MORITA

i·Dixel

One Volume Viewer

Operation Instructions

(Ver. 2.8)

CE
0197

Manufactured by J. MORITA MFG. CORP.

i-Dixel One Volume Viewer: Conditions of Use

1. Data Export Conditions

- This application can be used for any CT data which is compatible with i-Dixel software. However, the CT volume data must still be saved.
- The computer must have both the i-Dixel application and the i-Dixel One Data Viewer Plus software (option) in order to export data to be used with the i-Dixel One Volume Viewer.
- When exporting CT data, you must specify either Volume or Slice. Also, the option of exporting data for version 1.720 or earlier must be turned off.

2. Hardware and Software

i-Dixel One Volume Viewer requires the following:

Operating System (OS)

Windows 2000 Professional SP4
Windows XP Professional SP2/SP3
Windows Vista Business 32 bit
Windows 7 Professional 32 bit
* It has not been confirmed if other operating systems can be used.

Computer Specifications

The chart below shows the minimum and recommended specifications. For especially large amounts of data, the recommended specifications should be considered the minimum specifications.

	Minimum	Recommended
CPU	Pentium 4 1.7GHz, min., Intel CPU	Core 2 Duo, min., Intel CPU
RAM Memory	2GB, min.[1]	3GB, min.
HDD Free Space	1GB, min.	10GB, min.
Display Colors	16 bit Color, min.	32 bit Color
Display Resolution	1024×768, min.	1280×1024, min.

[1] Depends on volume data size. Minimum should be at least 2 times the volume data size.

3. Cautionary Remarks

- Proper operation cannot be guaranteed if running under virtual environments.
- Data cannot be used if it is in a folder with a network path. It must be in a folder on a local or mapped network drive. Refer to the Windows Help Files for how to map a network drive.
- Depending on computer settings, i-Dixel One Volume viewer may not work even if specified computer conditions have been met. If this happens, check with the computer administrator.
- For large amounts of data, data read-in and processing may take a long time. Therefore, even if the specified minimum computer conditions have been met, the application may not run smoothly.
- Do not run or start up any other applications while using i-Dixel One Volume Viewer. This could result in a shortage of memory for proper operation.
- Do not eject a medium with recorded data or shut down any data read-in devices while i-Dixel One Volume Viewer is running. This could damage data or the computer.
- Data output may take a long time under the following circumstances. In these cases, it is better to first copy the data on the computer's hard drive and then run the program.
  - For data saved on a device connected with a slow connection such as USB 1.1.
  - For data recorded on CD, DVD, MO disks which are used with a slow reading drive.
  - For data saved on a computer network.
- Anti-virus software can cause the application to run extremely slowly.

The volume rendering related functions of this software are based on collaborative research by Professor Kensaku Mori of the Graduate School of Information Science, Nagoya University, and J. MORITA MFG. Corp.

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June 2013

Do Not Fail to Observe the Following Cautionary Remarks

- *J. Morita Mfg. Corp. is the legal registered owner of the i-Dixel One Volume Viewer and does not permit unauthorized reproduction of it.*
- *J. Morita Mfg. Corp. cannot be held liable for problems or malfunctions attributable to the OS (operating system).*
- *J. Morita Mfg. Corp. bears no responsibility for problems attributable to factors arising from the operating environment established by the user.*
- *This software is not compliant with the Windows standby mode or with the unique standby modes for notebook computers.*
- *Do not use a screen saver; screen savers may prevent the software from running smoothly.*
- *Do not use controls for automatically turning off the display and hard disk which are in the screen saver section of the display control panel. These should both be disabled and not used; otherwise the software may not run smoothly.*
- *Do not use “Sleep” or “Suspend” functions; the software may not run smoothly if these are turned on.*
- *The J. Morita Mfg. Corp. bears no responsibility for problems and defects originating with hardware items such as the computer itself or peripheral devices or for problems and defects which seem to originate with such hardware items.*
- *This software has been confirmed to operate without problems on a computer with a Pentium 4 CPU or better, CPU clock speed of 1.7 GHz or faster, minimum RAM of 2 GB, and at least 1 GB of hard disk space, running Microsoft Windows XP Professional SP2, Windows 2000 Professional SP4, Windows Vista Business 32bit or Windows 7 Professional 32bit. J. Morita Mfg. Corp. does not warrant that the software will operate correctly on a computer not meeting the above requirements.*
- *When operations are performed using high definition or wide scope data, as loading and processing of data can take time, even if the minimum recommended environment is used, operation may not be smooth.*
- *The warranty for this software will not extend more than 1 year after the manufacturer of the operating system (OS), which has been proven to work, has discontinued sales of the operating system regardless of the original valid period of the warrantee.*

⚠WARNING

- **Implant overlay drawing is only for presentation purposes not actual planning.**
- **Depictions of implants in x ray images are only for explanation to patients and may not be accurate enough for actual planning.**
- **Implants displayed may not be available or may not be suitable. Ask implant makers about availablility and suitability.**
- **The user is responsible for how this software and the implant display feature are used for patient explanations and treatment.**

CONTENTS

1. Introduction

i-Dixel One Volume Viewer is a single user application for viewing CT data exported from i-Dixel databases. It is only designed to open exported CT data.

⚠NOTE

The user bears all responsibility resulting from use of this software.
CT does not provide absolutely accurate biological information, so caution is necessary.
Please use an adequate amount of time when observing images.

Users of i-Dixel-3DX are supported. Enquiries resulting from distribution of data to people other than users are not supported and cannot be answered.

Keyboard Input Usage

- **Ctrl+A**
  This means you hold down the Ctrl Key and press A.

- **Back Space**
  The key in the upper right corner of the keyboard.

- **Tab**
  The key on the far left side with arrows pointing to the right and left.

- **Shift**
  The two keys in the lower left and right corners with a larger arrow pointing up.
  Used to type in capital letters.

- **Enter**
  The large key on the right side of the main part of the keyboard used for typing, designated by the word "Enter" or "Return" with a curved arrow on it.

- **Space Bar**
  The wide key at the bottom and in the middle of the keyboard.

Standard Terms Used in This Manual

To avoid needless repetition, the meaning of terms related to operations using the mouse and other terms are defined below.

- **Click (Left Click)**
  Locate the mouse pointer on the object and then click the left button on the mouse once.
  For example, if the instruction is “click the file,” put the mouse pointer on the file and click the left button once.

- **Right Click**
  Click the button on the right side of the mouse

- **Double Click**
  Click the mouse button twice in quick succession. For example, “Double click the icon,” means to move the mouse’s pointer onto the icon and then click the left button twice in quick succession. It is possible to adjust the length of time between clicks which will distinguish between a “double click” and two, separate single clicks. Go to the Windows Control Panels.

- **Drag and Drop with the Mouse**
  This means to locate the mouse’s pointer on top of an icon or other object, hold down the left button and then move the icon or object to some other place. Release the left button when the object is at the desired location. For example, this is used to put an image in the image Arrangement Window.

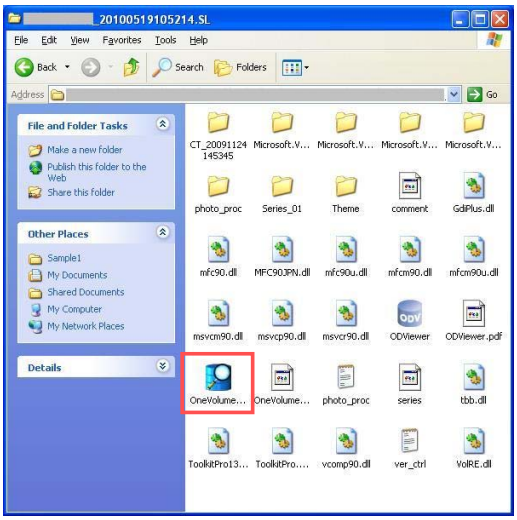
- **Windows Desk Top**
  This refers to the view in the monitor right after Windows has been started up where various program icons are displayed.
  Double click a program icon to start it up. With Windows, more than one program can be used at the same time.

- **Pop-up Menu**
  A menu which is displayed by clicking with the right mouse button.

- **Radio Button**
  On-and-off switches for various functions and features.

1.1. Start Up i-Dixel One Volume Viewer

Double click the One Volume Viewer icon in the export data folder.
If there is no One Volume Viewer icon, check the settings of the software used to export the data, and confirm that Volume, Slice, and OneDataViewer have been selected. (* Confirm that export was not performed with "Pre-1.72 versions ..." selected.)

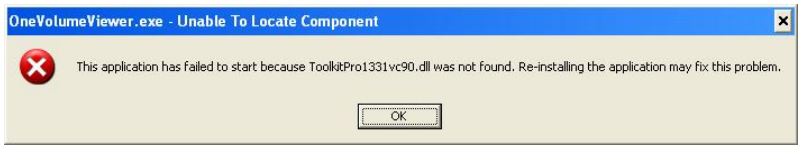


⚠NOTE

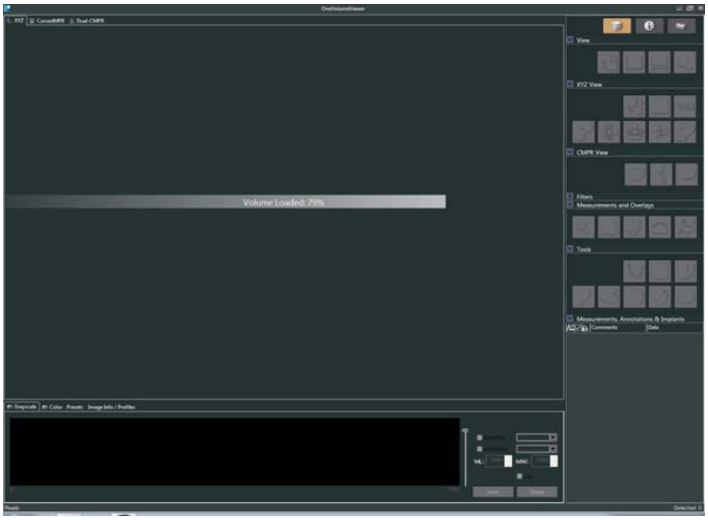
- *Please do not use VIEW One Volume Viewer and i-Dixel software at the same time. There is a possibility that i-Dixel One Volume Viewer will not operate correctly.*

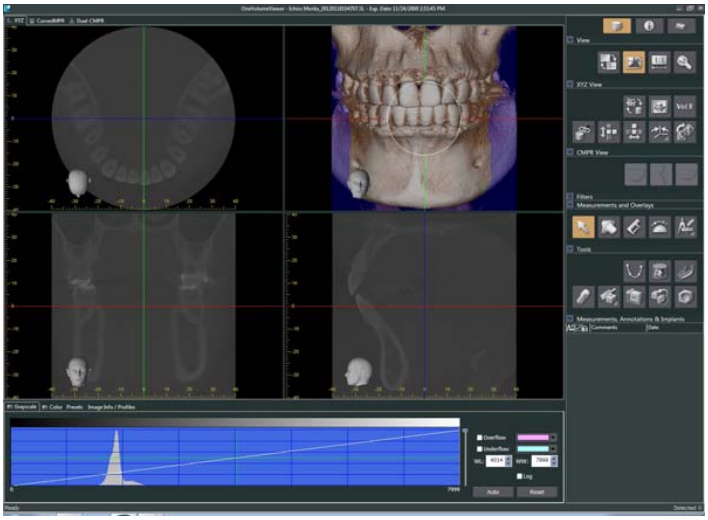
A dialog indicating cautions about usage will be displayed.
Please check the contents of the dialog and click "OK" if you agree to the conditions.

i-Dixel One Volume Viewer is configured to start in the same folder as the export data.
Please be aware that if the content of the folder in which the program was saved is changed, the program cannot be started.



After completing pre-processing, data is displayed in the XYZ view.
(*Pre-processing may take several minutes.)





1.2. Shut Down the Application

The application can be shut down by clicking the "x" in the upper right of the window.

2. Screen Layout

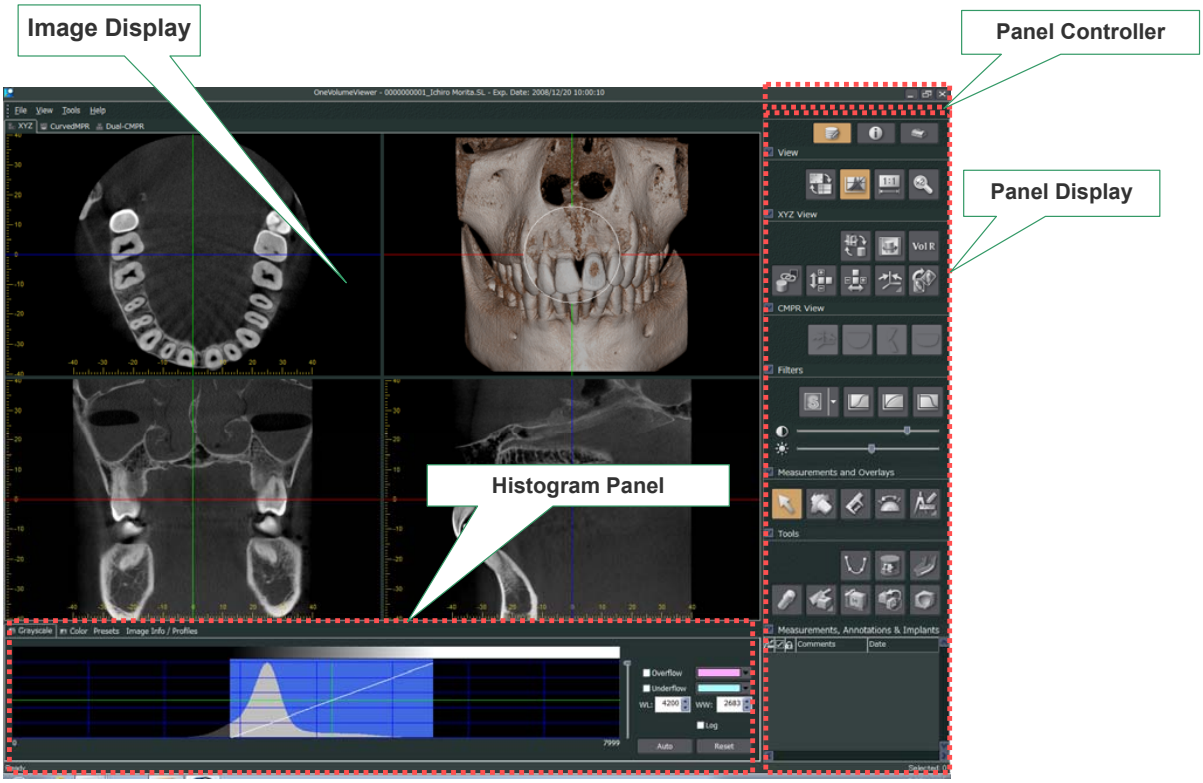
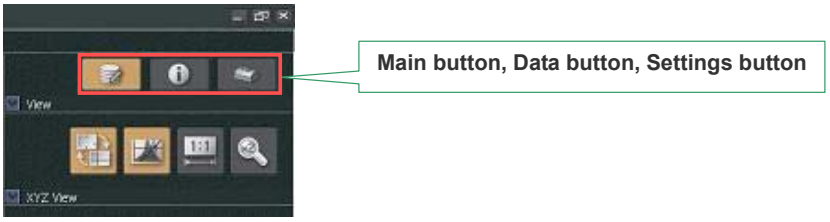


Image Display

When the i-Dixel One Volume Viewer is started, it displays CT slice images and volume rendering images.
You can select the XYZ, CurvedMPR, or Dual-CMPR tabs to switch between the displayed images.

Panel Controller

Clicking the buttons on the Panel Controller allows switching of panels.
The Main button displays the main panel, the Data button displays the data panel, and the Settings button displays the settings panel.



Main Panel

Use this panel for editing, image processing and making and measurements for CT slice images in the XYZ view, the volume rendering image, MIP image, and RaySum image. Also use it for editing, image processing and making measurements for the cross sections and panorama image in the Curved MPR view and the Dual-CMPR view.

[View]
Show or hide the histogram, zoom in or out etc.

[XYZ View]
Change the image arrangement in the XYZ View.
Select the volume rendering, MIP, or RaySum images.

[CMPR View]
Create cross sections and the panorama image. Show or hide images in the Curved MPR View and the Dual-CMPR View.

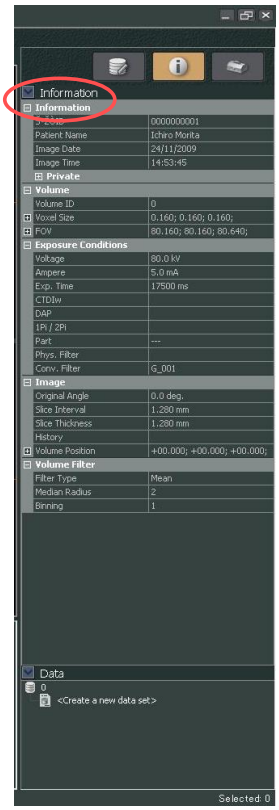
[Filters]
When there is a lot of spike noise, or the image lacks clarity or is otherwise degraded, using the filters can improve the MIP and RaySum images shown in the XYZ View and the images shown in CurvedMPR View and Dual-CMPR View.

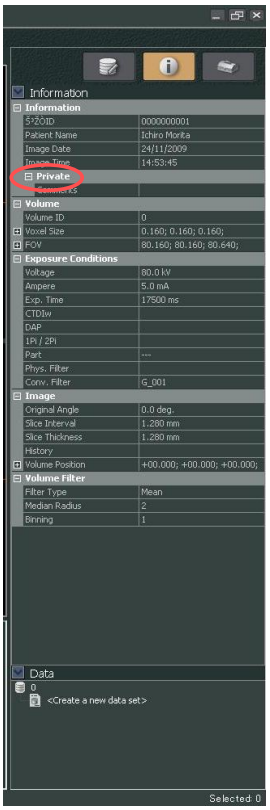
[Measurements and Overlays]
Make length and angle measurements for slices in the XYZ View and the Z-slice image cross sections and panorama image in the Curved MPR View. Also draw lines and shapes and add annotations.

[Tools]
Use these tools to draw the nerve canal, overlay implants for presentations, slice images and cut out parts of images.

[Measurments, Annotations & Implants]
This is a list of things added to the image such as the nerve canal or implant overlays, lines, shapes, annotations etc. for the XYZ View or the CurvedMPR View or the Dual-CMPR View. All items are dated and categorized.
The lock can be set so that the item cannot be changed or deleted.
Use this list to show or hide the items in the list.

Data Panel

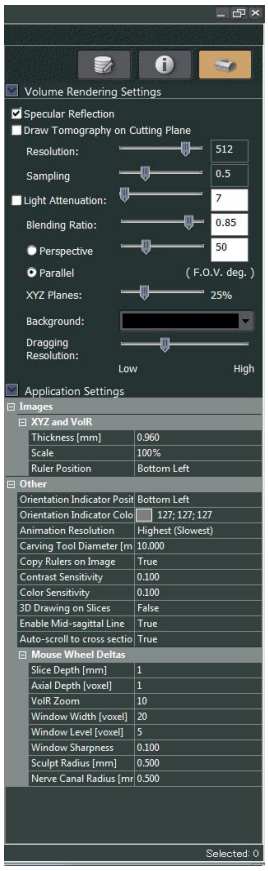




The data panel displays additional information related to exported images. This includes patient names, i-Dixel database patient IDs, image dates, rotation histories, and comments. Comments and patient information are not displayed under the initial settings. To display data, click the "+" button on the left of the "Information" displayed on the data table. To display comments, click the "+" button on the left of the "Private" displayed on the data table.

Settings Panel

Setting of [Volume Rendering Settings] and [Application Settings] can be performed.



[Volume Rendering Settings]

Adjustment of volume rendering images on the XYZ view can be performed.

[Application Settings]

Values of image display settings can be checked.

In regards to thickness when displaying XYZ slice images and cross section images, if spike noise and artifacts stand out, increasing the thickness will reduce the effects.

Histogram Panel

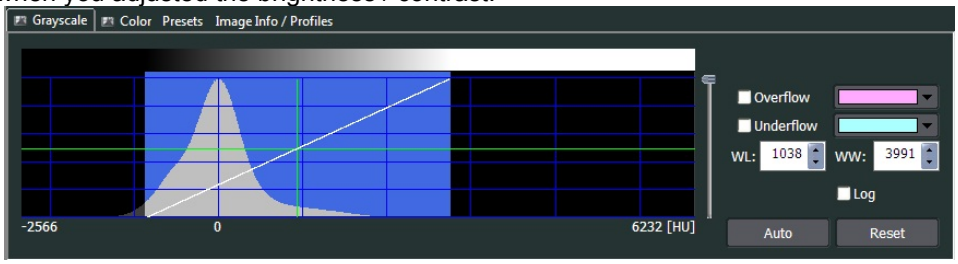
In the histogram panel you can check the histogram of the CT volume data, adjust the brightness / contrast of the grayscale images, set the VOI you wish to display in the volume rendered window, and more. You can click the histogram button:  on the main panel to switch between showing and not showing the histogram panel. The following four views are available in the histogram panel. Use the tabs to switch between the views.

[Grayscale View]

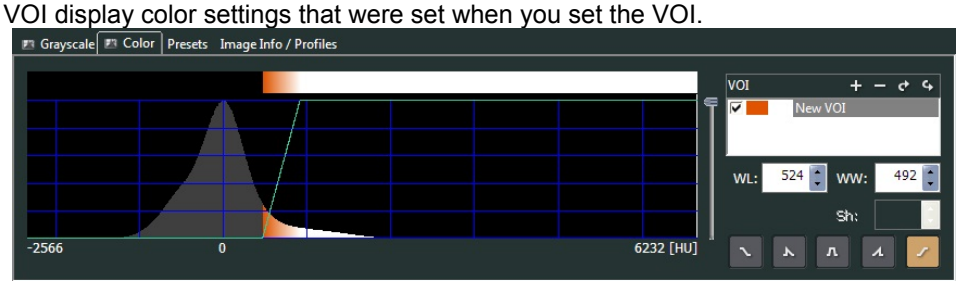
You can check the histogram of the CT volume data.

You can adjust the brightness / contrast for grayscale images.

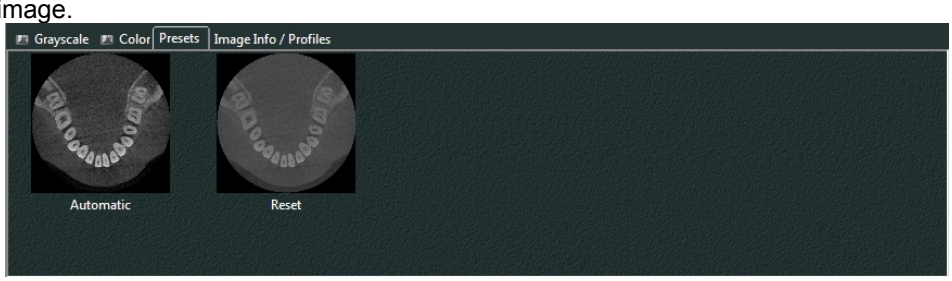
You can review the WL (window level), WW (window width), and brightness level settings that were set when you adjusted the brightness / contrast.



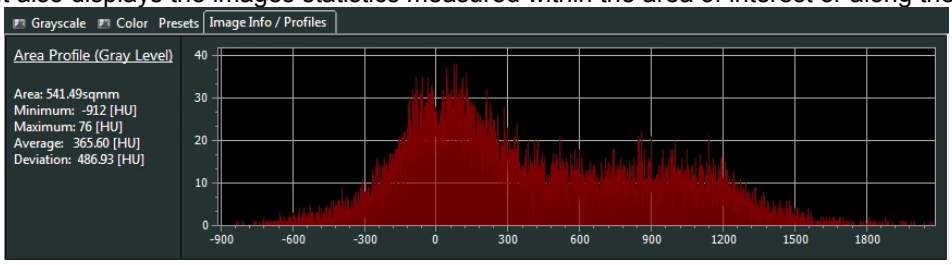
[Color View]
You can check the histogram of the CT volume data.
You can set the VOI you wish to display in the volume rendered window.
You can register the WL (window level), WW (window width), opacity level, opacity curve type, and VOI display color settings that were set when you set the VOI.



[Presets View]
By simply double-clicking the thumbnail you can adjust the brightness / contrast for the grayscale image.



[Image Info / Profile View]
Displays the measurement results when measuring a line profile or an area profile.
It also displays the images statistics measured within the area of interest or along the line.

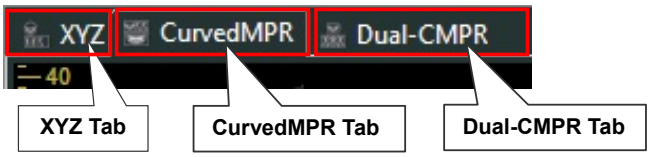


⚠ NOTE

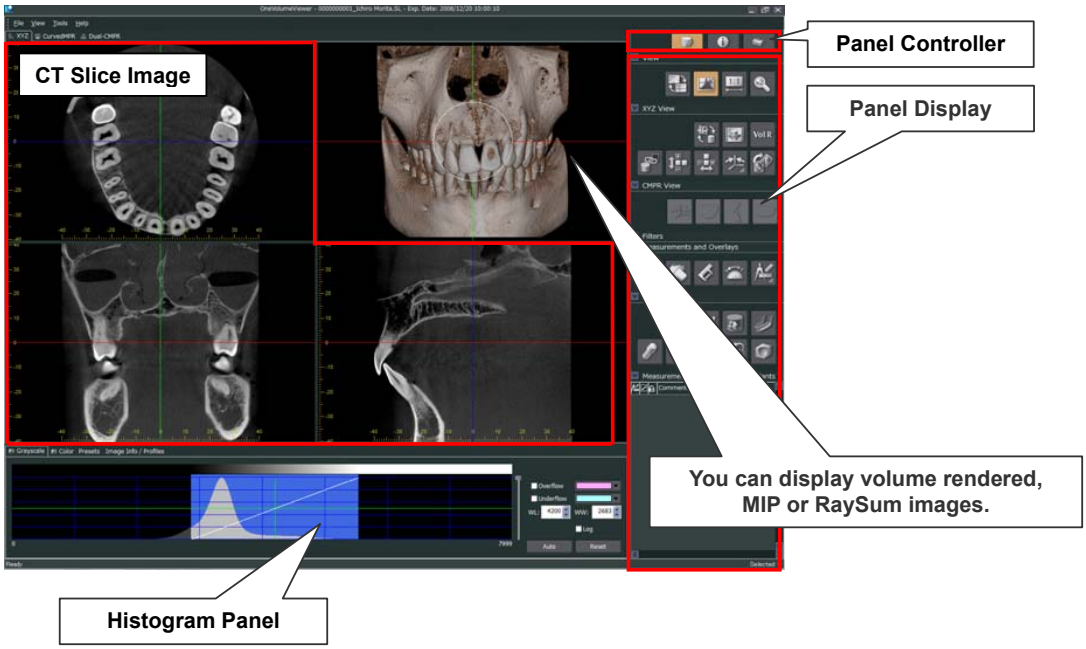
- **A grayscale image is a CT slice image, MIP image, or RaySum image displayed in XYZ View or an axial image, panoramic image, or cross section image displayed in CurvedMPR View or Dual-CMPR View.**
- **Line profiles, area profiles, and image statistics can be done using grayscale images, with the exception of MIP and RaySum images.**

3. Image Display

In the i-Dixel One Volume Viewer, you can show the data in either XYZ View or CurvedMPR View or Dual-CMPR View. You can switch the views by clicking on the tabs shown.

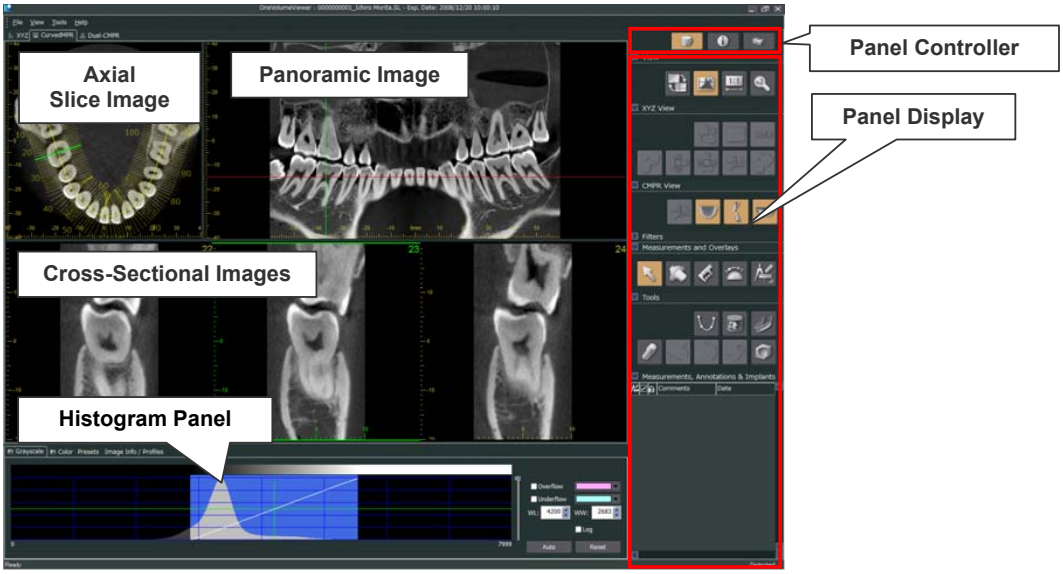


< XYZ View >



When the i-Dixel One Volume Viewer is started, CT slice images and volume rendered image will be displayed in XYZ View.
In XYZ View, you can perform various image processing operations. You can visualize and check the mandibular canal, add implants, measure, etc.

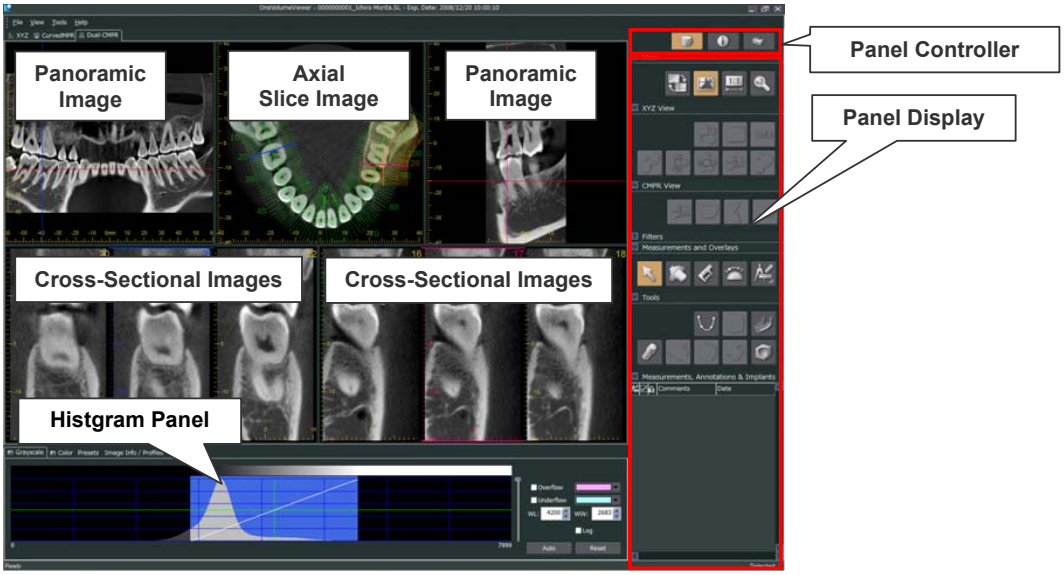
< CurvedMPR View >



In CurvedMPR View, Axial slice, panoramic, and cross-sectional images are displayed.
In CurvedMPR View, you can perform image processing operations, add implants, draw nerve canals and perform many different measurements.

* The Axial slice image refers to the image used to draw the spline curve required for CurvedMPR and MPR. In addition, the panoramic image refers to the image reconstructed using CurvedMPR, and the cross-sectional image refers to the images reconstructed using MPR.

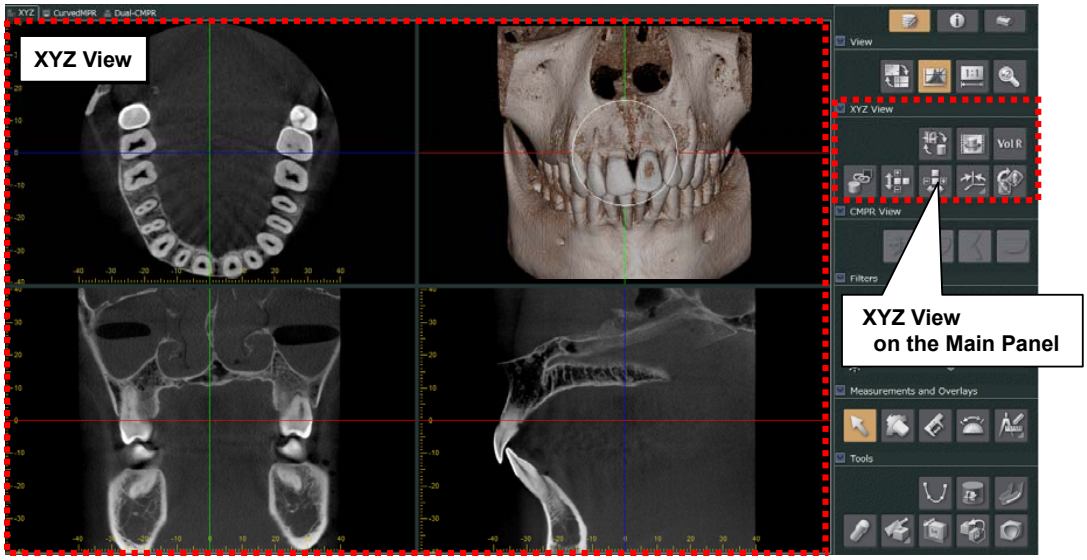
< Dual-CMPR View >



You can create two CurvedMPR and MPR sets in the Dual-CMPR View.
CurvedMPR and MPR can be done in series, with the generated panoramic and cross-section images displayed side by side.
This is useful when you want to display panoramic images and cross-section images from different locations or angles in order to compare them.

