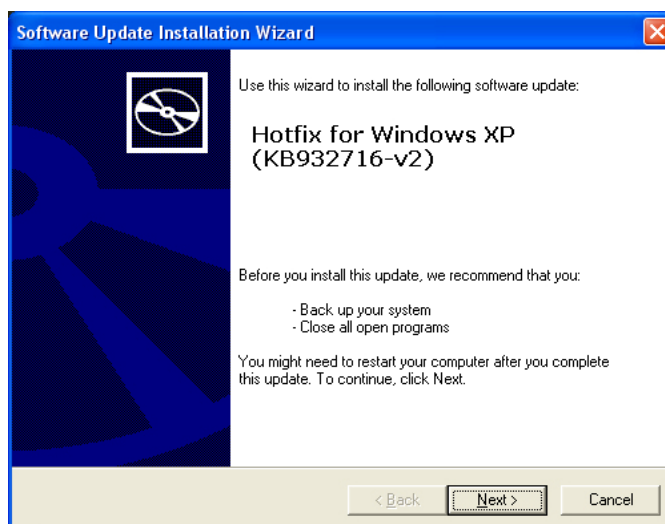
- I. Installation is completed. Click **Finish** button to complete installation.



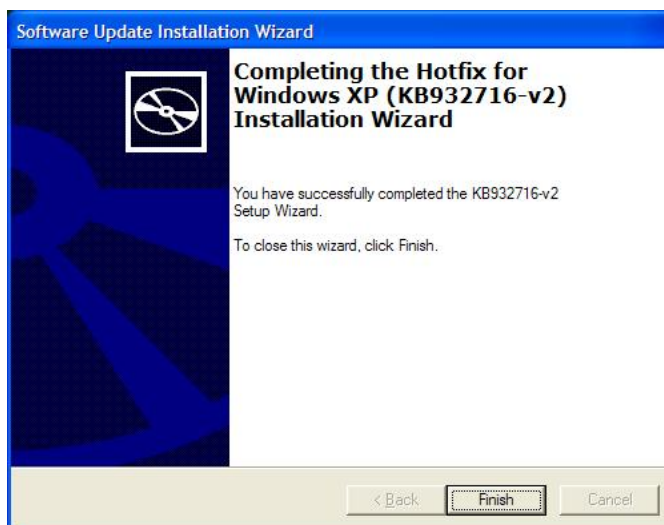
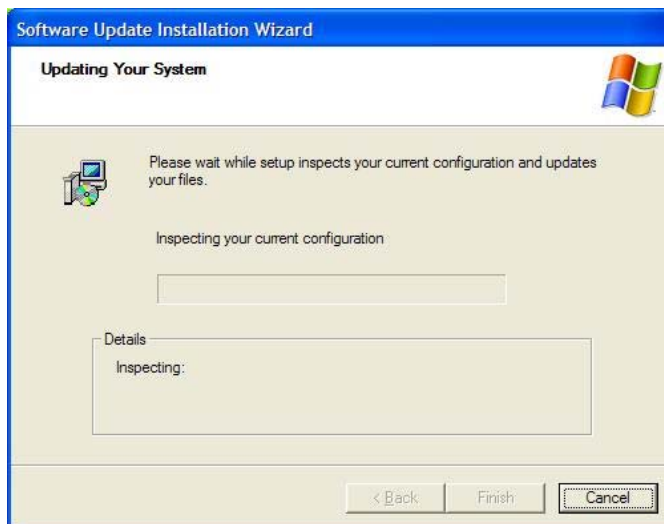
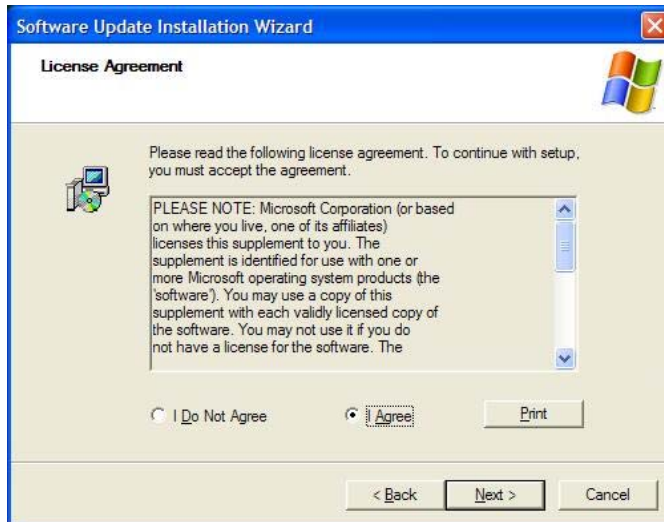
- J. After installation is finished, according to the user's OS version and language, the Windows Update files will be installed with subsequent process of installation program to use the CD/DVD Burn function. After completing the installation, re-start, then CD/DVD Burn function will operate normally. ***This is NOT applicable to Windows Vista.***

