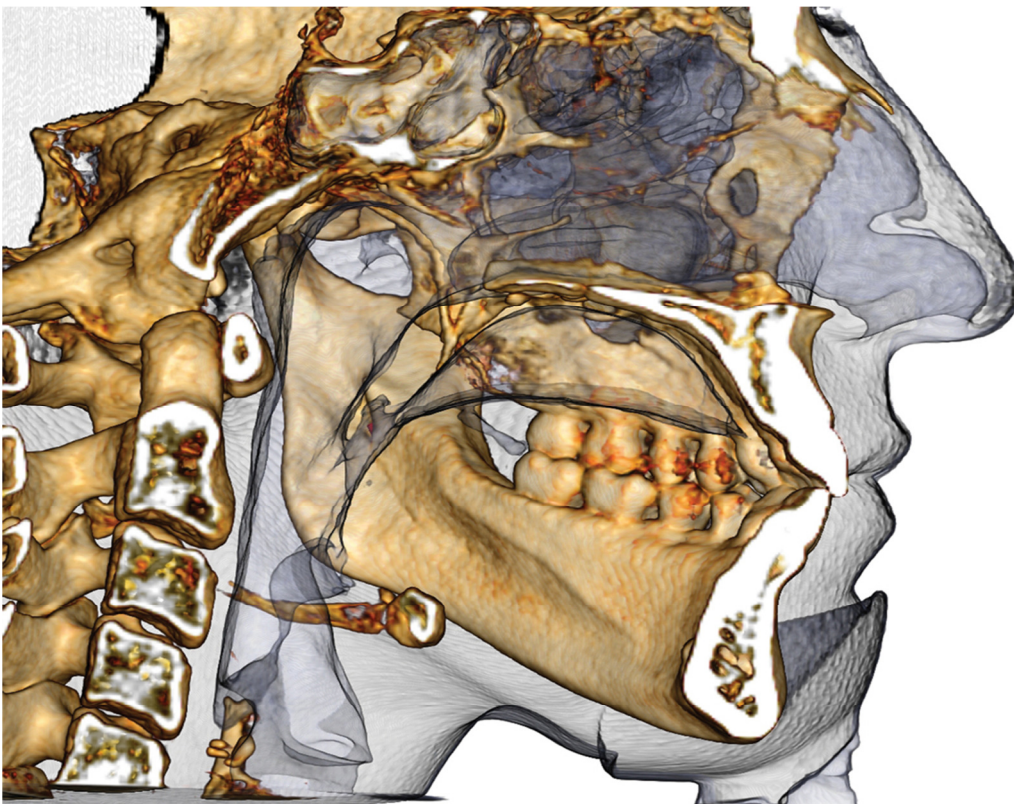


# InVivo5

## InVivo5.1 Reference Manual



# *Anatomage*

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## About Anatomage and InVivoDental 5.1 Software

The InVivoDental 5.1 software was released in 2011 as an update to the InVivoDental software from Anatomage, Inc. In this document, InVivoDental 5.1 refers to the latest version of the Anatomage InVivoDental software and is synonymous with the terms “Invivo” and “Invivo5.1”. To learn more about Anatomage, access the Anatomage website ([www.Anatomage.com](http://www.Anatomage.com)).

## Intended User

InVivoDental 5.1 is designed to be used by medical and dental professionals who have been appropriately trained to use 3D CT imaging devices and read the image data generated by the devices.

## Language

The original language of this manual is English. Other versions are available in French, Italian, German, Spanish, Portuguese and Japanese. Please contact Anatomage for other language versions.














**Caution:** Federal law restricts this device to sale by or on the order of medical and dental clinicians.

## Indications for Use

InVivoDental is a software application used for the display and 3D visualization of medical image files from scanning devices, such as CT, MRI, or 3D Ultrasound. It is intended for use by radiologists, clinicians, referring physicians, and other qualified individuals to retrieve, process, render, review, store, print, assist in diagnosis and distribute images, utilizing standard PC hardware. Additionally, InVivoDental is a preoperative software application used for the simulation and evaluation of dental implants, orthodontic planning and surgical treatments.

This device is not indicated for mammography use.

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# Introduction

## *InVivoDental 5.1 Imaging Software*

Anatomage, Inc. is a medical imaging company composed of a cross functional team consisting of the most elite researchers, mathematicians, engineers, software developers, business analysts, industry leaders, academic faculty, and dental specialists. We believe that InVivoDental 5.1 software will enable the profession to initiate a revolution of unimaginable scope and magnitude. Ultimately, our mission is dedicated to developing software specially designed for dentists to be simple and refined, yet utilizing the most advanced cutting edge software and technology to better serve their patients. With InVivoDental 5.1 software, doctors can create 3D volume renderings on their own computers, get cross-sections, trace nerves, place implants, print images, save images, and many more functions. The software is designed to reconstruct these 3D volume renderings from DICOM files generated by CBCT, Medical CT, and MRI radiography machines. InVivoDental 5.1 is intended for use as a planning and simulation software in the placement of dental implants, orthodontics and surgical treatment.



This manual is intended to provide supplementary information to your direct training with the Anatomage support team. For correct and safe use, training is available to all InVivoDental 5.1 users and is highly recommended. In this document, InVivoDental 5.1 refers to the latest version of the Anatomage InVivoDental software and is synonymous with the terms “Invivo” and “Invivo5.1”. Previously released versions of this manual are available. For more information on how to access previous versions of the InVivoDental Reference Manual, please contact the Anatomage customer support team at (408)-885-1474 or email [info@anatomage.com](mailto:info@anatomage.com)

# System Requirements

*Below are the minimal and recommended system configurations.*

Having an adequate computer system is essential to using InVivoDental 5.1 efficiently and generating the highest quality images possible for enhanced analysis and presentation for your patients and colleagues. The most important element is the video card (3d graphics chip or GPU). If your system does not have an appropriate video card, you can purchase and install video cards for desktop computers.

InVivoDental 5.1 has minimal system requirements; however, Anatomage recommends the following configurations to fully utilize all the features within the InVivoDental 5.1 Software.

## PC Users

	Minimum	Recommended
<b>CPU</b>	Pentium 3	Intel Core i7 900 series, comparable multi-core processor
<b>RAM</b>	1GB	4GB
<b>GPU / Graphics Card</b>	ATI Radeon HD 4650, Nvidia Geforce 9800 GT	ATI Radeon HD 5870
<b>Hard Disk</b>	100 GB	500GB
<b>OS</b>	Windows XP 32bit	Windows7 64bit OS

## Graphics Cards / GPU

Brand	Model Series	Low Profile Option	Recommendations
ATI	Radeon HD 4600 – 6900	4650, 5450, 5550, 5570, 5750	6970 (Highest Performance) 5770 (Affordable with Performance) 4650 (Most Affordable, Good Performance)
Nvidia	GeForce GT 9800 – 580	9800GT, GT-430, GTS-450	GTX-580 (Highest Performance), GTX-260 (Affordable with Performance)

## Mac Users

	OS	Hardware
<b>Not Compatible</b>	Apple OS X	MacBook Air, Mac Mini
<b>Partially Compatible</b>	Parallels	MacBook
<b>Fully Compatible</b>	Apple Bootcamp	iMac, MacBook Pro, Mac Pro,

**Notebook Recommendations****Dell**

Sizes	Model	Graphics Processor Options	Weight
11, 15, 17	Alienware M series	All options compatible	4.4 lbs – 11.7 lbs
15, 17	Studio XPS series	Nvidia GeForce GT435 or GT445	6.2 lbs – 8 lbs

**HP**

Sizes	Model	Graphics Processor Options	Weight
14, 17	Envy series	All options compatible	5.6 lbs – 7.5 lbs
15, 17	Pavilion DV6 or DV7 series	ATI Mobility Radeon HD 5650, 6550, or 6570	5.5 lbs – 6.9 lbs

For additional information, recommendations or assistance, please contact the Anatomage Tech Support Department (408)-885-1474 or email [info@anatomage.com](mailto:info@anatomage.com)

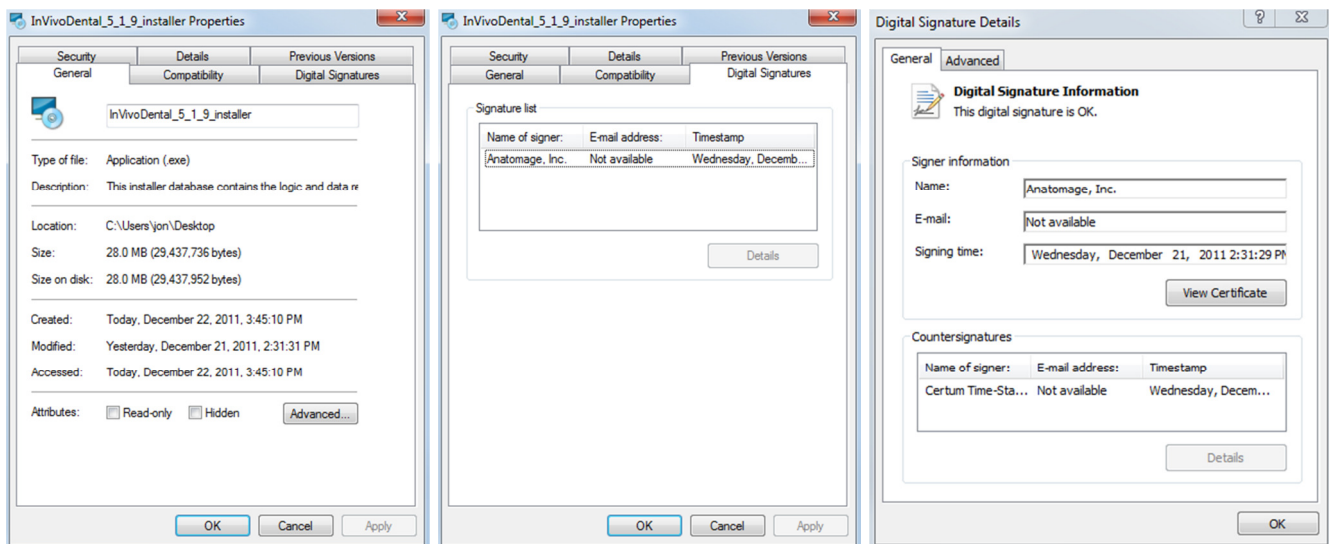
# Installing InVivoDental 5.1

1. Go to [www.Anatomage.com](http://www.Anatomage.com)
2. Select “Dr. Login”
  - Username: download
  - Password: support
1. Click InVivoDental 5.1 Installer
2. Click Save File
3. Run File
4. Enter Authorization Code
5. Test program by opening DICOM file(s) and viewing the “Volume Render Tab”

If you wish to validate the installer file:

1. Right-click the Installer file and select “Properties” to open the Properties Window
2. Open the “Digital Signatures” Tab
3. Select “Anatomage, Inc.” and press Details
4. Verify that the Digital Signature Information is “OK”

*The following pictures are for example purposes only. The name of the installer and Digital Signature Information is dependent on the release version and may change accordingly.*



# Feature List

*An overview of the various features provided by InVivoDental 5.1.*

- **Directly opens DICOM data from any CT machine**
- **Invivo File Compression**
- **Section and Multislice View Operations**
- **Volume Rendering of scan data**
- **Linear, Angular, Circumferential, Area and Volumetric Measurements\***
- **Image Capture and Export**
- **AVI (Movie) Capture and Export**
- **Implant, Abutment and Restoration Treatment Planning**
- **Bone Density Evaluation**
- **Quick Airway Volume Measurement and Evaluation**
- **Automatic Superimposition and Mirroring**
- **Platform for the AnatoModel service**

\*All measurements are performed with the metric system.

# Software Layout

The following is a description of how InVivoDental 5.1 is organized by Menu Bar, Tool Bar, View Tabs, View Controls, and Rendering Window.

## Menu Bar

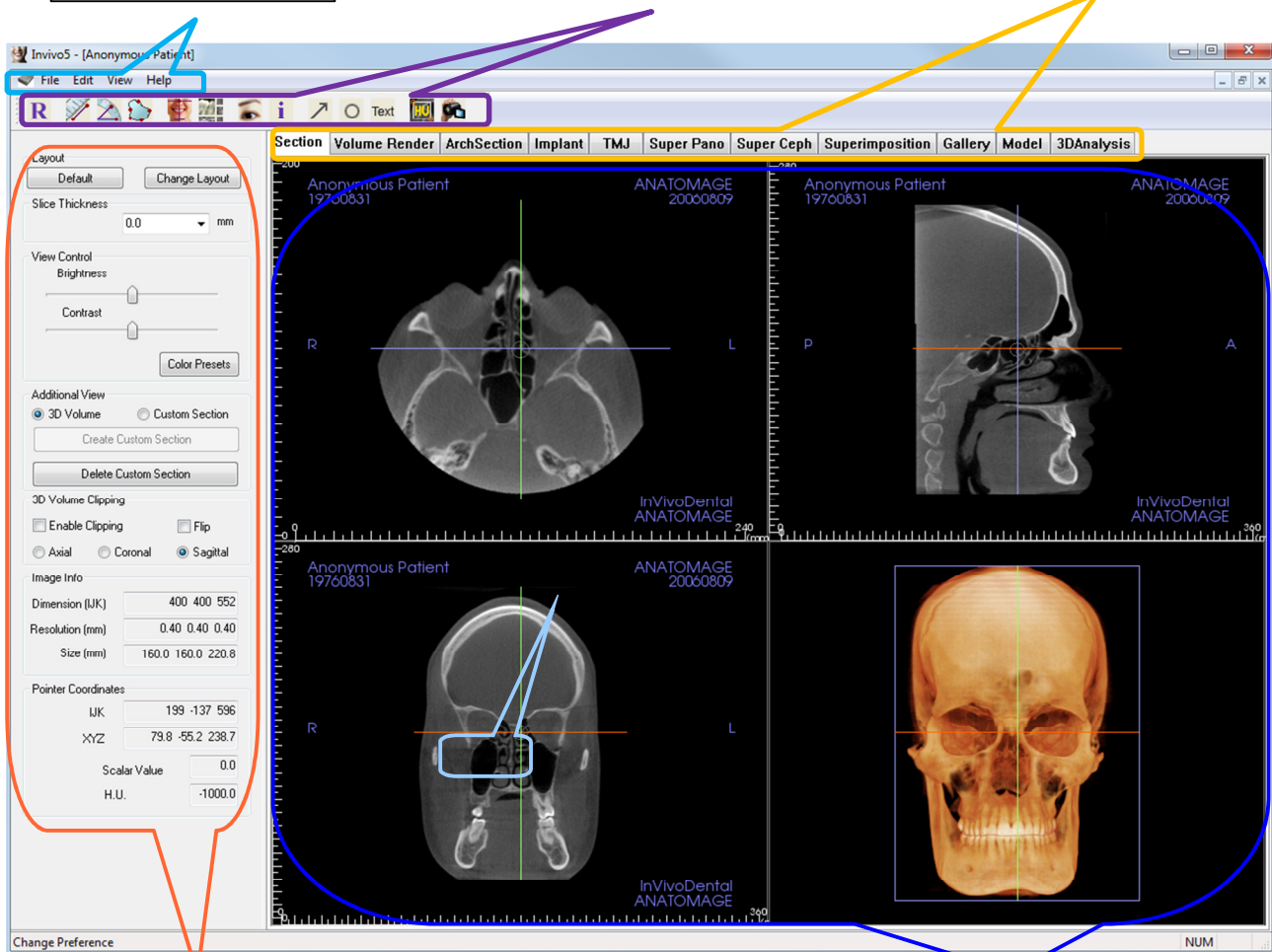
The **Menu Bar** allows you to perform application operations such as open, save, close, print, capture, etc.

## Toolbar

Tools can be accessed to perform certain functions on patient images. Sets of tools are associated with a specific **View Tab**.

## View Tabs

The **View Tabs** allow you to perform specific tasks or look at specific subjects of interest by adjusting the **Toolbar** and **View Controls**



## View Control

**View Control** is the region where patient images can be manipulated and controlled. The **View Control** is associated with a specific **View Tab**.

## Rendering Window

**Rendering Window** is the region where patient images are displayed. This window can be customized within many of the **View Tabs** by using the **Toolbar**.



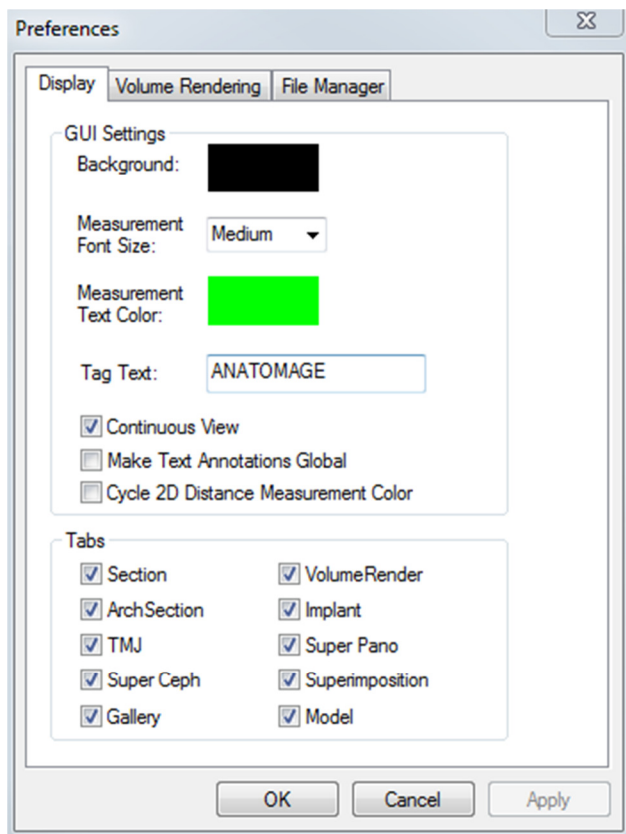
# InVivoDental 5.1 Preferences

This section will explain the different options within the Preference window of InVivoDental 5.1. The InVivoDental 5.1 Preferences includes options for Display settings, Volume Rendering settings, as well as File Manager settings.

## Accessing the InVivoDental 5.1 Preferences:

- In the Menu bar of the InVivoDental 5.1, select “File”.
- Select “Preference...” from the “File” dropdown.

## Display Preferences



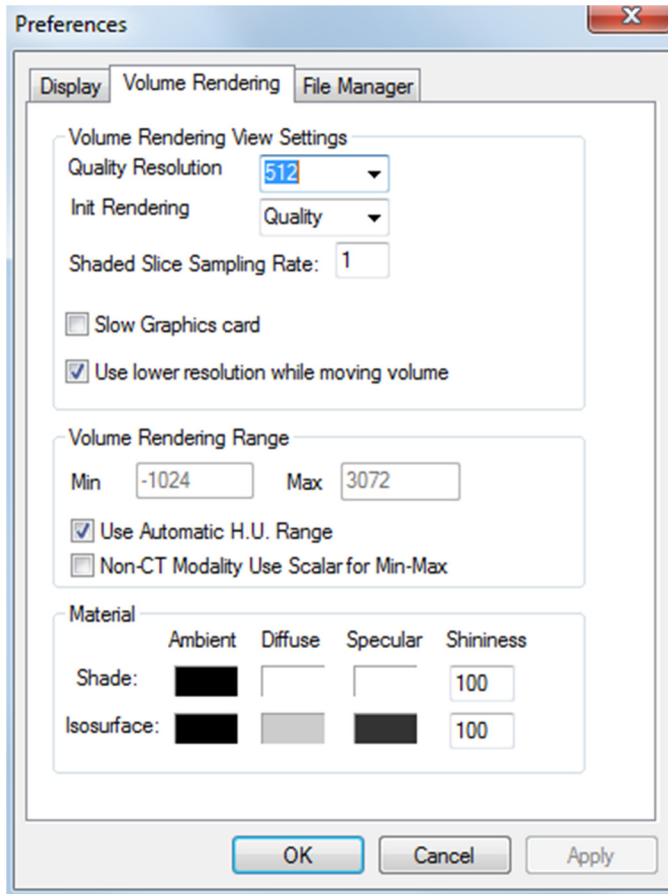
## GUI Settings

- **Background:** Sets the background color for the Rendering Window
- **Measurement Font Size:** Sets the measurement font size to a size preset: small, medium, or large
- **Measurement Text Color:** Sets the text color for measurement notations
- **Tag Text:** Provides an additional label to the right hand corner of the rendering window
- **Continuous View:**
  - **Checked** – Switching between view presets for volume renderings will show intermediate volume positions between the starting and final position
  - **Unchecked** – Switching between view presets will not show intermediate positions – the volume will “jump” to the final position
- **Make Text Annotations Global:** when checked, previously placed or new text annotations added to any 2D slice view (axial, coronal, sagittal) except group slices (TMJ, ArchSection) will be seen whether or not the current slice is the slice on which the measurements were placed
- **Cycle 2D Distance Measurement Color:** Measurement colors will cycle with every measurement that is added

## Tabs

This section determines which View tabs are seen by the user when the program is running. Checked boxes will be available while unchecked boxes will make those View tabs hidden. Note: Changes are made after restarting the program.

## Volume Rendering Preferences



### Volume Rendering View Settings

- **Quality Resolution:** Sets the limit for the resolution of the image. This can be set to either a user-defined number or set to Unlimited
- **Init (Initial) Rendering:** Sets the rendering quality upon opening InVivoDental 5.1
- **Shaded Slice Sampling Rate:** When checked, InVivoDental 5.1 will automatically adjust the sampling rate to a setting appropriate for low level graphics cards
- **Use lower resolution while moving volume:** positional changes of the volume will be rendered at a low quality resolution while maintaining the quality resolution setting in the final position

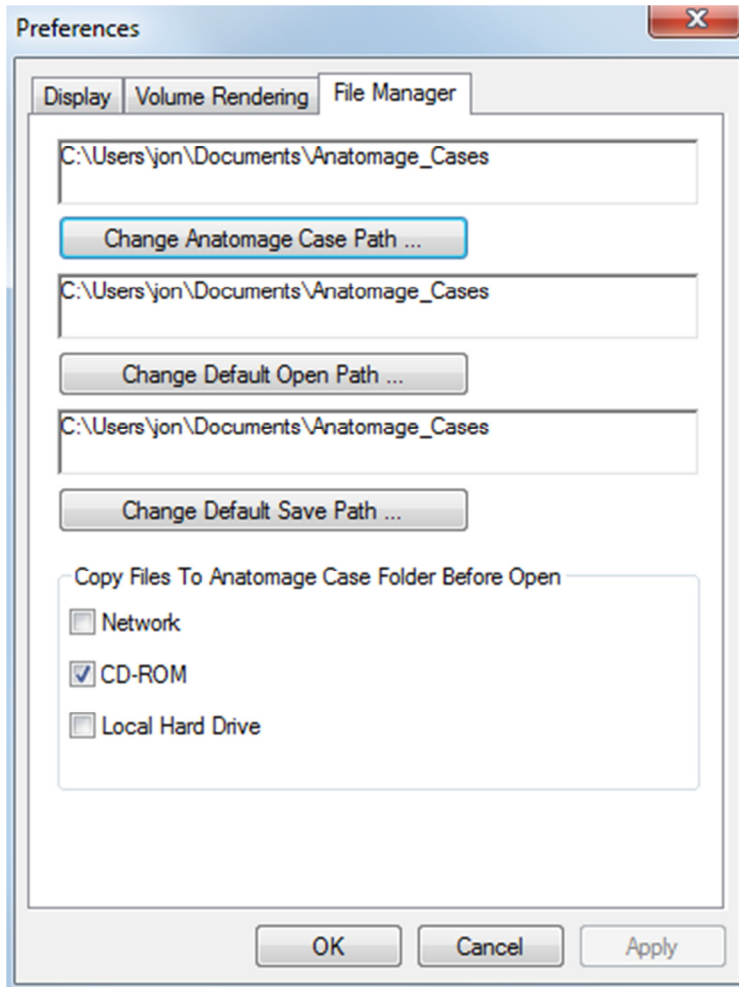
### Volume Rendering Range

- The user can define the range of Hounsfield Units that will be rendered. This cannot be set when “Use Automatic H.U. Range” is checked.
- Checking “Non-CT Modality Use Scalar for Min-Max” will allow the user to define the Min and Max Scalar units that will be rendered.

### Material

- Various properties can be adjusted to change the appearance of a volume rendering. Ambient, Diffuse, and Specular effects can be rendered in different colors
- Shininess is set to a number – higher numbers denote less shininess

## File Manager Settings



### Folder Paths

- **Anatamage Case Path:** Starting the program will open a window showing a list of cases within this location
  - Can also serve as a backup folder for all opened cases
- **Default Open Path:** This is the starting location for attempting to open a case through File > Open in the Menu bar
- **Default Save Path:** This is the starting location for saving a case file in InVivoDental 5.1

### Copy Files to Anatamage Case Folder Before Open

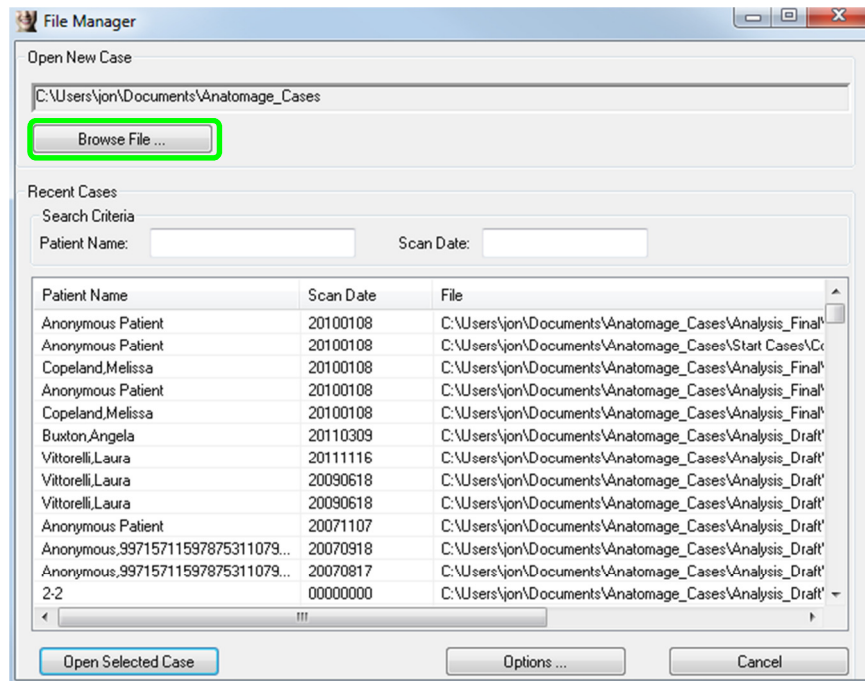
This section allows the user to save a copy of a case that is to be opened in the Anatamage Case Folder if it is in any location besides this folder, such as on a different location on a network, on a CD-ROM, or in a different folder on the local hard drive

# Basic Features

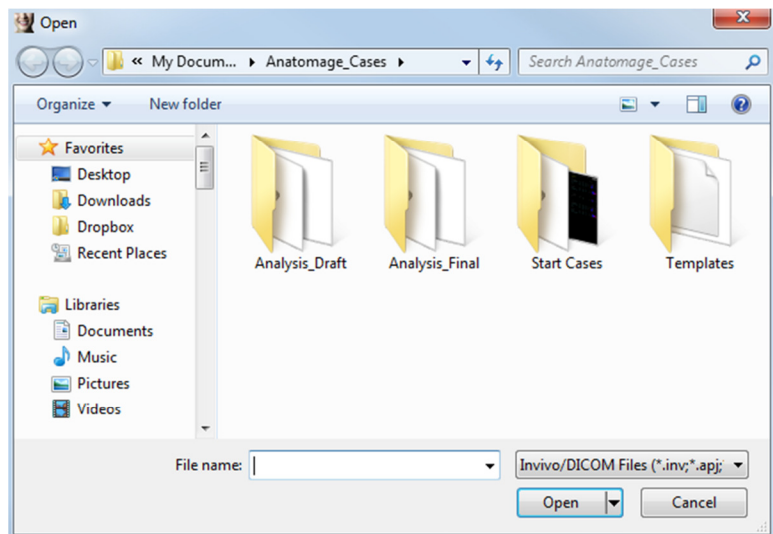
*The following is a detailed explanation of the various features provided by InVivoDental 5.1.*

## DICOM & InVivo File Loading with the File Manager

To open a DICOM data set, first launch the InVivoDental 5.1 software. The File Manager will appear upon startup allowing you to open the data.