3.1. XYZ View

In XYZ View, in addition to CT slice images, volume rendered, MIP, or RaySum images are displayed. Displaying images is done using the XYZ View button on the main panel.



X, Y, Z slice planes, X, Y, Z cursor lines and X, Y, Z slice images in three-view drawing on screen

A CT slice image displayed by i-Dixel refers to an X slice image, Y slice image, or Z slice image.

When CT data is displayed in a three-view drawing, the relationship between X, Y, Z slice images, X, Y, Z slice planes and X, Y, Z cursor lines is as shown in Figure 1.

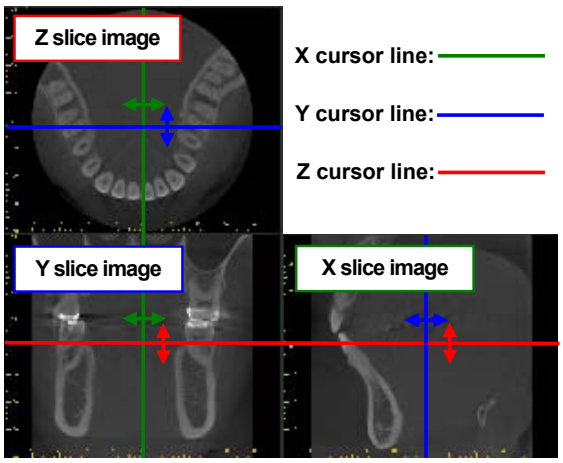


Figure 1. (a)

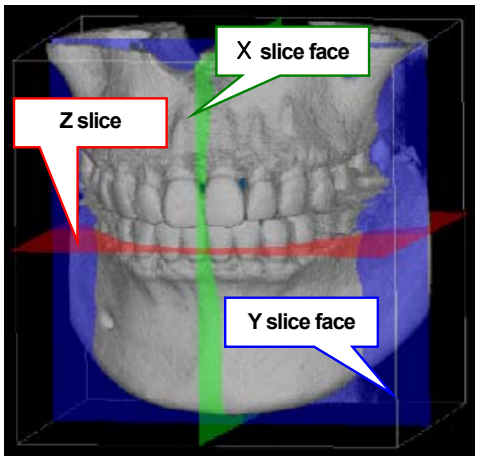


Figure 1 (b)*

* Point of interest: the intersection point of the X, Y, Z slice planes
* X slice plane: the cross section of an the X slice image
* Y slice plane: the cross section of a the Y slice image
* Z slice plane: the cross section of a the Z slice image

X, Y, Z slice planes in VolR image

i-Dixel allows CT data to be displayed as slice images (tomographic images) as well as in a volume rendered (VolR) image in three dimensions.
In a VolR image, X, Y, Z slice planes are shown so you can identify the position of an X, Y or Z slice image currently displayed three-dimensionally (Figure 2).
.

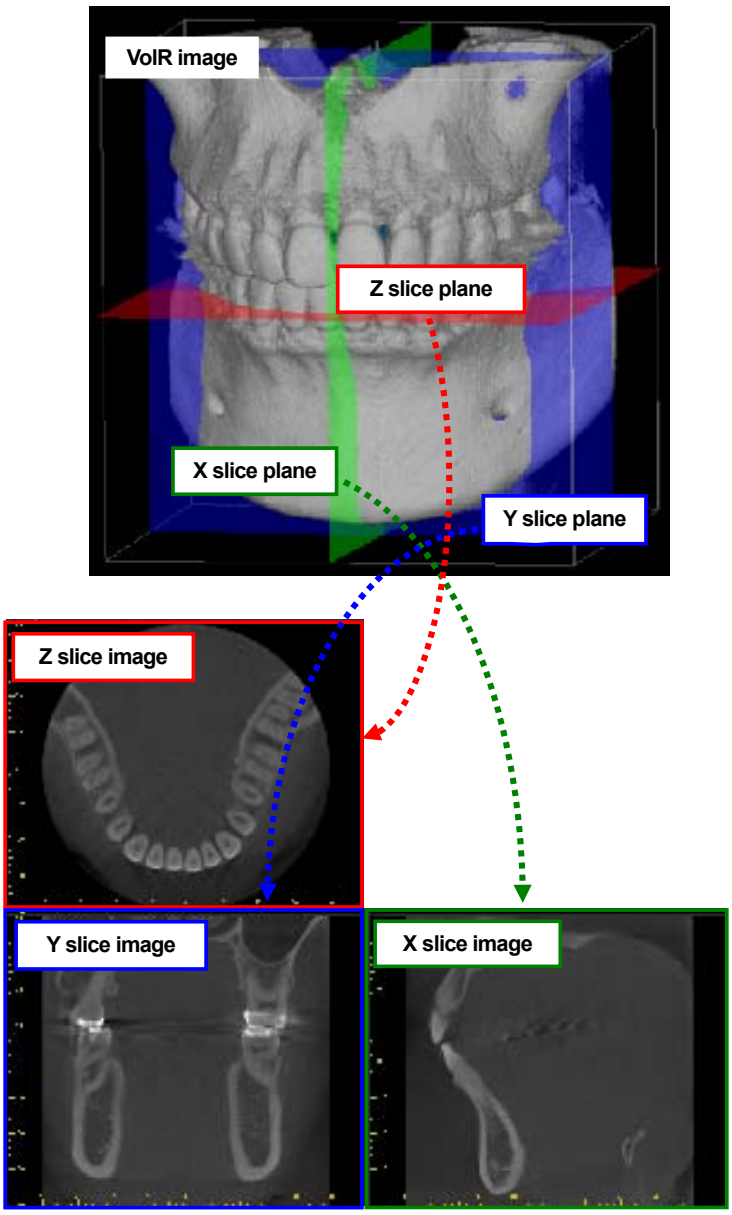


Figure 2

3.1.1. Selecting Image Display

In XYZ View, in addition to CT slice images, volume rendered, MIP, or RaySum images are displayed.

Volume rendered image:
The anatomical site is visualized three-dimensionally.

MIP image:
* MIP: Maximum Intensity Projection
The three-dimensional structure of the anatomical site is displayed as the projection onto the plane facing the observer. This is useful to check implants and prosthetics.

RaySum image:
* RaySum: Ray Summation
The three-dimensional structure of the anatomical site scanned with CT is displayed as an image taken as standard X-ray. This is useful to check the internal structure of the anatomical site.

Clicking the "Main" button on Panel Controller displays the following buttons:

This shows / hides the X, Y, and Z cursor plane.

This creates a movie of the volume rendered image. This movie can be saved in the i-Dixel database or on internal or external media.

This sets the image displayed to volume rendered, MIP or RaySum.

This synchronizes the CT slice images and the volume rendered image (or the MIP / RaySum image) .

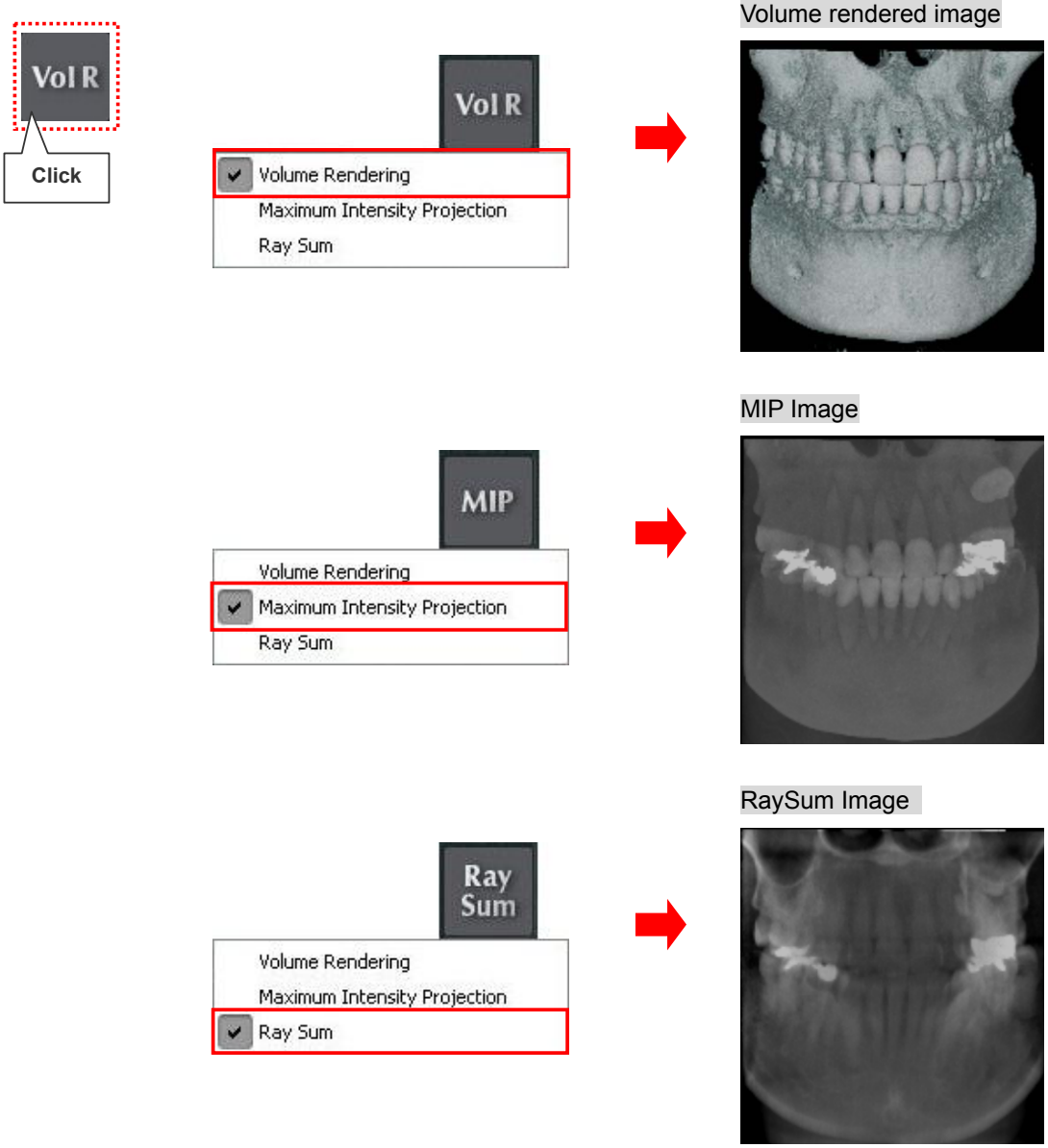
This flips the CT slice images in XYZ View along the Z-axis.

This flips the CT slice images in XYZ View along the X-axis.

This presents a menu of preset positions to which to rotate the volume.

This aligns the selected implant so that it is vertical with the cursors centered at its origin.

* Volume rendered, MIP, and RaySum images are set as shown below:



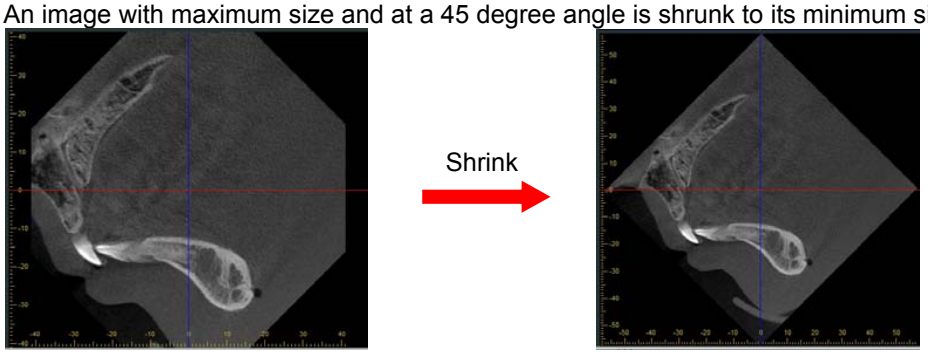
3.1.2. Enlarge or Shrink Image

CT slices in the XYZ view, volume rendered images, MIP images and RaySum images can all be enlarge or shrunk. This way depends on the type of image.

CT Slice Images

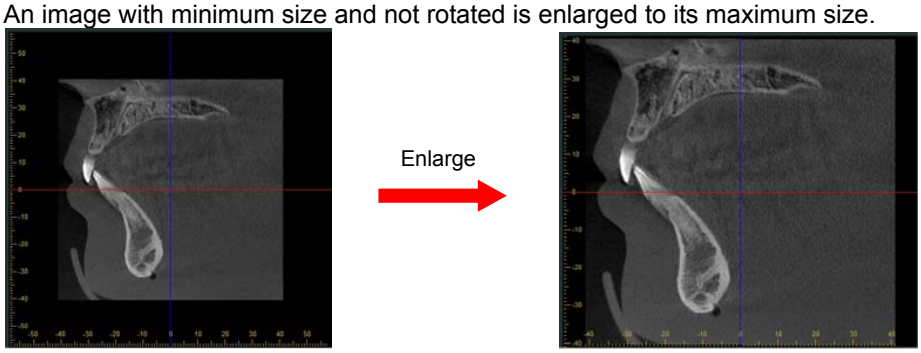
Hold down the Ctrl key and the right mouse button and then drag on the image to enlarge it or shrink it. Maximum enlargement is the same size as when the image is originally displayed.
If an image has been rotated 45 degrees, you can shrink it so that the corners stay inside the frame.

<<Example of Shrinking and Image>>
An image with maximum size and at a 45 degree angle is shrunk to its minimum size.



* For how to rotate and image refer to 3.1.3 Rotate and Move the Image .

<<Example of Enlarging an Image>>
An image with minimum size and not rotated is enlarged to its maximum size.



Volume rendered images, MIP images and RaySum images

Place the mouse pointer on a Volume rendered, MIP, or RaySum images and rotate the mouse wheel to zoom in and out.

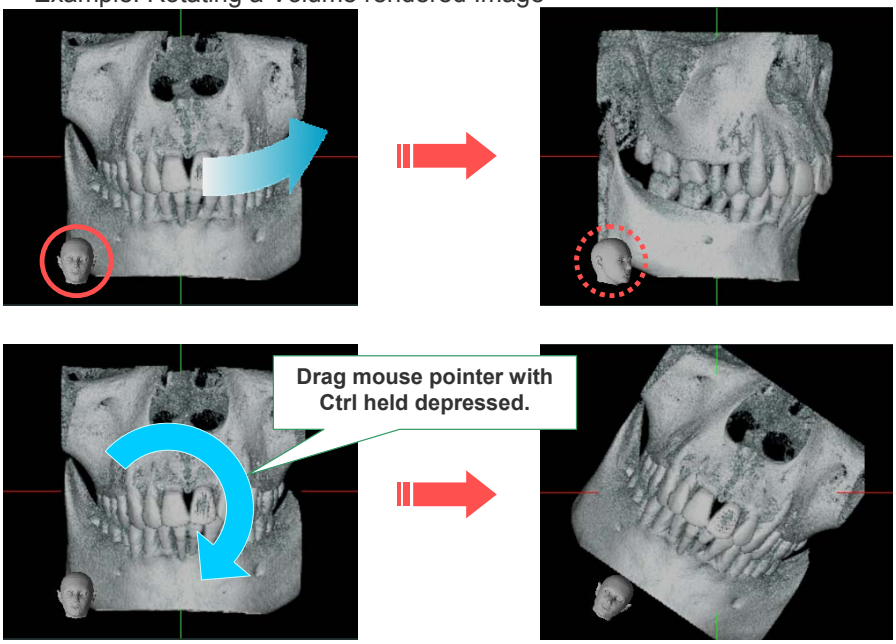
3.1.3. Rotate and Move the Image

You can move or rotate volume rendered image (or MIP / RaySum images) as well as slice images.

[Rotate Image]

Drag the mouse up and down or left and right to rotate Volume rendered, MIP, and RaySum images correspondingly.
If you drag with the Ctrl key held down, you can rotate the image clockwise or counterclockwise.
The head at the lower left shows the orientation of the image.

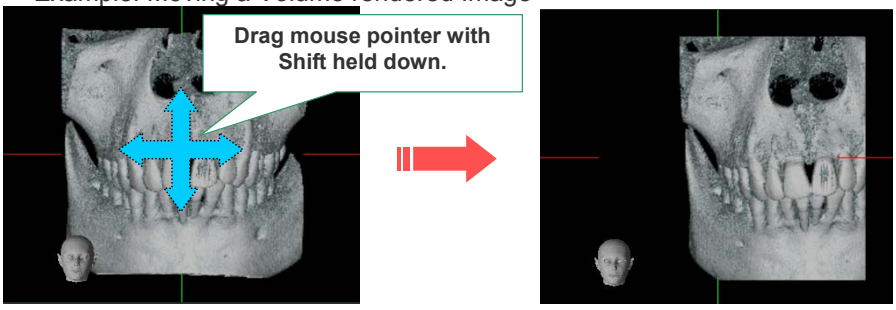
<<Example: Rotating a Volume rendered Image>>



[Move Image]

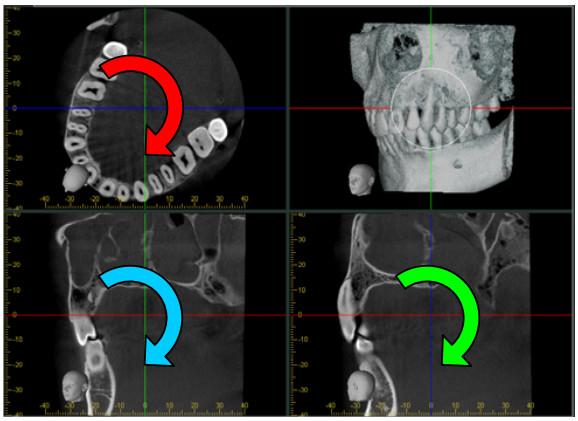
Hold down the Shift key and drag the mouse on the image to move it.

<<Example: Moving a Volume rendered Image>>



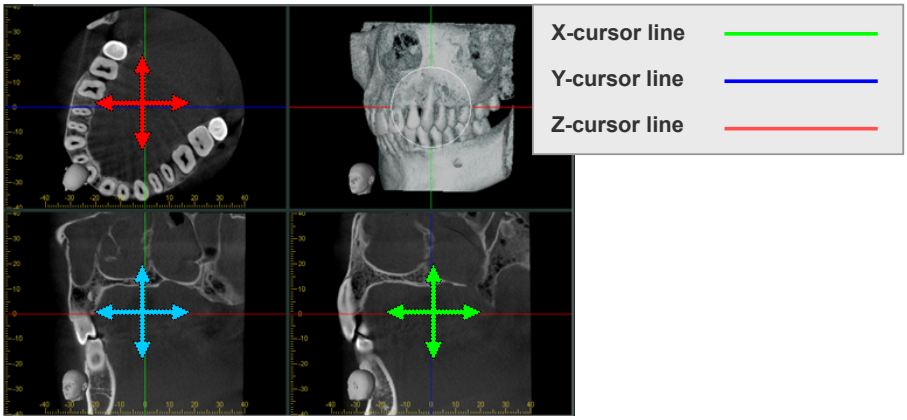
[Rotate the slice image]

Dragging the mouse pointer on each slice image (any point other than the cursor line) rotates the slice plane.
Optional slice plane are able to be observed.
In such event, each slice image rotates around the intersection of slice cursor lines.



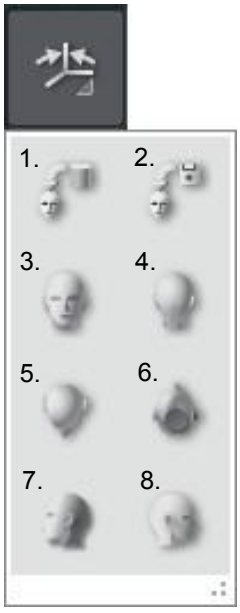
[Move the slice image]

Dragging the cursor line can move the slice plane corresponding to that cursor line.



[Select Rotation Direction]

Click the Orientation button:  and select one of the preset positions.



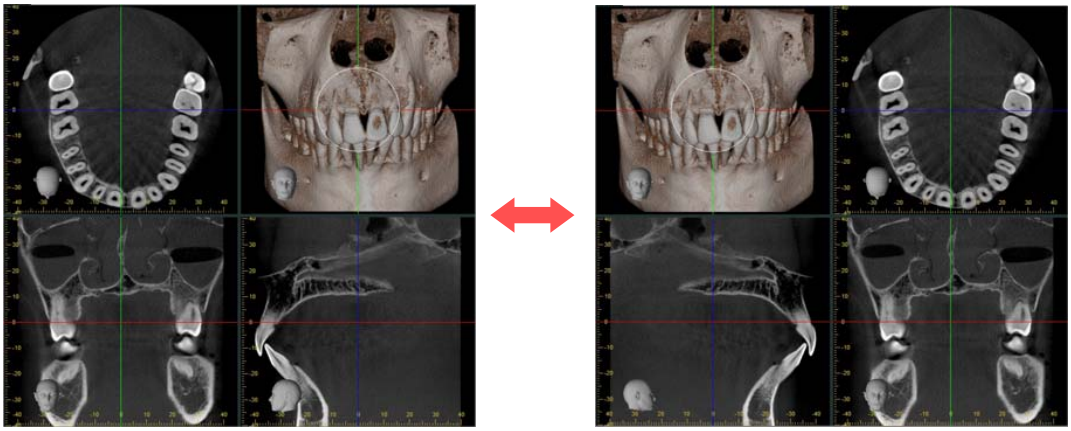
1. Original CT Position
2. Position loaded from data
3. Front
4. Back
5. Top
6. Bottom
7. Left
8. Right

3.1.4. X Image Inversion, Z Image Inversion

Clicking the  button on the XYZ View in the main panel lets you flip the display position of the X,Y, Z slice images or the volume rendered image (or the MIP / RaySum images) along the X axis.

You can also flip them along the Z axis by clicking the  button.

<<Example: When the X image inversion button:  is selected>>



The initial display positions of each view are the same as those used when CT data was exported from i-Dixel. The next time the application is started, there are reset to the initial positions.

3.1.5. Visual point lock

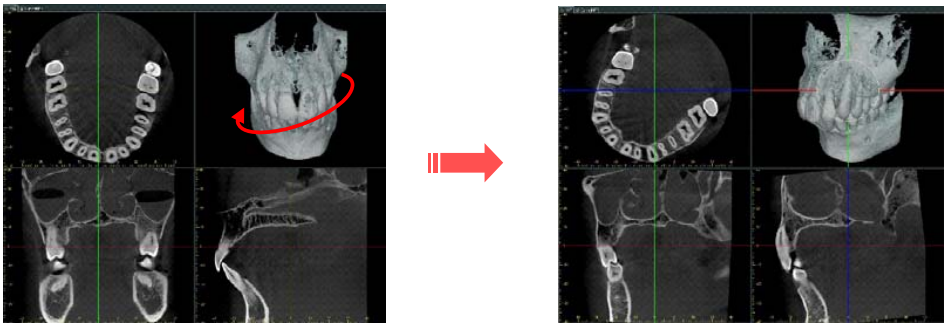
Synchronize visual point with VOIR / Synchronize visual point with X,Y,Z slice

Clicking the “Synchronize visual point with VOIR” button:  will change the orientation of the CT slice image to match that of the volume rendered image (MIP`image / RaySum image) being displayed.

Also, clicking the “Synchronize visual point with X,Y,Z slice” button:  will change the orientation of the volume rendering image to match that of the CT slice image being displayed.

<<Example: To rotate the volume rendering image with the visual point in synchronism with VoIR.>>

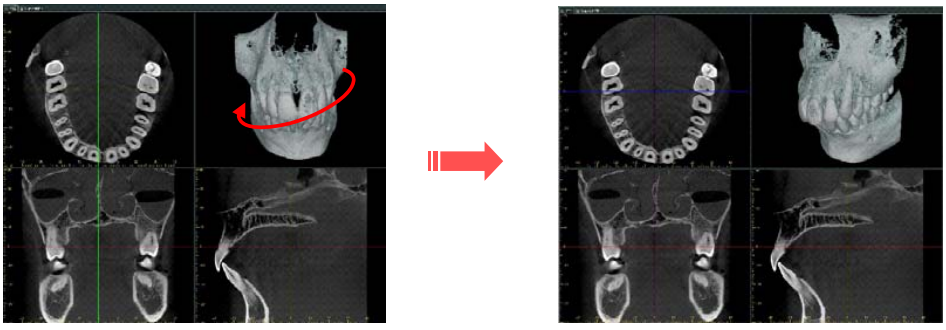
Rotating the volume rendered image rotates the slice image in synchronism with the rotating direction of the volume rendering image.



To bring the visual point to be asynchronized.

Clicking the “Visual point lock release” button:  means that the volume rendering image orientation will not be changed even if the CT slice image orientation is. In addition, even when the volume rendered image is turned, the CT slice image is not turned.

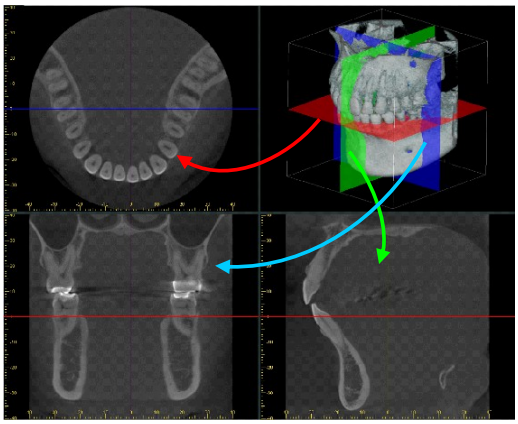
<<Example: To rotate the volume rendering image>>
Even if the volume rendering image is rotated, the slice image is not turned.



3.1.6. Show X, Y, and Z Cursor Planes

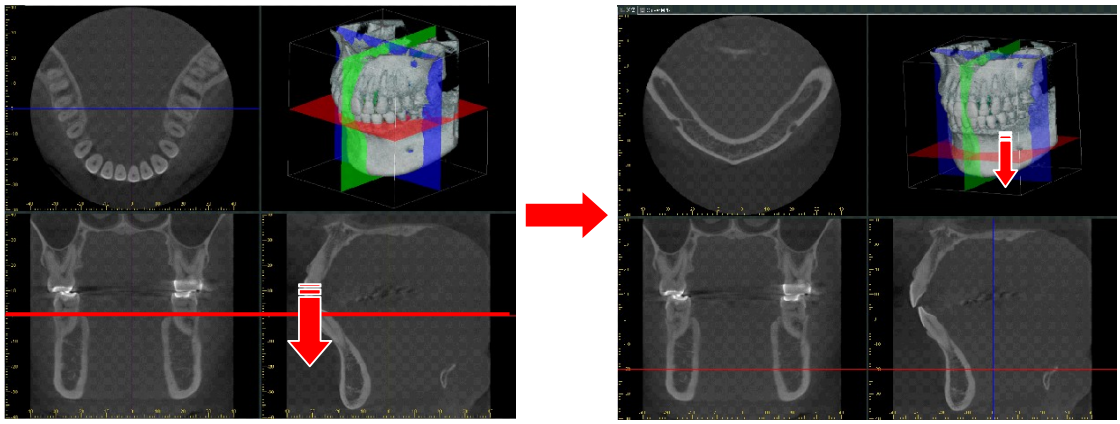
You can show the X, Y, and Z cursor planes by clicking the [Show XYZ cursor planes] button  .
Clicking again hides them.

You can show the X, Y, and Z cursor planes on volume rendered, MIP, or RaySum images. Showing the X, Y, and Z cursor planes helps you understand the positions of the CT slice images three-dimensionally.



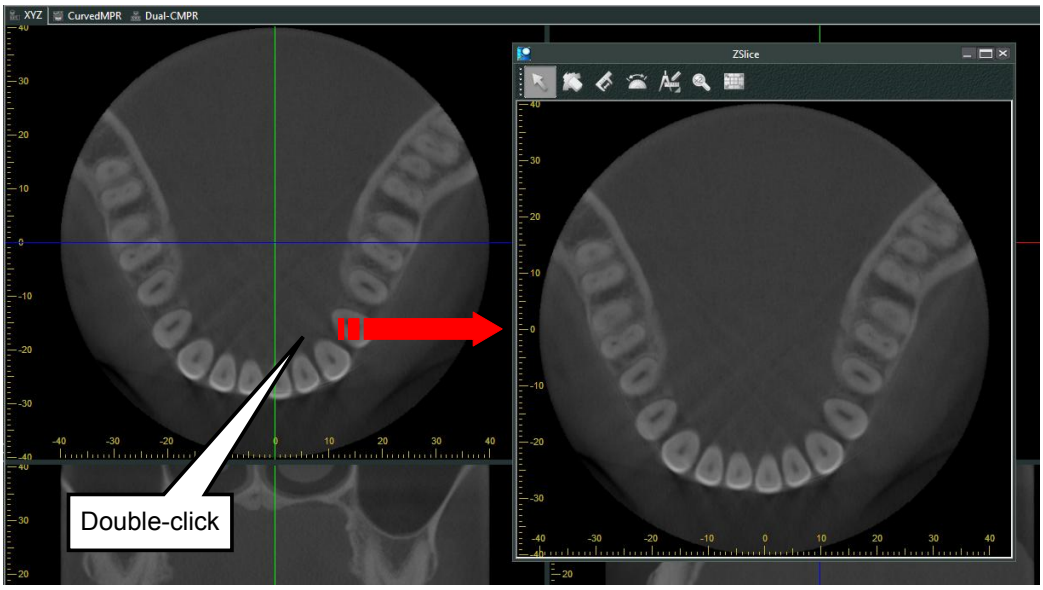
Unlocking Point of View allows you to show the X, Y, and Z cursor planes in any arbitrary orientation. Therefore, you can understand the position of the CT slice images displayed easily.
In addition, moving the X, Y, and Z cursor lines moves the X, Y, and Z cursor planes accordingly.

* If Point of View is locked, the X and Z cursor planes will not be displayed on the volume rendered image.



3.1.6. Display a Slice in a Separate Window

Double-click one of the slices shown in the XYZ view to display it in a separate window.



The tool buttons that appear at the top of the window are listed below.

Selects measurement lines, shapes, comments etc.

Deletes measurement lines, shapes, comments etc.

Measures distances.
* Refer to the chapter 5 Main Panel for how to use this tool.

Measures angles.
* Refer to the chapter 5 Main Panel for how to use this tool.

Access additional annotation tools such as arrows and comments.

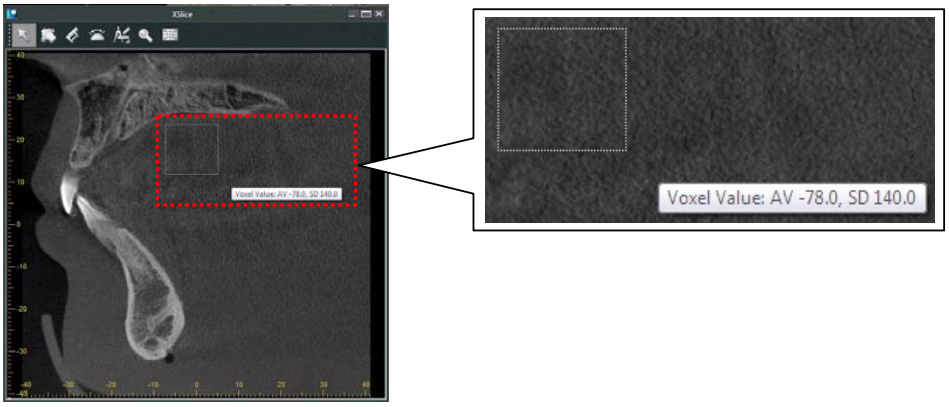
Magnifies selected area by 2.

Change the image magnification or set it to fit the window size.

[Checking differences between average values and standard deviation of the pseudo CT value]

You can check average value and standard deviation of the pseudo CT value in CT volume data reconstructed by using a filter that corresponds to the pseudo CT value calculation.

Dragging while holding down the left mouse button in the X, Y, Z slice images shown in the separate window will select an area.
You can check average value and standard deviation of the pseudo CT value for CT volume data voxels in the selected area.



CT volume data that you can check average value and standard deviation of the pseudo CT value is limited to CT volume data reconstructed using filters corresponding to the pseudo CT value calculations from the CT Raw data in i-Dixel Ver.2.100 or higher.

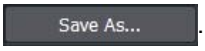
⚠ NOTE

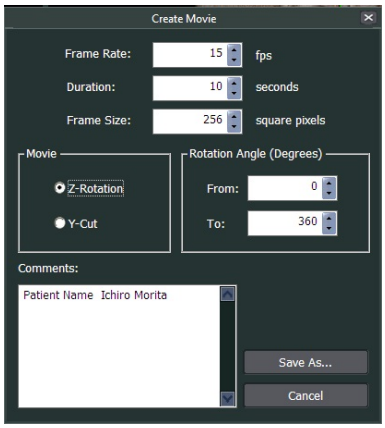
- **In pseudo CT value calculation, the amount projecting from the imaging area of the subject and the errors in location are included in the calculation as approximations, so in terms of accuracy, it is not as reliable as medical X-ray CT. However, the contrast is stable.**
- **Pseudo CT value calculation is optimized when captured with DR (Dose Reduction).**
  Errors will increase slightly when using other modes of operation. Please refer to the operating instructions for Veraviewepocs 3D / 3De / 3D R100 / F40 for DR photography.

