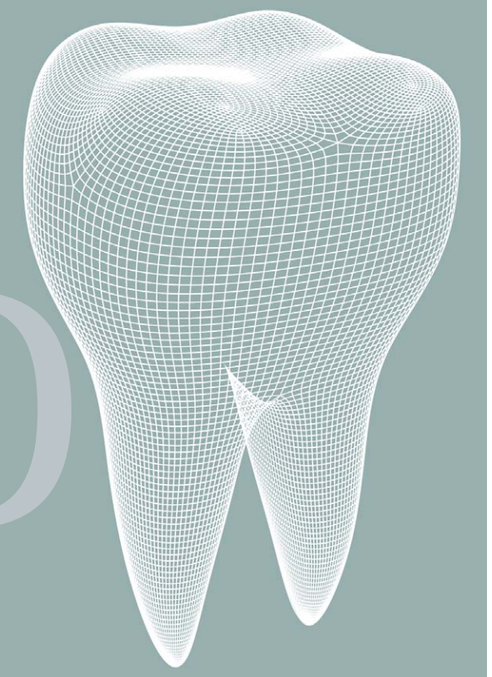
3D Analysis Software

Ez3D

User Manual Version 1.4



Ez3D is a dental imaging software
that assists the dentist to
perform objective diagnosis
and analysis of a patient's condition
through its 3 dimensional
reconstruction of CT images
in DICOM format

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Ez3D User Manual

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Attention

1

Introduction to Ez3D

Ez3D is a dental imaging software suitable for use on personal computers that assists the dentist in performing objective diagnosis and analysis of patients' conditions by recreating three dimensional CT images(Computer Tomography) in DICOM format that are stored within the basic image management software EasyDent. CT images can be easily analysed using various functions including 3D visualization, Multi Planar Reconstruction(MPR) and 2D analysis using an easy-to-use interface.

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1.1 Main functions of Ez3D

The main functions of Ez3D are:

- Cross-sectional view obtained by moving the axis on the MPR(Multi Planar Reconstruction).
- Quick and various rendering options such as VR(Volume Rendering) MIP(Maximum IntensityProjection) and X-Ray.
- An implant simulation tool with which you can preview results of an implant before the implant is placed.
- An image import function with which you can create a panoramic view of images in order to compare them at a glance.

2

Installing, Running and Removing the Program

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2.1 Minimum System Requirements

CPU	Intel Pentium4 Dual 3.0GHz or better Or Intel® Core™2 Duo 2.33 or better
Memory	1GB or better (2GB recommended)
HDD	More than 10G free space (100GB recommended)
Video-card	nVidia chipset, 1024x768, 24bpp (1280x1024, 32bpp or better recommended), 3D Acceleration, 256M memory or above, Support DirectX9 or above (nVidia GeForce 8500GT or better recommended) × On Board Type Graphic Driver can not be used (ex. INTEL on board type)
OS	Microsoft Windows 2000(SP4)/Windows XP (SP1) or better
Explorer	Microsoft Internet Explorer 6.0 or better
Etc.	USB port, Mouse, Keyboard, Network card, CD-R/RW drive

2.2 Installation of WIBU Lock Key Driver

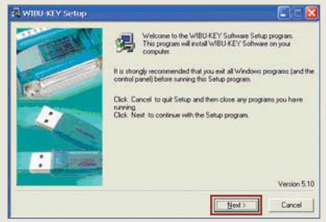
The CD contains 'WIBU Lock Key Driver' and 'Ez3D' Software. WIBU Lock Key must be installed first onto the computer before you start the installation of Ez3D.

Ez3D Installation File

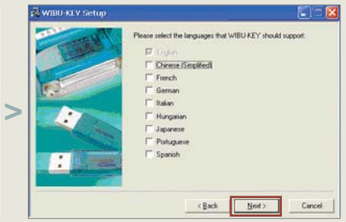
File Name	
WkRuntime.exe	Lock Key Driver file for using WIBU Lock Key
Ez3D_Local_Net.exe	Ez3D Local/Network Version Installation file

Automatically transfers to the next screen.

1) Please execute WkRuntime.exe file from among the above files.



Press Next Button

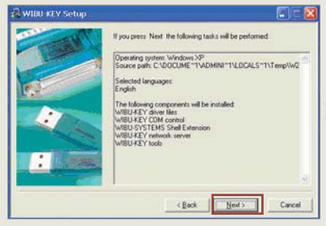


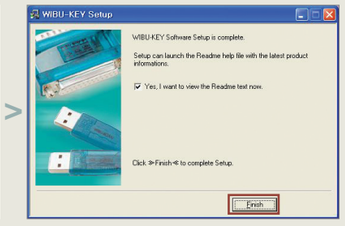
Select language to use and click 'Next'

2) Follow the instructions on the screen which will appear automatically.

3) Select a location to install 'Lock Key Driver' file and click 'Next' button. Files will be saved at C drive in default.

4)Select '32bit Network Server' and 'Monitor', then click 'Next'.

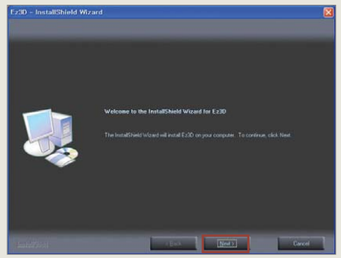




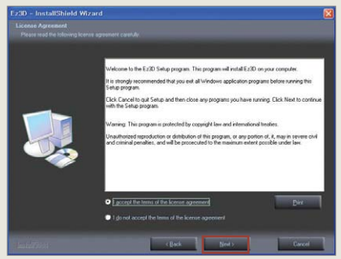
5) Follow the directions, clicking the 'Finish' button when prompted which will complete the installation.

2.3 Installation of Ez3D

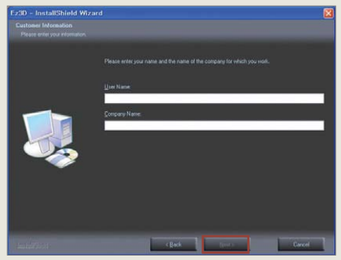
If the Lock key driver is installed, please execute Ez3D_Local_Net.exe file from among the files provided.To exit the installation, click the 'Exit' button.



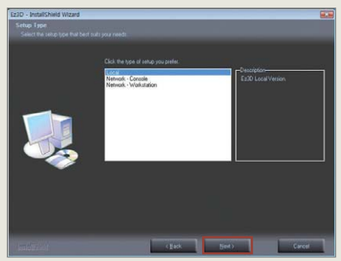
1) Click the 'Next' button.



2) Read the End-user License Agreement. Click 'I accept' button if you agree with the terms of the License Agreement.
Then, click 'Next' button.



3) Enter your user and company name, Then click 'Next'.

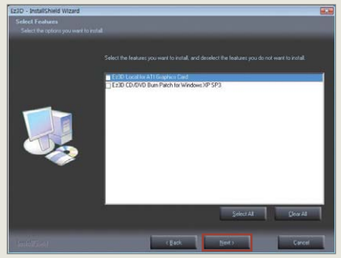


4) Select the set-up version you want to install, then click 'Next'.

Local version is the version used for an independent PC.
Network version has two types : Console and Workstation. Install Network Console (for Server) on the PC which is connected to the equipment and install Network Workstation (for Client) on other PCs. Network Workstation is a version used on PCs for viewing images within the hospital.

WARNING

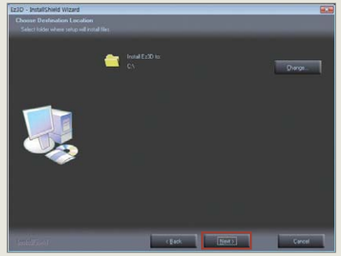
Warning on selecting installation version
The program will not work normally if the program version differs from the purchased Lock Key. It can be identified by looking at the names on the Lock key.
> WIBU-BOX/RU+ - Local
> WIBU-BOX/R+ - Network



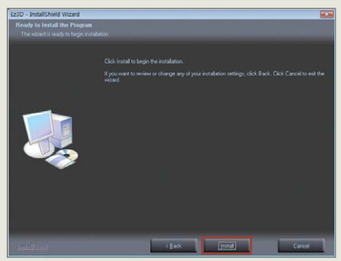
5) Select the optional features that you want to install and then click 'Next' button.

WARNING

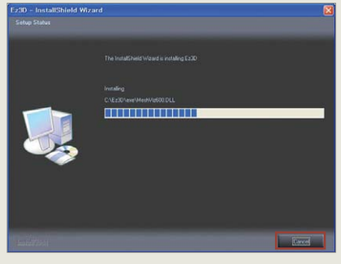
Warning on selecting optional features installation
> Ez3D Local for ATI Graphics Card - Select this if the graphic card on the PC is manufactured by ATI
> Ez3D CD/DVD Burn Patch for Windows XP SP3 - Select this if the OS of the PC is XP with Service Pack Version 3

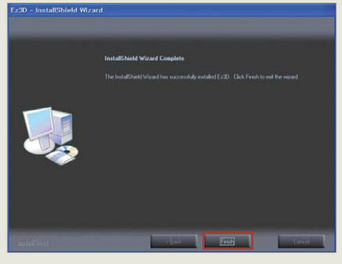


6) Select a drive to install Ez3D, then click 'Next' button.
The Program will be installed on C Drive in default.



7) Click 'Next' button to begin Installation.

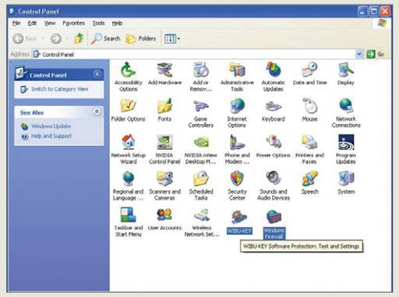




8) The Progress bar will appear which displays the progress of the installation.
Click the 'Finish' button when prompted to complete the installation.

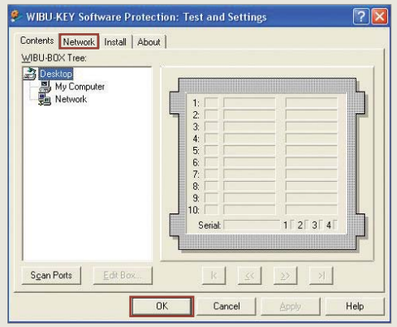
2.4 Lock Key Setting

Set the environment in the following way when using a Network Lock Key. Not applicable when using a Local Lock Key.

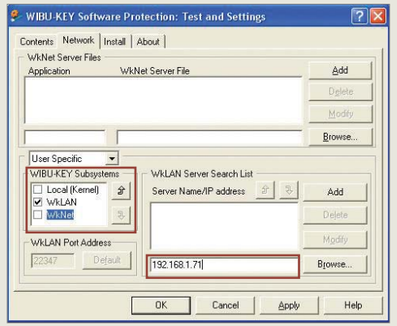


1) Open ‘Control Panel’ and change to ‘Classic View’ by clicking ‘Switch to Classic View’ if it is currently in ‘Category View’.