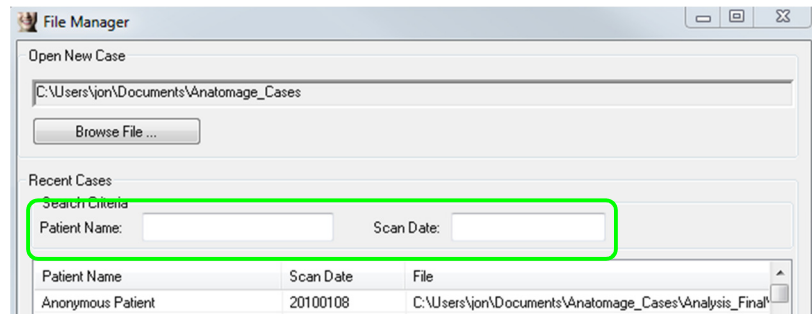


Click the Browse File box to manually search for the data you would like to open. If you are opening DICOM data, as shown to the right, simply highlight one of the .dcm files and click open. It does not matter which DICOM file you choose, just click one and the software will open all the files within the data set present in that folder. If you are opening an InVivo file just click it and press open. InVivoDental 5.1 cannot open compressed DICOM files. However, Invivo files can be compressed and opened.

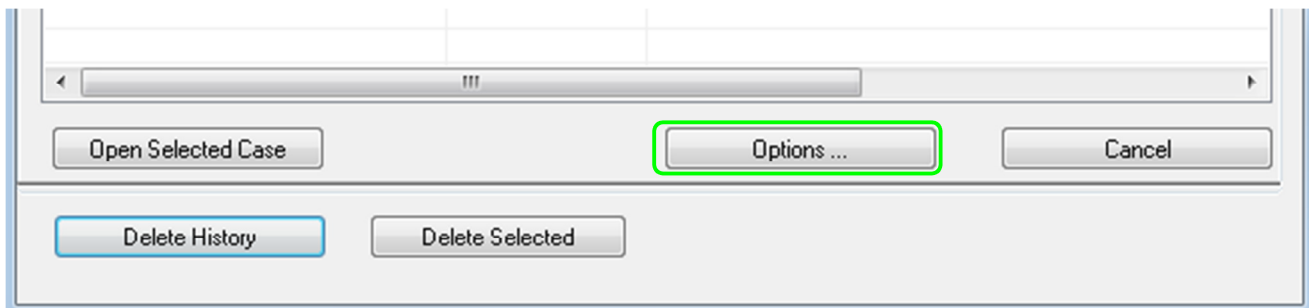


The File Manager allows you to automatically store and reopen recently viewed cases. This allows for quicker access to current cases. The automatic saving of the files is placed in a folder in your “My Documents” folder called “Anatontage\_Cases”. This location can be changed or turned off completely in the following location of the software: Menu Bar/File/Preferences/File Manager.


InVivoDental 5.1 allows you to quickly search through your recent cases by typing in the Patient Name or Scan Date in the search fields (shown right). You can also remove the selected Recent Cases from your Recent Case List by selecting the Options... box and using the additional boxes (shown below). This will also allow you to completely clear your Recent Case List.



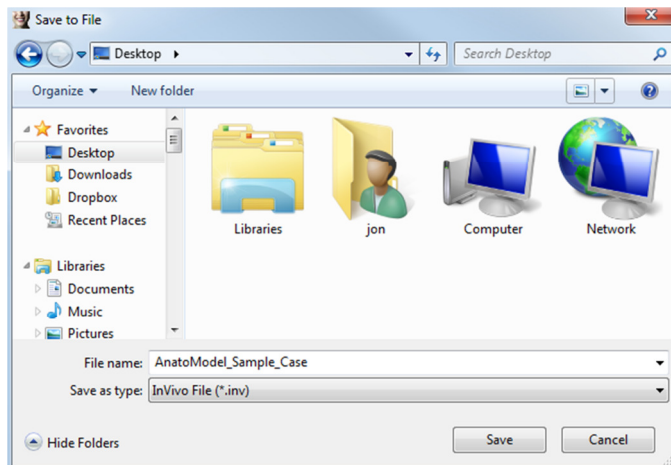
If you close a case and want to reopen another one, click on Menu Bar/File/Open and the File Manager will appear again.



## InVivo File Saving

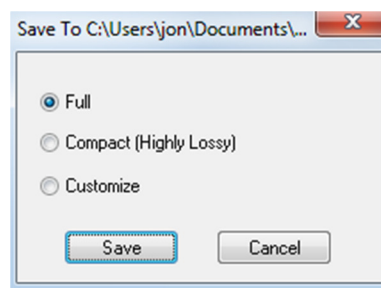
The following work can be saved as an InVivo File (.inv) .

- Case Information & Patient Orientation
- Traced Nerve Pathways
- Implants & Implant Measurements
- Volume Measurements, Landmarks and Annotations
- Images captured within the Gallery
- Sculpting Operations



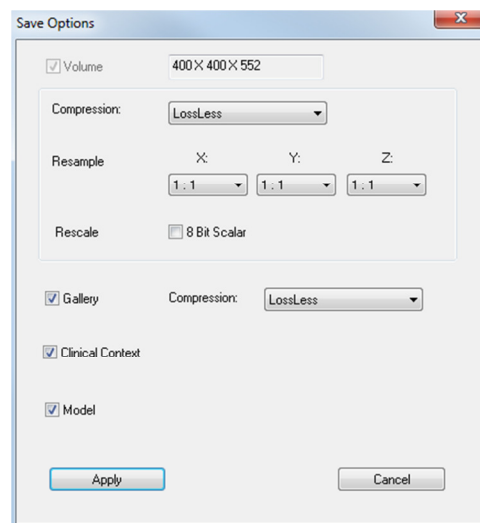
Click “File” → “Save As...”, browse to the area you would like to save, name the file (default is the patient’s name) then click “Save.”

The following save dialog box will show up. Select the default “Full” option for saving everything without losing any information.



## Custom Saving Dialog

By selecting “Customize” option, the custom saving dialog shows up. In the dialog box, one can compress the data. For the main volumetric image, you can select to save it as “LossLess” or “Lossy” compression. With LossLess compression, the volume is compressed to about 1/3rd – 1/4th of the original size. With the Lossy compression option, the file size can be dramatically reduced but the image is altered. Resampling the data will reduce its size very dramatically by combining voxels to reduce the overall voxel count. Rescaling the image will reduce the number of shades of gray in the image. You can also choose to selectively compress images in the gallery, the clinical content (such as implants and nerve tracings), and the models.



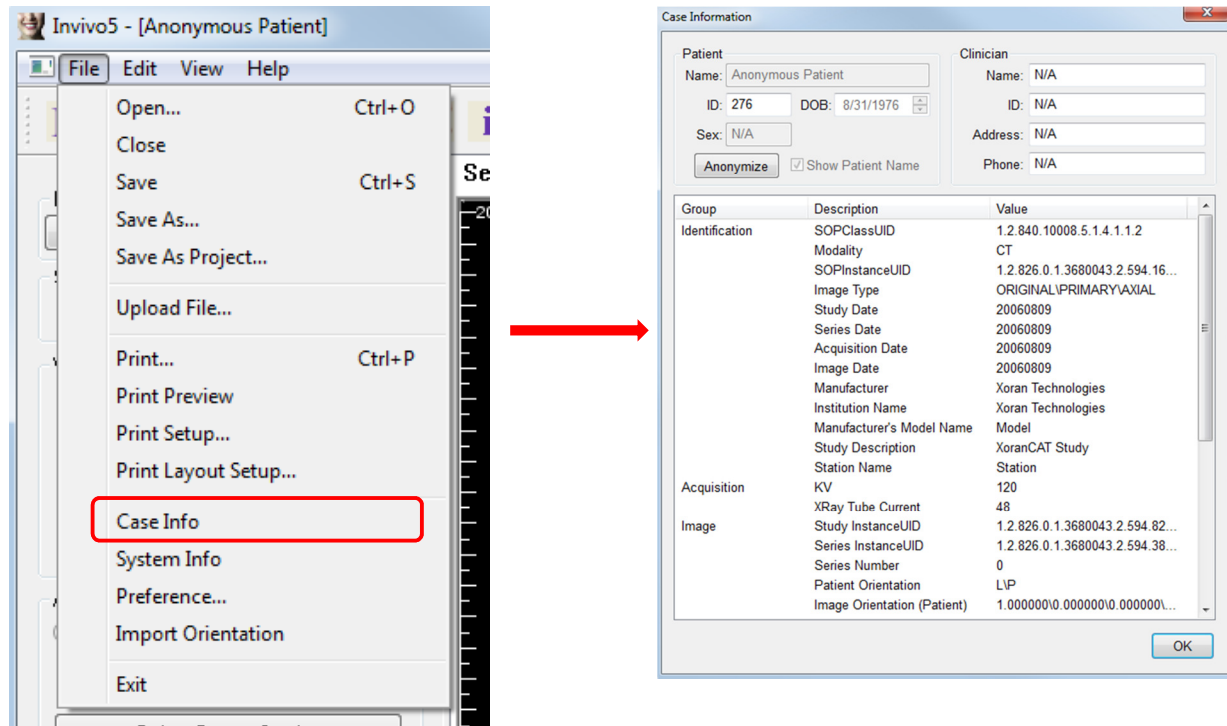
## Saving As an InVivo Project File

Click “File”, “Save As Project...” to save the case as an APJ, InVivo Project file. This file will save **only** changes made to the original scan data. It requires a reference data (.dcm scan data or .inv file) when opening. If InVivoDental 5.1 cannot locate the reference data, it will ask you to locate the data again. Because it is saving only the changes to the original, APJ files save much faster than full INV files.



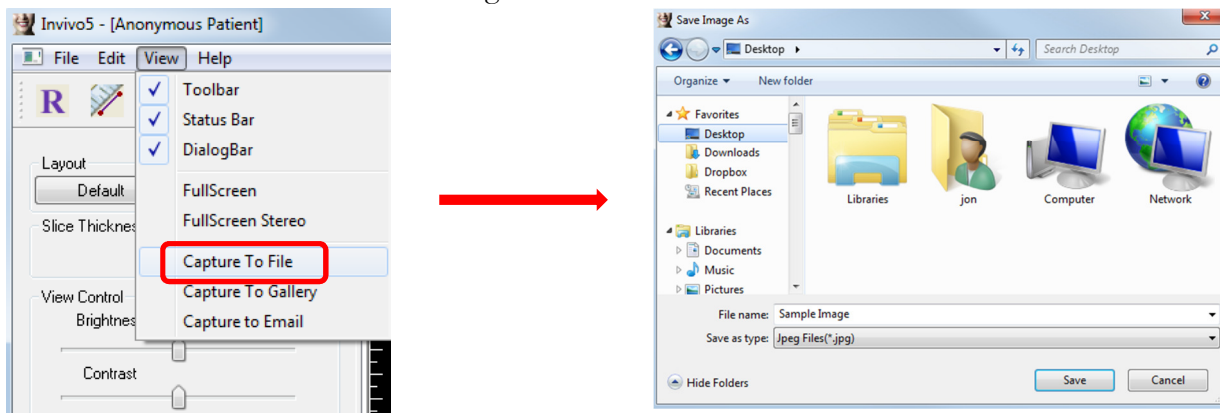
## Case Information Display

To display or hide the Case Information for a specific patient, go to the “File Menu,” click “Case Info.” Click “Anonymize” then Click “OK” to save the changes. For safety, only the patient's name or anonymous can be displayed and cannot be manually edited.



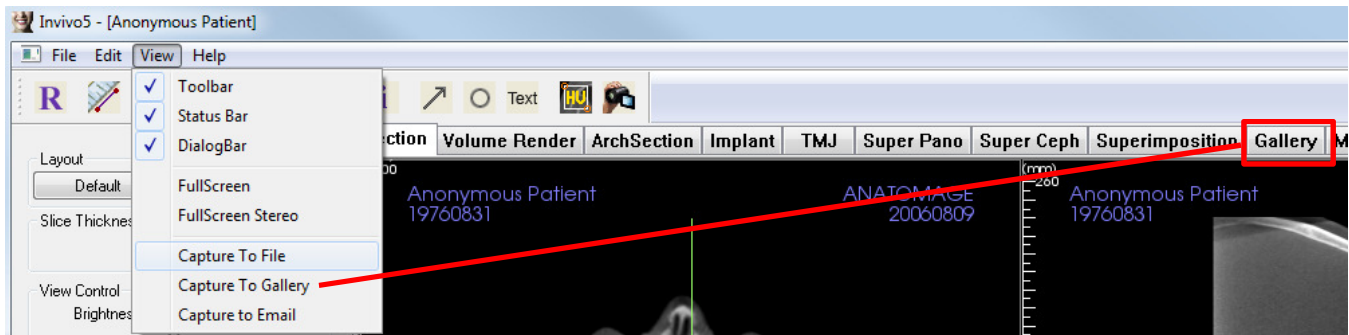
## Image Capture to File

★ To capture an image to file of the active display click “view,” then “Capture to File.” Browse to the location where you want to save the image, type the name of the file, choose the file “Save as type”, and click “save”. The file can be saved as bmp, jpg, or png format. Jpg is the most popular file format for images but there is a small amount of color degradation. Bmp preserves the image, but the file size is big. The .png is an effective lossless format that does not degrade the color.



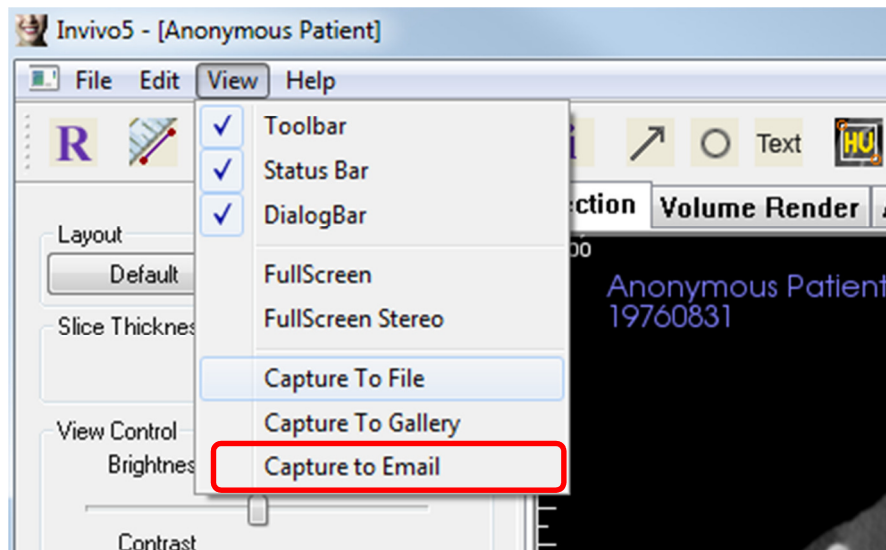
## Image Capture to Gallery

Selecting “Capture To Gallery” will capture an image of the Rendering Window and save it to the Image List (see **Gallery View Features** for additional information).



## Image Capture to an Email

Selecting “Capture To Email” will capture an image of the Rendering Window and attach it to an email ready to send. This will require the setup of an emailing client (ex: Microsoft Outlook, Mozilla Thunderbird).







# Image Navigation

*Below is an explanation showing how to manipulate images in the Rendering window with the keyboard and mouse.*

## ICON KEY

-  Keyboard navigation required
-  Mouse navigation required

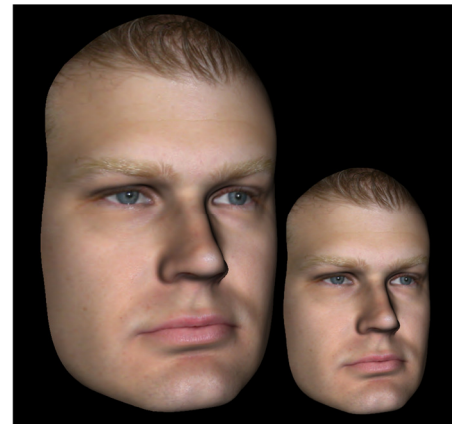
### Slider Bar Scroll



- Click the mouse cursor over any slider bar (e.g. axial slice, brightness, etc.) and move it to adjust the image.
- Keep the mouse cursor over the slider bar, “**scroll the mouse wheel**” forward or backward to achieve the image adjustment you like.

### Zoom In/Out

- Place the mouse cursor in the center of the image you want to zoom.
- Hold down the “**Control + left-button**” on the mouse.
- While holding down the buttons indicated above, move the mouse up and down on the screen.
- This shrinks/enlarges the image: **Down vertically , Zooms Out. Up vertically, Zooms In.**



### Pan (Shift)

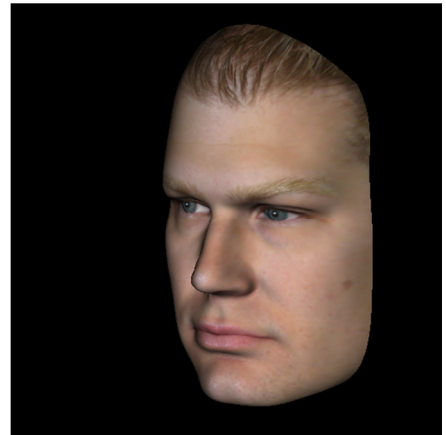
- Place the mouse cursor in the center of the image you want to shift.
- Hold down the “**Shift + left-button**” on the mouse.
- While holding down the buttons indicated above, move the mouse **any direction** to achieve the desired image displacement.



## Free Rotate

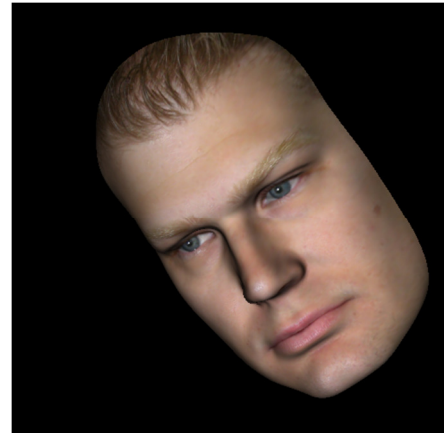
*Applicable only for 3D Images.*

- Place the mouse cursor in the center of the image you want to shift. Hold down the “**left-button**” on the mouse.
- While holding down the “**left-button**”, move the mouse in **any direction** to achieve the desired rotational position.



## Free Rolling

- Hold down the “**Space** + **left-button**” on the mouse.
- While holding down the buttons indicated above, move the mouse **up and down** to achieve the desired image orientation.



## Increment Rotate

*Only applicable for 3D Images.*

- Use the keyboard arrows ← ↑ ↓ → to rotate the 3D Model **1 degree** up, down, right, or left., perpendicular to the computer screen.

## Increment Roll

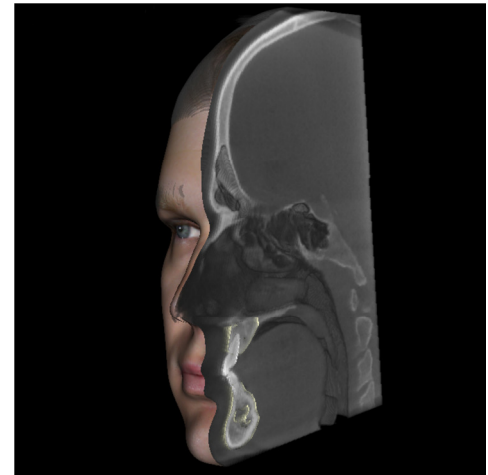
*Only applicable for 3D Images.*

- Hold down “**Control**” and use the keyboard arrows ← ↑ ↓ → to rotate the 3D Model **1 degree** rolling up, down, right, or left, perpendicular to the computer screen.

## Anatomical Plane Clipping

*Applicable only for 3D Images.*

- Place the mouse cursor over the center of the image, then scroll the mouse wheel forward or backward (“**roll the wheel**”) to clip the anatomic plane as you like.

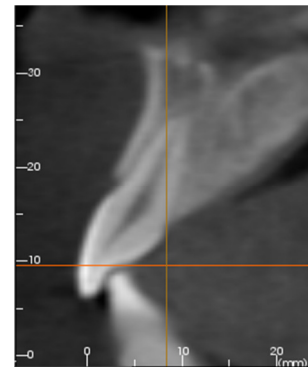


## Scroll Slice

Use when you would like to move through the series of sections when in either the Section, Arch Section, or Pano views.

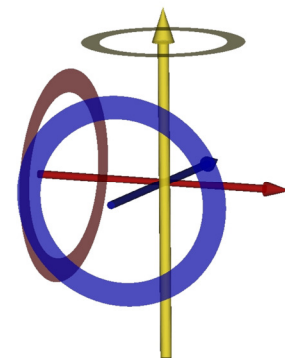
- Place the mouse cursor in the center of the image then “**scroll the mouse wheel**” forward or backward to move one section at a time as you advance through the data slices.

*Note: In the **Arch Section View**, you must first create an **Arch Spline** to activate this feature.*



## Move/Rotation Widget

- Volume Render View:** Click on either the ring or the arrows circling the patient and move it in the direction you want the patient to be oriented. (See Volume Render View Features for more details.)
- Implant View:** Use to move an implant through a portion of the volume for fine-tuning implant treatment planning. Click on either the ring or the arrows circling the implant and move it in the direction you want the implant to move.



# Full Screen Mode and Keyboard Shortcuts

*Below is an explanation pertaining to running the software in full screen mode without toolbars and controls.*

## Switching to Full Screen Mode

From the software menu, select “View” → “Full Screen”. “Full screen stereo” is only applicable for the stereo display system. To return back to the normal screen mode, press “Esc” key on the keyboard. Full screen is not applicable to arch section view and implant view.