3.1.7. Creating a Movie

You can create movies from volume rendered, MIP, and RaySum images.
The movie you create can be saved in either internal or external media.
You can also save movie frames in either internal or external media.

1. Click the “Create Movie” button:  in the Main Panel.

2. The Create Movie dialog is shown. Set the frame rate, time, and image size for the movie. Then click the “Name and Save” button  .



Frame Rate
This is the value which controls the number of frames per second. Increase this value to make the movie appear smoother.

Duration
This is the length of time the movie will play for.

Frame Size
This is the size of the image in horizontal and vertical pixels.

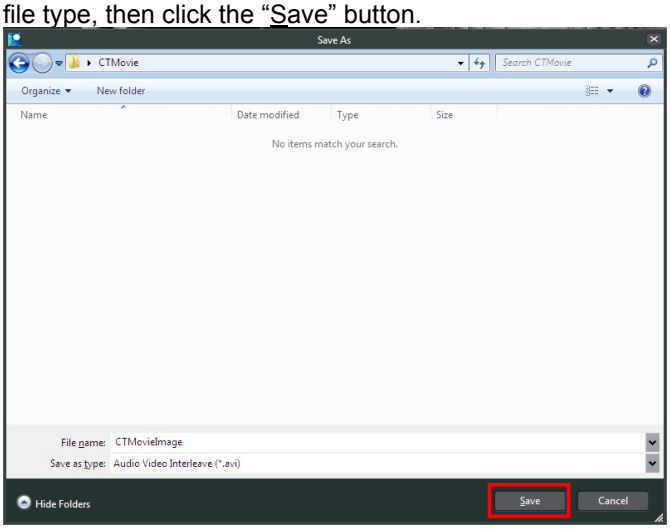
Movie
Select the type of movie you wish to create.
Note that if you select Z-Rotation, this sets the rotation angle (degrees) that the movie images will rotate.

Z-Rotation
Create a rotating image rotating about the Z axis.

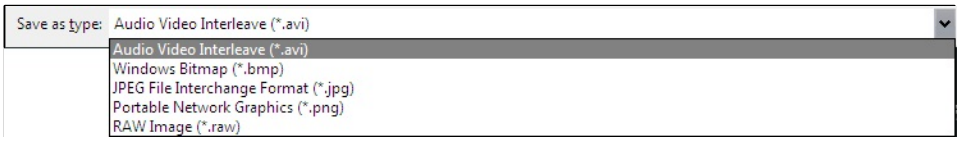
Y-Cut
Create a slice image where the cut face changes along the Y cursor face.

Comments
You can add comments. When the movie is saved to external or internal media, the comments will be saved in a separate text file.

3. When the “Save As” dialog is shown, set where you want to save the movie, the file name, and the file type, then click the “Save” button.



* You can save as one of the following formats: .avi, .bmp, .jpg, .png, .raw.
When the file format is set to .avi, it will be saved as a movie file, otherwise it will be saved as a series of frames.



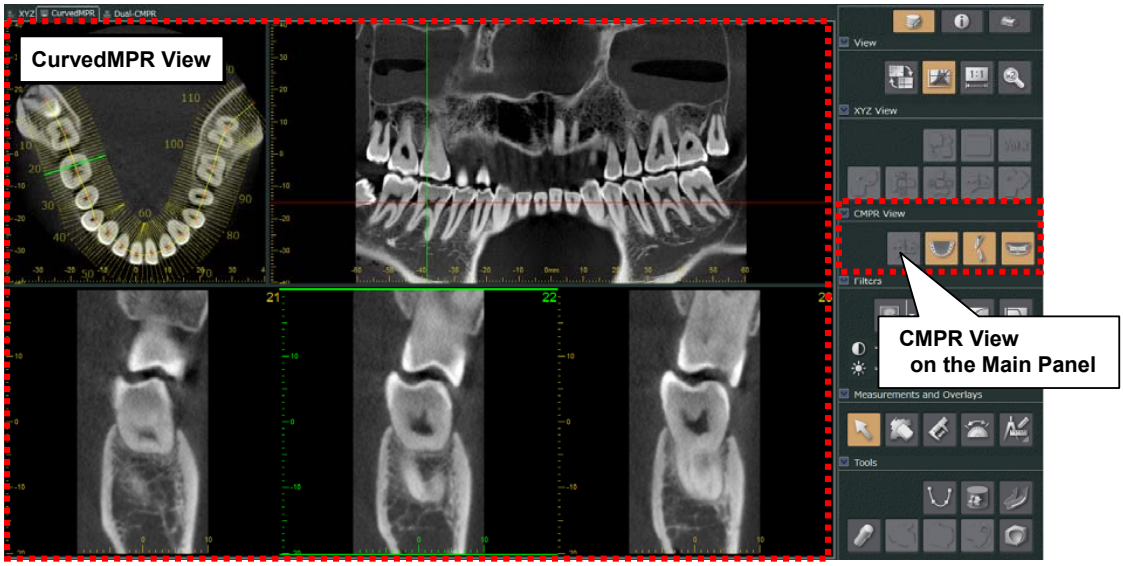
3.2. CurvedMPR View

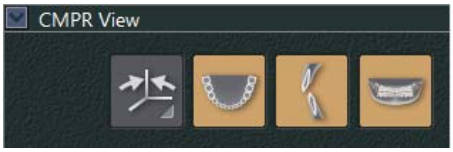
In CurvedMPR (cMPR) View, axial image, panoramic image, and cross-sectional images are displayed.

Executing CurvedMPR* generates a panoramic image from the CT volume data, and executing MPR* generates cross-sectional image from the CT volume data.
CurvedMPR and MPR are executed once you finish drawing a spline curve on the axial image.

* Curved Multi Planar Reconstruction
* Multi Planar Reconstruction

Click the “Main” button on the panel controller, then the CurvedMPR tab to show the following buttons in CMPR View. Then you can switch displays between the axial, the panoramic and the cross-sectional images shown in CurvedMPR view.





Axial image can be rotated.
For details see page 45【 Rotate Axial Image 】.

This shows / hides the axial image.

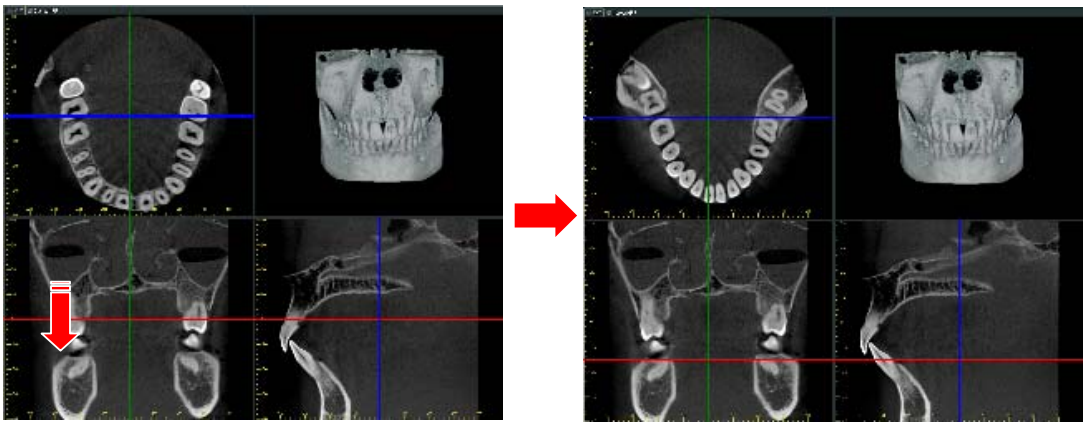
This shows / hides the panoramic image.

This shows / hides the cross-sectional images.

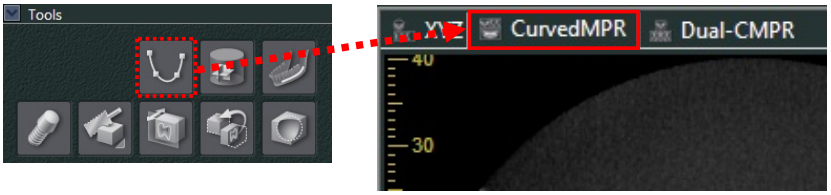
3.2.1. Generate and display panoramic / cross-sectional images

[1] In XYZ View, move the Z cursor line to select the axial image to be used for drawing the spline curve.

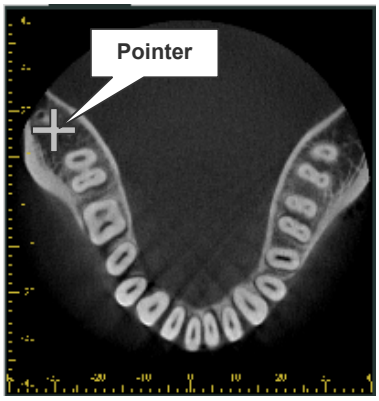
*Spline curve: The panoramic and the cross sectional images are created along this curve.



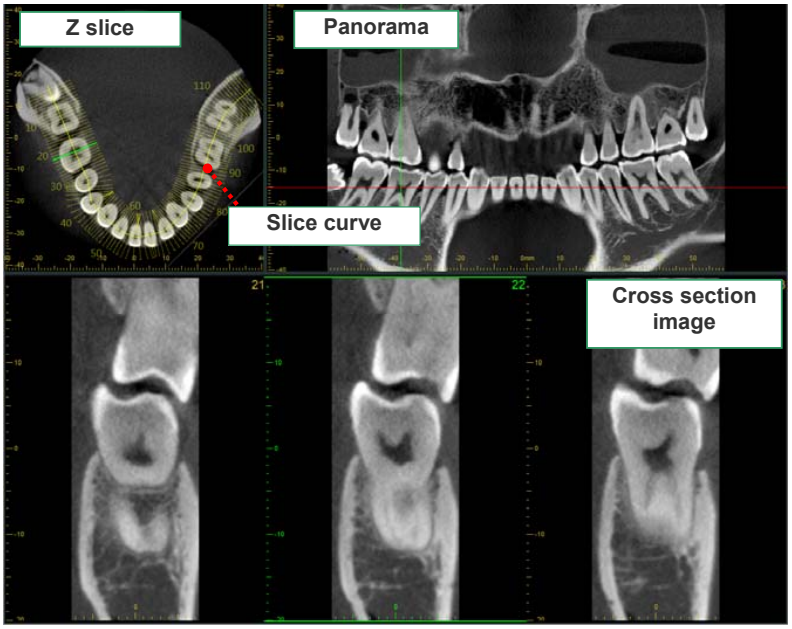
[2] Click the “Draw a spline curve” button  in Tools to change to CurvedMPR View.



[3] Click on the axial image to set the start point for the spline curve.
The pointer is a "+" during this time.
Click along the dental arch in the Z slice image. The points will be connected by short lines.
Double dlick to mark the end of the spline.



[4] After you finish drawing the spline, the panorama image and the cross section image are displayed (the defined curve is called the slice curve). The time before the image is displayed conforms to the processing speed of the computer you use (*while the image is being created, a progress bar may be displayed on the panorama or the cross section image window).

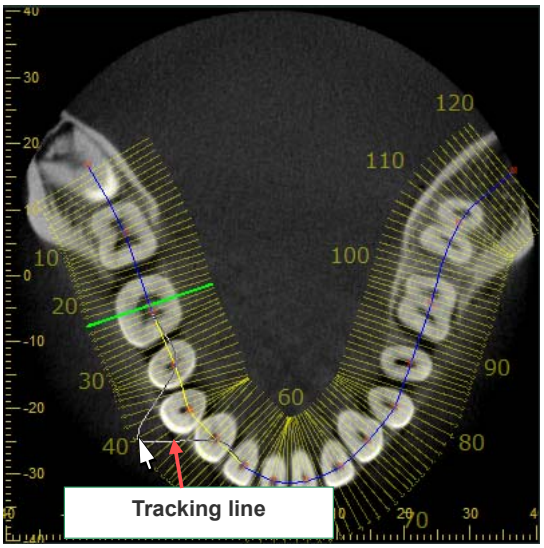


On the axial image, the spline curve (slice curve) and a line that crosses the spline (slice) curve at right angles (orthogonal line) are drawn.
The number of orthogonal lines indicates the total number of cross section images. In addition, the drawing position of the orthogonal line indicates the cross-sectional position of the cross section image and the length of the orthogonal line indicates the lateral width when the cross section image is displayed.
See the next page for fine-adjustment of the slice curve.

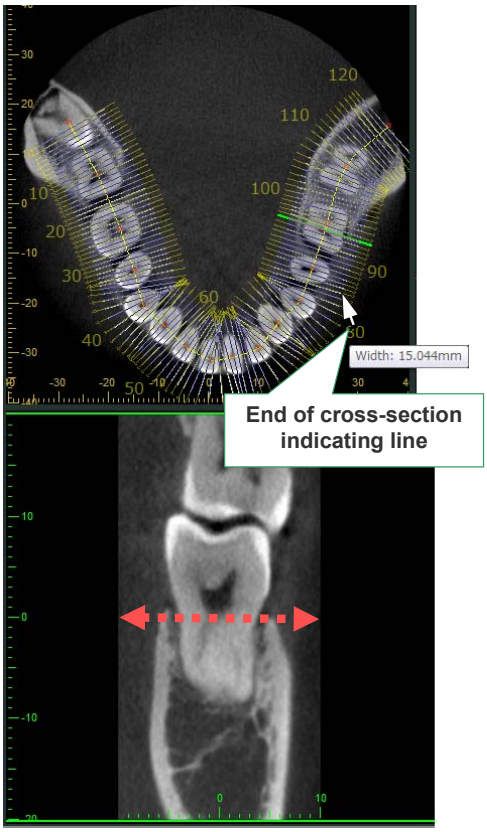
Also, you can change the number of cross section images displayed for a single row.
For detail, refer to page 36 【 3.2.4. Cross Section Image Display Modes 】.

3.2.2. Slice Curve Adjustment

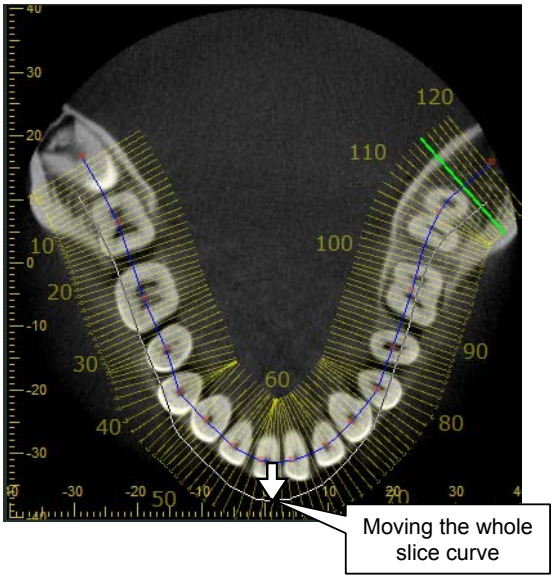
On the slice curve, red points (clicked points) are displayed. Dragging this point can change the point position. In addition, dragging the line that connects the point can move the whole slice curve. These changes are reflected to the panorama image and the cross section image (either pressing the ESC key or right-clicking before releasing the left button of the mouse can cancel the move).
While the pointer is being operated, the tracking line moves in accordance with the mouse operation.

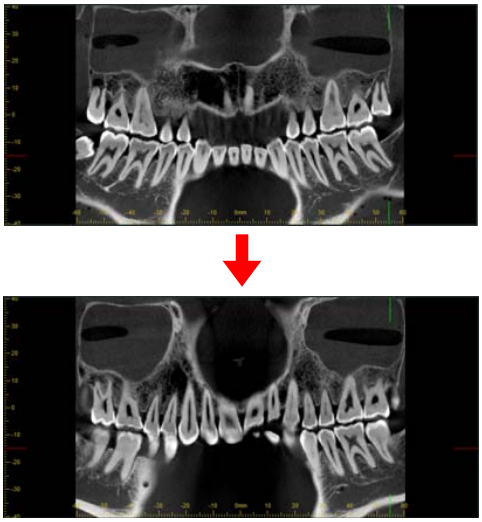


Dragging the end of the cross-section indicating line can adjust the “width in the buccolingual direction” of the cross section image.



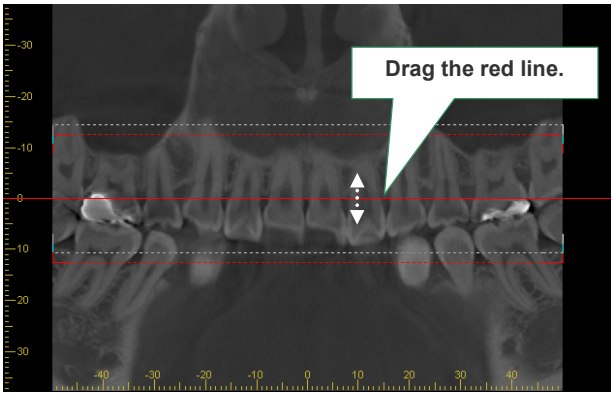
<< Example : Moving the whole slice curve >>

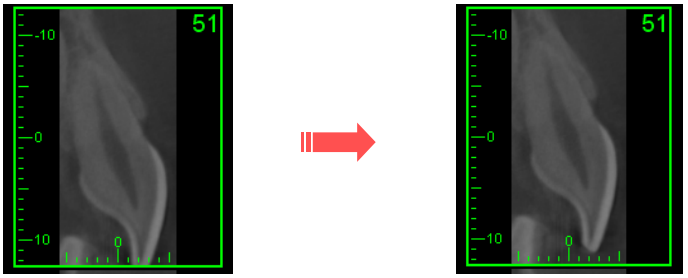




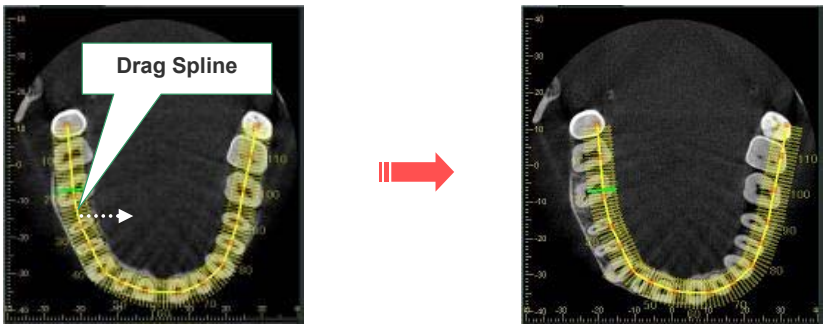
3.2.3. Cross Section Image Adjustment

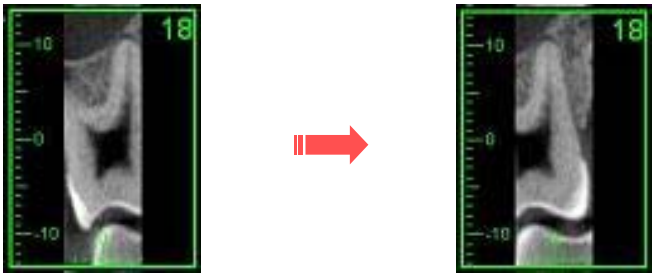
Dragging the red line on the panorama image can change the display range of the cross section image. Moving the red line is reflected to the axial image. In such event, the slice curve is temporarily not displayed.





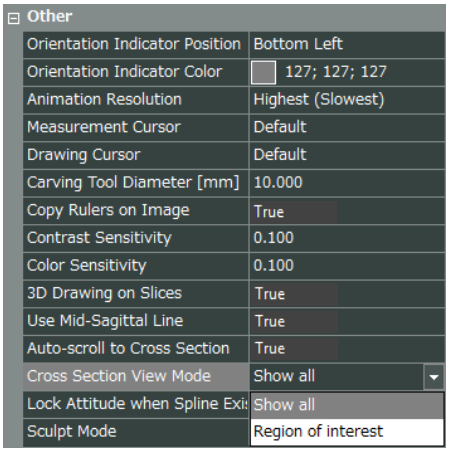
You can drag the spline curve (yellow line) in the Z slice image to change the cross sections.





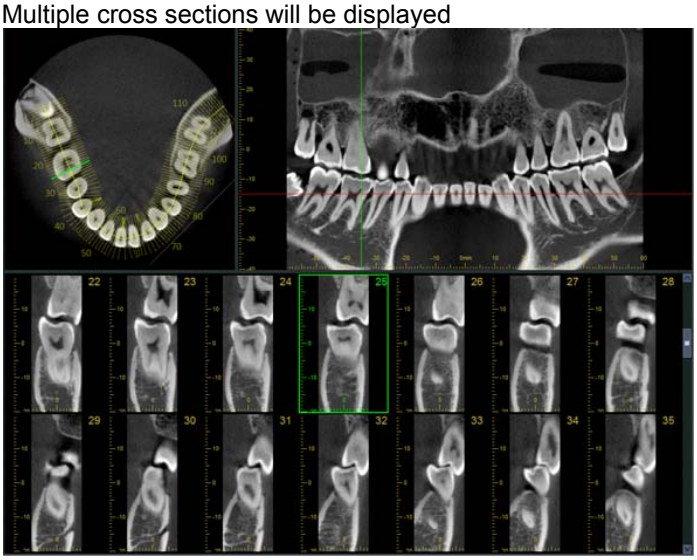
3.2.4. Cross Section Image Display Modes

The way cross sections are displayed can be set by going to Application Settings, then to Other and then select Cross Section View Mode.

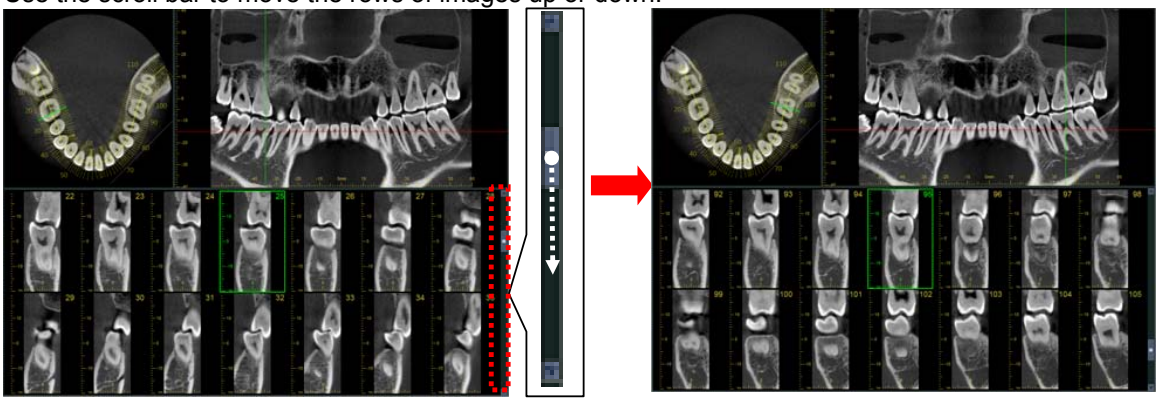


Show All selection

Multiple cross sections will be displayed

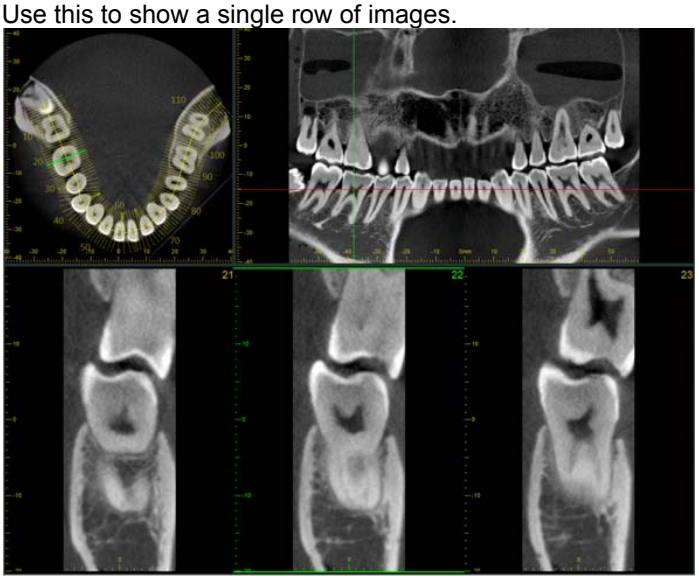


Use the scroll bar to move the rows of images up or down.

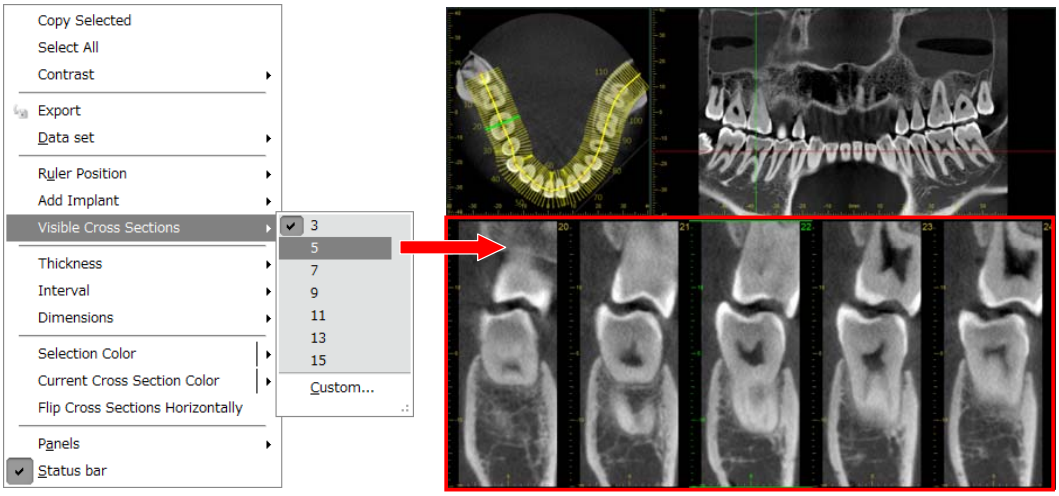


Region of interest selection

Use this to show a single row of images.



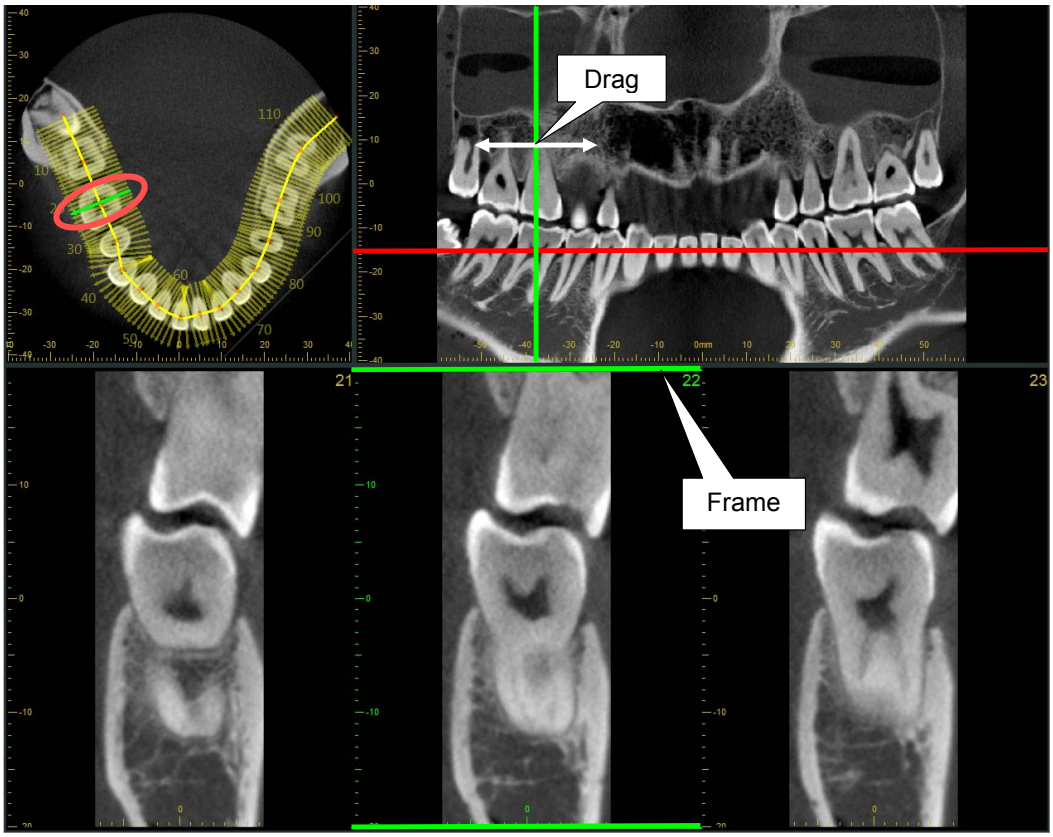
You can set the number of cross sections for a single row.
Right-click any cross-sectional image to display its pop-up menu and select " Visible Cross Sections" .
Select the number of cross sections displayed in the CurvedMPR View.
Also you can select the number in the sub-menu (Custom...). The number can only be odd.



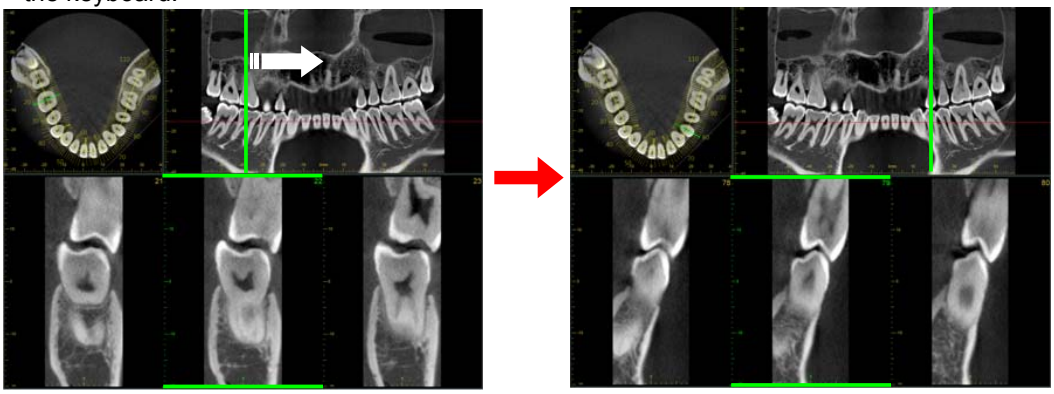
* This only works if Cross Section View Mode for Other in Application Settings is set for Region of interest.

3.2.5. Cross-sectional View Browsing

Drag the green line on the panorama image and designate the target cross section image. In such event, the cross section image is automatically selected from the cross section image table and a green frame is indicated. In addition, the cross-section indicating line on the axial image, which indicates the cross section image position, is displayed in the green color (*the initial setting color of the frame and the line is green but can be changed by right-clicking).

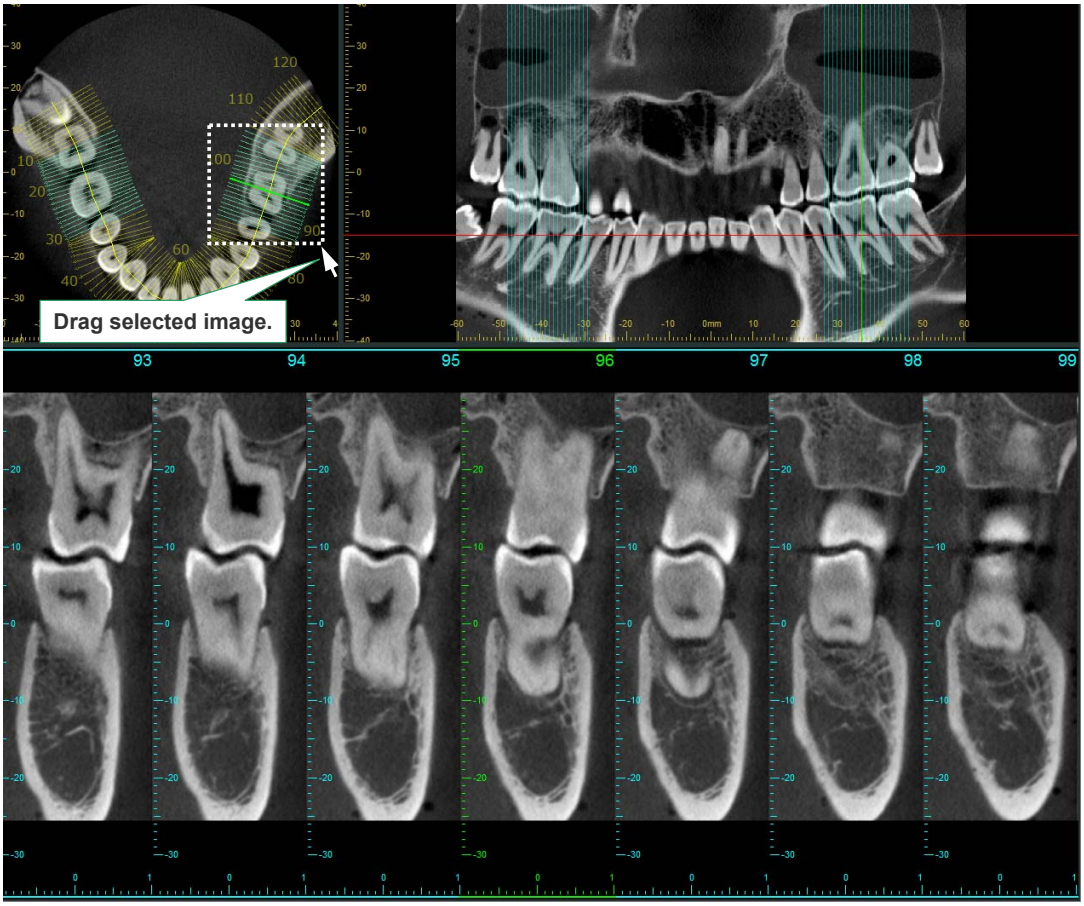


* The vertical line can be moved as explained below. Moving the vertical line will change the cross section images being displayed.
  - Drag the vertical line in the Panorama image to the left or right.
  - Place the mouse pointer on the cross section image and turn the wheel backwards or forwards.
  - Place the mouse pointer on the cross section image and use the left or right arrow keys on the keyboard.