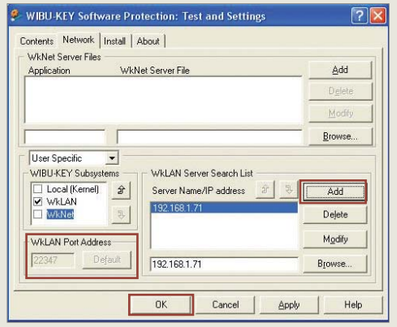
2) Set WIBU-KEY and Windows Firewall from the Control Panel. First, double click on ‘WIBU-KEY’.



3) Select ‘Network’ among the 4 tabs at the top. Then click ‘OK’.

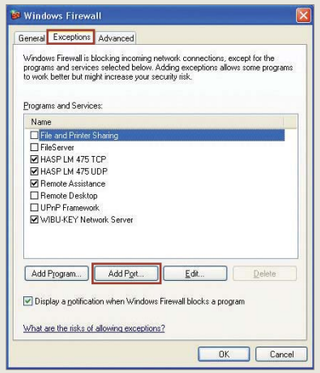


4) Check only the ‘WkLAN’ from the WIBU-KEY Subsystems, then enter the Server IP address in the Server Search List box.

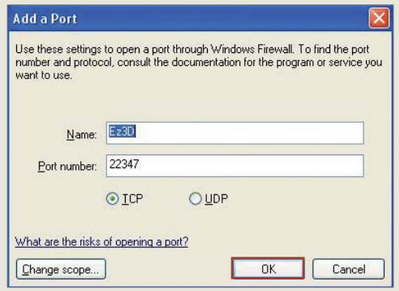


5) Register any additional Server IP addresses by clicking the ‘Add’ button.
At this stage please make a note of the number shown in the WkLAN Port Address window as you will require it later in the installation process.
Click on ‘OK’ to exit the program.

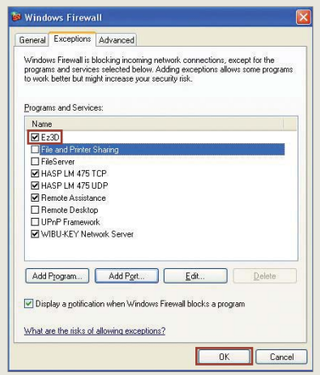
6) Now set the Windows Firewall. Select ‘Windows Firewall’ from the Control Panel.



7) Then select 'Exceptions' from the three tabs at the top. Click 'Add Port' button.



8) Enter the WkLAN Port Address from the Add Port Dialogue box from the Program Screen of Item (5)(noted from earlier) and assign the name as Ez3D.



9) Check that the name 'Ez3D' is added, then click the 'OK' button to complete the settings of the Firewall.

2.5 Structure of the Installation Folder

The Installation Folder of Ez3D is set as C:\Ez3D by default.

This folder can be changed from the installation screen. If Ez3D is installed normally, the following folders will be created under the root folder.

\Exe	Folder containing execution files
\Doc	Storage location for saved documents such as manuals, etc.
\Captured	Storage location for captured temporary files
\User Settings	Folder containing user setting files
\TmpData	Folder to save temporary files
\Counsel	Folder for saving data temporarily when using Panorama Import function
\CDViewer	Folder containing CD/DVD Burn Data

Please be cautious not to alter or change the files within each folder since it may result in an unstable operation of Ez3D.

NOTICE

DICOM image data and user preset files will not be automatically removed even when Ez3D is removed. This is to protect your data if Ez3D was removed by mistake.
Please use Window Explorer to delete all files.

2.6 Removing Ez3D

The Ez3D software can be removed from your computer in the following way.

1) Start 'Control Panel' from the 'Start' menu of Windows. (For Windows 2000, Start→ Setting → Control Panel).
2) Select 'Add/Remove Programs'.
3) Select 'Ez3D' from the list of currently installed programs, click the 'Remove' button and Ez3D will automatically removed.

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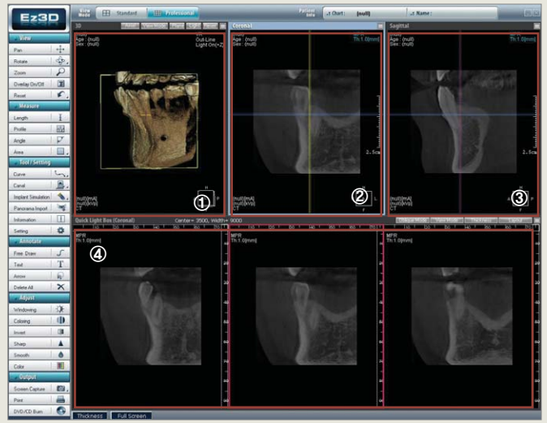
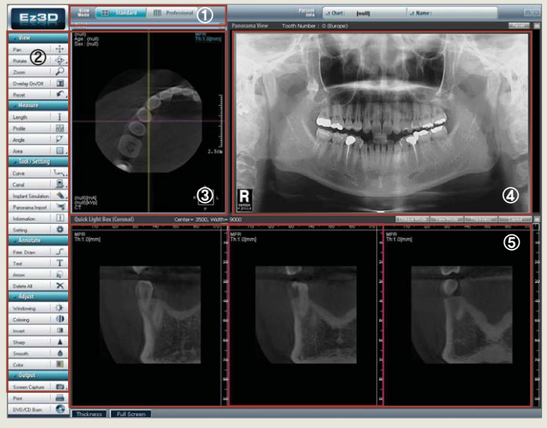
3 Main Screen of Ez3D



① 3D/Axial View
② Coronal View
③ Sagittal View
④ Multi-Slice Views

Professional View



Standard View

3.1 Screen Composition

3.1.1 View Mode

The Basic screen of EZ3D is composed of a Slide Menu on the left hand side with the Standard and Professional icons shown at the top left hand corner.

① Viewer Mode
② Slide Menu
③ Axial View
④ Panorama View
⑤ Multi-Slice Views

> The Difference between Standard View and Professional View

Standard View
The screen is composed of Axial, Panorama and Quick Light Box(Multi-Slice Views). Panorama Importing is possible thus the overall state of patient' teeth can be seen in Panorama View.

Professional View
Screen is composed of 3D, Coronal, Sagittal and Quick Light Box(Multi-Slice Views). It displays Axial, Coronal and Sagittal Views as well as a Cross-Sectional View at the bottom.
The 3D View may be substituted with the Axial View. Anatomical structure of the teeth to be treated can be examined in detail through implant simulations and various cross sections. However, Panorama View is not available.

Move from Professional to Standard

Move from Standard to Professional

NOTE

Please refer to 'Chapter 5 Slide Menu Application' on page 32 for details on the usage of the Slide Menu tools.

> **Viewer Mode**
Changes by selecting icons at the very top.

3.1.2 Slide Menu
Basic functions of Ez3D can be easily selected from the Slide Menu.

3.1.3 Title Bar
Shows the direction of the current cross section image. Shows reconstructed image in vertical section such as Axial/Coronal/Sagittal.

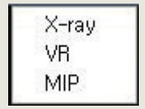
3.1.4 Movement
Easily move to the next slice or the previous slice by using the mouse wheel while the cursor is over the image. It performs the same role as the function of the right-hand side scroll bar.

3.2 3D and Axial Views

3.2.1 3D View
The 3D view is where 3D images can be examined.

> **Axial**
It is possible to toggle the View Mode from 3D to Axial and Axial to 3D.

> **View Mode (Rendering Mode Adjustment)**
Selecting 'View Mode' on the top right hand corner of the 3D View will display the following Context Menu.
Select the desired rendering option (X-Ray, VR, or MIP).



X-ray : Refers to an image displayed as X-ray by averaging the value of transparency on the 3D View.

VR : Refers to displaying the 3D View by rendering with volume.

MIP : Refers to displaying the maximum pixel values within a specific range at the 3D MPR View.

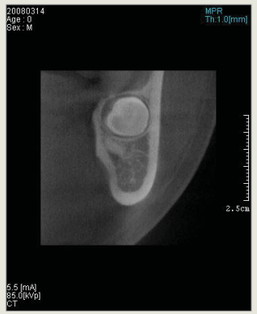
> **Plane (Clipping Plane Mode Setting)**
Clicking the 'Plane' button will provide 3 modes of Clipping Plane, Off/Out-Line/Plane in turn and displays the Plane Overlay according to each mode on the 3D View. Clipping Plane is the location of Axial, Coronal, Sagittal on 3D.

> **Light (Light Mode Setting)**
Light On(-z) / Light On(+z) / Off can be selected by clicking the 'Light' Button(Circulating Button).

> **Reset**
Returns back to the 3D View.

> **Expansion Mode**
Clicking the Full Screen button will display 3D view in full screen mode.

The above image displays a cross-section of the Axial View



The above image shows a cross-section of the Coronal View

The above image displays a cross-section of the Sagittal view

3.2.2 Axial View

> What is Axial View?

Refers to cross-sectional image of the patient in the horizontal plane viewed from below towards the top.

> Axis Adjustment

Direction of the Axial View can be changed through axial adjustment in the Sagittal or Coronal view windows.

NOTE

Please refer to 'Chapter 4 Rotating Axes' on page 25 for details on axes adjustment.

3.3 Coronal View

3.3.1 What is Coronal View?

Refers to a cross-sectional image of the patient in the vertical plane viewed from the front towards the back.

3.3.2 Axis Adjustment

Direction of Coronal View can be changed through axial adjustment in the Axial or Sagittal view windows.

3.4 Sagittal View

3.4.1 What is Sagittal view?

Refers to a cross-sectional image of the patient in the vertical plane viewed from left side to right direction.

3.4.2 Axis Adjustment

Direction of the Sagittal View can be changed through axial adjustment in the Coronal or Axial view windows.

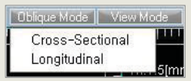
3.5 Quick Light Boxes(Multi-Slice Views)

Quick Light Box(coronal) shows cross-sections at right angles with the vertical axis of the Axial view and Quick Light Box(sagittal) shows cross-sections at right angles with horizontal axis of Axial view. Quick Light Box(cross sectional) displays cross-sections at right angles with a curve plot created from the Axial Viewer.

There are differences as much as the gap between front and back image of Multi Slice View. Red lined (or Green) image of Axial is displayed in the center. The number of images displayed on the screen can be changed into 3x1, 5x1, 7x1 by clicking on the Layout button.

> Oblique Mode : Cross-Sectional(coronal), Longitudinal(sagittal)
> View Mode : MPR, MIP
> Thickness : 0, 1, 2, 3, 5 ,10
> Layout : 3x1, 5x1, 7x1

The image above is a Cross-Sectional, Multi Slice View at 5x1



3.5.1 Oblique Mode

An Oblique Mode allows the user to change the desired image view direction by changing the Multi -Slice Views into Cross-Sectional(coronal) or Longitudinal(sagittal) views.