- Applicable OS Version

Windows XP ServicePack2, 3 / Windows 2003 SP2



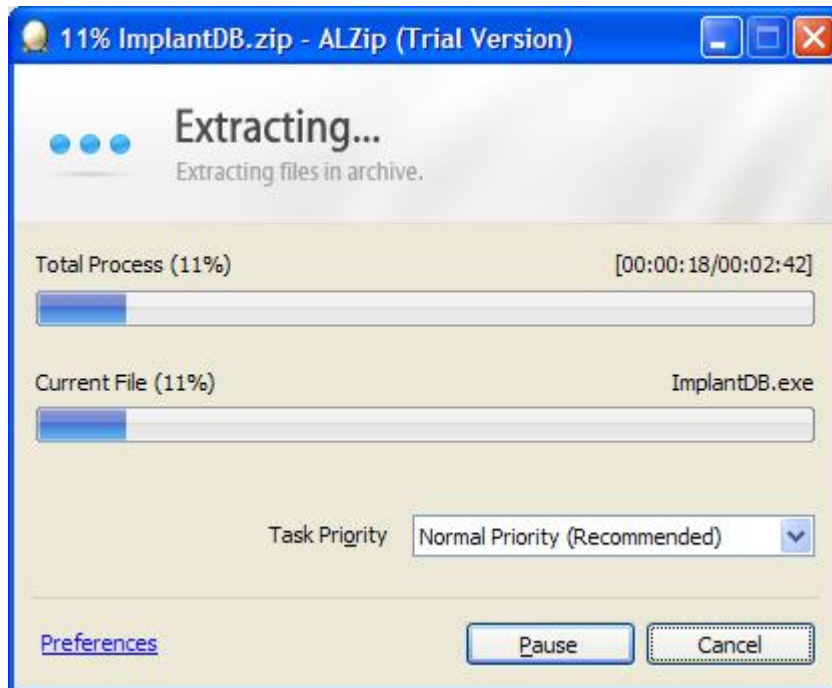
Window Update File Installation



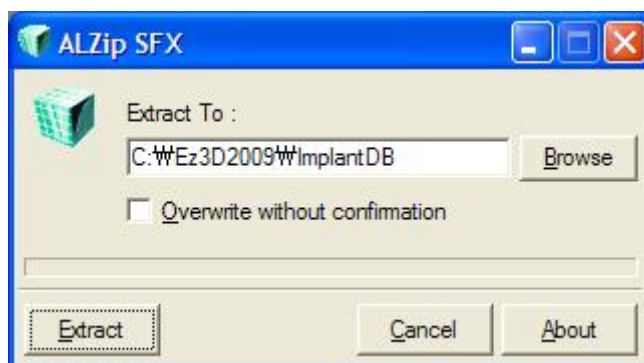
1.2.3 Installation of Implant Database

The installation method of Implant Database is same in both Windows XP and Windows Vista.

