Application

Operating Manual

Build 1.0.1.9163
Version 1.0

Cybermed
Advantage beyond imaging

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1. Introduction

Ondemand3D App is dental imaging software which provides 3D visualization of patient scanned image. Ondemand3D App provides MPR (Multi-Planar Reformat), panoramic, cross-sectional, and TMJ view and many functions for prompt and precise diagnoses.

1.1 Main Function

Ondemand3D App makes it possible to manage and organize medical images more easily and provides advanced tools for 2D and 3D analysis having a variety of visualization and reformatting functions. The main functions of Ondemand3D App are arranged into the following different modules.

1.2 DBM (Database Manager)

DBM module manages DICOM data. You can store and manage the data in local disk as well as in the server. You can simply drag & drop the DICOM data to copy (or move) to different location.
DBM is capable of writing DICOM files to CD/DVD. You can store DICOM images into CD/DVD with DICOM CD Viewer.

1.3 DLB (Dynamic LightBox)

Dynamic LightBox makes possible the quick and easy browsing of volumetric 3D images.
It provides axial, sagittal, and coronal browsing and thickness oblique and 3D rendering of a cubic area of interest at any browsing point.

1.4 DVR (Dental Volume Reformat)

Dental Volume Reformat makes it possible to reconstruct 3-dimensional volumetric images into specific reformatted dental images such as panoramic, cross-sectional, sagittal, and coronal images along the TMJ. Not only conventional 2D images but also thickness imaging, MIP, and even 3D rendered images are supported. Implant simulation is also supported.

1.5 Implant Planning (optional)

Implant planning is a functional addition to the DVR module. It provides a commercial implants library, simulations of implant placement, bone structure analysis and location of the mandibular canal. These functions make it possible to do pre-surgical planning with a new level of precision.

1.6 3D (optional)

The 3D module provides state of the art 3D visualization, segmentation, and analysis functions for DICOM images. 3D module has various rendering modes such as VR (Volume Rendering), MIP/MinIP, and more.
Its unique 3D zoom function enables users to visualize small anatomical structures with a high degree of precision and quality.

1.7 X-ray Generation (optional)

X-ray Generation is an optional module for creating perspective-projected X-ray images such as lateral or frontal Cephalometric images. Just pick a pair of points which corresponds to the virtual ear-rods, this module will generate the lateral Ceph X-ray image and frontal X-ray image in the same configuration and magnification as a real Cephalostat.

1.8 Report

The Report module keeps track of captured images of Ondemand3D App and you can create a custom report in HTML format with captured images. Also, Report module supports extended functions such as save, print, make films (by DICOM print) and transmit the captured images to DICOM/PACS servers.

1.9 Project Viewer (optional)

Project Viewer is not a module, but a separate program for viewing project files on the server. Project files can be made by Ondemand3D App modules and include all the work done using the Ondemand3D App modules.

2. Installation

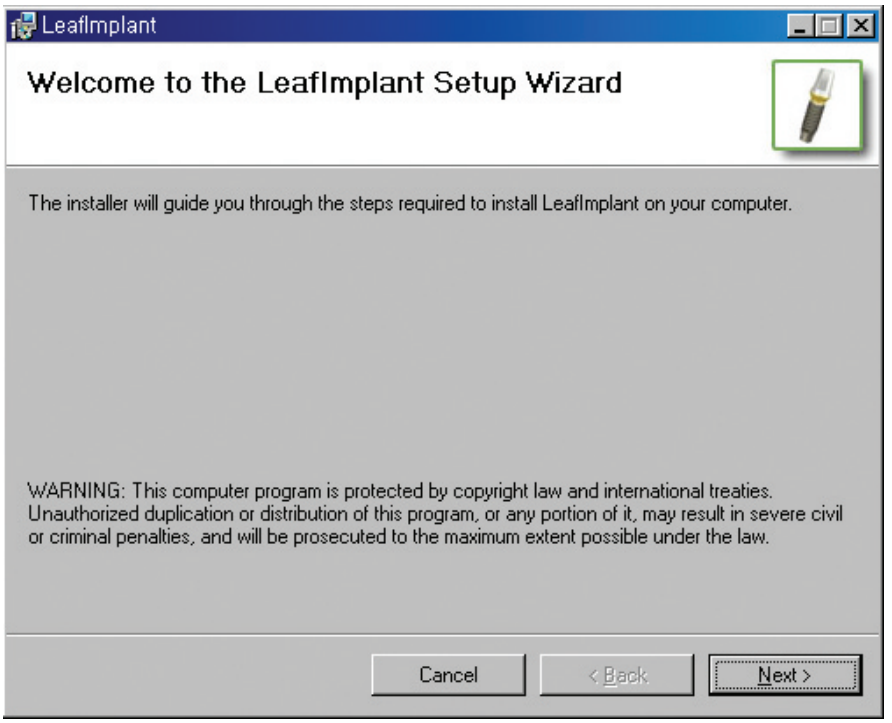
2.1 System Requirements

CPU	Pentium IV 2.1GHz Core Duo
Memory	More than 3GB
HDD	30GB free space
Graphic Card	1280X1024, 32bpp, Minimum Geforce Go 6600 Minimum Mobility Radeon X700 ※Intel GMA series graphic card is not allowed to use.
OS	Microsoft Windows XP(SP2),Vista(SP1)
Explorer	Microsoft Internet Explorer 7.0
Etc.	USB port, Mouse, Keyboard, Network card, CD/DVD-R/RW driver

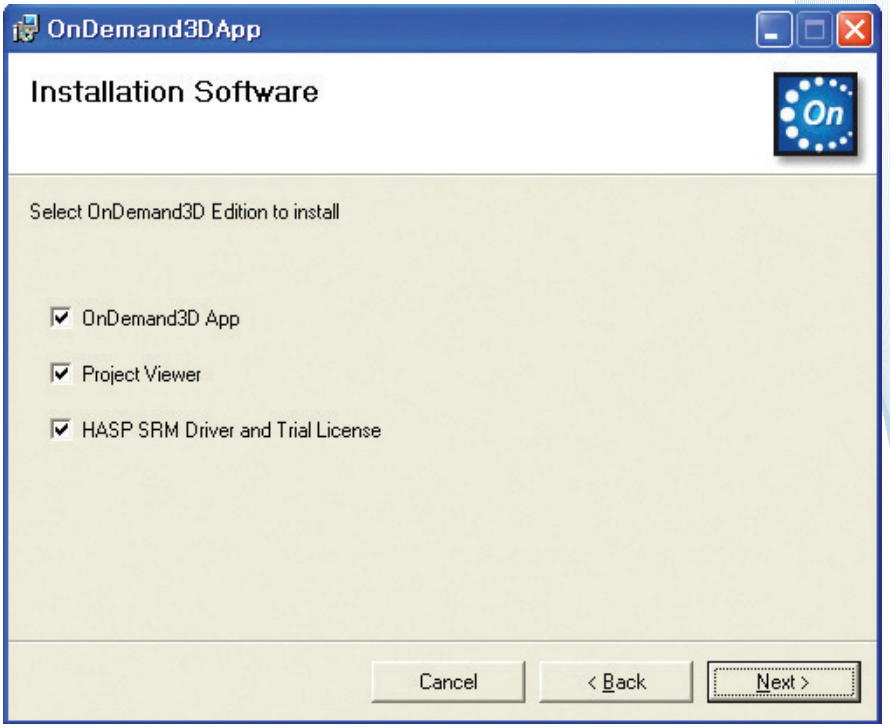
2.2 Installation of Ondemand3D App and Project Viewer

Step 1> Run the 'Setup.exe' file in the Setup folder by double clicking it.

Step 2> Following the Install Shield wizard, click the 'Next' button and proceed as shown in the following image.



Step 3> You will see Installation Software. Uncheck 'HASP SRM Driver and Trial License' if HASP driver is already installed. Otherwise, proceed as default by clicking 'Next' button.



Info	There could be a little pause at the end of installation. This is not a problem, so do not try to cancel installation.

Step 4> When you complete the installation, Ondemand3D App short-cut icon will be shown on the desktop. (Always be sure to plug the HASP USB key to PC before launching OnDemand3D App)

Step 5> If you want to simulate implant planning, install the Leaf Implant setup. Leaf implant is implant library which is managed and updated by Cybermed, regularly.

3. DBM

3.1 Overview

DICOM has been used to connect various medical equipments with different types of image information since the publishing of protocol at an RSNA (Radiological Society of North America) meeting in 1992. Since then, working groups of the ACR-NEMA (American College of Radiology-National Electrical Manufacturers' Association) have established to work on international standardization. Currently, DICOM 3.0 is made public and consolidated as a standardized format for medical image files and inter-equipment networking.

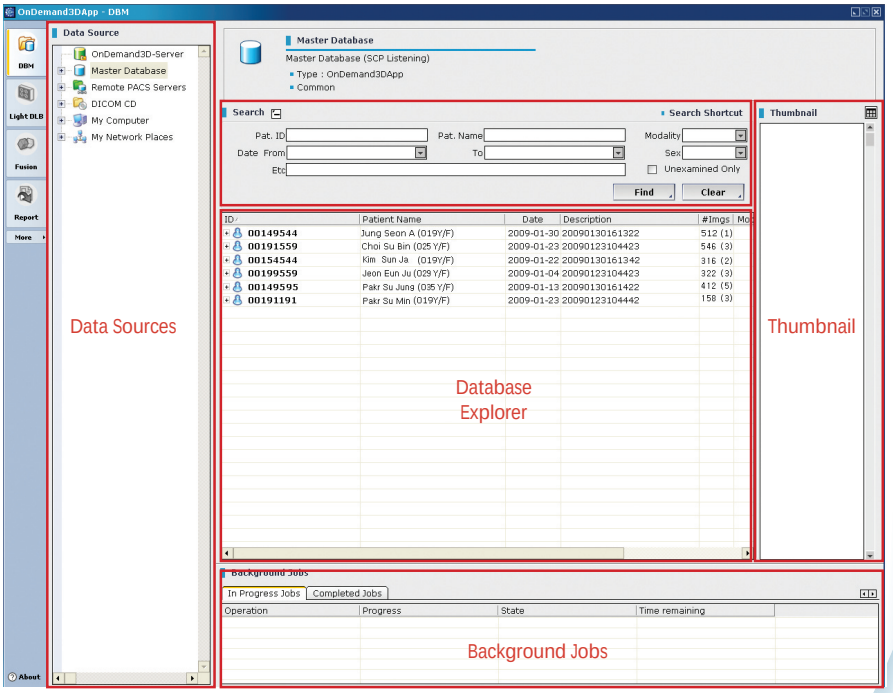
Today, most medical or dental imaging equipment utilizes DICOM format and Ondemand3D™ stores DICOM data in the server database or a local database. Ondemand3D App DBM connects to the Ondemand3D Server and retrieves DICOM data from the server rapidly using an inherent communication scheme called OnDemand3D transmission. Using this server-client scheme, DICOM images can be stored and managed without redundancy.

In addition, Ondemand3D App can connect DICOM compliant PACS servers using standard DICOM communications such as query, retrieve, send and receive.
These functions are useful in large hospitals with PACS servers.

Ondemand3D App can save captured images in DICOM format and Ondemand3D App can save its work status as a project file which is also in DICOM format. These saved files can be stored in a local database or Ondemand3D Server.

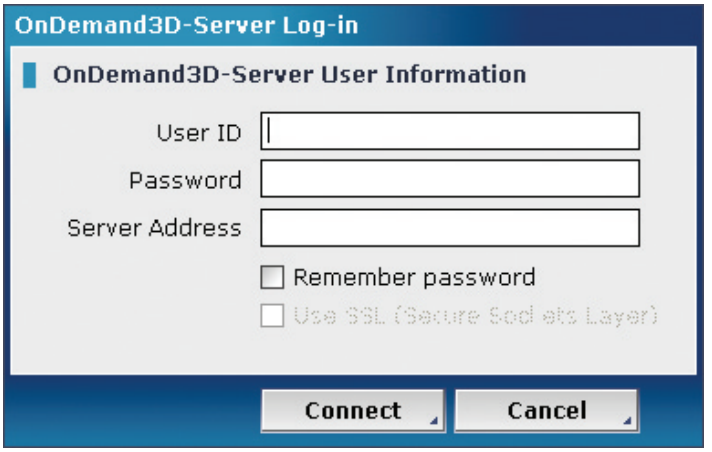
3.2 DBM GUI

The DBM consists of Data Source, Search, Database Explorer and Thumbnail.
Data Source consists of Server, Master Database (Local Database), Remote PACS Servers, DICOM CD, CD Writer, My Computer, and My Network Places.
In Search, you can query the database using user defined keywords. Database Explorer displays information about patients, studies and series of DICOM images



3.3 Log onto the Ondemand3D Server

To retrieve and load DICOM files to the Ondemand3D Server, select Ondemand3D-Server as the Data Source. Then a dialog box will appear as shown in the following figure.
To access the Ondemand3D Server, input User ID, Password, and the Server name. (During the installation of the Ondemand3D App, the User ID, Password, and Virtual directory name are set. The Server Address consists of 'IP Address/Virtual directory name')



3.4 Data Loading

You can open one or more studies or series from the Database Explorer with any module of Ondemand3D App. If you choose Ondemand3D Server, the contents of the selected database are displayed on the Database Explorer.

ID	Patient Name	Date	Description	#Imgs	Mod..	Comment
00149544	Jung Seon A (019Y/F)	2009-01-30	20090130161322	512 (1)		
00191559	Choi Su Bin (025 Y/F)	2009-01-23	20090123104423	546 (3)		
00154544	Kim Sun Ja (019Y/F)	2009-01-22	20090130161342	316 (2)		
00199559	Jeon Eun Ju (029 Y/F)	2009-01-04	20090123104423	322 (3)		
00149595	Pakr Su Jung (035 Y/F)	2009-01-13	20090130161422	412 (5)		
00191191	Pakr Su Min (019Y/F)	2009-01-23	20090123104442	158 (3)		
00191559	Choi Su Bin (019Y/F)	2009-01-23	20090123104423	513 (2)		
1		2009-01-23	Series0001	512	CT	
700		2009-02-16	OnDemand3DApp Project:	1	PRJ	

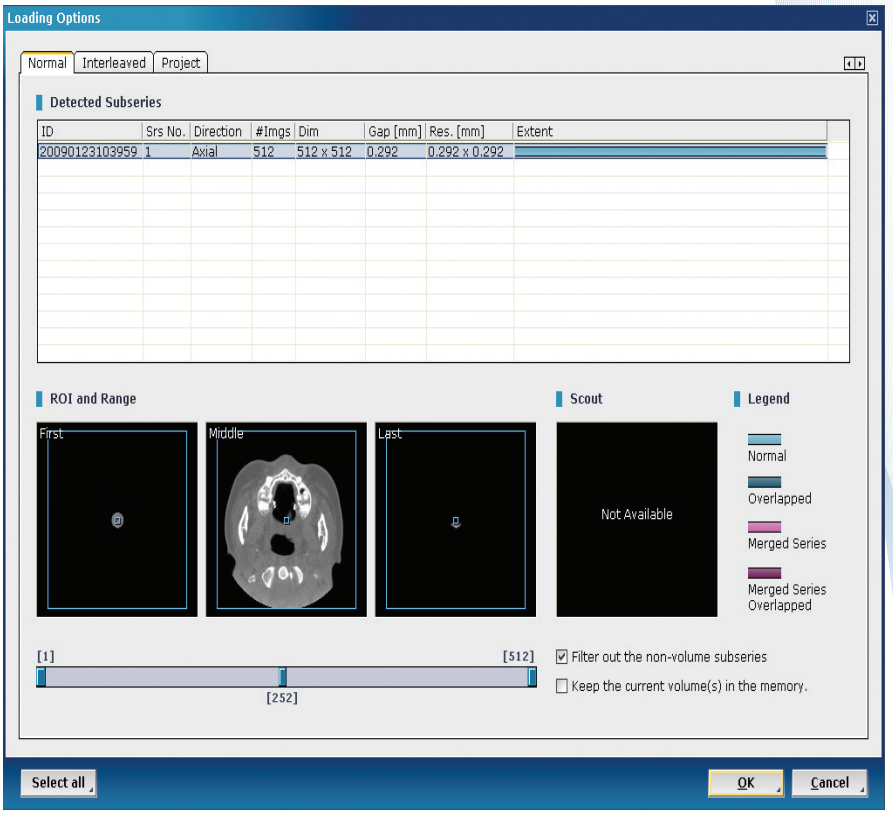
To load DICOM images, select a series and click a module button of your choice.
If a study is opened without making any selection, nothing will open or previously loaded images will remain open.

WARNING!	If you load new data, the previous loaded volume data and work will be lost. To keep the previous volume data, please refer to section "3.4.1 Loading Option".

Another method of loading data is through a project. A project is a file which includes DICOM image data and the job done by operator. Once the user opens a DICOM project file data series, can view the details of the project saved. It will be described in section 4.2 and loading the files in section 3.4.2. To load project files, double click the project file on the database list.

3.4.1 DICOM File Loading Options

You can set more detailed options for loading data in the following dialog.



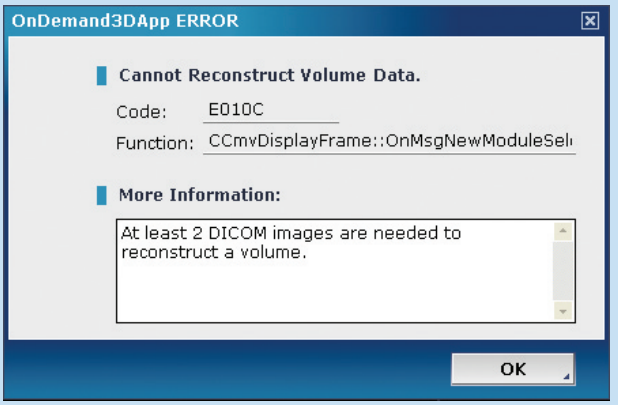
Detected Sub-series	When multiple series are selected in the DBM, all of the series are listed in Detected Sub-series. You can choose single or multiple series by pressing the Shift key (or the Ctrl key) and clicking the left mouse button simultaneously.
ROI (Region Of Interest)	By dragging one of the blue boxes shown in the 'First', 'Middle' or 'Last' image view in the dialogue, you can adjust a part of the volume data, i.e. the ROI, to be loaded into memory.
Filter out the non-volume sub-series	Filter out the non-volume sub-series which are unavailable to make volume rendering models.
Keep the current volume(s) in the memory	If this option is selected, the current volume in the memory will not be removed. After loading a new data, click the Volume button at the top of Main Tools. When the context menu appears, you can select and load the stored volume data.
Range	You can adjust the range of images in the selected series by dragging the tips of the blue slide bar indicating the currently selected images.

CAUTION

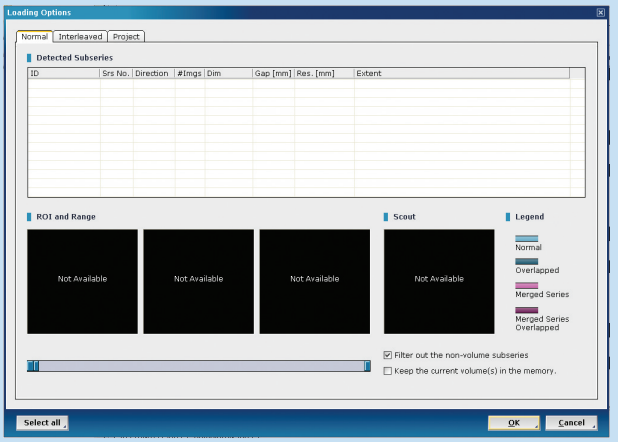
When you load DICOM images into certain modules such as DVR(Dental Volume Reformat), 3D, or DLB(Dynamic LightBox), please keep the following points in mind.

Ondemand3D App does not permit the loading of one slice of data.

If you try to load one slice of a study or series, the following error message will appear. To reconstruct a volume, at least 2 slices of DICOM data are needed. However you can see the image in the Lightbox of the Thumbnail area (See 3.6)

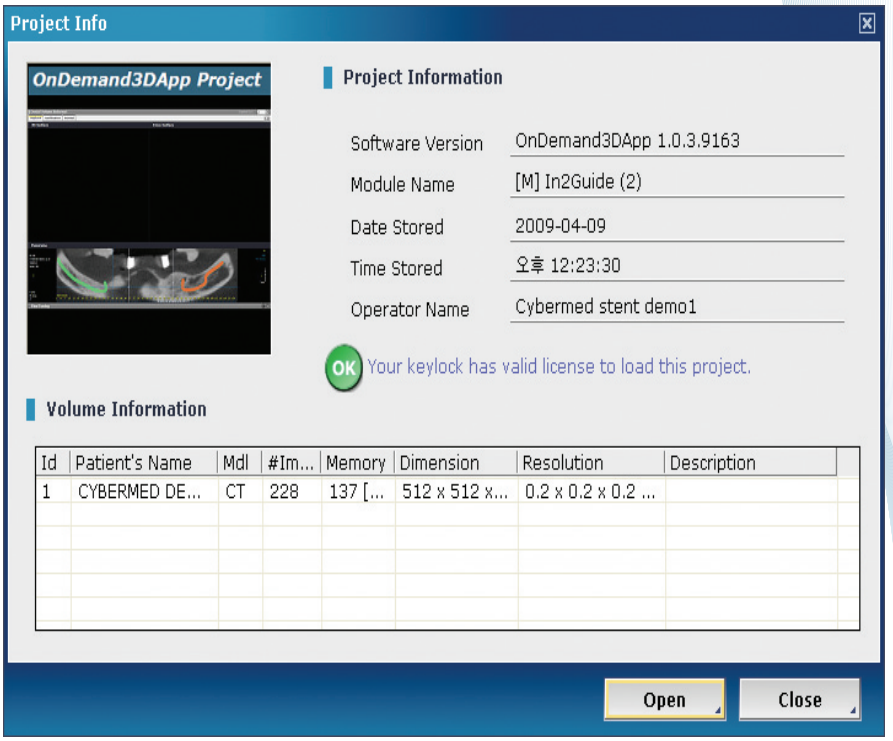


Ondemand3D App does not permit the loading of RGB DICOM data.
If you try to load RGB DICOM data, the ROI and Range box in the Loading Options dialog will notice you that the data you try to load is not available. However you can see the image in the Lightbox of the Thumbnail area (See 3.6)



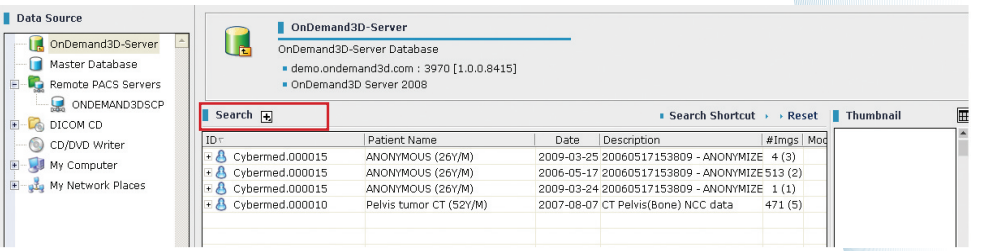
3.4.2 Project File Loading

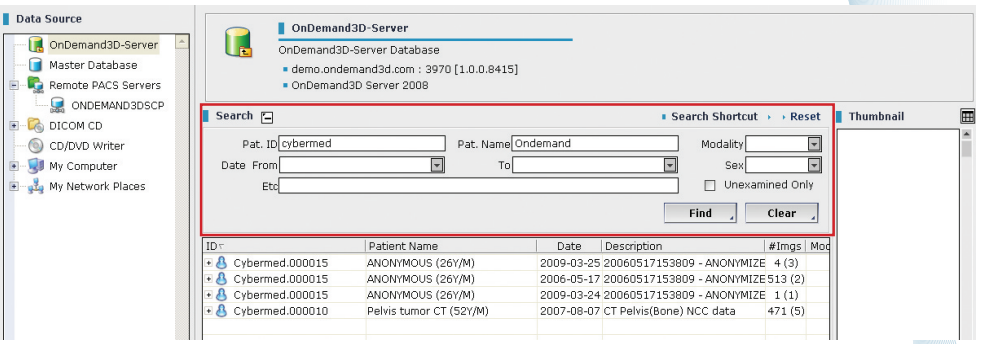
To load a project file, just double click the project file from the database list. Then the following project information dialog box will appear. Then select the Open button to load the project file with corresponding DICOM data.



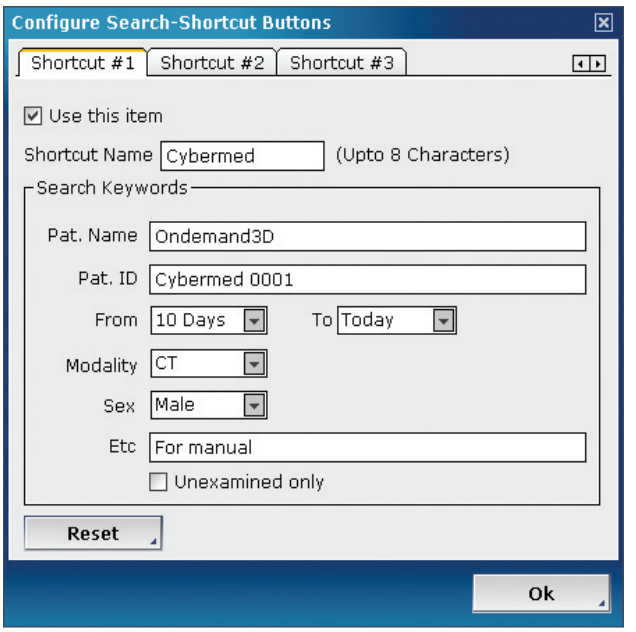
3.5 Searching Databases

You can toggle the Search window by clicking the Search button (Search) and search the database (i.e. patient name, patient ID, study date and modality) with keywords.





You can also save the keywords in the Search Shortcut box.



You can use the "*" mark for wildcard matching as shown below.

V*	Shows all studies with patients' names beginning with 'V'.
X	Shows all studies with patients' names containing an 'X'.
*P	Shows all studies with patients' names ending in 'P'.

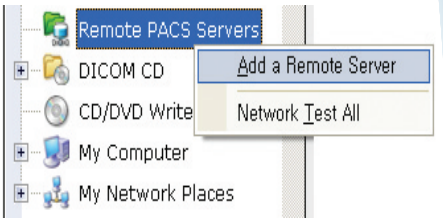
3.6 Thumbnail and LightBox

Before opening a study or series, you can see the images of the study as thumbnails located on the right side of the DBM.

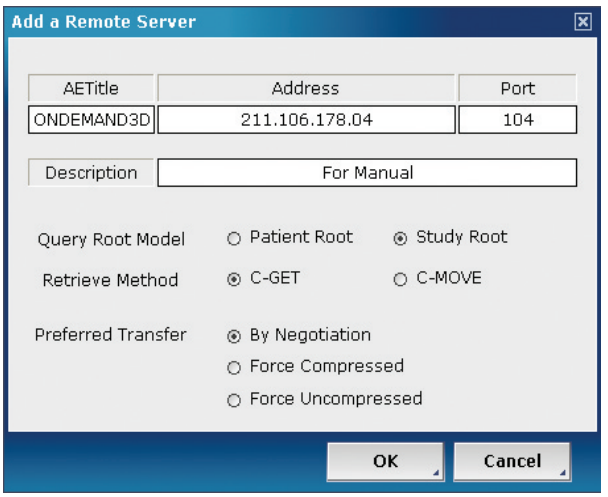
You can simply move to the LightBox directly by clicking the ( ) button in the upper right corner of the thumbnail after selecting a series.

3.7 Communication with a Remote PACS server

Add Remote Servers
In Data sources, click 'Remote PACS Servers' with the right mouse button.
Then a context menu will appear. Select 'Add a Remote Server' from the context menu, then a dialog box will appear as shown in the following figure.

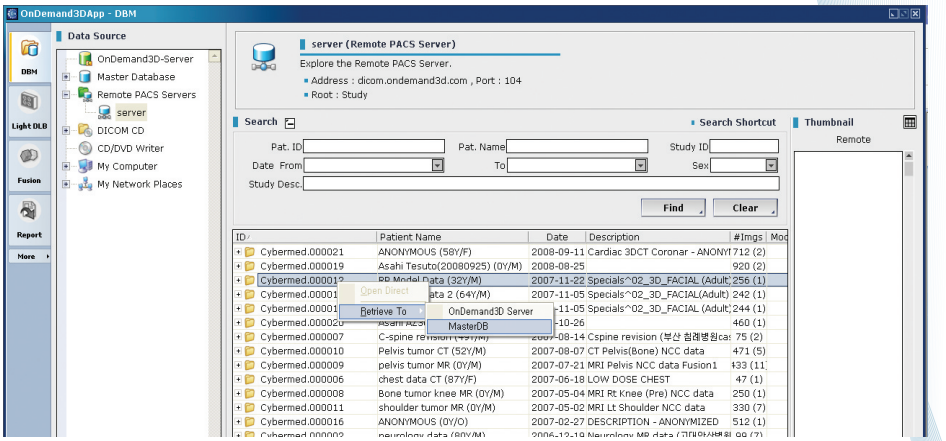


Input the AE Title, IP Address, Port Number and click the OK button.
A connection with the Remote PACS servers will now be made.



3.7.1 DICOM Query/Retrieve from a Remote PACS server

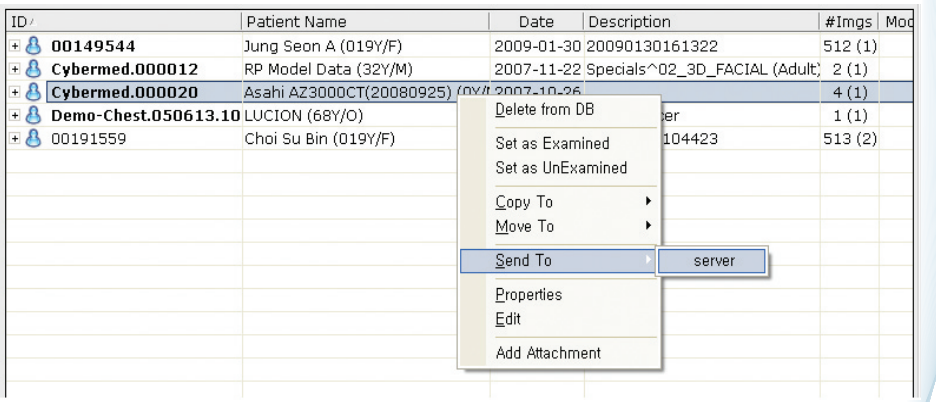
To query or retrieve DICOM data from remote PACS servers, choose a PACS server in the Data Source pane. Then input keywords and click the Find button (You can search for DICOM data from the Remote PACS server the same way as is done for the Master Database or Local Databases).
After finding DICOM data (a study or series), click the right mouse button over it and select 'Retrieve To' in the context menu which appears as shown in the following figure. You can save the DICOM data in the Master Database or Local Databases.