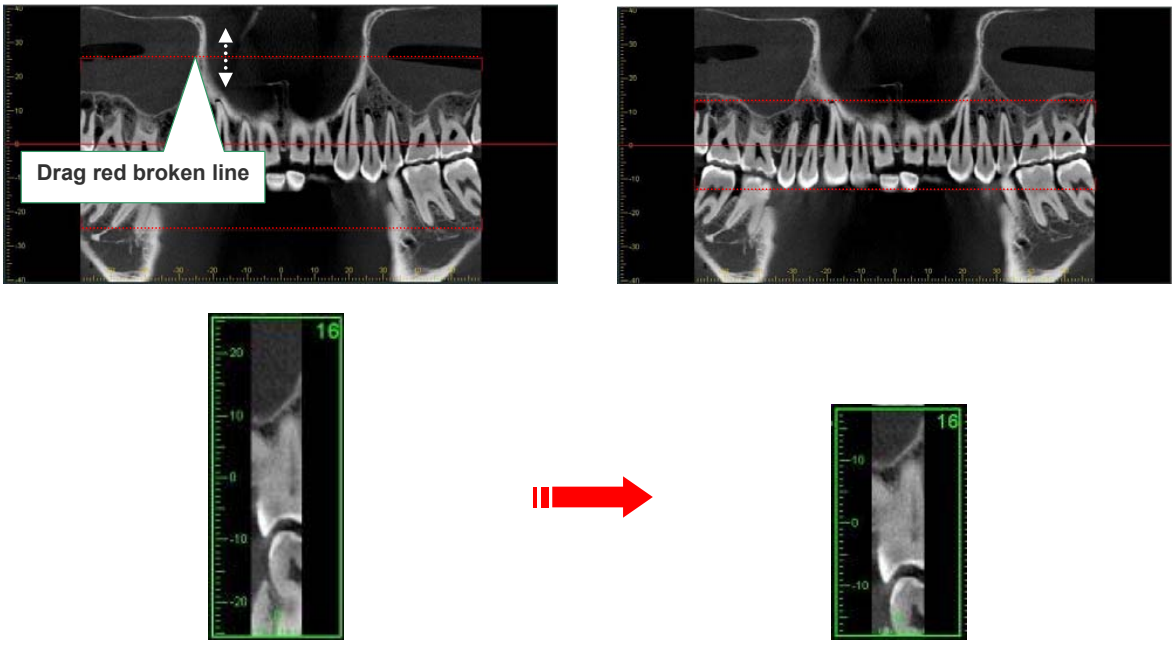
To select a plurality of cross section images

Dragging a selected image on the axial image displays the selected cross-section indicating line in the blue color. The cross section image of the selected portion is indicated by a blue frame, and in the panorama image, it is indicated by a blue perpendicular line.
(*The initial setting color of the frame and the line is blue but it can be changed.)
In addition, a plurality of cross section images can be selected by clicking the mouse pointer while pressing the Ctrl key.

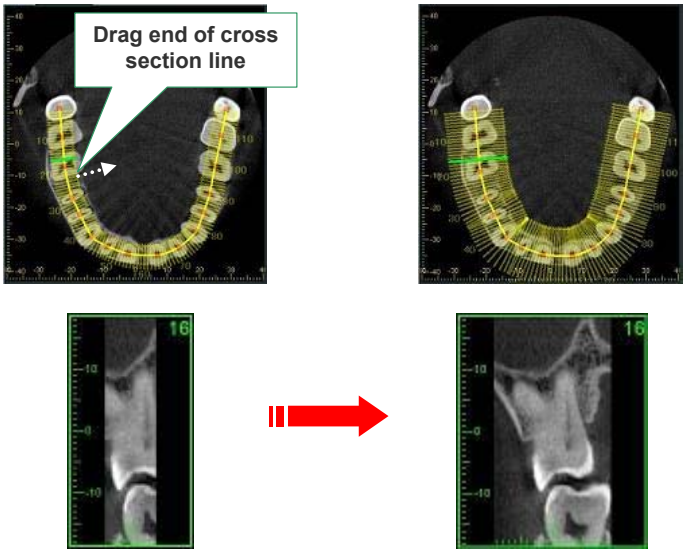


To adjust the display range of the cross section image

Selecting the red line on the panorama image displays a red broken line above and below the red line. Dragging either the upper or the lower broken line can change the vertical display range of the cross section image.
Moving the red broken line recreates the cross section image and changes the “vertical width.”

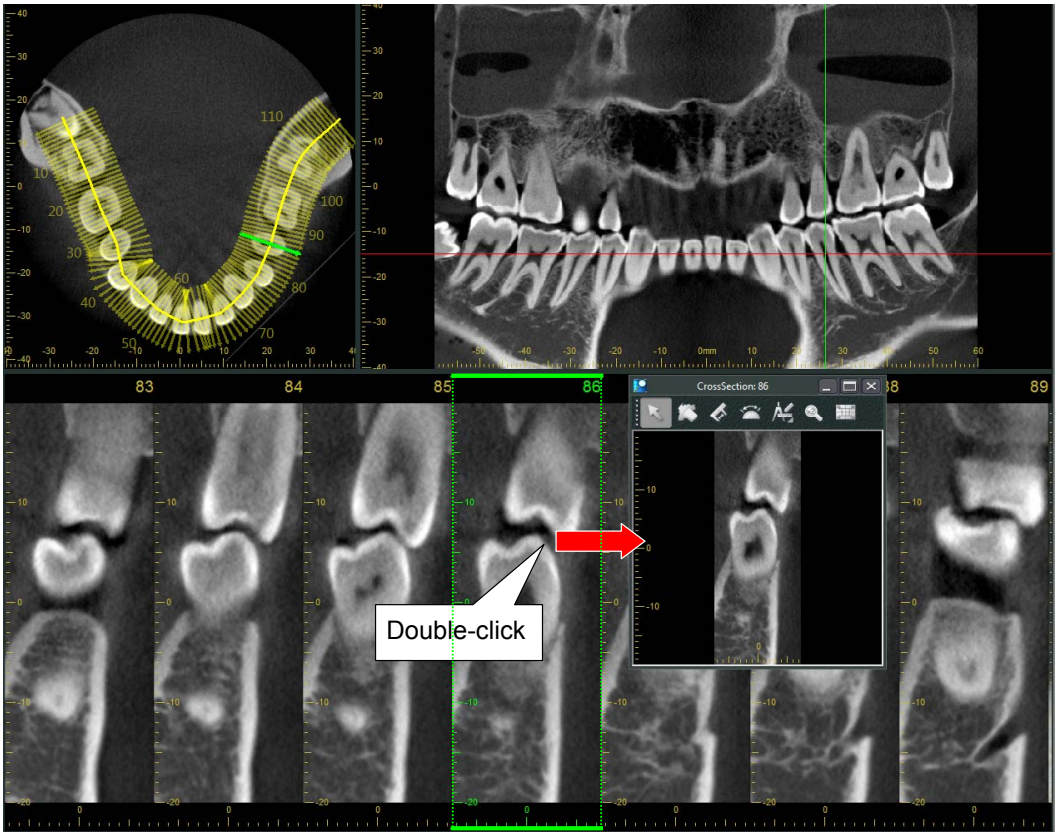


To make cross sections wider or narrower, drag the end of one of the cross section lines.



To display a cross section image by a different window

Double-clicking the selected cross section image displays the selected cross section image on a new window.



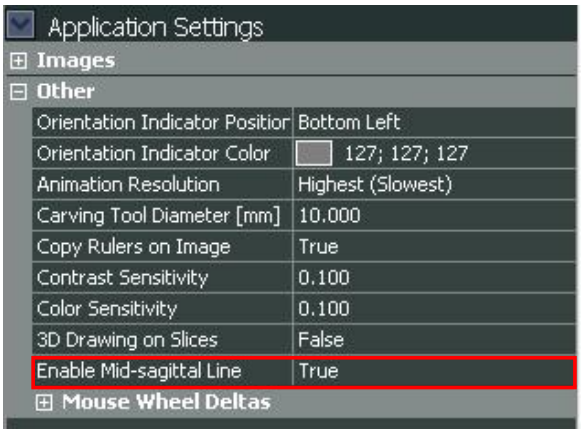
Even on a new window, tool menu functions are able to be used, and the results are reflected to the original cross section image.

In addition, clicking the zoom button:  displayed on the upper part of the new window can select the display magnification of the cross section image.

Specify Panorama Mid-sagittal Line

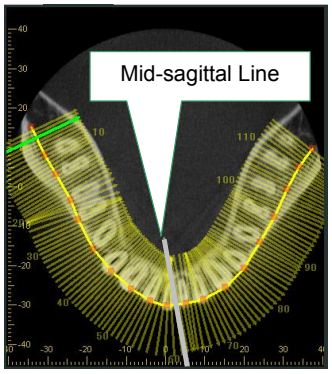
When the mid-sagittal line is specified, the cross sections will face either right or left depending on whichside of the line they are on.

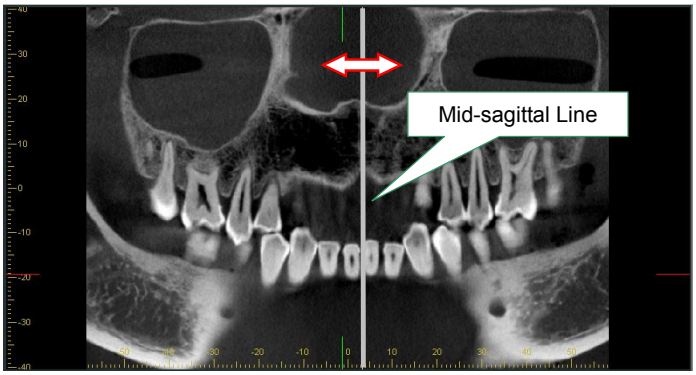
* This can be done only if the Enable Mid-sagittal Line item for the Application Settings is activated.



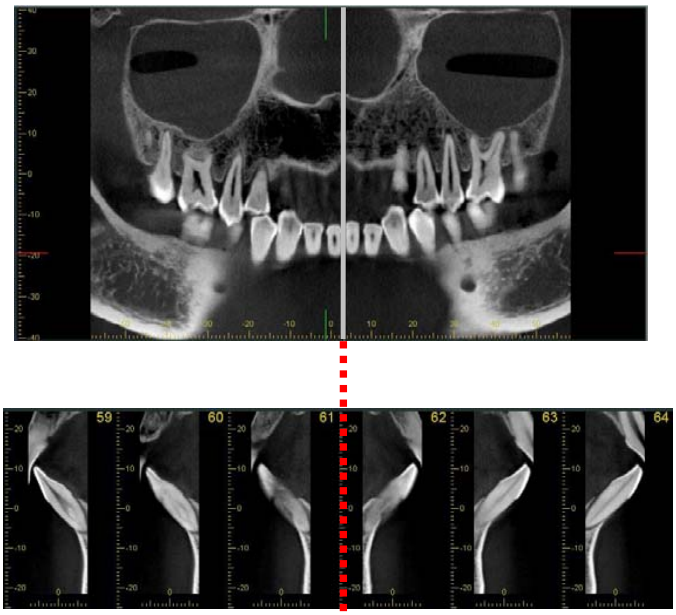
1. Right-click the panorama image and select Mid-sagittal Line from the pop-up menu.

2. A vertical white line will appear in the panorama image.
   Drag it left or right to change its position.
   A white line will also appear in the axial image.

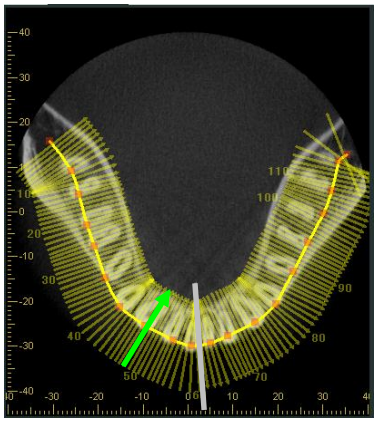


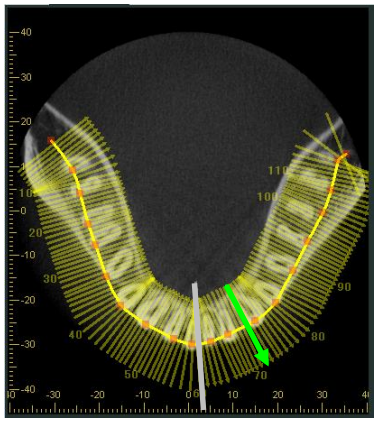


The cross sections will face to the right or left depending on which side of the line they are.



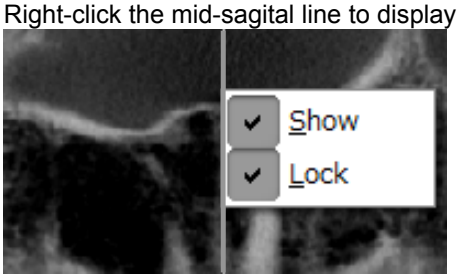
The direction of the arrows representing the cross sections in the axial image will also change direction depending on which side of the mid-sagittal line they are on.





Hiding and locking the mid-sagital line using the Pop-up Menu

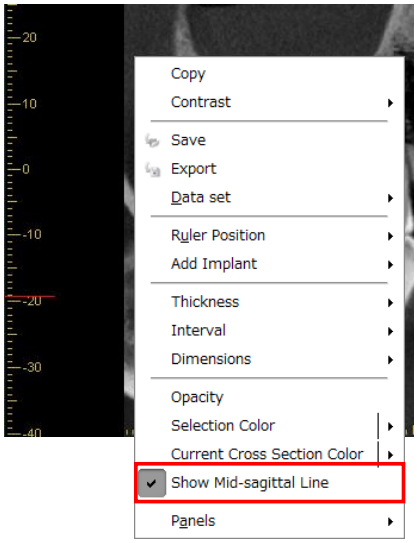
Right-click the mid-sagital line to display the pop-up menu.



1. Show
   The mid-sagital line will be hidden if you select " Show " to remove the check mark by it.

   * As explained on page 42 [Specify Panorama Mid-sagittal Line] , if you select " Show Mid-sagital Line " to put the check mark back, the mid-sagittal line will reappear.

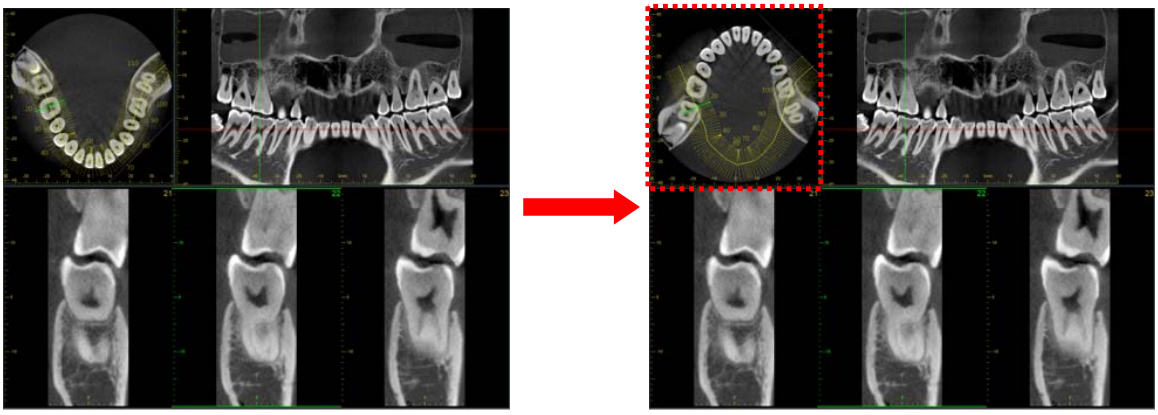
   << Example: Right-click a Panoramic image and put a check by " Show Mid-sagittal Line " >>



2. Lock
   If you put a check by " Lock " you will not be able to drag the mid-sagittal line.
   If you remove the check, you will be able to drag the mid-sagittal line.

Rotate Axial Image

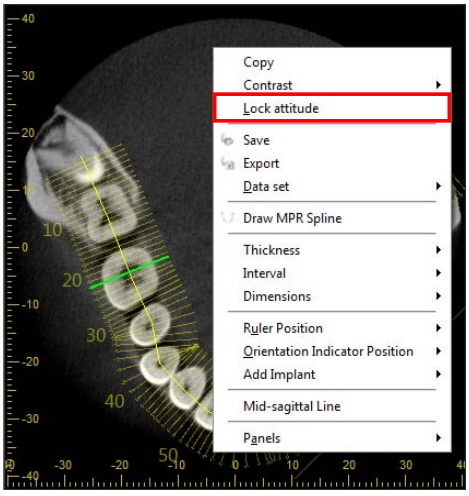
You can rotate the Axial image in the CurvedMPR Viewer.



By rotating the Axial image, the CurvedMPR is re-executed, and the panorama image and cross section images are reprocessed.

How to Rotate Axial Image

1. Right-click the Axial image and select “Lock attitude” from the pop-up menu to remove the check next to it.

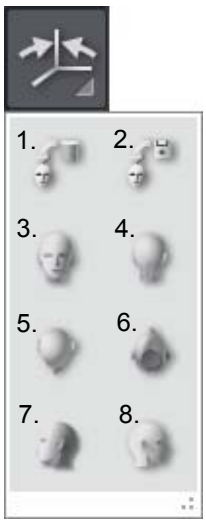


* If the spline curve has not been drawn on the Axial image, you cannot select " Lock attitude. "

2. Rotate the Axial Image in one of the following ways.

Rotate to specified position

Click the Rotation Position button on the main panel for the “CMPR View.” : 
Then select a rotation position.

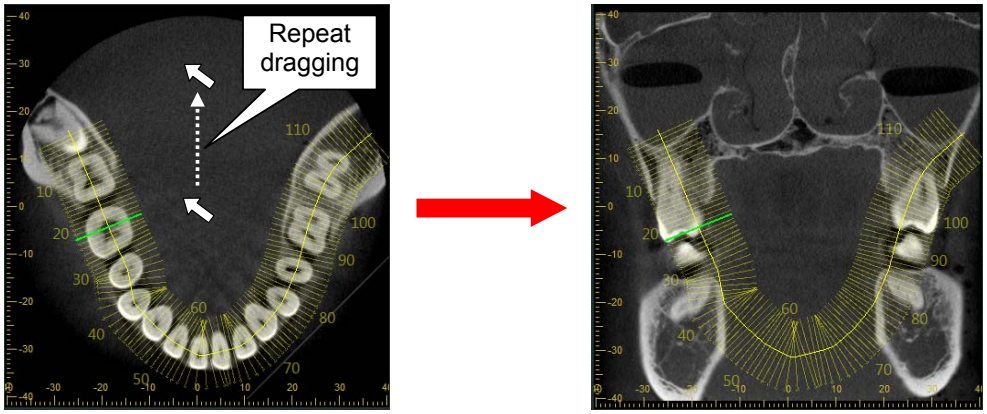


1. Rotate to original CT exposure position.
   * If the CT was made using the panorama scout, this will rotate the image so that the dental arch in the Axial image will be horizontal.
2. Rotate to position saved after editing.
3. Rotate 90° forward with Y-axis in the center.
4. Rotate 90° backward with Y-axis in the center.
5. Restore original position
6. Rotate 180° backward with Y-axis in the center.
7. Rotate 90° left with X-axis in the center.
8. Rotate 90° right with X-axis in the center.

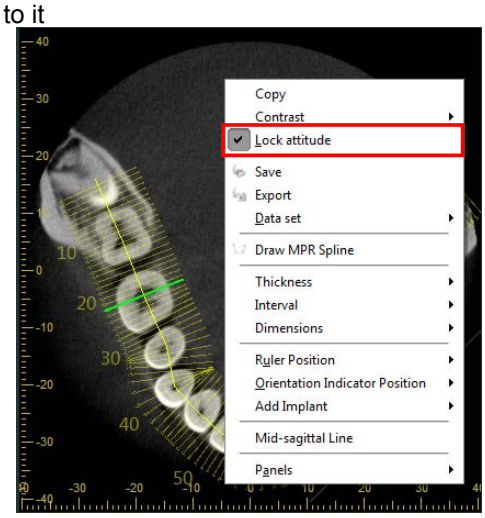
Rotate Freely

Click on the Axial image and drag up to rotate it forwards with the Y-axis in the center.
Drag down to rotate it backwards.

<< Example: Rotate 90° forward >>



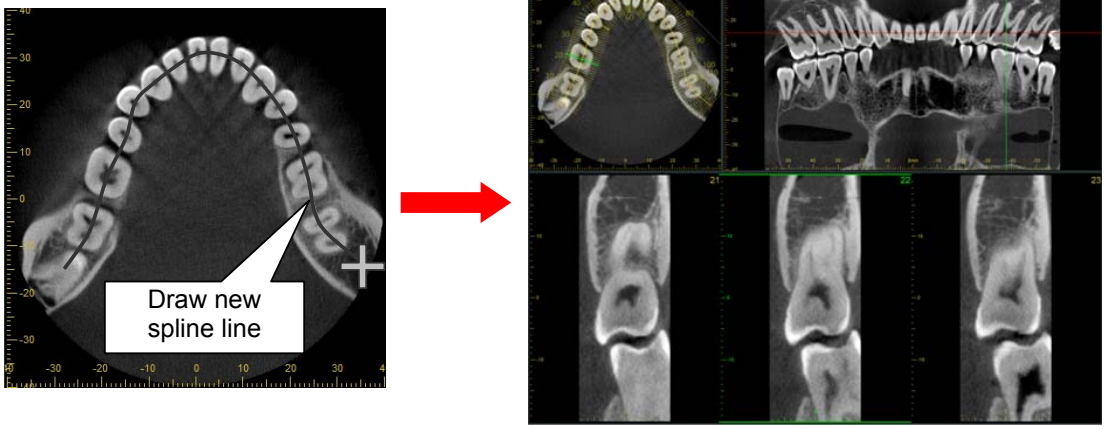
* Right-click the Axial image and select “Lock attitude” from the pop-up menu to put a check next to it



When the rotation position is locked, you cannot click the Rotation Position button () on the main panel for the CurvedMPR View

* Draw a new spline line on the rotated Axial image to re-process it. The panorama image and crosssection images will also be reprocessed.

<< Example: Reprocess CurvedMPR for an Axial image rotate 180° with Y-axis in the center. >>



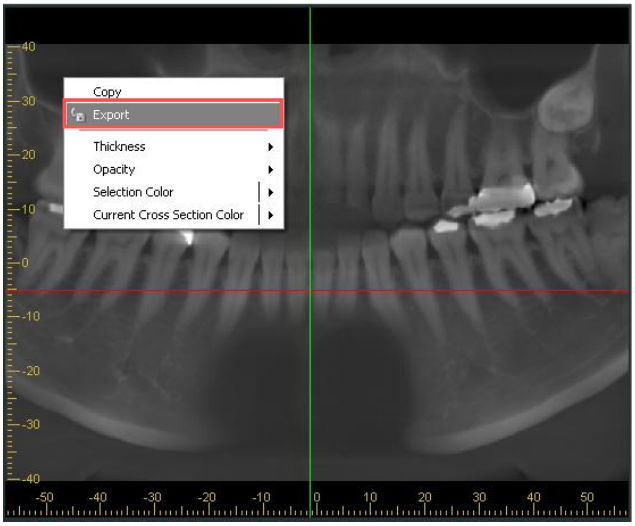
* Since the CurvedMPR has been reprocessed, you will have either save it or delete it.

3.2.6. Image Saving

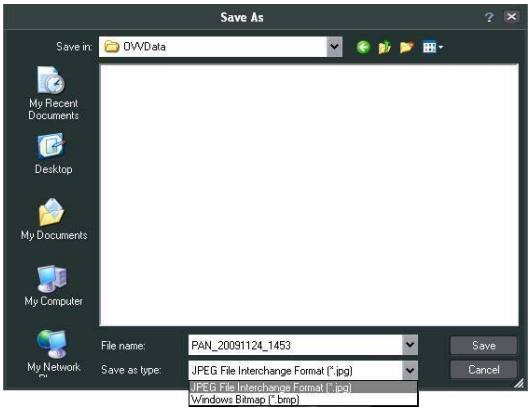
Each image is able to be saved by the following method.
For the cross section image, selecting multiple images in advance can save all the selected images.

* For the method to select multiple images, see 3.2.5 Cross-sectional View Browsing .

To save from the right-clicking menu.
Right-click the image and select [Export].



Select the file format* and save.

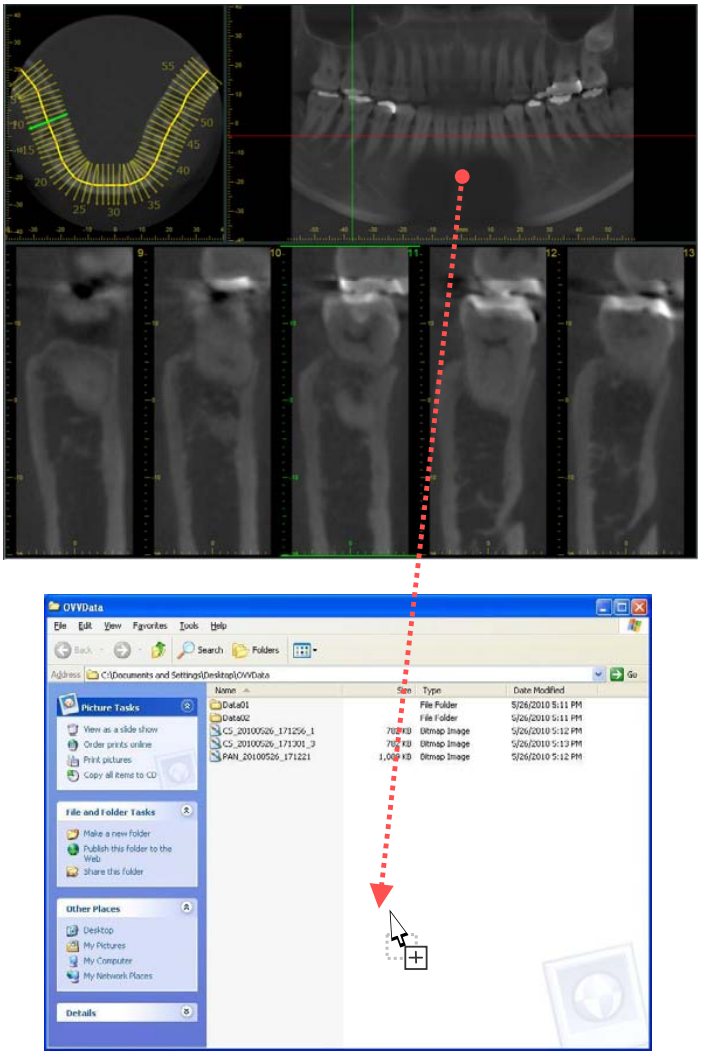


*Kind of file formats

JPEG File Interchange Format
The image data format with emphasis placed on the data compression ratio.
With degraded image quality allowed, data compression is performed.
The file size is reduced but the image quality is degraded.

Windows Bitmap
Windows Bitmap is a standard image saving system in Windows.
No data compression is conducted.
Practically 8 bits are used for the black-and-white density scale.
The picture quality is not degraded but the file size increases.

To save picture images by dragging and dropping the images.
With the Alt key held depressed, drag and drop the image into the folder to be saved.
The image is saved by BMP (bitmap).



3.3. Dual-CMPR View

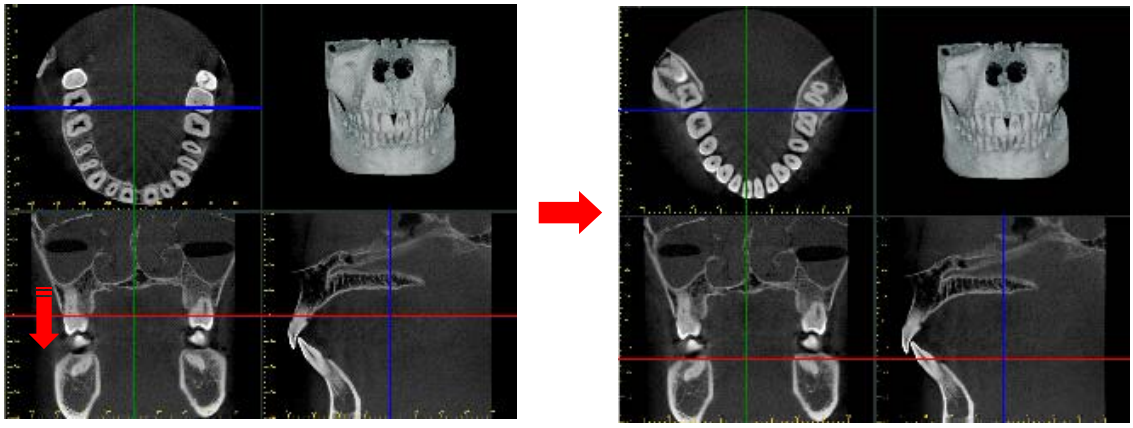
Unlike CurvedMPR View, you can draw two spline curves on an axial image, and can execute a double set of Curved MPR and MPR.

When executing Curved MPR and MPR as a double set, you can create two sets of panoramic images and cross section images.
The panoramic image and cross section image created by the first set are displayed on the left of Dual-CMPR View. The panoramic image and cross section image created by the second set are displayed on the right of Dual-CMPR View.

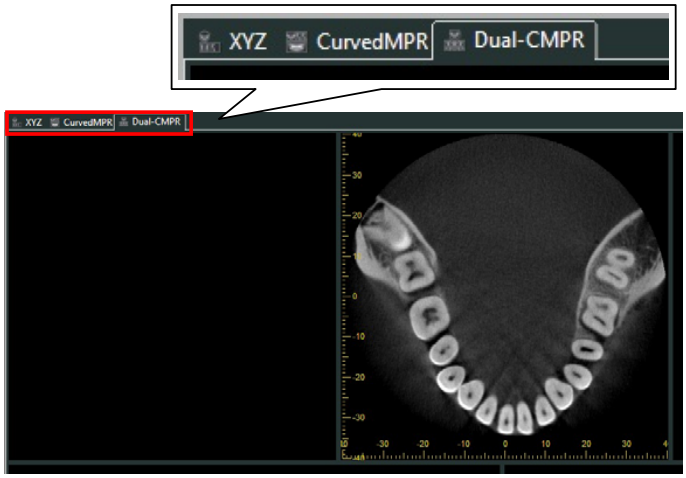
In the same way as CurvedMPR, after the spline curve has been drawn on the axial image, Curved MPR and MPR will be executed and the panoramic and cross section images will be generated from the CT volume data.

3.3.1. Generation and display of panoramic images and cross sections

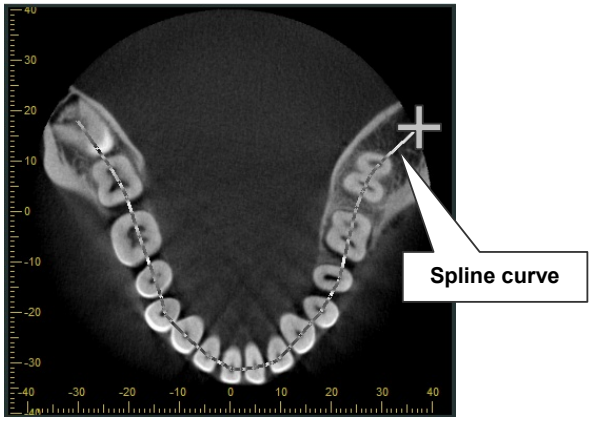
1. In XYZ View, move the Z cursor line to the point of interest, and determine the Z slice image to draw the first spline curve on.



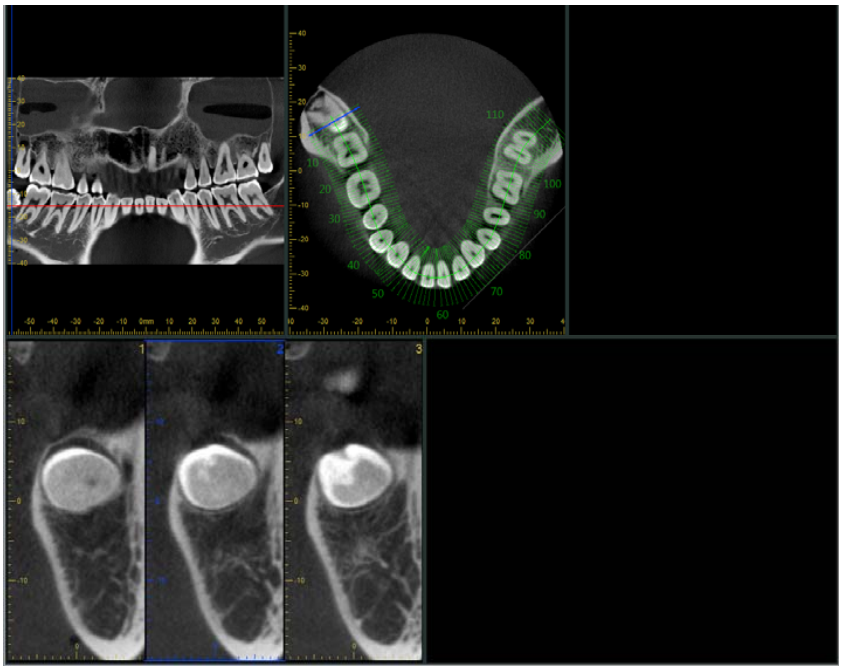
2. Click the Dual-CMPR tab to switch to Dual-CMPR View.