A Cross-Sectional image squaring with the vertical axis of Axial is called a Coronal Image.

Cross-sectional View

A Cross-Sectional image squaring with the horizontal axis of Axial is called a Sagittal image.

Longitudinal View

3.5.2 View Mode

The text displayed as MPR(Multi Planar Reconstruction), MIP(Maximum Intensity Projection) on the top right hand corner of the cross-sectional image refers to the currently displayed mode. To change the mode, click the text button to display the following Context Menu:

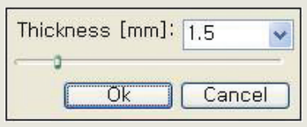
A cross sectional image can be examined by selecting the desired rendering mode.

> MPR(Multi Planar Reconstruction) : Refers to displaying each Coronal, Sagittal, Axial screen according to the viewing direction by reconstructing the 3D image into a 2D black and white image.

> MIP(Maximum Intensity Projection) : Refers to displaying the maximum pixel value within the thickness of 3D MPR Screen.

3.5.3 Thickness

Set thickness by adjusting the thickness value on the top right hand corner of the MPR image. Click the 'Thickness' button to display the following context menu:

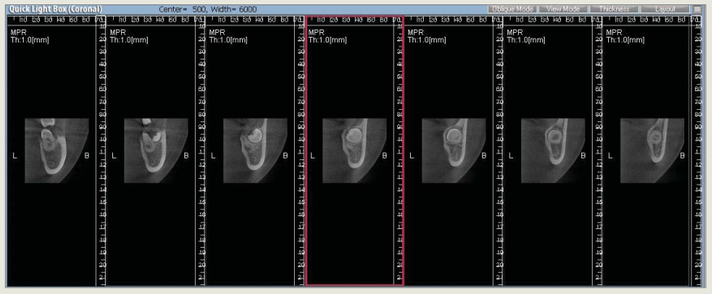


3.5.4 Layout Setting

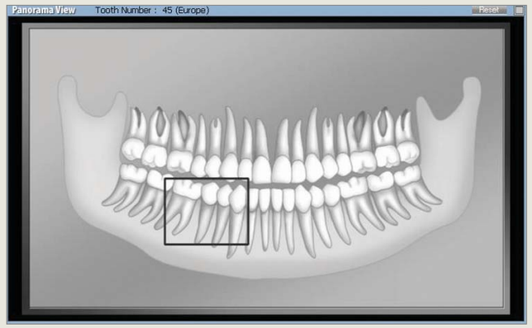
The number of Multi-Slice Views can be adjusted at the Context Menu.

3 X 1

5 X 1

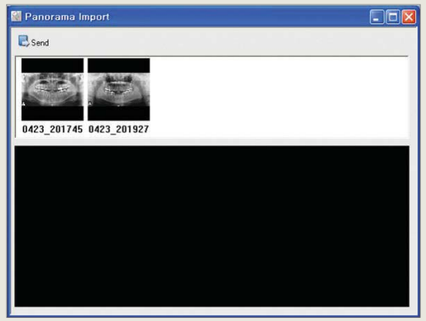


7 X 1



3.6 Panorama View

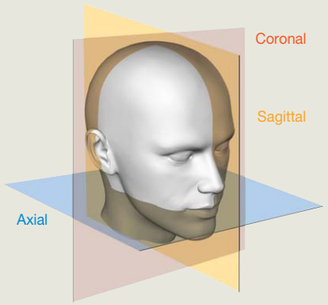
It shows a Panoramic View of the patient's whole teeth in Standard Mode. Panoramic images of patients can be imported using the Panorama Import Tool. On the Panoramic View, the area of the patient's teeth shown on the the illustration in squre box is for CT imaging.



Select the desired image from the Panorama Import Tool and click 'Send' to display that image on the Panorama View screen. Panorama Import function is only available when linked with the EasyDent program.

4

Rotating Axes



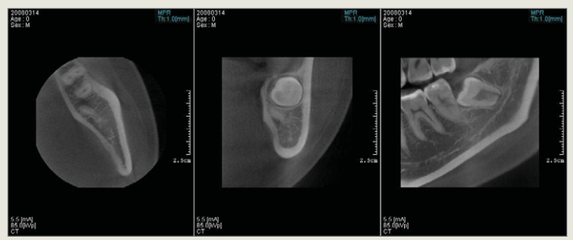
4.1 Understanding Axes

An Accurate image data of the area requiring treatment can be obtained by adjusting the axes of the Axial, Sagittal and Coronal views. The picture explains the concept of Axial, Coronal and Sagittal views.

> Sagittal means to side cut vertically from left to right (Color of Axis is yellow)

> Axial means to side cut horizontally from bottom to top (Color of Axis is Blue)

> Coronal means to side cut vertically from front to back (Color of Axis is Red)



Axial Coronal Sagittal

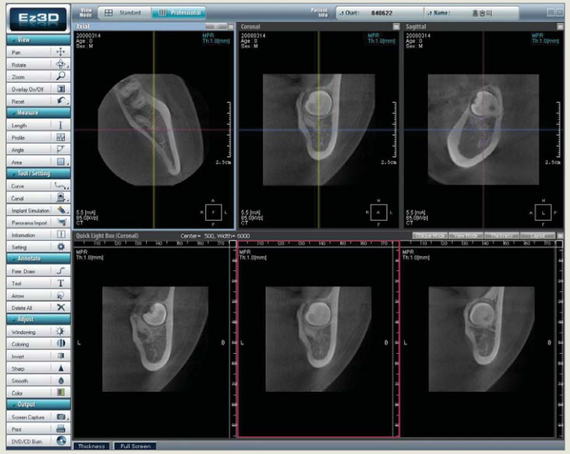
A section of teeth are displayed by comparing sectional slices in the Axial, Coronal and Sagittal views

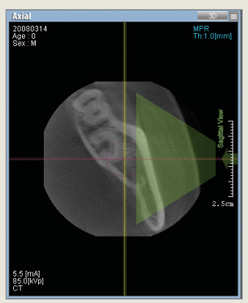
Value Added Technologies

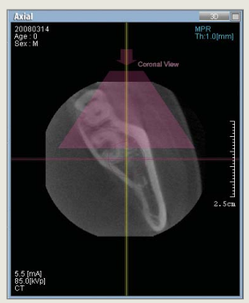
4.2 Methods of using the Axes

Ez3D has a function to rotate axes and adjust the location of axes from each view to examine more accurately the anatomical structure of the patient.
The Sagittal, Coronal, and Axial are vertically cut in cross-sections regardless of the shape of the dental arch thus there is limit in clearly understanding the anatomical structure of implants and teeth.
Therefore, accurate measurements of the length of the sections to be treated and detailed anatomical structure can be obtained through adjustments of the axes.

Start the explanation by looking at the following Professional View Screen.







4.2.1 Axial View

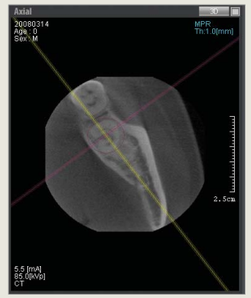
The Coronal and Sagittal Axes can be adjusted at the Axial View. The direction of the arrow displayed when the axis is clicked is the line of the sight.

Before moving the center circle

After moving the center circle

Axes can be moved by clicking the center circle in the Axial View and dragging over onto a specific tooth to examine.

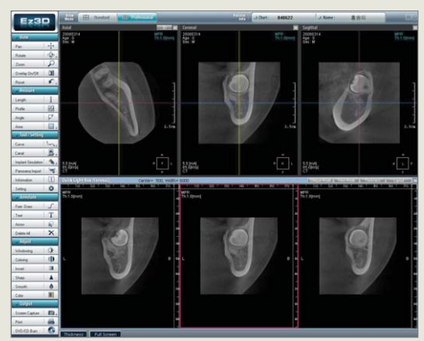
Before rotating the axes



After rotating the axes

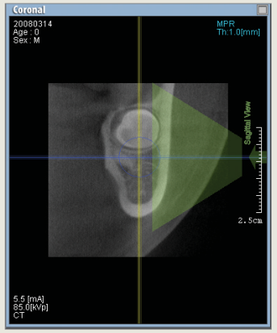
To rotate the Axis in a desired direction click the Axis outside of the center circle once and drag.

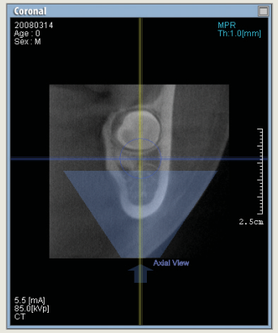
The picture below indicate the other views that have been changed except Axial.
This is because the view directions and angles have been newly adjusted.
The Coronal and Sagittal Views of the teeth can be changed by moving and adjusting the Coronal and Sagittal Axes.



Before moving, adjusting axes at Axial View

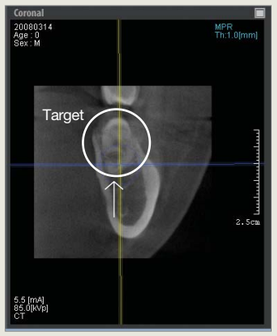
After moving, adjusting axes at Axial View





4.2.2 Coronal View

The Axial and Sagittal Axes can be adjusted at the Coronal View
The direction of the arrow displayed when the axis is clicked is the line of sight.

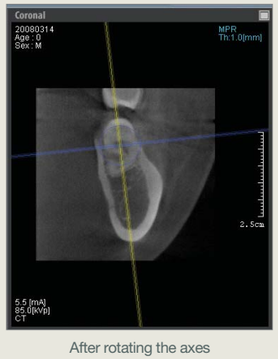


Before moving the center circle

After moving the center circle

Axes can be moved by clicking the center circle and dragging over onto a specific tooth to examine.

Before rotating the axes



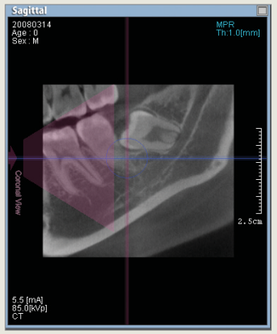
After rotating the axes

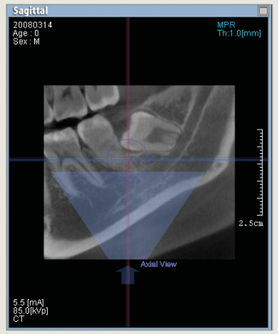
To rotate the Axis in a desired direction click the axis outside of center circle once and drag.

The Pictures below shows that all other views have been changed with the exception of the Coronal View. This is because directions and angles of view have been newly adjusted.
The Axial and Sagittal Views of the teeth can be changed by moving and adjusting the Axial and Sagittal Axes.