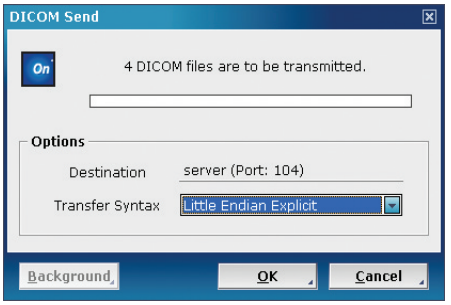


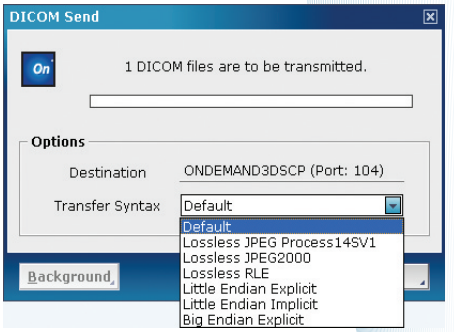
Info	You cannot search images with a wildcard ('*') if the Remote PACS server does not allow it. Please consult the system administrator of PACS server.

3.7.2 Sending DICOM to Remote PACS server

You can select one or more items on the study/series lists in the Master Database or one of the Local Databases and transmit them to a Remote PACS server through the DICOM network. Using the mouse, right click the list and select 'Send To' in the context menu as shown in the following figure. Choose the remote PACS server to which you want to send DICOM.







Choose the Transfer Syntax and then click the OK button. If you click the Background Job button, this job will be processed in the background and you can do other jobs during the transmission.
We recommend to load data with Default setting.

▶ Type Transfer Syntax
We support various Transfer Syntax supporting users select as an option.

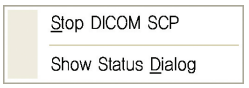
3.7.3 Receiving Images through DICOM SCP

The Ondemand3D App supports the DICOM SCP (Service Class Provider) function which receives DICOM data from any DICOM compliant PACS client software. The received DICOM data is saved in the default database of the Ondemand3D App.

DICOM SCP Status
You can check the DICOM SCP status of the Ondemand3D App in the System Tray which is in the bottom right area of the windows screen.
A different icon may be displayed depending on the system's OS version.

	Shows the DICOM SCP is idle
or	Shows the DICOM SCP is stopped
Animation	Shows the Ondemand3D App is receiving images from another system

If you right click the DICOM SCP icon, a context menu appears as shown in the figure below.

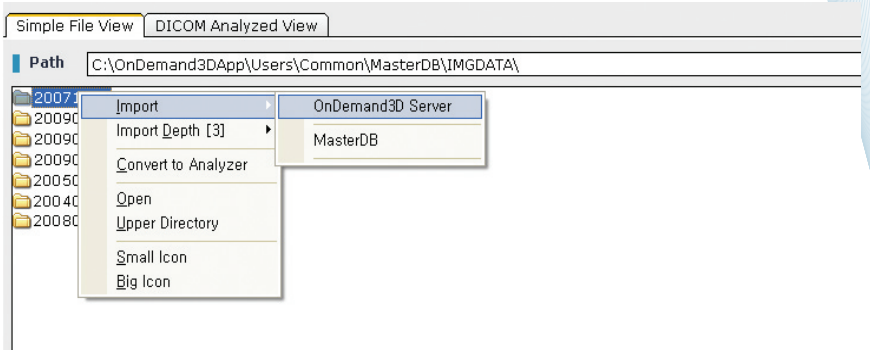


Start DICOM SCP/ Stop DICOM SCP	Starts or stops the DICOM SCP operation according to the current SCP status
Show Status Dialog	Shows the dialog box displaying the current DICOM SCP status

3.8 File Browser

3.8.1 Adding a Study/Series to a Database (Importing)

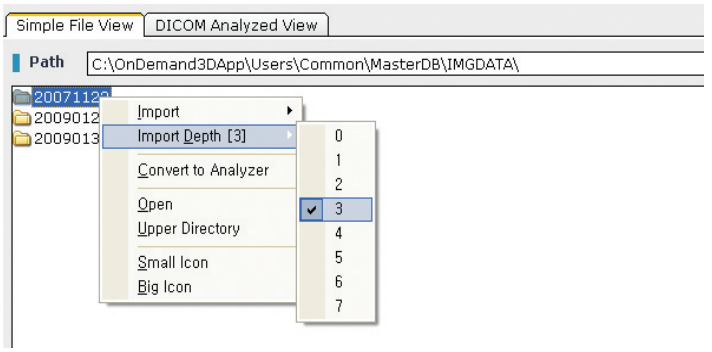
To query or retrieve DICOM data from remote PACS servers, choose a PACS server in the Data Source pane. Then input keywords and click the Find button (You can search for DICOM data from the Remote PACS server the same way as is done for the Master Database or Local Databases).
After finding DICOM data (a study or series), click the right mouse button over it and select 'Retrieve To' in the context menu which appears as shown in the following figure. You can save the DICOM data in the Master Database or Local Databases.



You can import a new study or series to the Master Database or Local Databases in the following 2 ways.
Drag a DICOM data folder and drop it onto the Master Database or Local Databases.
1> Drag the folder with DICOM files and then drop it onto the Master Database

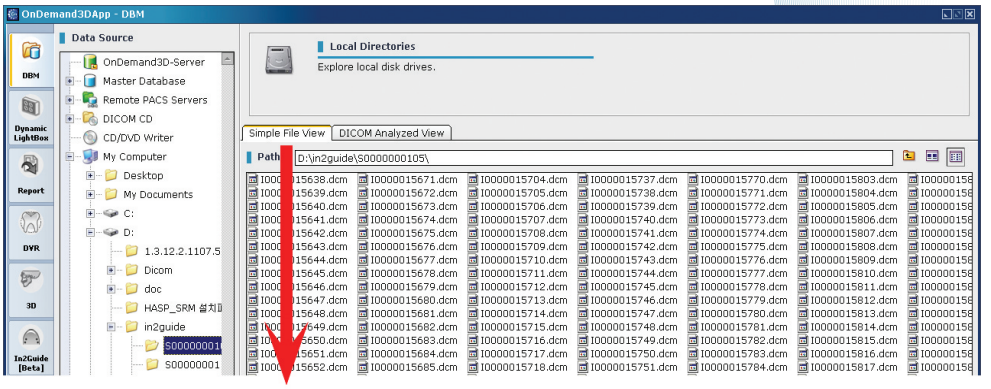
or

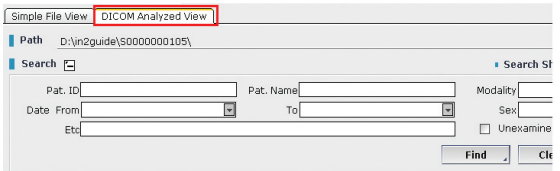
2> Click the DICOM data folder with mouse right button and select 'Import' and 'Master database'. Users can set the range of sub-directories to be imported for the selected folder by setting 'Import Depth' in the mouse right button context menu.



3.8.2 DICOM Analyzed View (Preview)

To browse DICOM data on a local disk drive, click the DICOM Analyzed View tab. Then, you can open it with any preferred modules but it is not saved to any database.



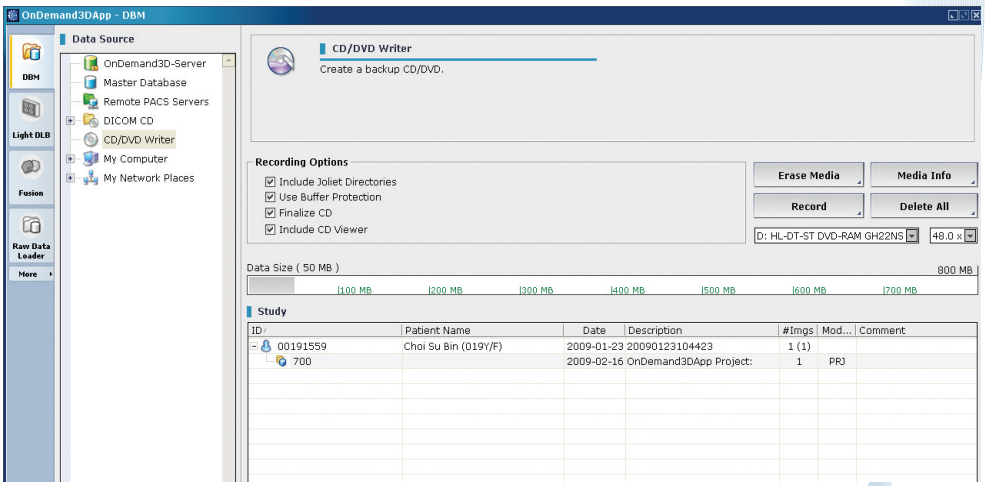


3.9 Study/Series Data Backup

You can make a backup CD if the system is equipped with CD/DVD writer. Select DICOM data in the Master Database or Local Databases, then drag and drop them onto the CD/DVD Writer in the Data Source list.

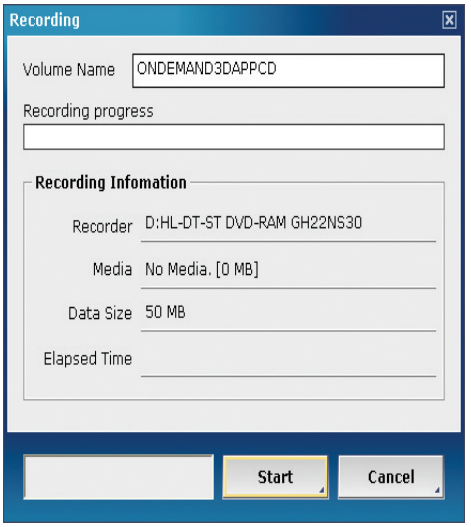
3.9.1. Make a Backup CD

Select CD/DVD Writer under Data Source, then you can see the list of the dragged data.

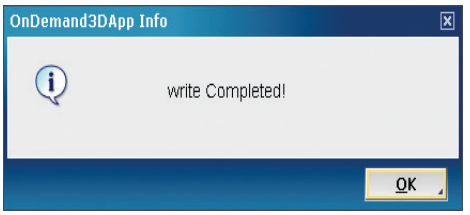


Include Joliet Directory	The standard file system named 'Joliet' is used to support long file names. A CD made without checking this option may result in compatibility problems.
Use Burn Proof	The 'Burn Proof' function is activated to prevent a 'Buffer Underrun' error. This function cannot be used with CD-RW media.
Finalize CD	'Multi-Session' is not supported when the CD is made. However, extra space on the CD made by other programs can be used when this option is off.
Include CD Viewer	Burns the CD Viewer program as well as DICOM data.
Erase Media	If the writing system is CD-RW, users can erase the contents of the CD.
Media Info	Shows the information of the CD-R/RW media
Record	Records the current study in DICOM format
Delete All	Deletes the study taken from the Master or Local Database

First, confirm the DICOM data and then click the Record button. The dialog box appears as shown in the following figure.



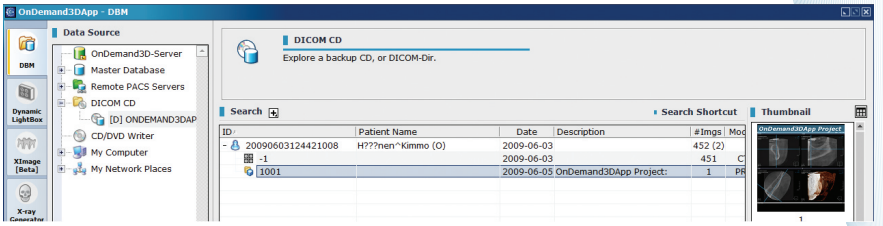
Input the Volume Name and click the Start button. When the writing CD/DVD procedure is finished, the following message will appears.



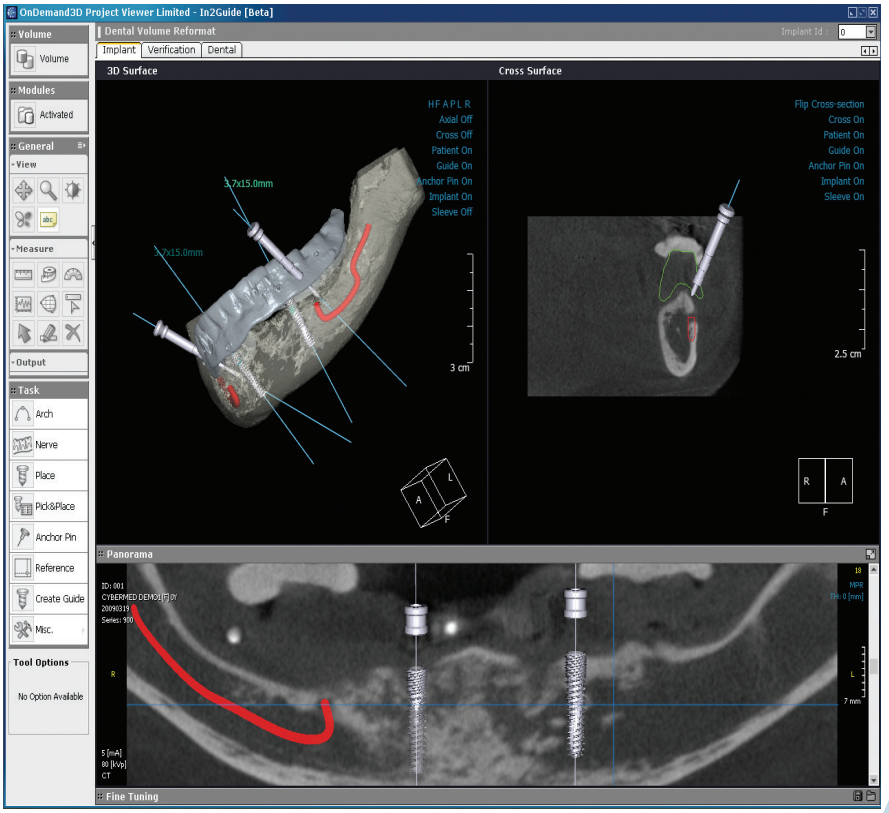
3.9.2. CD Project Viewer

If a project file is included inside a CD/DVD, the CD Project Viewer program will be included. All the functions of Ondemand3D App is available in this CD Project viewer except that it can only open the project files in the CD and it is not capable of modifying projects.

The CD Project Viewer is in most cases automatically launched when the CD is inserted. Data source window is not available in this CD Project Viewer.



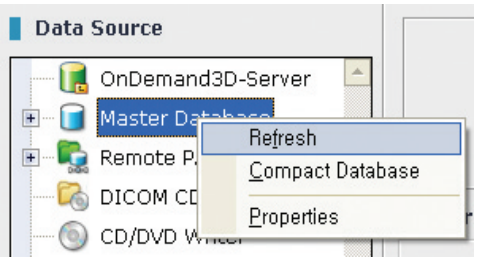
When selecting the project file, the CD Project Viewer is launched.
Although no module selection tab is available with this viewer, users can select available modules in the Modules->Activated list in the tool section.
Users have to press the F2 key to return to the DBM.



3.10 Local Database Management

This section describes local database management functions. Server database management is addressed in the separate Ondemand3D Server Operation Manual.

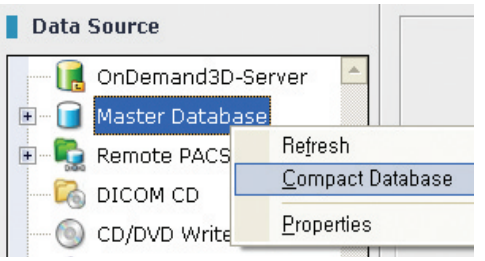
3.10.1 Database Renewal

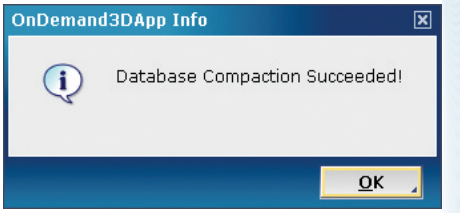


Right click the Master Database in Data Source to bring up the context menu, and select 'Refresh' in order to refresh the database.

3.10.2 Database Compression

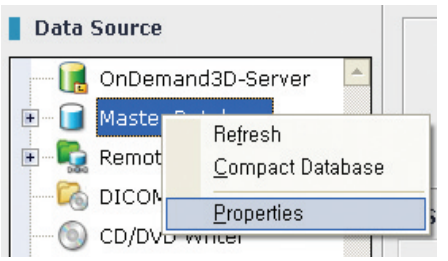
You need to compact the database in the DBM periodically to maintain it in optimal condition. To compact the database, right click the Master Database. And then select Compact Database in the context menu as shown in the following figure.





3.10.3 Database Properties

To see the properties of the Master database right click the database.
Then select Properties at the bottom of the context menu as shown in the following figure



4.1 Main Tools

The main tools includes the commonly used tools of Ondemand3D App modules. Some modules support a part of these tools. Generally, the main tools are displayed on the left side.

4.1.1 Viewing Tools

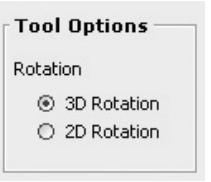
You can see basic tools such as Zooming, Panning, Windowing, Rotating, Inverting, etc. in the View group on the upper left side of the screen. Each main tool item has their own options and these are viewable under the Tool Options group.

Panning

This tool moves a selected image on all panes. Select this tool and then drag an image with the mouse left button.

Rotating

This tool rotates a 3D image on a 3D pane 3-dimensionally. After selecting this tool, drag a 3D image in any direction with the left mouse button. If you select the 'Rotating' button, you can see its 'Tool Options' as shown in the following figure. 3D Rotation is available for MPR image panes but if 2D Rotation is selected, only 2-dimensional rotation (right or left) is available for MPR images.

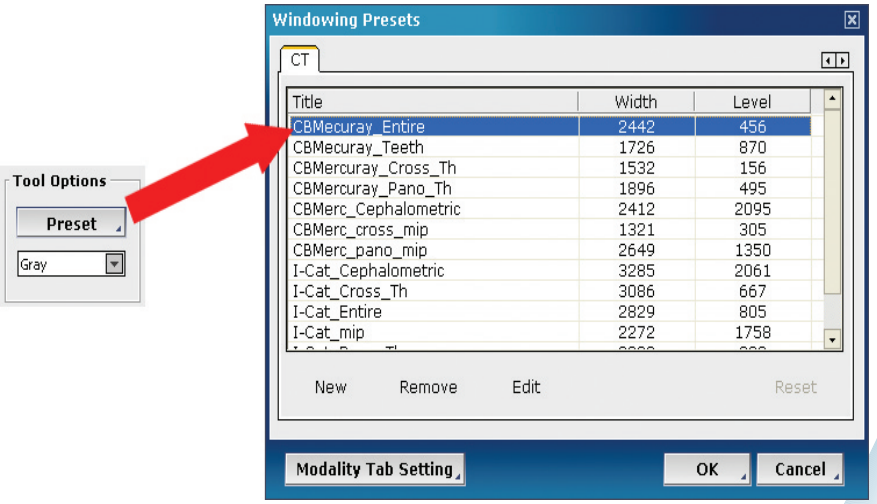


Zooming

This tool zooms in or out of a selected image. After selecting this tool, drag a selected image with the left mouse button.

Windowing

This tool adjusts the 'Window Width and Level' for contrast windowing parameters. After selecting this tool, drag the mouse pointer with the left mouse button. Dragging left and right controls the 'Window Width' value and dragging up and down controls the 'Window Level' value.
If you select the 'Windowing' button, you can see its 'Tool Options' as shown in the following figure. Click the Preset button, then a dialog box for Windowing presets will appear. You can select the Windowing presets you want and apply them to MPR images.



Modality Tab Setting	Adds or removes a tab
New	Adds a new preset
Remove	Removes a selected preset
Edit	Edits properties of a selected preset
Reset	Restores default tab setting
OK	Applies a selected preset value to MPR images
Cancel	Cancels applying a preset value to MPR images

Inverting

This tool inverts all images displayed on the screen. After selecting this tool, all images are inverted. Click the button for this tool a second time and you will see the original images.

Text Overlay

This tool toggles the displaying Text overlay on MPR images. When this tool is selected, text information appears on the screen.

VOI Overlay

This tool sets up VOI (Volume of Interest) which defines rendering on a 3D pane. After selecting this tool, the VOI box shown in blue lines is displayed on MPR panes. You can set up VOI by dragging the left mouse button on the VOI box for each MPR pane.

4.1.2 Measuring Tools

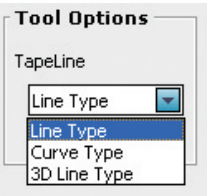
Measuring tools consist of Ruler, Tapeline, Angle, Profile, Area, ROI (Region Of Interest), Note, and Delete All. You can analyze your images more efficiently with these tools which make it possible to retrieve information such as a distance between two points, an angle between two lines, an area of ROI, and an average intensity value (Hounsfield Unit value) of image data.

Ruler

This tool measures a distance between two points on an image using metric [mm] units. After selecting this tool, mark a point by left clicking the mouse and when a second point is marked, a line is drawn between the two points. You can move the line by dragging it with the left mouse button.

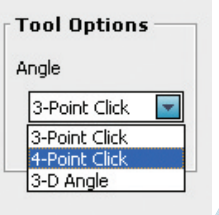
Tapeline

This tool measures the length of a line or curve connecting multiple points marked on an image in millimeters. After selecting this tool, mark some points along a line or curve you want on the image by clicking the left mouse button. To complete your drawing, double-click the left mouse button or click the right mouse button.
If you select the 'Tapeline' button, you can see its 'Tool Options' as shown in the following figure. You can select a line type to draw for the Tapeline.



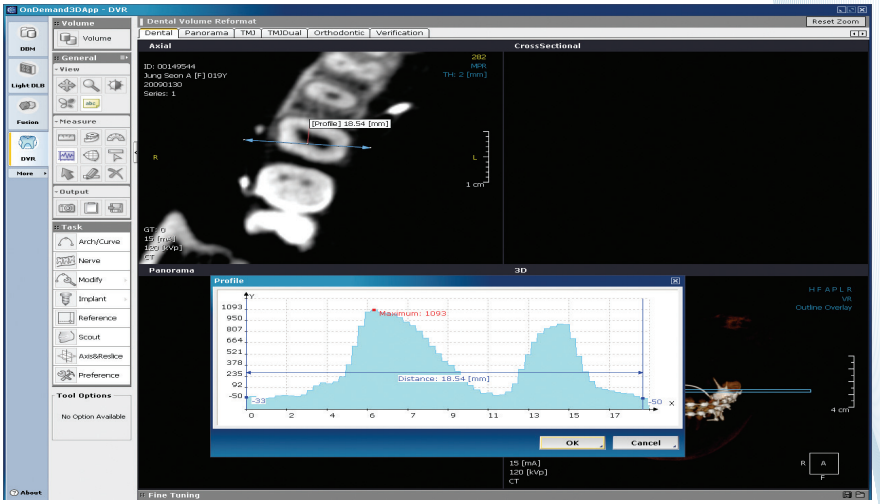
Angle

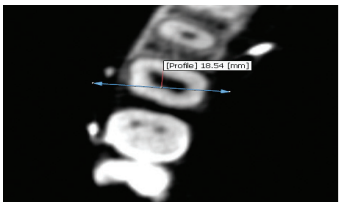
This tool measures an angle between two lines. After selecting this tool, click three or four points to measure the angle.
If you select the 'Angle' button, you can see its 'Tool Options' as shown in the following figure. There are three types of Angle tool options to draw lines for an angle: 3-Point Click, 4-Point Click and 3-D Angle.

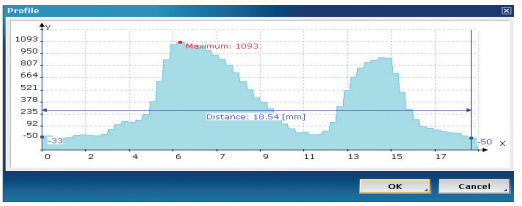


Profile

This tool shows the pixel values on a line in an MPR image with a graph as shown in the following figure. You can move each endpoint on the graph and on the image.





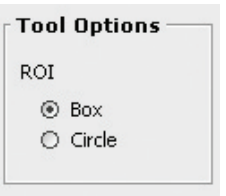


Area

This tool sets up a ROI (Region Of Interest) on an image and measures the area of the ROI. After selecting this tool, mark some points to draw an ROI box by clicking the left mouse button.
If you select the 'Area' button, you can see its 'Tool Options' as shown in the following figure. You can select a line type used to draw the ROI box.

ROI (Region Of Interest) Information

This tool gives information about the average, maximum, minimum, and variance of pixel values. If you select the 'ROI' button, you can see its 'Tool Options' as in the following figure. You can select the ROI box type to be a Box or Circle shape.



Arrow

This tool marks an arrow on an interesting part of an image.

Note

This tool writes a simple memo on MPR images in a location of your choosing.

Delete

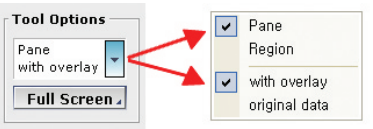
This tool deletes all the analysis results made on MPR images.

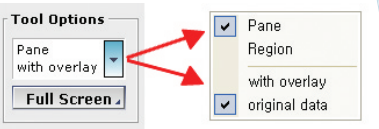
Info	To delete analysis results one by one, select the analysis result you want to delete with the mouse. Then click the 'delete' key on the keyboard.

4.2 Output Tools

Capture

This tool captures the selected images or the entire screen when user click the left mouse button. The captured images are stored on the local hard disk and can be used in the Report module.
If you select the 'Capture' button, you can see its 'Tool Options' as follows.



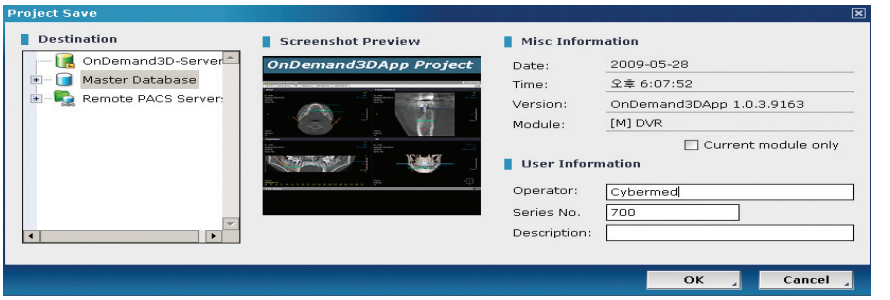


Pane with overlay	Capture an image on a pane with text overlay information such as patient ID, patient name, etc.
Pane original data	Capture an image on a pane without text overlay information
Region with overlay	Capture a rectangular region defined by dragging the left mouse button with text overlay information
Region original data	Capture a rectangular region defined by dragging the left mouse button without text overlay information
Full Screen	Capture the entire screen

Project Saving

With this function tool user can save all adjustments made on the original DICOM data.

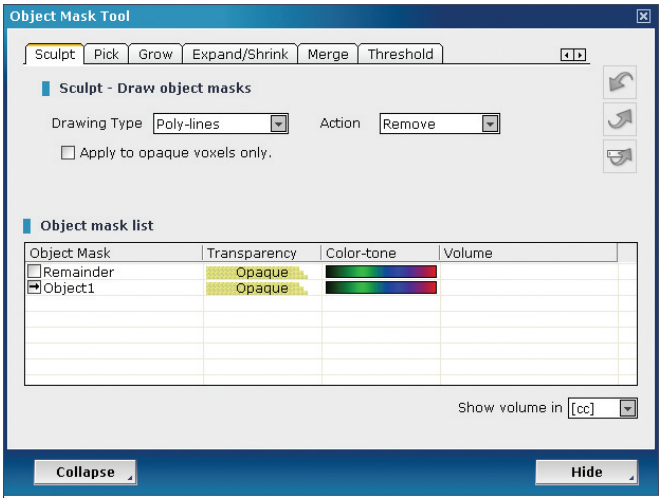
When users study images in various modules such as DLB, 3D, DVR, and X-ray, all the work done on each module is saved to a project file. The modules which have been operated on the project file can be activated when user open project files saved. With double clicking the DBM, user can launch module finally operated first, also can move to other modules included in the project files.



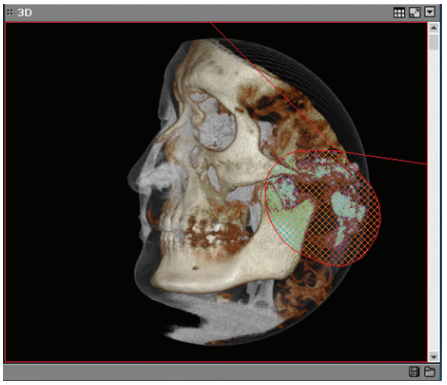
Destination	Selects where the project file is saved. Normally the saved project file where the DICOM data resides is preferred.
Current module only	If checked, saves the job status of the current module only.
User Information	This contains the information on the project file made by whom, the series number of the project file, and the description of the work done on the project file.

4.3 Segmentation Tools

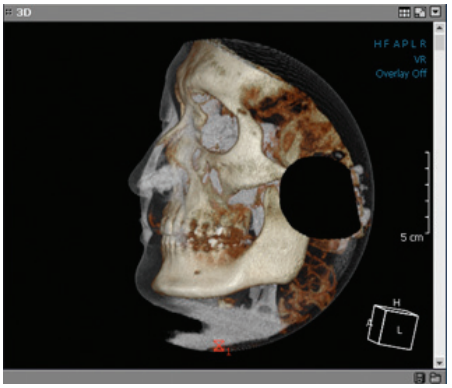
4.3.1 Sculpt



Select a part that you want to remove after selecting a drawing type.