## Keyboard Shortcuts at Volume Rendering View

The following keyboard short cuts are available in volume rendering view:

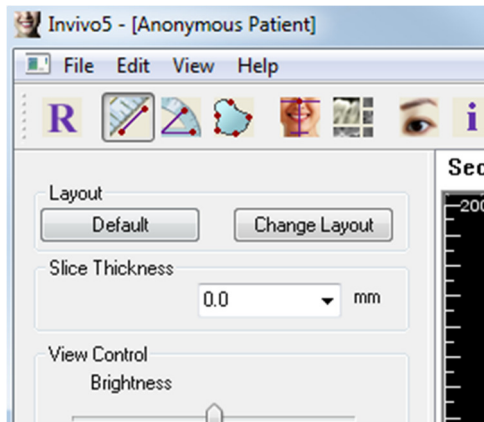
Category	Keyboard Shortcut	Description
View Preset	<i>1</i>	Inverse Volume Rendering
	<i>2</i>	Soft-Tissue 1
	<i>3</i>	Soft-Tissue 2
	<i>4</i>	Soft-Tissue + Bone 1
	<i>5</i>	Soft-Tissue + Bone 2
	<i>6</i>	Teeth
	<i>7</i>	Bone
	<i>8</i>	(unassigned)
	<i>9</i>	(unassigned)
	<i>0</i>	Gray Scale
Clipping Control	<i>P</i>	Toggles Clipping-Plane on/off
	<i>A</i>	Axial clipping set
	<i>S</i>	Sagittal clipping set
	<i>C</i>	Coronal clipping set
	<i>F</i>	Flip the clipping direction
	<i>Page Up / Page Down</i>	Move the clipping plane
	<i>Q</i>	Open Free-Sculpt Tool
	<i>W</i>	Open Point-to-Point Sculpt Tool

# Toolbar Button Functionality

*This section addresses the functional details of particular buttons within the toolbars of InVivoDental 5.1. Buttons that are not included in this section are considered to have functions that either do not require additional explanation or are explained in another section of this manual.*



## Distance Measurement Function

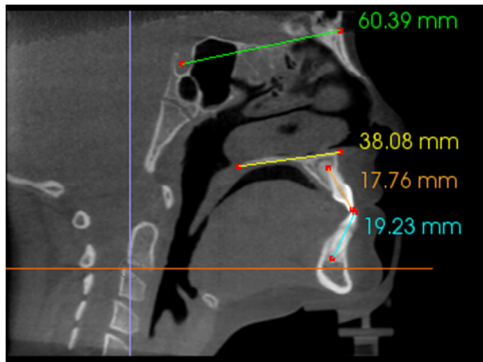


**Distance Measurement Mode** – Pressing the Distance Measurement button will now toggle on/off between two modes.

On – Clicking on the volume will continue to add measurements

Off – Clicking on the volume will not add distance measurements

*The image to the left shows the Distance Measurement Mode is set to “on” and will continue to add measurements when the volume is clicked*

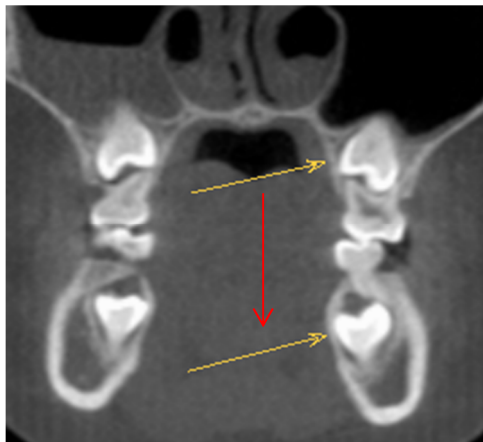


**Distance Color Cycling** – The color of a measurement will automatically alternate between four predefined colors (green, yellow, cyan, orange) when multiple measurements are added to a 2D image

*The image to the left displays multiple measurements added to the sagittal slice*



## Comment Marker and Arrow/Circle Notation Function



**Copy/Paste** – Text, Arrow, and Circle Annotations have copy/paste functionality:

Select an existing annotation and press Ctrl + C

Press Ctrl + V

Left Click to place the new annotation

### Notes about Copy/Paste

When an image is to be pasted, the mouse cursor will define the arrowhead for an arrow, the center of a circle, or the lower left corner of a text notation

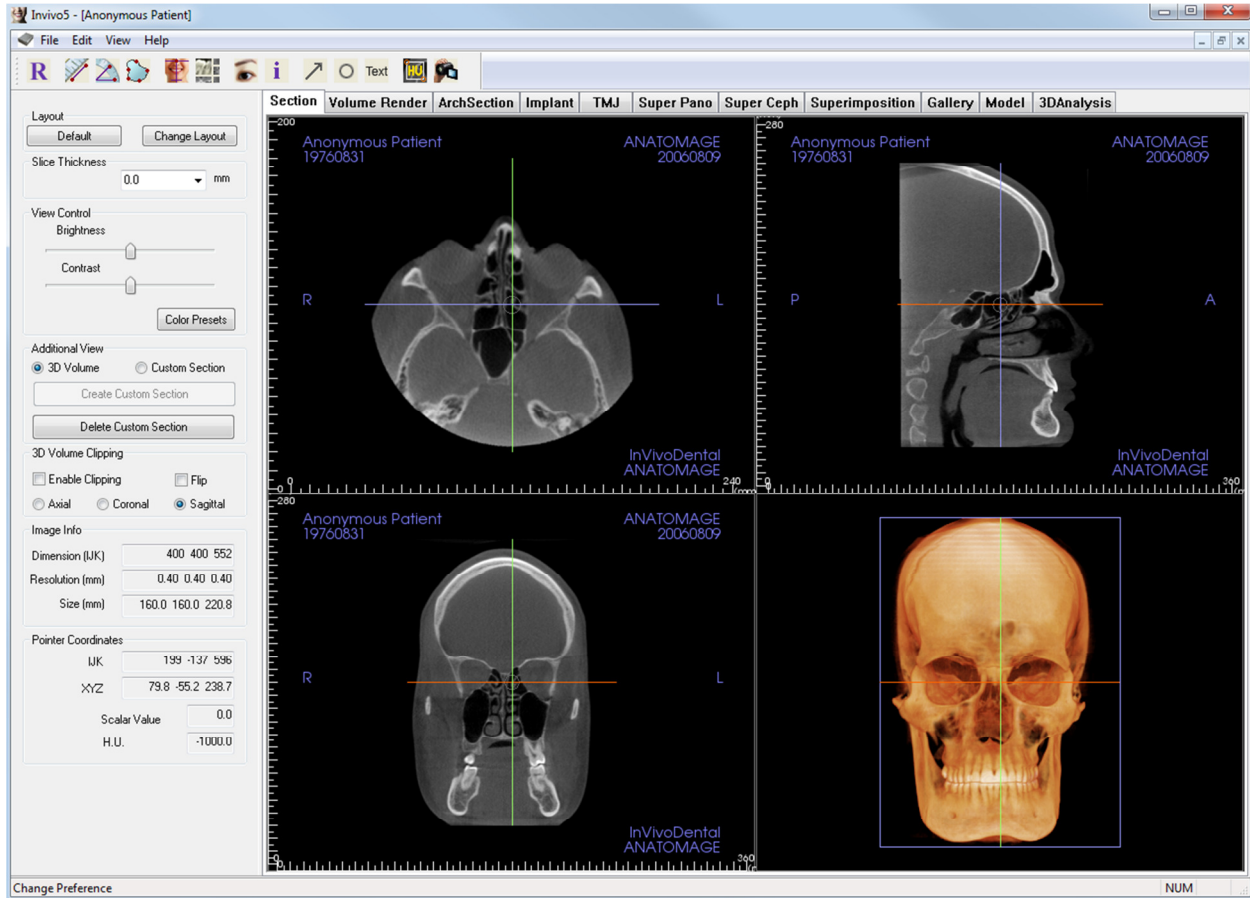
The Copy/Paste function does not allow the user to paste a notation in a different View from which it was copied

*The image on the left shows a coronal slice with the original arrow notation as well as a duplicate created using the Copy/Paste function*

# The View Tabs:

## Section View Features

The **Section View Tab** gives the ability to view the X, Y, and Z sections (Axial, Coronal, Sagittal) and User-Created, Custom Sections simultaneously for 2D visualization, measurements, and the utilization of several image enhancement features. InVivoDental 5.1 also integrates 3D functions in the Section View Tab.



## Section: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Section View Tab:



**Reset View:** Resets the Rendering Window to the original view size.



**Distance Measurement:** After selecting this tool, click one point and move the mouse over the end of the other point you would like to measure and click again.



**Angle Measurement:** After selecting this tool, “click” your first point, then move the mouse over your second point and click it, and finally click the last point. A number in degrees will automatically display.



**Area Measurement:** After Selecting this tool, click multiple points along the boundary of the desired area. Double click or right click to end the measurement. A number in millimeters squared will be automatically display.



**Reorientation:** Click this button to re-orient the image. A circle will show up in each section. Grab the circle and rotate the image to the desired orientation.



**Layout:** Creates a different layout to your preference. After clicking on the layout icon, a list of various layout options will appear. Click on the layout of your preference to apply it.



**Toggle Cursor Visibility:** Turns cursor on and off.



**Information Display:** Displays or hides case information embedded in the data.



**Arrow Notation:** Allows an arrow to be drawn on the image.



**Circle Notation:** Allows a circle to be drawn on the image.



**Text Notation:** Allows text to be written and edited on the image.



**Select Region:** Allows for a calculation of the HU value of an area within a bounding box.



**View Sequence:** Allows for the creation of custom camera sequences and AVI file movie capturing. Refer to the Volume Render View Sequence (p. 38) section for additional information and description.



Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)



## Sections: Control Panel

**Layout**

Default Change Layout

**Slice Thickness**

0.0 mm

**View Control**

Brightness

Contrast

Color Presets

**Additional View**

☐ 3D Volume ☒ Custom Section

Create Custom Section

Delete Custom Section

**3D Volume Clipping**

☐ Enable Clipping ☐ Flip

☐ Axial ☐ Coronal ☒ Sagittal

**Image Info**

Dimension (IJK) 400 400 552

Resolution (mm) 0.40 0.40 0.40

Size (mm) 160.0 160.0 220.8

**Pointer Coordinates**

IJK -160 199 10

XYZ -64.3 79.8 4.1

Scalar Value 0.0

H.U. -1000.0

### Layout:

- **Default:** Go back to original layout.
- **Change Layout:** Click to choose custom layout.

### Slice Thickness:

Select the cumulative thickness of the slices in view.

### View Control:

- **Brightness & Contrast:** Can be adjusted for each of the presets to enhance your image.
- **Color Presets:** Allows better visualization of certain anatomic structures, soft tissue profiles, airway, etc. The color rendering is only for visualization. **The colors are based on densities but DO NOT represent the density value of the bone.**

### Additional View:

- **3D Volume:** This option allows 3D volume rendering in the fourth corner of the window.
- **Custom Section:** By clicking two points, a customized section can be created on any cross section to better visualize anatomy along that axis.
- **Delete Custom Section:** Removes a custom cross section made in the Rendering Window.

### 3D Volume Clipping:

When 3D volume is enabled, this option allows you to clip the volume to see the internal anatomy. The clipping plane will be synchronized with section cursors.

### Image Info:

Dimension, resolution and field of view size is summarized.

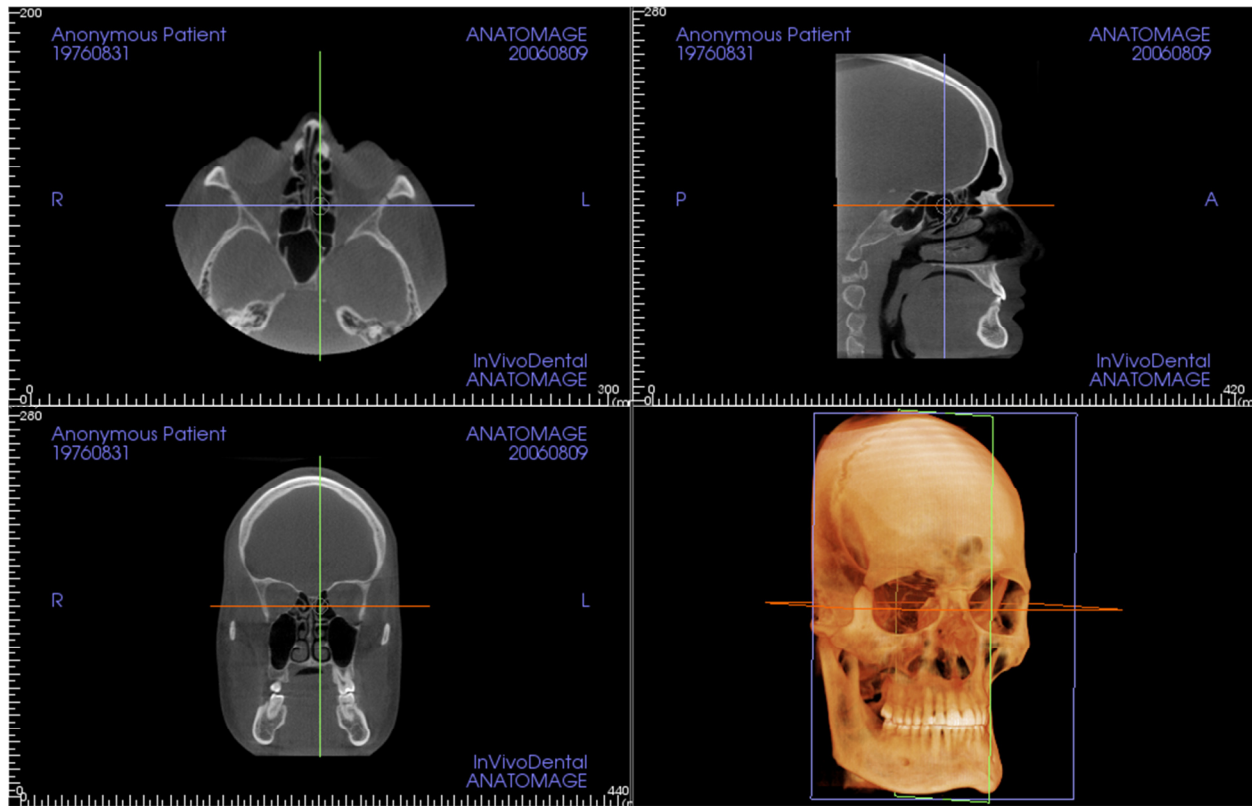
### Pointer Coordinates:

- **IJK or XYZ:** coordinates give the user the ability to examine the coordinate of the cursor upon the absolute coordinate system.
- **Scalar Value** is the gray scale value of the voxel pointed by the cursor pointer.
- **H. U.** or Hounsfield unit, is an approximate value of the voxel calculated by “Rescale Slope” and “Rescale Intercept” in DICOM information. *H.U. value approximations may be not as accurate if your CT hardware calibration is off. Contact your hardware manufacturer for more about H.U. Accuracy.*



## Sections: Rendering Window

This window allows viewing of the X, Y, and Z sections (Axial, Coronal, Sagittal) and Custom Sections or a 3D view simultaneously. This allows the clinician to have very accurate 2D visualization and 2D measurements.




There are three ways to navigate the image:

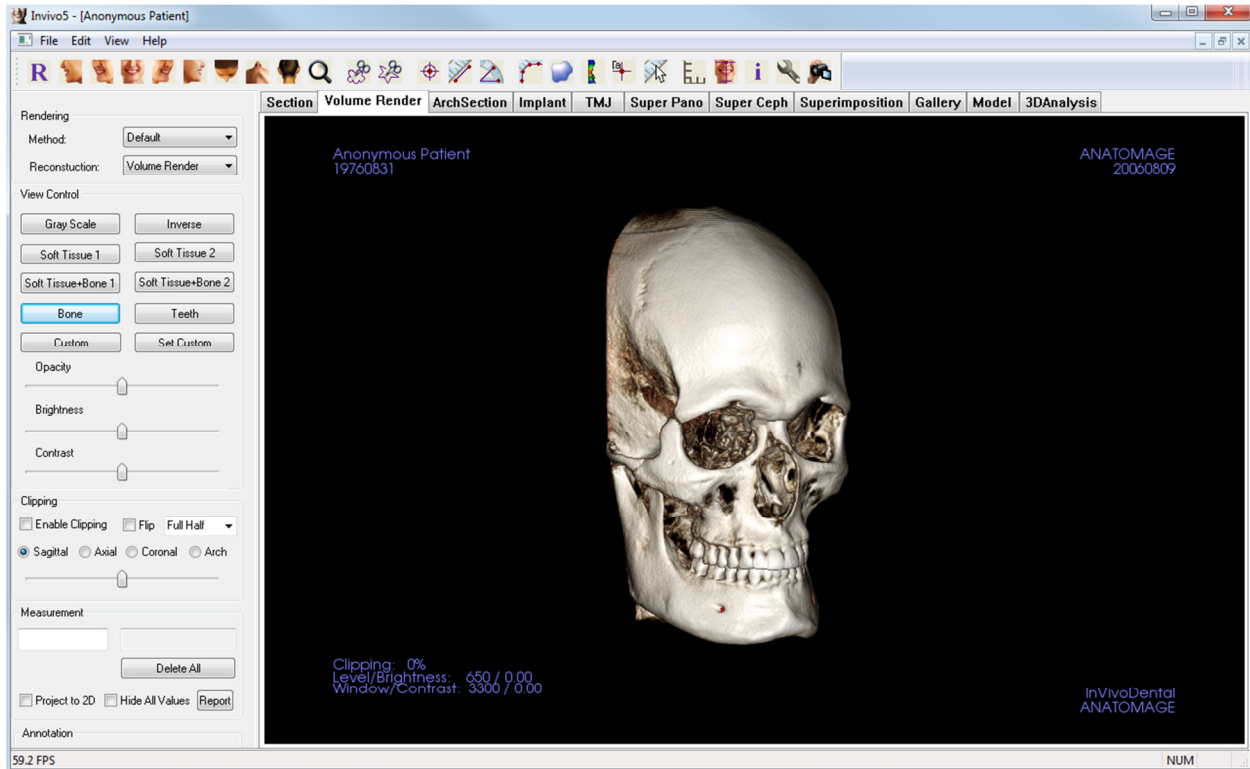
**Scroll wheel:** Move mouse pointer to the desired cross section. Use the scroll wheel to move the slice up and down.

**Cursor:** Grab one of the cursors (axial, sagittal or coronal). Move the cursor in the desired direction. The corresponding image will be updated.

**Center Circle:** Pick a point inside the center circle. Move the circle in the desired direction. The other 2 images will be updated.

# Volume Render View Features

The **Volume Render Tab** shows the patient in three dimensionally reconstructed views and allows you to explore the internal structures and never before seen anatomy of the patient. 



## Volume Render: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Volume Render View Tab:



**Reset View:** Resets the Rendering Window to the original view size.



**Left View:** Automatically orients the volume so the patient is facing left sagittal.



**Left 3/4 View:** Automatically orients the volume so the patient is facing 67° left sagittal.



**Front View:** Automatically orients the volume so the patient is facing the front.



**Right 3/4 View:** Automatically orients the volume so the patient is facing 67° right sagittal.



**Right View:** Automatically orients the volume so the patient is facing right sagittal.



**Top View:** Automatically orients the volume so you are oriented above the patient.



**Bottom View:** Automatically orients the volume so you are oriented below the patient.



**Back View:** Automatically orients the volume to the posterior view.



**Quick Zoom:** Click the zoom icon, then the point on the volume to zoom in. Use Reset icon to go back to normal size.



**Freehand Sculpture:** Allows you to freely outline an area that you want to remove from the volume in a “cookie cutter” manner. You may remove areas inside or outside the selection by clicking the scissors inside or outside of the area that has been outlined.



**Polygon Sculpture:** Allows you to outline an area (by selecting a series of points) for removal from the volume in a “cookie cutter” manner. You may remove areas inside or outside the selection by clicking the scissors inside or outside of the area that has been outlined. *Note: “right click” your mouse to indicate that you have marked your last point.*



**Marker:** When selected you may mark a point on the volume and X,Y,Z coordinates (Transverse, Sagittal, Vertical) will appear. Clicking on the point and moving the cursor can modify points. Clicking on the point and pressing, “delete”, can delete it. View Control features allow the values to be hidden or exported to a report.



**Distance Measurement:** When selected you may mark 2 points on the volume and distance will appear. Clicking on the point and moving the cursor can modify points. Clicking on the point and pressing, “delete”, can delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Angle Measurement:** When selected you may mark 3 points on the volume and angle between them will appear. Clicking on their control points and moving the cursor can modify measurements. Clicking on the point or line and pressing, “delete”, will delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Polygonal Measurement:** When selected you may mark an unlimited number of points on the volume and the total between the first point and the last point will appear. Clicking on the point

and moving the cursor can modify points. Clicking on a point and pressing, “delete”, will delete the measurement. View Control features allow the values to be projected to 2D, hidden, or exported to a report. *Note: “Right click” your mouse to indicate that you have marked your last point.*



**Volume Measurement:** This button will open the volumetric measurement window.



**Airway Measurement:** This button will open the airway volumetric measurement interface. More details can be found in the Airway Measurement section of this document.



**Comment Marker:** You can enter a point in the volume and enter comments. After you pick a point in the volume enter the text you would like to appear in the Insert Comment window and press OK.



**Quick Measurement:** click to activate a ruler at the tip of the cursor. Click again to turn off.



**Grid:** Toggles between 4 different grid layouts for simple assessment of size, measurement, and spatial location.



**Patient Orientation:** click to change patient orientation.



**Information Display:** Displays or hides case information embedded in the data.



**Setup View:** Allows option to view either parallel or perspective views in 3D. For *Airway Measurement*, you can set the threshold and displayed color range.



**View Sequence:** Allows for the creation of custom camera sequences and AVI file movie capturing. Refer to the View Sequence description in the Volume Render View section (p. 38)



Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Volume Render: View Control

**Rendering**

Method: Default

Reconstruction: Volume Render

**View Control**

Gray Scale Inverse

Soft Tissue 1 Soft Tissue 2

Soft Tissue+Bone 1 Soft Tissue+Bone 2

Bone Teeth

Custom Set Custom

Opacity

Brightness

Contrast

**Clipping**

☐ Enable Clipping ☐ Flip Full Half

☒ Sagittal ☐ Axial ☐ Coronal ☐ Arch

**Measurement**

Delete All

☐ Project to 2D ☐ Hide All Values Report

**Annotation**

☒ Visible

Layout: Vertical Even Distributed

### Rendering:

- You can select different methods of rendering to suit your needs.
- Method:** “Performance” is fast but there are some rendering artifacts. “Quality” gives the highest level of detail, but response is slower. “Default” is in between.
- Reconstruction:** There are three possible reconstruction methods: Volume Rendering, Maximum Intensity Projection, and X-ray.

### View Control:

- Color Presets:** Gray Scale, Inverse, Soft Tissue 1, etc. allow better visualizations of certain anatomic structures, soft tissue profiles, airway, etc. This is achieved by displaying specific densities with specific colors.
- Opacity:** Allows for the translucency/opacity to be adjusted.
- Brightness & Contrast:** Can be adjusted for each of the presets to enhance your image.

### Clipping:

- Click the Enable Clipping box to slice the image along the predefined Anatomical Planes (Sagittal, Axial, Coronal, and Arch).
- Scrolling the mouse wheel or slider bar will move the clipping plane.
- To switch a view to the opposite side, click “Flip.”
- Control the clipping with the scroll mouse or the slider bar.

### Measurement:

- Once landmarks or measurements are defined, the text can be edited in the edit box.
- Measurements can be projected as 2D values or hidden by clicking the appropriate box.
- Report:** Exports the values and annotations to a .CSV file for viewing and/or computations in Excel or similar programs.

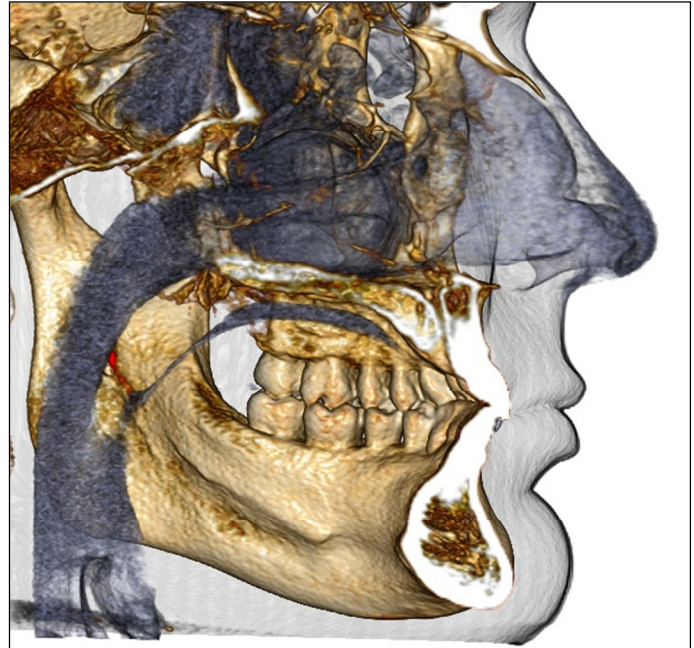
### Annotation:

- Edits selected comment/annotation in the text field
- You can toggle added comments on/off by selecting “Visible”.
- Layout:** Sorts all added comments in the Rendering Window based on selected setting (Horizontal, Stick to Point, User Dragged, Vertical, Vertical Even Distributed, Vertical Round Distributed).



## Volume Render: Render Window

One of the most powerful features of InVivoDental 5.1 is the remarkable rendering quality and speed at which the software works. The simplicity of this window is that it only displays the volume, Patient Info (if desired), and the opacity, brightness and contrast values.

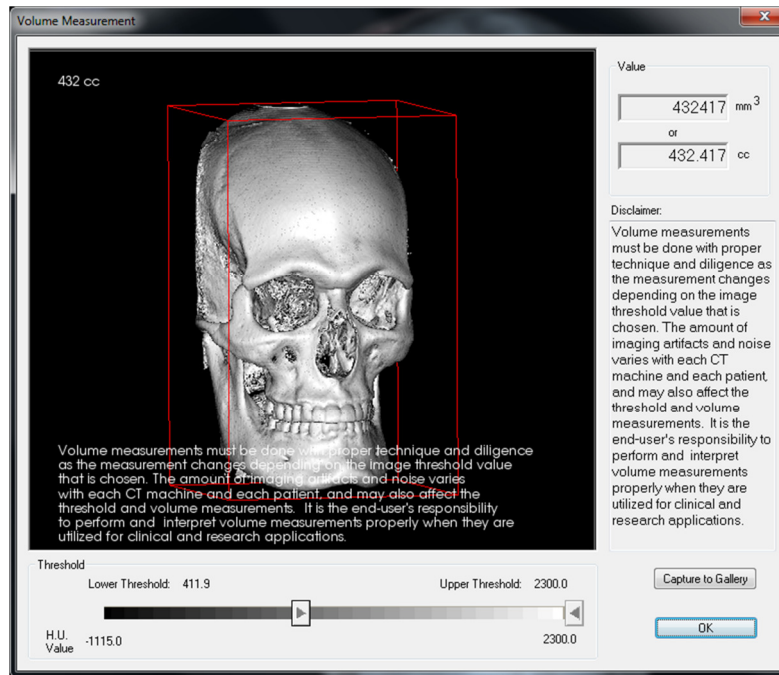


Please refer to **Image Navigation (p. 21)** for information about controlling and adjusting these images.




Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Volume Render: Volume Measurements



The Volume Measurement interface allows you to estimate displaced volume (cc or cubic millimeters) of a specific anatomical structure. You must first perform sculpting operations to isolate the desired anatomical structure.

Then, press the **Volume Measurement**  button. The new window will open and the volumetric measurement value will be displayed. Finally, you can adjust the threshold values to obtain desired measurements.



**Important:** the measurement values may not be true anatomical volumetric measurements. Due to the nature of the imaging, there are imaging artifacts such as white noise, scattering, beam hardening, ring noise or off scale H.U. The software measurement tool cannot distinguish the imaging artifact from the true anatomy. Furthermore, the measurement values depends on threshold values, thus, user must set proper thresholds to get the best estimate of the desired structure. The measurements value must not be used as the sole metric for any treatment.