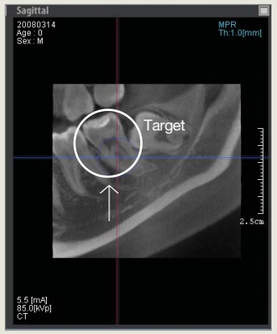
Before moving, adjusting axes from Coronal View

After moving, adjusting axes from Coronal View





4.2.3 Sagittal View
The Axial and Coronal Axes can be adjusted at the Sagital View.
The direction of the arrow displayed when the axis is clicked is the line of the sight.

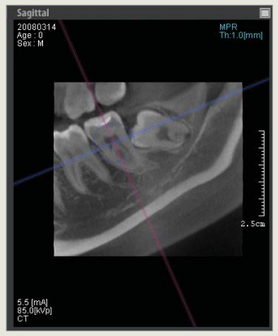


Before moving the center circle

After moving the center circle

The Axes can be moved by clicking the center circle and dragging over onto a specific tooth to examine.

Before rotating the axes

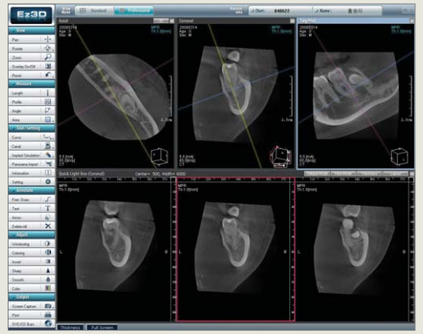


After rotating the axes

Possible to rotate in desired direction to examine by clicking the Axis outside of the center circle once and dragging it.

The pictures below indicates all other views have been changed except Sagittal. This is because the directions and angles of view have been newly adjusted.
The Axial and Coronal views of the teeth can be changed by moving and adjusting the Axial and Coronal Axes.

Before moving, adjusting axes from Sagittal View



After moving, adjusting axes from Sagittal View

5

Slide Menu Application

Tools commonly used throughout Ez3D.
Main tools are located on the left and divided into Text Sections with the corresponding Icons shown to their right. Any tools with further options available have an arrow on the right-hand corner of the icon.
Press the arrow to bring up the further options.

5.1 View (Image View Tools)

The View in the Slide Menu provides basic tools such as Pan, Rotate, Zoom, Overlay On/Off, and Reset.

> **Pan**
Views the image by moving.
After selecting this tool, click left button of the mouse and drag the image to the desired location. The image can be panned by dragging the axis in the desired directions.

> **Rotate**
An Image can be rotated in 2D or 3D.
Click the arrow on the right side of 'Rotate' icon and 2D/3D options will appear.
Select tool and click the left button of the mouse on the image and drag to a desired direction. Or, click the right mouse button ( ) on the 3D MPR Screen to create Rotate Tool Icon and drag image to the desired direction.

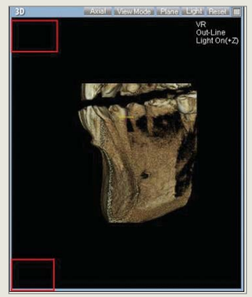
> '3D Rotation' enables 3D Rotation within 3D screen and MPR Screen.

> Only left and right turn is possible for '2D Rotation'.

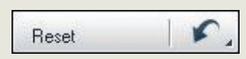
> **Zoom**
Selecting this button allows the user to zoom in or out.
Select Zoom and place the cursor over the image. Select and hold the left mouse button( ) and drag to the left or right, the image will zoom in or out accordingly.

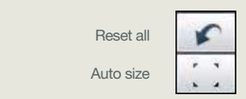
> **Overlay On/Off**
> Turns Overlay on or off.

Overlay Button Off



Overlay Button On





> **Reset**
Resets the image. Clicking 'Reset' will display 'Option'.

> 'Reset All' will reset the program.

> 'Auto Size' will reset the image into an appropriate size to examine.

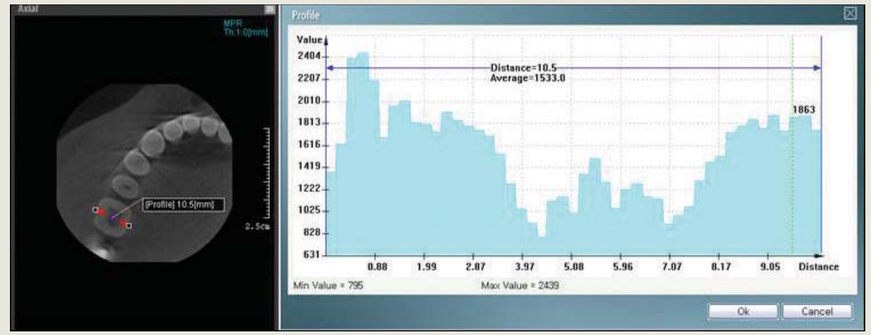
5.2 Measure (Image Measuring Tools)

Measure is composed of Length, Profile, Angle and Area.

Length Angle Area

> **Length**
Measures distances between two points on the image and is shown in [mm].
Click 'Length' then click the first point on the image with the left button then place a second point on the image again clicking the left button. The length between the two points is displayed.
The measurement line can be moved by moving the mouse over the measured line until a blue cross appears, then left click and hold to drag the measurement line to a new position.

> **Profile**
Pixel values on the line drawn on 2D image are displayed in graph as in below.
Click between the desired points with the left mouse button and draw a line. The Density Profile Graph will be created and both ends can be moved to desired locations using mouse.

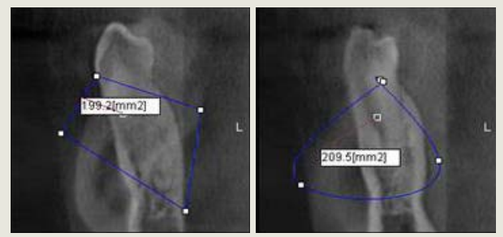


> **Angle**
Measures the angle between two lines, shown in 'Degrees'.
Click 'Angle' then click the first point on the image with the left button then place a second point on the image again clicking the left button.
This will display a line on the image, then place a third point on the image which will show a second line on the image, the angle between the two lines will be displayed.

> **Area**
Measures the area of the ROI (Region of Interest) on the image. Select 'Area', click as many points as is necessary to trace around the ROI ensuring that you finish with a double click at the point of origin.Displayed in (mm^2).

> Line Area creates polygon made of straight lines.

> Curve Area creates a figure made of curves.



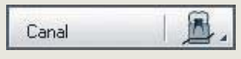
Value Added Technologies

5.3 Tool/Setting

In addition to the tools to assist with diagnosis, there are also tools for consulting with patients.
Ez3D can be conveniently used by changing the properties within the Ez3D Program.

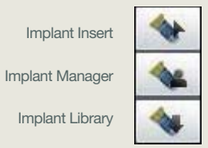
> **Curve**
The Curve tool allows the user to draw a line that follows the curve of the dental arch which in turn enables the possibility of creating a Cross Sectional View at right angles to the plotted curve line.

NOTE | Refer to 'Chapter 7. Curve Use' on page 53 for details on how to use curves.



> **Canal**
The canal drawing function adds color to the mandibular canal and can be a helpful tool when the dentist explains the relationship between the tooth and the canal to the patient upon consultation.

NOTE | Canal Drawing is explained in detail on 'chapter 8. Drawing Canal' on page 56

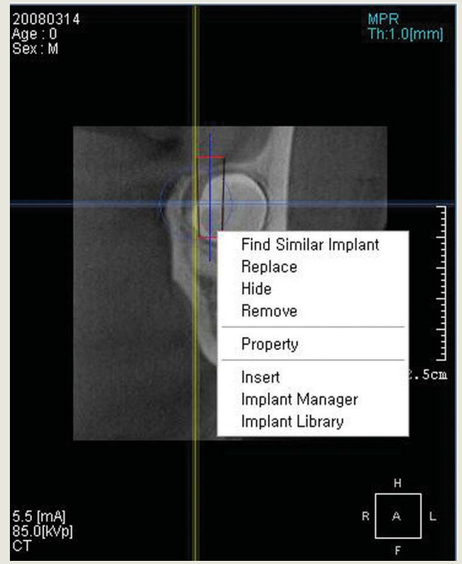


> **Implant Simulation**
User can simulate implant insertion on dental images of patients before surgery.

> Simulate implant insertion on images with 'Implant Insert'.

> 'Implant Manager' shows types and numbers of currently inserted implants and their characteristics. Show, Hide, Delete and Alter Implants are also available.

> Types of implants per manufacturer can be seen at once from the 'Implant Library', implants may be selected according to the patients needs. Also, it is possible to list implant models similar to that of selected implants from the Database.



This is the Implant Insert Menu, clicking the right mouse button ( ) will show submenus relevant to the Implant, as shown in the picture.

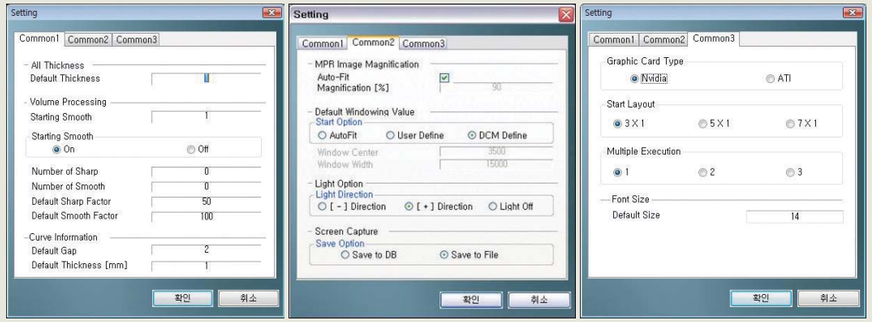
NOTE | Refer to 'Chapter 9. Implant Simulation' on page 60 for details on Implants.

> **Panorama Import**
Imports panorama images of patients which are saved in EasytDent. Shows imported panorama images on Panorama View.
Panorama Import is only available when linked with EasyDent.

> **Information**
Shows System Information.
System Information is composed of information on computer specification, Lock Key information, and program type &version.

> Setting

Displays setting options of each menu on the pop-up windows.



[Common 1]

> **All Thickness :** Set the basic thickness at each view screen when the program starts.

> **Volume Processing :** Volume Processing is an option for deciding how many times an image be sharpened or smoothened according to assigned factor.
The Default Sharp Factor shows the intensity of sharpening and its range which is between 0~100. The higher the value, the stronger the sharpness.
Default Smooth Factor shows the intensity of smoothing. Its values ranges between 0~100. The higher the value, the more intense the smoothness.

> **Number of Sharp :** The Number of Sharps decides how many times it will sharpen when the program starts.

> **Number of Smooth :** The Number of Smooth decides how many times it will smoothen when the program starts.

> **Default sharp Factor :** Decide on Sharpness.

> **Default smooth Factor :** Decide on Smoothness.

> **Curve Information :** Option to set the distance between each multi-slice view and thickness of reference position.