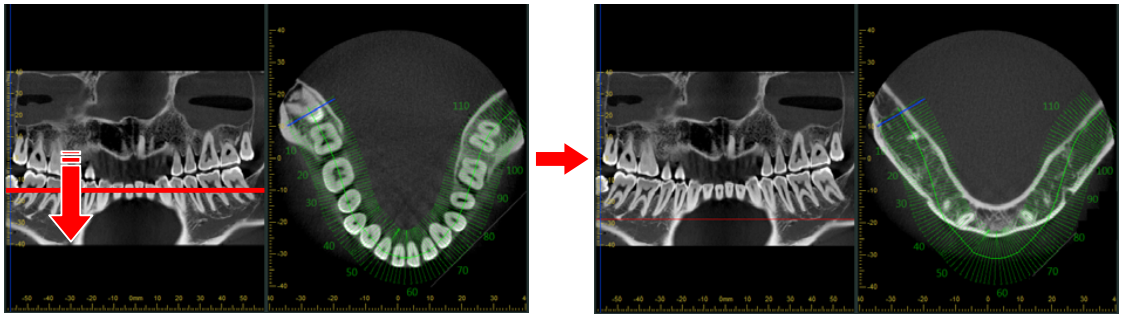
3. Click the Draw spline curve button  in Tools and draw the first spline curve. The drawing method is the same as for generating and displaying panoramic images and cross sections in CurvedMPR View.



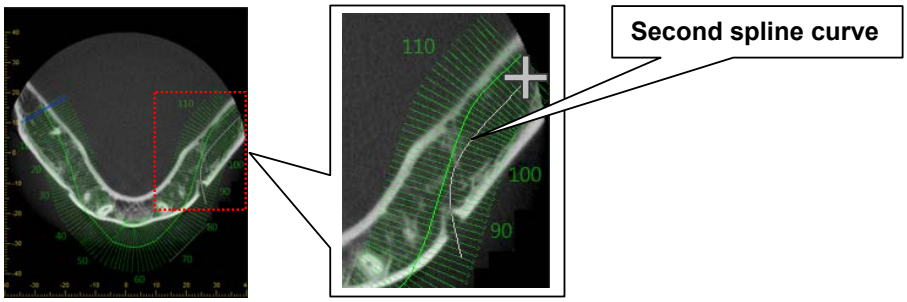
4. When you have finished drawing the spline curve, CurvedMPR and MPR will execute, and the generated panoramic image and cross section will be displayed on the left of the screen.



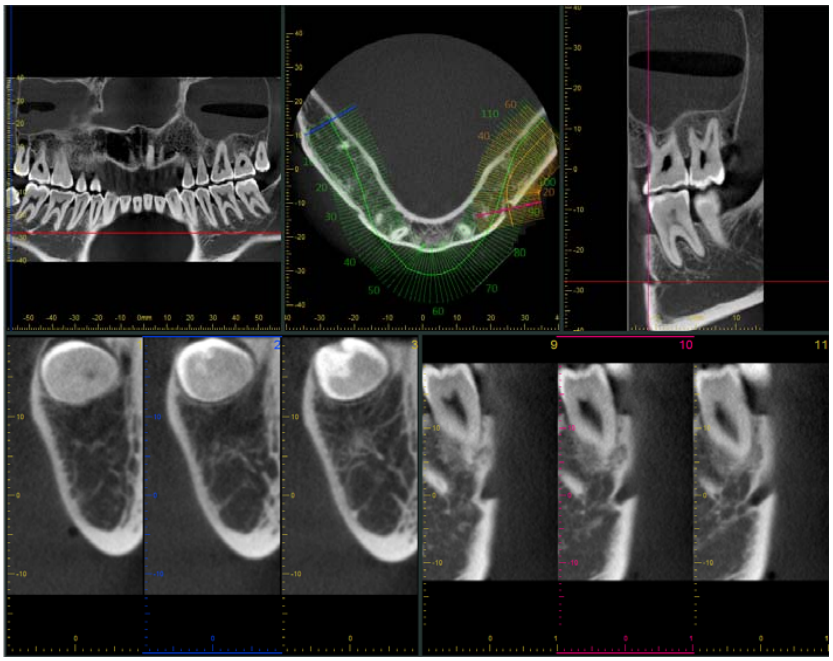
5. Move the Z cursor for the panoramic image you generated (the red line) up or down to determine the position to draw the second spline curve.



6. Click the Draw spline curve button  in Tools and draw the second spline curve.



7. When you have finished drawing the spline curve, CurvedMPR and MPR will execute, and the generated panoramic image and cross section will be displayed on the right of the screen.



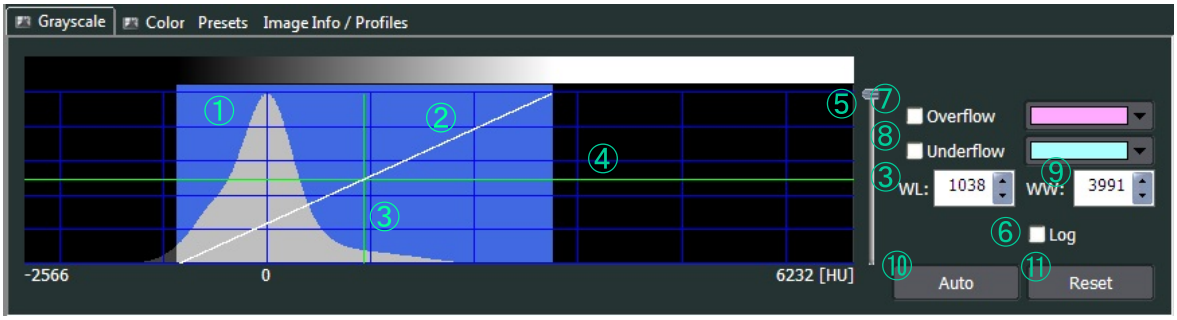
* Just like in CurvedMPR View, you can set the number of cross section images displayed, change the cross section images display mode, adjust spline curves, adjust the displays of panoramic iand cross-sectional images, select multiple cross-sectional images, display cross-sectional images in a separate window, specify the mid-sagittal of a panoramic image and rotate the Axial image.

4. Histogram Panel

In the histogram panel you can adjust the brightness / contrast of grayscale image and set the Volume of Interest (VOI) for volume rendered image.
Also the window display the measurement results from line profiles, etc.
The methods for displaying line profile measurement results, etc. is shown in Chapter 5, Main Panel .

4.1. Grayscale View Functions

To adjust the grayscale image, click the Grayscale tab to switch to Grayscale View. You can adjust the WW (window width), WL (window level), contrast slope, and brightness of a grayscale image while referring to the histogram displayed in Grayscale View.



1. Histogram of Voxel Values:

   The distribution of the voxel values in the CT volume data is displayed.
   From the histogram, it is possible to distinguish what level of hard tissues such as teeth and bone, and soft tissues such as gums are included in the CT volume data.

   You can enlarge the histogram by moving the mouse to over the histogram and scrolling the mouse wheel while holding Ctrl.

   * If CT volume data, reconstructed from the CT Raw data in versions older than i-Dixel Ver.2.100 is read, or if CT volume data reconstructed using a filter that does not correspond to pseudo CT value calculations , the voxel value will be from 0 to 7999.

2. Contrast Curve:

   The contrast is adjusted by changing the slope of the contrast curve.
   The size of WW (Window Width) changes with the slope of the contrast curve.

3. WL (Window Level):

   Setting WL sets the voxel value of the center of WW.
   You can enter the value directly or set the value by dragging the vertical line on the histogram left or right.

4. Brightness Level:

   The brightness can be adjusted by dragging the horizontal line on the histogram up or down.

5. Opacity Level Slider:

   Opacity Level Slide is disabled in the Histogram Panel for gray-scale images.

6. Log:

   Checking this lets you switch the vertical axis scaling of the histogram to logarithmic display when you view the histogram.

7. Overflow:

You can specify the color for the voxels with a value above the voxel value limit for WW.

8. Underflow:

You can specify the color for the voxels with a value below the voxel value limit for WW.

10. WW (Window Width):

Window Width represents the range of voxel values to be displayed as gray scale.
You can set the value by directly entering the value or changing the slope of the contrast curve.

12. Auto:

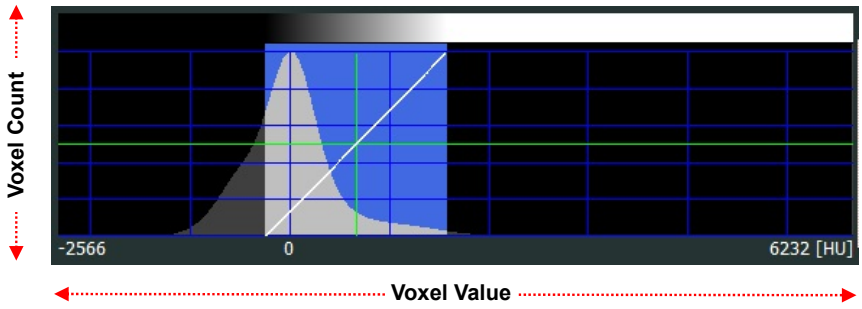
Clicking this button sets the WW, WL, and brightness level for the image to optimal values.

13. Reset:

The WW will be set to the maximum voxel range (or pseudo CT value) with the WL set to the center of that range.

Histogram

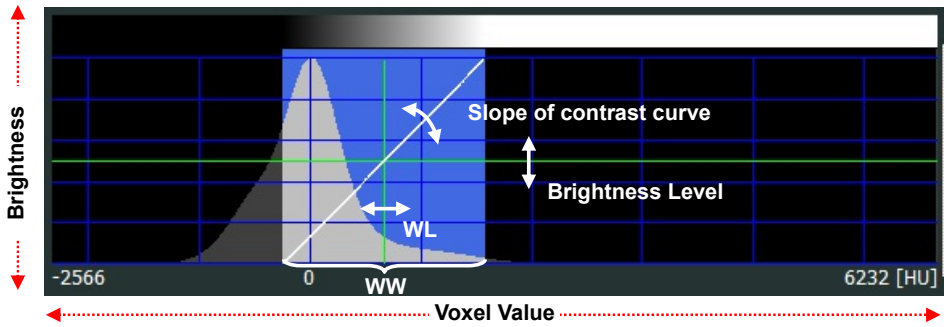
The histogram is the graph showing the distribution of voxel values of the CT volume data, and the horizontal axis and vertical axis represent the voxel value and voxel count for each voxel value, respectively.



* The voxels containing the elements of tooth, bone, and prosthetics are mainly shown on the right side of the histogram.

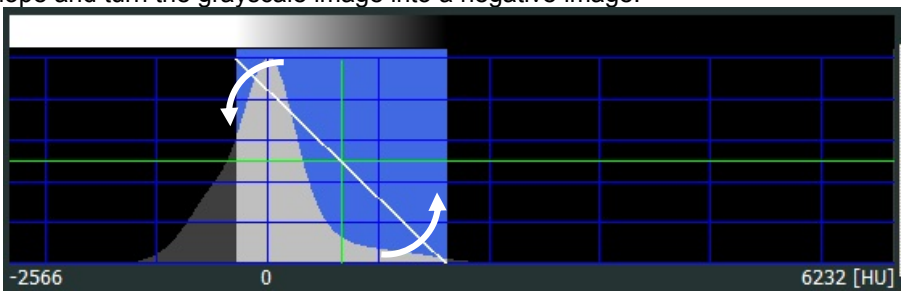
Settings for WW (Window Width), WL (Window Level), and brightness level:

WW (Window Width):	Window Width is set by dragging the contrast curve to change the slope of the curve or by dragging the edges of the highlighted area. Increasing the slope narrows the width and increases the contrast.
WL (Window Level):	Window Level is set by dragging the vertical line on the histogram. Moving to the left makes the image brighter, and moving to the right makes the image darker.
Brightness Level:	Brightness Level is set by dragging the horizontal line on the histogram. Moving upwards makes the image brighter, and moving downwards makes the image darker.



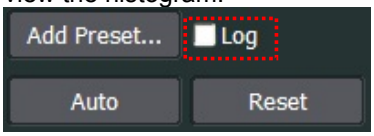
* You can adjust the Window Width and Window Level for the gray-scale image using the mouse. Hold down the right button on the mouse and move it right or left on the image to adjust the Window Width and up or down to adjust the Window Level.

* Continuing to drag the contrast curve in an anti-clockwise direction will reverse the contrast curve slope and turn the grayscale image into a negative image.



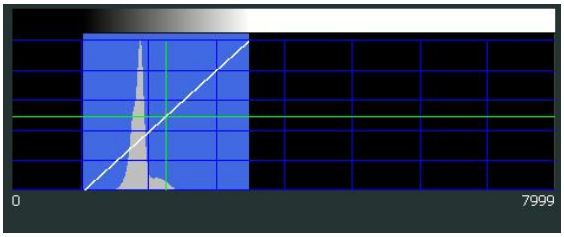
Switch the scale for the vertical axis of the histogram:

Checking Log lets you switch between displaying the vertical scaling as linear or logarithmic when you view the histogram.



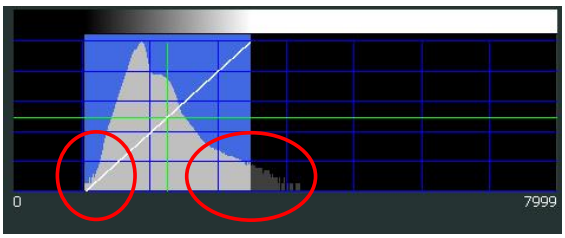
Linear display

Unchecking the Log box shows the histogram in linear scale.



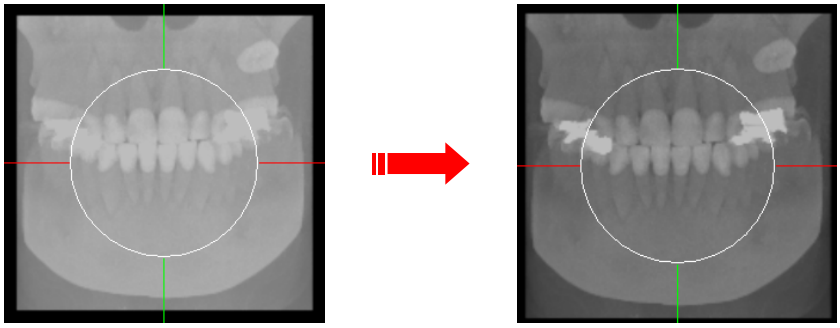
Logarithmic display

Checking the Log box shows the histogram in logarithmic scale.
Compared to the linear scale, it is easier to see the distribution of the voxels at the right and left edges of the histogram. (Shown below)

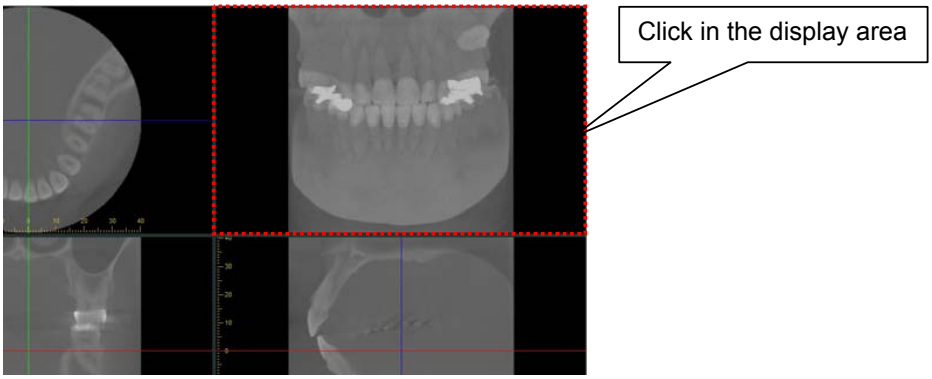


[Adjust the brightness / contrast of gray-scale images]

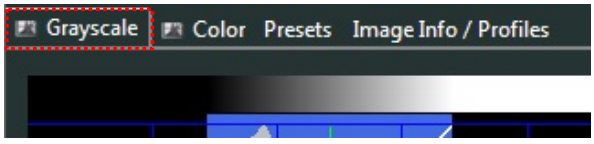
<<Example: Displaying prosthetics clearly in CT slice and MIP images>>



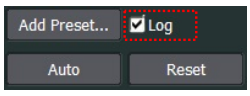
[1] Click the display area in the MIP image.



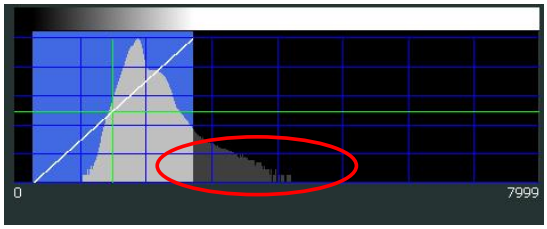
[2] Click the Grayscale tab in the histogram panel.



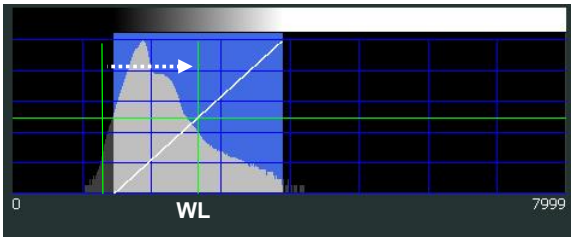
[3] Check the Log checkbox to switch to logarithmic display.



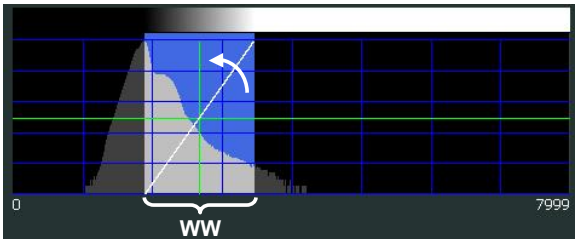
Check the distribution of voxels for teeth, bone, or prosthesis elements in the CT volume data.
The voxel values for teeth, bone, or prosthesis elements are generally distributed to the right of the histogram.



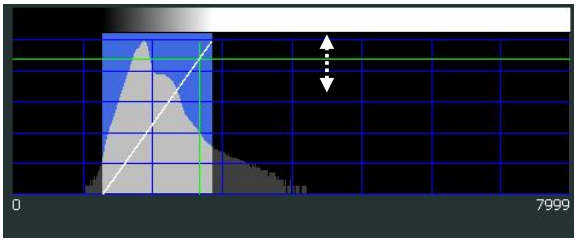
[4] Setting WL (Window Level) to the right side of the histogram shows teeth, bones, and prosthetics clearly.



[5] Adjusting the slope of the contrast to a narrow WW (Window Width) shows teeth, bones, and prosthetics clearly.

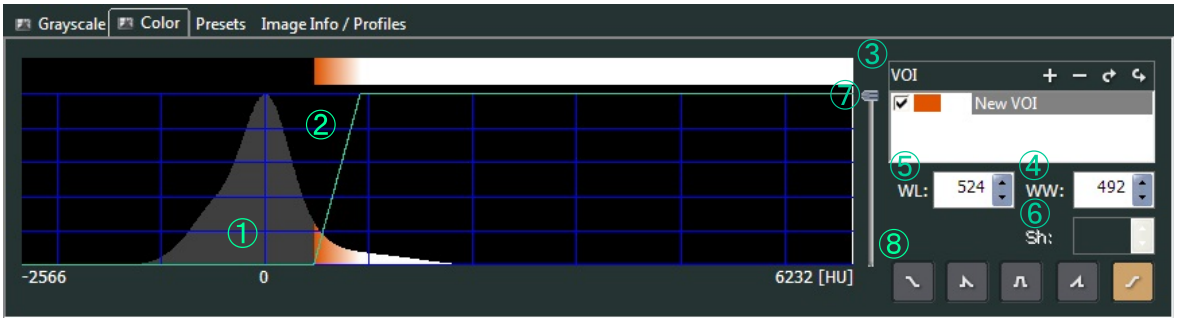


[6] Adjust the brightness level as needed. You can adjust this by dragging the green horizontal line on the histogram panel up and down.



4.2. Color View Functions

Volume rendered images are displayed in accordance with a predetermined volume of interest (VOI).
In Color View, you set the VOI and store them as presets.
CT volume data includes many voxels with the elements of hard tissues such as teeth, bones, etc. and soft tissues such as gingiva. Therefore, to show a specific object such as teeth, bones, etc., it is necessary to set the volume of interest.
You can set the volume of interest by adjusting the shape of the opacity curve, WW (Window Width), WL (Window Level), and the opacity level while checking the histogram shown on the histogram panel.



1. Histogram of Voxel Values
   The distribution of the voxel values in the CT volume data is displayed.
   You can determine the portion of the hard tissue elements such as teeth, bones, etc. and the soft tissue elements such as gingiva in the CT volume data from the histogram.
   Move the mouse over the histogram and scroll the mouse wheel while holding Ctrl to enlarge the historgram.
   * If CT volume data, reconstructed from the CT Raw data in versions older than i-Dixel Ver.2.100 is read, or if CT volume data reconstructed using a filter that does not correspond to pseudo CT value calculations, the voxel value will be from 0 to 7999.

2. Opacity Curve
   You can adjust the WW (Window Width), WL (Window Level), and the opacity level by changing the shape of the opacity curve by dragging with the mouse.

3. VOI
   You can store, delete, show, and hide the volumes of interest and set the display color (color coding).
   The priority for displaying multiple volumes of interest is from top down in the list.

4. WW (Window Width)
   Window Width represents the range of voxel values of objects to be displayed.
   You can set the value by directly entering the value or changing the shape of the opacity curve.

5. WL (Window Level)
   Window Level represents the reference point of the opacity curve. However, if the trapezoid shape opacity curve is selected, this represents its center.

   ⚠NOTE
   - ***The reference point of the opacity curve varies with the shape of opacity curve selected.***

6. Sh

This is enabled only if the trapezoid shape opacity curve is selected.
Sh is the “sharpness” and affects the shape of trapezoid. If Sh is 0, the opacity curve becomes an isosceles triangle, and if Sh is 1, the curve becomes a rectangle.
You can set Sh by directly entering the value or changing the shape of the opacity curve.

7. Opacity Level Slider

You can adjust the opacity level of the combined VOIs by moving the slide up or down.
You can adjust the opacity for only the voxel values within the range of WW (Window Width).
Moving the slider downwards decreases the opacity revealing the internal structures of the volume rendered image.

8. Types of Opacity Curve

You can select the basic shape of the opacity curve.

Increasing 

Select this shape to show the objects such as teeth, bones, etc. with the relatively large voxel value.

Trapezoid 

Select this shape to show multiple objects such as hard tissues, soft tissues, etc.

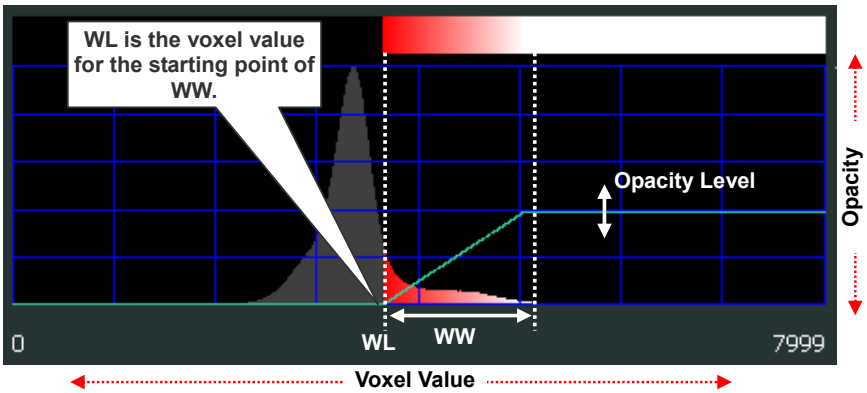
Decreasing 

Select this shape to show the objects such as air, etc. with the relatively small voxel value.

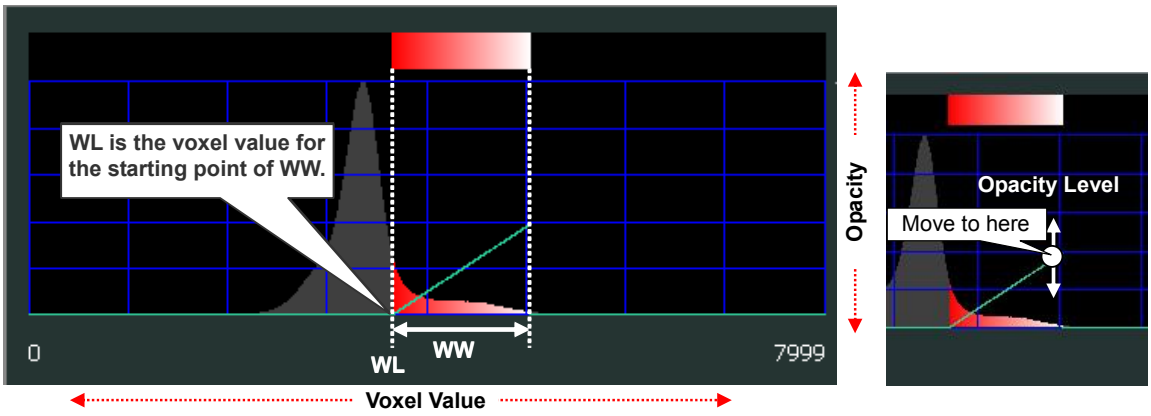
Set WW (Window Width), WL (Window Level), and the opacity level

You can set the WW (Window Width), WL (Window Level), and opacity level by dragging the opacity curve to change the shape of the curve.

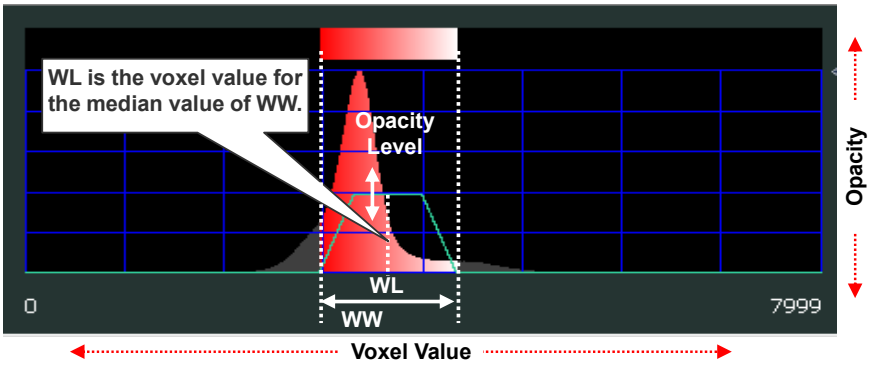
WW (Window Width), WL (Window Level), and the opacity level for the increasing shape 



WW (Window Width), WL (Window Level), and opacity level for the increasing shape 

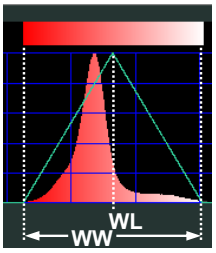


WW (Window Width), WL (Window Level), opacity level, and Sh for the trapezoid shape 

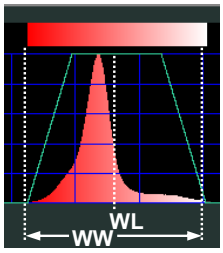


The shape of trapezoid can be changed with the value of Sh. You can set the value for Sh between 0 and 1. If Sh is 0, the opacity curve becomes an isosceles triangle, and if Sh is 1, the curve becomes a rectangle.

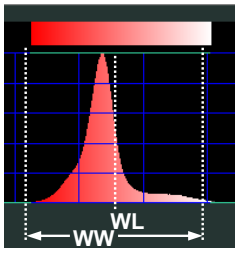
Sh = 0



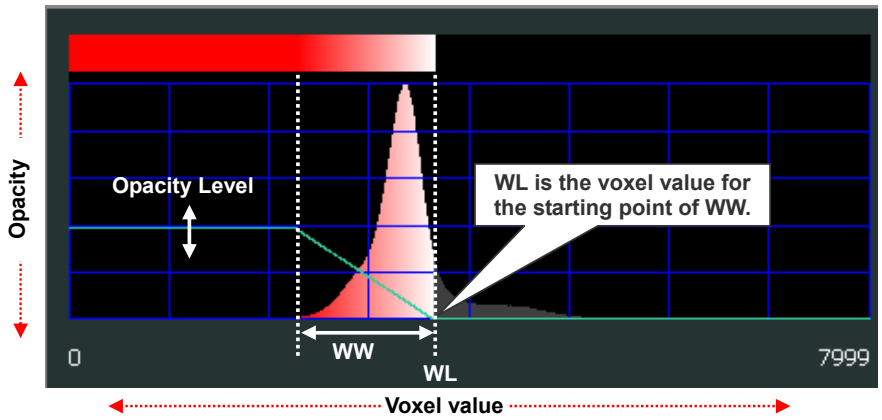
Sh = 0.5



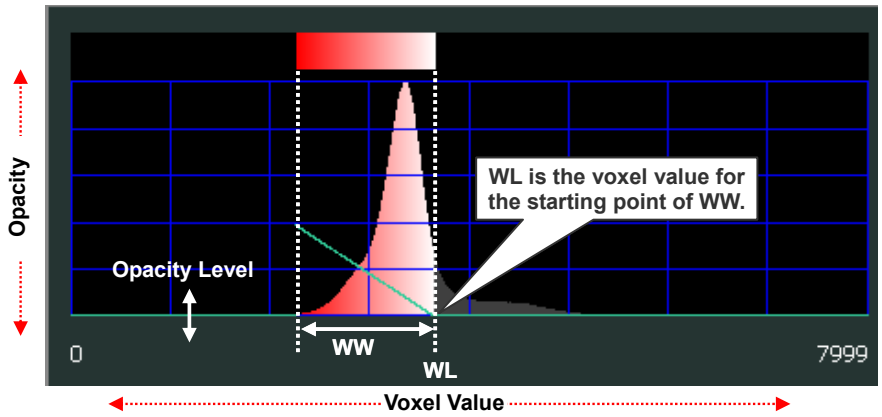
Sh = 1

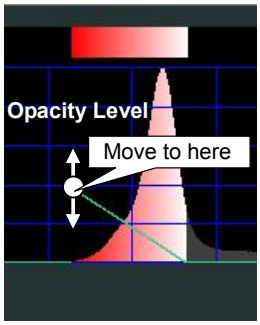


WW (Window Width), WL (Window Level), and opacity level for the decreasing shape 



WW (Window Width), WL (Window Level), and opacity level for the decreasing shape 





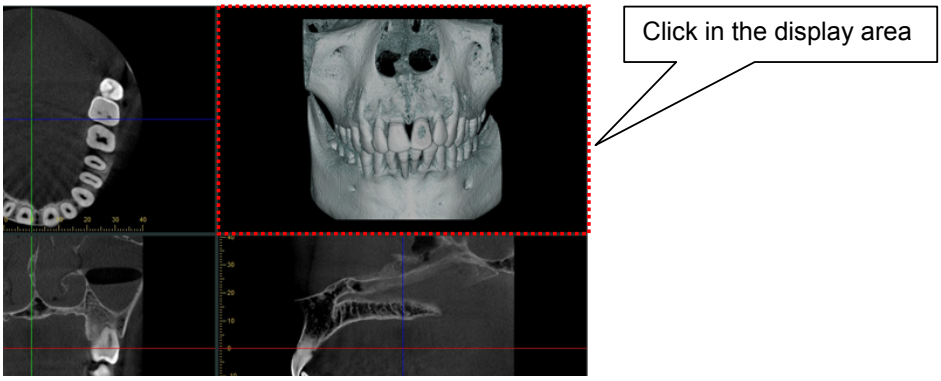
* You can adjust the Window Width and Window Level for the selected VOI for volume rendered image using the mouse. Hold down the right button on the mouse and move it right or left on the image to adjust the Window Width and up or down to adjust the Window Level.

[Display the volume of interest of the volume rendered image]

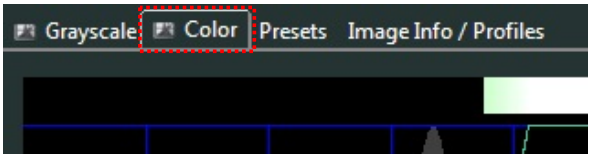
The steps differ with the number of volumes of interest.

<Display hard tissues such as bones, teeth, etc. for a single volume of interest>

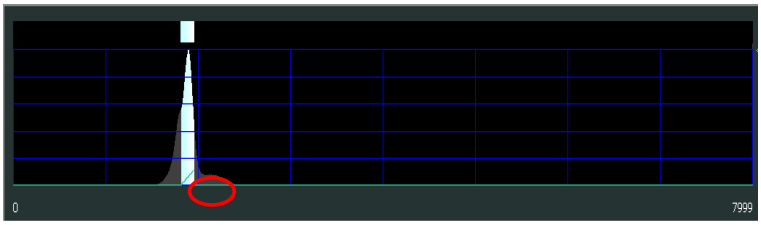
[1] Click the display area in the volume rendering image.



[2] Click the Color tab in the histogram panel.

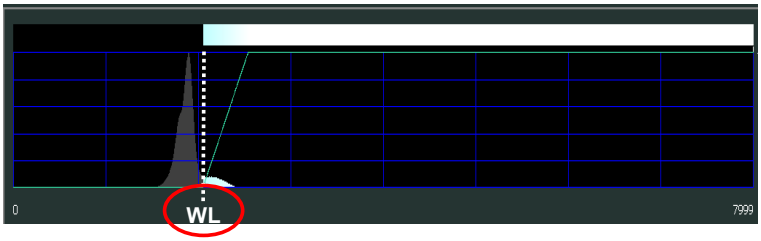


[3] Check the distribution of the voxels with the elements of teeth and bones in the CT volume data.
The voxels with the elements of teeth and bones are mainly shown on the right side of the histogram.