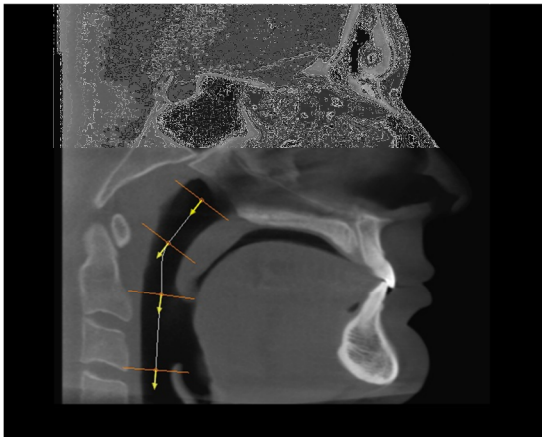
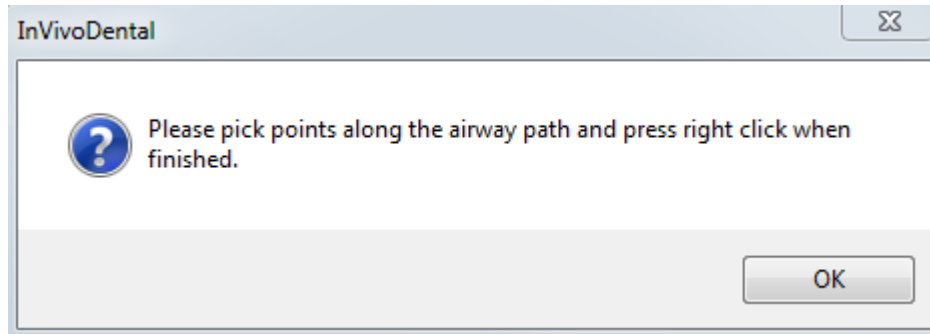


**Warning:** Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Volume Render: Airway Measurement



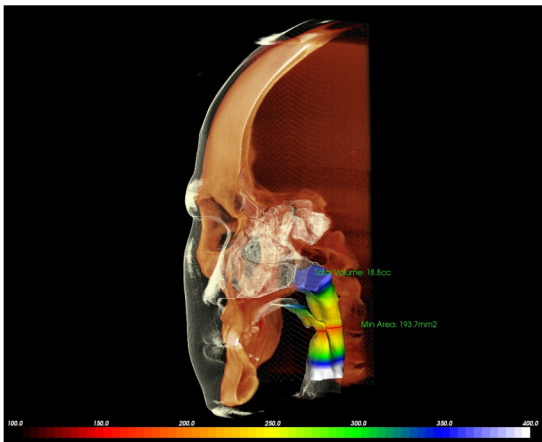
**Airway Measurement:** Selecting the icon will prompt the dialog box (below). Select OK to continue.




### Tracing the Profile:

Use the scroll-wheel to locate the Mid-Sagittal Plane  
 Pick points along the airway to define your measurement path with the Left-click button  
 Right-click when finished

*The image (left) shows a completed profile tracing for a typical airway measurement, but the above steps will work for other air volumes too.*



### Viewing the Volume Measurement:

InVivoDental 5.1 will convert your profile tracing into a volume rendering and superimpose it onto the scan data. The minimum cross-sectional area and total volume are displayed next to the airway measurement. The color range and threshold can be adjusted by selecting the Setup View icon in the Toolbar: 



**Important:** the measurement values may not be true anatomical volumetric measurements. Due to the nature of the imaging, there are imaging artifacts such as white noise, scattering, beam hardening, ring noise or off scale H.U. The software measurement tool cannot distinguish the imaging artifact from the true anatomy. Furthermore, the measurement values depends on threshold values, thus, user must set proper thresholds to get the best estimate of the desired structure. The measurements value must not be used as the sole metric for any treatment.

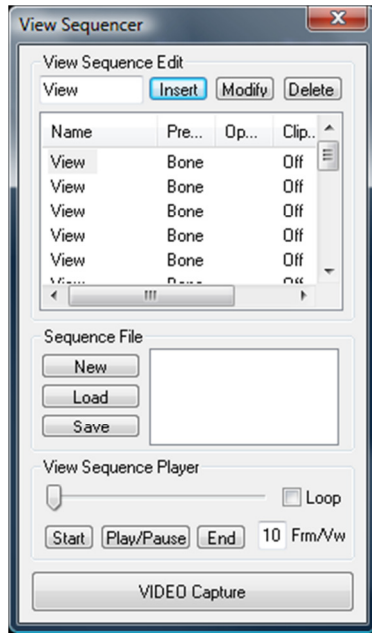


**Warning:** Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must



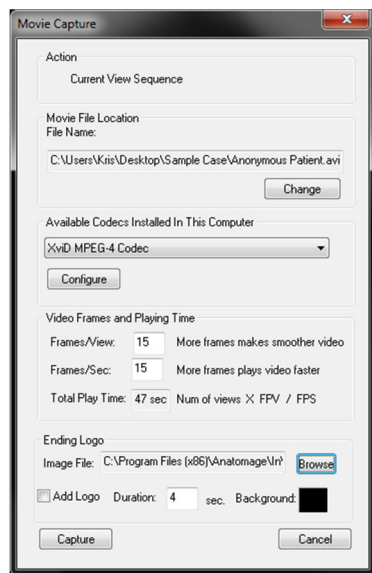
understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Volume Render: Movie Capturing and Customized View Sequences



### View Sequence:

- Allows you to create your own sequences by clicking on the **Insert** button to each step you want the volume to move in your sequence.
  - *If you want a movie that spins left to right, and then turns up for a submental view, you would add a New Camera for each step and the video capture of it will connect the positions in a seamless movie.*
- You can integrate multiple, different rendering presets so that it switches not only in sequence, but also in colorizations.
- Video sequences can be saved for future use and then loaded using the **Load** Sequence and **Save** Sequence buttons.
- Click on the **VIDEO Capture** button to open a dialog to customize and save the movie file.



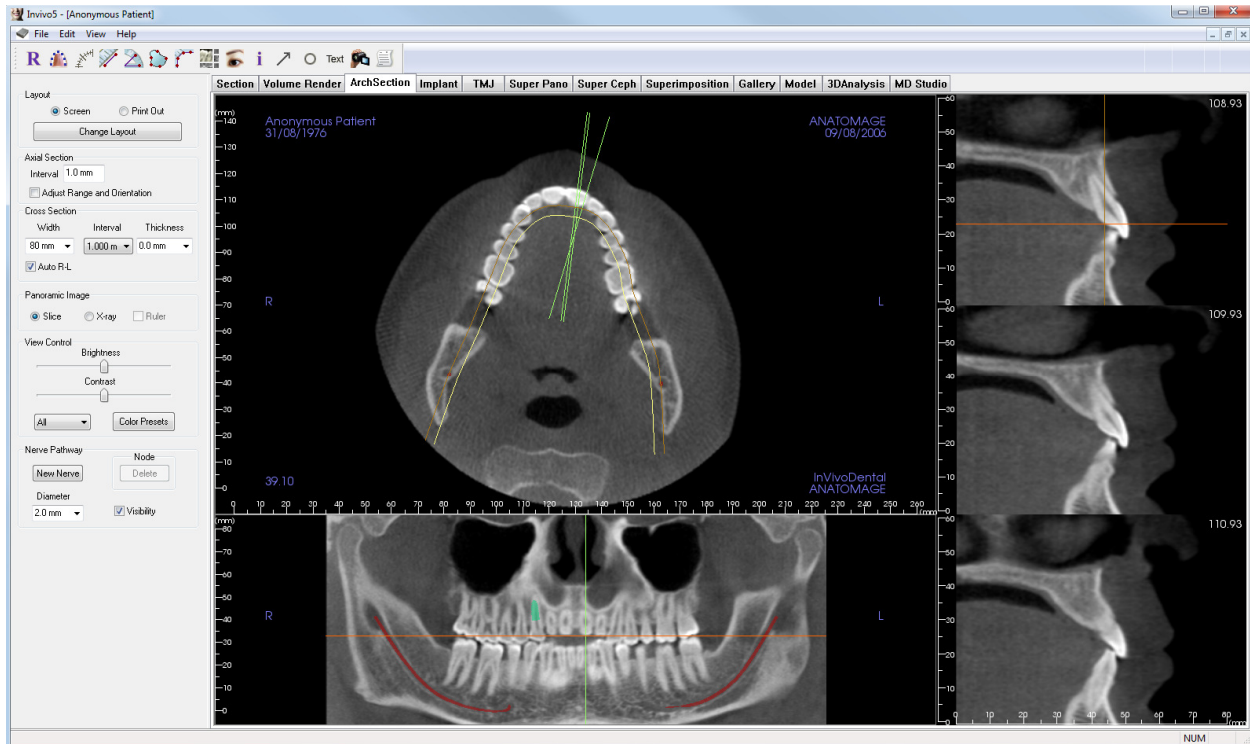
### Movie Capture:

The **VIDEO Capture** button allows you to customize, capture and export an AVI (movie) file of the volume rendering sequence.

- Select **Change** to determine the AVI file name and save location.
- Various codecs that are on your computer can be used to capture the movie at different qualities. If you experience any trouble with the video quality, a different codec may be better.
- Set your frames/view and frames/sec to desired value.
  - *More frames/view will make the video smoother*
  - *More frames/sec will make the video run faster.*
- Add an Ending Logo by selecting **Browse** and choosing an image file to display at the end of your video
  - *Select "Add Logo" to add the ending image*
  - *Set your duration and background color*
- Click **Capture** once everything is set up to automatically export the video to the specified location with the specified name.

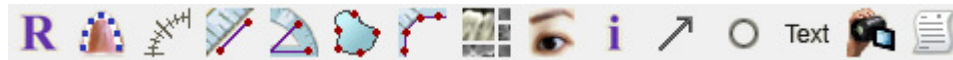
# Arch Section View Features

**Arch Section View** is a sectional image exploration view. Instead of conventional X-Y-Z sections, this view allows the user to review the image in dentally meaningful perspectives using multiple cross sections traversing the lengths of the dental arches.



## Arch Section: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Arch Section Tab:



**Reset View:** Resets the window to the original view.



**Create Arch Spline (Focal Trough)★:** After selecting this tool, you can create a new Arch Spline or edit an existing **Arch Spline**. First, “left-click” on the point you would like to start and continue adding points by “left-clicking.” After you have marked your final point, “right-click” or double click to finalize the **Arch Spline**. When modifying an existing **Arch Spline**, drag the control points to the desired positions.



**Arch Spline (Focal Trough) Ruler:** Places ruler along the Arch Spline for easy reference.



**Distance Measurement:** After selecting this tool, click one point and move the mouse over the end of the other point you would like to measure and click again.



**Angle Measurement:** When selected you may mark 3 points on the volume and the angle between them will appear. Clicking on their control points and moving the cursor can modify measurements. Clicking on the point or line and pressing, “delete”, will delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Area Measurement:** After Selecting this tool, click multiple points along the boundary of the desired area. Double click or right click to end the measurement. A number in millimeters square will be automatically display.



**Polygonal Measurement:** When selected you may mark unlimited number of points on the volume and the total between the first point and the last point will appear. Clicking on the point and moving the cursor can modify points. Clicking on a point and pressing, “delete”, will delete the measurement.



**Layout:** Creates a different layout to your preference. After clicking on the layout icon, a list a various layout options will appear. Click on the layout of your preference to apply it. These options allow for different case workup images.



**Show/Hide Implant/Cursor/Nerve:** Conceals or displays cursors.



**Information Display:** Displays or hides case information embedded in the data.



**Arrow Notation:** Allows an arrow to be drawn on the image.



**Circle Notation:** Allows a circle to be drawn on the image.



**Text Notation:** Allows text to be written and edited on the image.



**View Sequence:** Allows for the creation of custom camera sequences and AVI file movie capturing. Refer to the Volume Render View Sequence (p. 38) section for additional information and description.



**Slice Capture Mode:** Opens the Slice Capture Manager to enable the capture of slices or groups of slices from a series of cross sections. Requires the creation of a slice group in the Report view. **(NOTE: Only available with an installed/activated Report Module)**

purchased separately from Invivo.)



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## Arch Section: View Control

The screenshot displays the 'Arch Section: View Control' interface with the following sections and controls:

- Layout:** Radio buttons for 'Screen' (selected) and 'Print Out'. A 'Change Layout' button is below.
- Axial Section:** An 'Interval' dropdown set to '1.0 mm'. A checkbox for 'Adjust Range and Orientation' is below.
- Cross Section:** Three dropdowns for 'Width' (40 mm), 'Interval' (1.000 m), and 'Thickness' (0.0 mm). A checked checkbox for 'Auto R-L' is below.
- Panoramic Image:** Radio buttons for 'Slice' (selected), 'X-ray', and a checkbox for 'Ruler'.
- View Control:** Two sliders for 'Brightness' and 'Contrast'. Below them is a dropdown set to 'All' and a 'Color Presets' button.
- Nerve Pathway:** A 'New Nerve' button, a 'Node' section with a 'Delete' button, a 'Diameter' dropdown set to '2.0 mm', and a checked checkbox for 'Visibility'.

### Layout:

- **Screen** layout is optimized for viewing the image on the computer screen. **Print Out** layout is optimized for printing the image on paper. With **Print Out** layout, what you see on screen will be what you get on the paper in life-size. First capture to Gallery, then print from Gallery to ensure the image is life-size.
- **Change Layout** allows you to adjust the layout with different amounts of slices and orientations.

### Vertical Range and Orientation:

**Adjust Range and Orientation** will switch to a mode allowing for the adjustment of the upper and lower limit of pano and cross section. You can also reorient the image in this view.

### Cross Section:

- **Width:** Cross Section Width
- **Interval:** Distance between the subsequent cross sections.
- **Thickness:** Allows for the cumulative thickness of the slices to be viewed in the cross sections.
- **Auto R-L:** This will allow the cross section to be oriented to a consistent R-L orientation on screen. If turned off, the cross section orientation will be consistent to arch spline.

### Panoramic Image:

- **Slice** mode will show you a single cross section along the panoramic curve (yellow).
- **X-ray** will show you the ray sum (reconstructed x-ray) in the focal trough. Slice mode is used for drawing the nerve.

### View Control:

- **Brightness and Contrast** allows you to adjust the image
- Different **Color Presets** can be used to view the images in color.
- The **All** button allows you to adjust brightness/contrast in different areas independently.

## Nerve Pathway:

*Creating a Nerve Pathway (e.g. Inferior Alveolar by following the mandibular canal to its exit).*

- Click **New**
- Left click the mouse where you want the nerve to start
- Move the mouse to the next point along your path and left click again
- Repeat this procedure for the entire length of the nerve
- **2.0mm** is the default diameter of the nerve pathway, but you may adjust it for your preference.
- Press **Done** to finish

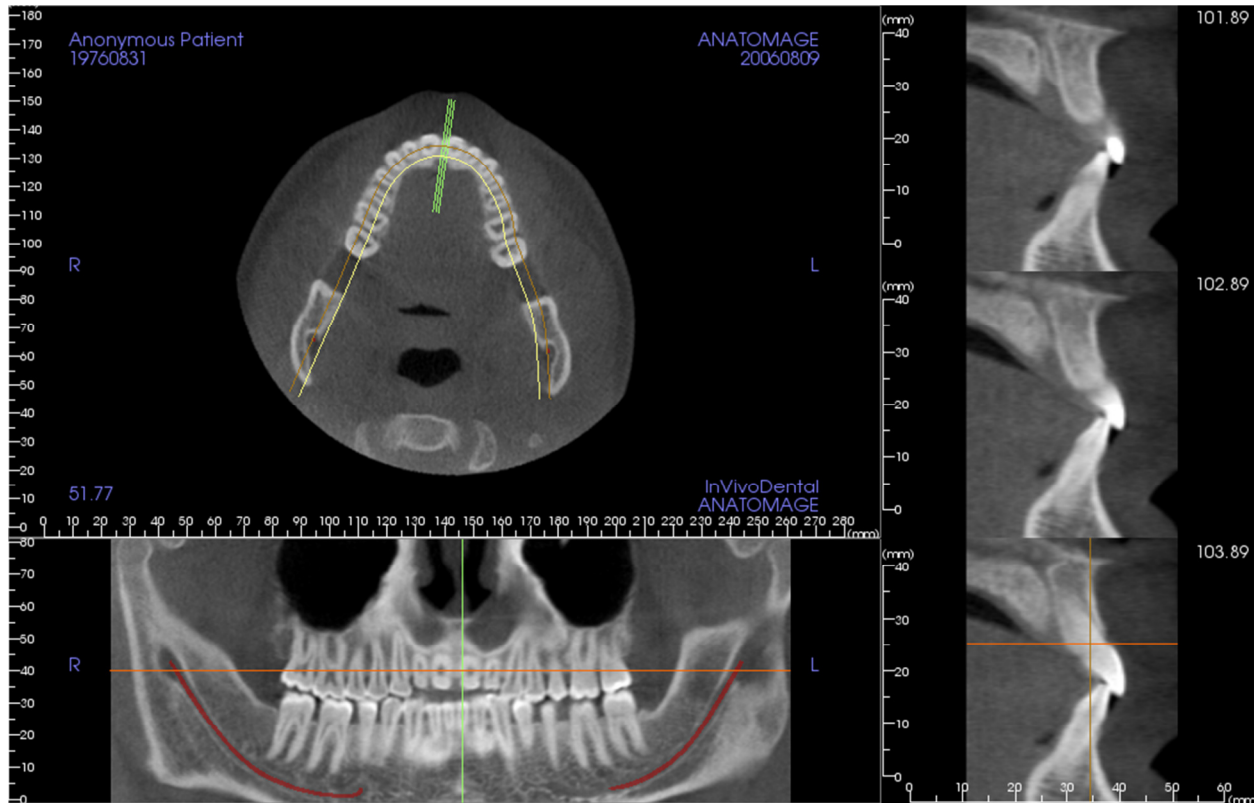
*Deleting a Nerve Pathway*

- The **Delete** tab can be used if a point was plotted in the wrong spot; it will delete the last point added.
- Picking the nerve and pressing the “delete” key will delete the nerve that was traced if you want to get rid of it.
- Visibility will turn the nerve on or off from view.



Warning: Any nerve that is traced in a way that does not conform to the actual pathway of the nerve can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect tracing. It is critical for the end user to learn how to properly perform nerve tracings correctly. If you notice any inconsistencies or software problem with nerve tracing or have further questions or concerns about nerve tracing, please contact Anatomage support at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Arch Section: Rendering Window



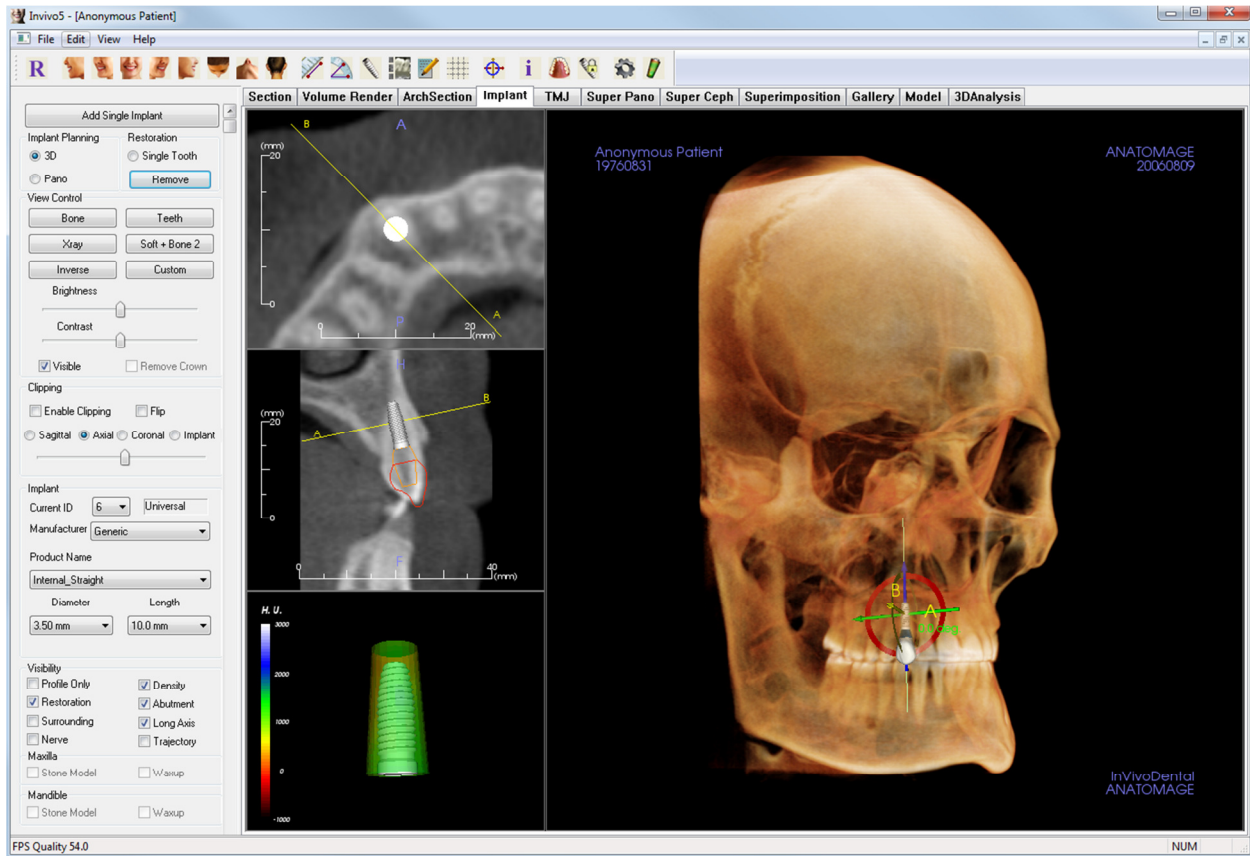
**Arch Cursor:** Notice the Green, Red, and Orange coordinate indicators. These Arch Section Coordinate Indicators show where you are spatially located within in the Arch Section Modeling Window.

- **Cross Section Indicator:** The Green lines gives the location of the cross sections along the **Arch Curve**.
- **Axial Slice Indicator:** The **Red line** shows the axial coordinate position within the section.
- **Arch Spline:** The Orange spline in the center of the arch spline represents the current position where the **Arch Section** has moved.
- **Cross Section:** Mouse scrolling within any one of the three Sagittal frames advances the slices to the patient's right or left and causes the Green Coordinate Indicator to move anteriorly or posteriorly in the Axial and Pano Section simultaneously.
- **Axial Section:** Mouse scrolling within the Axial section advances the sections superiorly or inferiorly and causes the Red Coordinate Indicator to move superiorly or inferiorly in the Cross or Pano sections simultaneously.
- **Pano Section:** Mouse scrolling within the Coronal frame advances the slices buccal or lingual and causes the Orange Coordinate Indicator to move buccal and lingual in the Axial and Cross section simultaneously.



# Implant View Features

The **Implant View Tab** allows you to access the full-featured implant planning module.



## Implant: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Implant View Tab:



**Reset Views:** Resets the Rendering Window to the original view.



**Left View:** Automatically orients the volume so the patient is facing left sagittal.



**Left 3/4 View:** Automatically orients the volume so the patient is facing 67° left sagittal.



**Front View:** Automatically orients the volume so the patient is facing the front.



**Right 3/4 View:** Automatically orients the volume so the patient is facing 67° right sagittal.



**Right View:** Automatically orients the volume so the patient is facing right sagittal.



**Top View:** Automatically orients the volume so you are oriented above the patient.



**Bottom View:** Automatically orients the volume so you are oriented below the patient.



**Back View:** Automatically orients the volume to the posterior view.



**Distance Measurement:** When selected you may mark 2 points on the volume and distance will appear. Clicking on the point and moving the cursor can modify points. Clicking on the point and pressing, “delete”, can delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Angle Measurement:** When selected you may mark 3 points on the volume and the angle between them will appear. Clicking on their control points and moving the cursor can modify measurements. Clicking on the point or line and pressing, “delete”, will delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Insert Implant:** To place an implant, first click the **Add Implant** icon, then “left-click” the mouse on the spot that you want the implant to be placed. Note: specific manufacturers measure the implant from different points, so a measurement in the software might not be the same as the actual measurement of the specific implant design.



**Change Layout:** To toggle the layout click on this icon.



**Create Summary:** Creates an Implant summary of images.



**Toggle Grid:** Toggles between two different grid layouts for use in the upper two section frames allowing quick assessment of measurements and spatial location.



**Toggle Move Widget:** Toggles the implant orientation widget on and off.



**Information Display:** Displays or hides case information embedded in the data.



**Change Model Visibility:** Allows various models to be turned on or off from view.



**Treatment Lock:** Locks the implants in place so that they are not accidentally moved when viewing the 3D images.



**Preferences:** Allows you to adjust the different rendering, color and visibility preferences.



**Density Profile Control:** Adjust the settings for the displayed density profile around planned implants.



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Warning: Any implant planning that is performed incorrectly in any aspect including but not limited to implant location, orientation, angle, diameter, length, and/or manufacture can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the implant planning error(s) in question. It is critical for the end user to learn how to use the implant treatment planning tools correctly. If you notice any inconsistencies or software problem with implant planning or have further questions or concerns about correct utilization of implant planning, please contact Anatomage support at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Implant: View Control

### Add Single Implant:

- Click to add single implant to the 3D volume
- Adjust the implant orientation and placement using the Move Widget that appears on the selected implant.

### Implant Planning:

- 3D: Place and adjust individual implants on 3D volume
- Pano: Add multiple implants using the Pano view; select “3D” to exit Pano view and re-adjust individual implants.

### Restoration (Single Tooth):

- InVivoDental 5.1 will reorient the volume into an occlusal view. You can use the Move-Widget to adjust the individual restorations.
- The Remove button removes all restorations.

### View Control:

- View Presets: Different settings allow for better visualization of certain anatomic structures, soft tissue profiles, hard tissue, etc. This is achieved by displaying specific densities with specific colors.
- Brightness & Contrast: Can be adjusted for each of the presets to enhance your image.
- Visible: allows the 3D Volume Rendering to be turned on or off from view.
- Remove Crown: Only applicable with surgical guide related modeling service options.

### Clipping:

- Click the Enable Clipping box to slice the image along the predefined Anatomical Planes (Sagittal, Axial, Coronal, and Arch). Scrolling the mouse wheel or moving the slider bar will move the clipping plane. To switch a view to the opposite side, click “Flip.”

### Implant:

- ID: Use the drop-down menu to select an implant to manipulate. The active implant will appear lighter in color than the others.
- Manufacturer, Product Name, Diameter, and length: The default is generic, but you may select a specific implant manufacture, diameter and length.