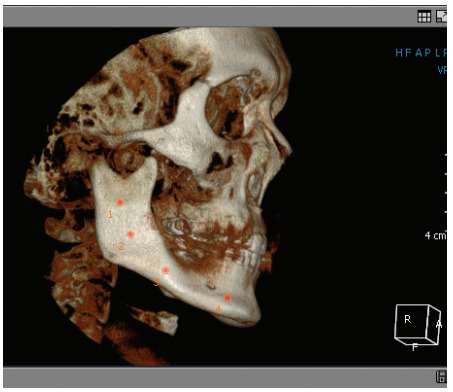
Remove the selected part by clicking 'Remove the Region' in the 'Mask Operation' window.



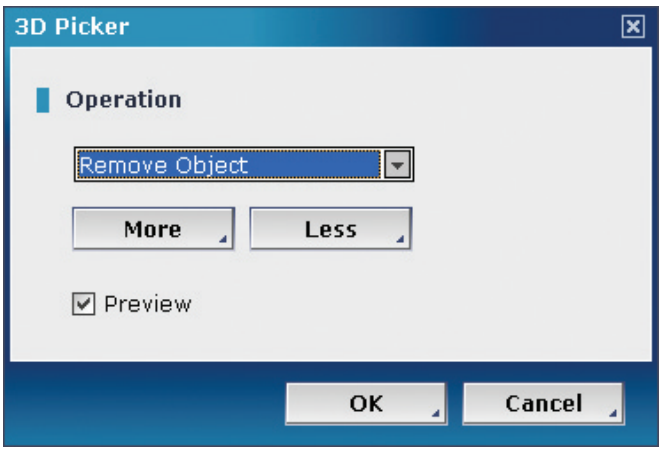
4.3.2 Pick

Using Opacity

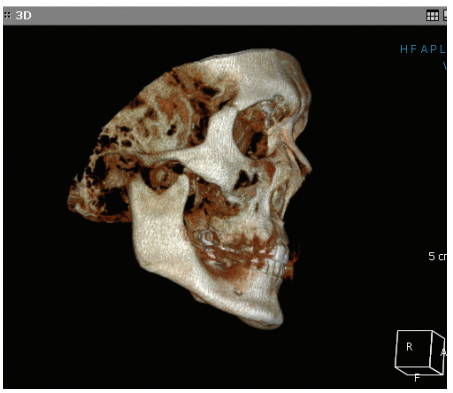
Click the mouse and paint dots on the part of an image that you want to remove, restore or create as a new object.



Select the 'Start' button to start the Pick tool. When the work is completed, select Operation type (Remove, Restore, or create as a new object). The level of the Picker can be controlled by the 'More' or 'Less' button.

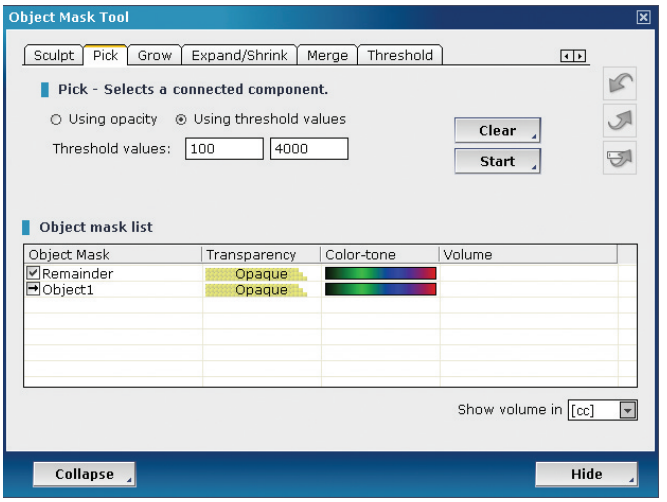


The following image shows bone removed by the Pick Tool.



Using Threshold value

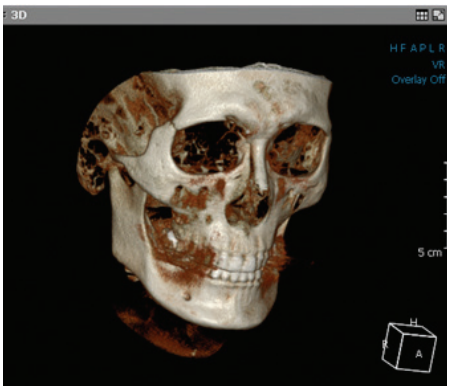
Enter the threshold value of a corresponding object in the 'Object Mask Tool' dialog box to remove or keep an object by using 'Fine Tuning'.



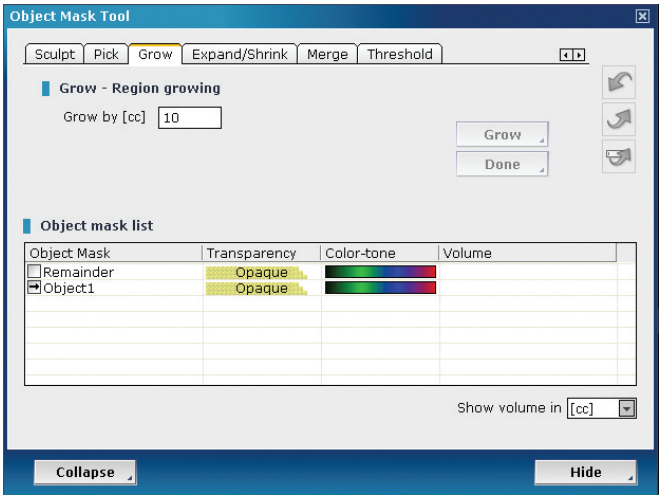
If you click several arbitrary points while using threshold values, only the parts which have threshold values of 1000-2800 are kept as shown in the following figure. You can remove, restore the part or create a new object.

4.3.3 Grow

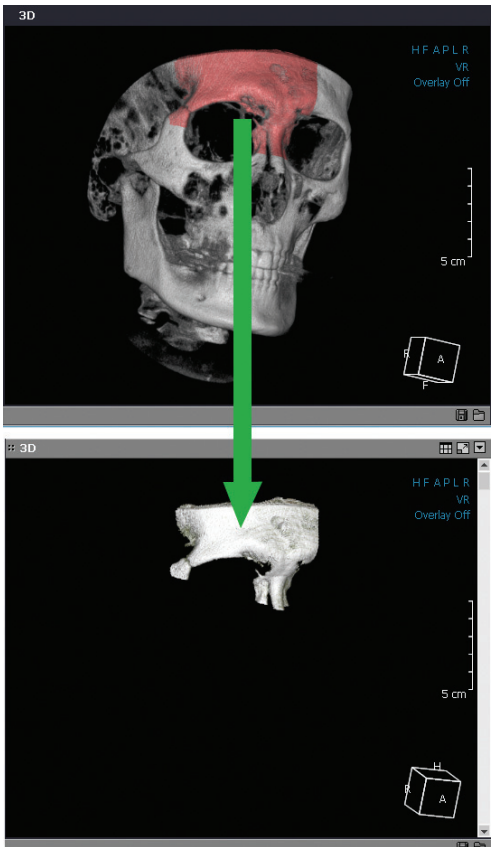
Using the mouse, click it on the image that you want to work with.



Enter the Grow value in the 'Object Mask Tool' dialog.
The volume related to the entered Grow value will be removed or kept



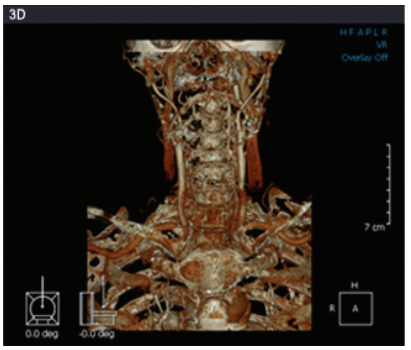
After entering the Grow value, click the 'Grow' button. When the work is Completed, click the 'Done' button to complete the job. You can remove, restore the part or create a new object.



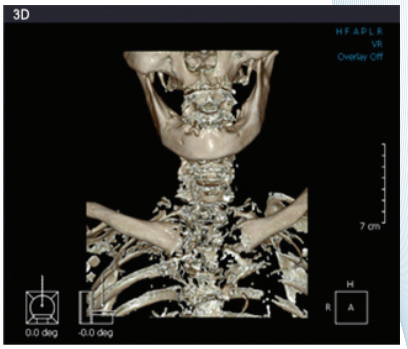
4.3.4 Expand/Shrink

Expand

This tool expands the selected object in 3D space.

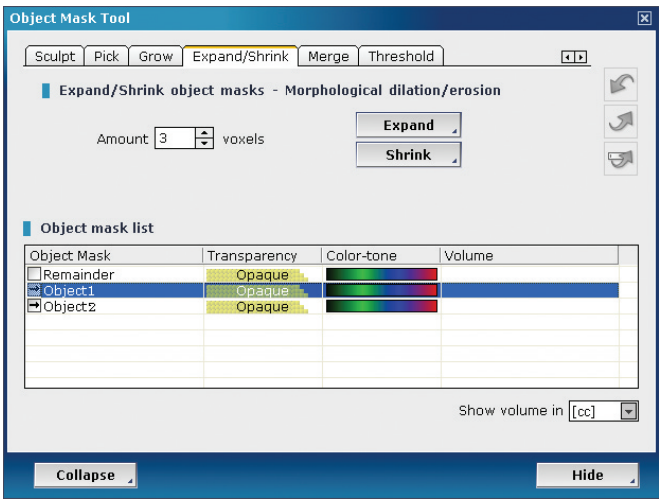


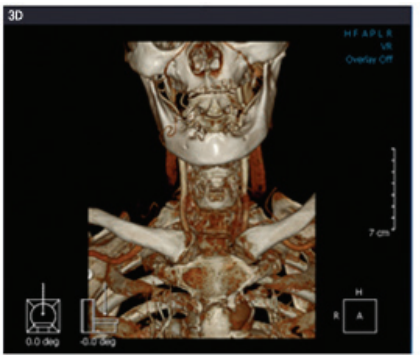
Object 1



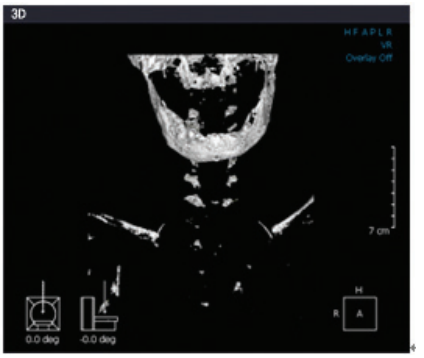
Object 2

Object 1 is an image which shows the bones removed and keeps the vessels.
Object 2 is an image showing only the bone structure.
Input 3 voxels in the Amount section, and click the 'Expand' button.





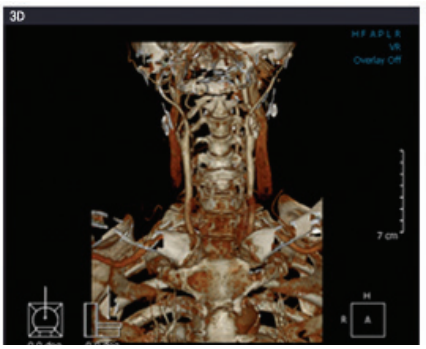
Object 3



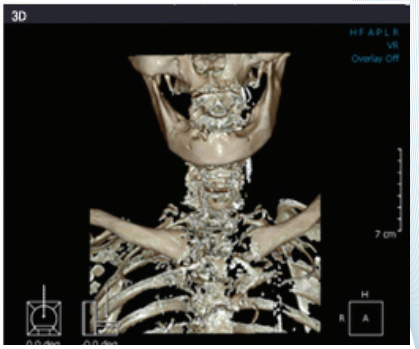
Object 4

You can see that Object3 has been expanded.

Shrink



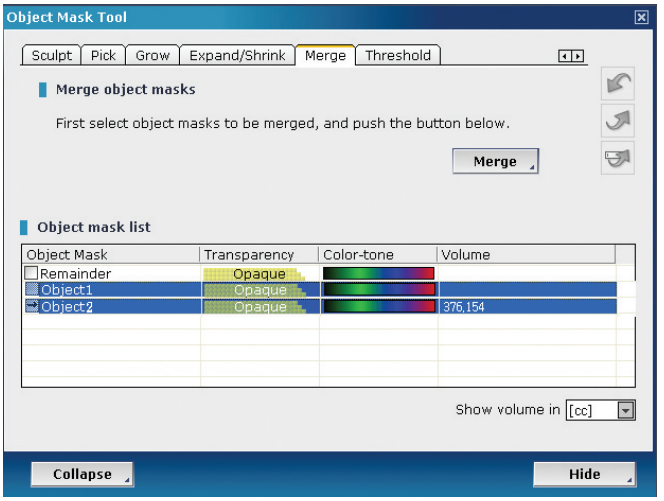
Object 5



Object6

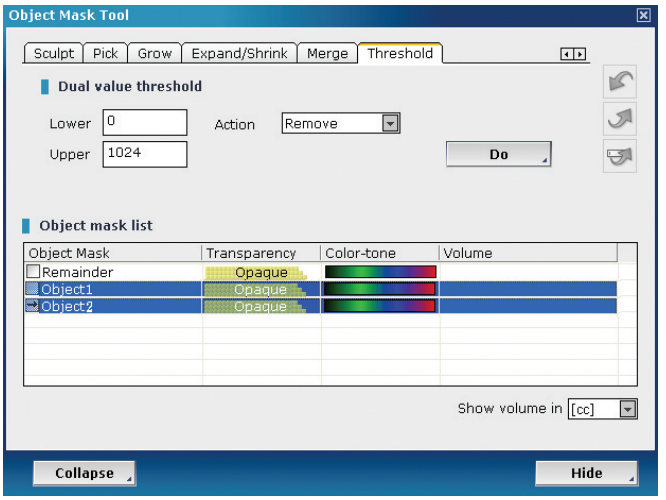
Shrink is the opposite function of Expand. If you use 'Shrink' on Object 5, you can see that the image is reduced like object 6

4.3.5 Merge



If you click the 'Merge' button, Object1 and Object2 are merged into a united image.

4.3.6 Threshold



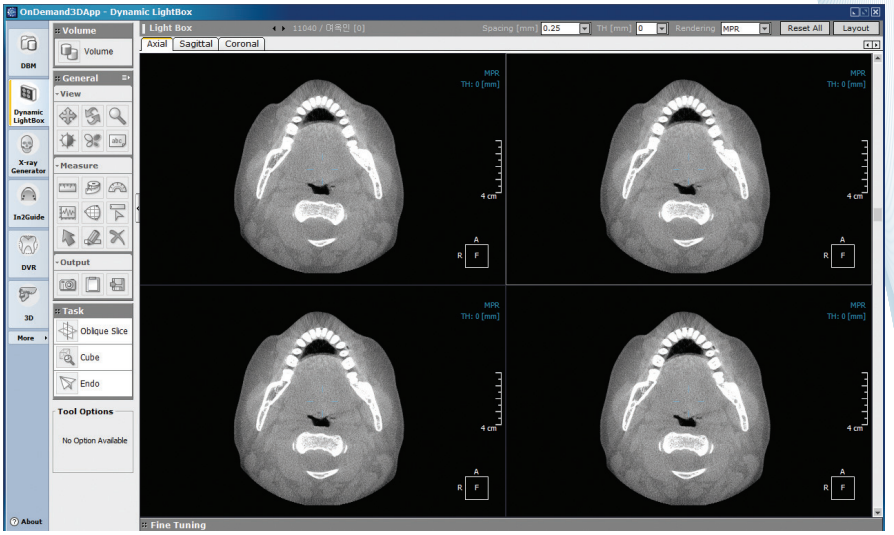
After entering the Bone Density value, click the 'Do' button.
You can remove, keep, restore the part or create as a new object.

5. Dynamic Light Box

5.1 Overview

Dynamic Light Box display the 2D images generated by 3D image. Dynamic Light box has various tools provided in the 3D module which make it possible to analyze and diagnose your patient.

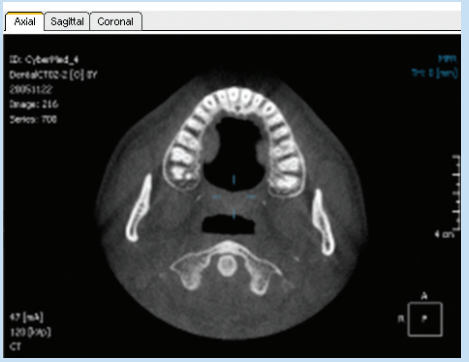
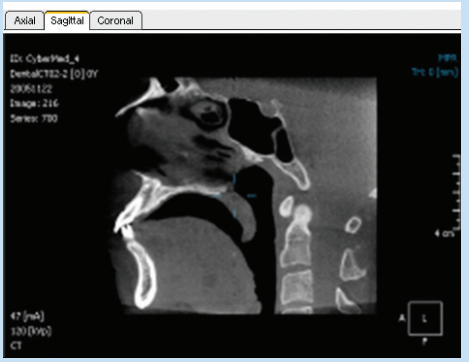
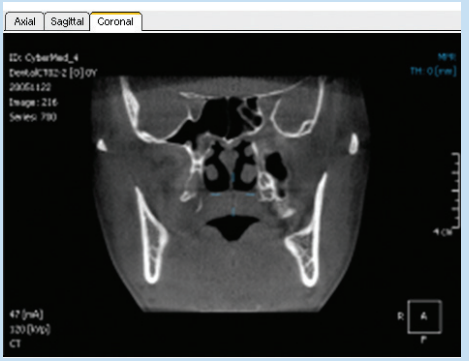
5.2 Dynamic LightBox GUI



Dynamic LightBox consists of a LightBox Pane, Tool bar and Histogram. The toolbar on the left side of the screen consists of Volume tools, Viewing tools, Image Analysis tools, and Task tools. These tools make it possible to zoom in & out, pan, and reconstruct the images in the LightBox Pane.
In the LightBox Pane, you can see the images selected in the DBM.

5.2.1 LightBox Pane

You can see Axial, Sagittal and Coronal images by selecting the appropriate image tab.

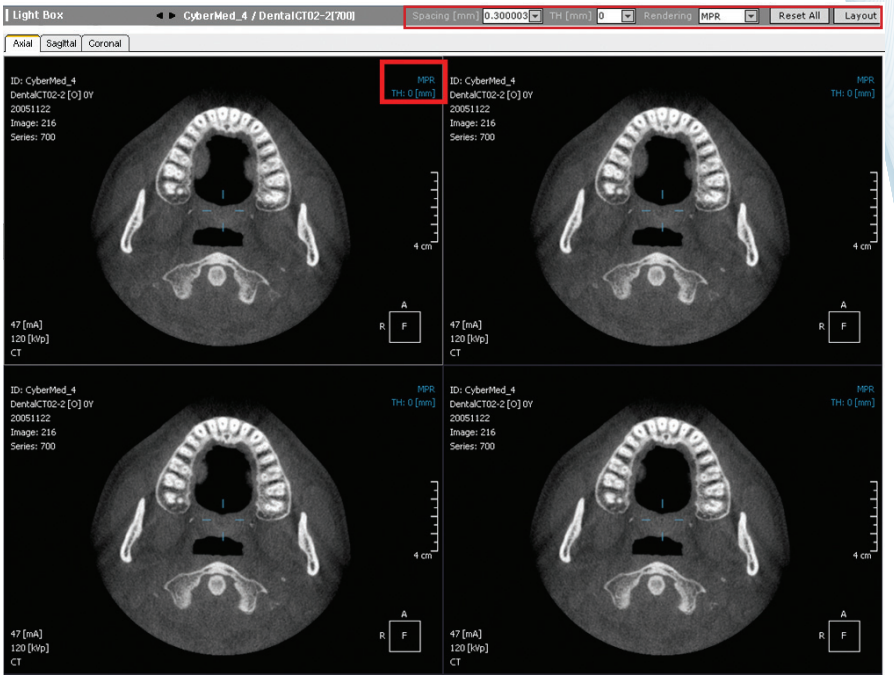
Axial	
Sagittal	
Coronal	

5.3 Tools

5.3.1 Main Tools

Info	Please refer to Chapter 4, Tools.

5.3.2 Local Tools



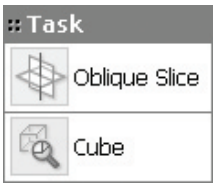
Spacing	Sets the interval of images in mm
Thickness	Sets the image's thickness
Rendering	Switches MPR to MIP, minIP, or VR
Reset All	Initializes the MPR pane and sets values
Layout	Changes the layout of the image pane

5.3.3 Task Tools

3D tools such as Oblique Slice and Cube are provided in DLB module

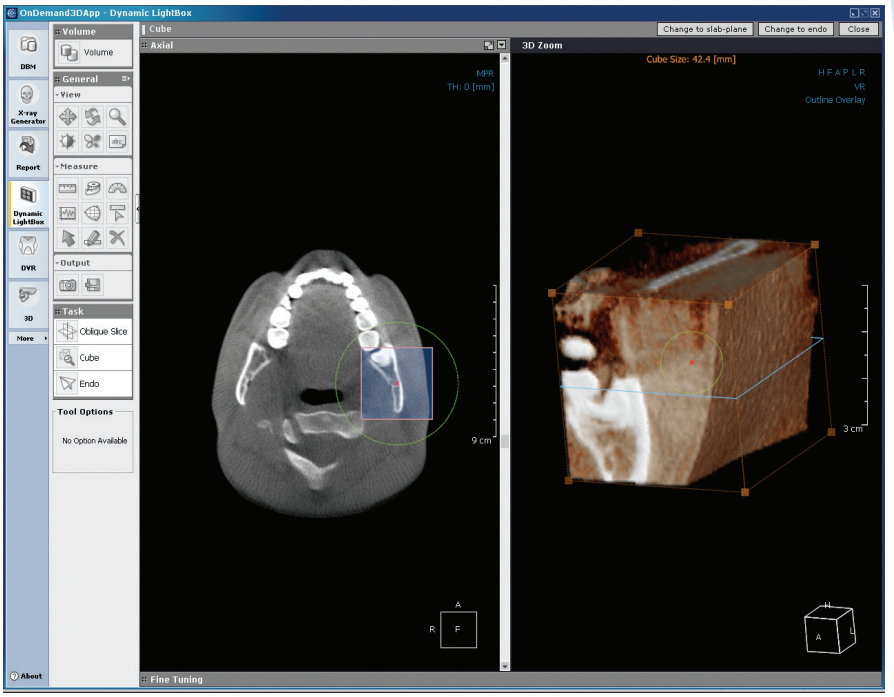
Info	If you need further explanation, please refer to Chapter 6, 3D

Oblique Slice



Window Information

If you click 'Oblique Slice' on the pane that you want to examine, the orthogonal section image of the selected image appears in the Oblique pane. As with 'MPR Rotating', the image can be rotated and the thickness can be controlled. Also, it is possible to magnify and reduce the image by using the square around the image.



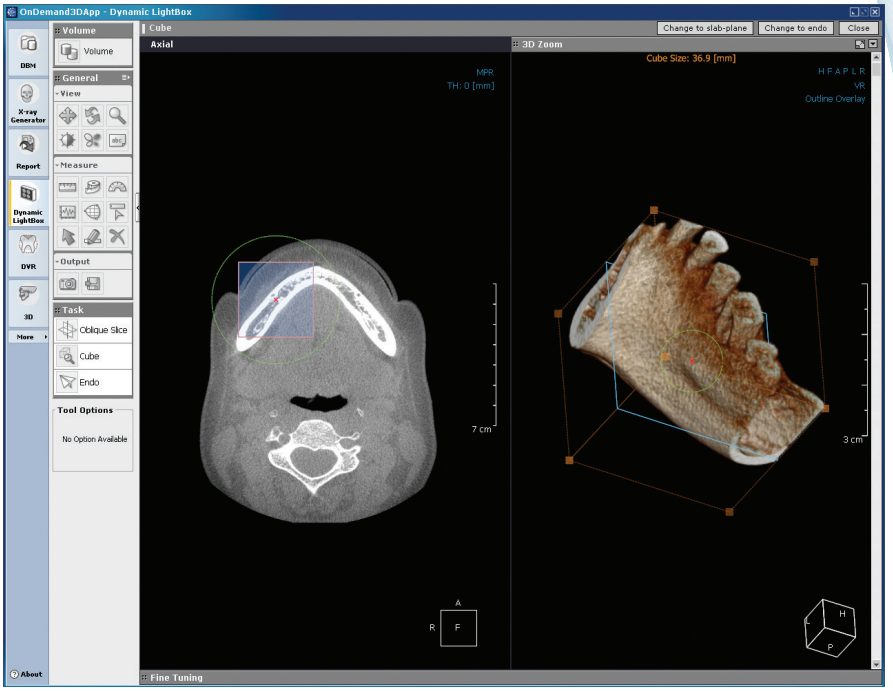
Local Tools

Change to Endo	Changes to the Endoscopy pane
Change to Cube	Changes to the Cube pane
Close	Closes the window

Cube

Window Information

Drag the mouse over an image to select the image that you want to observe in detail. The selected part is magnified and displayed as a cube.
Select the part that you want to observe by using a circle in the MPR pane. You can examine the image in detail by rotating the cube in the 3D Zoom pane.



6. Dental Volume Reformat

6.1 Overview

The Dental Volume Reformat module provides the standard way for doing 3D dental reformatting with panoramic, cross-sectional studies, TMJ studies and so on. The Ondemand3D App Dental Volume Reformat module has five layouts. Panoramic images, Cross sectional images, TMJ images and Orthodontic occlusion images can be reconstructed very easily. Also, marking the location of the mandibular canal and various analysis tools are supported.

An important addition to the Dental Volume Reformat is the simulation of implant surgery. For implant surgery planning, panoramic and cross-sectional reconstruction and marked nerves will be of great help. The addition of implant simulation functions can streamline implant site assessment and remove redundant arch definition, nerve marking, etc.

Sections 6.4.4. and 6.4.1.5 will address the implant simulation functions which are optional.

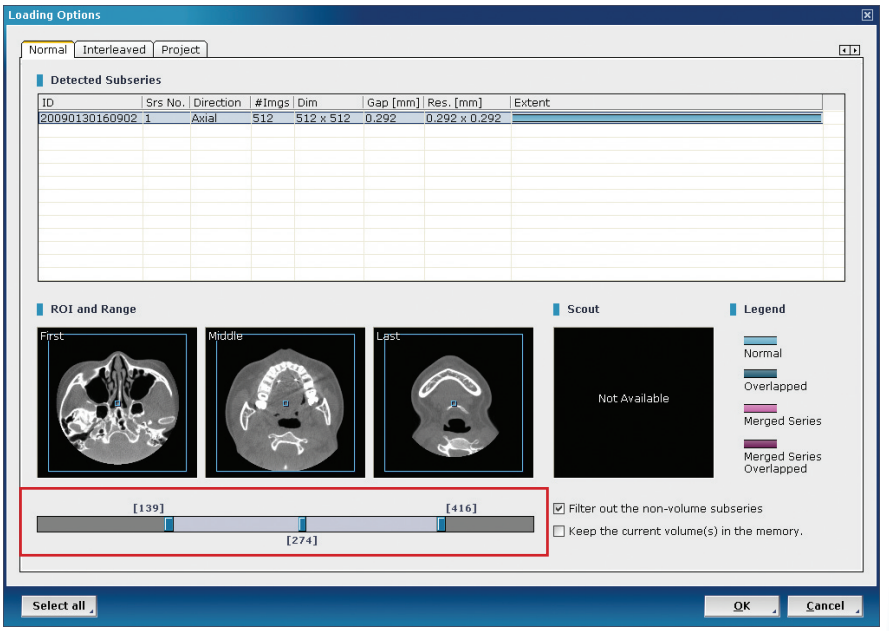
6.2 Launching the Dental Volume Reformat Module

Click the icon below after selecting the data in the DBM. 

6.3 Dental Volume Reformat GUI

6.3.1 Launching the Dental Volume Reformat Module

This window appears after selecting a series or study from the DBM and clicking the Dental volume reformat module. Slice ranges and ROI can be set here.



You can adjust image boundary

6.3.1.1 Image Information

Each field shows image information about a selected study or series.
'Srs No.', '#Imgs', 'Dim' and 'Res.' stand for Series Number, number of images, dimension and resolution.
'Extend' shows the Z axis position status of images. The color bar shows a different color or discontinuous bar if multiple series have overlapped slices selected or if there are blank slices in the series or study.

6.3.1.2 ROI and Range

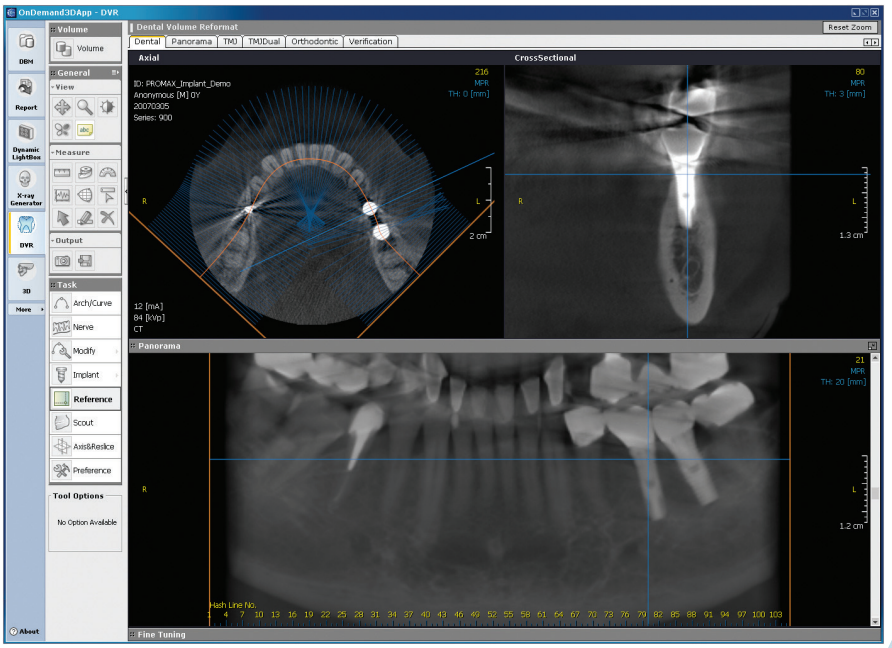
ROI and Range of slices can be set. First set the left and the right slide bar setting a starting and ending image, and confirm the images which will be loaded by the middle slide bar. You can see the Red marked on previous page.
The ROI can be set by dragging the blue line in the 'First', 'Middle' and 'Last' image window.