- A. Unzip the Implant **DB.zip** file.



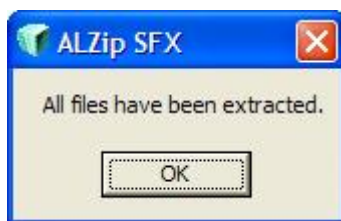
- B. Install the **Implant DB file** by double-clicking **Implant DB.exe**.



- C. Designate the path for the ImplantDB folder of Ez3D plus, and then click the **Extract** button. (Click the **Extract** button at once if you did not change the folder upon installation of the **Ez3D plus** program.)

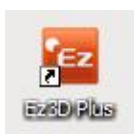


- D. Click the **OK** button to complete the installation.



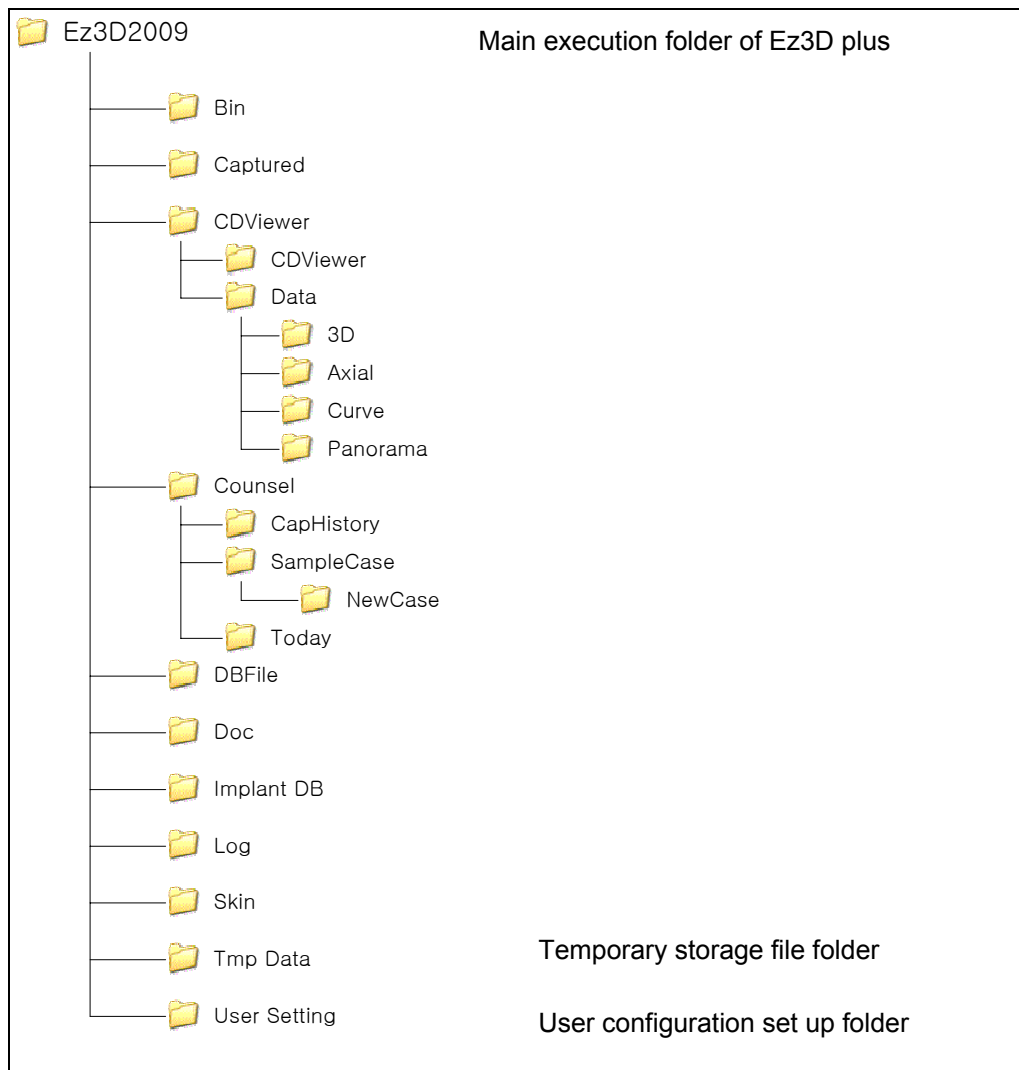
1.2.4 Short-cut icons of installed program files