> **Reference Position :** It is an Option for deciding on the interval between each Multi-Slice View and the thickness of Reference Position.

[Common 2]

> **MPR Image Magnification :** Sets check options that automatically optimizes the size of an image and zoom rate when manually setting.

> **Default Windowing Value :** Default window value selection option when program begins.

> **Light Option :** Select the direction of light from screen and On/Off.

> **Screen Capture :** Selects whether to save in the database or as files in the local computer.

[Common 3]

> **Graphic Card Type :** Selects the type of video card installed on the computer.

> **Start Layout :** Set basic Layout when the program begins.

> **Multiple Execution :** Set number of programs that can be executed at the same time.

> **Font Size :** Decide on the size of font to be used for Measurements and Annotations.

NOTE | The changed Option will be applied immediately by clicking 'OK'.

5.4 Annotate

Annotation tools are composed of Free Draw, Text, Arrow, Delete All. It allows users to analyse images easily by marking key points with lines and memos. i.e. highlighting an area of interest and making text comments on the image.

> **Free Draw**
Draw lines on the desired locations on 2D images.

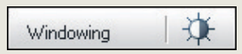
> **Text**
Write simple texts on the desired locations on 2D images.

> **Arrow**
Mark parts to emphasize on the images using the Arrow tool.

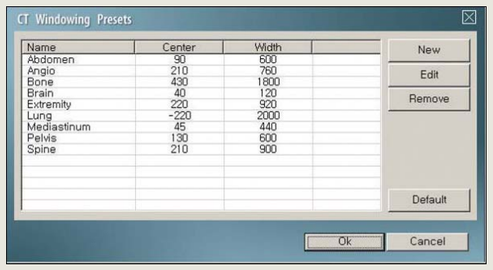
> **Delete All**
Deletes all memos on 2D images.

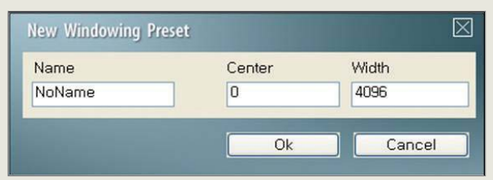
5.5 Adjust

Adjust Tools are composed of Window Adjustment, Color Conversion, Invert. It allows users to analyse images in detail since images are processed using these tools.



> **Windowing (Width/Level)**
Adjust Windowing Width/Level of Window. Select Tool and dragging left to right by clicking left mouse button will adjust Width (Contrast: Left-Strong, Right-Weak), dragging top to bottom will adjust Level (Brightness: Top-Dark, Bottom-Bright).





Clicking 'Windowing' button will show a button to activate a dialogue box called 'Presets' at the bottom of the MPR Screen. The Preset Windowing value can be applied on images by selecting the desired Preset from this dialogue box. The following pictures show 'Windowing Preset' Dialogue Boxes.

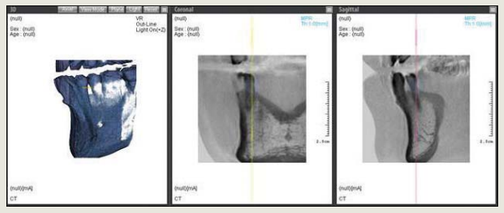
Default	Set Default Preset
new	Add new Preset Value
Remove	Remove Current Preset Value
Edit	Edit Current Preset Value
OK	Applies Selected Preset on Images
Cancel	Cancels the Operation and Return Back to Screen

'Windowing Preset' Dialogue Box provides the following functions.

Clicking 'Windowing' button will show dropdown combo box menu list next to 'Preset' at the bottom of the MPR Screen that adjusts Windowing Gamma Value. Windowing Gamma Selection Tool converts into Gamma Table Value saved in the images.

> **Coloring**
Adjust OTF (Opacity Transfer Function) on images. Select the tool and click left-mouse button from image and dragging left or right will adjust OTF sections on images.

> **Invert**
It Inverts all images displayed on the screen. Selecting 'Invert' button will invert the images and the status will be maintained until the button is de-selected.

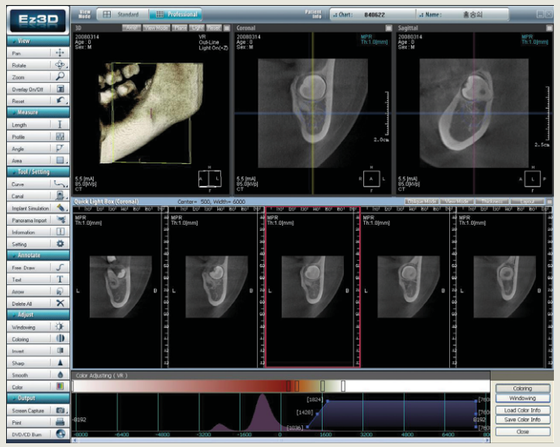


Value Added Technologies

> **Sharp**
Sharpens all images displayed on the screen.
Sharpness is adjusted in the Setting.

> **Smooth**
Smoothen all images displayed on the screen by blurring.
Smoothness is adjusted in the Setting.

> **Color**
Displays tool for adjusting the brightness and contrast of 2D images and matching volume colors of 3D images at the bottom.



NOTE | Refer to 'Chapter 6. COLOR' on page 46 for more details.

5.6 Output

Capture images and save in file server of a personal computer or print.

Original Data

With Overlay

> **Screen capture**
Click on the 'Screen Capture' tool to capture images by left clicking on the selected images. It shows saved location at the time of capturing.

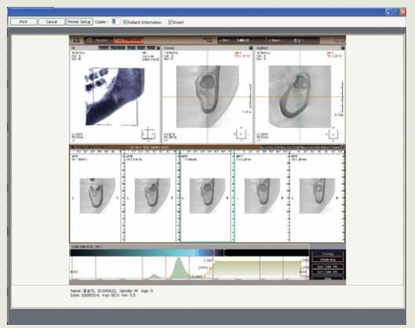
> 'Original Data' captures only images.

> 'With Overlay' captures Overlay and image.

Clicking Screen Capture button will reveal a 'Full Screen' button at the bottom of the screen. Clicking this button will capture the entire screen.

Captured images can be saved as image or DICOM files in the desired location.

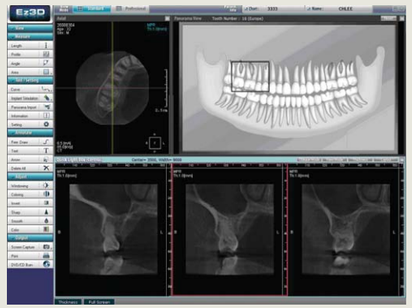
> **Print**
Prints the entire image area excluding the tool bar area.



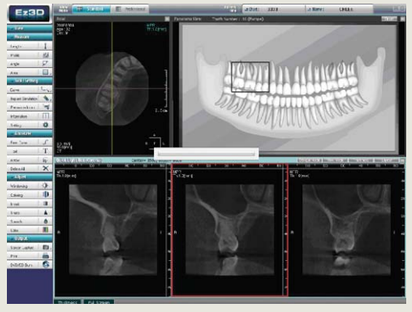
Invert and Patient Information selected Print Screen

Clicking 'Print' will change the entire screen into Print Mode. Checking 'Invert' at the top of the screen will invert the colors on the screen and print patient information at the bottom of the image as well by checking 'Patient Information'.

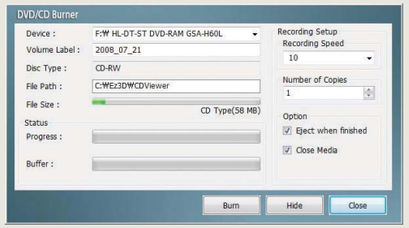
> **DVD/CD Burn (DICOM Data Export)**
Exports CD Viewer and currently loaded patient's DICOM Data using DVD or CD.



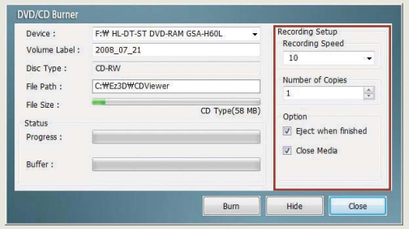
Clicking 'DVD/CD Burn' at the bottom of the slide menu will burn Viewer in the DVD/CD which will enable us to view DICOM Data being used in Ez3D and Data burnt on CD without Lock Key.
Please insert a blank DVD/CD into the CD drive to burn Data using the 'DVD/CD Burn' function.



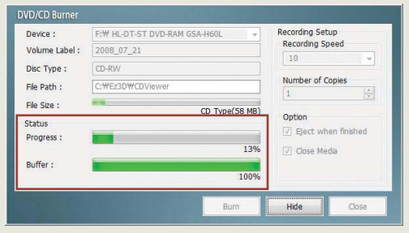
[Figure 1]
Copies DICOM Data currently shown with a progress bar



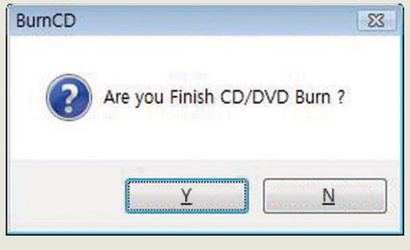
[Figure 2-1]
The following DVD/CD Burn window will activate if Data is copied.



[Figure 2-2]
Select options for burning Data and click 'Burn' button. Clicking 'Hide' button will hide the window and will create a Tray Icon at the right bottom corner of your screen. Double clicking Tray Icon will reactivate the window.



[Figure 3]
The progress of DVD/CD Burning can be checked through the progress bar.



The following message box appears if CD/DVD Burning has been completed.
Clicking 'Y' will end Burning ; selecting 'N' will hide the message box and will go back to [Figure 2] to access Burn function again.

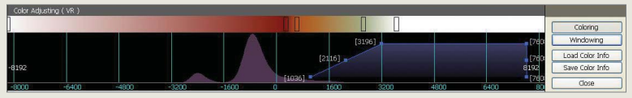
6

Value Added Technologies

Color

6.1 Outline

Opacity adjustment function is available to examine desired parts of 3D Image Data from the Color Volume Rendering Screen. The color screen of Ez3D allows various user settings and possibility to create and save personal preset.

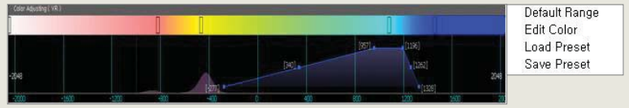


It is composed of Windowing Bar to display and adjust the Opacity Graph (Transfer Function) indication area and Windowing. Color and Windowing is converted by clicking the 'Convert button' on the right.

The Opacity Graph(Transfer Function) is composed of lines displaying the range of Opacity and adjustment points(square boxes). If the Opacity Graph(Transfer Function) is changed, the corresponding Volume Rendering Image and other images will be freshly updated.