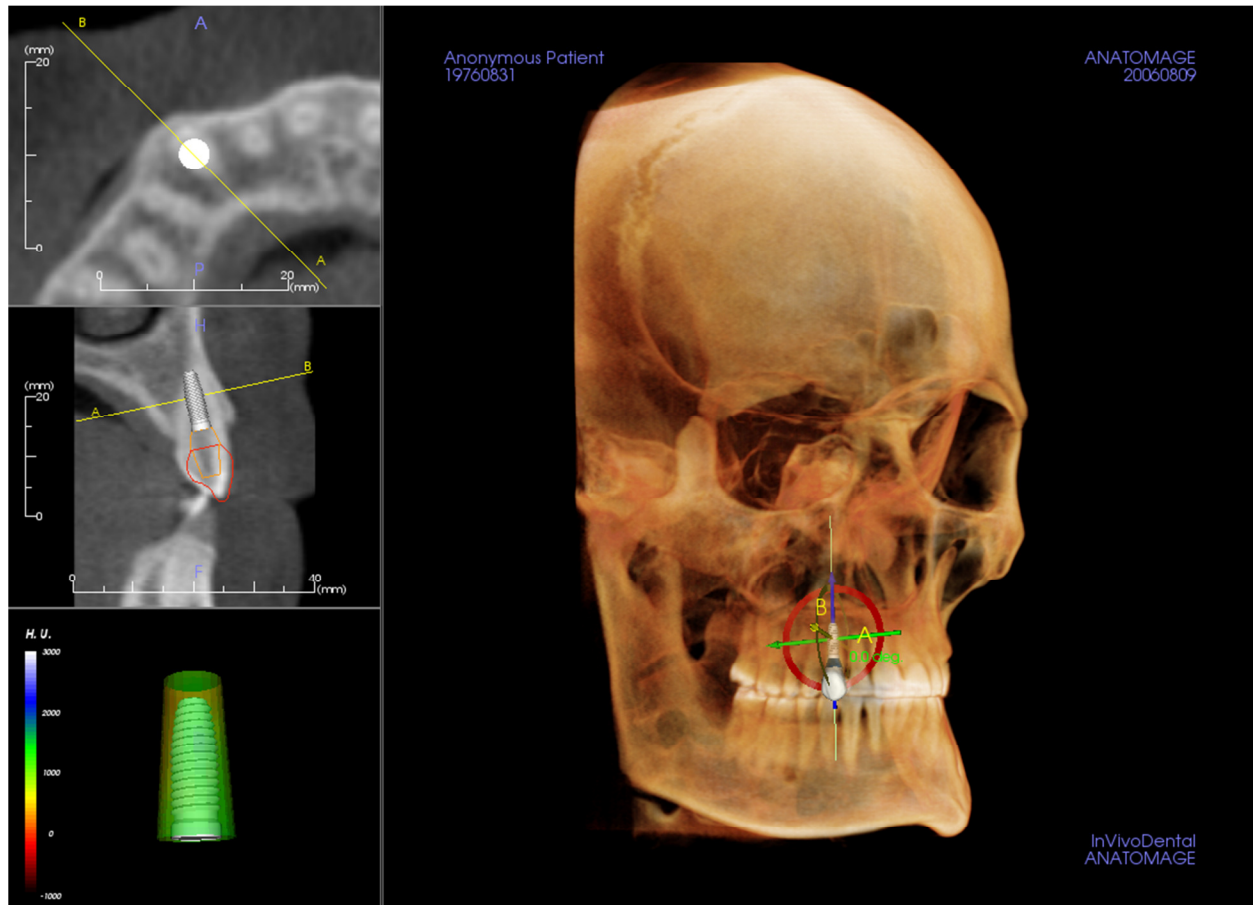
### Visibility:

Hide/show various features in the Rendering Window.

### Maxilla, Mandible:

Only applicable with surgical guide related modeling service options. Hide/show added stone model(s) and wax up(s).

## Implant: Rendering Window



Used for more precise control and final detailed touches to implant treatment planning. Using the navigation discussed below, you can visualize all aspects of the implant in the 3D volume. ★ **Once an implant is added, it will also appear in the Volume Render View.**

**Axial Section:** Top left window. This section is the view from the top of the implant. The yellow line passing through the axis creates the view seen in the Sagittal view. Scrolling the mouse wheel after clicking inside the Axial window, or clicking and dragging the line will change the cross-section seen in the Sagittal view as the line rotates about the axis of the implant.

**Sagittal Section:** Middle left window. This section is the view from the side of the implant. The yellow line passing through the implant creates the cross-section view that appears in the Axial view. Scrolling the mouse wheel after clicking inside the Sagittal window, or clicking and dragging the line will change the cross-section seen in the Axial view.


**Density Profile:** Lower left window. Displays a real-time visualization of the volume density immediately surrounding the implant

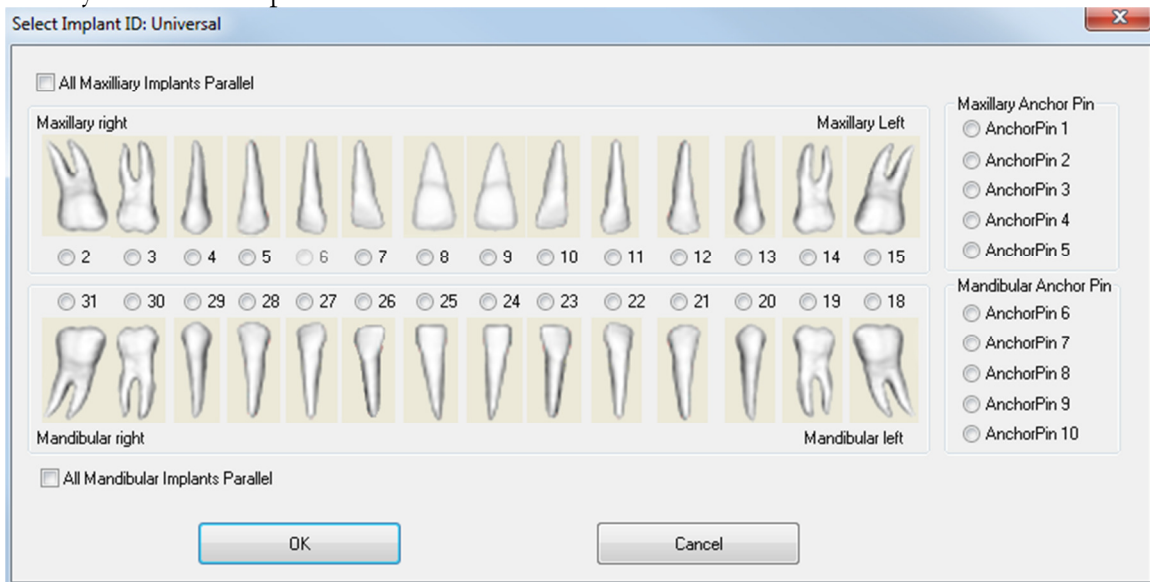
**Volume Rendering:** Right window. This frame allows user to change the implant position and orientation with the orientation widget within the 3D volume rendering.



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## Implant: 3D Implant Planning

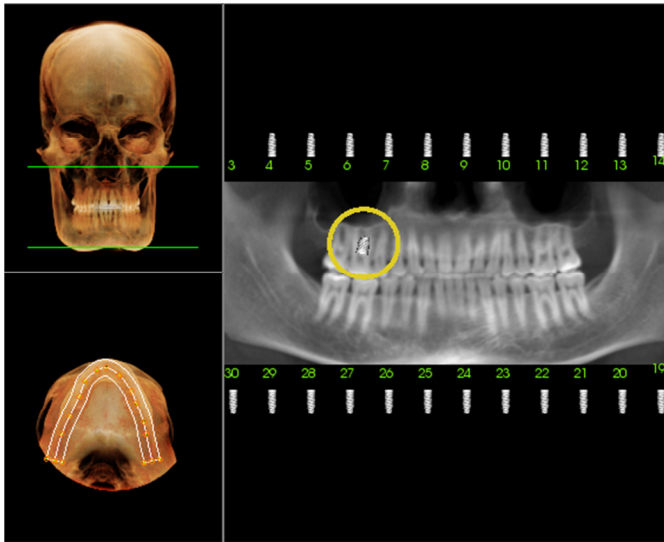
- In the View Controls, click the **Add Single Implant** button .
- The implant ID dialog will show up (image below).
- Select implant ID to be inserted. Press OK, and a new implant will appear on the mouse pointer.
- Drag and drop the implant in 3D view onto the surgical site. (It helps to have the volume rotated so that the surgical site is centered).
- In Axial view, align the yellow line such that the below Cross Section view becomes the view along mesial-distal direction.
- In Cross Section view, re-orient and position implant so that its angle is as desired.
- In Axial view, align the yellow line such that the below Cross Section view becomes the view along buccal and lingual direction
- In Cross Section view, re-orient and position implant so that its angle is as desired.
- Review the final implant position in 3D view.
  - To delete an implant, select the desired implant in the 3D view and press the “delete” key on the keyboard. The implant will be removed.



A similar procedure can be done to add anchor pins to your 3D volume. Select which anchor pin you would like to add and follow similar steps for adjusting its position.

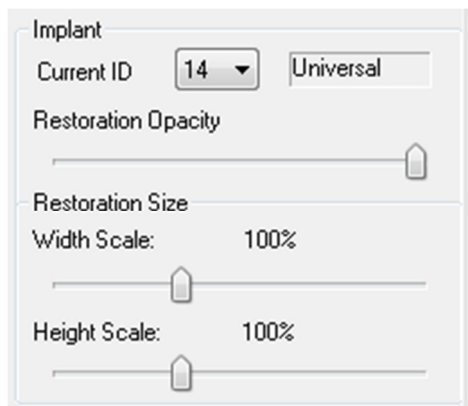
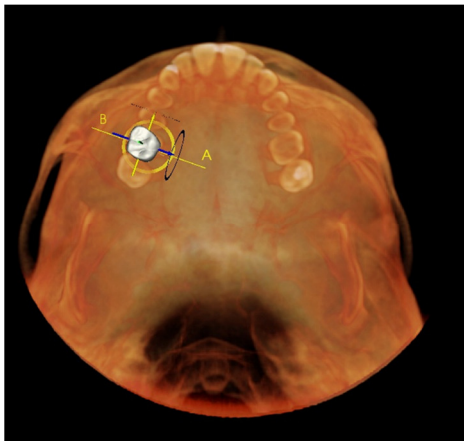


## Implant: Pano Implant Planning



- Select Implant Planning: Pano under the View Controls in the Implant Tab.
- Rendering Window updates to Pano view (shown below)
- Adjust the Arch-Section focal trough such that the middle profile passes through the dentition
- Drag implant to its desired location and adjust the angle of the implant
- Repeat for all desired implants
- Select Implant Planning: 3D to exit Pano-Mode and adjust individual implants.

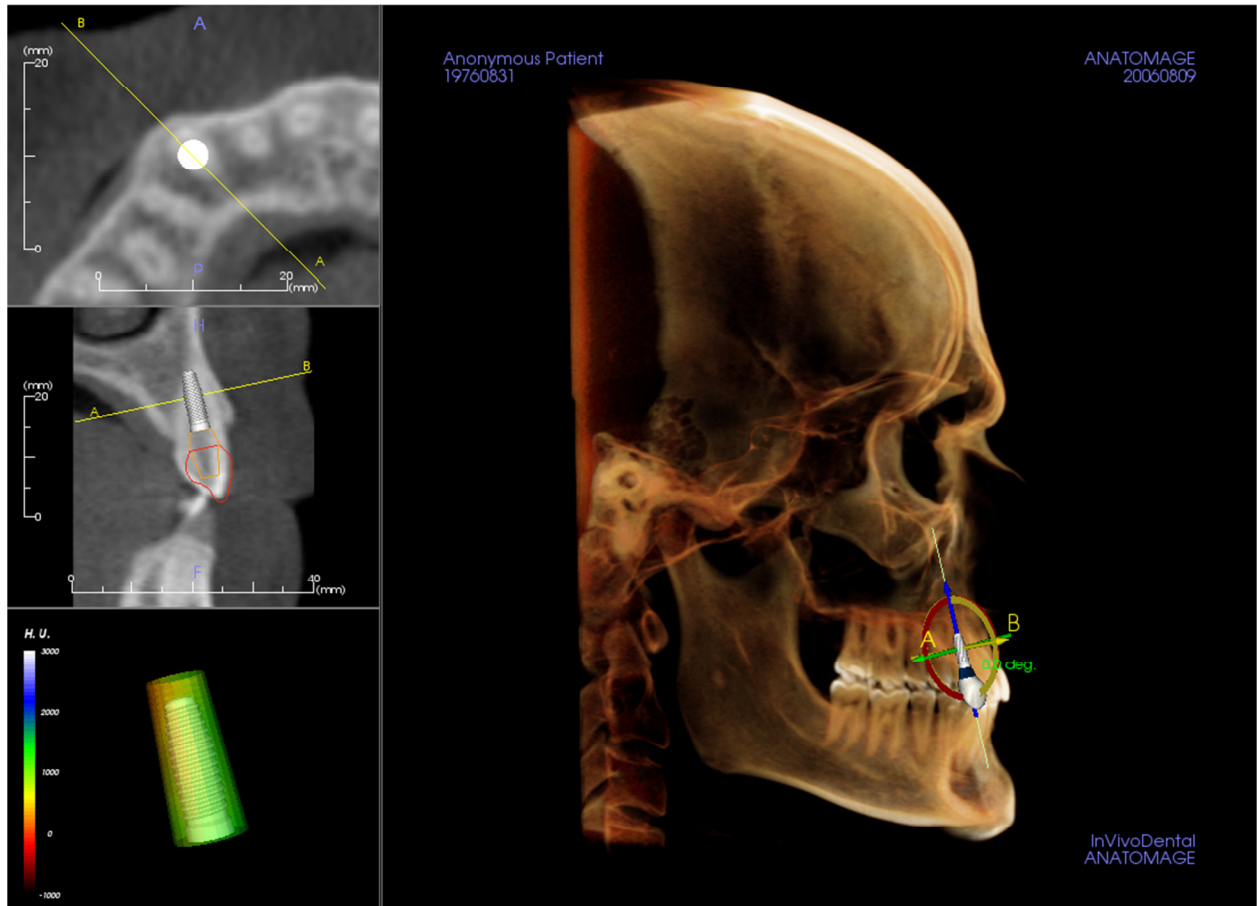
## Implant: Restoration Planning



- Insert the necessary implants for your case.
- Select Restoration: Single Tooth in the View Controls to open the Restoration Planning interface in InVivoDental 5.1.
- The Rendering Window will update to show you an occlusal view of the volume rendering. (Image shown, left)
- Using the Move-Widget, you can adjust the individual restorations independent of the implant.
- The View Control updates in the Restoration Planning Mode.
- Use Restoration Opacity to adjust the transparency of the restoration
- You can adjust the size of the restoration by adjusting the Width Scale and Height Scale.
- To exit the Restoration Mode, select the Implant Planning: 3D option in the View Controls.



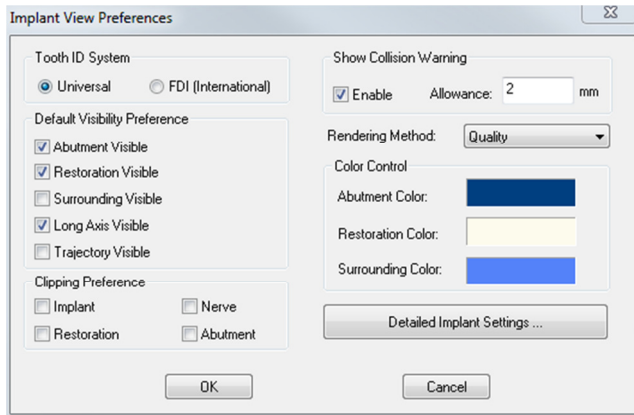
## Implant: Abutment Planning



- The abutment automatically connects the restoration model with the implant model in the Rendering Window.
- The abutment cannot be adjusted independently of the restoration and implant. It is recommended that you take into consideration the abutment angle and position when planning your implants and restorations.
- You can hide/show the abutment model under **Implant View Controls: Visibility**.

## Implant: Settings and Preferences

By selecting the **Preferences** icon  you can open up a customization window within the Implant Tab.



### Tooth ID System:

You can set the ID to either the Universal or FDI(International) standard

### Default Visibility Preference:

Adjust the default visibility settings when InVivoDental 5.1 opens old and new cases.

### Clipping Preference:

Options for which models to include in volume clipping

### Show Collision Warning:

You can define whether or not to display a proximity warning between implants at an allowed tolerance.

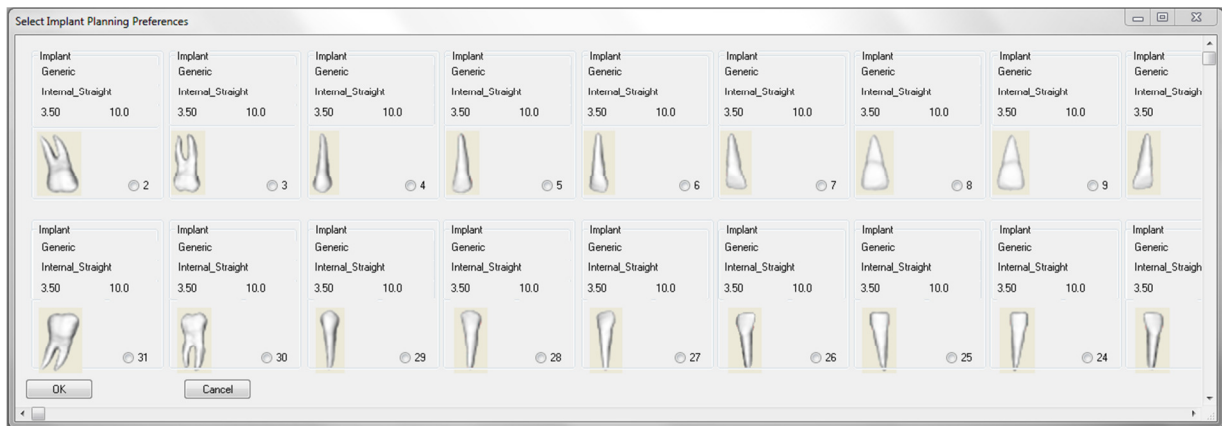
### Rendering Method:

Choose which rendering method (Default, Performance, Quality) you would like to use in the Implant View Tab.


### Color Control:

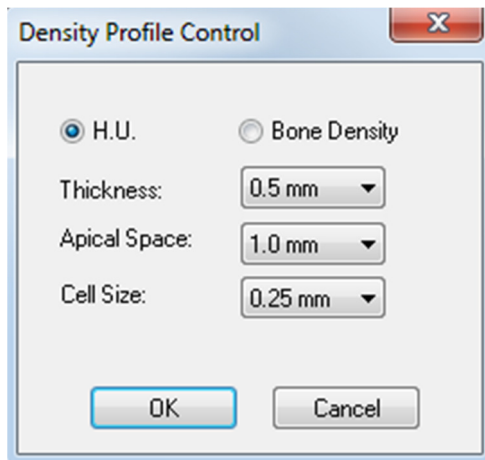
Set the various colors for the abutment, restoration, and collision colors.

When you select **Detailed Implant Settings**, you are able to adjust the default settings for individual implants in the Implant Planning Preference Window.



For each implant, you can have a preset manufacturer, product name, diameter and length. These settings are still adjustable after placing the implant in your scan.

By selecting the **Density Profile Control** icon  you can adjust the settings for the Density Profile.



**H.U.** shows the bone density in Hounsfield units

**Bone Density** shows the density in Misch's bone density units.

**Thickness:** Changes the sampled volume located around the implant.

**Apical Space:** Changes the sampled volume located at the apex of the implant.

**Cell Size:** Changes how finely the voxels will be sampled and displayed in the volume around the implant.



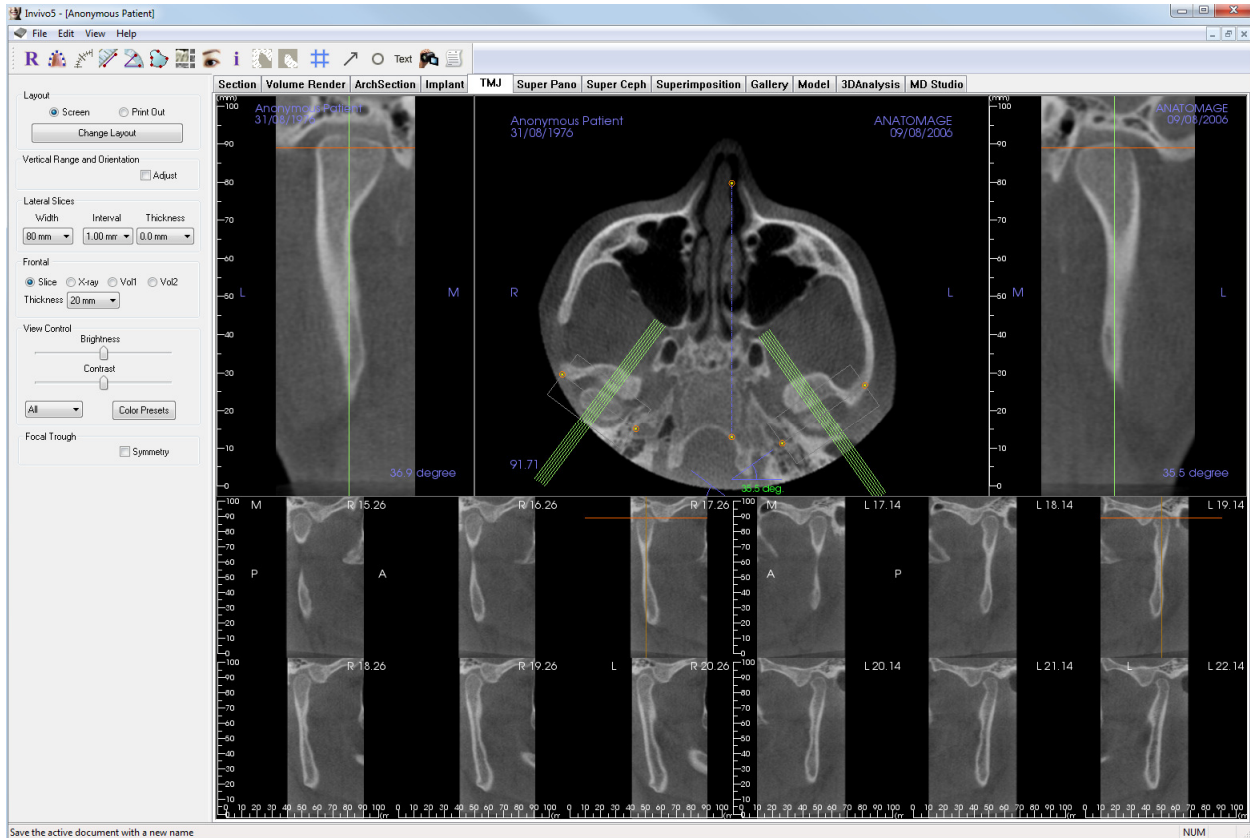
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# TMJ Features

In the **TMJ View Tab** you can view the TMJ region with two independent focal troughs allowing you to get cross-sections of each TMJ in one view, along with corresponding coronal and axial views. The TMJ View Tab also lets you see the TMJ in 3D volume renderings with automatic segmentation.



## TMJ: Toolbar

Shown below is the Tool Bar and tools that are loaded with the TMJ View Tab:



**Reset View:** Resets the Rendering Window to the original view.



**Create Arch Spline (Focal Trough)★:** After selecting this tool, you can create a new Arch Spline or edit an existing **Arch Spline**. First, “left-click” on the point you would like to start and continue adding points by “left-clicking.” After you have marked your final point, “right-click” or double click to finalize the **Arch Spline**. When modifying an existing **Arch Spline**, drag the control points to the desired positions.



**Arch Spline (Focal Trough) Ruler:** Places ruler along the Arch Spline for easy reference.



**Distance Measurement:** After selecting this tool, click one point and move the mouse over the end of the other point you would like to measure and click again.



**Angle Measurement:** After selecting this tool, “click” your first point, then move the mouse over your second point and click it, and finally click the last point. A number in degrees will automatically display.



**Area Measurement:** After selecting this tool, click multiple points along the boundary of the desired area. Double click or right click to end the measurement. A number in millimeters squared will be automatically displayed.



**Layout:** Creates a different layout to your preference. After clicking on the layout icon, a list a various layout options will appear. Click on the layout of your preference to apply it. These options allow for different case workup images. In this window, you can also choose how many millimeters you want the cross section interval to be. If you choose 1.0mm, for example, there will be a space of 1.0mm between each cross section.



**Show/Hide Cursor/Implant/Nerve:** Conceals or displays cursors.



**Information Display:** Displays or hides case information embedded in the data.



**Condyle Segment:** Allows for automatic segmentation of the condyle in 3D.



**Fossa Segment:** Allows for automatic segmentation of the mandibular fossa in 3D.



**Positioning #:** Allows for a positioning grid to toggle on/off the cross-sections.



**Arrow Notation:** Allows an arrow to be drawn on the image.



**Circle Notation:** Allows a circle to be drawn on the image.



**Text Notation:** Allows text to be written and edited on the image.



**View Sequence:** Allows for the creation of custom camera sequences and AVI file movie capturing. Refer to the Volume Render View Sequence (p. 38) section for additional information and description.



**Slice Capture Mode:** Opens the Slice Capture Manager to enable the capture of slices or groups of slices from a series of cross sections. Requires the creation of a slice group in the Report view. **(NOTE: Only available with an installed/activated Report Module purchased separately from Invivo.)**



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## TMJ: View Control

The screenshot displays the 'TMJ: View Control' interface with the following sections and controls:

- Layout:** Radio buttons for 'Screen' (selected) and 'Print Out', and a 'Change Layout' button.
- Vertical Range and Orientation:** An 'Adjust' checkbox.
- Lateral Slices:** Three dropdown menus for 'Width' (40 mm), 'Interval' (1.00 mm), and 'Thickness' (0.0 mm).
- Frontal:** Radio buttons for 'Slice' (selected), 'X-ray', 'Vol1', and 'Vol2', and a 'Thickness' dropdown menu (20 mm).
- View Control:** Two sliders for 'Brightness' and 'Contrast', a dropdown menu set to 'All', and a 'Color Presets' button.
- Focal Trough:** A 'Symmetry' checkbox.

### Layout

- **Screen** shows the Rendering Window in full size but not life size. **Print Out** mode shows the image in life size and allows you to capture and print in life size.
- **Change Layout** button lets you switch to different layout orientations.

### Vertical Range and Orientation

Select **Adjust** to change the rendered volume range and orientation.

### Lateral Slices

- **Width** allows you to change the width of the slices.
- **Interval** allows you to change the interval between the cross-sectional slices.
- **Thickness** allows you to add multiple slices together for ray sum visualizations.

### Frontal

- This lets you adjust the view visualizations of the coronal slices of the TMJ
  - **Slice** – Gray Scale rendering
  - **X-ray** – X-ray rendering
  - **Vol1** – Teeth rendering
  - **Vol2** – Bone rendering
  - Using the **Thickness** button, you can create a ray sum view.