When the **Ez3D plus** installation is completed, the **Ez3D plus** Icon will be created on the Desktop. This icon is a shortcut to **C:\Ez3Dplus\Ez3Dplus.exe**. **Ez3D plus** can be executed by double clicking this icon.



1.2.5 Structure of installed folders

Ez3D plus is installed to **C:\Ez3D2009**. Users can change this folder at installation time. When Ez3D plus is installed with the default folder option, the following folder structure will be created.



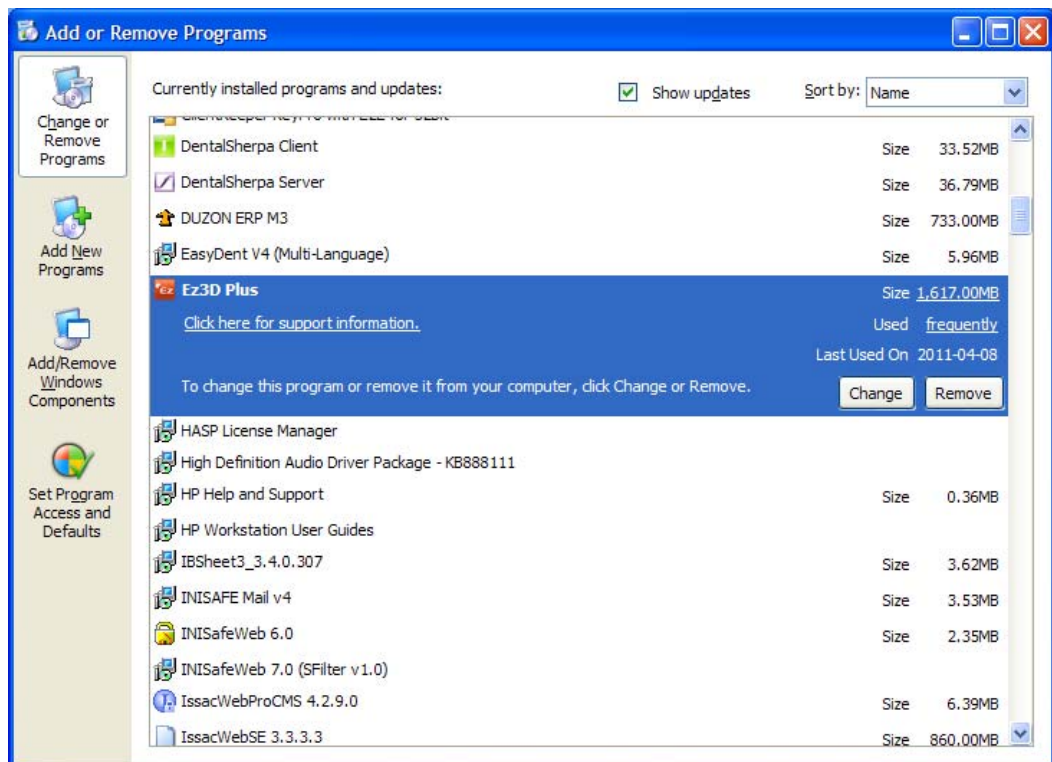
WARNING

If file name(s) are modified by the user, Ez3D plus cannot operate properly. Please do not modify them.