6.2 Color

The Opacity Graph will be shown at the bottom of the image when the 'Color' button is clicked at the Icon Tool Menu on the left. Clicking the 'Color' button on the right side of the Opacity Graph area will activate the Color Adjustment Window, and clicking the 'Window' Text Button will activate the Windowing Adjustment Window.
Click 'Color' on the tool menu again to hide the areas of the Opacity Graph.
This provides the most realistic data to examine the patients through simulation by adjusting the existing colors or adding new colors.

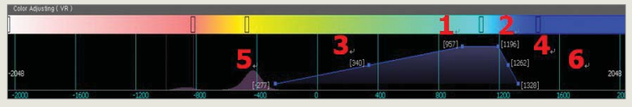


6.2.1 Transfer Function (Opacity Graph) Adjustment

The following options will appear if the right mouse button( ) is clicked on the Opacity Graph.

6.2.1.1 Graph Adjustments

Perform the following tasks to move the graph.



> **Graph Movement**
The entire graph will move along the desired direction by clicking the left mouse button on the blue adjustment points in the graph area.

> **Adjustment using Graph Adjustment Points**
There are six points on the graph, adjusting points 3 and 4 do not change the slope and are used for adjusting the range of the graph.
Points 1 and 2 adjust general transparency and area of the image, Points 5 and 6 at the bottom are used for adjusting the transparency and area of the graph.

6.2.1.2 Display area according to the Opacity Graph (Transfer Function)

Decide the range of the image being displayed on the 3D Screen by moving the graph area left to right.
As the graph is moved to bigger numbers (2000~4000) only images of hard calcareous area will remain, as the graph is moved to smaller numbers (0~-2000) images of soft tissue area will be shown.

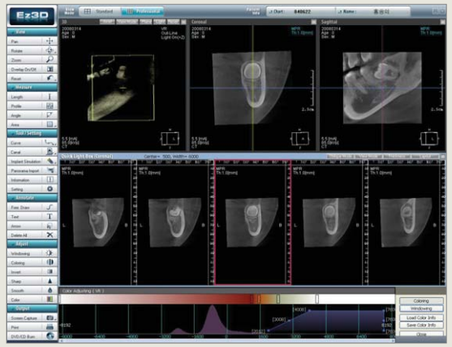


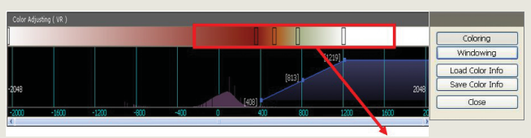
Image viewed by moving the graph towards the larger numbers(2000~4000)

Image viewed by moving the graph towards the smaller numbers (0~-2000)

[Color Bar]

Adjust the color spectrum corresponding to each value. Move the location of the square points on the spectrum or activate the pop-up menu with the right mouse button( ) on the color spectrum to change the colors.

The Opacity Graph Area(Opacity Filter) can be altered by dragging the square adjustment points with the mouse.
Each adjustment point has a limit in the direction it can be moved according to its location, positioning the mouse on the adjusting points will change the mouse pointer in the form indicating direction to move.



Color Adjustment Point

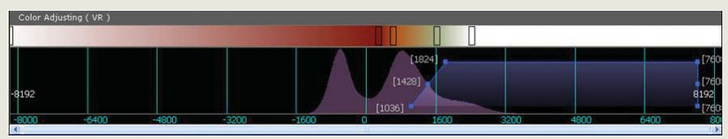
Use the Color Bar to position the adjustment points at the desired location for convenient examination and use by applying to the 3D Screen.

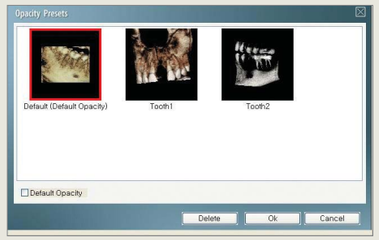
> Color Adjustment Point
The Color Adjustment Point is the base location of displaying colors on the corresponding opacity graph.
One Color Adjustment Point indicates one color, Color-Map includes the middle color between one color adjustment point and other color adjustment point.

> Edit Color Adjustment Point
Click the right mouse button( ) on an adjustment point or click 'Edit Color' to display the Color Selection Window again.

Select the desired color and click 'OK', this will change the color on Color Bar and applies it to the 3D Screen.

> Default Range
The following window will activate by clicking the Color Menu and has the default range values at(-8000~8000). It is possible to change ranges using the mouse wheel after selecting the following window. Click the 'Default Range' Button to return back to the default Range.





6.2.2 Load Color Info (Preset)

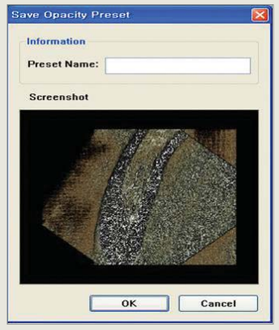
> **Importing Preset**
Preset refers to preset color values selected by the user to be applied on the 3D Object Screen. The colors of objects differ according to the 3D Object.
Clicking right mouse button( ) on areas where the graph is displayed on the Histogram Screen will activate the following Options.
New Presets can be imported by using 'Load Preset' or 'Load Color Info' from the Option Menu located to the right of color area.

6.2.3 Save Color Info (Saving Preset)

Activate the Option Menu by using the 'Save Color Info' button or click right mouse button( ) on the Histogram Screen to save Opacity Graph setting currently applied on the VR(Volume Rendering) and the Color Map setting as new Preset file.

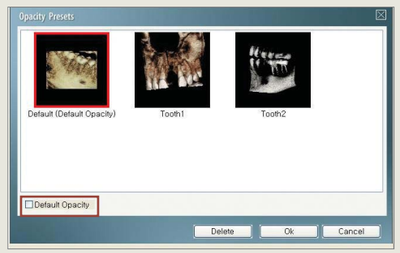
The following Options will appear when the right mouse button ( )is clicked from the areas where the graph is displayed on the Histogram Screen.

The following dialogue box will appear when 'Save Color Info' is selected at the right side of the Color Adjust area or 'Save Preset' from the Options. The New Presets can be added by using 'Save Color Info' button on the right.



Clicking 'Save Color Info' will capture the 3D Screen in the current Professional Mode and will be displayed on the Screenshot.

> **Saving Preset**
Enter the name of the Preset and click the 'OK' button to save, it can be confirmed by executing Load Color Info on right.
A warning message will appear if the same name exists.



6.2.4 Selecting Default Preset

Default color values on graphs created by adjusting 3D screens from the Color Bar are saved as image samples using 'Preset Save'. When the user selects the desired Preset as the default Preset of the corresponding Category, the 3D screen that appears when the program starts will load with the newly created Default Preset.

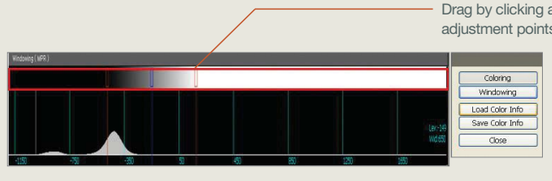
> **Selecting Default Preset**
Click the desired preset thumbnail then check the Default Opacity box. Click 'OK' will assign the currently selected preset as the default.

6.3 Windowing

Shows a screen for adjusting the window by clicking 'Windowing Button' on the right.
Seeks optimum image by looking at the Histogram.

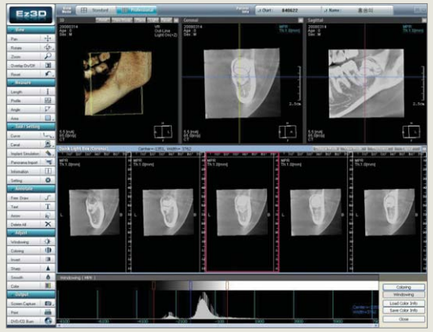
6.3.1 Windowing Bar

Used for adjusting brightness and contrast of the image the user can adjust the Windowing value that the user is viewing.



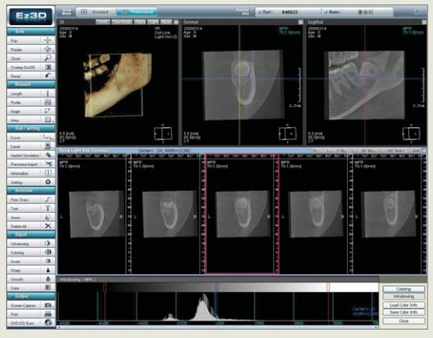
> **Window Center Adjustment**
The central value for Windowing is adjusted by dragging the red square adjustment points at the top with left mouse button( ). Set Brightness of the image by adjusting the blue square adjustment points according to the location of the central value of the Window.

Low Brightness



High Brightness

> **Window width adjustment**
Adjust by dragging the red square adjustment points at the top of the Line Bar being displayed using the left mouse button( ).
As the size of Windowing gets bigger(as the distance between the red adjustment points gets wider) contrast will get lower; reversely, as the size of Windowing gets smaller (as the distance between the red adjustment points gets narrower) contrast will get higher.



Low Contrast

High Contrast

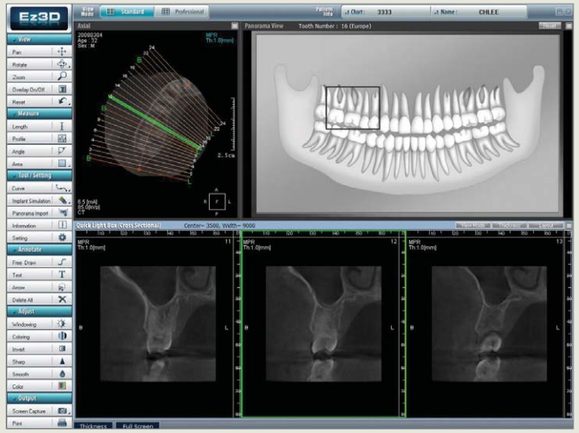
Value Added Technologies

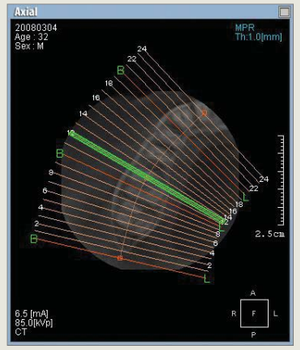
7

Curve Use

7.1 Outline

Curve refers to straight line or curve defined in 3D. Patient's dental conditions can be examined in detail using Curve Function from Ez3D. It is possible to check the status of continuously created 3D sides in the direction of set location by setting Path on top of patient's dental image. Also, Curve can be altered or edited using pop-up menu.





7.2 Curve- Cross Sectional

7.2.1 Creating Curve

Set the Path of the Curve by clicking the mouse from Axial View. Click the left mouse button( ) once from the starting position of Path (if the image is curve, then creating mid points by clicking left button in Path will create well-formed curve) and double clicking or clicking right mouse button( ) once at the finishing point will set the Path of the Curve.