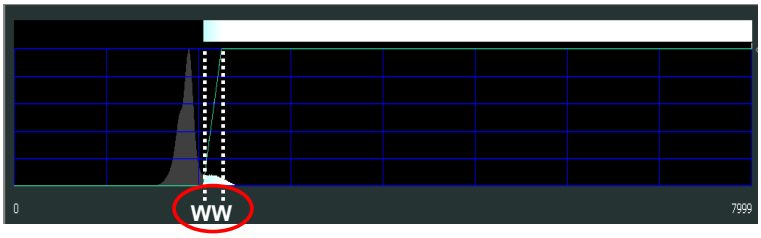


[4] To show the objects such as teeth, bones, etc., with relatively large voxel value, select the increasing opacity curve.

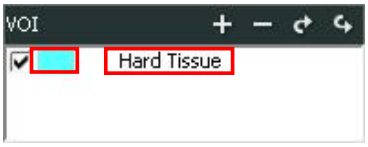
[5] Drag the opacity curve to set the WL (Window Level) to the right side of the histogram so that objects are shown.

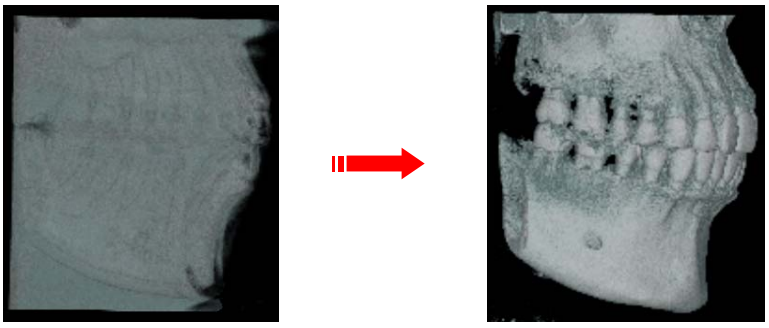


[6] Drag the opacity curve to adjust WL (Window Level) so that hard tissues such as teeth and bones are targeted. Narrowing the width of WW shows hard tissues such as teeth and bones clearly. WW is set using WL (Window Level) as the reference point.



[7] Set the name and the color of the object to be displayed for the volume of interest. Double-click the name (“New VOI” for initial setting) to enter changes. In addition, click the color (blue and white for initial setting) to select an optional color from the “color setting” dialog.





<< By setting multiple of VOIs, teeth, gingiva, and other soft tissues are displayed.>>

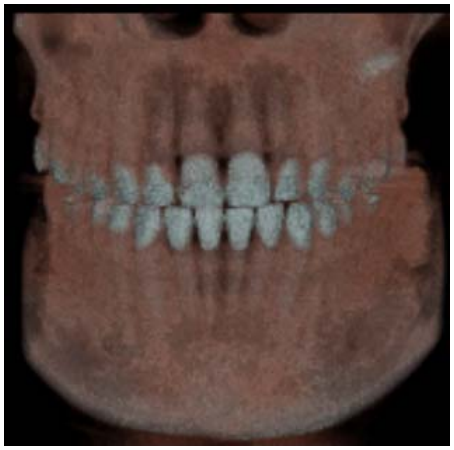
In order to display multiple of VOIs, they must be created and the display priority must be decided.

[1] Set the VOI of the teeth and set the color and name.

[2] Click the “ New VOI ” button to add a VOI, and set it for the gingiva or other soft tissues.
Set the color and the name.

[3] Only checked VOIs are displayed on the volume rendered image.
Set the display priority of the VOIs.
Select the VOI which you want to display in the foreground, click the “Move up” button to display in one it to the top of the VOI item list box.
Unneed VOIs can be deleted by selecting it and clicking the “Delete VOI” button.

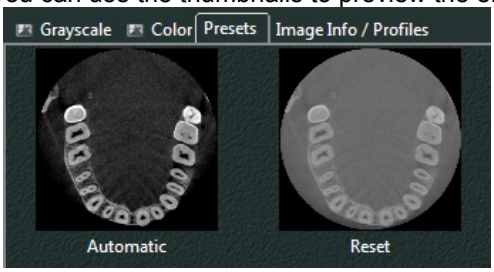
Multiple of VOIs are displayed according to the priority set.



4.3. Presets View Functions

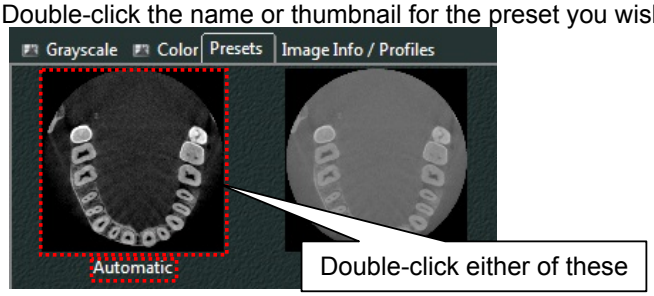
Clicking the Presets tab switches to Presets View, where you can select the preset values to adjust the grayscale image. You can redisplay the adjusted grayscale image with the preset you selected.

1. Click the Presets tab to display the list of presets. The list shows the names and thumbnails. You can use the thumbnails to preview the effect.



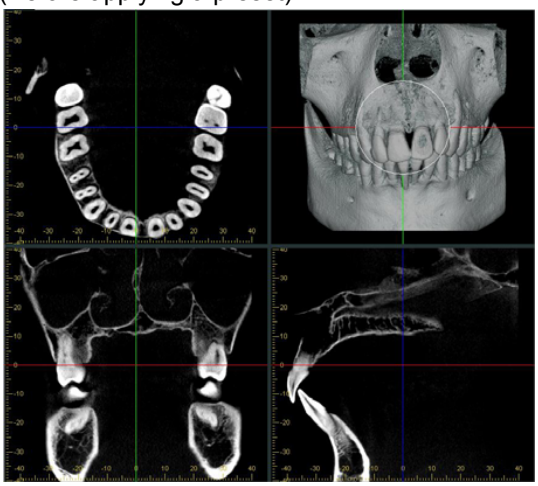
* You can choose Automatic and Reset as settings. The effects of the image quality adjustment are the same as when you click the “Auto” or “Reset” buttons in Grayscale View.

2. Double-click the name or thumbnail for the preset you wish to apply.

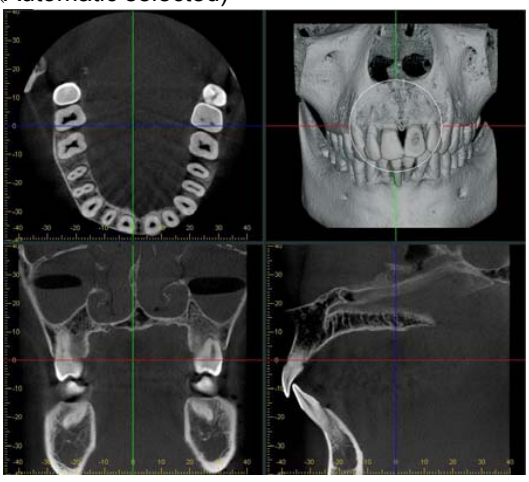


The adjusted grayscale image will be displayed. The following example shows a CT slice image before applying the preset and after the Automatic preset were applied.

(Before applying a preset)



(Automatic selected)



* When you adjust the brightness / contrast of a CT slice image using the presets, the X,Y,Z slice image in XYZ View and the axial image in CurvedMPR View, Dual-CMPR View will all be adjusted at the same time.

5. Main Panel

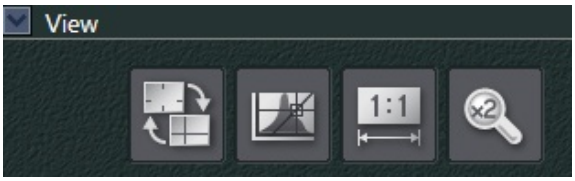
Clicking the "Main" button on Panel Controller displays the main panel.

From the main panel, you can perform operations such as editing and measuring of the image.

* See Chapter 3.1, XYZ View, for an explanation of XYZ View on the main panel.
* See Chapter 3.2, CurvedMPR View, for an explanation of CMPR View on the main panel.

5.1. View

You can show / hide the histogram, magnify the image, etc.



This shows / hides the cursor lines.

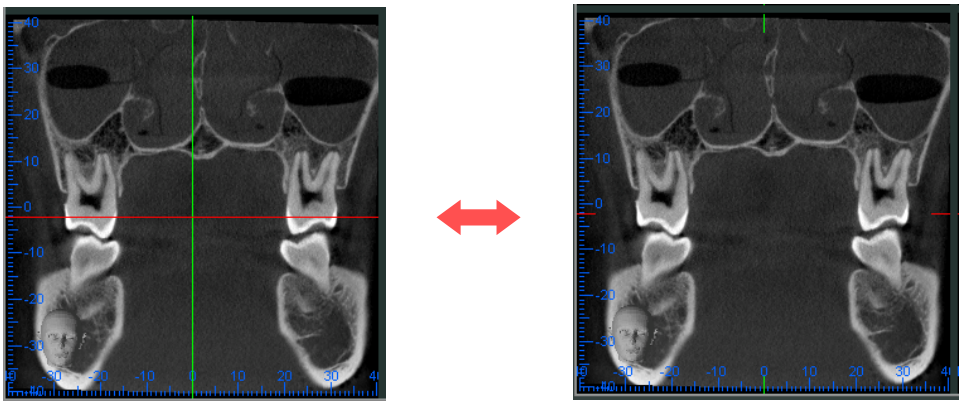
This shows / hides the histogram panel.

This displays the image at 1:1 (pixel of display: pixel of image).

This displays a specified region at twice the size of the original image.

[Cursor]

Clicking the “Cursor” button:  on the main panel, switches between displaying and hiding the cursor line on slice images.
(When operating cursor lines, all cursor lines will be displayed regardless of the settings.)



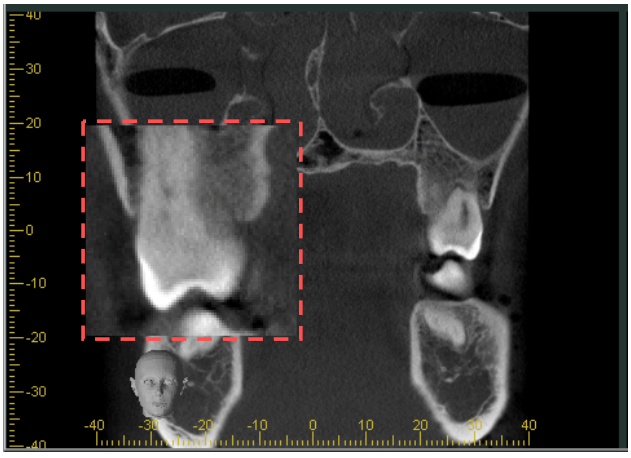
[1:1 Pixel Magnification]

Images are shown on the display at a 1:1 pixel ratio. Clicking the “1:1 Pixel Magnification” button:  on the main panel turns 1:1 pixel magnification ON and OFF.
The size of displayed slice images will be magnified/reduced.
If images are too large for the display area, scroll bars will be displayed.

[Magnifying Glass]

Magnifying glass displays the selected area at double resolution. Clicking the “Magnifying Glass” button:  on the main panel, enables the magnifying glass and changes the shape of the pointer to a magnifying glass.

Display of the selected area is magnified.
While using the magnifying glass it is not possible to move cursor lines.
To disable the magnifying glass, either click the “Magnifying Glass” button again, click another measuring tool, or right click with the mouse.



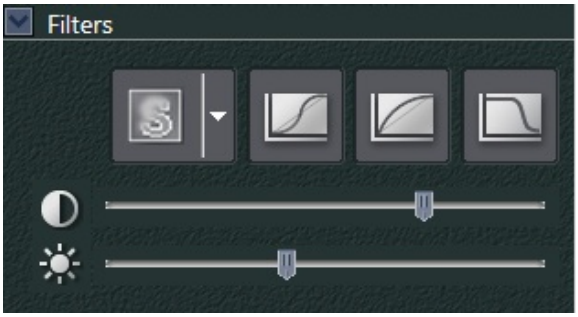
5.2. Filters

When there is a lot of noise in the grayscale image or it lacks clarity or is otherwise degraded, you can improve the quality by processing it using filters. This is effective in extracting borders or other characteristics of an image.

You can also adjust voxel values by adjusting gamma, contrast, or brightness.

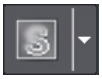
When you execute one of these, the same processing will be executed for the following grayscale images simulataneously:

All CT slice images for the XYZ View
All cross section, Axial, and Panorama images in the CurvedMPR View
All cross section, Axial, and Panorama images in the Dual-CMPR View



⚠ NOTE

- **You cannot apply filters to adjust sharpness, sigmoid, gamma, or others to MIP or RaySum images.**



Sharpness the grayscale image.

Corrects the gamma along as sigmoid curve.
* This can tend to exaggerate contrast.

Corrects gamma other than sigmoid.

You can select edge enhancement or other filters.

Adjust the contrast of a grayscale image.
Moving the slider to the left or right is the same effect as adjusting the contrast line slope in the histogram view.

Adjusts the brightness of a grayscale image.
Moving the slider to the left or right is the same effect as adjusting the WL (window level) in the histogram view.

[Sharpness]

Sharpness the grayscale image. Clicking the ▽ to the right of the button displays the scroll bar shown below, where you can adjust the level of sharpne

⚠ NOTE

- **If you increase sharpness, the image will become sharper with greater contrasts, but at the same time, the noise will be enhanced and the image will roughen. You may also get artifacts on the boundaries between teeth and metal prostheses, so use this filter with care and do not over-sharpen the image.**

[Sigmoid]

Corrects the gamma.
Use this when the contrast of the grayscale image contrast is poor.
Click the button to select the gamma correction you wish to make.

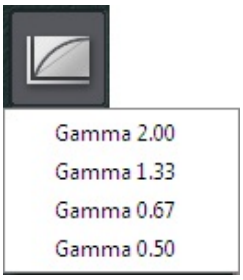
Sigmoid1
Corrects the gamma using the characteristics of the sigmoid function when the gain is 1. In general, this is used when the contrast of the image is poor.

Sigmoid2
Corrects the gamma using the characteristics of the sigmoid function when the gain is 2. This is effective when using Sigmoid 1 is not sufficient to fix the contrast.

* The gain values for the sigmoid functions are equivalent to the start slope characteristic of the sigmoid function.

[Gamma filter]

Adjusts the gamma other than the sigmoid.
Use this when the grayscale contrast is not displayed clearly.
Click the button to select the gamma adjustment you wish to make.



Gamma 2.00
Corrects using a gamma value of 2.00. This is effective when a gamma correction of 1.33 does not fix the problem.

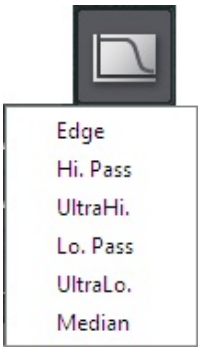
Gamma 1.33
Corrects using a gamma value of 1.33. This is generally effective for displays that show the mid-tones as a little dark.

Gamma 0.67
Corrects using a gamma value of 0.67. This is generally effective for displays that show the mid-tones as a little light.

Gamma 0.50
Corrects using a gamma value of 0.50. This is effective when a gamma correction of 0.67 does not fix the problem.

[Other filters]

After clicking the area of the grayscale image you wish to process, click this button to select the filter you wish to use.



Edge
Extracts edges of a grayscale image.

Hi. Pass
This filter lets you check the areas of a grayscale image that have been made clearer or where there are major changes in the voxel values, or to check local areas. Using this filter tends to increase the image contrast.

UltraHi.
This is effective when Hi. Pass does not give optimum results.
Using this filter tends to increase the image contrast.

Lo. Pass
This filter lets you smooth the contrast, remove noise, or remove interference fringes for a grayscale image. Using this filter tends to smooth the image.

UltraLo.
This is effective when Lo. Pass does not give optimum results.
Using this filter tends to smooth the image..

Median
This removes noise with almost no change to the image contrast.

Filtering a grayscale image displayed in a separate window

You can also filter grayscale images displayed in a separate window. Click the display area of the image displayed in a separate window to start filtering.

5.3. Measurements and Overlays

You can measure distances and angles or draw shapes or text on CT slice images in XYZ View and axial, panoramic and cross section images in CurvedMPR View and Dual-CMPR View.
Essentially grayscale images with the exception of MIP and RaySum images.
In addition, you can measure line profiles, area profiles, and view image statistics.

Select objects displayed on the image.
Objects refers to distance or angle measurement results, lines, rectangles, ellipses, arrows, text, freehand curves, polygons, or lines for displaying line profiles.
* Clicking this while measuring will stop the measuring.

Delete objects shown on the image.
* Once you delete an object, you cannot get it back.
* You can also delete an object by clicking it and pressing the Delete key on the keyboard.

Measure distances.

Measure angles.
*** You cannot measure panoramic images in CurvedMPR View or Dual-CMPR View.**

Draw straight lines, rectangles, ellipses, arrows, text, freehand curves, polygons, or straight lines for measuring line profiles.

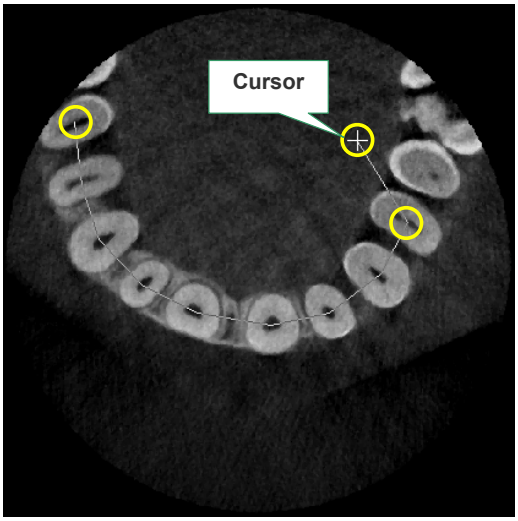
Line Profile
Draw a straight line on the image to display the voxel values along the line. You can check the voxel values in the histogram.

Area Profile
Draw an area on the image to display the maximum, minimum, and average voxel values, as well as the standard deviation, within that area.
You can check the voxel values in the histogram.
You can also show the size of the area you have drawn. You can use rectangles, ellipses, or polygons to draw areas.

Image Statistics
Draw a straight line on the image to display the maximum, minimum, and average voxel values, as well as the standard deviation.

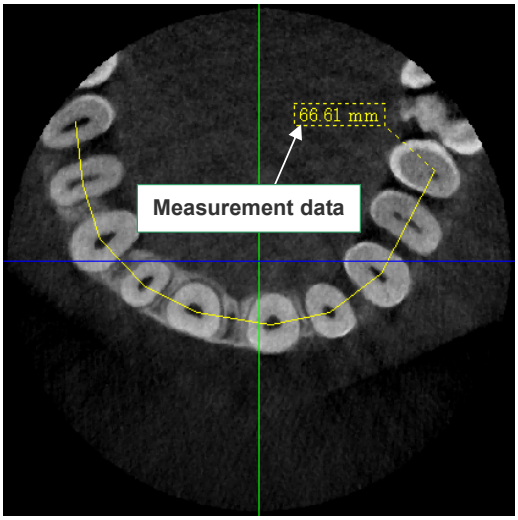
[Length Measurement]

Performs measurement of distance. Clicking the “Measure Length” button:  on the task panel will change the pointer to a "+."
(Clicking this button during measurement will stop the measurement process.)

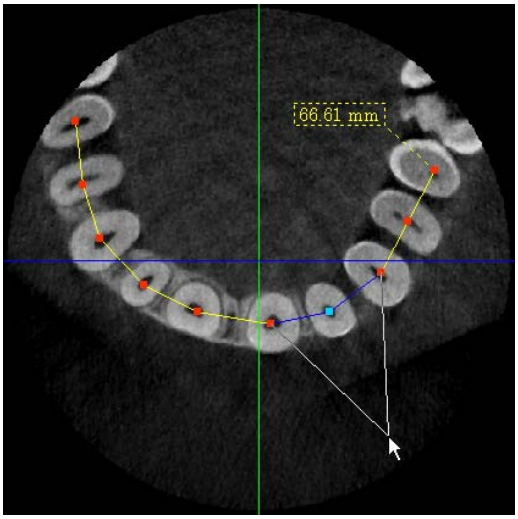


The first position clicked is the starting point of the distance measured, and each position clicked is maintained until you double click. The double clicked position is the end point, and the measured distance from the start to the end is displayed in a text box. This text box can be moved as desired.
When measuring, clicking the next slice image has no effect.
When measurement of distance is complete, the next measurement can be performed.

The points (measurement points) clicked when measuring can be moved by dragging them. By dragging a measurement line it is possible to move the entire line, and when the positions of points or lines are changed the measurement data is updated.



The location being changed is displayed is blue. By right clicking with the mouse before releasing the left mouse button it is possible to stop adjustment.
If a measurement line is clicked once, it will remain selected until something other than a line is clicked, or another line is selected.



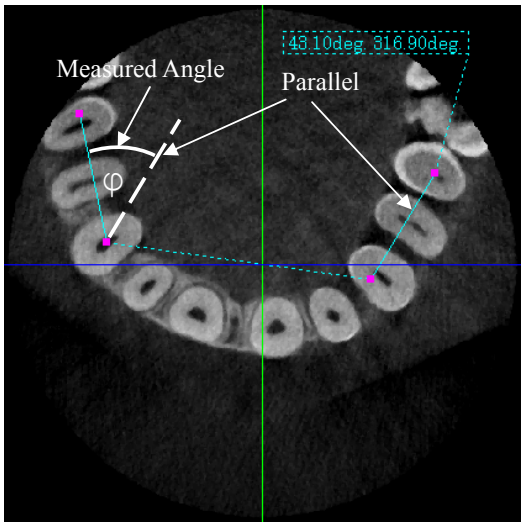
⚠NOTE

- *Measurement results other than rotations on the same plane will remain even if the displayed direction or position of slice images are changed. Please execute measurement after defining the display direction and position of slice images.*

[Angle Measurement]

Angle measurement performs measurement of angles. Clicking the “Measure Angle” button:  on the task panel will change the pointer to a "+."
(Clicking this button during measurement will stop the measurement process.)

The first position clicked becomes the start point for angle measurement, and the angle is displayed on the fourth point clicked. The angle of the straight lines connecting points 1 & 2, and 3 & 4 is calculated and the measurement data is displayed in a text box. This text box can be moved as desired.
While measuring the angle, clicking another measurement tool or right clicking with the mouse reverts to the selection tool.



When angle measurement is complete, the selection tool is automatically restored.

The points (measurement points) clicked when measuring can be moved by dragging them. By dragging a measurement line it is possible to move the entire line, and when the positions of points or lines are changed the measurement data is updated.

When moving measurement lines or measurement points, it is possible to stop the movement by right clicking before releasing the left mouse button.
If a measurement line is clicked once, it will remain selected until something other than a line is clicked, or another line is selected.

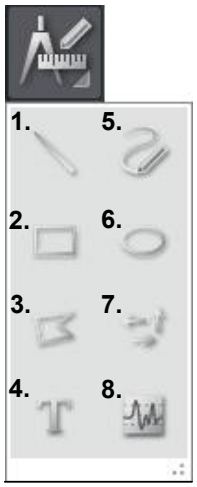
⚠NOTE

- *Measurement results other than rotations on the same plane will remain even if the displayed direction or position of slice images are changed. Please execute measurement after defining the display direction and position of slice images.*

[Drawing an Object]

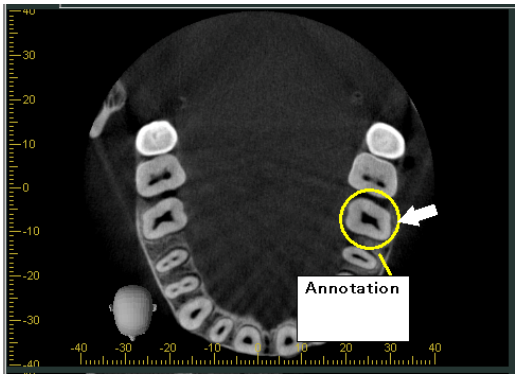
Aside from MIP images or RaySum images, you can draw objects such as straight lines on grayscale images.

Clicking the “Draw Object button”:  lets you choose what object you want to draw.



1. Straight lines
2. Rectangles
3. Polygons
4. Text
5. Freehand curves
6. Ellipses
7. Arrows
8. Straight lines for measuring line profiles

To draw an object other than a text object, drag it.
With text objects, drag to create a quadrilateral frame, and then enter text.
To exit, click another location.



Added objects can be moved using the Selection tool:  on the tool panel.

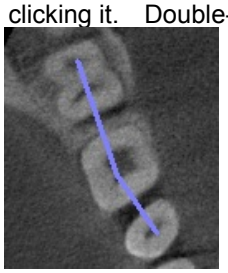
Objects can be deleted by selecting either the Eraser tool:  or the Selection tool:  , and pressing the Delete key on the keyboard.

[Line Profile]

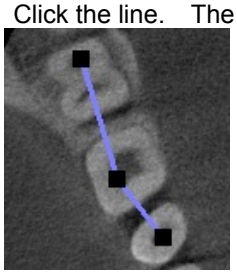
You can display voxel values for grayscale images, with the exception of MIP and RaySum images.
The values are displayed as a graph in the Image Info / Profiles View in the histogram panel.
You can also display the voxel values of individual point along the line as desired.

1. Click the Draw Object button and then click the Line Profile button.

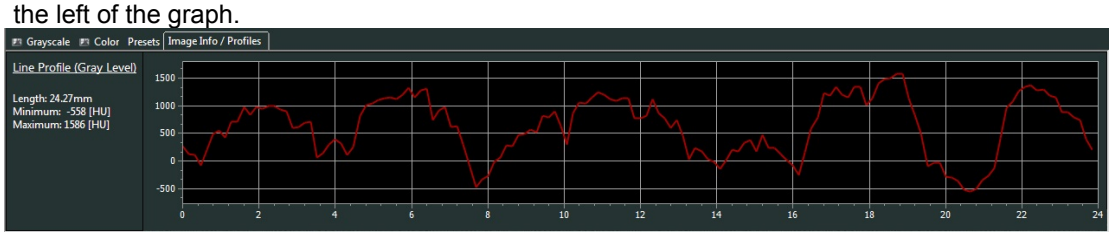
Draw a line where you want to display the voxel values. You can change the line direction by clicking it. Double-click the last point of the line to set it.



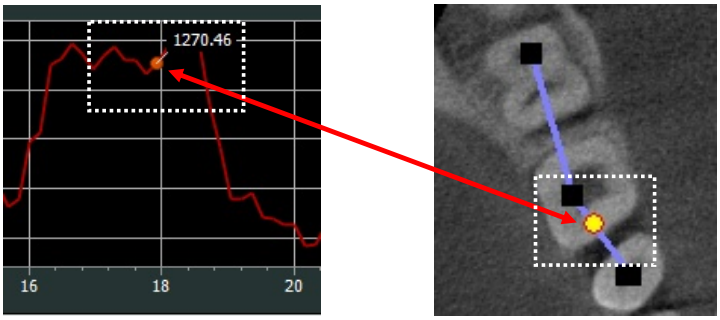
2. Click the line. The end point nodes will be shown.



3. Click the Image Info / Profiles Tab in the histogram panel to display the voxel values on the line as a graph. The length of the line you drew and the maximum and minimum voxel values are shown on the left of the graph.

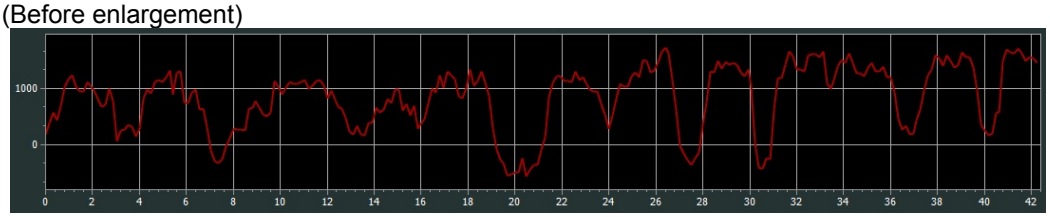


Double-click any point along the horizontal axis of the graph to display the voxel value at that point as a number.

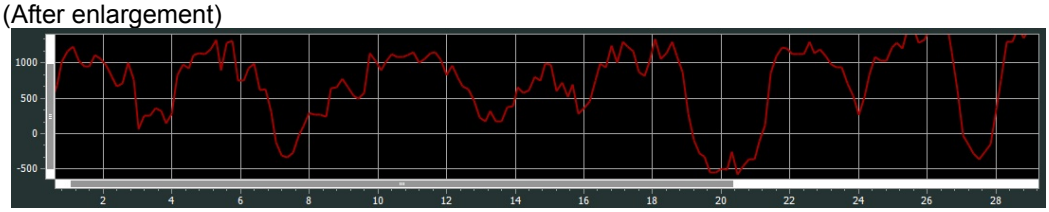


* Moving the mouse pointer over the graph and scrolling the mouse wheel will enlarge the graph.

(Before enlargement)



(After enlargement)

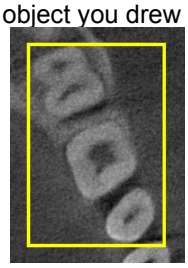


[Area Profile]

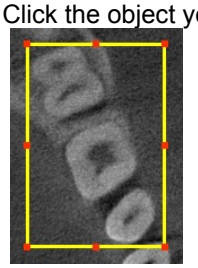
You can display the area profile, maximum, minimum, and average voxel values, and voxel values standard deviation for a specific area on a grayscale image, with the exception of MIP and RaySum images.

* You can use rectangles, ellipses, or polygons to define the area.

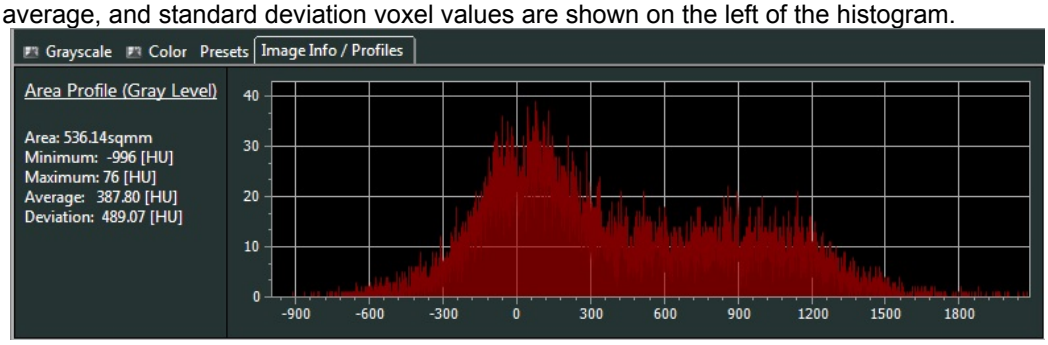
1. Draw a rectangle, ellipse, or polygon at the position you wish to examine the area profile. The object you drew will define the area of interest.



2. Click the object you drew. The end point nodes will be displayed.



3. Clicking the Image Info / Profiles Tab in the histogram panel will display a histogram of the voxel values in the specified area. The size of the specified area you drew and the maximum, minimum, average, and standard deviation voxel values are shown on the left of the histogram.

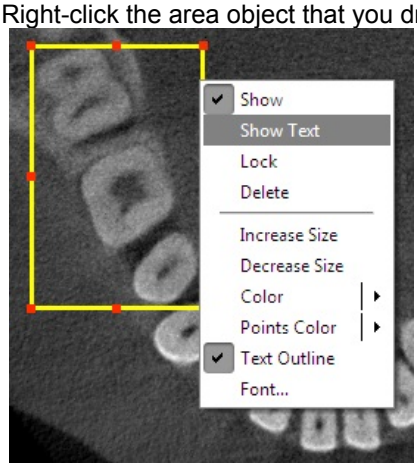


* As with Line Profiles, moving your mouse pointer over the histogram and scrolling the mouse wheel will enlarge the graph.

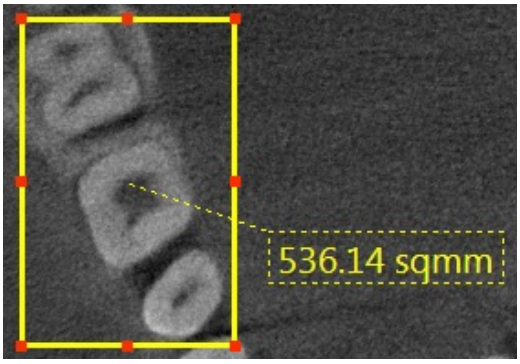
Showing the measured area

You can display on the image the area of any rectangle, ellipse, or polygon you draw.

1. Right-click the area object that you drew.



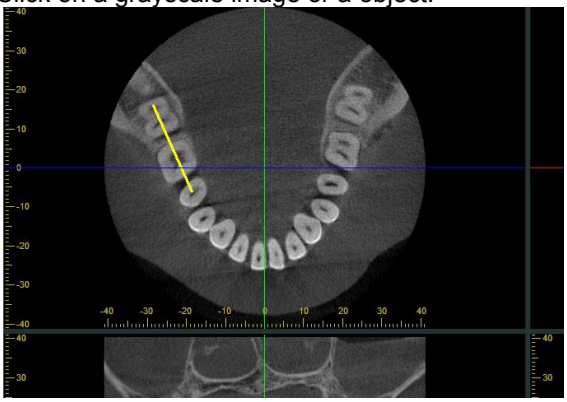
2. Select “Show Text” from the pop-up menu. The area value will be drawn on the image.
Note that if you also select “Text Outline” from the pop-up menu, the area value will be enclosed in a dashed border.