6.3.1.3 Scout View

Scout images which have been made by the CT device appear in this window if the series includes Scout images.

REMARK	Scout image is generated by CT machine. It is not created by Ondemand3D App. The Ondemand3D App can make pseudo-Scout images using MIP

6.3.2 Main Window



6.3.2.1 General Tool

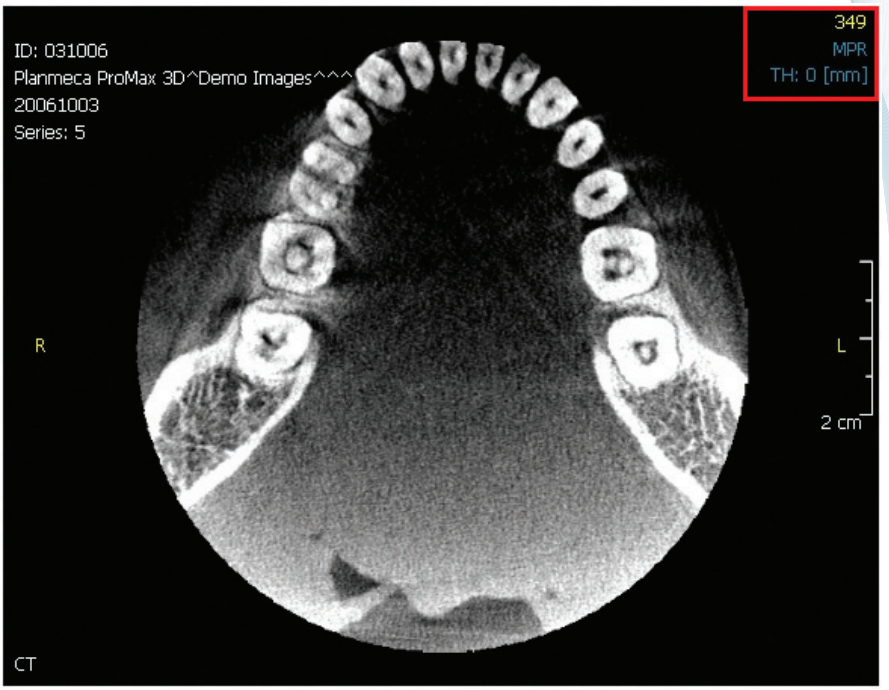
These functions work the same in all layouts.

INFO	For more details, please refer to chapter 4, Tools.

6.3.2.2 Task

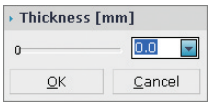
These task tools are used for dental protocols such as Arch and Curve drawing, Nerve marking, etc.

6.3.2.3 Default window



Adjusting Thickness

The thickness of images can be adjusted by inputting the value manually or selecting one value from the combo box. The thickness value is not limited.



REMARK	The rendering speed might be affecting if the thickness value is too high.

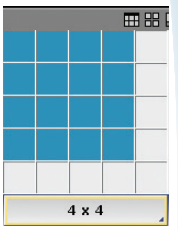
Changing Rendering mode

MPR, VR, MIP and MinIP are supported in all windows as rendering methods.

< 5 mm MPR and 15 mm VR images (thickness)>

The number of cross sectional windows

The number of windows can be changed. This layout is applied to reconstructed cross sectional or panoramic, etc. windows. Click the icon and drag as in the following figure.



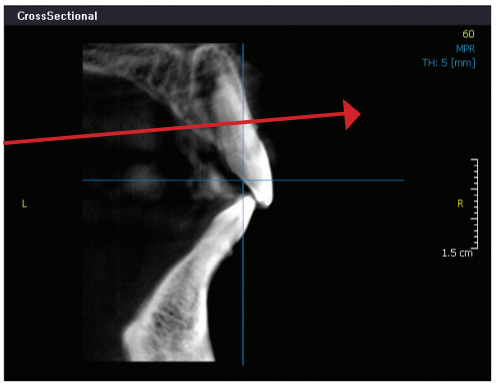
TIP	Hit the Enter key to show or hide lines on images.

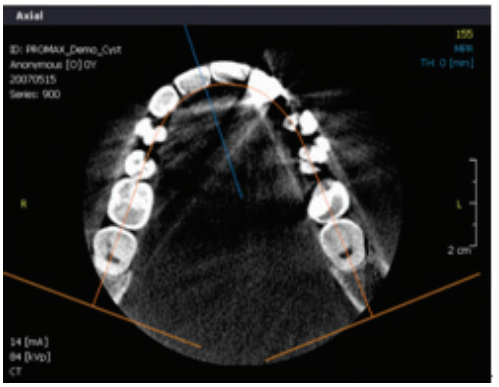
Maximizing or Minimizing

Click the icon button. The windows will maximize. One exception is maximizing the panoramic window as the panoramic window will spread horizontally and hide 3D windows.

6.3.2.4 Cross Sectional window

To reconstruct cross sectional images, the arch line should be made first using the Curve tool. Every cross sectional image in each layout is made in this way.





The blue cross line on the middle of image is a reference line. The vertical line is positioned in agreement with the blue line in the Arch line. The horizontal line is the position of the Axial. The horizontal line can be moved to a specific axial image after clicking 'Referencing' in the Task menu.

INFO	Refer to Task tools on next page

6.3.2.5 Panoramic window

Panoramic images are also generated using the Curve tool. To reconstruct cross sectional images, the arch line should be made first using the Curve tool.
The vertical line decides the position of the cross sectional image. The horizontal line decides the position of the axial image. The horizontal and vertical lines can be moved after clicking 'Referencing' in the Task menu.
A ruler unit can be set at the bottom by setting a Hash Line and Number in the Preference settings.

6.3.2.6 Layout Tab

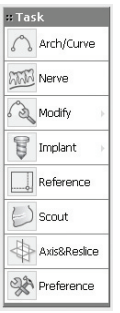
To move into another layout, click a tab at the top of the window. Each layout is designed for optimized image processing for each diagnosis. Dental mode and panorama mode can set customized layouts..

6.3.2.7 Fine Tuning

Volume Rendering Image's color and opacity is decided by the histogram in Fine Tuning. The histogram of Fine Tuning is adopted only in cases where the rendering mode is set to VR.

6.4 Task Tools

Most processes in the Dental Volume Reformat module use the following tools. Drawing arches, marking nerves, modifying arch or nerve and placing implant. But make sure Axis&Reslice adjustment needs to be set at the very first.

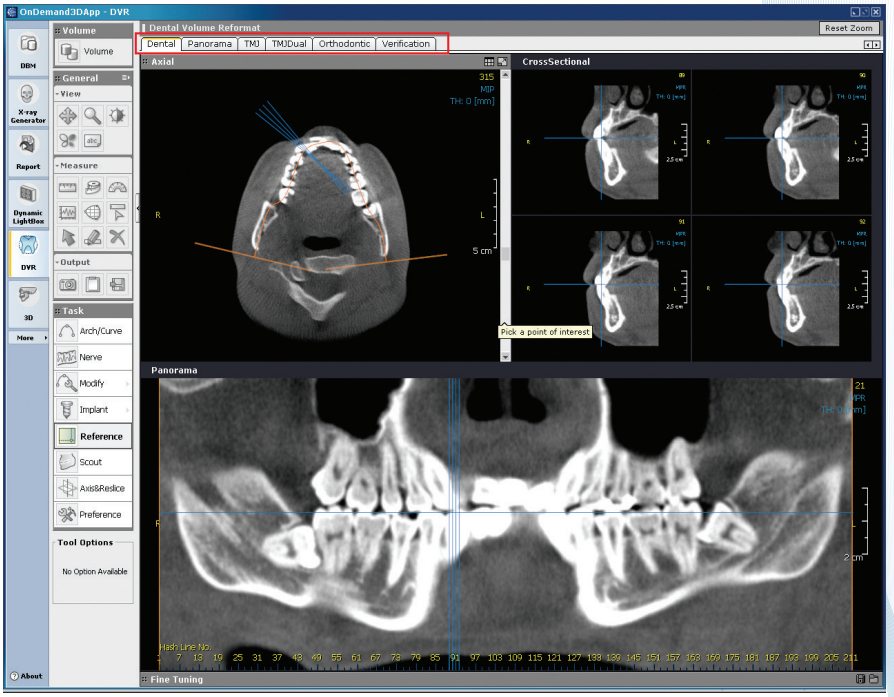


6.4.1 Arch / Curve

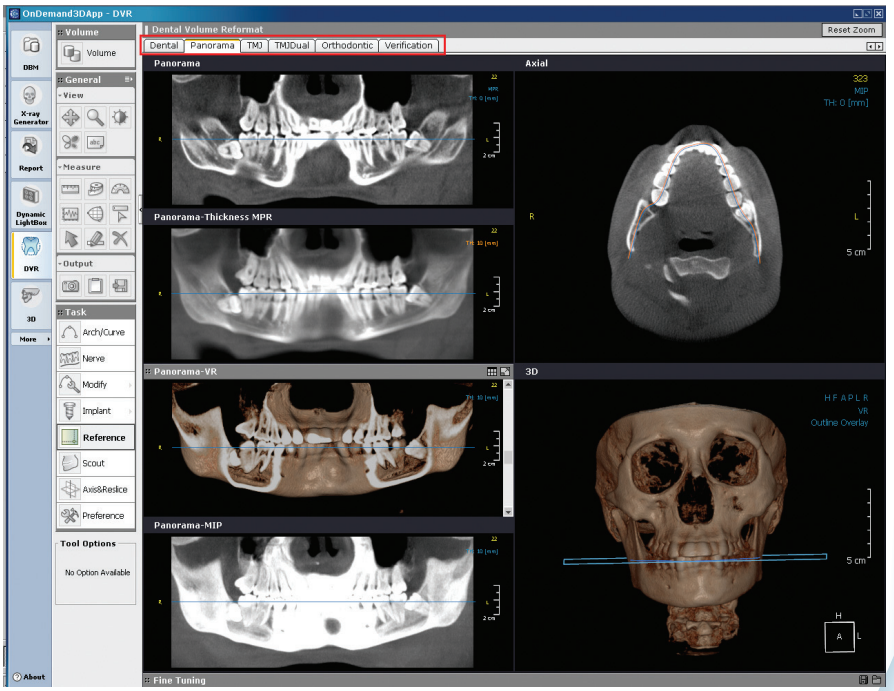
You can create unique lines for each layout by clicking the Arch/Curve button.

6.4.1.1 Panorama image

Select Arch/Curve in the Task menu and draw an arch curve on the Axial image by picking some points. First, click a start point on the Axial image, and then click along the arch path. Double click when you want to finish drawing. Then, a Panorama image and a Cross-sectional image will be generated in each image pane.



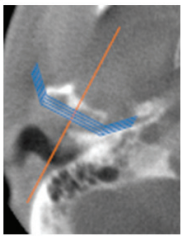
Dental View



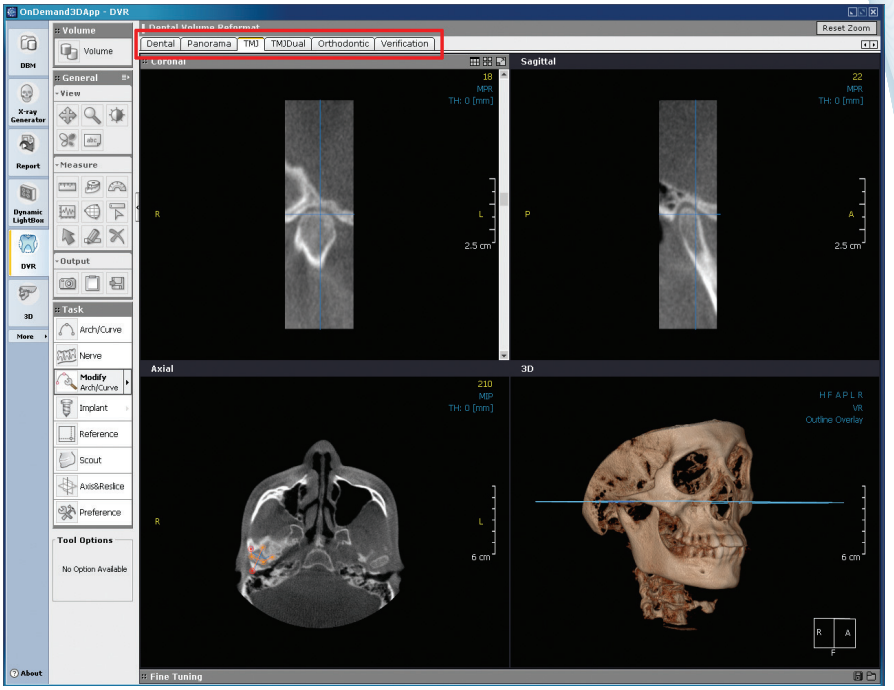
Panorama View

6.4.1.2 TMJ View

The TMJ line is used to make TMJ sectional images which are made available for a TMJ layout. To create a TMJ curve, first, move to the TMJ layout by clicking TMJ in the Layout Tab. Click the Arch/Curve button in Task Tools and draw a line over the TMJ section on the axial image. Users can create a polygonal line by defining at least 4 points.



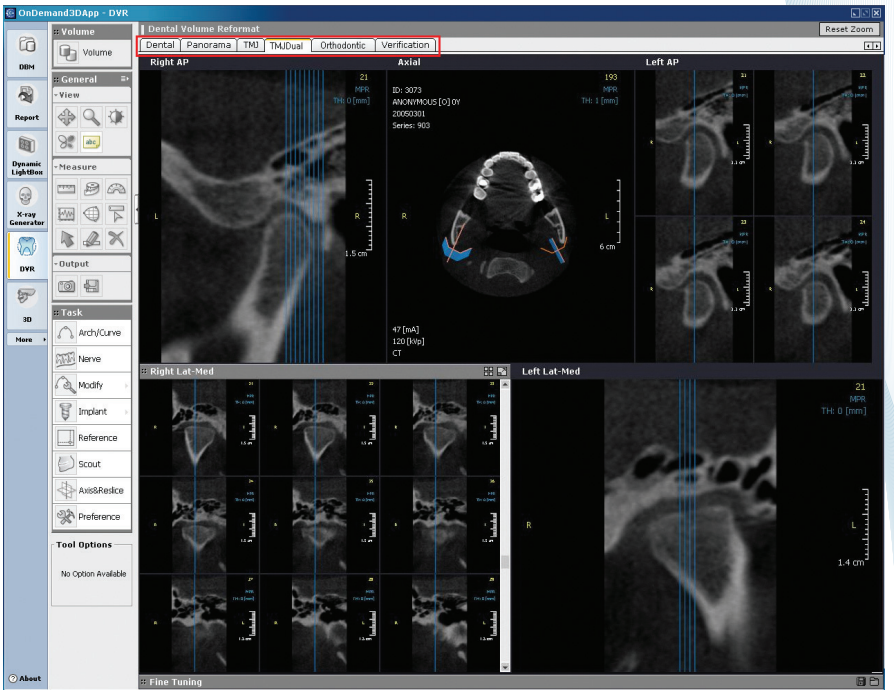
TMJ line



TMJ View

6.4.1.3 TMJ Dual View

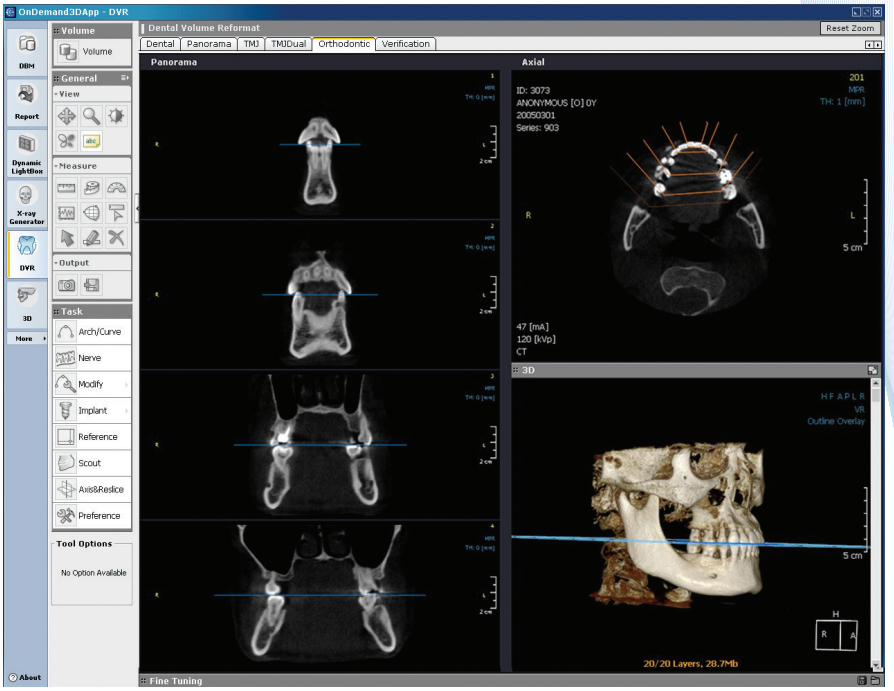
TMJ Dual mode is for reconstructing two TMJs at the same time. If you make a TMJ curve on one side, a Mirroring TMJ curve is automatically made on the other side. A user can then modify the TMJ curve.
To create a TMJ line, first, move to the TMJ Dual layout by clicking TMJ Dual under the Layout Tab. Click the Arch/Curve button in Task Tools and draw the line over the TMJ section on the Axial image. You can create a polygonal line if at least 4 points are defined.



TMJ Dual View

6.4.1.4 Orthodontic View

This mode provides a reconstructed view of the patient's occlusion and symmetry. If you make curves crossing the left and right pair of teeth, It will show a reformatted view as follows.

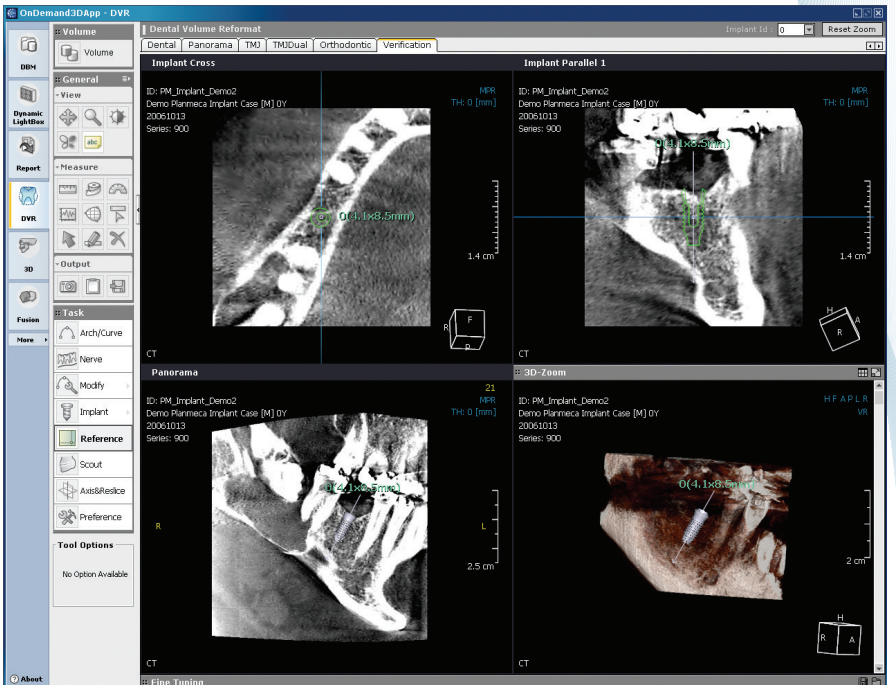


Orthodontic View

6.4.1.5 Verification View

This mode is for verifying simulated implants. A perpendicular and two parallel cutting plane images to an implant axis are reconstructed.

If there is more than one implant, please click the Implant ID and select the implant number for verification. Also when in the Dental layout, pick an implant for verification, then right mouse click and select 'Verification' in the pop-up menu to see the verification layout.

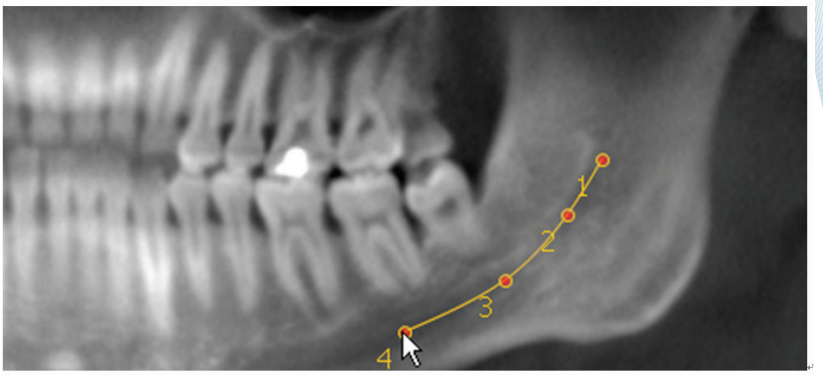


Verification View

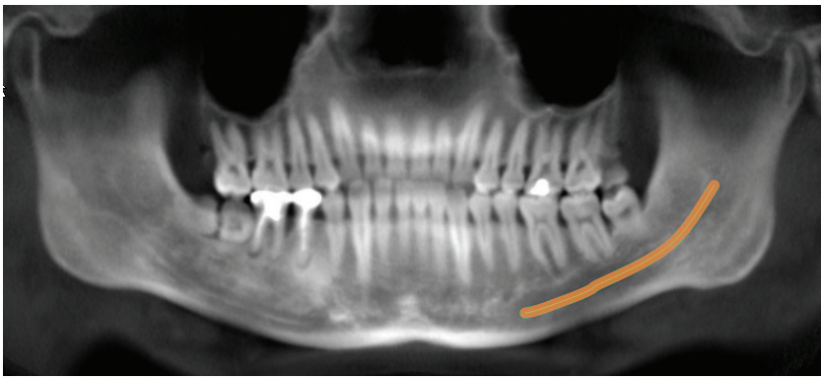
Picking the perpendicular line on the image (Implant Cross), and rotating the line creates a cutting plane around the implant. For the Fine tuning section, right mouse click the bottom bar, then select 'Show Color Palette Dialog' to go to the color palette selection dialog. Selection of a color scheme generates color mapped images according to the CT value.

6.4.2 Mark Nerve

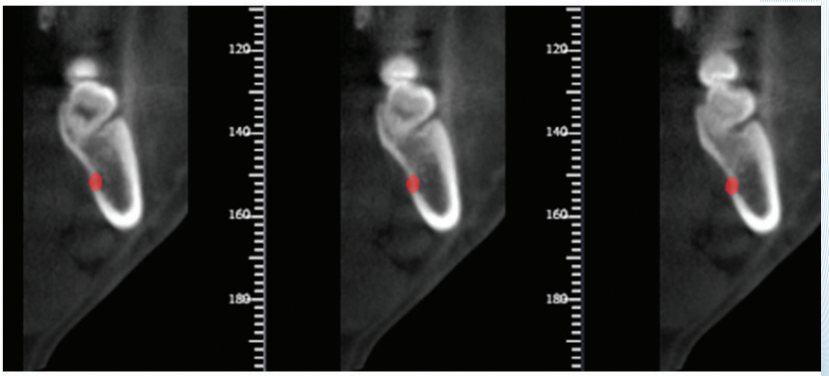
Vital structures for diagnosis can be drawn with the Mark function. For instance, the inferior alveolar nerve within the mandible can be marked.
To mark a nerve, select the 'Mark Nerve' icon, and click points on the axial, cross sectional, or panoramic images. Place points by clicking on the images. Double click to finish marking.



TIP	Assuming that you want mark an inferior alveolar nerve, one simple method would be to draw a nerve line on the panoramic image. If set to enough thickness, you can see the canal in the image. Place points where you can see the canal. Another method which takes more time to draw but is more accurate is to find and place points together on the axial, cross sectional and panoramic images. A blue reference line in each image can help you check the position.



Result in panoramic panel



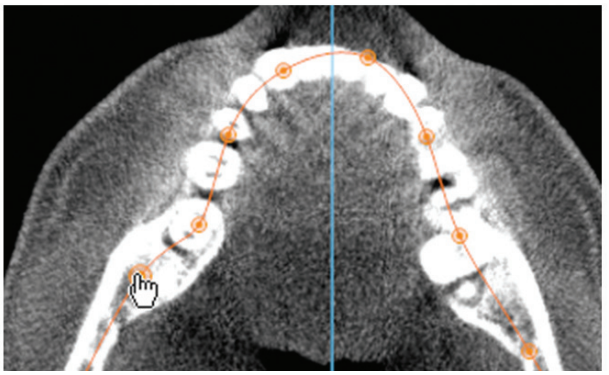
<Result in cross sectional panel>

INFO	Refer to 6.4.3.2 to modify the marked nerve line.

6.4.3 Modify

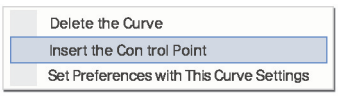
6.4.3.1 Arch / Curve Modifying

To modify lines, click Modify icon and select Arch/Curve in the sub-menu. Then the selected line can be modified by repositioning or deleting the points as shown in the following figure. All lines can be modified with this menu.



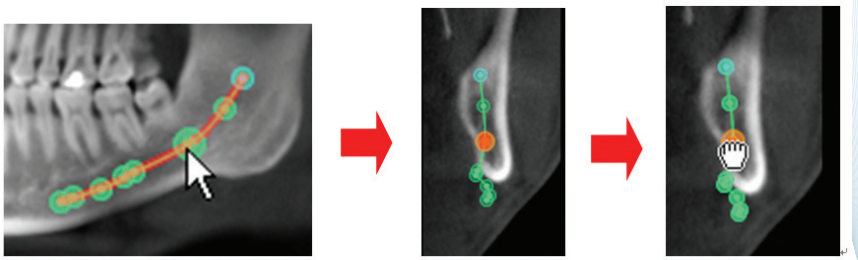
All marked points appear while Modify mode is activated. When you move the mouse pointer on this figure, the mouse pointer changes into a hand shaped pointer and the point can be moved by dragging it. The whole line moves together while the pointer shape is like this image. Press the ESC key when you have finished modifying.

While modifying, deleting the Curve or Inserting another point is also available in a sub-menu which can be reached by clicking the mouse right button (see the figure below).



6.4.3.2 Nerve-line Modifying

To modify the Nerve-line, click Modify and select Nerve in the sub-menu. A Nerve-line is modifiable similar to Arch/Curve modifying. A hand shape pointer appears when you move the point. The whole line moves together when the pointer appears. To finish modifying, press the ESC key. First, click one point in the panoramic panel, and then the control point in the cross sectional panel will appear. Move the point in the cross sectional panel into the correct place.

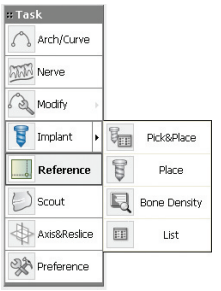


To change the diameter of a nerve line or to change colors of a Projection/Segment, set a respective conditions on Preference button setting view.

INFO	To learn about the differences between Projection and Segment, please refer to Preferences.

6.4.4 Implant

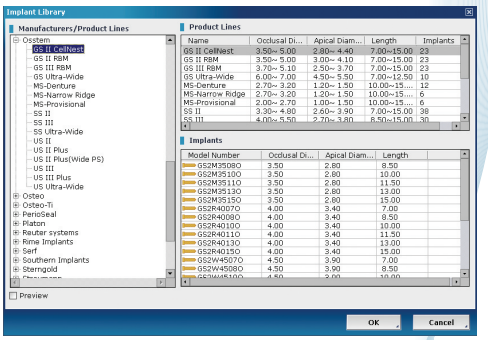
Ondemand3D App supports implant simulation functions. You can simulate implant surgery using a library of commercial implants. The implant task menu contains functions of Pick&place, Place, Bone Density and Implant List.



6.4.4.1 Pick & Place

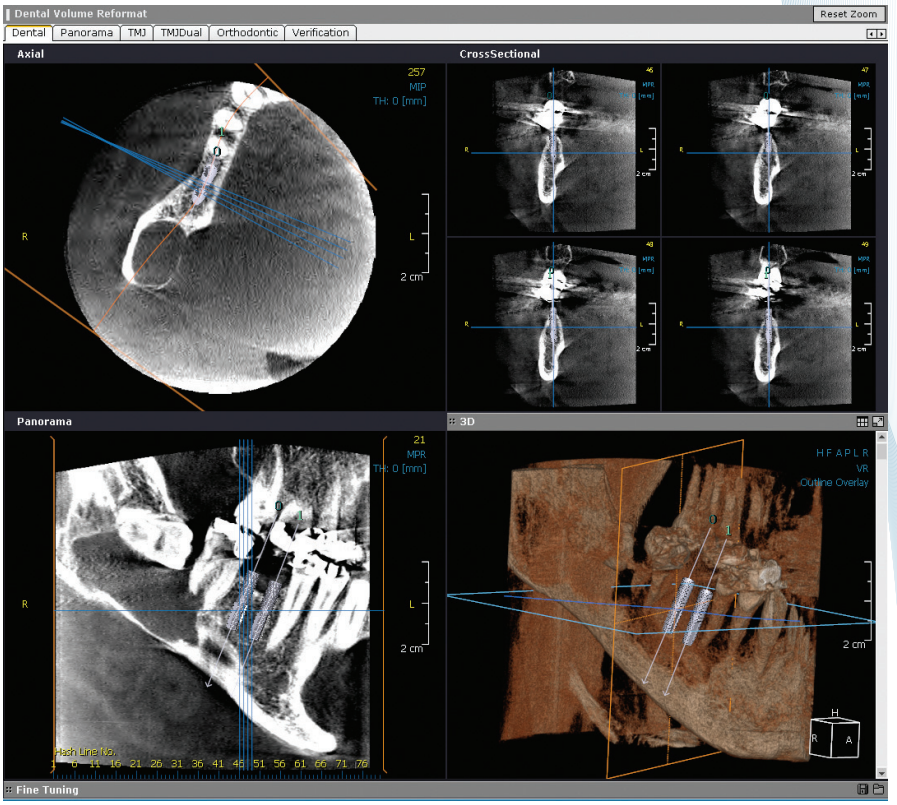
Selecting Pick&Place provides the user with an implant library which includes the manufacturer and each product line of most commercial implant products.