### View Control

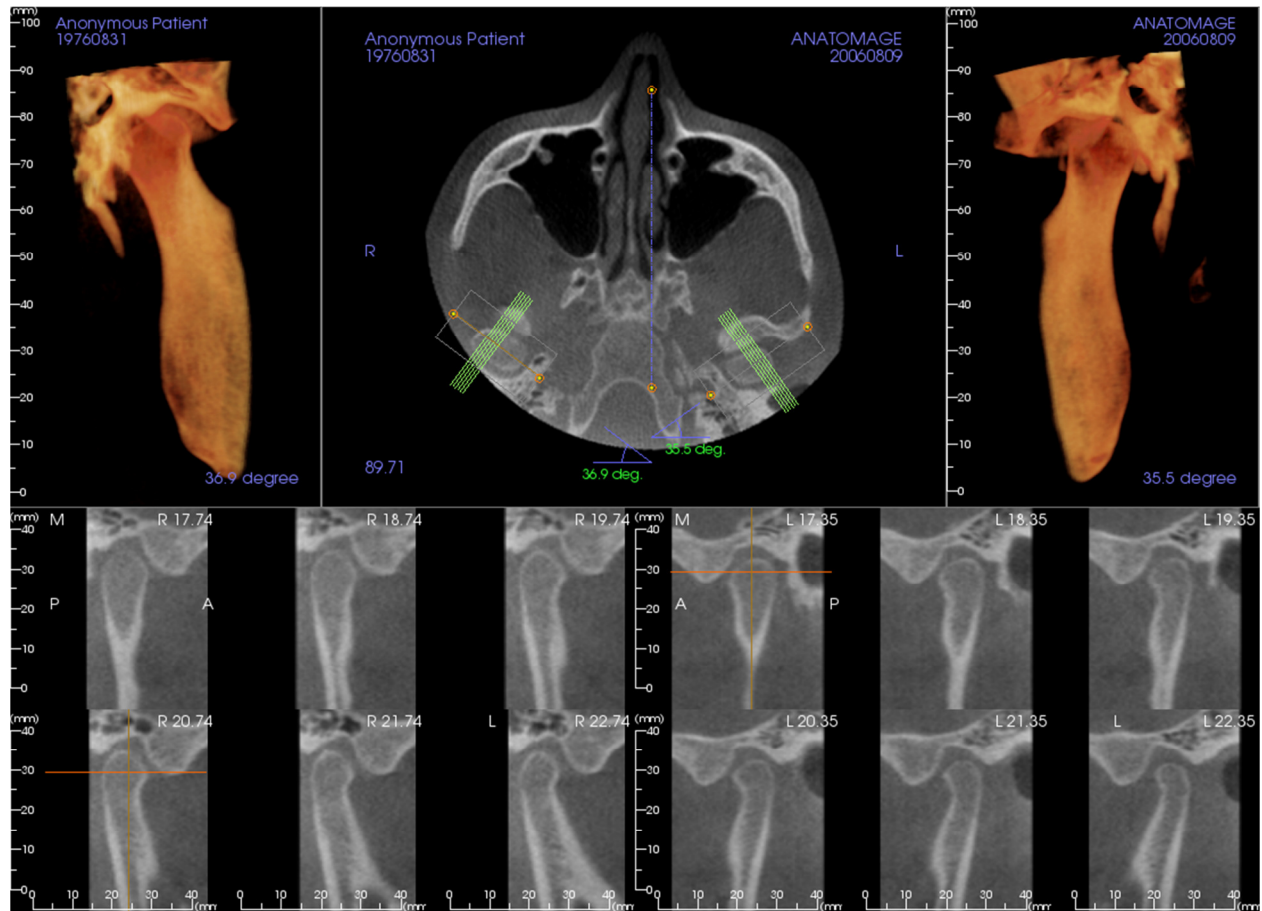
These tools allow you to control the brightness and contrast of the images selectively. The **Color Presets** box toggles on/off different colorization visualizations.

### Focal Trough

Click on the **Symmetry** box to keep the focal trough angles symmetrical.



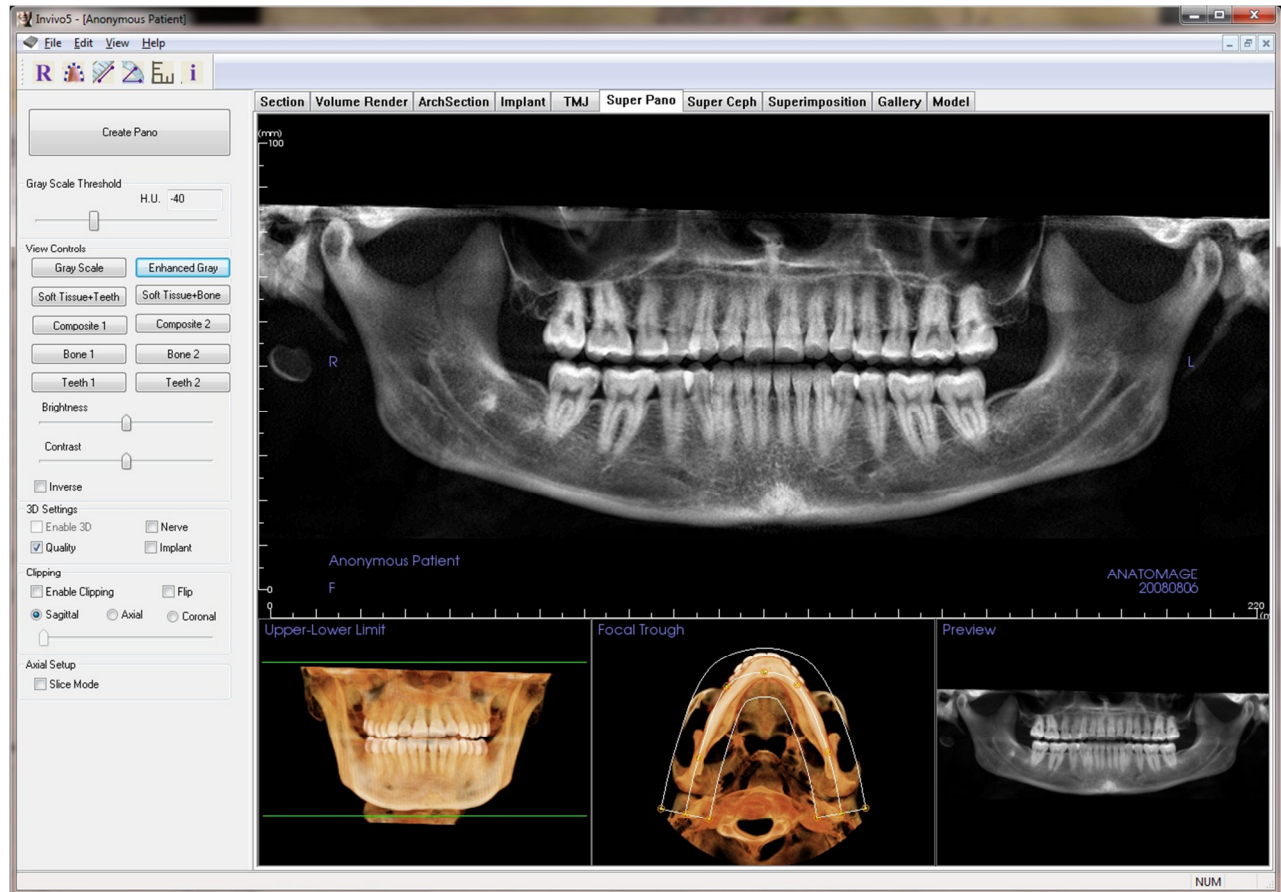
## TMJ: Rendering Window



Please refer to **Image Navigation (pg. 21)** for information about controlling and adjusting these images.

# Super Pano Features

The **Super Pano View Tab** gives you the ability to construct and view an enhanced version of a panoramic radiograph, take measurements, and utilize several image enhancement features. It also has the ability to render a pano into a volumetric 3D image that can be rotated for greater visual advantages.



## Super Pano: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Super Pano View Tab:



**Reset View:** Resets the Rendering Window to the original view.



**Create Focal Trough:** Sets the boundaries of the Super Pano. A focal trough is automatically set but can be adjusted or recreated entirely. Use the yellow dots to stretch, widen, or reshape the focal trough. The focal trough selects only the objects you want to appear in the Super Pano and excludes others such as the spine, which traditionally appears in panoramic radiographs as background noise.



**Distance Measurement:** After selecting this tool, click one point and move the mouse over the end of the other point you would like to measure and click again.



**Angle Measurement:** After selecting this tool, “click” your first point, then move the mouse over your second point and click it, and finally click the last point. A number in degrees will automatically display.



**Grid:** Toggles between two different grid layouts for use in the all of the section frames allowing quick assessment of measurements and spatial location.



**Information Display:** Displays or hides case information embedded in the data.



Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Super Pano: View Control

**Create Pano**

Gray Scale Threshold H.U. 245

**View Controls**

Gray Scale Enhanced Gray

Soft Tissue+Teeth Soft Tissue+Bone

Composite 1 Composite 2

Bone 1 Bone 2

Teeth 1 Teeth 2

Brightness

Contrast

☐ Inverse

**3D Settings**

☐ Enable 3D ☐ Nerve

☒ Quality ☐ Implant

**Clipping**

☐ Enable Clipping ☐ Flip

☒ Sagittal ☐ Axial ☐ Coronal

**Axial Setup**

☐ Slice Mode

### Create Pano

- The Lower-Upper Limit is adjusted by left-clicking on a green line and dragging with the mouse. It specifies the vertical dimension of the Pano that is being created.
- The Focal Trough is adjusted by left-clicking on the yellow points and dragging with the mouse. The length, width, and shape of the Focal Trough are adjusted to specify what will appear in the Pano.
- A preview is also shown in the Rendering Window.
- The Create Pano button should be pressed after the Lower-Upper Limit and Focal Trough are first adjusted

### Gray Scale Threshold

- This threshold sets the density limit in the pano.
- For noisy images, adjust the threshold so that the noise does not contribute to the pano.
- Threshold is usually set slightly below bone density

### View Controls

- Pano can be rendered in multiple visualizations
- Enhanced Gray sharpens Gray Scale rendering
- By default, Enhanced Gray is selected
- Brightness & Contrast: Can be adjusted to enhance your image.
- Inverse: switches the background to white (switches coloring for Gray Scale Rendering)

### 3D Settings

- Enable 3D: select this feature to render the Pano as a volumetric 3D image. The Pano can be rotated, clipped, etc. like other volumes (see Image Navigation, p. 21)
- Quality: select this to give the highest level of detail for the generated Pano.
- A traced nerve or placed implant can be toggled on/off with the Nerve and Implant boxes.

### Clipping

This option is only applicable when 3D Pano is available. Clipping hides some part of the image so that the internal structure can be visible.

### Axial Setup

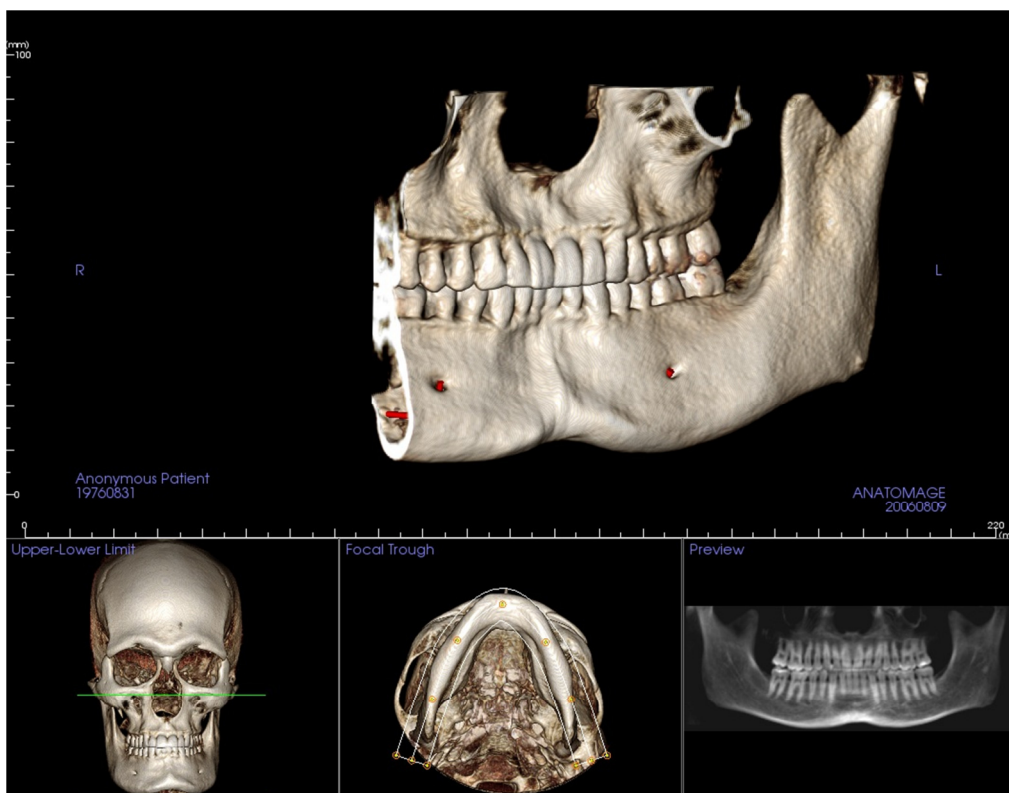
The slice mode box lets you choose how the focal trough will be shown.

## Super Pano: Rendering Window

**Upper-Lower Limit:** The lower left box where the vertical parameter of the Super Pano is set. The green lines indicate the vertical limits. They can be dragged to set the desired Upper and Lower limit of the Super Pano. When Slice Mode is selected, the red line indicates where the focal trough plane is and can also be adjusted.

**Focal Trough:** The focal trough is adjusted in the lower middle box. Whatever is contained within it will appear in the Super Pano allowing the construction of a panoramic x-ray with minimal background noise. The yellow dots can be left-clicked and dragged to adjust the length, width and shape of the focal trough. The focal trough can be adjusted by dragging the focal trough control points, or a new trough can be created by clicking the trough icon on the toolbar.

**Preview:** A preview of the Super Pano will be displayed in the lower right box before actually creating it. This feature allows a Super Pano to be made more efficiently and with fewer or no adjustments needed afterwards.

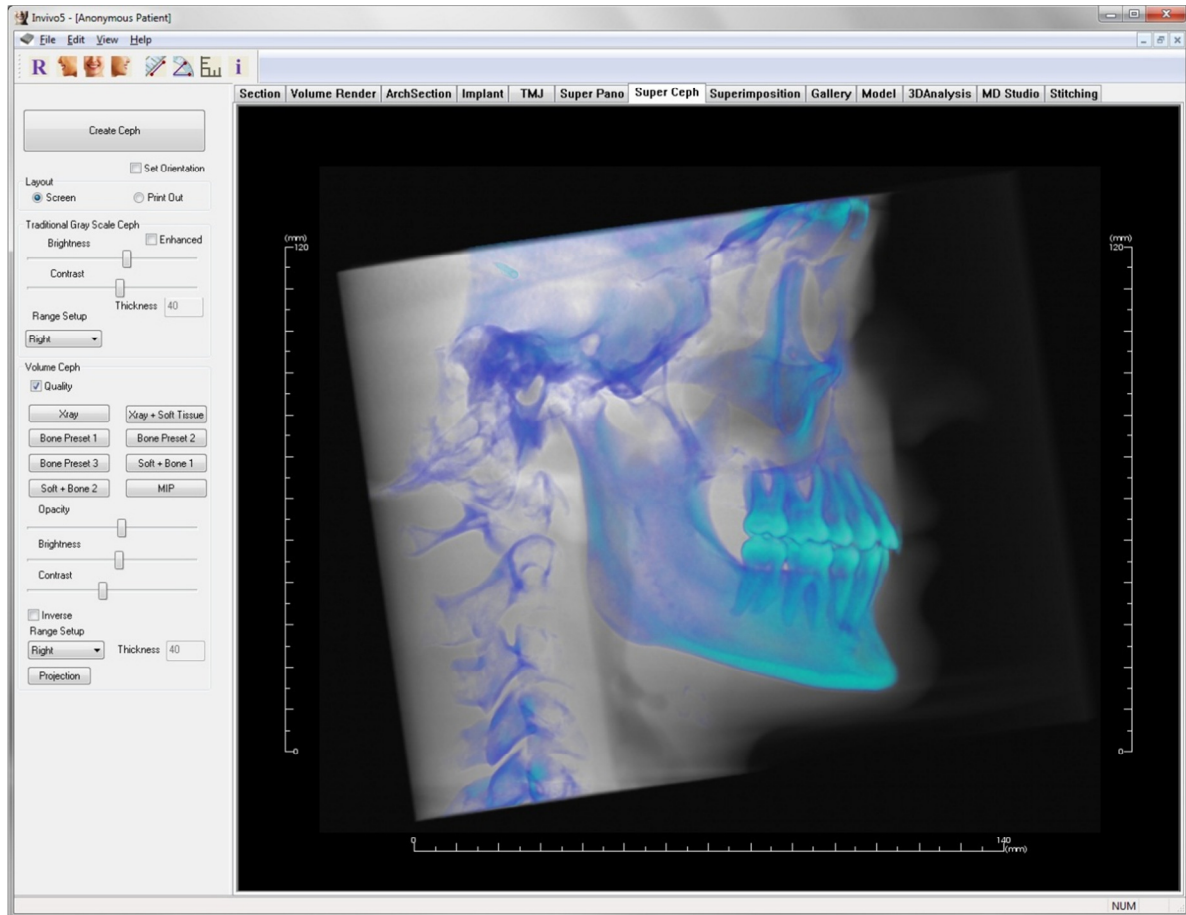


## How to make a good Pano?

- Make a U-shaped, narrow focal trough encompassing the arches by adjusting points on the focal trough.
- Adjust Gray scale threshold to filter soft tissue, so that the image is not too dark or too light.
- Refer to **Image Navigation (p. 21)** for information about controlling and adjusting these images.

# Super Ceph Features

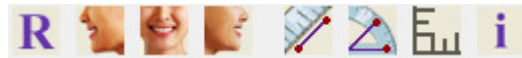
*The **Super Ceph View Tab** gives the ability to construct and view an enhanced version of a cephalometric radiograph, take measurements, and utilize several image enhancement features, all of which dramatically increases its diagnostic value.*





## Super Ceph: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Super Ceph View Tab:



**Reset View:** Resets the Rendering Window to the original view.



**Left View:** Automatically orients the volume so the patient is facing left sagittal.



**Front View:** Automatically orients the volume so that the patient is facing the front.



**Right View:** Automatically orients the volume so the patient is facing right sagittal.



**Distance Measurement:** After selecting this tool, click one point and move the mouse over the end of the other point you would like to measure and click again.



**Angle Measurement:** After selecting this tool, “click” your first point, then move the mouse over your second point and click it, and finally click the last point. A number in degrees will automatically display.



**Grid:** Toggles between two different grid layouts for use in the all of the section frames allowing quick assessment of measurements and spatial location.



**Information Display:** Displays or hides case information embedded in the data.



Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)



## Super Ceph: View Control

### Create Ceph

- The **Create Ceph** button should only be left-clicked after the orientation of the patient's volumetric image is adjusted in the rendering window.
- The **Set Orientation** box will reset the orientation if a Ceph was created incorrectly. Once the image is orientated correctly, press the **Create Ceph** button again.

### Traditional Gray Scale Ceph

- **Brightness** and **Contrast** can be adjusted to enhance your image.
- The **Enhanced** box can be left-clicked on or off to sharpen and enhance the quality of the image.
- **Range Setup** allows you to select which side of the patient's head the Ceph will be created from. **Thickness** allows you to control how thick the range is.
- When you change the **Range Setup**, you must recreate the Ceph image using the **Create Ceph** button.

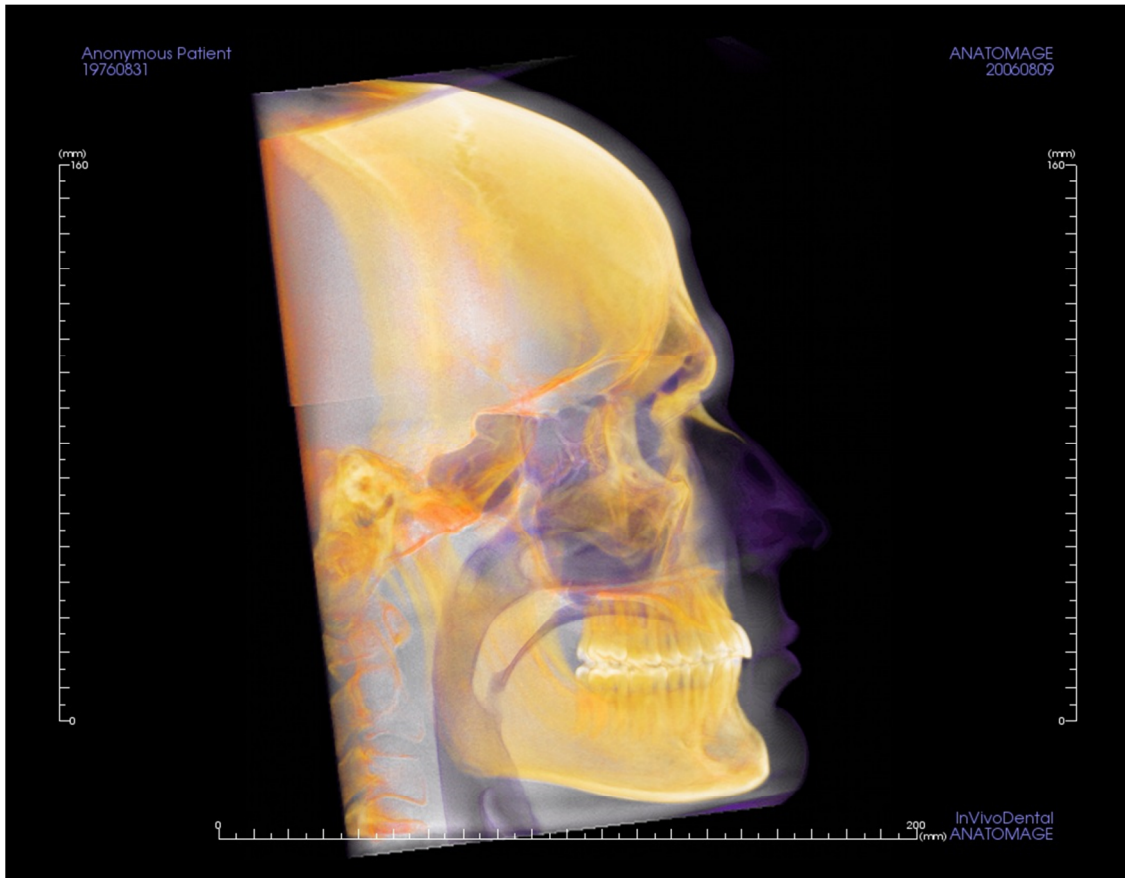
### Volume Ceph

- Increase the **Opacity** slider bar to superimpose the volume rendering onto the generated Ceph.
- Various enhanced views of the Ceph can be added; each has different advantages:
  - **Bone** highlights hard-tissue landmarks
  - **Soft+Bone** emphasizes the soft-tissue on the Ceph
  - **Opacity Brightness** and **Contrast** can all be adjusted for image enhancement.
  - **Inverse** switches the background to white (Gray Scale coloring switches black/white)
- **Range Setup** allows you to select which side of the patient's head the ceph will be created from.
- **Projection** allows you to switch from parallel views of the cephalometric images to perspective views which resemble the magnification found in traditional cephalometric radiographs.

## Super Ceph: Rendering Window

This window is where the volumetric image of the patient is orientated to create a Ceph and is where the Ceph will be viewed after creating it.

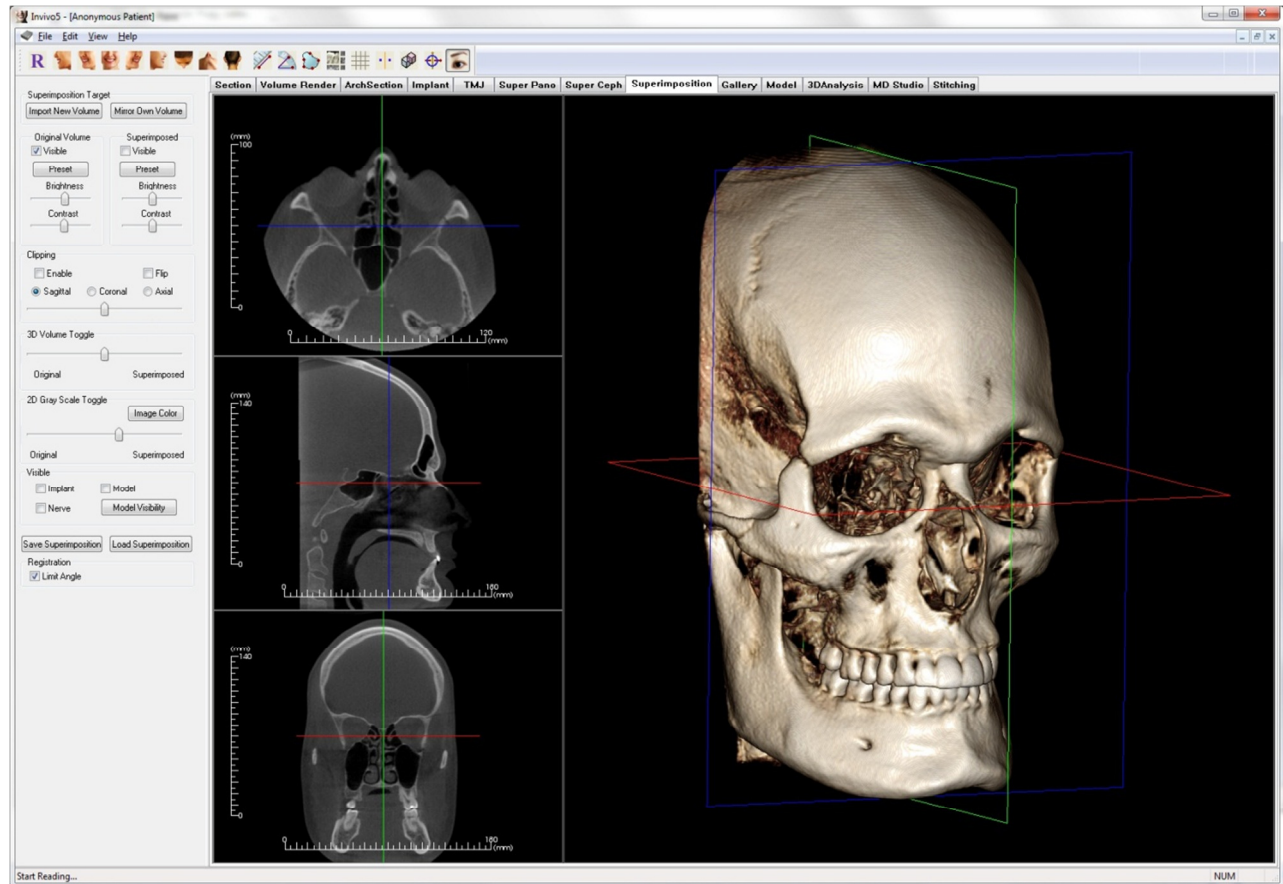
Before clicking on the “Create Ceph” button in the View Controls, the patient’s volumetric image must be correctly orientated. The easiest way to do this is to line up the left and right angles of the mandible. If the Ceph is created with an improper orientation, it can be adjusted using the Set Orientation box in the view controls.