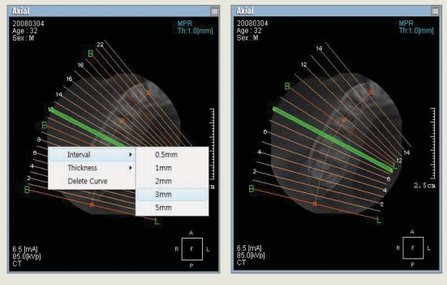
NOTICE

Multi Slice Views of L(Lingual), B(Buccal) will be displayed properly when it is Cross-sectioned from left to right or from bottom to top

If the curve is set, then vertical cross-section of the Axial View are displayed on Quick Light Box(Multi-Slice Views).

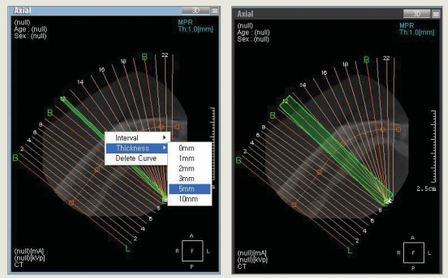
7.2.2 Function

Open pop-up menu by clicking the right mouse button( ) from the Axial View. Available functions include Interval, Thickness and Delete Curve. It can be viewed by adjusting the values of vertical sections of the Multi Slice View.



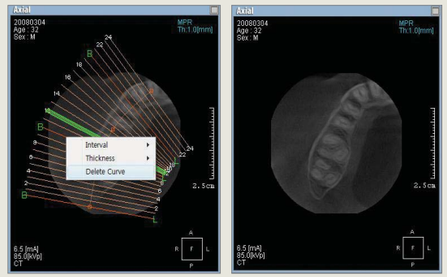
> Interval

The distance between slices on the Curve can be adjusted from here. The Vertical images being displayed at the bottom of the Multi Slice View can be changed by adjusting the distance.



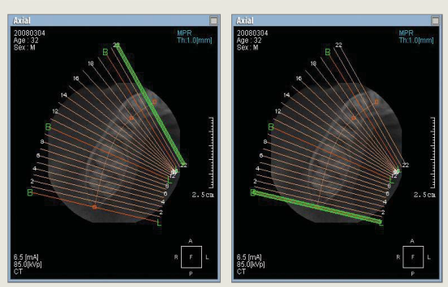
> Thickness

The thickness of the slices can be adjusted from here.
The slices being displayed at the bottom of the Multi Slice View can be changed by adjusting the thickness.



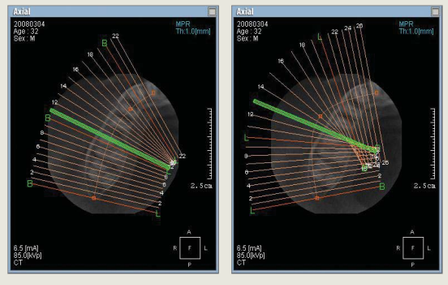
> Delete Curve

The path of curve can be deleted from here.



> Wheel Control

The location of vertical sections being displayed vertically along the Curve, changes when the mouse wheel is used on Multi Slice View image.



> Moving Curve

Can be changed into a desired shape or moved to a desired location by selecting the points on the Curve Path from the Axial View.

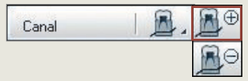
8

Value Added Technologies

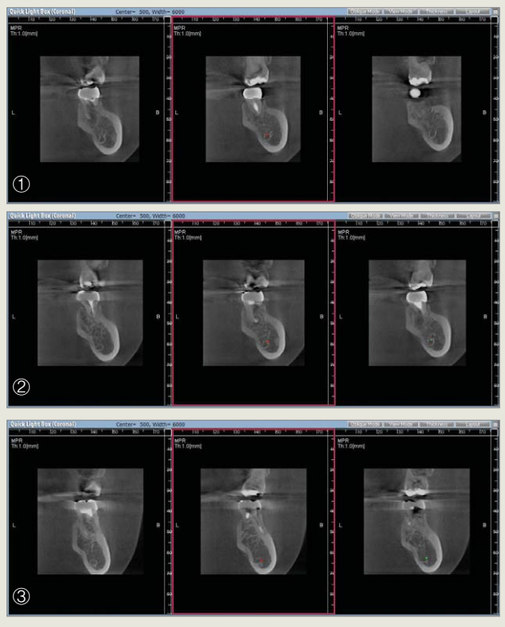
Drawing Canal

Ez3D provides an easy way to draw the path of the canal using Coronal, Sagital, Axial, and Curve-Cross-Sectional Views.

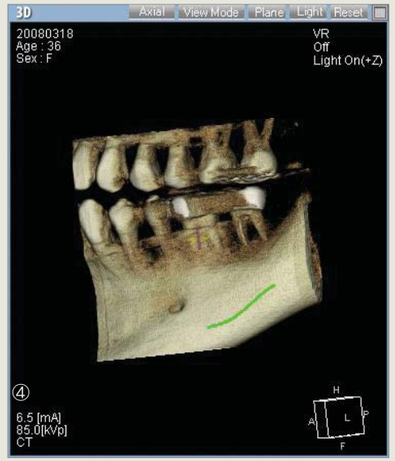
8.1 Canal Drawing at the Coronal View



Adjust the axis to show the canal.
At the Main Tool Bar, Select 'Canal → Canal Insert'.



In the Coronal View, draw the path of the canal by tracing along the route using the mouse wheel. Finish setting the path by right clicking or double clicking the mouse to enter the final point.

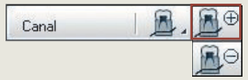


The canal path can be checked at the Coronal, Sagital, and Cross-Sectional Views.

8.2 Canal Drawing at the Cross-Sectional View

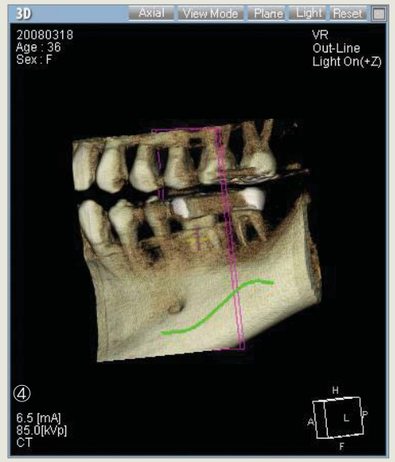
First, generate a Cross-Sectional View on the image viewer.
The path can be drawn by clicking along the canal route, moving the Cross-Sectional image, and right clicking or double clicking the mouse to enter the final point to complete drawing.

> **Creating Cross-Sectional View**
Generate Cross-Sectional View, as shown. Refer to 'Chapter 7 Curve-Cross-Sectional'.

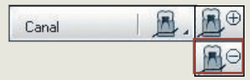


> Canal Drawing at the Cross-sectional View
At the Cross-Sectional View, choose an image to draw a canal.
At the Main Tool Bar, Select 'Canal → Canal Insert'.

At the Coronal View, move the image as shown below using the mouse wheel and click to set canal path. Finish setting the path by right clicking or double clicking the mouse to enter the final point.



The canal path can be confirmed, as shown below, when setting is completed.



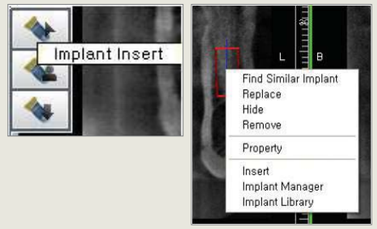
> Deletion of canal drawing
At the Main Tool Bar, Select 'Canal → Canal Delete'. All canals drawn by the user will be deleted.

9 Implant Simulation

9.1 Outline

The size, location and direction of the Implant that suits the patient to be treated can be confirmed in advance by inserting the Implant onto the image.
Select model from Tool/Setting → Implant Simulation → Implant Library then click 'Insert' this will change the mouse into the shape of Implant.
Click left mouse button( ) at the desired location and place a cylindrical implant at that location. The types of implant to be inserted can be selected or replaced from the 'Implant Library'.

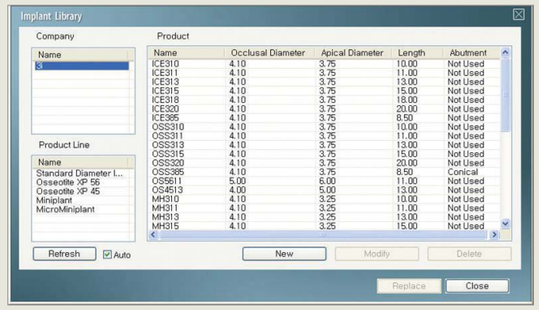
9.2 Functions



9.2.1 Implant Insert

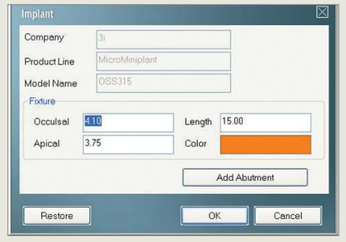
Insert Implant. Click Tool/Setting → Implant Simulation → Implant Insert will activate the Implant Library.
Select the desired model and click 'Insert' this will change the cursor into Implant shape, left click on the image to place the implant at that point.
Or right mouse( ) click on the axis of the Implant currently selected will also activate the 'Insert Menu'.

The most recently selected model of Implant from the Implant Library will be inserted, a default implant will appear if the Implant Library is not used.

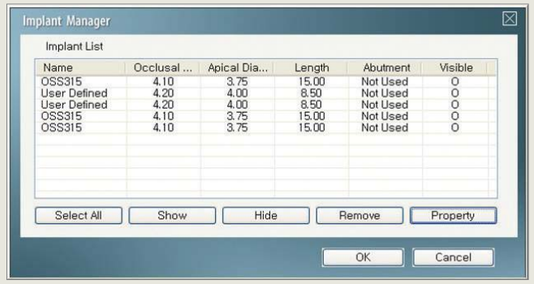


9.2.2 Implant Library

Shows lists of implant models saved in the Database.
New implant models can be registered or deleted or replaced.
Click Tool/Setting → Implant Simulation → Library. Or, click 'Implant Library' from the menu activated by clicking the right mouse button( ) .



A window for registering a new implant model will appear when 'New' button is clicked from the Implant Library screen.
Enter the length and property and register by clicking 'Confirm'.
'Delete' button will delete the selected Implant Model from the DB.
'Modify' button will change the property of the selected implant among the implants registered in the DB.
'Replace' button will replace the most recently used implant with an implant selected from the Library.

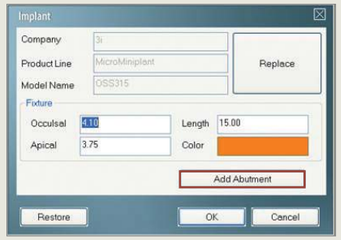


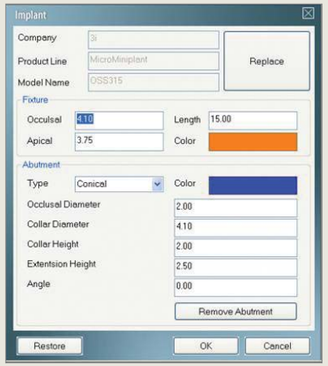
9.2.3 Implant Manager

It displays the type, number, and property of implants currently inserted. It shows hides, deletes, or replaces implants.
Select Tool/Setting → Implant Simulation → Implant Manager.