Users can choose an implant which fits the implant site of the patient. Pick an implant from the library, select OK, and then place the selected implants.



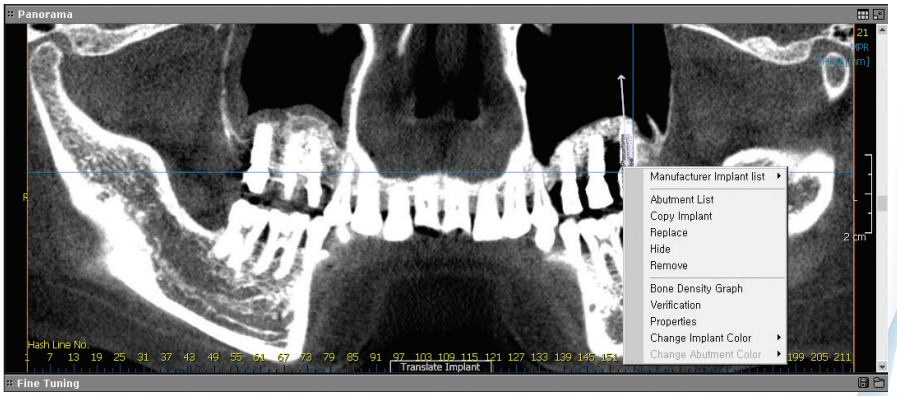
6.4.4.1.1 Place

Select the implant you want to simulate, then click MPR or 3D. Using the mouse, you can adjust the implant direction in panoramic, cross-section, or 3D images. You can set the default implant direction (maxillary or mandibular) in 'Preferences'.



INFO	Refer to Preferences to set implant direction.

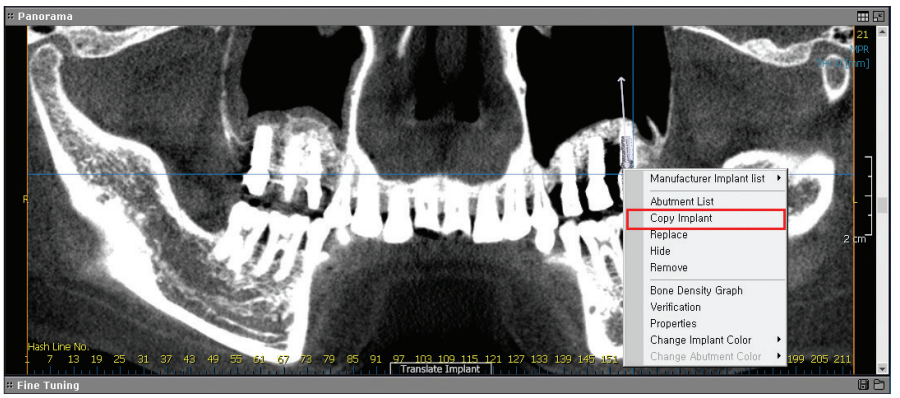
If you want to change an implant, click the right mouse button. The New File dialog box will pop up.



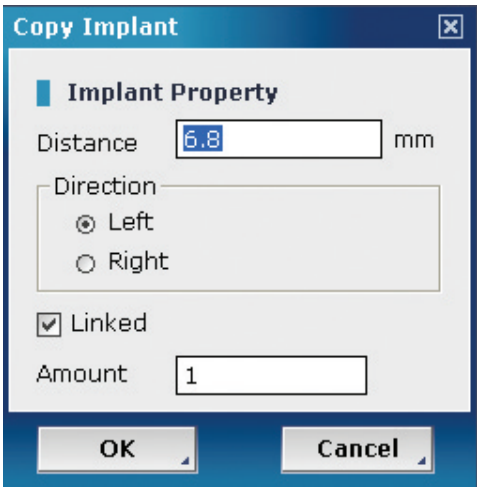
Abutment list	Abutment list for the selected implant
Copy Implant	Copies an implant which has the same direction (tilt and turn angle) as the original implant
Replace	Replaces with another implant in the implant library
Hide	Hides the selected implant
Remove	Removes the selected implant
Bone Density Graph	Displays bone density of the selected implant by graph
Verification	Verifies the bone layout around the implant
Properties	Confirms the selected implant's properties
Change Implant Color	Changes color of the selected implant

6.4.1.1 Placing Multiple Implants

If you need to simulate the same implant near a standard implant, click the right button.



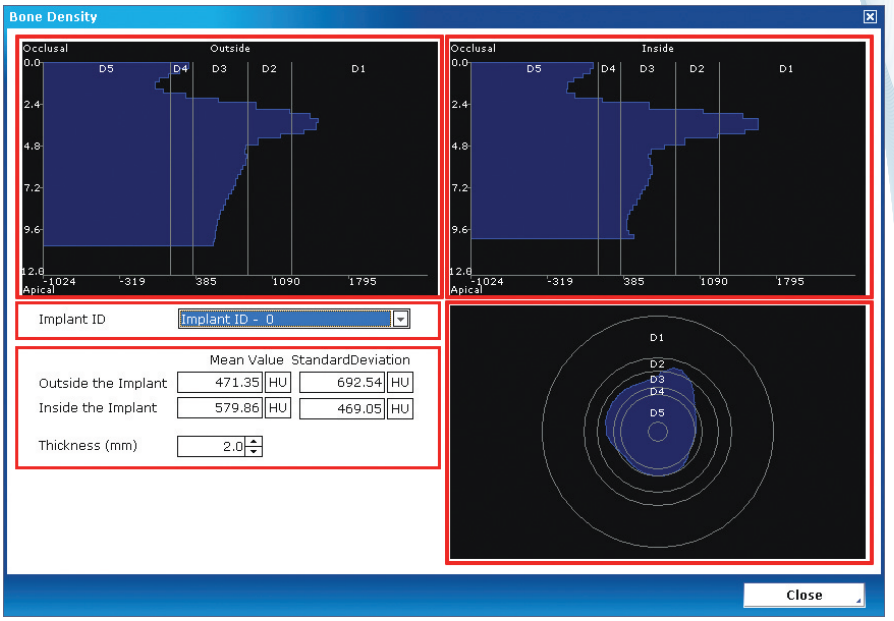
Input the information of the implant to be copied.



Distance	Sets the distance from the original implant to the copied implant
Direction	Sets the direction of the copied implant to the left or right side
Link	Keeps the copied implants at the same angle as the original implant. If you want to unlink the linked implant, click the right mouse button. Select "Unlink"
Amount	Sets the number of implants to make copies for.

6.4.1.2 Bone Density

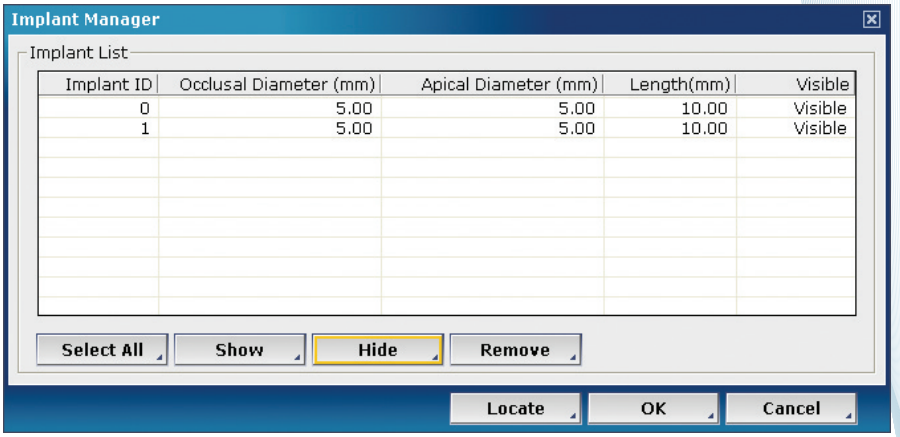
The bone density dialog shows the bone density statistics of the inside and outside of the selected implant. Thickness is used to define the outside region of the implant. The statistics along the implant axis are depicted according to the predefined density scale. The bone quality scale by Lekholm and Zarb is used.



Lekholm and Zarb	Upper bound	Lower bound
D1		More than 851 HU
D2	701 HU	850
D3	501 HU	700
D4	1 HU	500
D5	Less than 0 HU	

6.4.1.3 List

After finishing the implant simulation, you can confirm it in the implant list. It shows the implant's apical diameter, occlusal diameter and length.



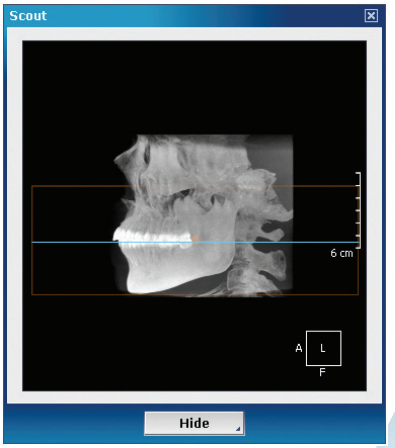
Select All	Selects all implants
Show	Shows the selected implant. The selected state is shown under the "visible" column.
Hide	Hides the selected implant. The selected state is shown under the "visible" column.
Remove	Removes the implant selected. The selected state is shown under the "visible" column.

6.4.5 Referencing

Click one position in the axial, cross sectional, or panoramic image to move to another position while turning on Referencing. The blue cross line moves to where you have clicked.

6.4.6 Scout

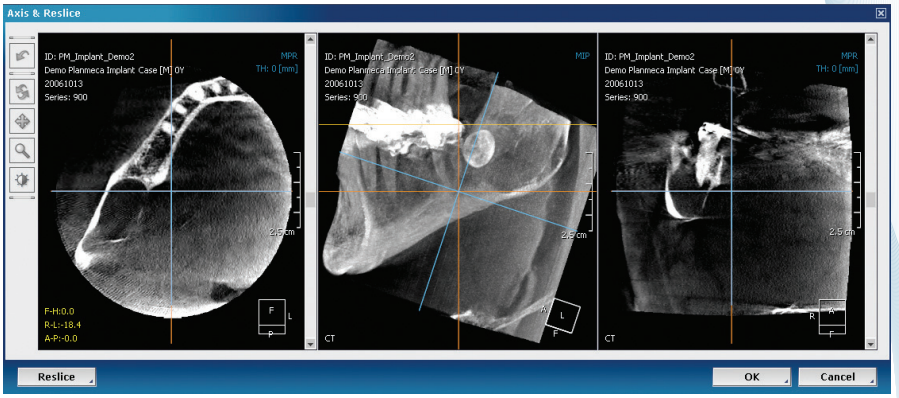
The scout image referred to here is an image reconstructed by Ondemand3D App not a low scanned image by a CT device. Axial slice position and range for reconstructing other images can be adjusted with this function.



After clicking a position in the scout image, the axial image will move to that position. The blue horizontal line indicates the current position of the axial. The rectangular area decides the range of the axial which is used for reconstructing cross sectional or panoramic images. Drag it while the mouse pointer is shaped like the following icon .
After setting the correct range, click the hide button for the scout dialog to disappear.

6.4.7 Axis & Reslice

Sometimes defining new axes is very important, in the cases of malpositioned image of a patient during a scan and reorientation along the occlusal plane. Three axes of original data can be reset here. In the axial windows, rotation can be changed. In the lateral MIP view, new axial planes can be set. In the coronal view, symmetric posture can be defined.



Reslice : If you click the Reslice button after having changed the standard axis, the changed DICOM files will be saved in the DBM.

INFO	A standard axis is referred to by using the yellow line on the sagittal for making a comfortable reslice.

6.4.7.1 Rotating Axes

Axial, lateral MIP and coronal images appear in Rotate Axis by default. Rotate each image by dragging the blue lines in each window. Afterwards the Ondemand3D App will work with the newly reconstructed images.

6.4.7.2 Image Mode Changing

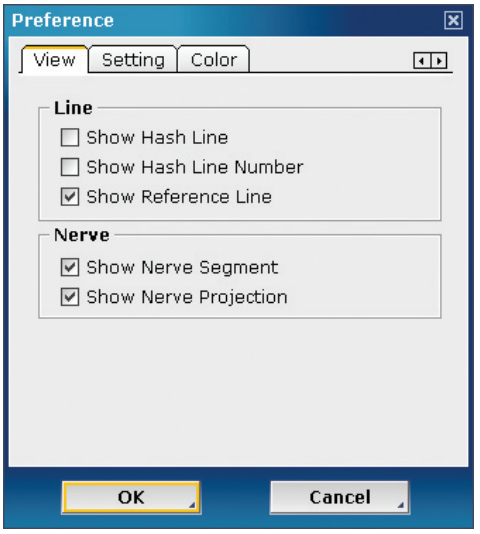
Axial, lateral and coronal image types can be changed. Click MPR, MIP, or VR on the images of the 'Rotate Axis' dialog, and select the type. VR, MIP, MinIP and MPR are supported.

INFO	To adjust the WWL values, click the right mouse button and drag up and down for the level value and left and right for the width value. ALT+ right mouse button will auto-adjust the WWL value.

6.4.8 Preferences

Most settings can be set here.The settings are saved so that these settings are used when the Ondemand3D App is launched again.

6.4.8.1 View



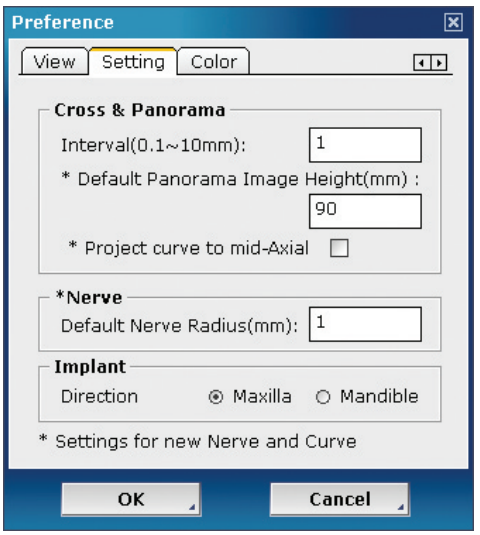
Line

Show Hash Line	Shows the hash line on a panoramic pane and the curve on an axial pane
Show Hash Line Number	Shows the hash line number on the curve of an axial pane
Show Reference Line	Shows the reference line on axial, panorama and cross sectional images

Nerve

Show Nerve Segment	Shows a section of the nerve
Show Nerve Projection	Shows the whole nerve including projected part.

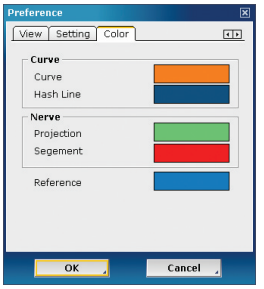
6.4.8.2 Settings

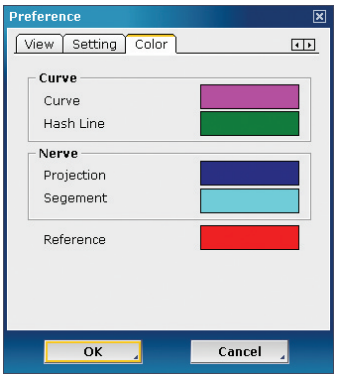


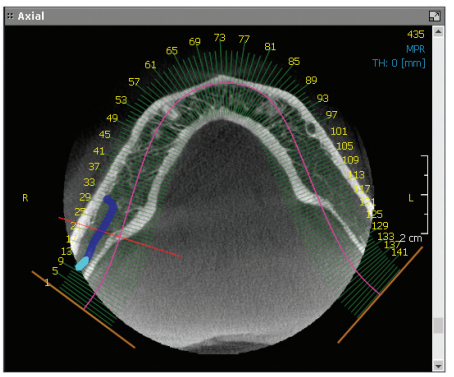
Cross & Panorama Interval	Defines the interval of cross and panorama images
Project Curve to Mid-Axial	Translates curve to the mid-axial
Default Nerve Radius	Defines the default nerve radius

6.4.8.3 Color

In the Color tab, the color of the curve, Nerve, or the other settings can be changed according to a user's preferences.







<Example of custom color setting>

7. X-ray Generation

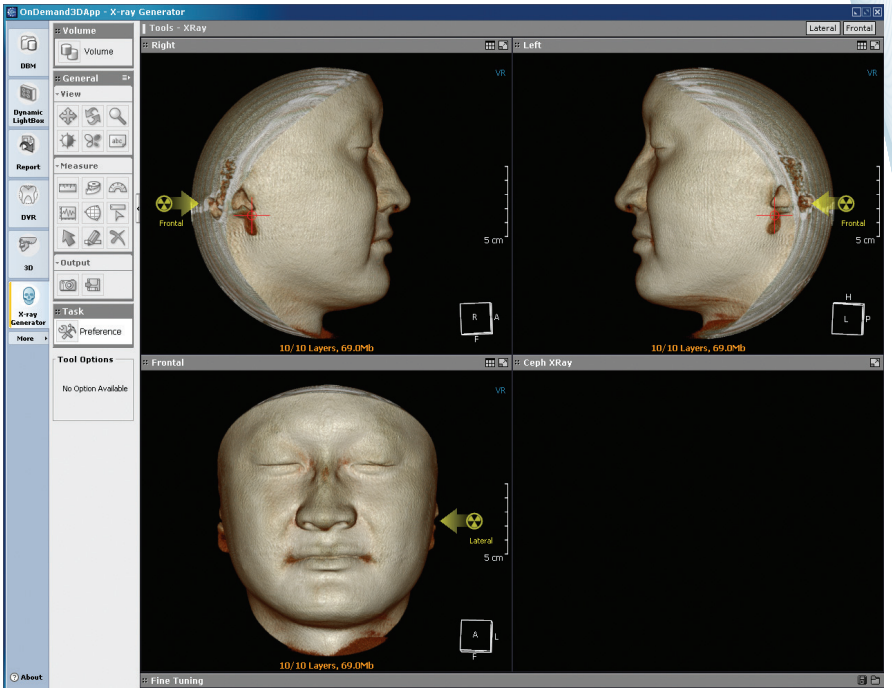
7.1 Overview

In the X-ray Generation module, you can create X-ray images for Cephalometric analysis. Lateral X-ray images and frontal X-ray images can be generated.

7.2 Launching the X-ray Generation Module

Click X-ray Generation after selecting a data from DBM.

7.3 X-ray Generation GUI

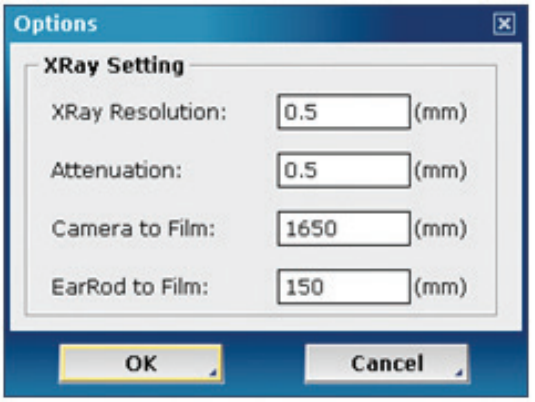


7.3.1 General Tools

These are common tools which are used in all modes.

7.3.2 Preferences

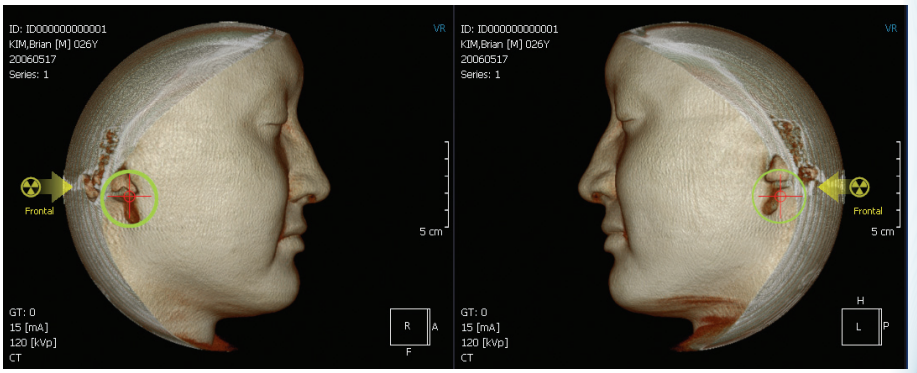
Click the 'Preference' icon, and a dialog box will appear as in the following figure. You can set parameters for X-ray image generation such as X-ray resolution, attenuation, and distance from camera to film, and distance from ear-rod to film.



X-ray Resolution	Millimeters per pixel [mm]
Attenuation	Reduction Rate of X-ray beam while meeting structures of the target. Generally, users don't need to reset this value.
Camera to Film	Distance from the virtual film to X-ray source
Ear-Rod to Film	Distance from the virtual film to the center of Ear-rod

7.3.3 Ear-rod Setting

To generate an X-ray Image, the Ear-rod should be set on the left Ear-rod panel and on the right Ear-rod panel. You can define both sides of the Ear-rod with Ear-rod pointers. To position Ear-rod pointers, drag the Ear-rod pointer with the left mouse button as shown in the following figure.

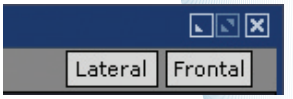


7.3.4 AP Plane Setting

To generate an X-ray image, the AP plane should be set. You can set the AP plane on the frontal pane by rotating the 3D image vertically. The face (frontal 3D image) will be rotated on the axis made by both sides of the Ear-rod position.

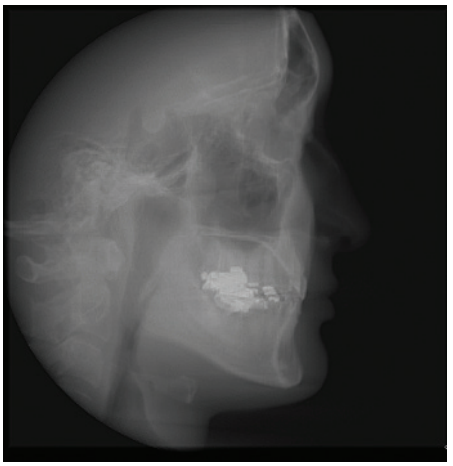
7.3.5 X-ray Image Generation

You can generate 2 types of X-ray images: lateral and frontal. You can find 2 buttons for X-ray Image Generation on the top right of the screen.



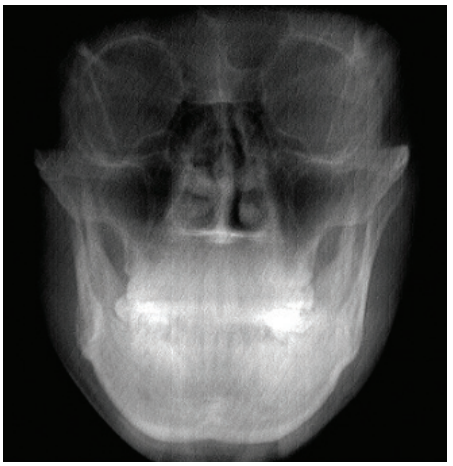
7.3.5.1 Lateral X-ray Image Generation

To generate lateral X-ray images, click the Lateral Lateral button.



7.3.5.2 Frontal X-ray Image Generation

To generate frontal X-ray images, click the Frontal Frontal button.



8. 3D

8.1 Overview

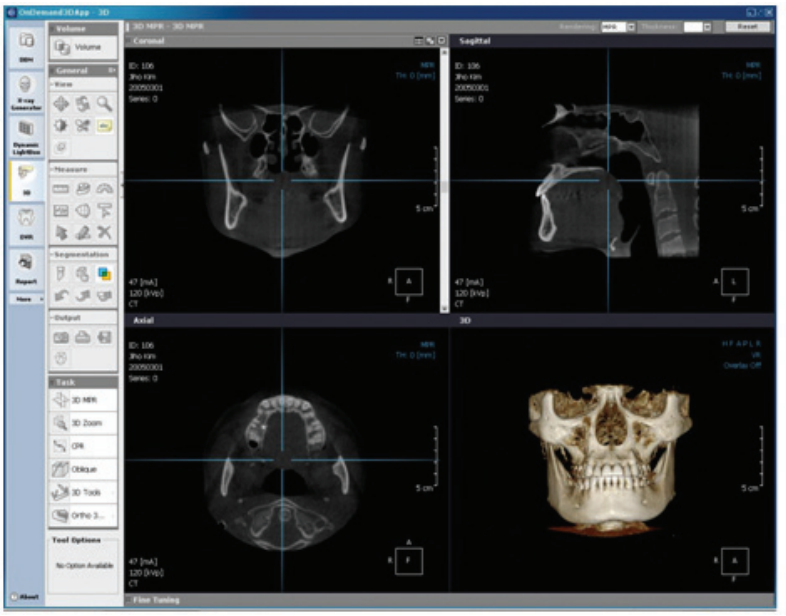
The 3D module reconstructs 3D images with patient DICOM files selected from the DBM. The 3D module supports MPR, Curve/Slice oblique, Volume Rendering, MIP and Endoscopy.

8.2 Launching 3D

Click 3D after selecting the patient's data.

8.3 3D GUI

The 3D module reconstructs 3D images with patient DICOM files selected from the DBM. The 3D module supports MPR, Curve/Slice oblique, Volume Rendering, MIP and Endoscopy.



8.3.1 General Tools

These are common tools which are used in all modes.

8.3.2 Task Tools

Tools for advanced diagnosis are in this tool box. 3D protocol, Oblique, Endoscopy and other useful functions can be realized with these tools.

8.3.3 Tool Options

Each main tool has their own options in the 'Tool Option' which appears on the bottom left hand side of the window.

8.3.4 MPR Rendering Mode and Thickness

These two values are adopted for all MPR images. Click 'Reset' if you want to reset them.

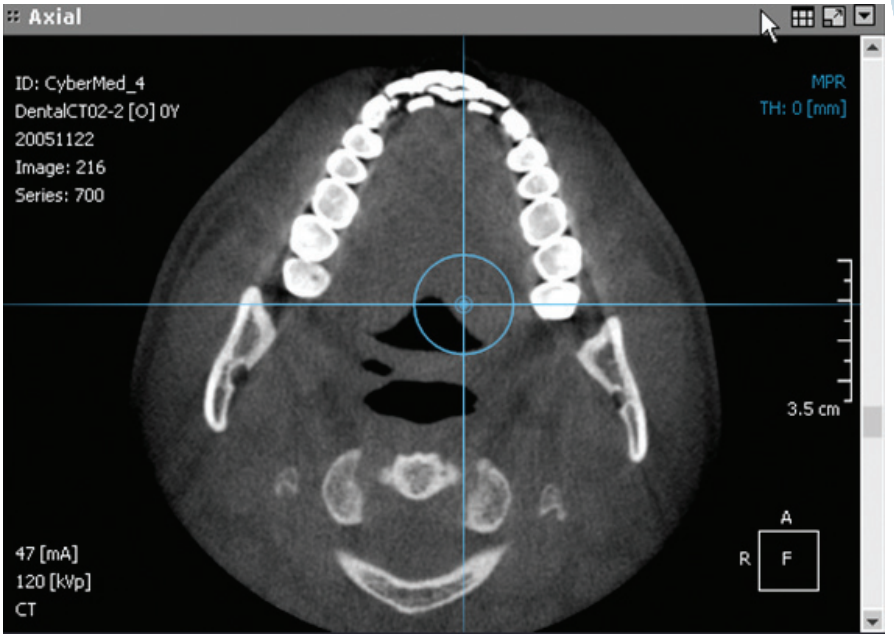
8.3.5 Main Window

The first window that appears is 'MPR' which consists of Coronal, Sagittal, Axial, and 3D Images. Window layout can be changed into another one by using 'Task Tool'.

8.3.6 Fine Tuning

This tool is for tuning volume opacity, color, and WWL. Multiple objects are managed here.

8.4 MPR



8.4.1 Title Bar

The title bar shows the basic property of the image, for example Axial, Sagittal, Coronal, 3D, Endoscopy, Oblique, Curved Planar Reformat, Perpendicular, etc. If you click the title bar, the property can be changed to another one on each image view.

8.4.2 Menu

Title Bar Menu

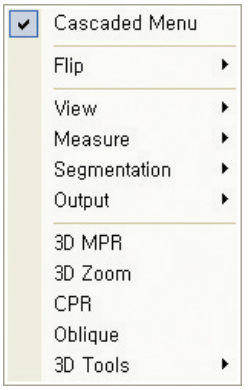
Quick Light Box. Refer to chapter 7, Quick Light Box.

Maximize and minimize the image

Flip the image vertically or horizontally

Context Menu

Click the right mouse button on the image and then the context menu will appear. The menu's usage is the same as that of General tools and Task tools. If Cascaded Menu is activated, only the closed branch menu for the tools will show up.



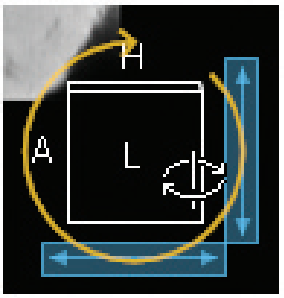
8.4.3 MPR Control line

Position, Thickness or Axes of MPR images can be adjusted with the blue cross line.
You can change the positions of other images by dragging the blue cross line when the mouse pointer shape becomes a left-right or up-down arrow(↔, ↕). Also, you can change the axes of images by rotating the line when the mouse pointer shape becomes  The thickness of other images can be changed by dragging the mouse when the mouse pointer shape becomes 

TIP	In an Axial image, the vertical line indicates the Sagittal, and the horizontal line indicates the Coronal. Right click on the line and then select 'Reset' to reset all directions and thicknesses.

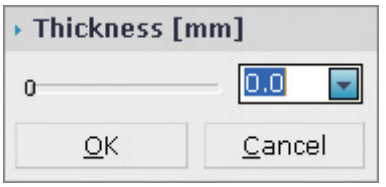
8.4.4 Direction Displayer

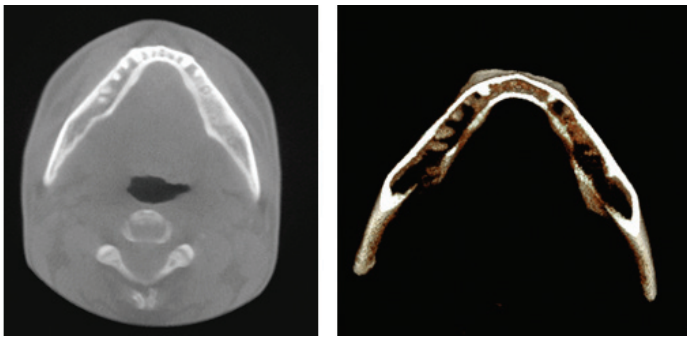
This cube shows the 3D directions of an image. Users can change the directionality by dragging the cube.