Please refer to **Image Navigation (pg. 21)** for information about controlling and adjusting these images.

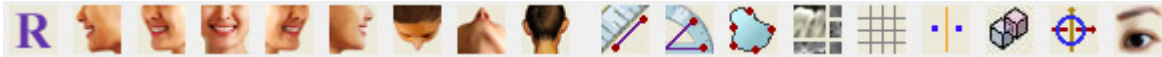
# Superimposition Features

*In the **Superimposition View Tab**, you have the ability to open two different scans at once and view them side by side, and superimpose them. This is especially useful for assessing pre- and post-treatment scans.*



## Superimposition: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Superimposition View Tab:



**Reset View:** Resets the Rendering Window to the original view size.



**Left View:** Automatically orients the volume so the patient is facing left sagittal.



**Left 3/4 View:** Automatically orients the volume so the patient is facing 67° left sagittal.



**Front View:** Automatically orients the volume so the patient is facing the front.



**Right 3/4 View:** Automatically orients the volume so the patient is facing 67° right sagittal.



**Right View:** Automatically orients the volume so the patient is facing right sagittal.



**Top View:** Automatically orients the volume so you are oriented above the patient.



**Bottom View:** Automatically orients the volume so you are oriented below the patient.



**Back View:** Automatically orients the volume to the posterior view.



**Distance Measurement:** When selected you may mark 2 points on the volume and the distance will appear. Clicking on the point and moving the cursor can modify points. Clicking on the point and pressing, “delete”, can delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Angle Measurement:** When selected you may mark 3 points on the volume and the angle between them will appear. Clicking on their control points and moving the cursor can modify measurements. Clicking on the point or line and pressing, “delete”, will delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Area Measurement:** After selecting this tool, click multiple points along the boundary of the desired area. Double click or right click to end the measurement. A number in millimeters squared will automatically be displayed.



**Change Layout:** Click on this icon to toggle the layout.



**Toggle Grid:** Toggles between two different grid layouts for use in the upper two section frames allowing quick assessment of measurements and spatial location.



**Registration:** This icon is used to register the original volume to the second volume. Four or more anatomical points are chosen from each scan to properly align both scans at common, stable landmarks.



**Volume Registration:** This icon is used to open the Volume Registration interface for automatic superimposed volume registration. Users will define a VOI (Volume of Interest) Box as a reference for automated superimposition.



**Adjust:** This icon is used to make adjustments to better align the two volumes that are superimposed.



**3D Cursor:** toggles on/off the cursor lines in the 3d volume rendering.



Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## Superimposition: View Control

The screenshot shows the 'Superimposition: View Control' panel. It is organized into several sections:

- Superimposition Target:** Contains two buttons: 'Import New Volume' and 'Mirror Own Volume'.
- Original Volume:** Includes a 'Visible' checkbox (checked), a 'Preset' button, and sliders for 'Brightness' and 'Contrast'.
- Superimposed:** Includes a 'Visible' checkbox (unchecked), a 'Preset' button, and sliders for 'Brightness' and 'Contrast'.
- Clipping:** Features an 'Enable' checkbox (unchecked), a 'Flip' checkbox (unchecked), and radio buttons for 'Sagittal' (selected), 'Coronal', and 'Axial'. A slider is positioned below these options.
- 3D Volume Toggle:** A slider between 'Original' and 'Superimposed'.
- 2D Gray Scale Toggle:** A slider between 'Original' and 'Superimposed', with an 'Image Color' button to its right.
- Visible:** Includes checkboxes for 'Implant' (unchecked), 'Nerve' (unchecked), and 'Model' (unchecked). A 'Model Visibility' button is located to the right of the 'Model' checkbox.
- Buttons:** 'Save Superimposition' and 'Load Superimposition' buttons are located below the 'Visible' section.
- Registration:** Includes a 'Limit Angle' checkbox (checked).

### Superimposition Target:

- Select **Import New Volume** to import a second volume Superimpose either an Invivo file (.inv) or DICOM (.dcm) scan set
- Volumes will be registered to each other by selecting four (4) or more landmarks on each volume using the Landmark Selector.
- Select **Mirror Own Volume** to mirror the patient's anatomy to check for asymmetries.

### Original Volume and Superimposed:

- **Visible** turns on/off either volume independent of each other.
- **Preset** allows you to choose different visualization presets for the volume.
- **Preset** can also be selected independent of each other.
- The **Brightness** and **Contrast** in the volume renderings can be adjusted independently to adjust and improve image.

### Clipping:

- Select **Enable** to slice the image along predefined anatomical planes (Sagittal, Coronal, Axial).
- Select **Flip** to switch the view to the opposite side.
- Control Clipping with the scroll mouse or Slider Bar.

### 3D Volume Toggle:

This slider allows you switch between the original volume and superimposed volume. Set the slider in the middle to visualize both volumes in equal opacity. Set the slider to one side to visualize only one image.

### 2D Gray Scale Toggle:

This slider allows you switch between the original gray scale slice and superimposed one. Set the slider in the middle to visualize the both in equal opacity. Set the slider to one side to visualize only one image. The **Image Color** box allows you to change the slice color.

### Visible:

- Selectively control the visibility of the Implants, Nerves, and Models.
- In **Model Visibility**, you can hide/show individual models in the Rendering Window

### Save Superimposition:

- This allows you to save the settings of the Superimposition into an external file.
- In the dialog that appears, choose where and what filename to save.
- InVivoDental 5.1 will save two files: .vdata and .odata

- .vdata: stores the registration points and superimposed volume information
- .odata: stores the original scan's volume orientation information

**Load Superimposition:**

- This allows you to restore saved Superimposition.
- Select Load Superimposition and choose the correct .vdata file.
- The Superimposition file will be reloaded with the saved volume.

**Registration:**

**Limit Angle** will set limitations within the software during its registration calculations. If you are experiencing inaccurate Superimpositions after registering your points due to volume inversions, selecting **Limit Angle** may resolve some of these issues. It is recommended that you attempt to use different or additional registration points if this does not resolve the volume inversions.



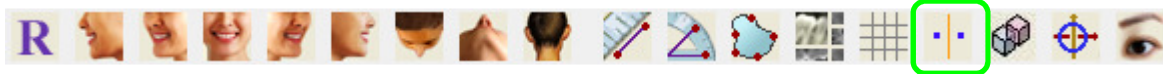
## Superimposition: How to Superimpose Two Volumes

InVivoDental 5.1 provides easy to use tools for Superimposition. Although they are easy to use, Superimposition is a technique-sensitive procedure with the most critical step being the registration of the new scan via the selection of stable landmarks in both scans. The proceeding sections discuss how to superimpose two scans step by step.

**Step 1. Open First File.** Open the first file that you want to start with. You do not have to open them in any order, but starting with the pre-treatment scan may be recommended for sake of organization. See DICOM and Invivo File Loading (p. 16) section if you are unsure how to open an Invivo file with the software.

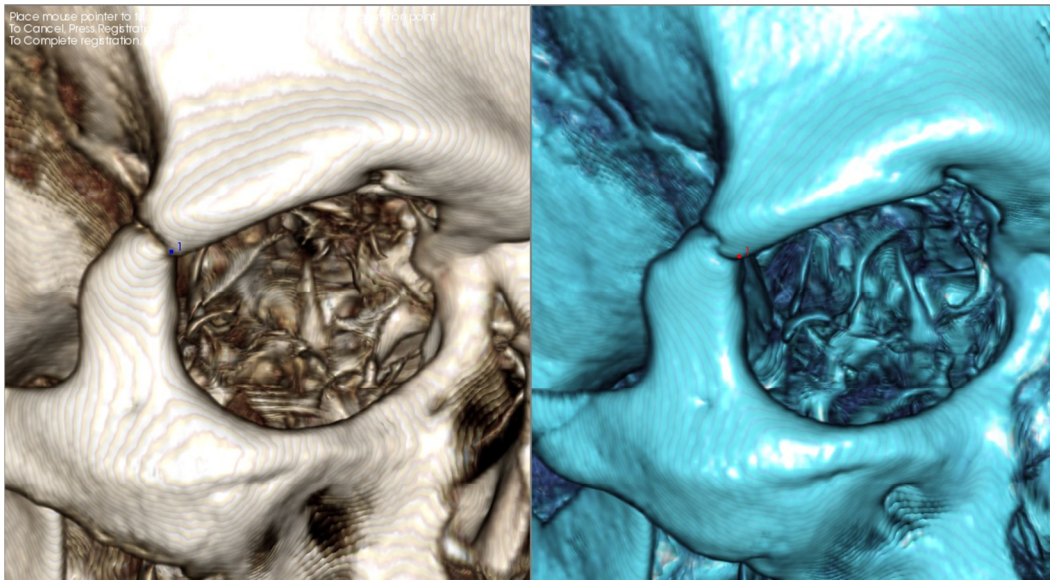
**Step 2. Import Volume.** Go to the Superimposition Tab and from the view controls to the left, click on the button labeled **Import New Volume** to select your second file to open. The File Manager will appear allowing you to open either a DICOM file or an Invivo file.

**Step 3. Press the Registration icon.** It can be found in the Superimposition Toolbar.



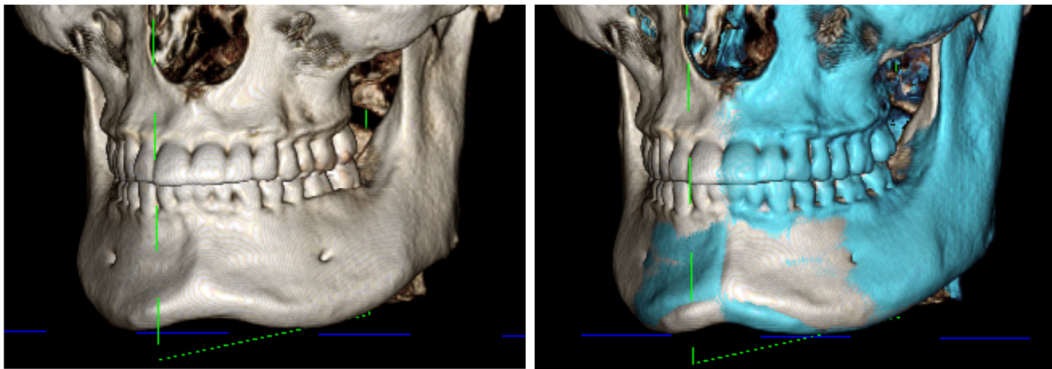
**Step 4. Registering the Two Scans to Each Other.** In order to superimpose the scans correctly and precisely as possible, strict attention must be placed in selecting at least four (4) matching and stable landmarks in both scans.

- To select landmarks on each volume:
  - Press down on the center scroll-wheel of the mouse
  - Or, position the mouse over the landmark and press the space bar on the keyboard
- Select the first stable landmark on one scan using either method above
- Select the matching stable landmark on the other scan using either method above
  - Each point shows up as either a blue or red dot
  - Points are numbered for easy-reference
- The volume can be rotated using the left-mouse button as before
- The volume can be clipped by selecting **Clipping: Enable** in the View Controls.
- The volume rendering presets can be adjusted using the **Preset** button(s)
- Use caution in setting your **Brightness** and **Contrast** settings
  - Be sure the Brightness and Contrast settings for the original and imported volumes are similar
  - Be sure to use the similar **Preset** settings when registering points



*The image above shows a registration point (Registration Point 1) located on the anterior point of the right zygomaticofrontal suture. The point has been added to both the original scan (white, left) and the new scan (blue, right).*

**Step 4. Save Points and Finish Registration.** Once all points are plotted one by one, click the right-mouse button to register the two scans. It is recommended to practice by opening the same scan twice before trying to superimpose two different scans. You can see how precise you are by how much overlap in the two registered scans there are.



(a)

(b)

*(a) The above image on the left is of two identical data sets that are registered to each other precisely. Notice there are no overlapping areas of different colors.*

*(b) The image on the right is of two volumes not registered precisely. Notice the blue and white skeletal boundaries do not line up, and the presence of double images.*

## Superimposition: Using Superimposition Aligner for Fine Adjustments

After finishing the landmark registration, you can use the other tools provided in the Superimposition Toolbar to make final adjustments to your superimposition.



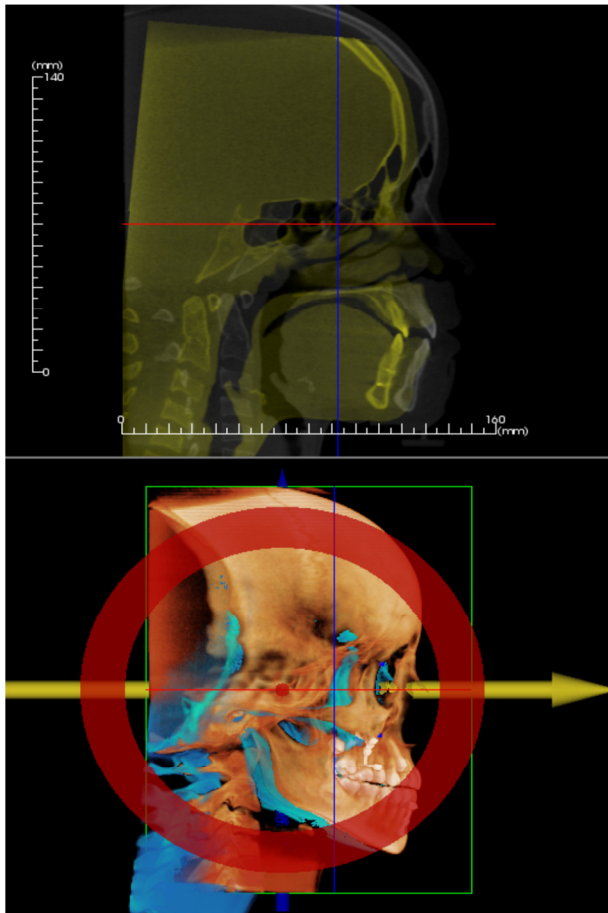
To make the cross sections bigger, use the **Change Layout** icon from the Toolbar



To move the volume manually, use the **Adjust** icon from the Toolbar to display the Move-Widget on the superimposed volume

The above tools are available for use prior to using the Landmark Selector; however, it is strongly recommended that you first use the **Registration** tool before using the **Adjust** tool.

Check the cross-sections for accuracy by adjusting the Layout (**Change Layout** icon) and the **2D Gray Scale Toggle** slide bar (View Controls). The superimposition is shown in 3D as well as in the cross sections. Make the necessary adjustments.



For example, notice in the sagittal section shown to the left that the superimposed volume is not totally overlapped. Using the Adjust tool, all you would need to do is move the volume in the anterior-posterior direction until the sections align. This is done by clicking on the yellow arrow in the Aligner Widget and dragging it forwards or backwards.

One should go through each anatomical plane to check for precision. The cranial base should match up perfectly because it is stable, however the vertebrae will usually be off because the patient's head is always tilted somewhat differently in each scan.

## Superimposition: Using Volume Registration for Fine Adjustments

After finishing the landmark registration, you can use the other tools provided in the Superimposition Toolbar to make final adjustments to your superimposition.



To make the cross sections bigger, use the **Change Layout** icon from the Toolbar



To fine-tune the registered volumes, use the **Volume Registration** icon from the Toolbar to open the Volume Registration interface

The above tools are available for use prior to using the Landmark Selector; however, it is strongly recommended that you first use the **Registration** tool before using the **Volume Registration** tool.

Select the **Volume Registration** icon in the toolbar to open the Volume Registration interface.

Left-click on any of the 2D cross-sections to place the center of the VOI (Volume of Interest) Box. The VOI box can be moved at any time by clicking another location in one of the 2D cross-sections.

**Automatic Volume Based Registration**

Target volume size

R-L Size: 50

A-P Size: 50 Update Size

H-F Size: 40

Perform Registration Close

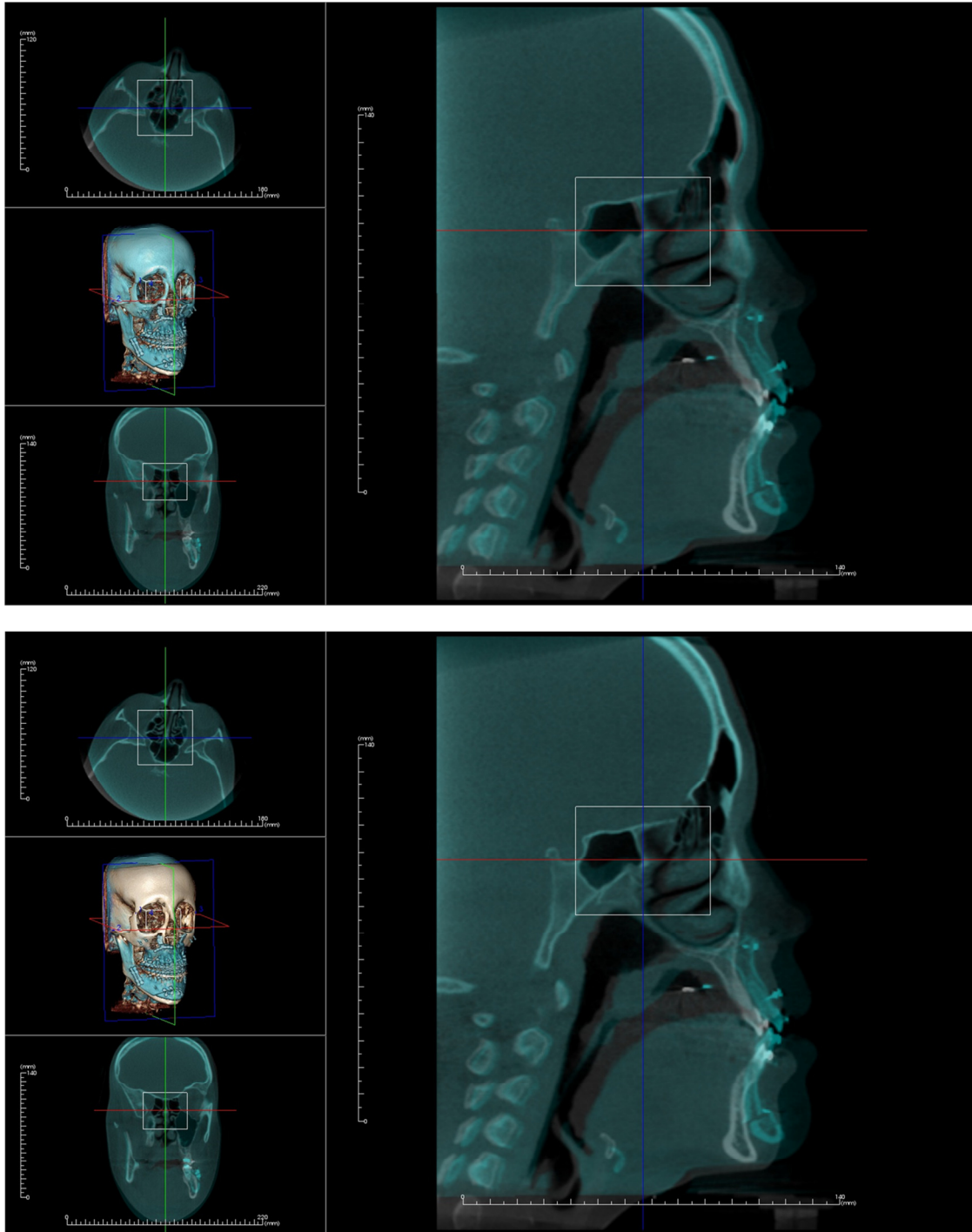
### Target Volume Size:

- **R-L Size:** defines the lateral width (mm) of the Volume of Interest (VOI) Box
- **A-P Size:** defines the anterior-posterior width (mm) of the Volume of Interest (VOI) Box
- **H-F Size:** defines the inferior-superior height (mm) of the Volume of Interest (VOI) Box
- Press **Update Size** to show the updated VOI Box size in the Rendering Window

Select **Perform Registration** to run the automatic registration process for the VOI Box selected. The process time is based on your computer's hardware components; however, in general, the larger the VOI Box, the more time is required to complete the automatic registration.



The following images show the VOI Box applied around the cranial base of a pre- and post-surgery superimposed scan (top image) and the results of the automatic registration process (bottom image). Notice that the two cranial base profiles line up exactly following the automatic registration process. The VOI Box used is the default  $(x, y, z) = 50\text{mm} \times 50\text{mm} \times 40\text{mm}$ .



## Superimposition: Difference Between .vdata Files and .odata Files

After you have successfully registered a different scan to your original volume data, InVivoDental 5.1 allows you to save the Superimposition data using the **Save Superimposition** button. This section looks to further define the difference between the outputted files (.vdata and .odata) and how to use them.

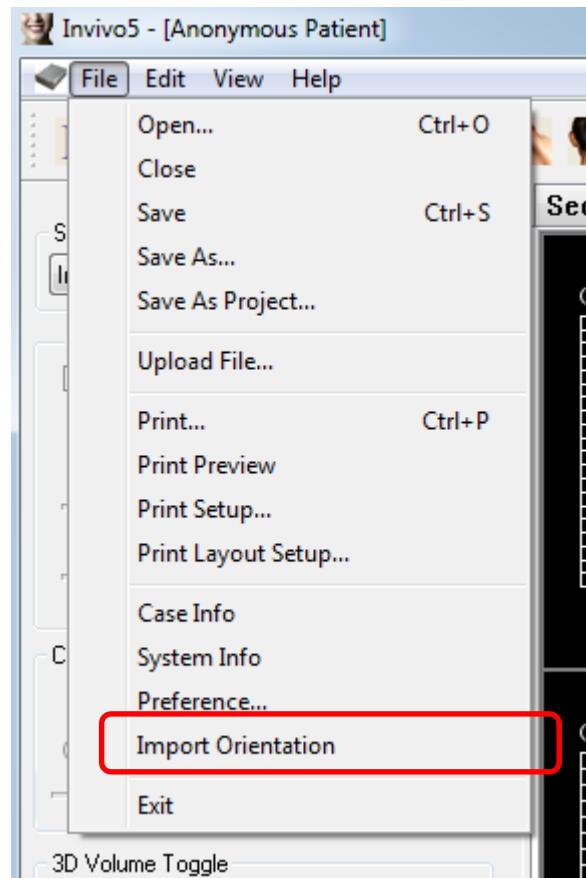
### .vdata

Information stored in the .vdata file includes the registration points and the path for finding your superimposed scan data. When you re-open your original scan, in the Superimposition Tab, press the **Load Superimposition** button and load the desired .vdata file. This will allow you to look at the Superimposed image without having to re-register your landmarks.

### .odata

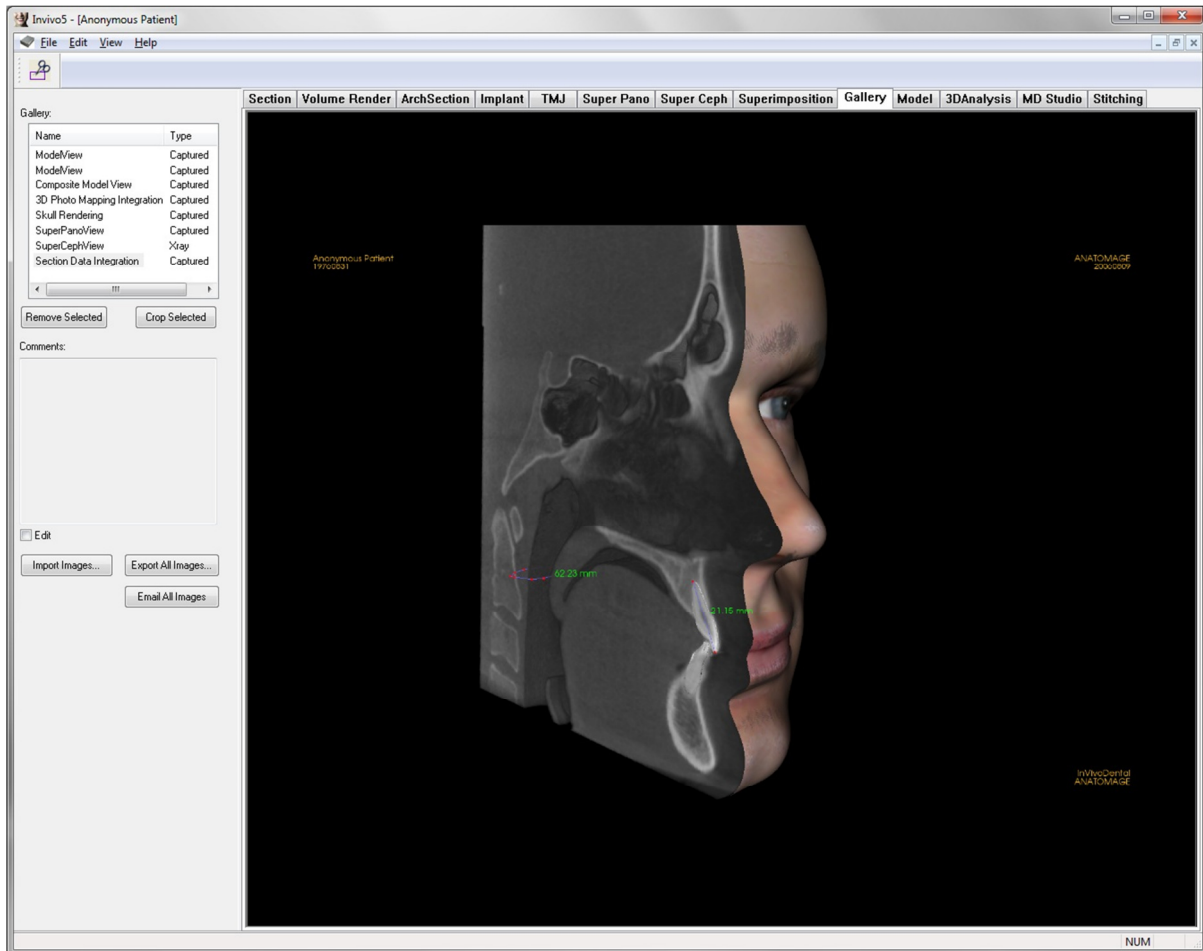
Information stored in the .odata file includes the orientation information of your original scan data (not your Superimposed scan). With this information, you can set specific orientations for other cases as well.