Appendix 2 Removing Ez3D plus

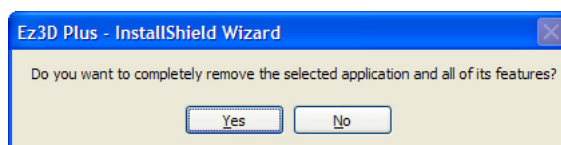
The **Ez3D plus**, which is installed in the system, can be removed in the following sequence:

- A. Run **Control Panel** from the Start Menu in Windows. (For Windows XP, Start → Set Up → Control Panel)
- B. Select **Program Add/Remove**.
- C. Search and select **Ez3D plus** from the currently installed program list, then click **Remove** button.

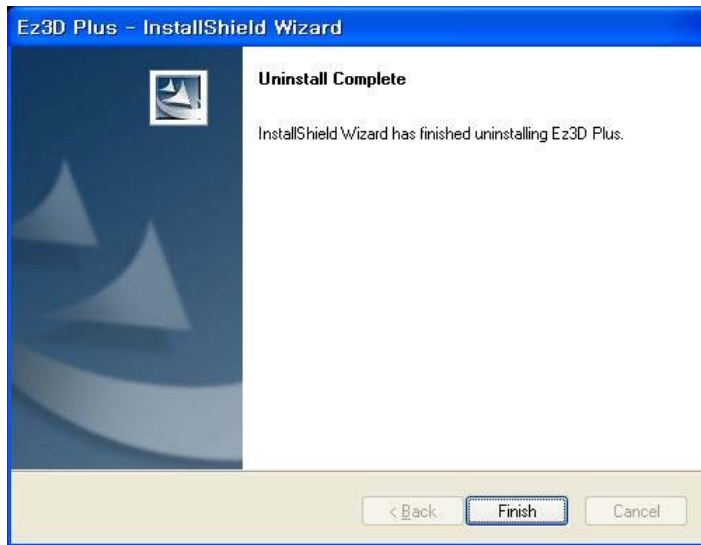



Control Panel → Program Add/Remove → Select Ez3D plus

- D. When the following dialog window appears, click the **Yes** button.



- E. Click **Finish** button and Remove is completed.



| | |
|--|---|
|  <p>WARNING</p> | <p>After uninstalling Ez3D plus, some files like DICOM image data, and user-defined files are not removed automatically. If you would like to remove these files, please delete them manually.</p> |
|--|---|

Appendix 3 DICOM Networking

This chapter introduces how **Ez3D plus** and DICOM modalities communicate on a DICOM network.

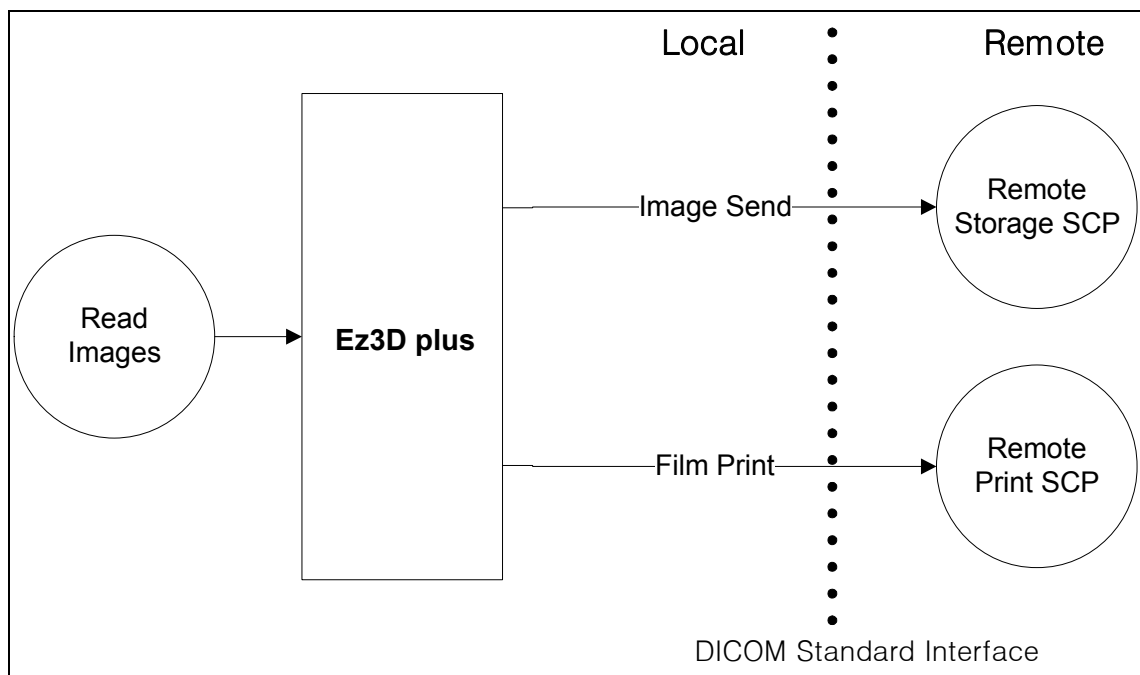
3.1 What is DICOM?