8.4.5 Rendering Mode and Thickness

These show the current rendering mode and the image's thickness. A rendering mode can be changed into another one by clicking. The thickness of the image also can be adjusted by clicking TH.





<MPR and VR mode in Axial panel>

INFO	Refer to the appendix to read more about Rendering mode.

8.4.6 Slice scroll bar

Drag the scroll bar and a slice of the image will be moved.

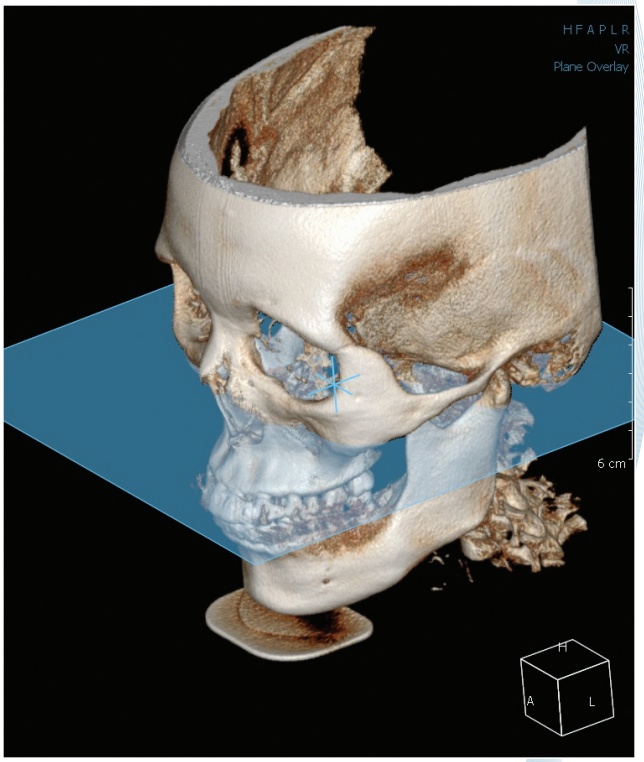
TIP	By default, users can adjust WWL by clicking the right mouse button at any time.

8.5 3D

8.5.1 MPR Overlay

An MPR plane can be checked in 3D when Plane Overlay is turned on. The blue transparent plane indicates a plane of the activated image. For example, the axial plane appears when the horizontal line in the Sagittal is activated.

The MPR image cell is also overlapped in 3D. Turn on the MPR Overlay. This is very useful when you would like to see bone in 3D or skin and airways in 2D.

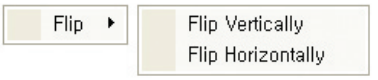


8.5.2 Menu

Quick Light Box. Refer to chapter 7, Quick Light Box.

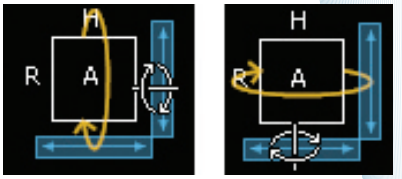
Maximize and minimize the image.

Flip the image vertically or horizontally



8.5.3 Directions

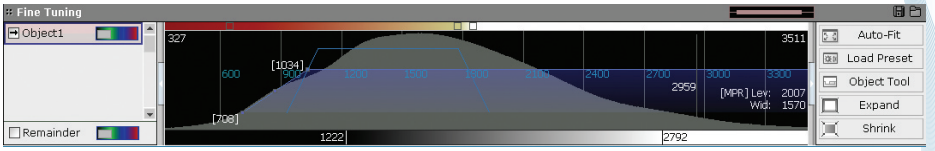
You can use the wheel mouse to rotate the 3D model with Direction guidance.



Vertical , Horizontal rotating

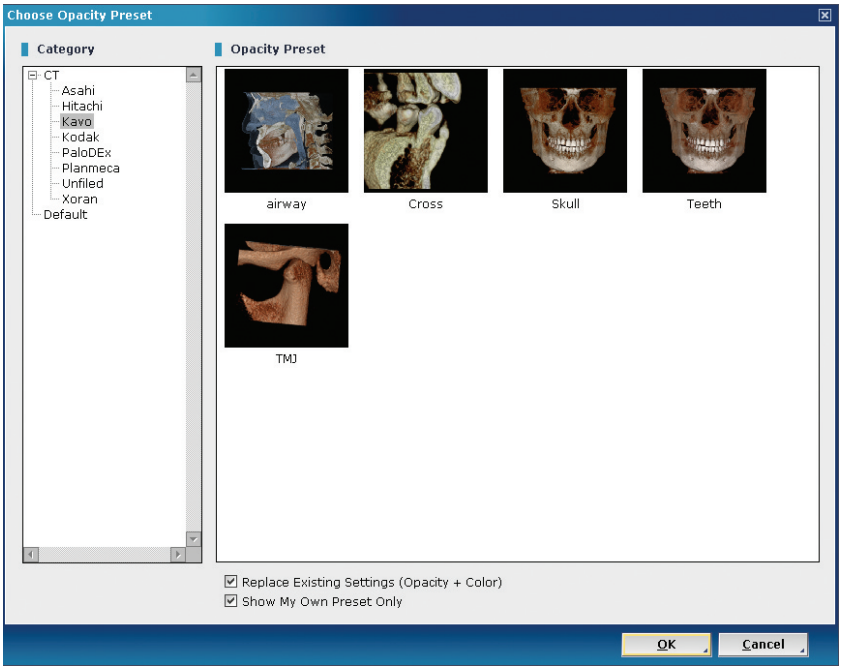
8.5.4 Fine Tuning

The 3D Volume model can be adjusted with Fine Tuning by controlling the opacity, color, and density range being displayed in 3D. Also, presets for users are supported for user friendly conditions. To show Fine Tuning, double click the Fine Tuning bar.

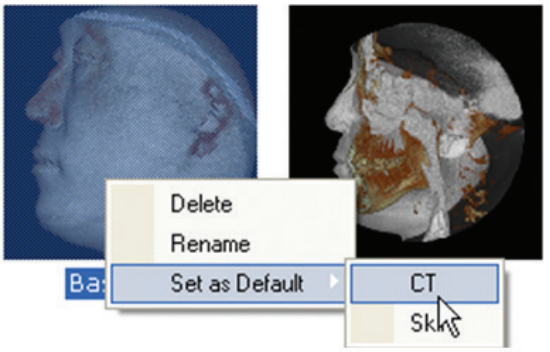


Use Preset

Controlling the Volume model is not easy for users. Using the presets is strongly recommended. Click Load Preset. 



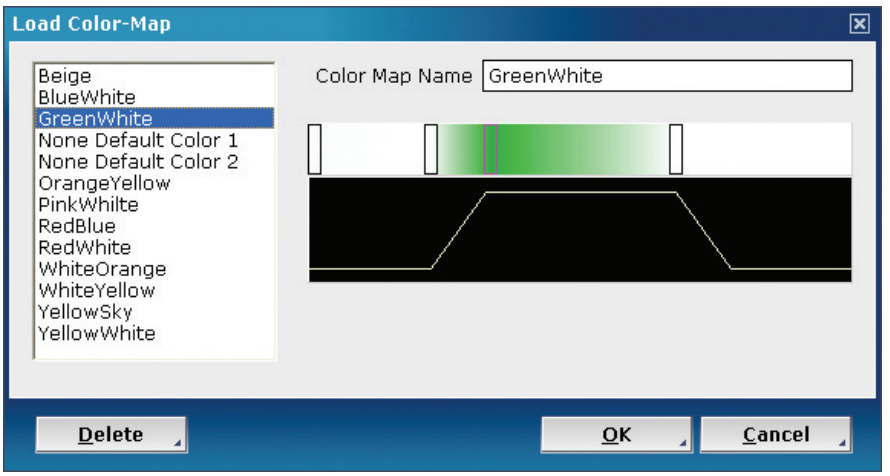
First, choose a category in the left tree and then select one preset and click OK.
The default preset for VR in Axes Adjustment and for Skeletal and Skin in Ortho3D can be set here. Click the right mouse button on a preset and select 'Set as Default.' You have to adjust each default preset for Skin and Bone.



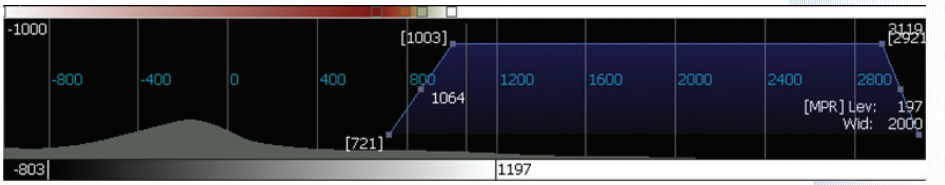
Color Bar

The color range can be adjusted by moving the pointer, and another color can be added by clicking the right mouse button.

Use the ColorMap if you feel it is hard to add or control the color. Click Load Colormap. Right click on the trapezoid histogram and then click Load Colormap in the sub-menu. The 'Load Color-Map' dialog appears as shown in the following figure.



Opacity Change Function

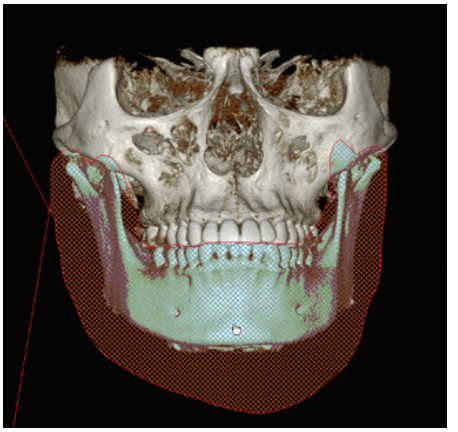


The blue trapezoid shows the display region along with the density value. The horizontal axis is units of density and the vertical axis is the opacity value. For instance, the above trapezoid shows the object's opacity increasing from 721 to 1003 and opaqueness from 1003 to 3119. You can adjust these values by dragging up and down or right and left.
Click the Auto-Fit button Auto-Fit if the trapezoid is not fully displayed.

8.6 Segmentation Tool

8.6.1 Draw Mask

The Ondemand3D App supports a segmentation function by using 'Draw Mask.' This tool has two types, Polyline and Polygon line, which you can select in Tool Options. After selecting 'Draw Mask, ' draw a line in 3D by dragging or clicking. Double click or click the right mouse button to finish drawing. Select the region to make a mask as shown in the following figure.



Then select the region which you want to remove, keep, or restore.

INFO	Regarding select as a new object, please refer to the Fine Tuning section.

If you keep the region, you can have an image similar to the result shown in the following figure.

<Result Image>

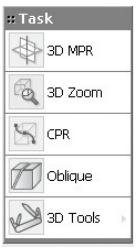
INFO	Refer to section 4.2 "Segmentation Tool" for more information

8.6.2 Undo /Redo /Reset

Click Undo if you want to return to the previous job. Redo works as reverse to Undo when you want to recover previous job done. Reset will reset all objects to their original setting.

8.7 Task Tools

Most specific diagnoses can be done with these tools.

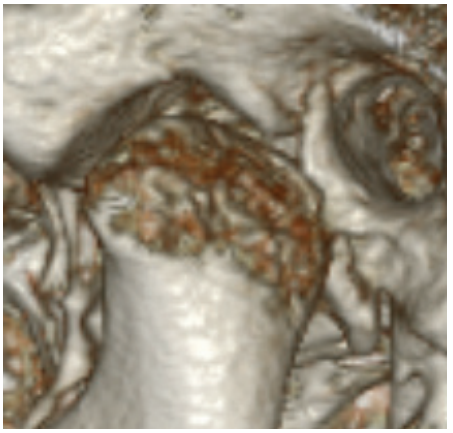


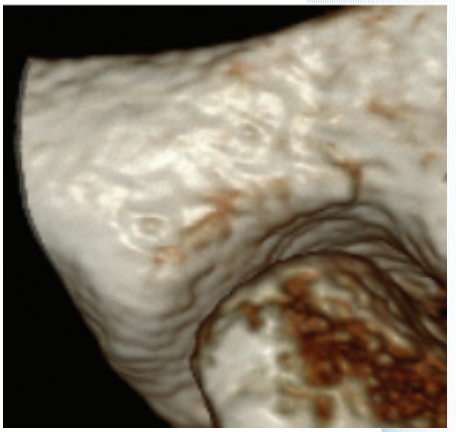
8.7.1 3D MPR

Click the MPR button whenever you would like to return to the default MPR layout.

8.7.2 3D Zoom

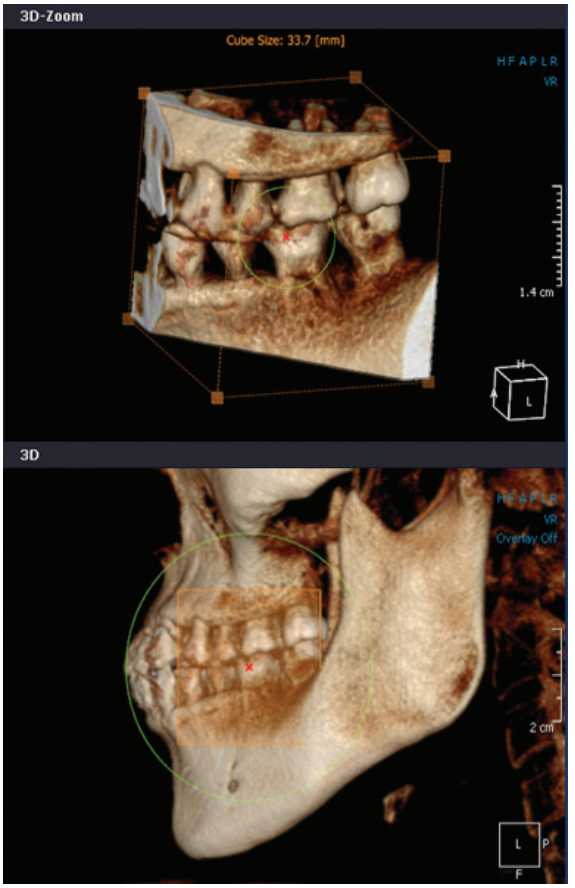
3D Zoom supports high quality 3D. Different from general 3D, it keeps the same quality image even though the target image is zoomed in on. It is very useful when viewing very tiny structures.





<General 3D and 3D Zoom>

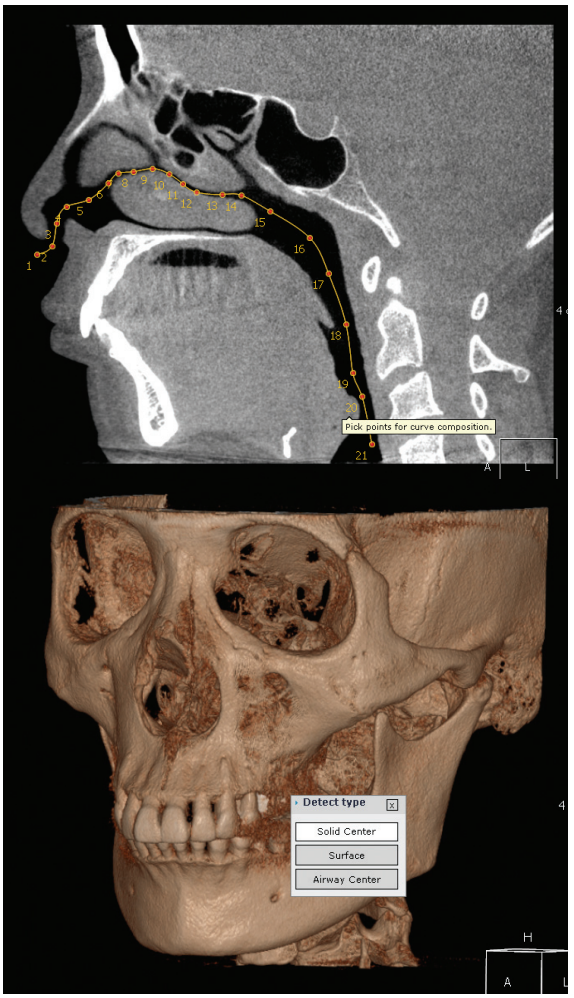
3D zoom makes fine images in a specific cubic region.
First, click a point in the center of an interesting region in 3D.



If you would like to move the cube, drag the X-point to another point. Drag each point of the cube outwards to expand the region. Rotate the cube with the right mouse button.

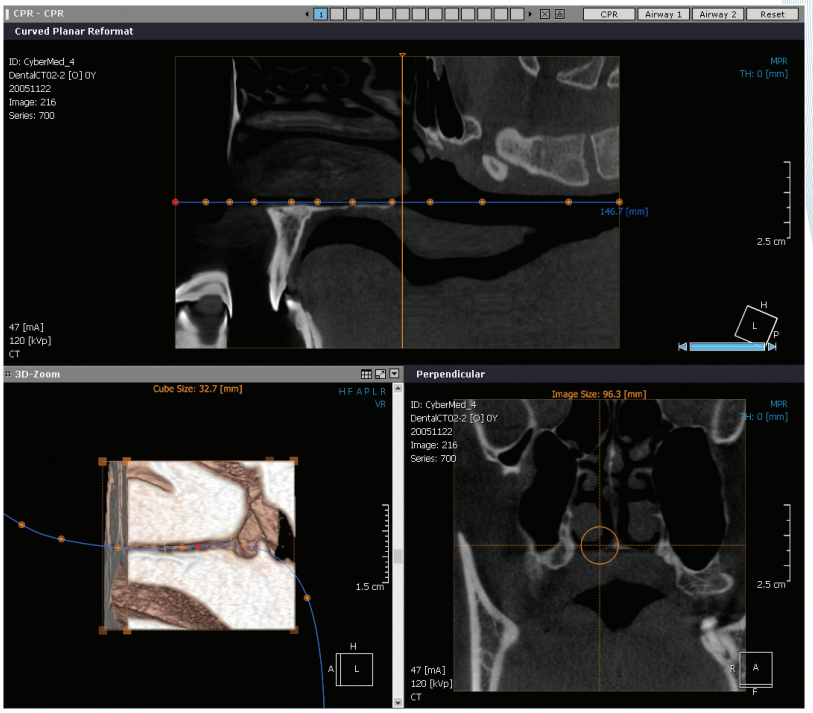
8.7.3 CPR

'CPR' supports the Panel optimized for airway study.
This tool can be used on any image. But especially in 3D, each point for a curved line can be placed automatically in the solid center, surface, or airway center.



First, select the Detect type as shown in the above figure, then draw a path by clicking and placing points. Double-click to finish drawing. Then the layout changes into the window shown in the following figure.

TIP	In the case of airway studies, adjust Fine tuning for airway density.

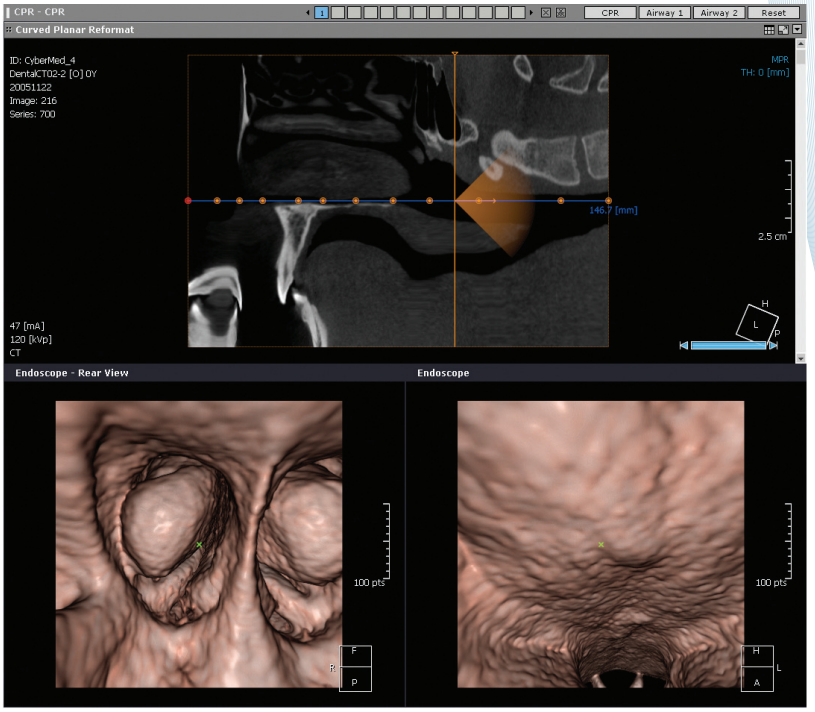


Secondly, adjust the range of the oblique image. Drag the orange lines in the Curved Planar Reformat or Perpendicular. To take a better image, minimize the range of the image.
Finally, adjust the points in each image. Drag each point to the accurate position of the path, and then the other two images will also change along the new path.

TIP	Move along the path by moving the thick yellow vertical line in 'Curved Planar Reformat' to the right and left. Then the position of the other two images will also change. On the horizontal scroll bar located at the bottom right hand side, users can rotate the oblique image with the axis (the path) by using the mouse wheel.

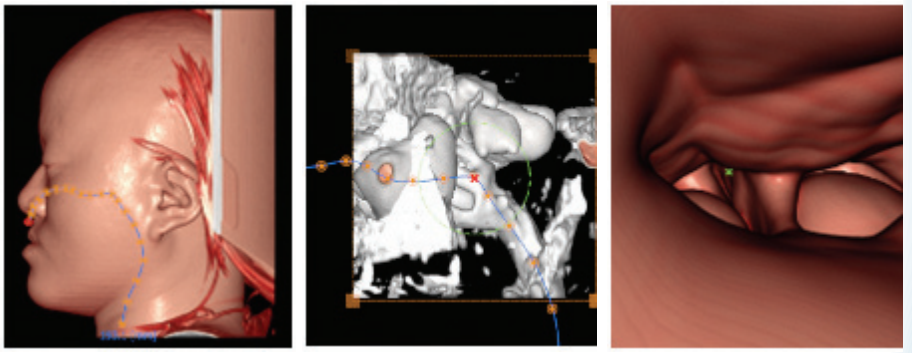
TIP	The 'Curved Planar Reformat (CPR)' History remembers all CPR information worked on before. Click the box at the top of the window if you would like to go back to another CPR window.

To change to an airway with the same path, Click the Airway 1 button in the title bar.



In addition, you can select Rendering mode in 3D.
General 3D shows the whole image, and 3D-Zoom shows only a section of an image.

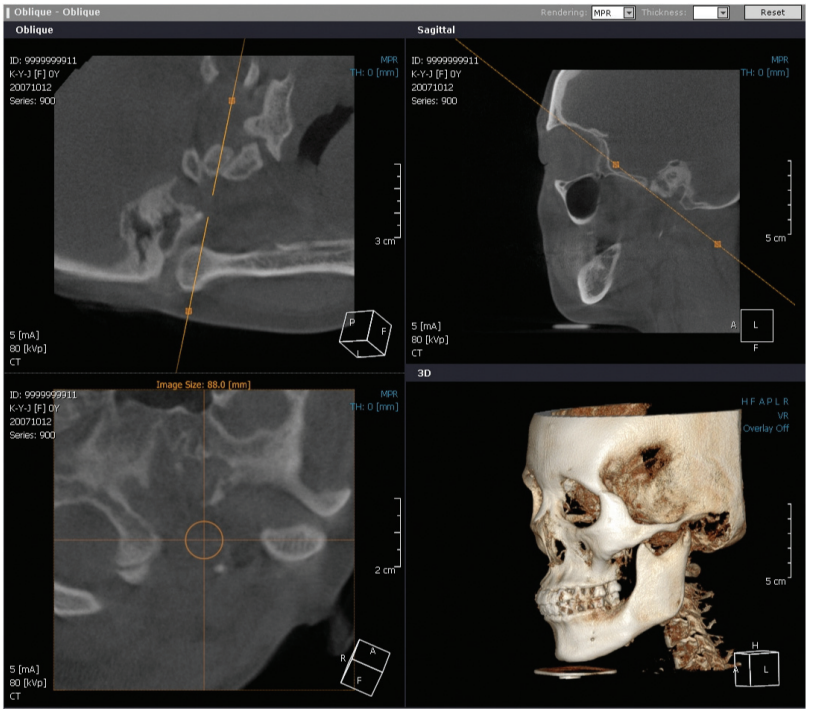
However, 3D-Zoom shows better quality images than general 3D, so 3D-Zoom is better for diagnosing an airway. In the case of Endoscopy-Rear View, the Camera tracks along the path to show a virtual endoscopy image.



<3D, 3D-Zoom and Endoscopy-Rear View>

8.7.4 Oblique

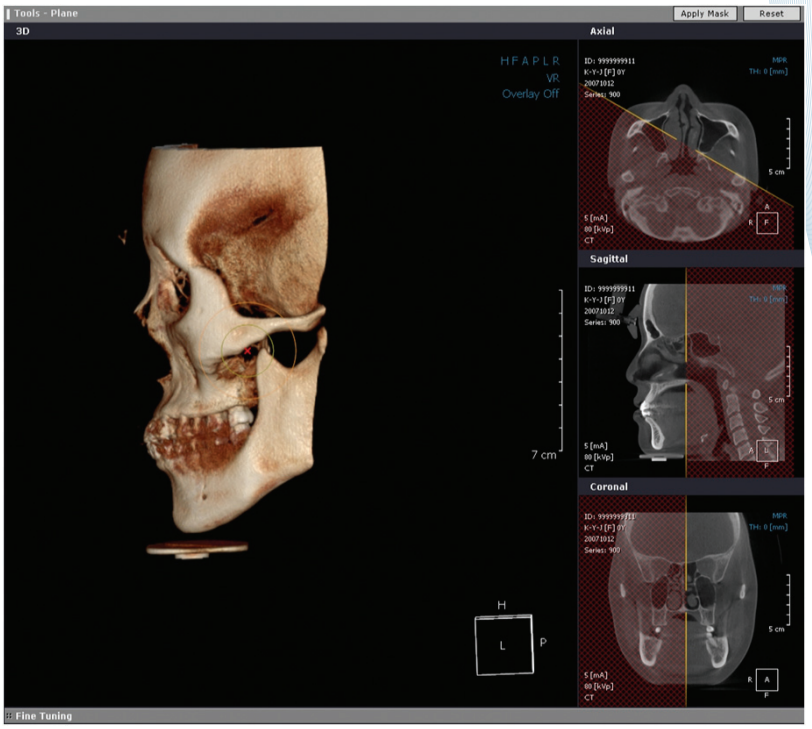
An oblique slice image can be reconstructed with this function. Especially, this function is used in 3D as well as 2D images and supports infinite oblique levels.
Place one point in any image and drag the line to a target region.
To make another oblique image, click the Oblique slice again and then draw a new line in any plane. An oblique of an oblique is also possible.
Click the green arrow button if you would like to go back to a previous oblique image.



8.7.5 3D Tools

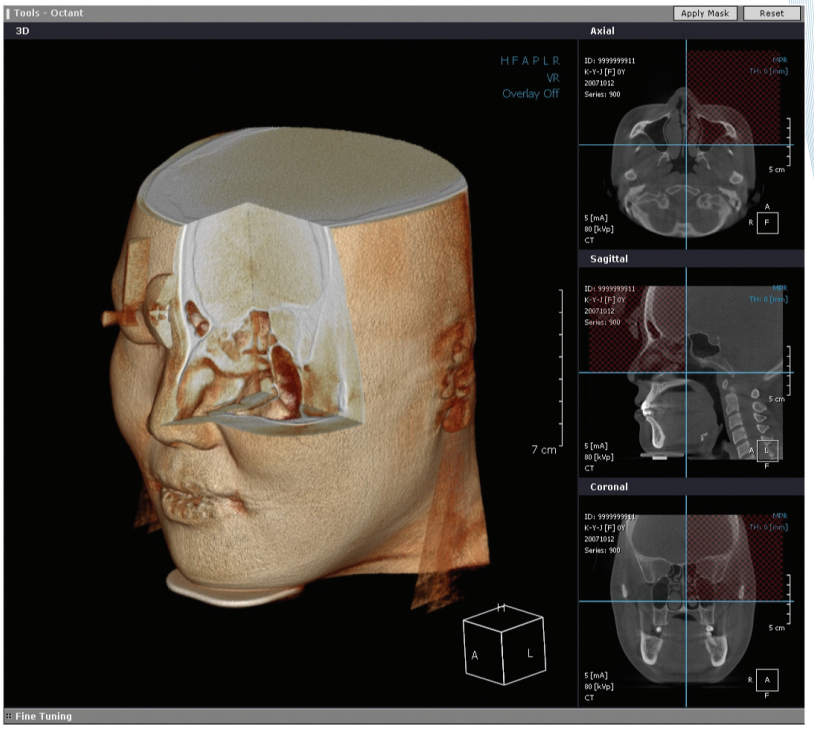
Users can see internal structures which have been hidden by another structure.

8.7.5.1 Plane



The red color region in MPR shows hidden parts. Drag or rotate the yellow line in MPR to control the region.