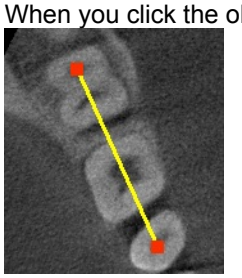
[Measuring Image Statistics]

You can measure the maximum, minimum, and average voxel values, and standard deviation, for a grayscale image, with the exception of MIP images and RaySum images.

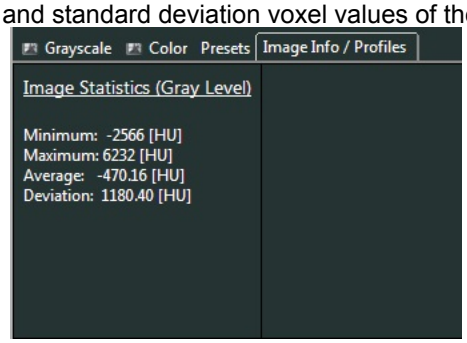
1. Click on a grayscale image or a object.



* When you click the object you drew on the image, the end point nodes will be displayed.



2. Clicking Image Info / Profiles tab in the histogram panel will display the maximum, minimum, average, and standard deviation voxel values of the image.



5.4. Tools

There are advanced tools for drawing mandibular canals, implant simulation to patients, slicing the volume and more.

Draw spline curves on the axial image in CurvedMPR View or Dual-CMPR View.

Show / Hide region for partial slicing.

Draw mandibular canals on any CT slice image.

Select an implant for implant simulation.

Slice (cut) the volume rendered, MIP, or RaySum image.

Move the Y cursor line to move the Y cross section of volume rendered, MIP, or RaySum image.

Cancel the slicing of volume rendered, MIP, or RaySum images.

Sculpt the CT slice or volume rendered image.

[Partial Slicing]

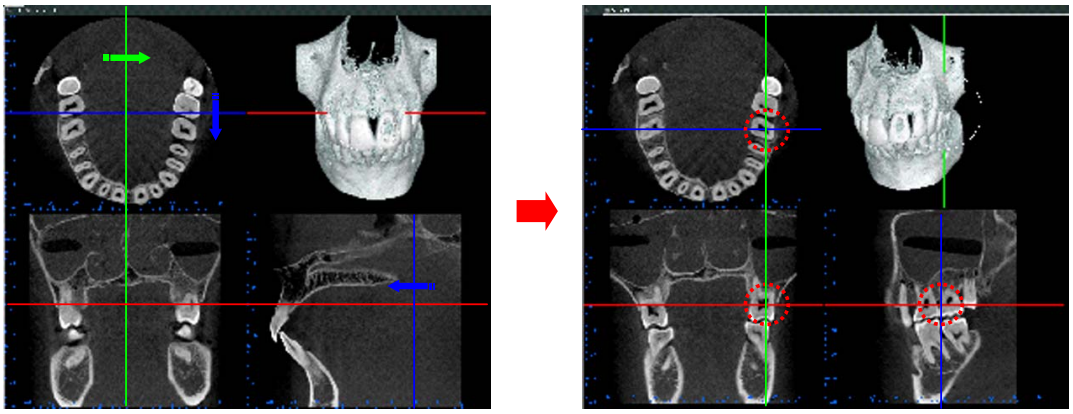
Partial slicing is a useful tool for showing only the volume of interest in CT slice images in XYZ view or panoramic image / axial image in CurvedMPR View.

⚠NOTE

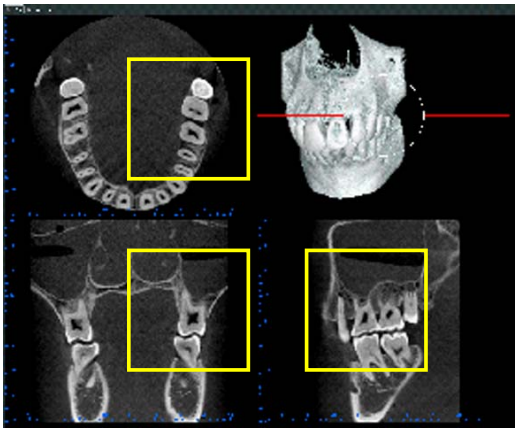
- ***Partial slicing is not available in Dual-CMPR View.***
- ***Partial slices displays the CT slice images using the specified FOV (Field of View) area, but FOV will not be used for the volume rendered, MIP, and RaySum images.***

<Partial slicing of CT slice images in XYZ View>

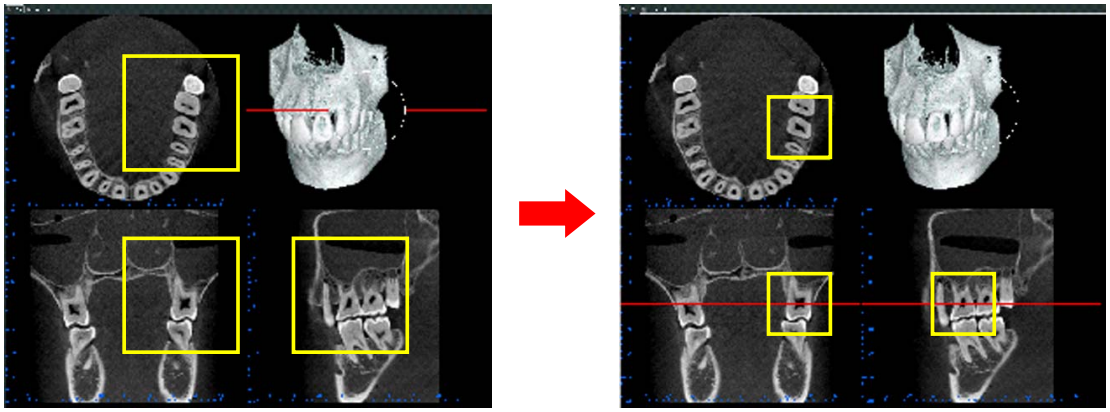
[1] Move the X, Y, and Z cursor lines to the center of the volume of interest.



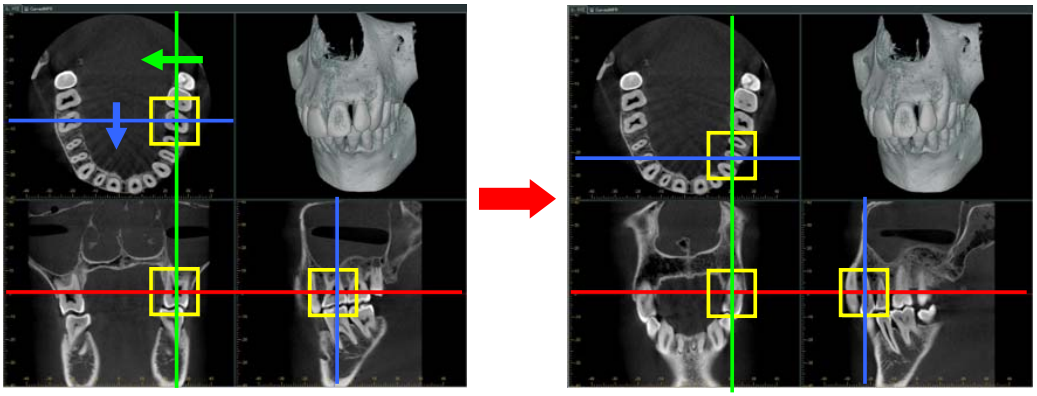
[2] Clicking the "Show / Hide FOV for partial slicing" button  shows the frame of the field of view (FOV) on the CT slice image.



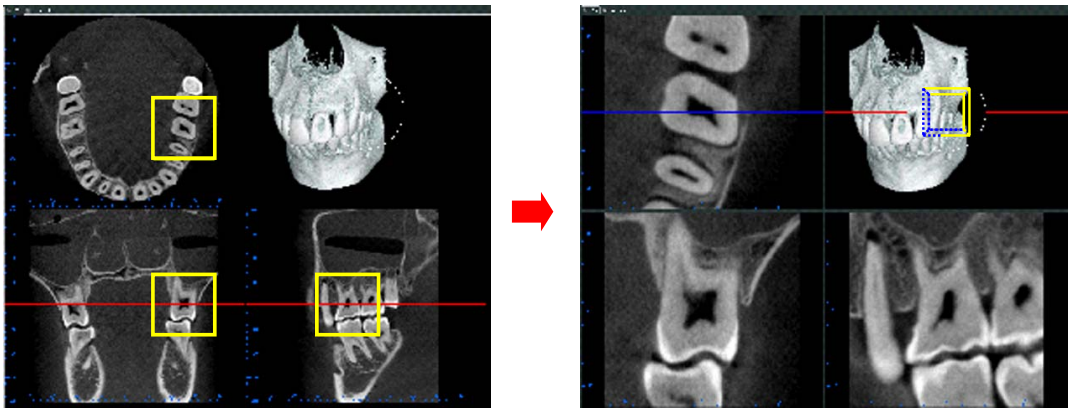
[3] Set the field of view area for the partial slicing by dragging the frame.
The size of the field of view area is equivalent to the volume of interest.



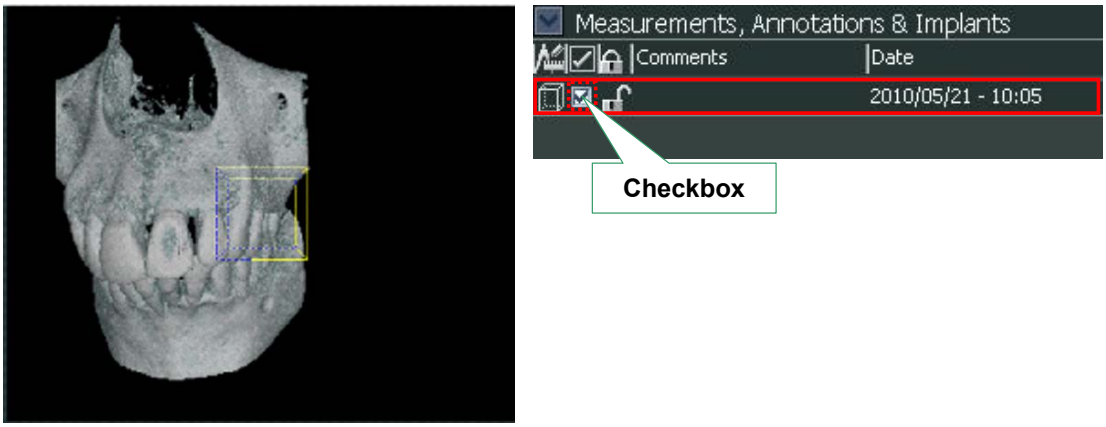
* After the frame for the Field Of View (FOV) appears, move the X, Y, and Z cursor lines to adjust its position.



[4] Double-clicking the frame of the field of view area performs the partial slicing, and the results are reflected to the CT slice image. On the volume rendered image, the field of view area is shown as a wireframe cube.

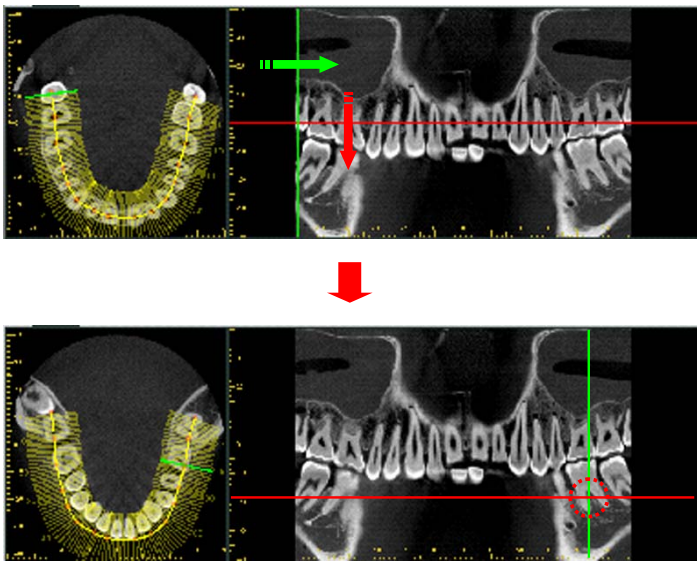


Once the field of view volume (cube) is shown on the volume rendered image, the record of the field of view volume is added to the Measurements, Annotations & Implants list. On the list, the show / hide toggle checkbox for the object will be checked.
(* Removing the check mark hides the field of view volume from the volume rendering image.)



<Partial slicing of panoramic images and axial images in CurvedMPR View>

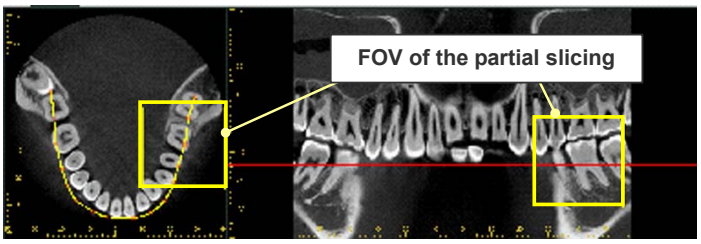
[1] Move the cursor lines on the panoramic image to the center of volume of interest.



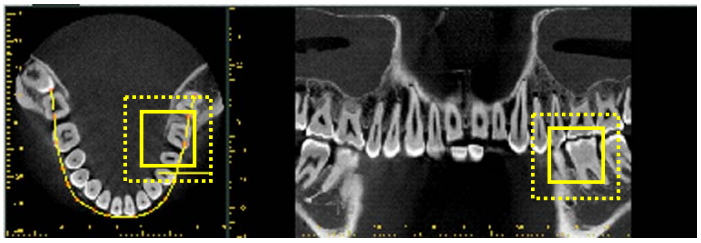
⚠NOTE

- *Moving the cursor line of the horizontal axis (red cursor line) automatically executes CurvedMPR and updates the cross-sectional images and axial image based on the movement of the cursor line.*

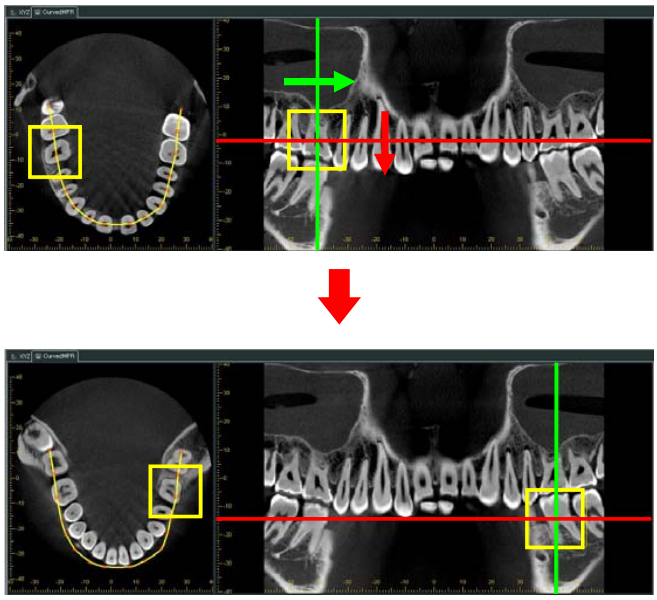
[2] Clicking the show / hide FOV for partial slicing button  shows the frame of the field of view (FOV) area for the partial slicing on the panoramic and axial images.



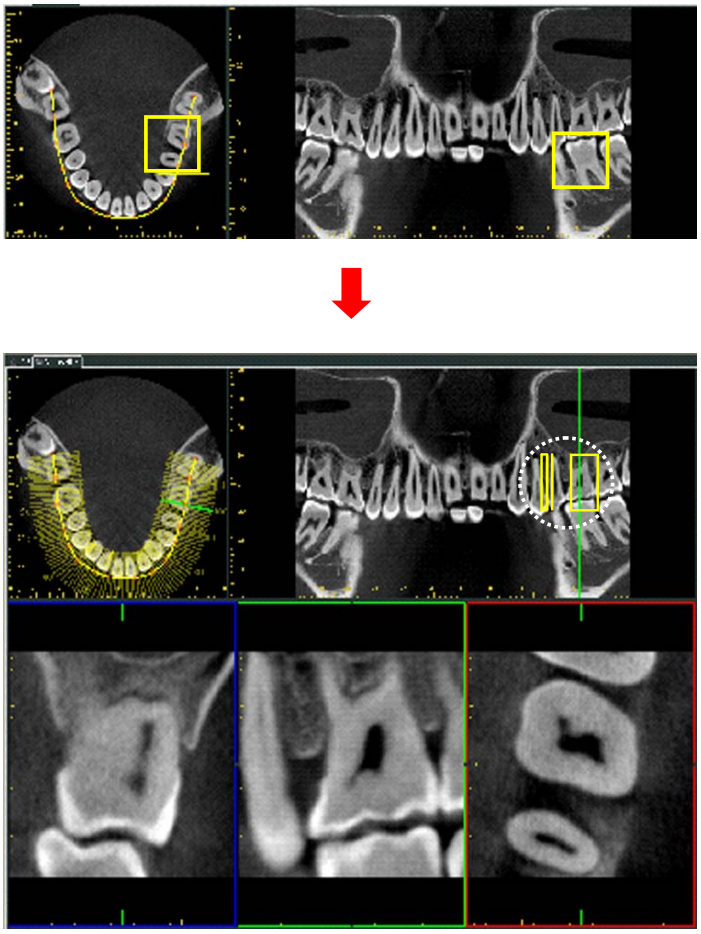
[3] Set the field of view area for the partial slicing by dragging the frame. The size of the field of view area is equivalent to the volume of interest.



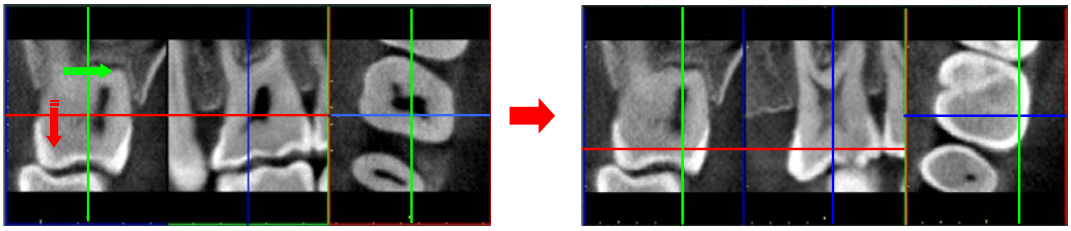
* After the size for the Field Of View (FOV) is set, you can move the X, Y, and Z cursor lines to adjust its position.



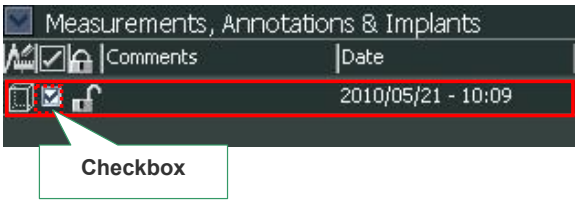
[4] Double-clicking the frame of the field of view area performs the partial slicing. The partially sliced CT slice image is displayed (See below). On the panoramic image, a rectangular frame representing the field of view area is displayed.

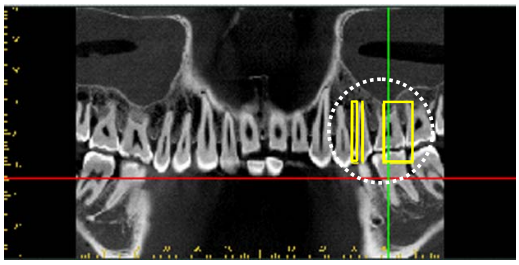


You can switch the CT slice images by moving the X, Y, and Z cursor lines.



Once the field of view area is shown on the panoramic image, the record of the field of view area is added to the Measurements, Annotations & Implants list. On the list, the show / hide toggle checkbox for the object will be checked.
(* Removing the check mark hides the field of view area from the panoramic image.)

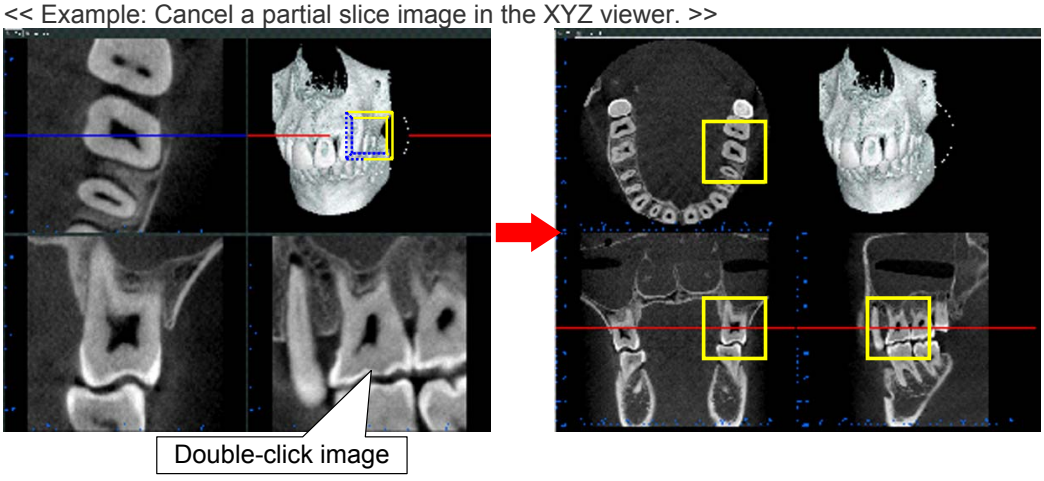




Cancel Partial Slice

Double-click a partial slice image to cancel the partial slice and return to the original image.

<< Example: Cancel a partial slice image in the XYZ viewer. >>

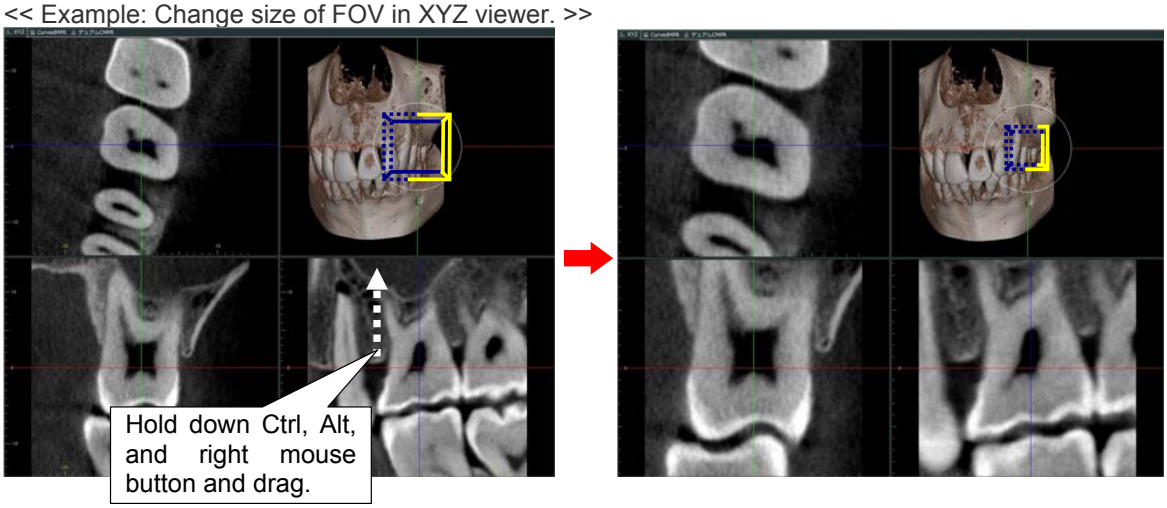


* Partial slice images can also be canceled in the CurvedMPR viewer.

Change FOV (field of view) Size

Hold down the Ctrl key, Alt key, and the right button on the mouse and drag on the partial slice image to change its FOV.

<< Example: Change size of FOV in XYZ viewer. >>



* FOV size can also be changed in the CurvedMPR viewer.

[Draw Mandibular Canal]

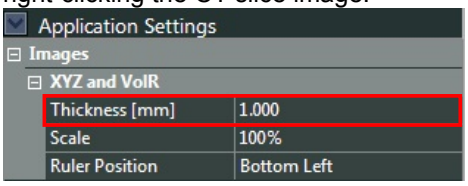
You can draw the mandibular canal on the cross sections or panorama for the CurvedMPR view or the Dual-CMPR view. Or you can draw it on the CT slice image the XYZ view.
You can draw the mandibular canal using the same method in any View.
You can draw an image for an implant presentation on the slice image while checking the drawn mandibular canal.
The following explanation uses an example of drawing the mandibular canal on a CT slice image in XYZ View.

* It is easier to see the canal overlay in the MIP View than in the volume rendering or RaySum views.

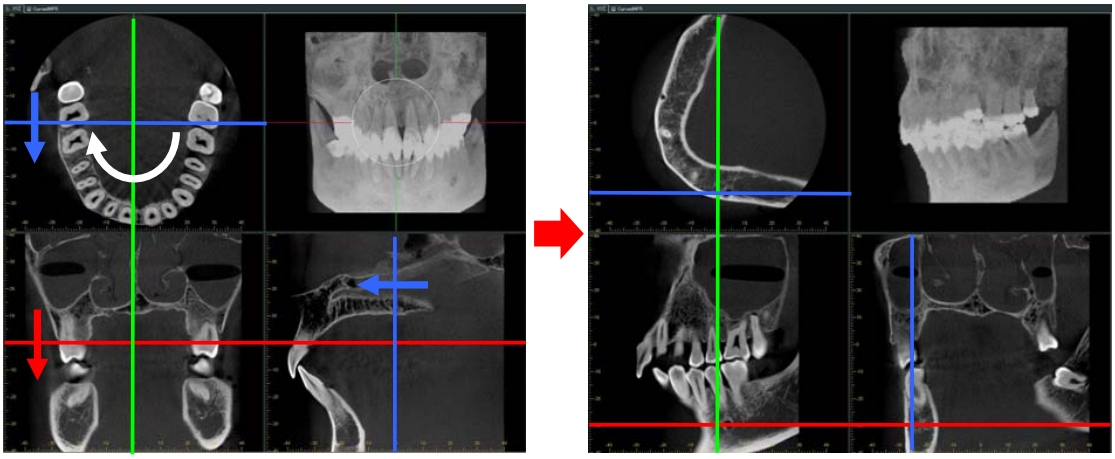
⚠ NOTE

- ***The canal drawing cannot be saved.***
- ***You need to set the slice thickness to no greater than 1.0 mm in order to draw a mandibular canal on the image.***

1. Set the Thickness [mm] in XYZ and VolR under Images in the Application Settings in the settings panel to 1.000 mm or less. You may also do this from the pop-up menu displayed when right-clicking the CT slice image.

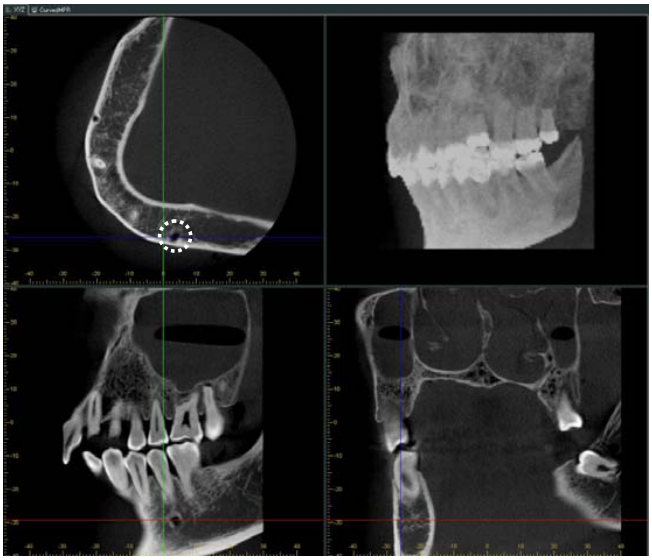


2. Adjust the X, Y, and Z cursor lines and the orientation of the CT slice images so that the mandibular canal is shown.

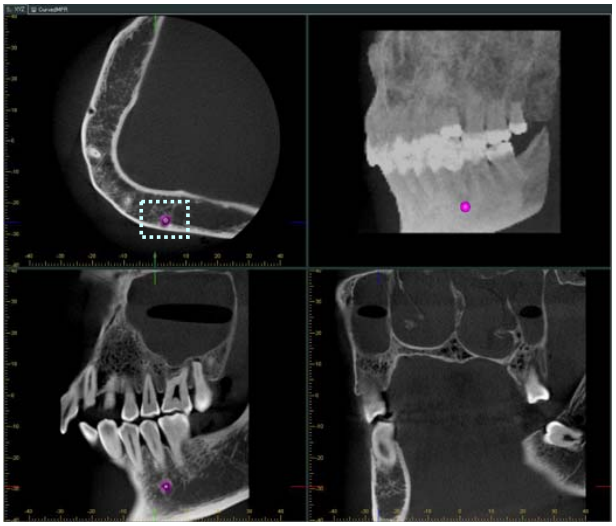


3. Click the "Draw the mandibular canal" button  on the main panel.

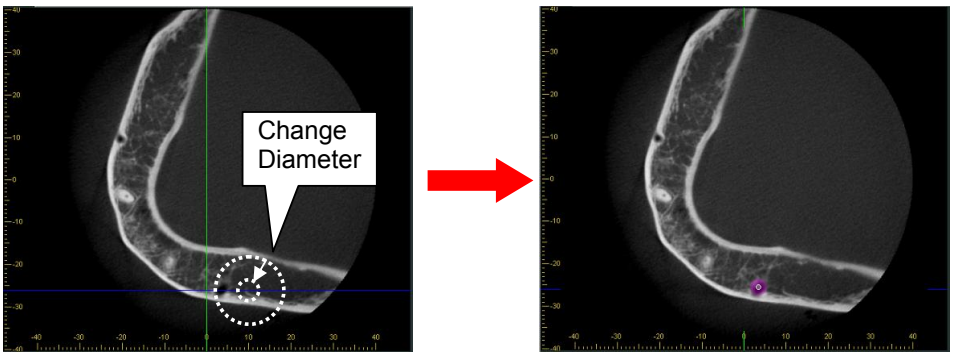
4. Move the mouse pointer to the starting point for the mandibular canal.
The mouse pointer changes to a dotted circle.



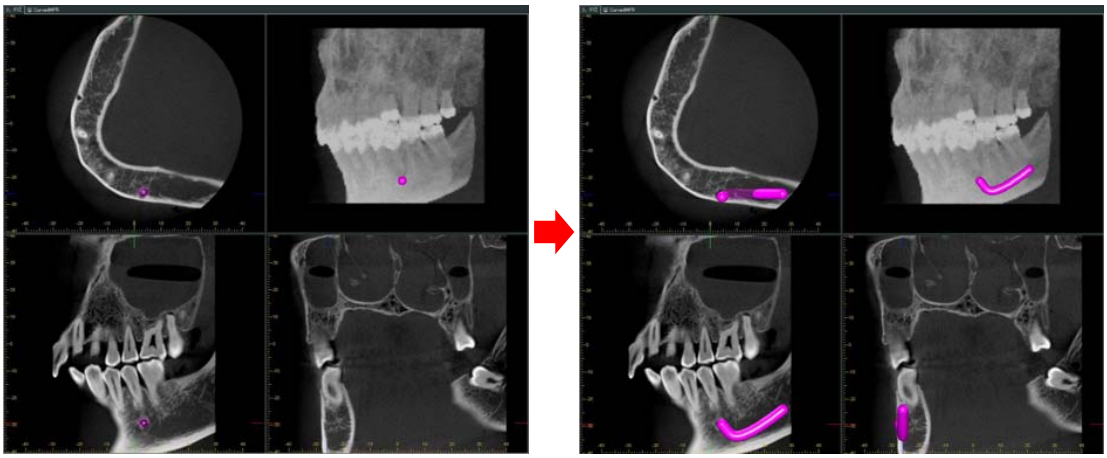
5. Right-click on the image to specify the mandibular canal.



* The diameter of the canal drawing can be adjusted by turning the wheel on the mouse while holding down the right button.



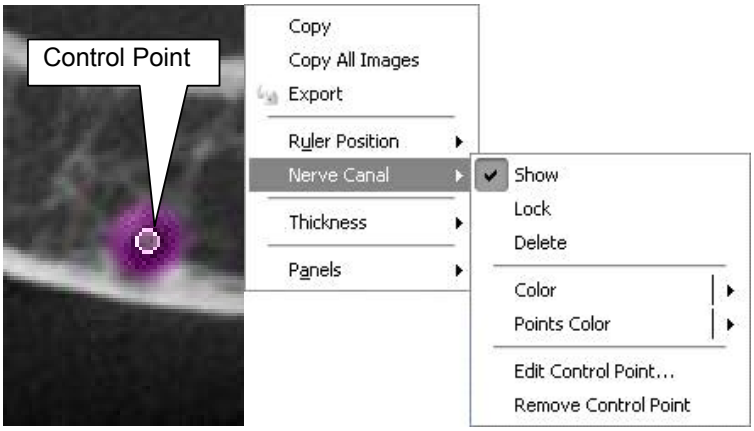
6. Repeating the step connects the specified points to draw the mandibular canal.
   All images shown in the XYZ view will be updated automatically to show the drawn mandibular canal.



7. To end drawing the mandibular canal, double right-click the last point or click the [Select object] button:  .
   The drawn mandibular canal is defined, and the data are added to the "Measurements, Annotations & Implants" list.