The Digital Imaging and Communications in Medicine (DICOM) Standard is a detailed specification that describes a means of formatting and exchanging images, and associated information. The standard applies to the operation of the interface, which is used to transfer data in and out of an imaging device.

DICOM relies on computer industry standard network connections, and media devices that address the communication and storage of digital images from diagnostic modalities such as CT, MR, PET, Nuclear Medicine, Ultrasound, X-ray, CR, digitized film, video capture and Hospital Information System/Radiology Information System (HIS/RIS) information. It also supports the connection of networked printers, such as laser imagers.

DICOM is the result of an alliance of potential users of the standard (members of the American College of Cardiology and American College of Radiology) with the companies that manufacture medical equipment (members of the National Electrical Manufacturer's Association - NEMA). The DICOM effort began in 1984, and it was originally called the ACR/NEMA standard. Now, DICOM has been embraced by other worldwide standards organizations outside of Radiology. For example, DICOM has been adopted by the Committee European de Normalization (CEN TC 251) and the Japanese Industry Association for Radiation Apparatus (JIRA). Now, it is controlled by the DICOM Standards Committee and is supported by a wide range of medical images across the fields of radiology, cardiology, pathology and dentistry.

3.2 Ez3D plus DICOM Image Operation Model



3.3 Ez3D plus DICOM Compliance

| Supported services | Description |
|--------------------|-------------------|
| DICOM Storage SCU | |
| DICOM Print SCU | 4.4.2 DICOM Print |


3.4 DICOM Network Consideration

Ez3D plus remote host configuration consists of AE title, IP address (Host Name), port number, alias and description. To use **Ez3D plus** on the DICOM Network, you need to define your PC's AE Title and host name, and know the AE Titles, IP address (host names), port numbers of the remote hosts that you wish to network with.

| Information | Definition |
|-------------------|--|
| IP Address | The Internet Protocol address is a numeric address that identifies the station to other TCP/IP devices on the network. The IP addresses consist of four whole numbers separated by periods (e.g., 192.168.1.1). |
| Host Name | The host name is a common alphanumeric alias for the IP address. Although you can use the IP address on DICOM network instead of the host name, the hostname is better than IP address on the complex network system. |
| Port | The TCP/IP protocol uses a number of ports for communication. The standard port number that is used for DICOM networking is 104. This means that Ez3D plus will receive and send files only through the Port 104. |
| AETitle | AE Title (Application Entity Title) is a unique identity value of all connected DICOM modalities and workstations. The AE Title defines the device as a valid DICOM source and / or destination. |

3.5 Defining the AETitle, IP Address and Port Number

Set-up for DICOM Networking in **Ez3D plus** is described in detail in **section 8.9 Setting**.

| | |
|---|---|
|  WARNING | <p>To set up the DICOM Networking, the proper Hostname (IP Address), AE Title and Port Number must be set.</p> |
|---|---|



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