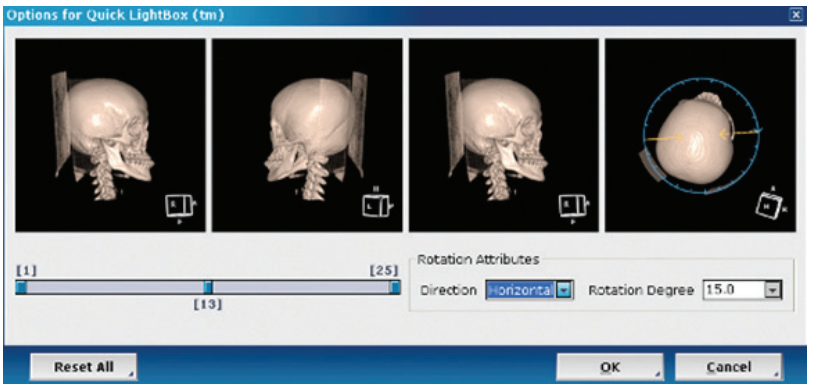
8.7.5.2 Octant



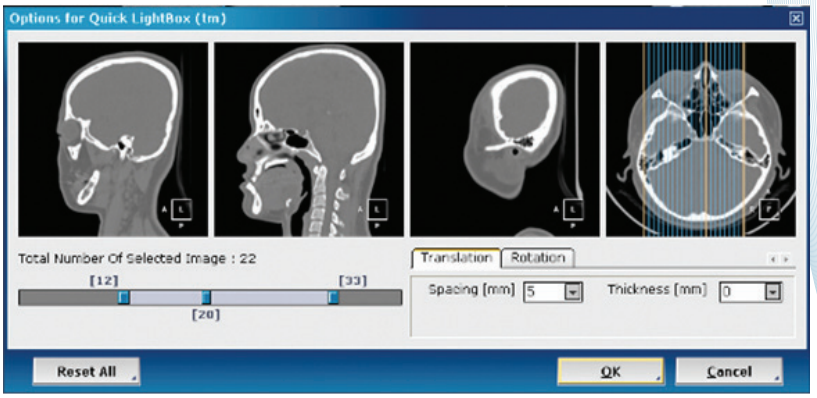
Octant is the same as Plane in that the red color region in MPR shows hidden parts of the octant. Rotate the model if you want to see other parts of the octant. The displayed part is changed along the viewing direction.

8.8 Quick LightBox

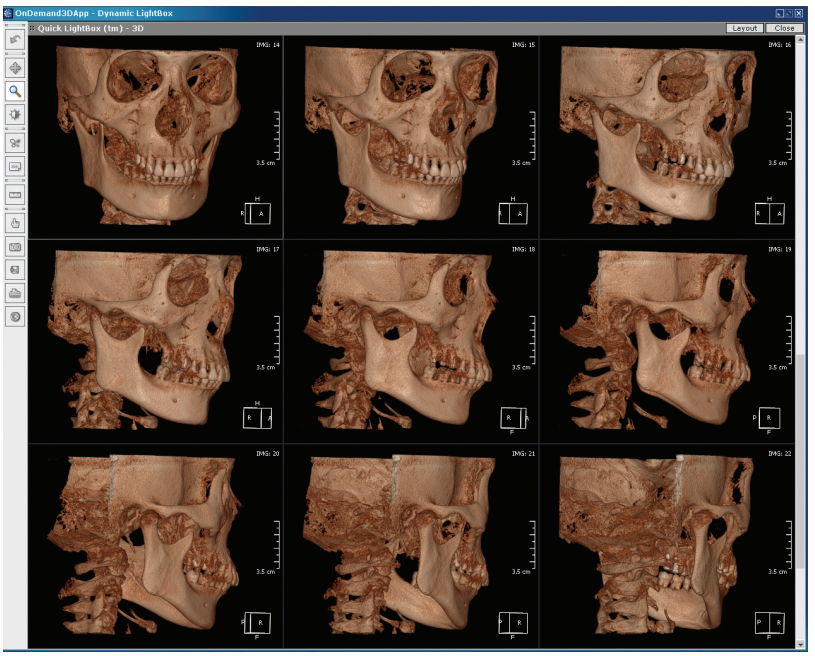
Quick LightBox is the user interface for generating 2D series from all image types. Click icon in any window.



In the case of 3D, the direction and degree of rotation can be set.



In the case of MPR, spacing and thickness values can be set.



Tools on the left side are the same as those in 3D or common tools.

9. Fusion

9.1 Overview

Fusion is a visualization tool using a registration technique to combine and show the image data from different modalities such as CT, MRI and PET in one window at the same time. A Fusion window consists of each MPR image of the Primary, Secondary and Fused pane matched between two images. In the case of images comes from same patients we can compare the changes between pre and post - operation. Fusion provides functions for loading two series of Primary and Secondary images and saving the fused image as a new DICOM series.

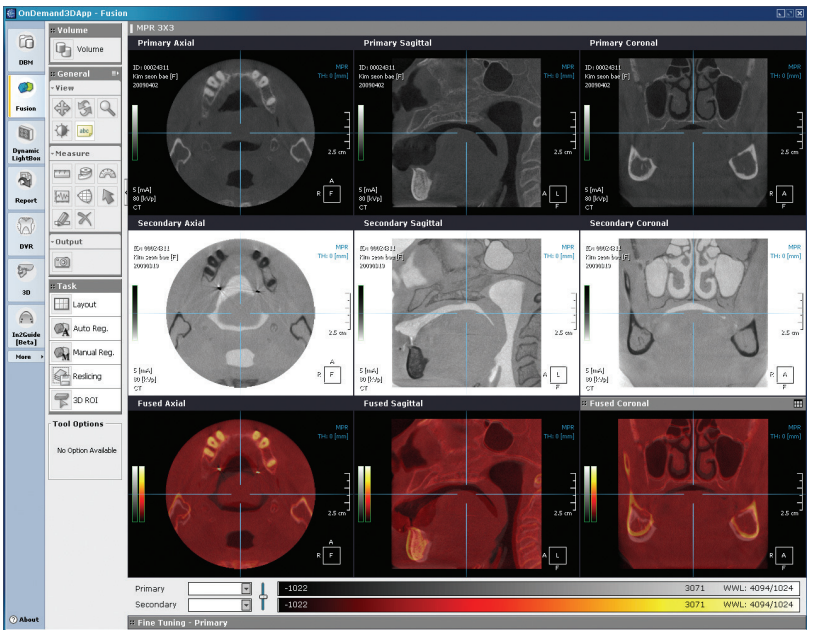
9.2 Launch Fusion

To execute the Fusion module, you must load two series of image data from a different modality for the patient. Select the two series by using the Ctrl key or dragging the mouse in Database Explorer of DBM or the Loading Option dialog.

00024311	Kim seon bae (F)	2009-04-02		0 (0)	
-1		2009-04-02		0	CT
00024311	Kim seon bae (F)	2009-03-19		0 (0)	
-1		2009-03-19		0	CT

Left-click ( ) the button image shown below in the module bar to execute the Fusion module.

9.3 Fusion GUI



9.3.1 Primary Image

Title Bar of the image pane includes the text "Primary".

9.3.2 Secondary Image

Title Bar of the image pane includes the text "Secondary".

9.3.3 Fused Image

Title Bar of the image pane includes the text "Fused".

9.3.4 Fine Tuning

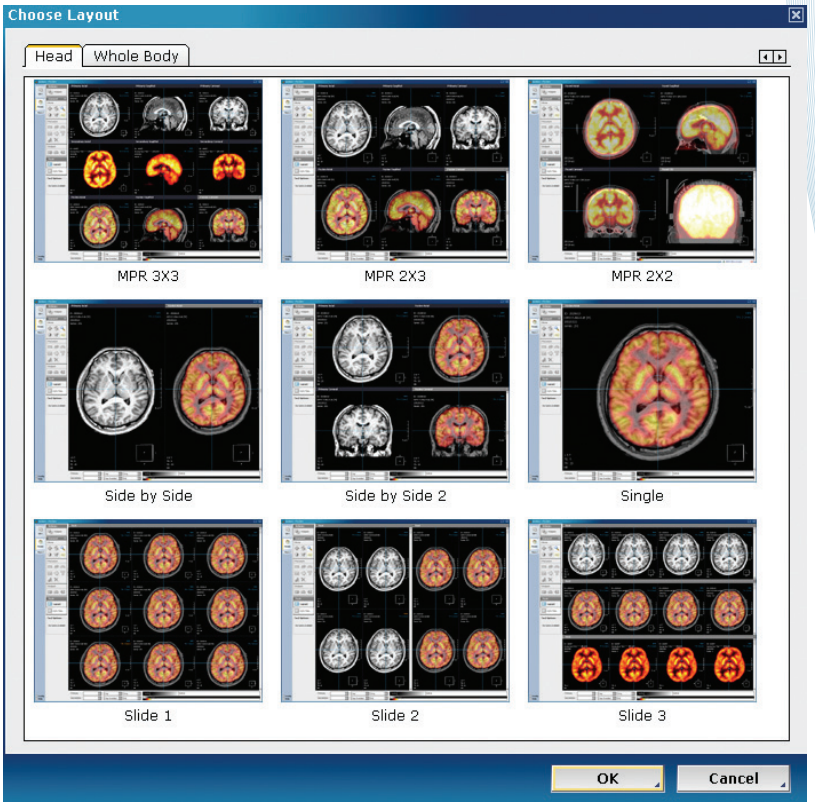
Fine Tuning appears at the bottom of the screen.

9.4 Task

9.4.1 Layout

Converts the layout

Select the 'Layout' button found in the Task Tools to change the layout.
The 'Choose Layout' dialog box appears.

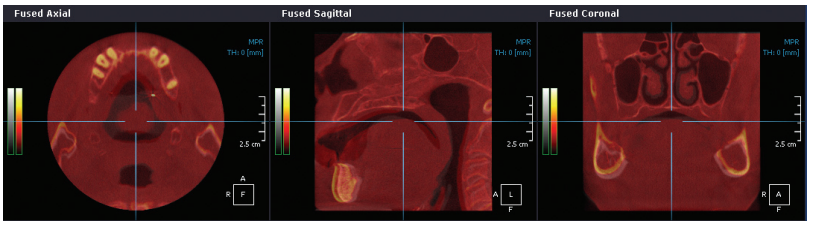


After selecting the necessary layout, left-click ( ) the 'OK' button.

9.4.2 Auto Reg

Executes Automatic Registration

If you select the 'Auto Reg' button, Primary and secondary MPR images are matched and the fused image is displayed in a Fused MPR pane.

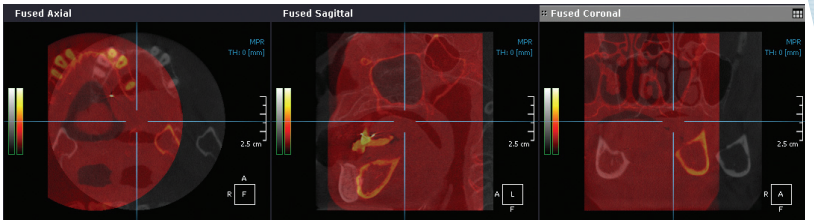


Fused panes displaying registration results

9.4.3 Manual Reg

Users execute Registration manually

If images fail to match because of a wide difference between the positions of the two images or it takes a long time to match using a auto registration function, users can match images manually. In the case of matching manually, Secondary image position is changed on the basis of the Primary image. Click the 'Manual Registration' button to execute.



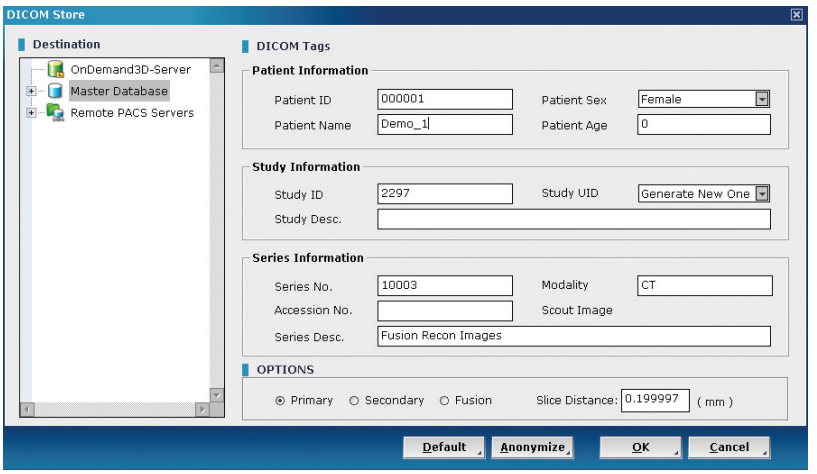
Moving the Secondary pane spontaneously by using Manual Registration button.

The Manual Registration button is used prior to using the main tools and the usage is the same as that of the general tools. During the time that this tool is being used, the other tools cannot be used and previous registration results are removed from memory. Accordingly, you will then have to execute registration again.
After clicking the Manual Registration button, you can move images up/down and to the left/right sides by using the left mouse button and rotate on the basis of the center of the image by using the mouse wheel.

9.4.4 Reslicing

Executes Reslicing

If you click the Reslicing button after having changed the standard
Primary, Secondary, Fused file can be changed DICOM files and saved in the DB after Reslicing.



INFO	Reslicing is used as the same patient's each image of mandible and maxilla to make a integrated image.

9.4.5 3D ROI

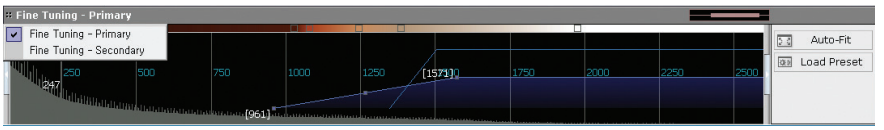
Uses ROI (Region Of Interest) tool using 3D ellipsoid

In the case of using the 3D ROI tool, a 3D ellipsoid appears on the MPR crossbar and statistical information related to the pixel values inside of the ellipsoid is displayed. While this tool is being used, the maximum value of the current secondary volume and the slider controller for adjusting the threshold appear at the top of the screen.

In the screen, the locations of ellipsoids and pixels used as threshold values are displayed with a blur overlay. In the dialog box, statistical information concerning the inside of the ellipsoid and the pixels using the threshold is indicated at the same time.

9.5 Fine Tuning

Click "Fine Tuning" at the bottom of the screen and select Primary or Secondary Fine Tuning to see the corresponding volume.



You can control the color and windowing value of primary and secondary images with the Fine Tuning function. Each volume is adjusted as according to different values, and therefore two objects can be easily compared.

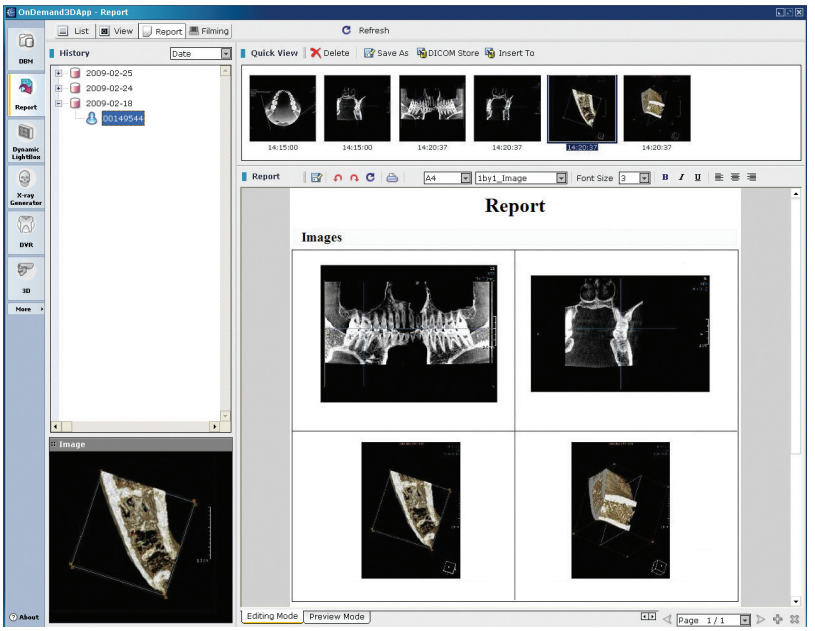
10. Report

10.1 Overview

Users can make a report more easily and quickly by using the ordinary and easy-to-use editor which the Report module provides. In addition, you can export it as an HTML formatted document to see it whenever and wherever you want. The Report module supports the extended functions of capture, save and convert, and prints reconstructed images of each Ondemand3D App screen.

INFO	If you want to know how to capture, please refer to Chapter 4, Tools.

10.2 Report GUI



10.2.1 Mode Switch

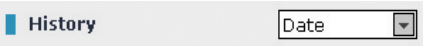
List	Switches to Quick View mode to see captured images
View	Switches to Image View mode
Report	Switches to Report mode
Filiming	Switches to Filming mode

10.2.2 History

Captured images can be sorted by patient ID or date.

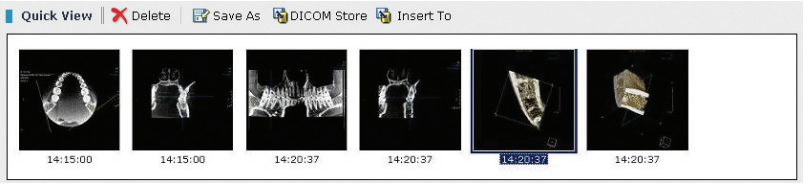
Sort By Patient ID

Sort By Date



10.2.3 Quick View

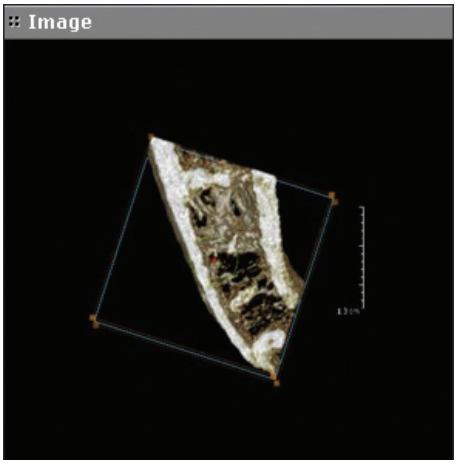
You can see the captured images as thumbnails.



Delete	Deletes the selected images
Save as	Stores the selected images to the local disk in BMP, JPEG, TIF, PNG format
DICOM Store	Stores the selected images in DICOM format
Insert To	Inserts the selected images into the report document

10.2.4 Image

You can confirm the selected images in the Quick View of the Image pane.



10.2.5 Report Mode

You can find the buttons below in the bottom Report tab in Report mode.

Editing Mode

Editing Mode allows editing of the report.

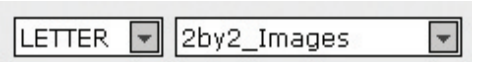
Preview Mode

Preview Mode allows the completed report to be previewed.

10.3 Reporting

10.3.1 Report form specifying

You can select the paper size to be used for the report and the image-layout.



10.3.2 Text Editing

Ondemand3D App provides the following tools for editing reports.

Save

This tool allows saving the project files.

Undo/Redo

This tool undoes the last operation during report editing or redoes the undone operation.

Refresh

This tool refreshes the screen when an unexpected problem comes up while using Bold/Italic/Underline when editing.

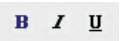
Print

This tool displays the print preview screen. You can print the report by clicking the Print button on the preview screen.

Font Size

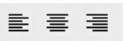
This tool specifies the text size.

Bold/Italic/Underline



This tool changes the text to the corresponding text style.

Left/Center/Right



This tool aligns the selected paragraph.

10.3.3 Image Inserting

You can insert the captured images to the report with Drag&Drop or by going through the right mouse context menu and selecting 'Insert Image to Report'.

11. Project Viewer

11.1 Overview

Project Viewer is a separate program for project files viewing function which comes from the server or CD/DVD ROM. After installing Project Viewer, the following Project Viewer icon will appear on the Windows desktop.

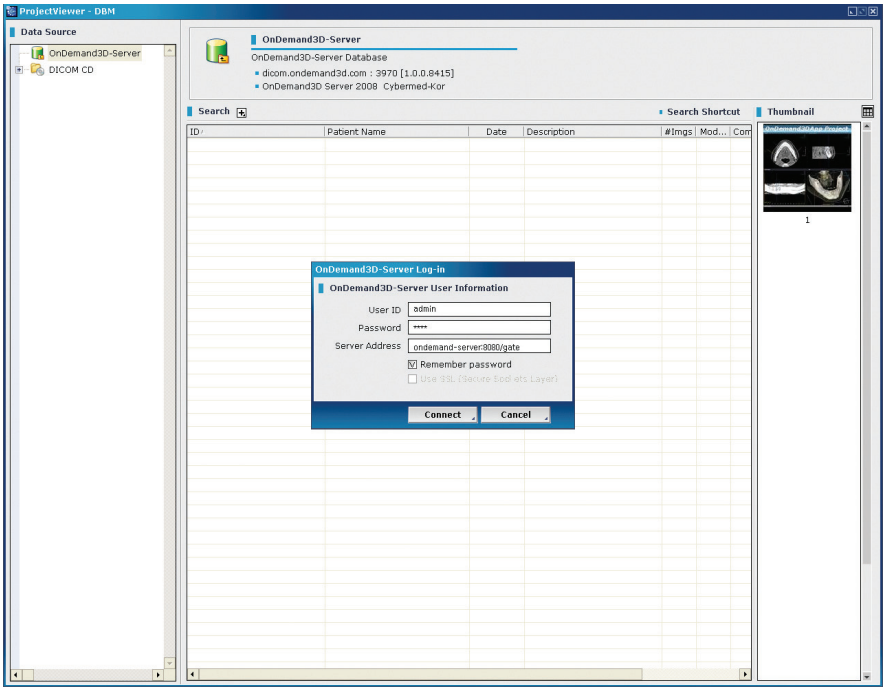
A project file can be made by Ondemand3D App modules and will include all operations done using Ondemand3D App modules.

INFO	If you want to know how to install the Application and Project Viewer program, please refer to section 2.4.
INFO	If you want to know how to save project files, please refer to section 4.2, Output Tools.

11.2 Project Viewer Operations

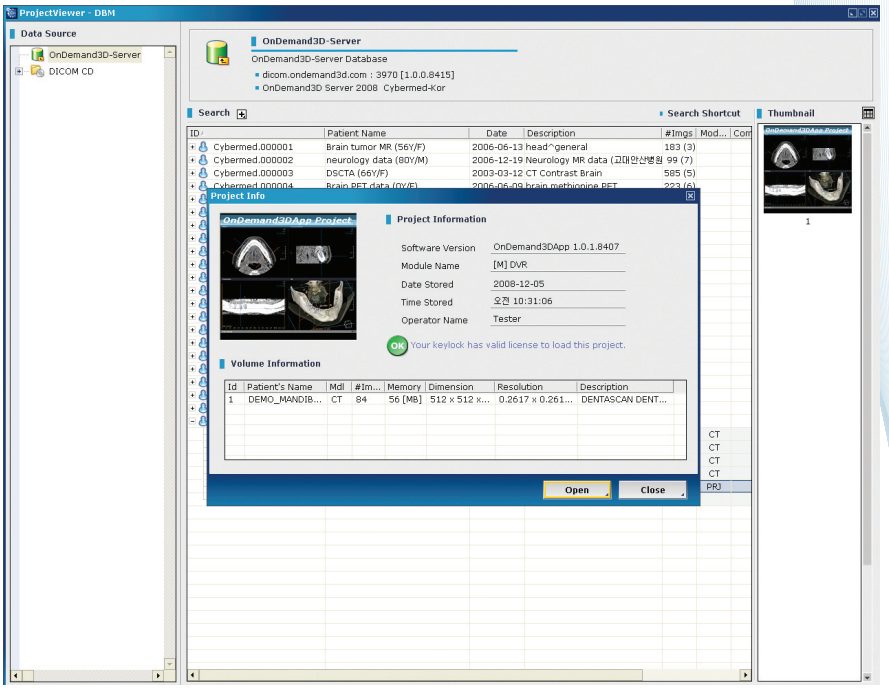
Launching and Connecting to the Server

Project Viewer GUI is almost the same as the Ondemand3D App. After launching the project viewer, the following DBM screen will appear. There are only two data sources on the left: Ondemand3D-Server and DICOM CD. The default data source is Ondemand3D-Server, and the server connection dialog will appear. After logging onto the server, access will be granted to all the data.



Viewing the Project file

After Selecting a project file and double clicking, it will launch the project dialog box and viewer as follows:

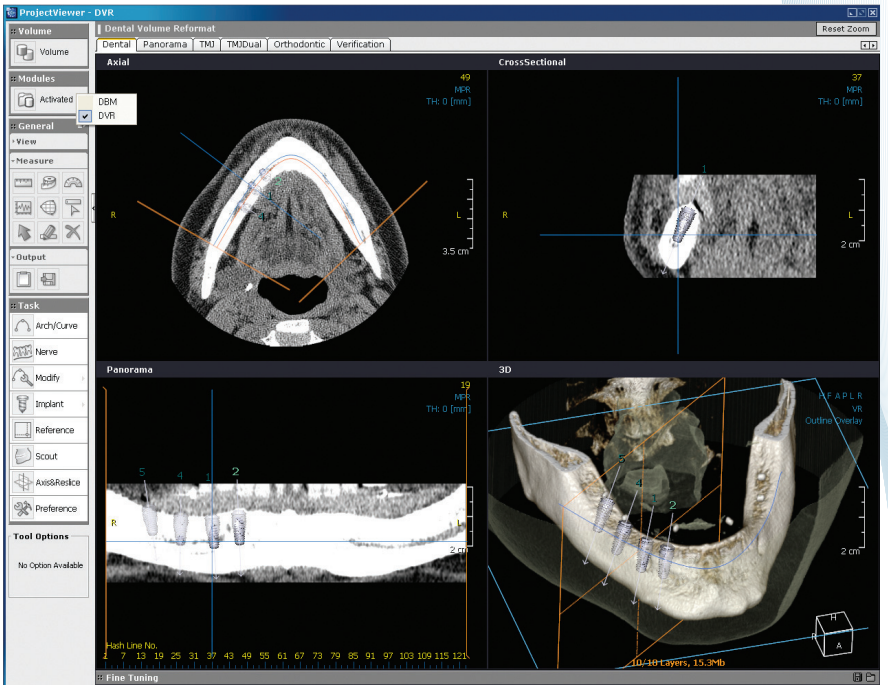


All the features are the same as those of the Ondemand3D App, except that the Project viewer does not have module buttons but instead has a Module tab in the tool region. Project files include job statuses of all the modules used. Selecting 'Activated' in the Module tab will list the available modules. Users can switch activated status between modules using this tool.

11. Project Viewer

Viewing a DICOM file

=>The Project viewer support DICOM files which has been worked as project file thru Ondemand3D App, but not allowed to view original DICOM files in DBM and operate other modules which is not included in that project file. As an extra function, the DBM thumbnail viewer can open the original axial slice data. See section 3.6 for details.



12.1 X-Report Template Designer

12.1.1 Overview

X-Report Template Designer is software which designs report templates for Ondemand3DTM. A user can create numerous report templates with X-Report Template Designer in Ondemand3DTM. Customized report templates will increase the efficiency of writing a report. To start X-Report Template Designer, press the Windows 'Start' button => All Programs => Ondemand3DApp => X-Report Template Designer.

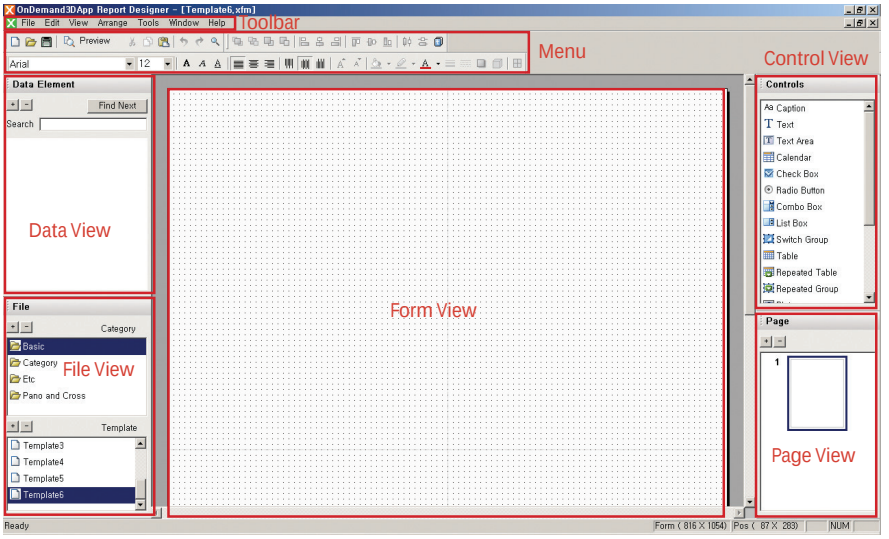
12.1.2 Main function

X-Report Template Designer provides functions to create and manage a report template file. X-Report is based on XML and makes it is possible to combine data elements such as the patient ID, name, sex, etc. to a control. This binding enables the auto-binding function in X-Report.

12.1.2.1 Main GUI

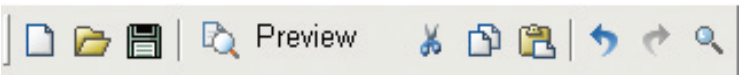
X-Report Template Designer is composed of a number of Views, a toolbar and a menu similar to any general Windows application.

12.1.2.2 Main View



12.1.3 Tools

12.1.3.1 Common Tools



12.1.3.2 Alignment Tools

Refer to section 4.3,'Control Alignment'.

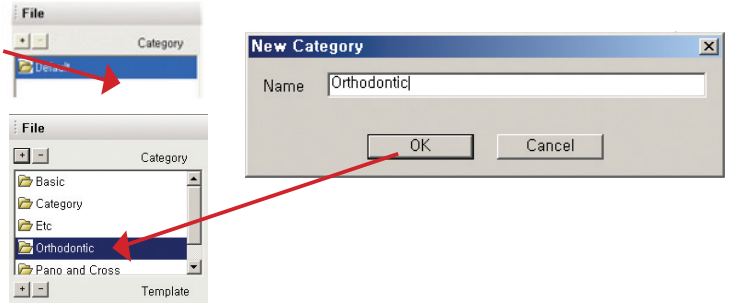
12.1.3.2 Alignment Tools

Arial	Font	Select a font
12	Font Size	Font Size
A	Bold	Bold
A	Italic	Italic
A	Underline	Underline
	Text Align Left	Text Align Left
	Text Align Center	Text Align Center
	Text Align Right	Text Align Right
	Text Align Top	Text Align Top
	Text Align Vertical Center	Text Align Vertical Center
	Text Align Bottom	Text Align Bottom
	Font Bigger	Make the font size of the selected control bigger
	Font Smaller	Make the font size of the selected control smaller
	Fill Color	Change the background color of the selected control
	Line Color	Change the line color of the selected control
A	Font Color	Change the font color of the selected control
	Line Width	Change the line thickness of the selected control
	Line Style	Change the line style of the selected control
	Shadow Style	Add a shadow effect to the selected control
	3D Style	Add a 3D effect to the selected control.
	Image Layout	Change the layout of the selected control (Series Image box, Multiple Image box)

12.1.4 File Management

12.1.4.1 Category Management

Add and Delete Categories
Template files are sorted by category. To create a new category, click the 'Add' button in the Category View, and type in a category name.