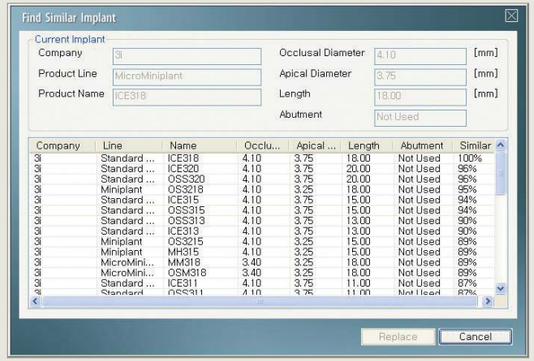
It shows whether the current implant is shown or hidden on the screen. Click 'Show' and 'OK' buttons to display the selected implant, if the implant is hidden. Click 'Hide' and 'OK' buttons to hide the selected implants from the screen.

Delete selected implants by clicking 'Remove' and 'OK' buttons. Click 'Property' button to activate the following Implant Property.





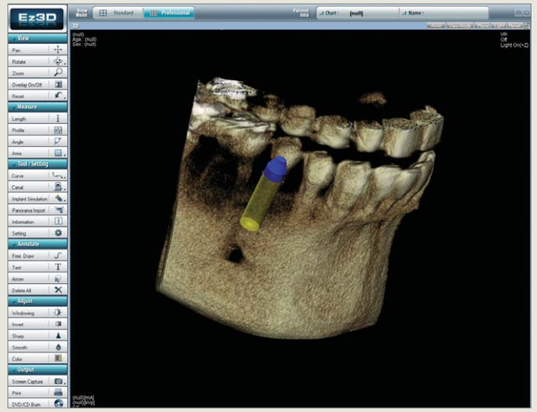
Abutment will be added and the property of Abutment will be shown as well by clicking the Add Abutment button.
The property of the Implant can be changed by activating the 'Implant Library' window by clicking the 'Replace' button.



9.2.4 Find Similar Implant

Its function is to list types of implants similar in shape to the selected implant by searching from the Database.
Clicking the right mouse button( ) on the axis of implant being currently drawn will activate the 'Find Similar Implant' Menu.

Clicking the 'Replace' button will change the implant previously placed into the model from the list.



9.2.5 Implant Simulation Check

The completed implant can be checked from the 3D Mode screen.

Appendix |

Frequently Asked Questions

Q. Ez3D displays error message “WIBU not Found”.

A. Copy Proof Hardware Lock Key is missing or not inserted correctly.
Please make sure that Lock Key is correctly inserted.

Q. Screen does not display properly when Ez3D is started.

A. Select ‘Properties’ from the desktop by right-clicking the mouse.
Ensure that the screen resolution is set to 1024x768 or better.
(Recommend 1280x1024 or better)

Q. Color is not displayed correctly when Ez3D is started.

A. Select ‘Properties’ from desktop by right-clicking the mouse.
Ensure that the color is set to 24-bit or higher from ‘Settings’.
(Recommend 32bit or better)

Q. The Operating System needs to be reinstalled, what can I do to retain previously saved data?

A. Copy and save of the original data in the folder C:\Ez3D which is the default installation folder onto a separate backup drive or USB stick. Then reinstall the Operating System and Ez3D if necessary. Copy the saved data into the same directory.

Q. A message appears while un-installing the WIBU Key Program which reads: “C:\Program Files\WIBU-SYSTEMS\System\WibuShellExt.Dll is still in use by another application”

A. The message appearing during the un-installing of the WIBU Key Program indicates that certain files cannot be deleted.
Select 'Ignore' and then click 'OK'. Then reboot the system.

Q. A message appears when the Implant Library is selected which reads: “Cannot locate C:\Ez3D\User Setting\implant3d.mDatabase”

A. A database file has been deleted or is not registered. Un-install Ez3D and reinstall.
Please remember to back up your data

Q. Keyboard is not operating normally.

A. Please install keyboard driver on computer.

Q. 3D Screen is black.

A. Click 'Light' from the top menu on 3D Window or select Color from the left and adjust Transfer Function.

Q. MPR screen is not displaying.

A. Turn-off hardware accelerator or select Color from left and adjust Windowing.

Q. An error message appears or the computer crashes when closing Ez3D.

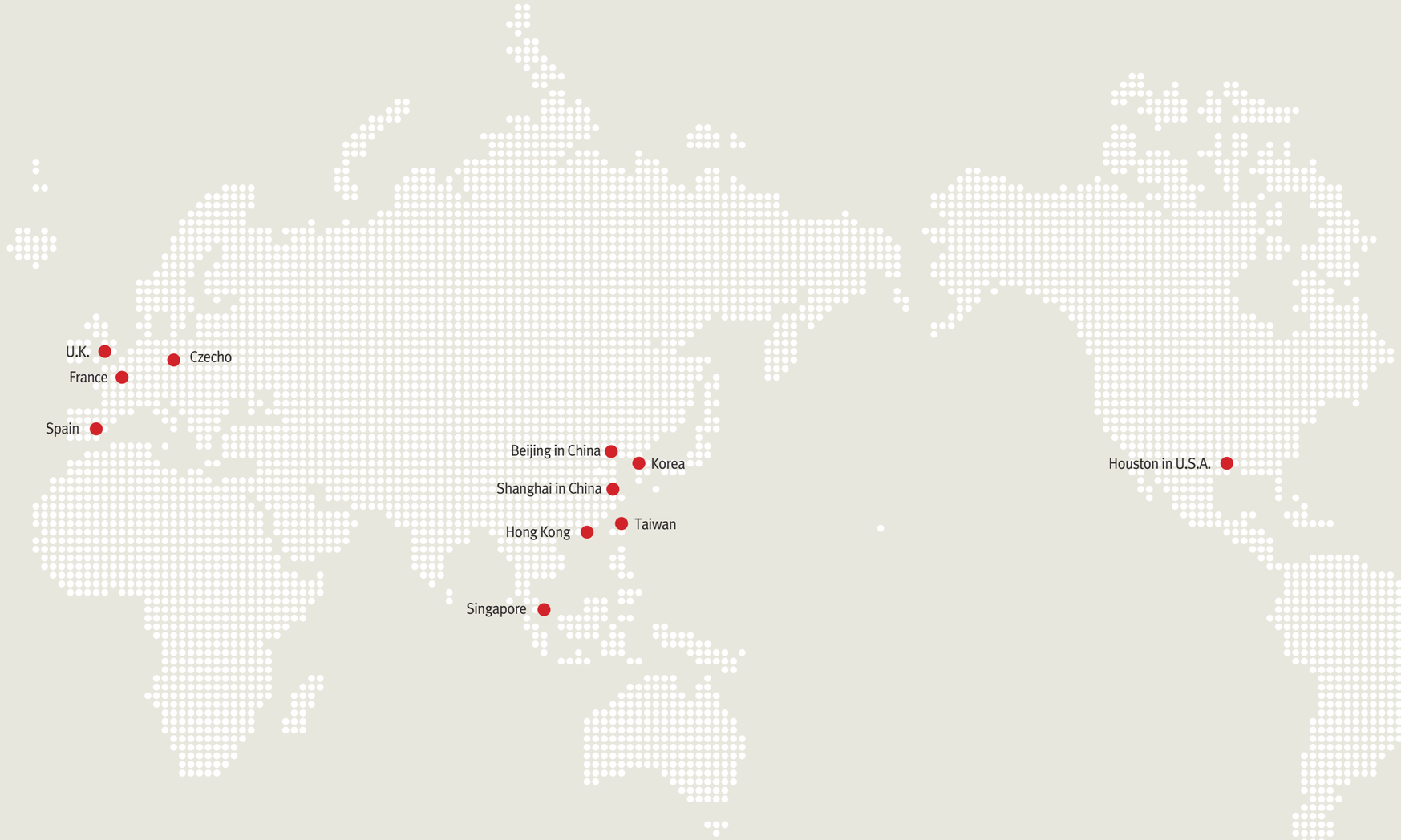
A. Check the system requirements provided and use or upgrade your computer to at least the minimum recommended specification.

Q. I am a laptop computer user. A window called MPR is divided into 4 sections and abnormally broken.

A. The laptop computer’s installed graphic card is not supporting the 3D Acceleration function. Double-click ‘Display Property’ from ‘Control Panel’.
Open the ‘Advanced Setting Window’ from ‘Setting’ by clicking ‘Advanced’ button.
Set hardware acceleration to ‘Minimum’ by clicking on ‘Solve Problem’ tab.
Changing this setting will reduce the refresh rate

Q. Ez3D operates unstably displaying “error 7 occurred” after running screen saver.

A. It is caused by the termination of Lock Key process being used by Ez3D from the current PC’s screen saver mode. The message appears when using power save mode. The Lock Key program can be normally used again just by clicking ‘Restart’ or ‘Ignore’ but not ‘Stop’ button for the Error message.



Value Added Technologies

Thank you for taking the time to use the Ez3D User's Manual. We would appreciate any feedback or comments you have about this document. Please email or phone us with your comments.
You can reach us at :

Head Quarters
Tel > +82-31-679-2073
Fax > +82-31-8005-7816
Email > info@vatech.co.kr

Branch Offices

U.S.A.	Tel > + 1-281-598-8131
	Email > yshan@e-wootech.com
U.K.	Tel > + 44-7506713008
	Email > hhseo@e-wootech.com
France	Tel > + 82-31-679-2063
	Email > alpacino9@vatech.co.kr
Spain	Tel > + 34-685-991-481
	Email > cdcs97@e- wootech.com
Czecho	Tel > + 420-733-654-280
	Email > info@vatech-ce.eu
Hong Kong	Tel > + 852-27838711
	Email > totolam@ewootech.com.cn
Singapore	Tel > + 65-8223-1461
	Email > chin@e-woo.com.sg
Taiwan	Tel > + 886-2-2627-1505
	Email > silas@vatech.co.kr
Shanghai in China	Tel > + 86-158-006-55-006
	Email > yeoo2@e-wootech.com
Beijing in China	Tel > + 86-10-5165-5488
	Email > rickzhai@ewootech.com.cn

This manual only contains the EZ3D user guide. For additional information pertaining to this manual and the product, please contact VATECH at:
Tel > +82-31-899-7979 Fax > +82-31-8005-7816 Email > info@vatech.co.kr
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VATECH Co., Ltd.
473-4, Yun-Min Bidg, Bora-Dong, Giheung-Gu,
Yongin-Si, Gyeonggi-Do, Republic of Korea

www.vatech.co.kr