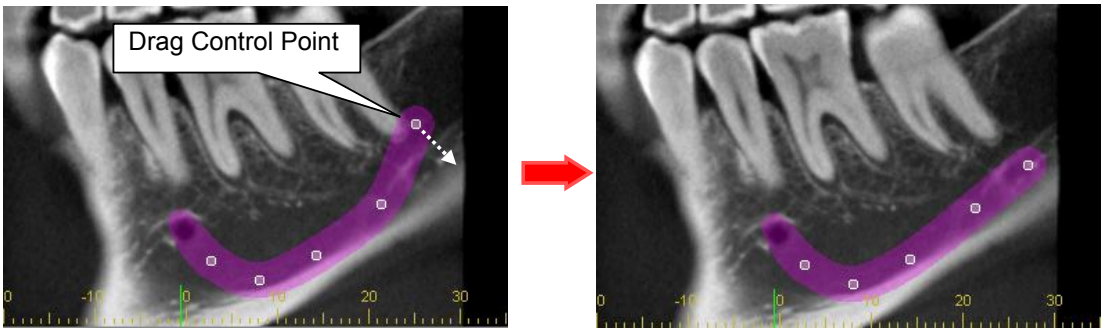
Change Properties or Delete Canal Drawing

You can change the color and other properties of the canal.
Right-click one of the control points (a point click to draw the canal) on the canal to display a pop-up menu. Select Nerve Canal and then change the canal or control point color, delete the canal etc.



Revise Canal

Click the Selector Tool:  . Then use it to drag one or more of the control points to change the canal location.



Delete the Dot that Indicates the Canal

Delete the dot that indicates the canal by holding down the Ctrl key and right-clicking on the image. Holding down the Ctrl key and right-clicking on the image repeatedly will delete the dots in the opposite order starting with the last one.

[Implant Overlays]

You can overlay implants on any CT slice images for the XYZ, Curved MPR and Dual-CMPR View to use for presentations.
You can also use the same method to overlay an implant in any View.
The following explanation uses the example of overlaying an implant on a CT slice in XYZ View.

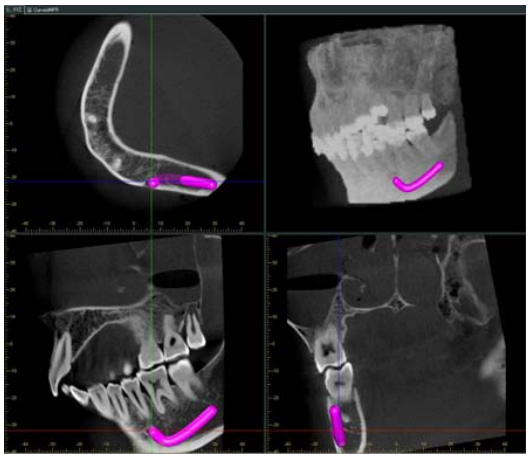
⚠ WARNING

- **Implant overlay drawing is only for presentation purposes not actual planning.**
- **Depictions of implants in x ray images are only for explanation to patients and may not be accurate enough for actual planning.**
- **Implants displayed may not be available or may not be suitable. Ask implant makers about availablility and suitability.**
- **The user is responsible for how this software and the implant display feature are used for patient explanations and treatment.**

⚠ NOTE

- ***Implant overlays cannot be saved.***

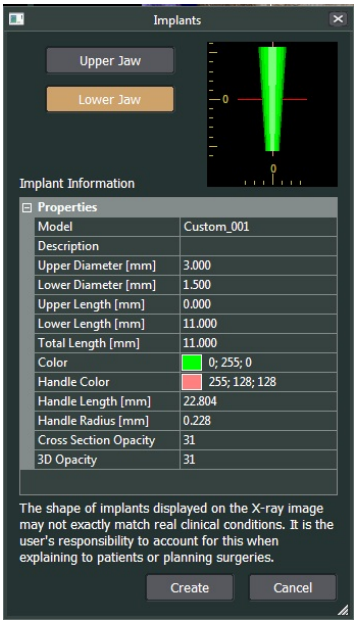
1. Adjust the position of the image with the X, Y, and Z cursor lines to set the position of the implant.



2. The orientation and properties for implant overlays can be customized.
   Click either Lower Jaw or Upper Jaw to set the implant orientation.
   A preview of the implant's shape depending on its orientation and other properties will be displayed.

⚠ NOTE

- ***Customized implant overlays cannot be saved.***

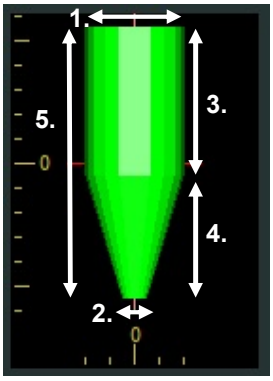


* Properties:

Model
Set the model name of the implant..
Description
Details are defined as needed.

Upper side diameter [mm]　Lower side diameter [mm]　Upper side length [mm]
Lower side length [mm]　Total length [mm]

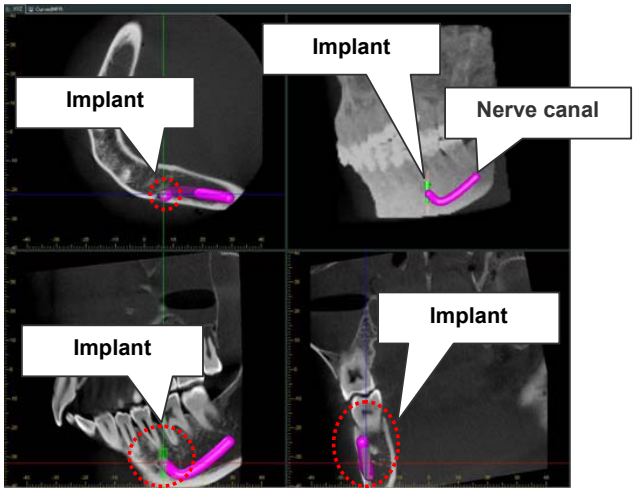
Set the dimensions of the implant.



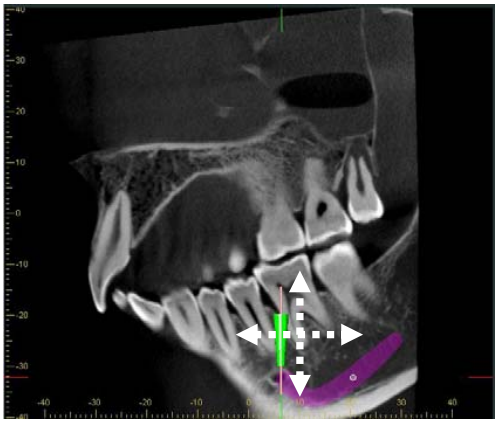
1. Upper side diameter [mm]
2. Lower side diameter [mm]
3. Upper side length [mm]
4. Lower side length [mm]
5. Total length [mm]

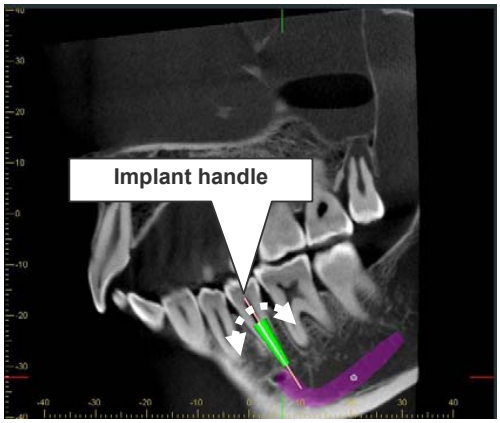
Color
Set the color of the implant.
Handle Color　Handle Length [mm]　Handle Radius [mm]
Set the diameter, length, and color of the implant handle (rotation axis) displayed when drawing the implant.
Cross Section Opacity
The smaller the value, the more transparent the implant appears.
3D Opacity
The smaller the value, the more transparent the implant appears in 3D beneath a plane.
To display the implant as a 3D object, go to the Application Settings on the Settings Panel and select Other, then set 3D Drawing on Slices to “True”..

3. Double-clicking or clicking the "Create" button draws the implant at the intersection of the X, Y, and Z cursor lines on the CT slice image.



4. Next, change the position and orientation of the implant drawn.
You can change the position of the implant by dragging the implant.
In addition, you can change the orientation by dragging the implant handle.

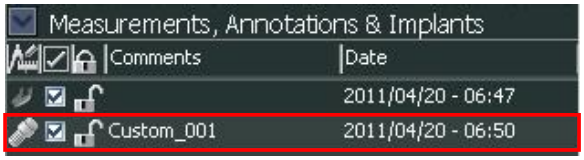




The images in the XYZ view are updated automatically.

5. To end drawing the implant, click the “Select object” button  .

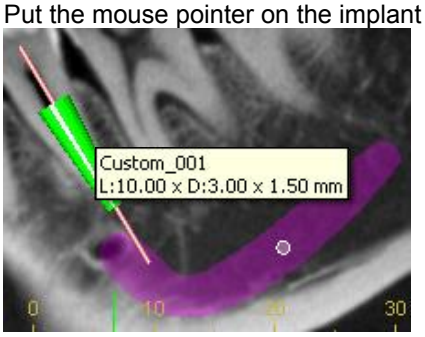
   The drawn implant is defined, and the data are added to the "Measurements, Annotations & Implants" list. The name of the implant will appear in the Comments field.



* You can readjust the position, orientation, etc., by performing the respective steps after clicking the "Select object" button. In addition, you can delete the implant by clicking the "Delete the object" after clicking the "Select an object" button and selecting the implant to delete.

Display Properties

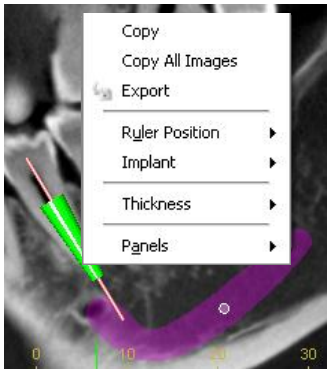
Put the mouse pointer on the implant to display its upper and lower diameters and its length.



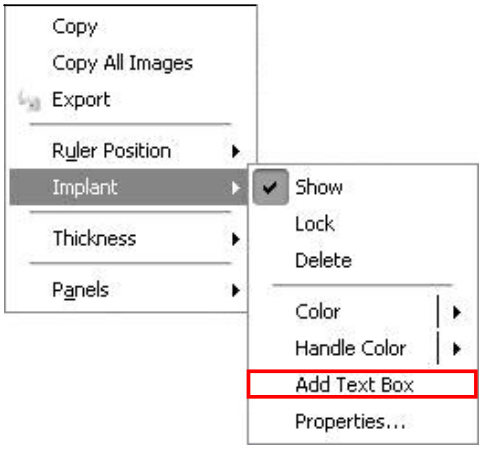
Overlay Properties

Overlay the implants various properties: name, upper and lower diameters, and length.

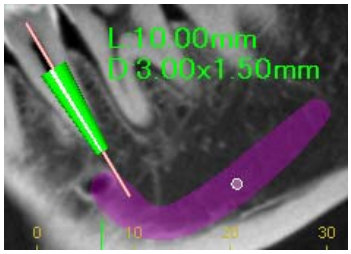
1. Right-cick the implant to display a pup-up menu.



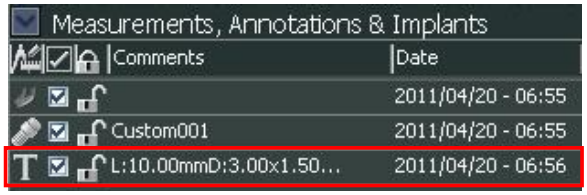
2. Select Implant and then Add Text Box from the pop-up menu.



3. The implant length and diameter will be overlayed onto the image.

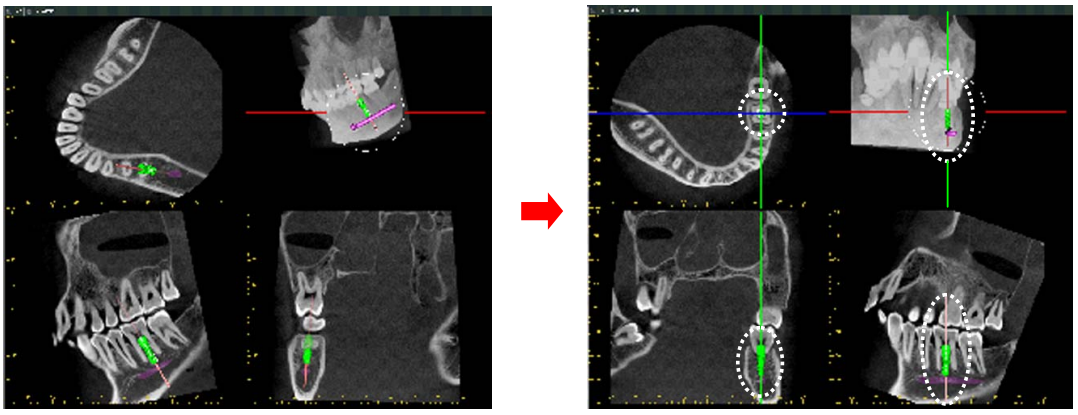


The information for the implant will appear in the Measurements, Annotations & Implants list.



Align the Volume to the Selected Implant

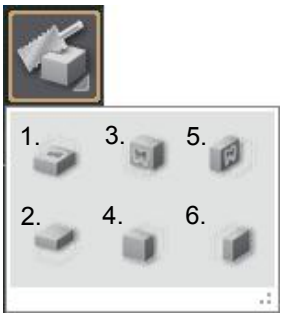
If you click the "Align the volume to the selected implant" button  , the volume will be aligned such that implant is vertical in the X and Y planes with the cursor set to its center.



[Cut Plane Display]

You can cut volume rendered, MIP, or RaySum images along the X, Y, and Z cursor planes.
Click the [Cut the volume] button and select the cutting plane.

Click the “Volume Cut” button  on the task panel to select the plane you want to cut.

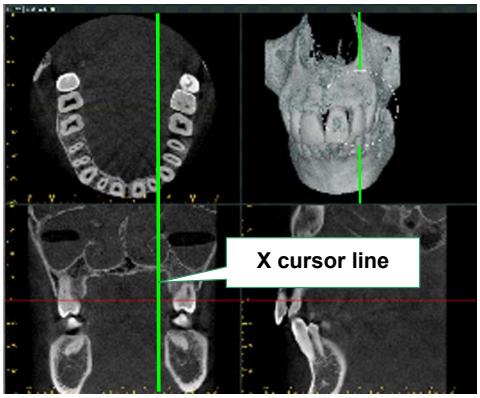


1. Cut along the top side
2. Cut along the bottom side
3. Cut along the front side
4. Cut along the back side
5. Cut along the right side
6. Cut along the left side

* The volume can be sliced along 6 planes.

<Example: Cutting the right side of a volume rendering image with the X cursor plane as the boundary>

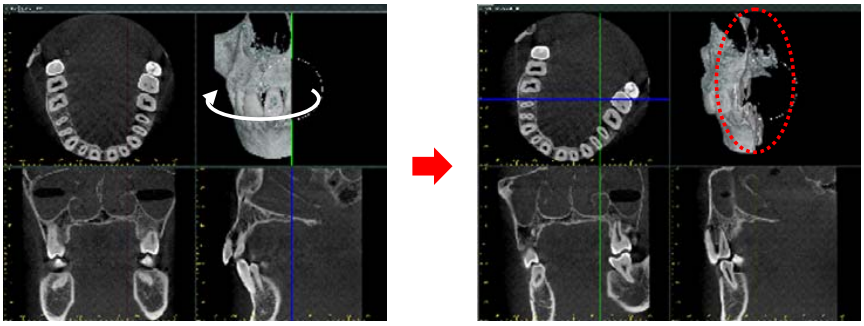
[1] Move the X cursor line to the cutting plane.



[2] Click the “Cut the volume” button  and click the button  .

[3] The volume will be cut at the X cursor plane.

[4] To view the cutting plane, rotate the volume rendered image.

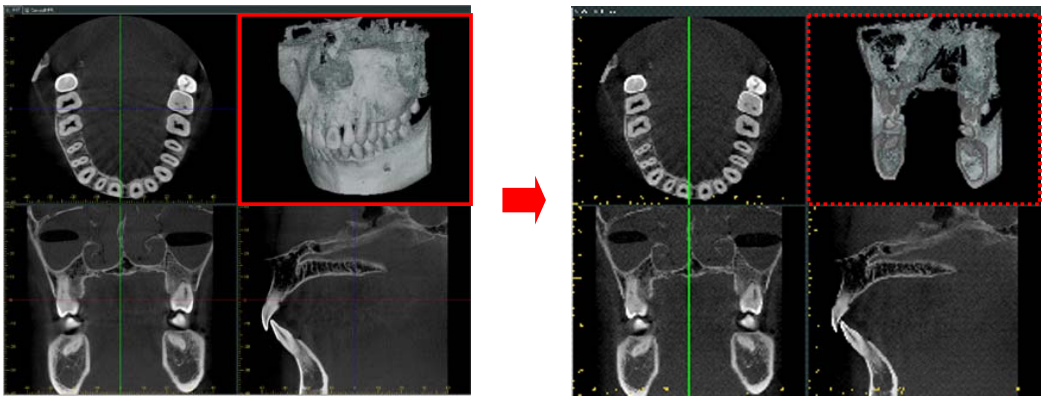


* You can cancel the cut by clicking the "Cancel the cut" button:  .

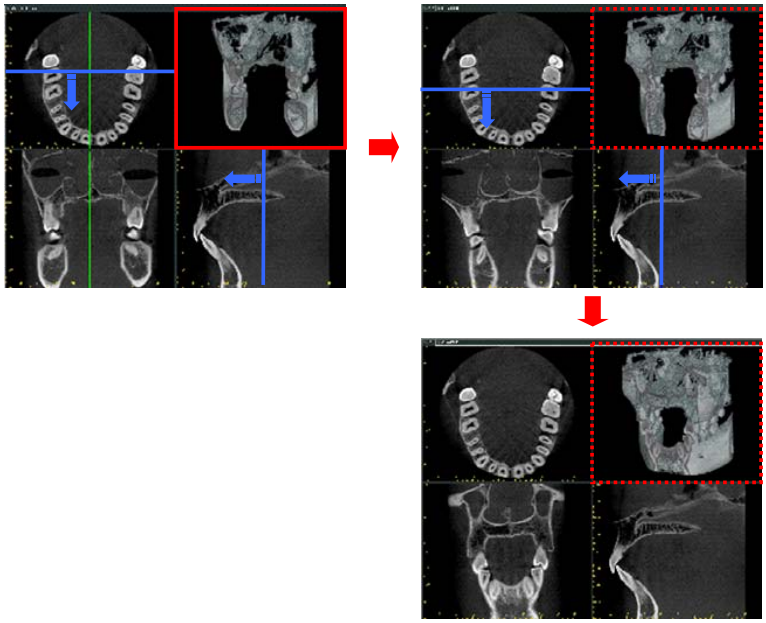
[Y plane dynamic cut]

You can view the Y cutting plane dynamically for volume rendered, MIP, or RaySum images by moving the Y cursor line.

[1] Click the [Y plane dynamic cut] button  to cut the volume along the Y cursor plane and display the cutting plane.



[2] Moving the Y cursor line changes the cutting plane displayed on the screen accordingly.



[3] To end the Y plane dynamic cut, click the [Select an object] button  or [Y plane dynamic cut] button  .

* You can cancel the cut by clicking the "Cancel the cut" button:  .

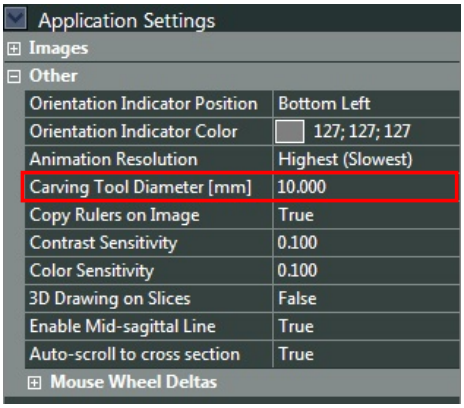
[Carve Images]

You can carve CT slice or volume rendered images.
Carving images is effective for removing artifacts, etc.
If you carve an image, all images shown in 3D Viewer are updated accordingly.

<Example: Carving the right lower 30>

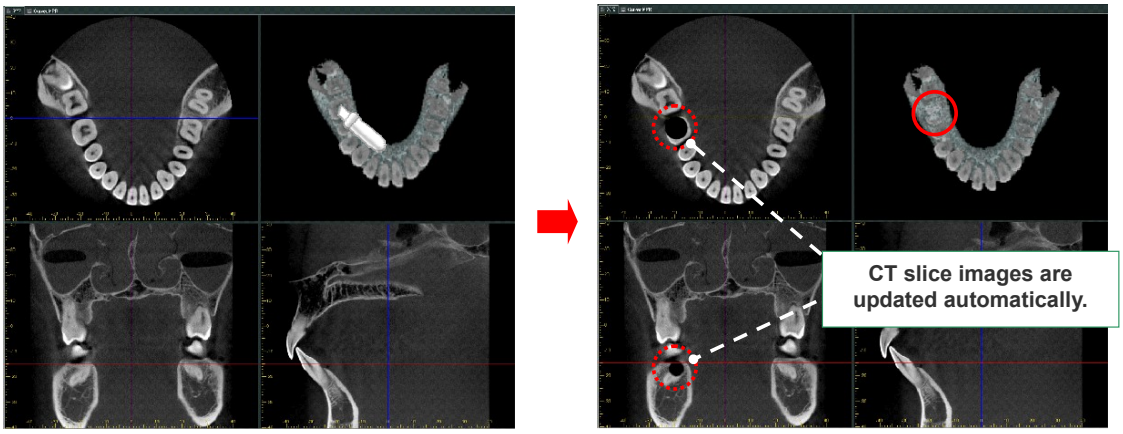
* In this example, to show the right mandibular first molar clearly, the intersection of X, Y, and Z cursor lines were moved to the right mandibular first molar to cut at the Z cursor plane, and the volume rendering image was rotated toward the anterior-inferior direction.

[1] Click the [Settings] button from Panel Controller and enter the initial value for the Carving Tool Diameter [mm] in the "Other" settings under "Application Settings".



[2] Click the "Main" button of the Panel Controller and click the "Carve the volume" button  from "Tools" . The mouse pointer changes to the handpiece shape.

[3] Move the pointer to the right mandibular first molar on the volume rendering image and right-click the image to carve the tooth. The CT slice images are updated automatically.



To carve the tooth deeper, repeat.

[4] To end carving, click the [Select an object] button .

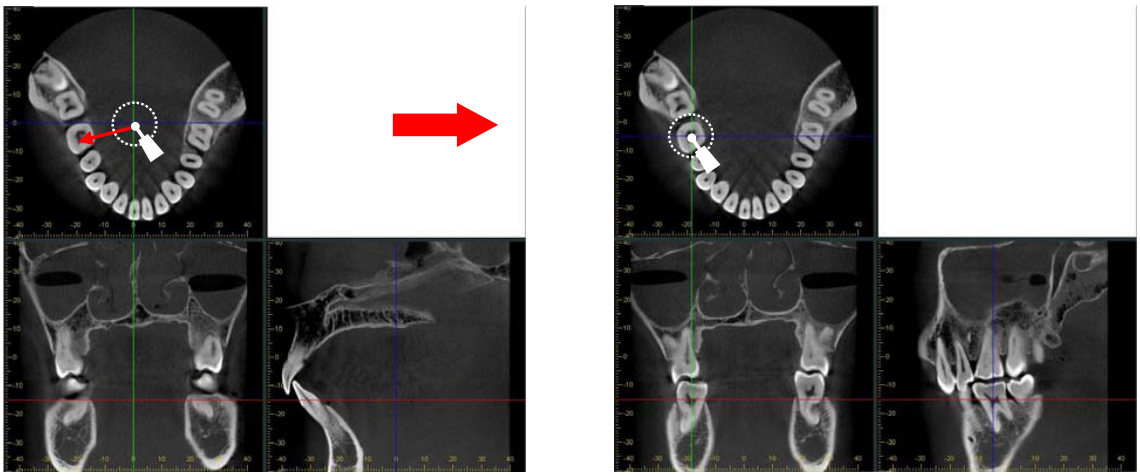
Undo carving

If you repeatedly right-click while holding Ctrl while carving, you can undo the carving in order from the last carve.

Specifying the carving location by moving the mouse pointer

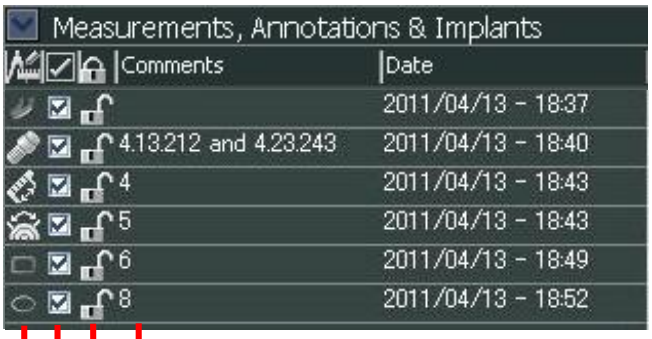
After clicking the button, hold the right mouse button and move the mouse pointer to the carving location. Moving the pointer will move the intersection of the X, Y, Z cursors to the mouse position and update the slices.
You will no longer need to display the carving location image before carving.

<< Example: Specifying a carving position on the right first mandibular molar from the 0, 0, 0 intersection of the X, Y, and Z cursors. >>



5.5. Measurements, Annotations & Implants List

You can check the results of measurements made in the XYZ view and CurvedMPR view and the drawing histories such as the number, type, and creation date, etc. for objects like mandibular canal.



Comments are displayed.
The figures will be input automatically when creating a distance measurement, angle measurement, rectangle, ellipse, arrow, text, freehand curve, polygon, or straight line for measuring a line profile.
Implants on the list will be identified by their names.
You can edit a comment by double-clicking the comment.

This switches between Locked ( ) and Unlocked ( ) for editing.
If it is locked, you cannot change the position and orientation of the object or edit the properties.

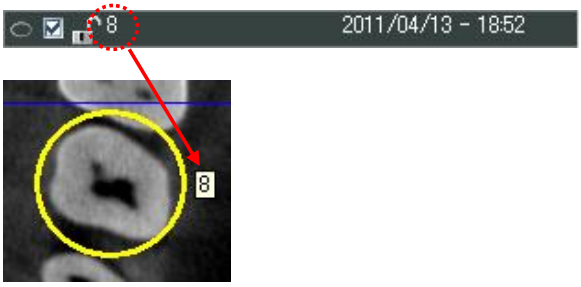
This shows or hides the object.
The object will be displayed if this is checked.

The icon indicates the object type.

Comment display

If you place the mouse cursor on or near an annotation, line, shape etc., the comments will be shown in a tool tip.

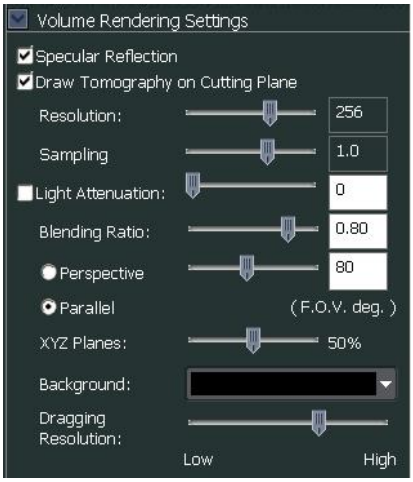
<< Example: 8 is written in the comments of the oval object. >>



6. Setting Panel

6.1. Volume Rendering Settings

You can set the properties for volume rendered images.
You can set properties such as Specular Reflection, Light Attenuation, Blending Ratio, Projection, etc.



<Draw Tomography on Cutting Plane>

Check <Draw Tomography on Cutting Plane> to allow the tomographic view to be displayed for the cutting plane of the volume rendering image.

<Specular Reflection>

If you check the Specular Reflection checkbox, the effects of light reflection will appear strongly around the center of images.


Without specular reflection


With specular reflection

<Resolution>

Moving the slider to the right increases the resolution of the volume rendered, MIP, and RaySum images.

<Sampling>

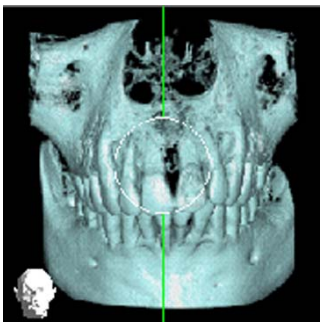
Increasing Sampling improves the image display speed, but may result in laminar artifacts.
Decreasing Sampling slows down the display speed, but the images will be displayed with more detail.

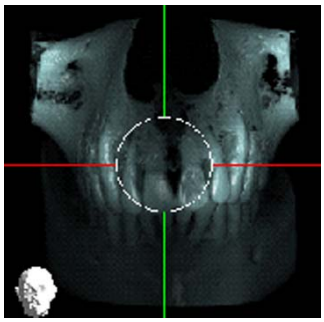
⚠NOTE

- ***The image display speed depends on the performance of the i-Dixel computer.***

<Light Attenuation>

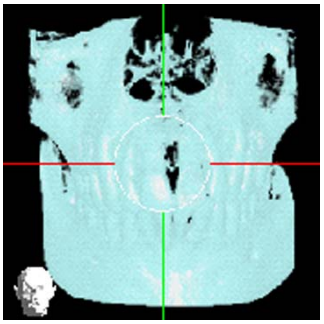
You can reduce the diffused light by checking the Light Attenuation checkbox.
Moving the slider to the left decreases the light attenuation.

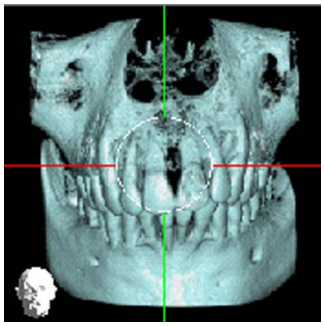

Without light attenuation


With light attenuation

<Blending Ratio>

Blending Ratio represents the ratio of ambient light to diffuse light.
Moving the slider to the right increases the blending ratio emphasizing convex and concave.


Small blending ratio


Large blending ratio

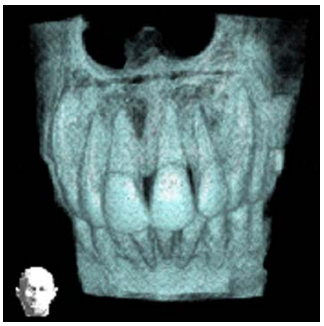
<Projection>

You can select either Perspective or Parallel projection.

With perspective projection, changing the angle of view results in apparent changes in the distance from the point of view.

Parallel projection

Perspective projection (Angle of View: 10°)



Perspective projection (Angle of View: 20°)

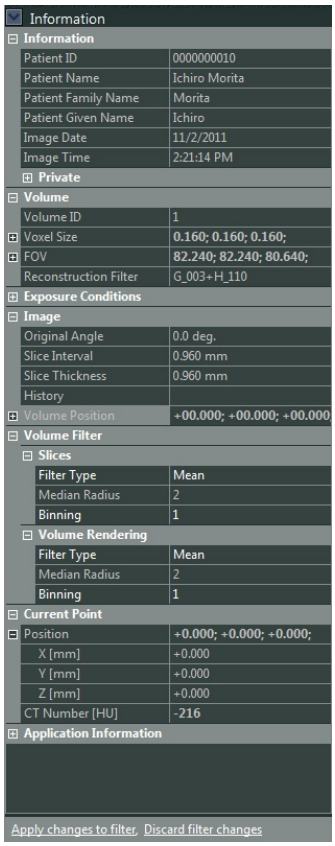
Perspective projection (Angle of View: 80°)

7. Data Panel

7.1. Information

This gives information about the currently displayed image, image quality adjustments and the version of the i-Dixel One Volume Viewer application.

Information: Gives patient information.
Volume: Gives voxel size etc.
Exposure Conditions: Gives tube current and voltage etc. for the CT exposure.
Volume Filter: Tells how image quality of currently displayed image has been altered.
Also, can be used to alter image quality.
Current Point: Gives the x and y coordinates for the point where the mouse cursor is.
Application Information: Gives the version of the i-Dixel One Volume Viewer application.



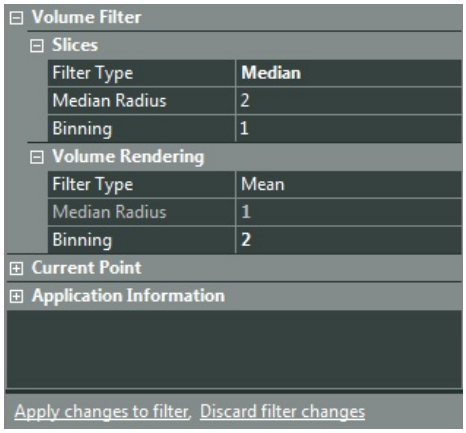
Volume Filter

The Volume Filter item can be used to alter the image quality without reconstructing the CT volume data or re-slicing it. There are two types of filters: a median filter and a mean filter.

* The median filter compares to neighboring voxels gives them an average value.
  This eliminates voxels that have sharply different values and the resulting noise.

* The mean filter compares values for neighboring voxels and smoothes out the image quality.
  Also it combines neighboring voxels by adjusting the binning, which, in turn, changes the size of the voxels.

“ Slice ” can be used for XYZ slice images displayed in XYZ View, axial, panorama and cross section images displayed in CurvedMPR and dual CMPR View.
“ Volume Rendering ” can be used for volume rendered images, MIP images and Ray-Sum images.



Adjust the Median Filter in the following way.

1. Select Median as the filter type.
2. Set the Median Radius.
3. Click “Apply changes to filter.” The adjusted image will appear in the 3D Viewer.

Adjust the Binning in the following way.

1. Select Mean as the filter type.
2. Set the Binning.
3. Click “Apply changes to filter.” The adjusted image will appear in the 3D Viewer.

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