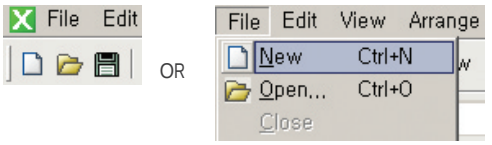


To delete a category, select a category and click the 'Delete' button.

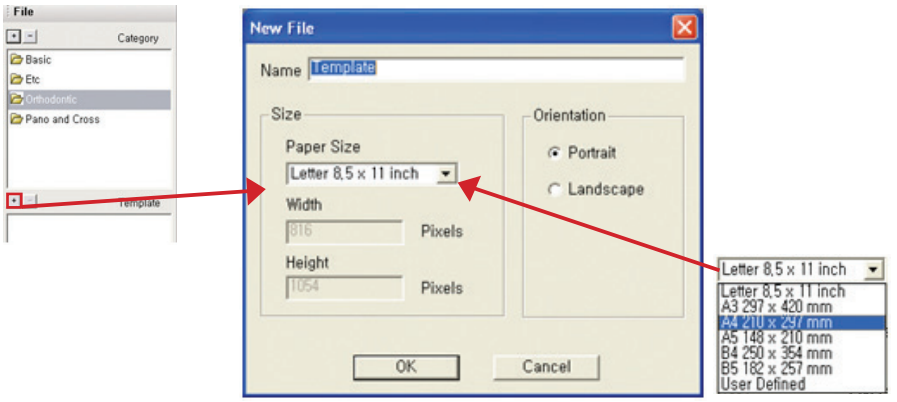
12.1.4.2 Template Management

Create and Delete a template file

To create a new template, first select a category that the template will belong to and click the 'New' button in the toolbar (or the 'New' item in the File menu). A New File dialog box will pop up.



Another way to create a new template is by clicking the 'Add' button in Template View after selecting a category.



After clicking the 'OK' button in the New File dialog box, a form view for the new template will appear in the main view. To delete a template, select a template and click the 'Delete' button .

Template Saving

To save the current template, click the 'Save' button in the toolbar or select the 'Save' item from the File menu. If you want to save the current file under the different name, select the 'Save As' item located in the File menu.

Template Loading

To load a saved template, double click a template name in File View. The saved template will be loaded. Another way to load a saved template is clicking the 'Open' button on the toolbar or by selecting 'Open' from the File menu options.

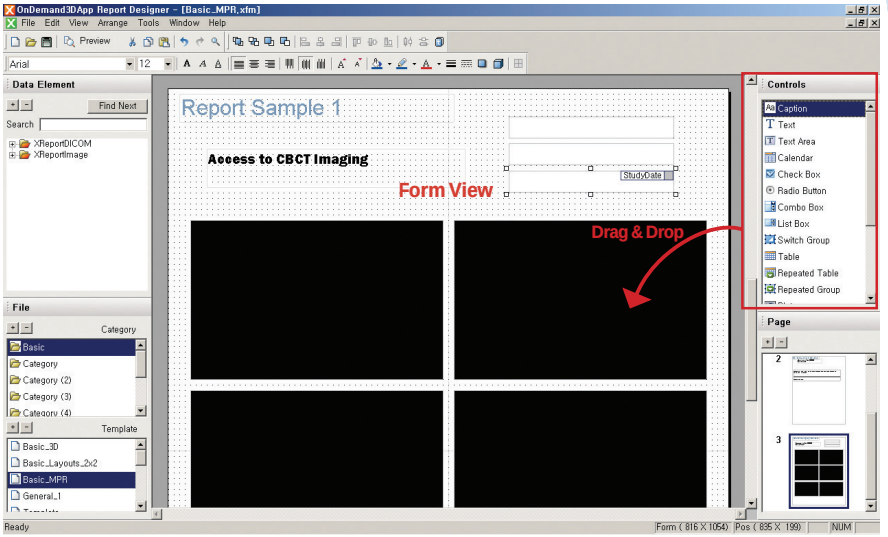
Template Preview

You can preview the current template using a web browser. To preview the template, click the 'Preview' button Preview on the toolbar or select 'Preview' from the Tools menu.

12.1.5 Controls

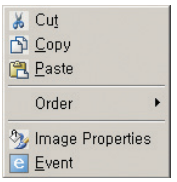
12.1.5.1 Add a Control to Form View5

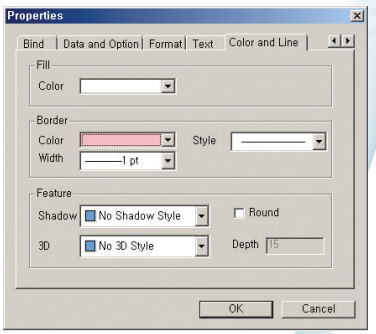
You can add controls to the Form View by using the mouse's Drag & Drop functionality. Select and drag a control from Controls View and then drop it to the location in the Form View where you want to place it.



12.1.5.2 Control Properties

You can edit the properties of each control by selecting the 'Caption Properties' item from the Context menu.





12.1.5.3 Control Alignment

You can align the controls with the Align tools located on the toolbar.

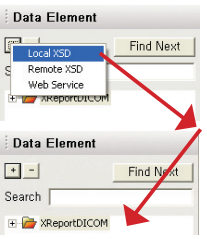
Tool	Align
	Align Left
	Align Center
	Align Right
	Align Top
	Align Vertical Center
	Align Bottom
	Equal Width
	Equal Height

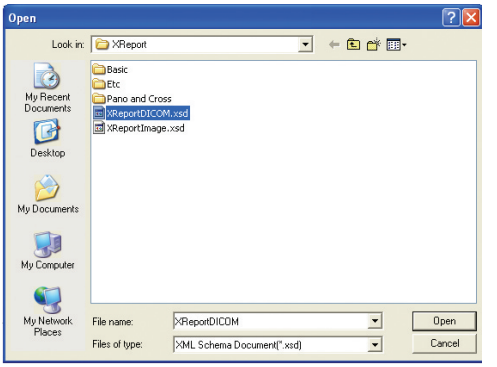
12.1.6 Data Element Binding

You can combine controls with data elements such as the patient ID, name, sex and images. If a control is bounded, the corresponding information will be automatically entered from the DICOM file when the user writes a report.

12.1.6.1 Data Element File Loading (XSD File Loading)

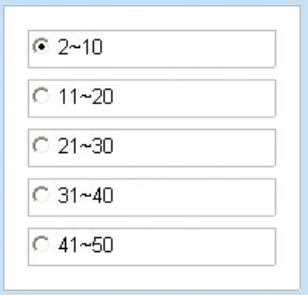
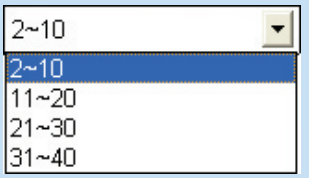
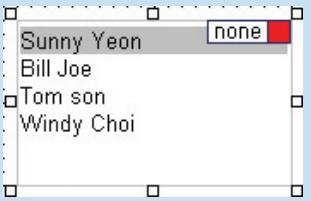
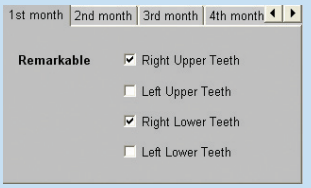
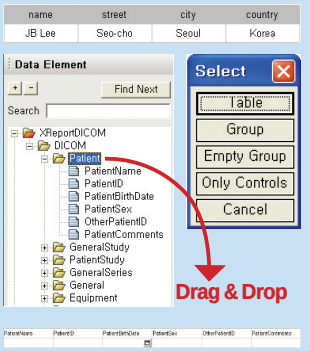
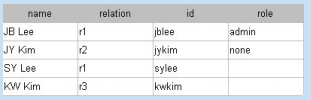
Click the 'Add' button from Data View and select 'Local XSD'. From the 'Open' dialog box, open 'XReportDICOM.xsd' file. 'XReportDICOM.xsd' file contains Header Information of DICOM data such as the patient ID, name etc. By using the same method, open an 'XReportImage.xsd' file. The 'XReportImage.xsd' file contains information of the image type which can be generated by Ondemand3DTM such as axial, cross sectional, panoramic and TMJ-sectioned images.



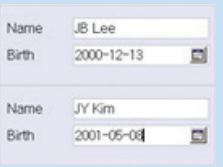
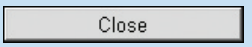
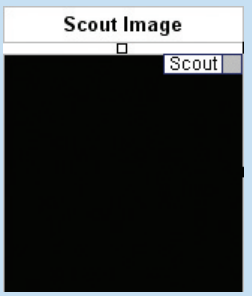
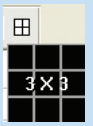


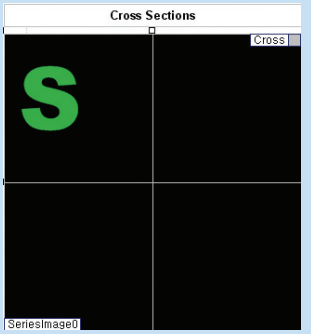
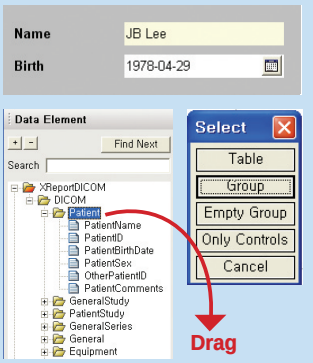
12.1.7 Control Description

Caption	Create a box to display text which will be used as a label. Click inside the Caption box area, and then you will be able to enter text. You can change the properties by clicking 'Text Properties' in the context menu.	Report 1
Text	Create a single-line box for getting text input from user. To set the default text of the box, click 'Text Properties' from the context menu. In the 'Data and Option' tab, you can enter the Default value. The text box can be bound with data elements such as 'Patient ID', 'Name', 'Sex' etc. To bind a data element, drag & drop an item from data elements to the Text Control.	Writer : ANONYMOUS (Default Value,'ANONYMOUS') Patient ID Name Sex (Bind PatientName to Text Box)
Text Area	Create a multi-line text area box where text will be entered.	Comment
Calendar	Create a pop-up style calendar box. This control can be bound with a data element such as 'Birth Date'.	Birth Date Birth Date 2009년 5월 일 월 화 수 목 금 토 오늘: 2009-05-17
Check Box	Create a checkbox. A checkbox control is used to receive a yes or no value from a user. Click inside the checkbox area and then you will be able to edit the checkbox label.	☑ Right Upper Teeth ☐ Left Upper Teeth ☑ Right Lower Teeth ☐ Left Lower Teeth

Radio Button	Create a radio button. Only one radio button in a group can be selected. Click inside the radio box area and you will be able to edit the radio button label.	
Combo Box	Create a combo box control which can be used to present a list of selectable options. To apply options, double-click the combo box and select option by clicking the 'Add' button in the 'Data and Option' tab.	
List Box	Create a list box control to present a scrollable list of text items from which a user can select one option. To insert options, double click the list box control. And then insert an option by clicking the 'Add' button in the 'Data and Option' tab.	
Switch Group	Create a switch group to provide a space controlled by numerous tabs. You can add or remove a tab and insert various controls onto each tab.	
Table	Create a table. Click inside a cell, and then you will be able to enter text into the cell. Each cell can be bound with a data element. Drag a data element folder to Form View, and then select 'Table'. This will automatically create a table bound with the data elements in the folder.	
Repeated	Create a table with repeating rows. Click inside a cell, and you will be able to enter text into the cell.	

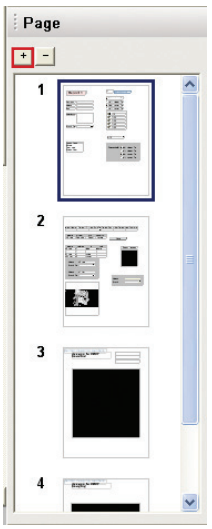
12.1.7 Control Description

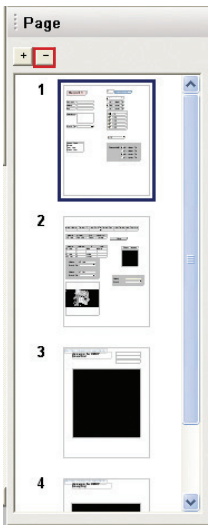
Repeated Group	Create a repeating group for repeated table elements.	
Picture	Create a picture box. To load an image, double-click the picture box and then type the path to the image in the 'Link' tab.	
Button	Create a custom button. To assign an event to a button, click the right mouse button, and select the 'Event' item. If you want to close the report screen with this button, click the right mouse button and for 'OnClick' select 'Close Browser'.	
Image	Create an image box to display an image from Ondemand3D™. You can bind a data element to the image box. Drag an item from 'XReportImage' in Data Element View, and drop it onto the image box.	
Multiple Image	Create an image box to display multiple images from Ondemand3D™. A user can insert different images into each cell. You can bind a data element to the image box. Drag an item from 'XReportImage' in Data View, and then drop it into a cell. To change the layout of an image box, click the Layout button on the toolbar.	 

Series Image	Create an image box to display a series of images from Ondemand3D™. The user can insert a series of images. You can bind data elements to the image box. Drag an item from 'XReportImage' in Data View, and then drop it on the series image box. To change the layout of image box, click the Layout button on the toolbar.	
Group	Create a group box to put together several controls. Drag a folder to form a view, and select 'Group'. This will automatically create a group bound with the data elements in the folder.	

12.1.8 Page Addition & Deletion

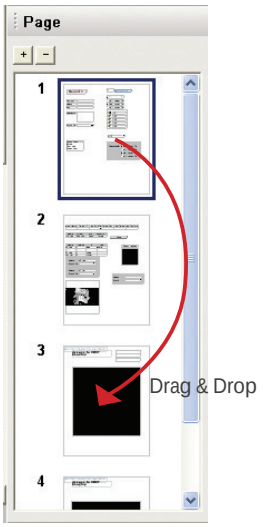
You can add or delete a page with the 'Add' [+] or 'Delete' [−] button.





12.1.9 Control Description

With the mouse's drag and drop functionality, you can change the order of pages.



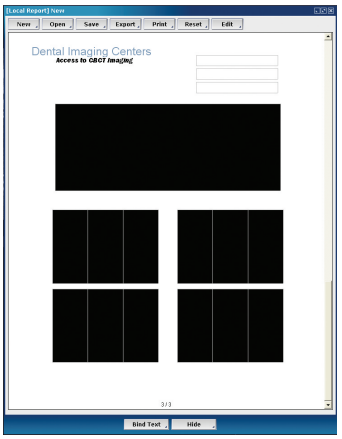
12.1.10 Page Copying

In order to copy and paste a page, press the Ctrl key and drag and drop a page.

User Guide X-Report

12.2.1 Overview

Ondemand3D™ provides two solutions for reporting. One is the basic report based on HTML and another is the X-Report based on XML.
The Basic Report can be used for the simple reporting required by clinics. On the other hand Report, X-Reporting can be used for the sophisticated and repetitive reporting work done at university hospitals or imaging centers by generating customized report template.



<X-Report, template manager and reporting window>

In X-Report, a user can insert images into a customized report form. Users of X-Report are able to create customized templates which fulfill their needs. It is a very powerful and advanced reporting system for advanced users. X-Report is able to retrieve images automatically based on XML tags which help to create reports efficiently and quickly. X-Report also supports real-size printing and exporting as PowerPoint or HTML files.

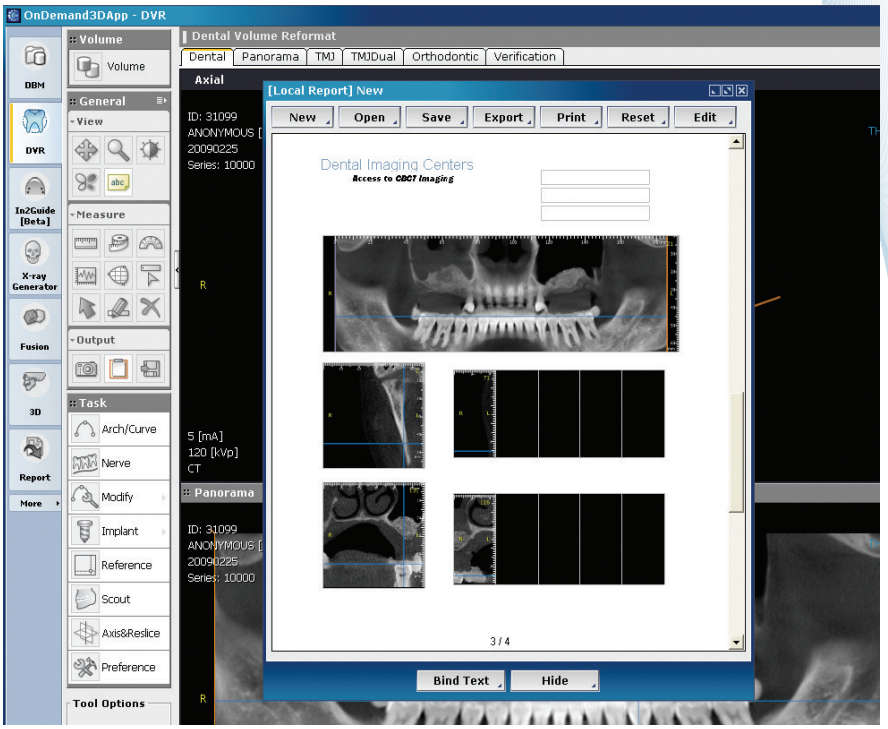
Ondemand3D comes with Basic Report by default. In order to use X-Report, you have to purchase the X-Report module which is not included in the Ondemand3D package.

12.2.2 Use the X- report in Ondemand3D™ module

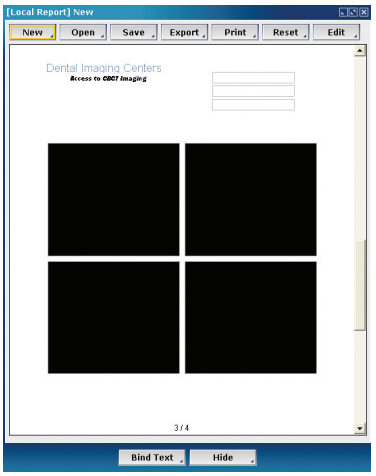
X-Report can be generated directly in all module

Loading an X-Report Template

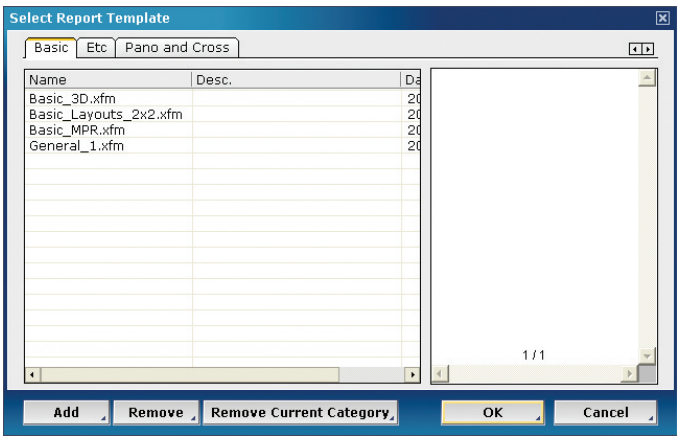
Select the data in the DBM and launch the DVR module or the 3D module
Manipulate the view to generate the images that you want to insert into an X-Report



Click the 'Report' button and click the 'New' button in the dialog box New



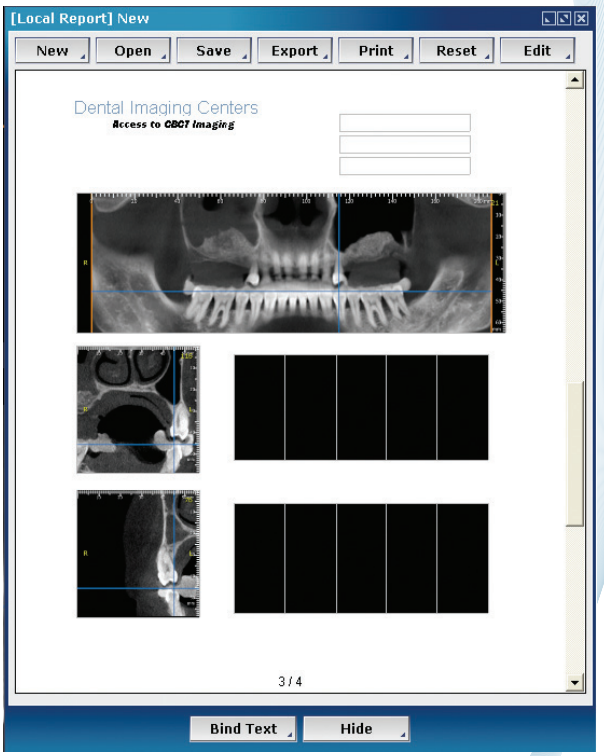
Select a template and press the 'OK' button



Add	Adds a template which you created in X-Report Template Designer
Remove	Removes the selected template
Remove Current Category	Removes the selected category. This will remove all templates in the selected category.

12.2.3 Insert images

X-Report supports drag and drop. From the view, drag an image you want to insert and drop it into an X-Report image box.

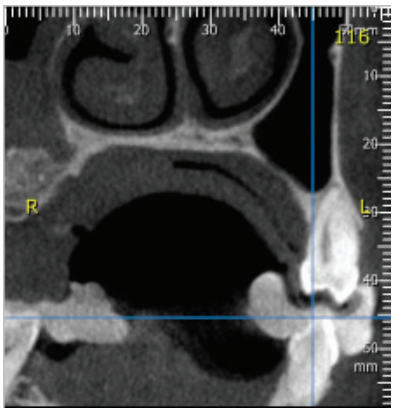


12.2.4 Edit the report

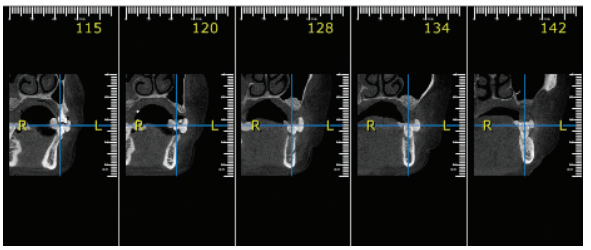
1 > Click the 'Edit' button. 

This will move X-Report to Edit Mode.

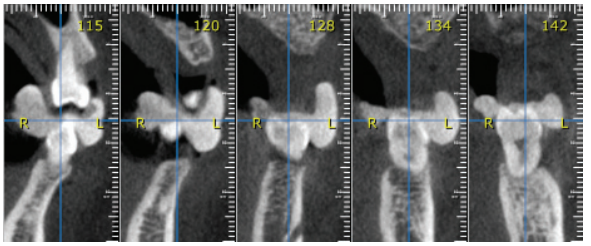
2> Click an image box and then select an edit tool to use.



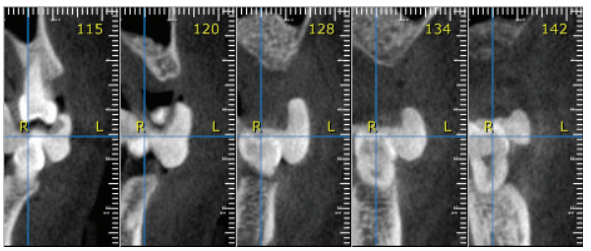
3>Image Real Size, Image Zoom Fit, Image Zoom and Image Pan controls are accessible via the buttons shown below, respectively.



<Image Zoom Fit control is used in cross sectional images.>



<Image Real Size control is used in cross sectional images>

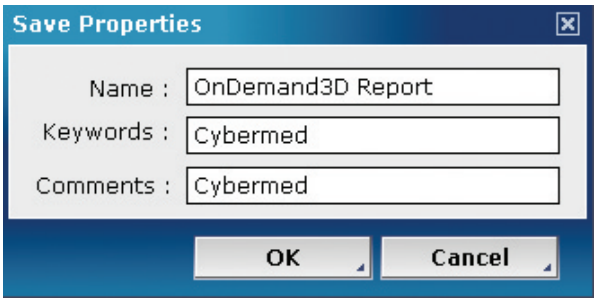


<Image Pan control is used in cross sectional images to display the area of interest.>

12.2.5 Save the report

1>Click the 'Save' button Save after finishing to write a report.

2> Type your report name and press the 'OK' button to save. This report will be managed as part of the patient data in the DBM module.



Note that in using the report module , 

you can insert other images and edit your report.

12.2.6 Export or Print the report

1> Click the 'Export' button Export to export the report as a PowerPoint or HTML file.
Note that you must have MS PowerPoint installed on your PC to perform this function.

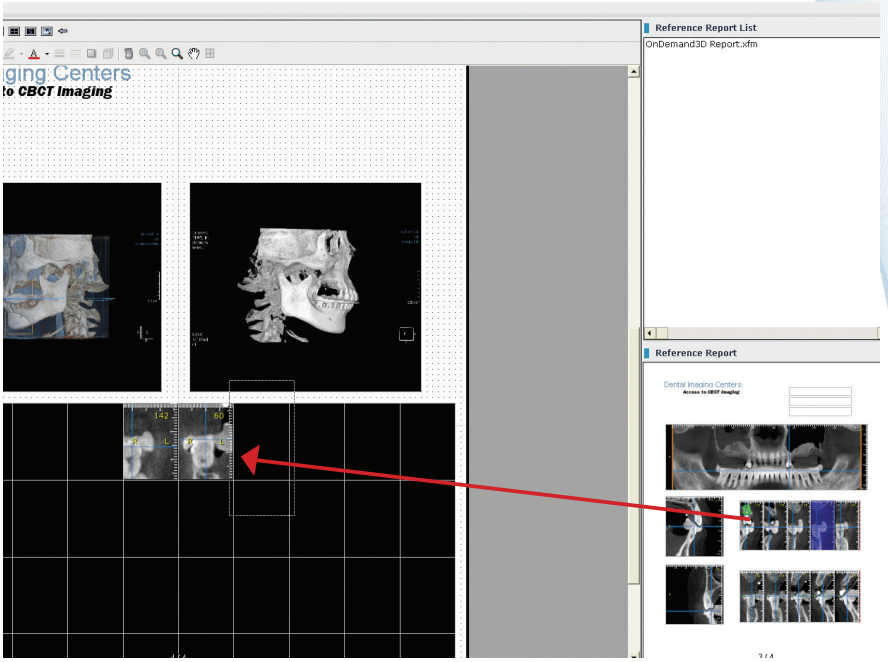
2> Click the 'Print' button Print to print the report.

12.2.7 Insert images to other saved X-Report

Other reports will appear in the Reference Report list if you have multiple reports for the same patient.
1> Double Click the report you want to refer, and you will see the report in the Reference Report window.

2> Click the image in the Reference Report and drag it into the image box in your report.

3> Save the report.

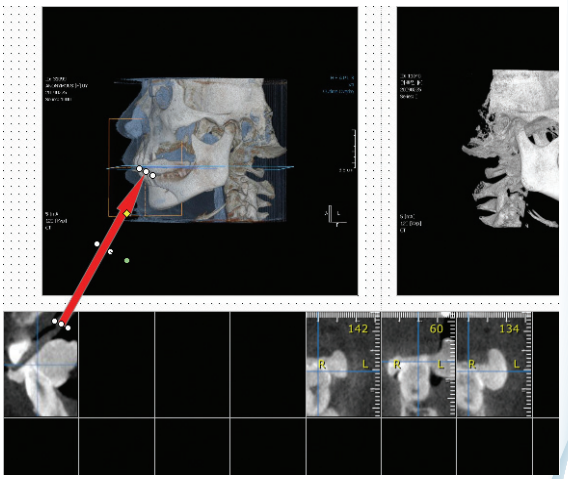


12.2.8 Insert the arrow mark

1> Click the 'Arrow' button .

2> Insert an arrow mark into an image.

3> Change the color of the arrow by clicking the 'Background Color' button



A. How to edit an X-Report template

You can modify an X-Report template to generate customized template. From Report module, you can perform the following functions to modify an X-Report template.

1> To delete a box, select a box and press the 'Delete' key.

2> To edit the size of a box, select a box and grab one of the points surrounding the box and drag it.

3> To copy and paste a control, select a box and press CTRL + C and then CTRL + V.

4> To add a box, click one of the box controls and draw the box in the template.

(Text box, Single Image control box, Multiple Image control box, Series Image control box and Picture control box)

Text box	A text box into which a user can input comments
Image control box	An image box into which a user can insert a single image
Multiple Image control box	An image box which enables user to control the image layout. You can switch it to a series image box by dragging the 'Series Image box' button
Series Image control box	An image box divided into multiple sections to host a series of images such as multiple cross sectional images. You can switch it to a multiple image box by dragging the 'Multiple Image box' button over this box.
Picture control box	A picture box into which a user can insert other image files type such as jpeg, bmp, and etc.

5> To change the layout of a Multiple Image box or Series Image Box, select a box and click the 'Image Layout' button . ⊞

Appendix A : Troubleshooting

Please make sure that your screen resolution is set to higher than the minimum system requirements (1024 x 768). If the resolution is lower than the minimum system requirements, some buttons may not display on all windows of the Ondemand3D App.

※ The font setting does not cause any problems, so font size can be set as desired.

Caution

1) The Medical Imaging Processor Unit should be used by experienced personnel only.

1-1. Check if the Imaging Storage Device has enough disk space.

1-2. Check if the Imaging Storage Device, Imaging Analysis Device, and Imaging Output Device are turned on.

2) We recommend reviewing the following checklist before using the Medical Imaging Process Unit.

3) You must logon with your user ID and password.

3-1. Do not save or delete the medical image while operating on it.

3-2. Use a function with caution if you do not fully understand the function.

3-3. Do not turn off the power or forcibly close the program while it is running.

4) When you finish using the Medical Imaging Processor Unit, adhere to the following cautionary measures:

4-1. You need to close all the images which were used.

4-2. You need to log off the program once you finish using it.

4-3. Do not turn off the electricity to the Imaging Storage Device even after finishing use it.

4-4 Keep the device in a dry and average temperature environment.

INFO	When used in hospitals, we recommend using antivirus software to protect your system. For better security, using an intranet will minimize exposure to computer viruses.

If problems occur during installation or operation contact us by e-mail ondemand3d@cybermed.co.kr or telephone

(Korea : +82-2-3397-3970 USA : +1-703-830-1179).