To import a new orientation, go to File in the Menu Bar and select “Import New Orientation”. Choose your desired .odata file and your case will automatically reorient itself.



# Gallery Features

*In the **Gallery View Tab** you can retrieve images that have been captured. Additionally, images can be imported or exported to the location of your choice. Comments or notes can be added to describe images that have been captured.*





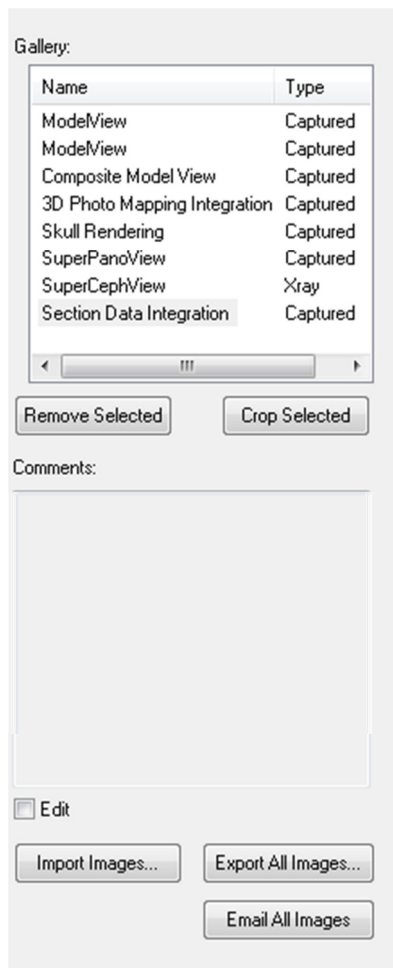
## Gallery: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Gallery View Tab:



**Crop Image:** Allows you to crop and save the image that was captured.

## Gallery: View Control



**Gallery:** Gives a list of all captured images.

- Each of these images has a “**Name**” and “**Type**” which can be renamed by double-clicking on the text.
- **Remove Selected:** deletes an image from the Gallery List.
- **Crop Selected:** allows you to crop the image within InVivoDental 5.1.

**Comments:**

- Text box displays comments about the image displayed in the Rendering Window.
- Add or change comments by clicking **Edit** at the bottom of the Comment Box.

**Import Image:**

- Select to import images (.jpg, .bmp, .png) from an external source into the Gallery Tab.
- Using this, you can import patient photographs into the InVivoDental 5.1 software for storage within the Invivo file once saved.

**Export All Images:**

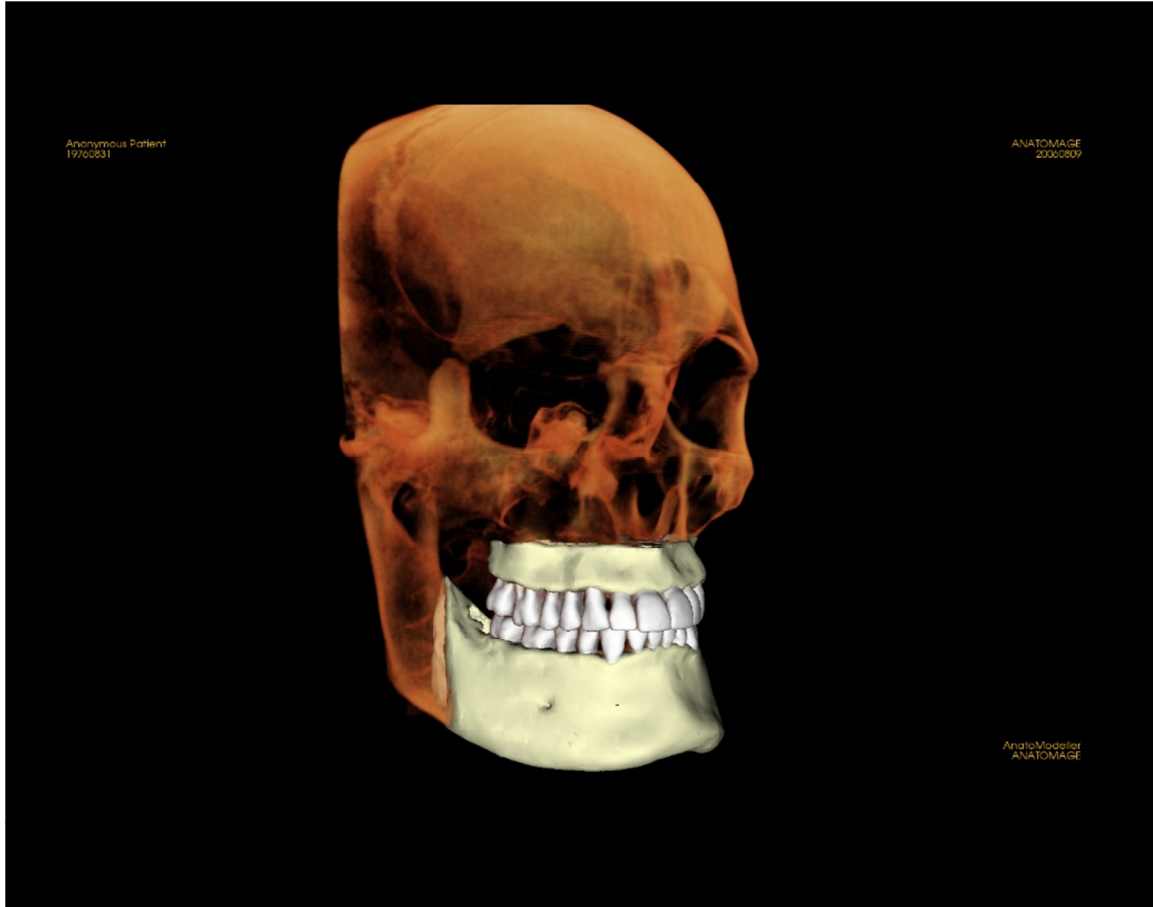
- Allows you to export all the images in the Gallery List to a path specified in the dialog box that opens.
- Files can be saved as one of the following formats: .jpg, .bmp, or .png.
- **Note: export as .jpeg file types for Life Size exporting.**

**Email All Images:**

Capture all images to your email ready to send.

## Gallery: Rendering Window

This window allows the viewing of captured and imported images. The Gallery is particularly useful for creating a workup of a particular case. Remember that the Gallery's images will only be saved if you re-save the whole file, otherwise any images captured will be lost.

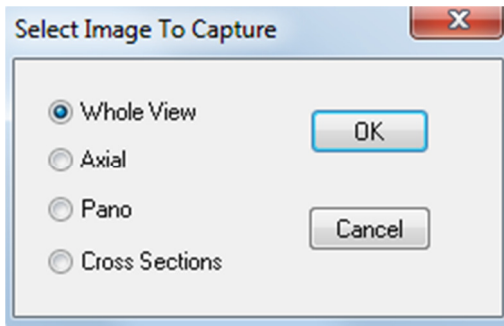


Please refer to **Image Navigation (pg. 21)** for information about controlling and adjusting these images.

## Gallery: Adding Images to the Gallery

**Capture any single image to the Gallery.** A single image within any view can be captured without including the other parts of the Rendering Window. When the Capture to Gallery function is used, a dialog will appear on the screen providing the user with options regarding which parts of the Rendering Window to capture.

The options provided by each dialog will vary according to which InVivoDental 5.1 view is currently displayed; the following example is the dialog that appears within the ArchSection view:



*This is the Image to Capture dialog that appears in the ArchSection view*

### Capture to Gallery Dialog:

- **Whole View** – Captures a screenshot of the Rendering Window
- **Axial** – Captures the Axial slice view and no other parts of the Rendering Window
- **Pano** – Captures the Pano view and no other parts of the Rendering Window
- **Cross Sections** – Captures a series of slices that are within the Rendering Window

### Options within each Image to Capture Dialog:

*Note: Some options will appear gray (disabled) in the Select Image to Capture dialog. The choices available are determined by the specific layout as well as the View Tab.*

Section	Whole View Axial, Coronal, Sagittal Slices Cross (Displays Custom Cross Section or 3D Volume)	
Volume Rendering	No Dialog	
ArchSection	Whole View Axial	Pano Cross Sections
Implant	Whole View Main Volume Axial Cross Density	Para Arch Pano Arch Volume Front Volume
TMJ	Whole View Axial Left Pano	Left Cross Section Right Pano Right Cross Sections
SuperPano	Whole View	Axial

	Pano Front Volume	Preview Pano
SuperCeph	No Dialog	
SuperImposition	Whole View Main Volume Axial	Coronal Sagittal Imposed Volume
Model	Normal Layout	No Dialog
	Occlusal Layout	Whole View Lower Occlusional Upper Occlusional
	Composite Layout	Whole View Composite 1-9

### Capture to Gallery Dialog:

The screenshot shows a standard Windows-style dialog box titled "Capture To Gallery". It features a close button (X) in the top right corner. The main area contains three input fields: a "Name:" label followed by a text box containing the word "Sections"; a "Type:" label followed by a dropdown menu currently set to "Captured"; and a "Comments:" label followed by a large, empty text area. At the bottom of the dialog are two buttons: "OK" and "Cancel".

**Name:** Image label

*Note: Image name must be unique from any other captured image in the Gallery*

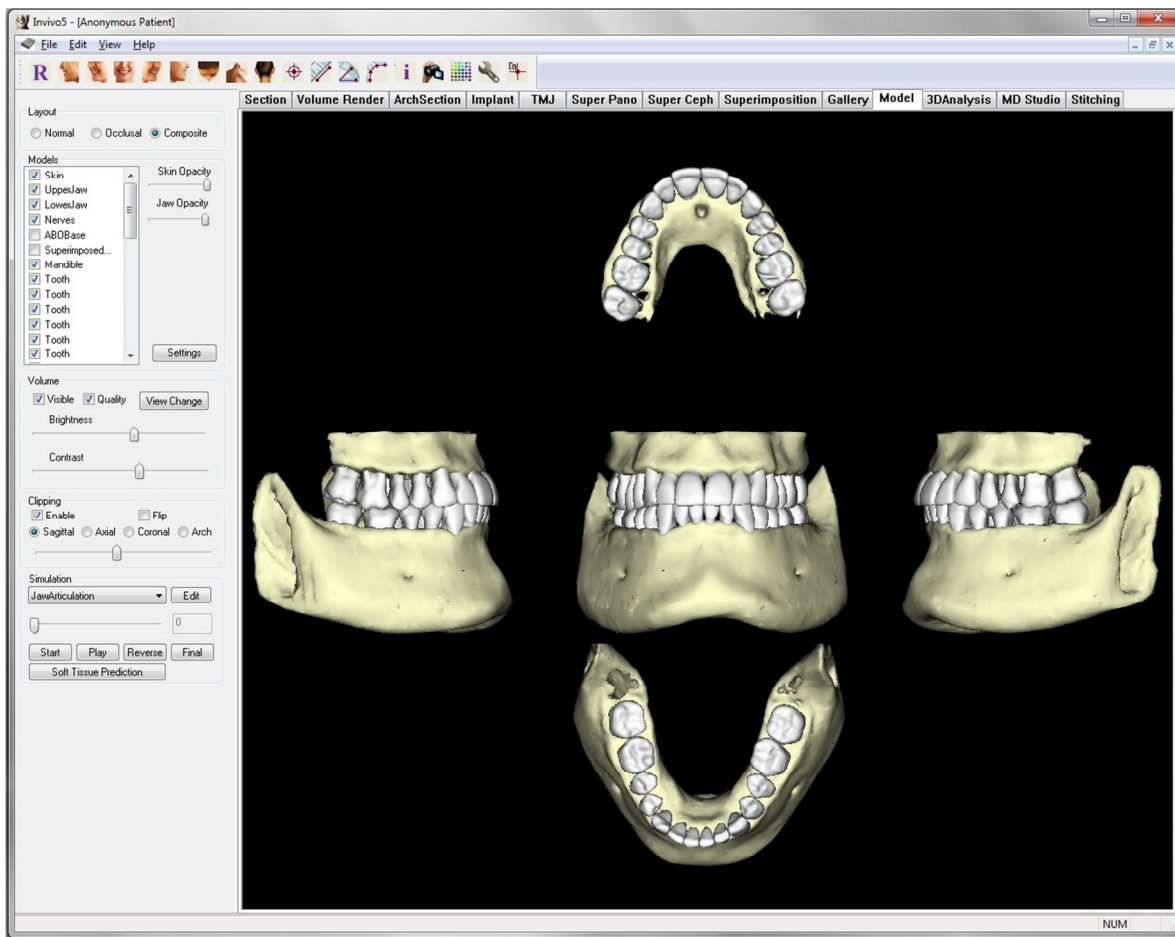
**Type:** Image type – can be set from the pull down to Captured or Photo

**Comments:** Additional comments about the image can be added in this section

# Model Features

The **Model View Tab** is where you can view your patient's AnatoModel or 3D photograph and simulate surgical or orthodontic simulations, as well as 3D soft tissue predictions. An AnatoModel is a 3D digital study model that is created by Anatomage via a case-by-case service. The DICOM data of the patient is sent to Anatomage where it is modeled to create the most advanced digital study model available. This is so because the AnatoModel contains anatomy such as roots, developing teeth, impactions, alveolar bone, and so on, while other models just show the crowns of teeth. The 3D photograph service that Anatomage also offers is viewed here too. Anatomage developed the technology to combine one frontal photo of the patient and the patient's CT scan, to create a 3D model that overlays the scan data.

Any nerve tracings, implant planning, or superimposition placing that has been done will also be visible in the **Model View Tab**. Each item can be turned on/off independently to see how all these systems come together with the volume data.



For more in depth information about the Model view tab and the AnatoModel services, please refer to the *AnatoModel Manual*.

## Model: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Model View Tab:



**Reset View:** Resets the Rendering Window to the original view size.



**Left View:** Automatically orients the volume so the patient is facing left sagittal.



**Left ¾ View:** Automatically orients the volume so the patient is facing 67° left sagittal.



**Frontal View:** Automatically orients the volume so the patient is facing the front.



**Right ¾ View:** Automatically orients the volume so the patient is facing 67° right sagittal.



**Right View:** Automatically orients the volume so the patient is facing right sagittal.



**Top View:** Automatically orients the volume so you are oriented above the patient



**Bottom View:** Automatically orients the volume so you are oriented below the patient.



**Back View:** Automatically orients the volume to the posterior view.



**Marker:** When selected you may mark a point on the volume and X,Y,Z coordinates (Transverse, Sagittal, Vertical) will appear. Clicking on the point and moving the cursor can modify points. Clicking on the point and pressing, “delete”, can delete them. View Control features allow the values to be projected to 2D, hidden, or exported to a report.



**Distance Measurement:** When selected you may mark 2 points on the volume and distance will appear. Clicking on the point and moving the cursor can modify points. Clicking on the point and pressing, “delete”, can delete them.



**Angle Measurement:** When selected you may mark 3 points on the volume and angle between them will appear. Clicking on their control points and moving the cursor can modify measurements. Clicking on the point or line and pressing, “delete”, will delete them.



**Polygonal Measurement:** When selected you may mark unlimited number of points on the volume and the total between the first point and the last point will appear. Clicking on the point and moving the cursor can modify points. Clicking on a point and pressing, “delete”, will delete the measurement. View Control features allow the values to be projected to 2D, hidden, or exported to a report. Note: “Right click” your mouse to indicate that you have marked your last point.



**Toggle Grid:** Toggles between 4 different grid layouts for simple assessment of size, measurement, and spatial location



**Information Display:** Displays or hides case information embedded in the data



**View Sequence:** Allows for the creation of custom camera sequences for movie capturing. Refer to the Volume Render View Sequence (p. 38) section for additional information and description.



**Background:** Allows for the background color to be easily changed.



**Setup View:** Allows option to view either parallel or perspective views in 3D. You can change the annotation layout options under the Setup View.



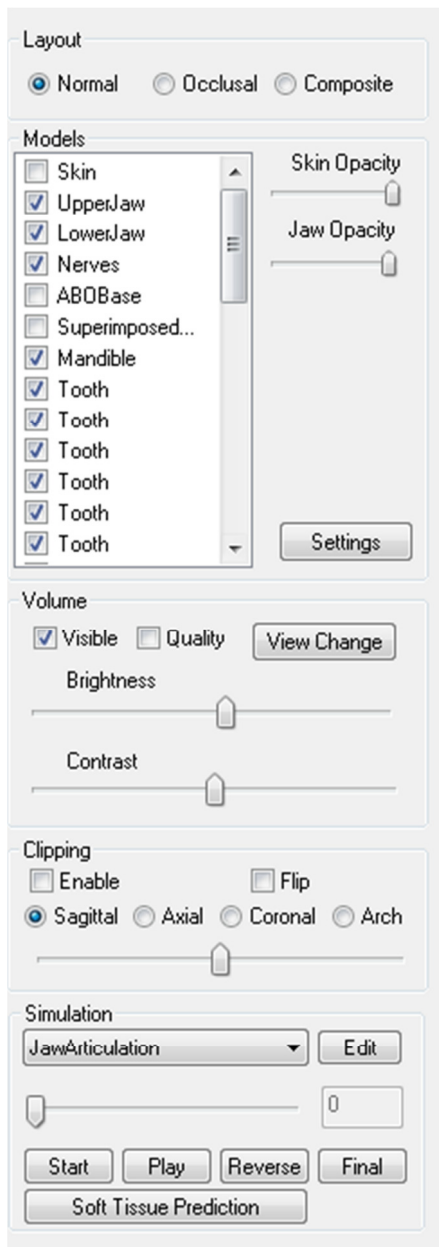
**Show/Hide Annotation:** Hide/show comments made to the volume in the Volume Render View Tab. You can change the annotation layout options under the Setup View.



Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)



## Model: View Control



### Layout:

- **Normal** shows the digital models in the normal patient orientation along with the volume rendering if wanted.
- **Occlusal** shows both arches from the occlusal perspective.
- **Composite** shows a composite of multiple views of the model all at once.

### Models:

- **Skin Opacity:** If you used Anatomage's 3D photo service, the 3D photo is available for viewing by checking the visible box. The Opacity of the photo can be changed to see the underlying anatomy of the patient.
- **Jaw Opacity:** If you used Anatomage's AnatoModel service, the AnatoModel is available for viewing by checking the Visibility box for each arch respectively. The Opacity of the Alveolar bone/ ABO base can be adjusted for your viewing preference.
- **Models:** the individual, digital models (implants, nerves, teeth, superimposition) can be turned on or off in the Rendering Window
- **Settings:** select a Model in the Models list and press the Settings buttons. Here you can change the model visibility, clipping, color and shading settings.

### Volume

- Select **Visible** to toggle the volume rendering on or off with the digital models.
- The **View Change** box allows volume rendering options, such as "Soft Tissue", "Teeth", etc. The **Brightness** and **Contrast** of the images can be adjusted with the slide bar.

### Clipping

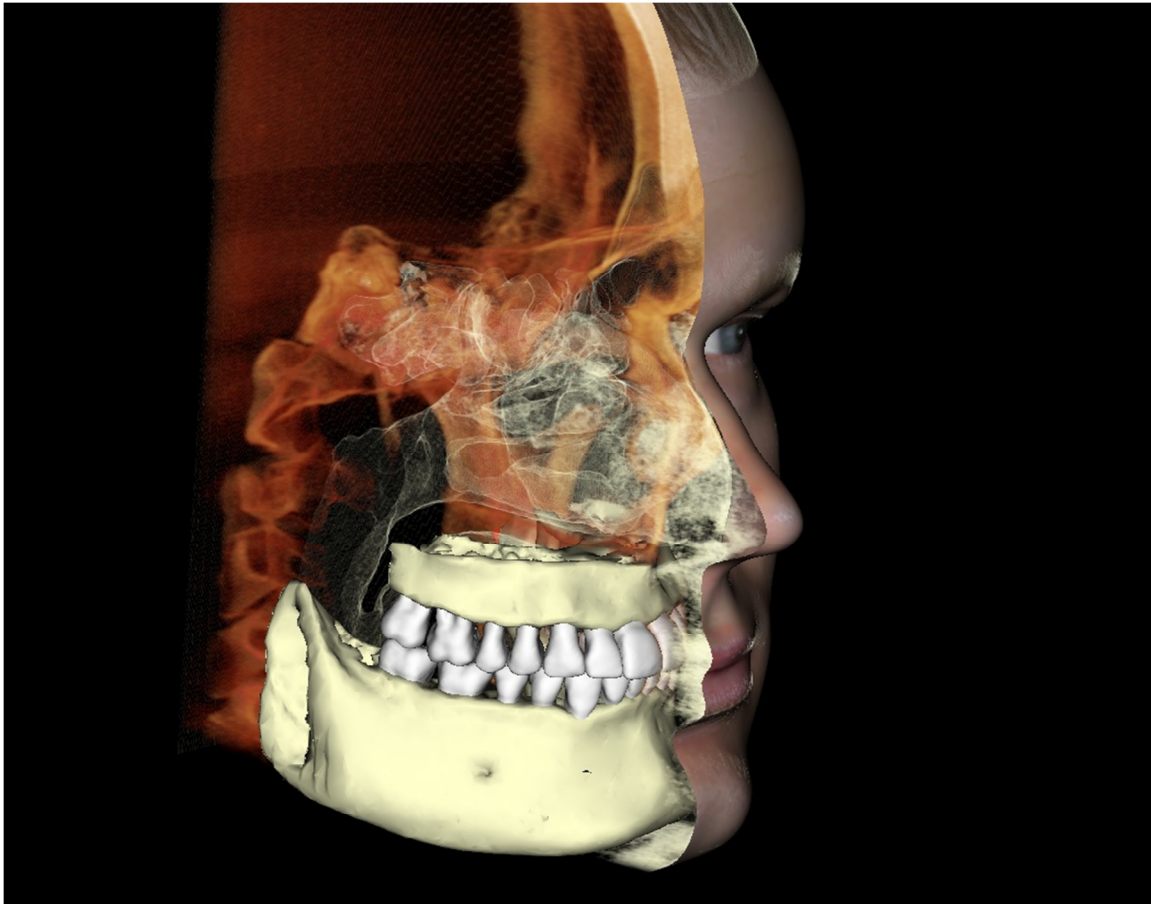
Select **Enable** to slice the image along the predefined anatomical planes (Sagittal, Axial, Coronal). To switch a view to the opposite side, click **Flip**. Control the clipping with the scroll mouse or the slider bar.

### Simulation:

To create a new simulation:

- Select either the TeethMovement or JawMovement simulations, or press **Edit** to make your own name.
- Move the slide bar to the right to indicate your ending point
- Click on a digital model to move it (either individual teeth or whole arches) with the Move-Widget
- After the final position is reached using the 3D move widget, press Start button to go back to frame one
- Press Play to view your simulated movement.
- Press the **Soft Tissue Prediction** box to create a simulation of the soft-tissue prediction. This is only possible with the use of a 3D Photograph and Skin AnatoModel.

## Model: Rendering Window



*This window allows the viewing of AnatoModels, 3D photographs, and simulation, all of which are services that must be ordered per case for this feature to work. These services provide excellent diagnostic data and case presentation material.*

**Please refer to Image Navigation (pg. 21) for information about controlling and adjusting these images.**

# Common How To Tasks

## How to Trace A Nerve

- Go to Arch Section View
- Make sure Pano Image is in Section Mode (not X-ray mode).
- Adjust Focal Trough such that nerve pathway is visible in Pano Image
- Move pointer to Pano Image
- Review nerve pathway while using scroll wheel. If the nerve is not clearly visible scroll mouse wheel.
- If the nerve is not clearly visible adjust focal trough.
- When the nerve was identified through the pano image, press “New Nerve” button in Nerve Pathway section of Control Panel.
- Starting from mandible foramen pick point by point.
- If nerve is not clearly visible, use scroll wheel to find the nerve and continue picking.
- If traced near mental foramen, move pointer to cross section view.
- Use scroll wheel to find the exit of the nerve.
- Pick points connecting the nerve exit
- Press “Done” button in Nerve Pathway section of Control Panel.



Warning: Any nerve that is traced in a way that does not conform to the actual pathway of the nerve can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect tracing. It is critical for the end user to learn how to properly perform nerve tracings correctly. If you notice any inconsistencies or software problem with nerve tracing or have further questions or concerns about nerve tracing, please contact Anatomage support at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com)

## How to Create Reports In Life Size

- Go To Arch Section View
- Check Adjust button in Vertical Range and Orientation.
- Adjust Upper and Lower limit by dragging green lines and then Un-check Adjust
- Adjust Focal Trough (Arch Spline) or re-draw Arch Spline by Pressing Create Arch Spline Button.
- Change Layout Mode to Print Out
- Change to a desired Layout Choice using the Layout button
- Adjust Cross section width and interval
- Move cursor to set cross section in desired location.
- In Print Out mode, user cannot zoom the image since they are to be printed out in life size.
- If desired structure is not visible in cross section, adjust axial cursor or focal trough.
- Switch pano image to X-ray Mode and turn on Ruler
- Turn on Arch Spline Ruler and turn off Arch Spline Control Points
- Turn off cursor if necessary
- Go to View Menu and choose “Capture to Gallery”
- Go to Gallery Tab
- See Print Preview in File Menu and Print out a test page.
- If you want to change format, go to Print Layout Setting in File Menu
- If you want to put your own logo, replace “printLogo.bmp” file in installation folder. Installation folder is typically “C:\Program Files\Anatimage\InVivoDental 5.1”
- After Print Layout Setting is change, make sure you re-do “Print Out” mode switching and recapture image. Otherwise the image could be still in previous Print Layout Setting



Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based on the incorrect measurements. It is critical for the end user to learn how to perform measurements correctly and employ proper usage of all measurement tools. Measurement accuracy depends on the image data and the hardware scanner that generated the image data. The measurement cannot be more precise than the resolution of the image. Software reports the value based on user-picked points. Due to the nature of the medical imaging, the boundary is not always well defined. The appeared boundary depends on the current brightness and contrast setting. The boundary may shift as the user makes adjustments to brightness and contrast. The user must understand the limitation of the measurement value before applying to the patient. If you notice any inconsistencies or software problems with measurements, or have further questions or concerns about using measurement tools correctly, please contact us at (408)-885-1474 or email us at [info@anatimage.com](mailto:info@anatimage.com)

## How to Create a Positive Airway View

- Go To Volume Rendering View
- Select “Inverse” Preset
- Reduce Opacity such that the internal structure starts to show up
- Change the view point to Top View (Press Top View button in tool bar)
- Use sculpting tool to remove undesired part
- Change the view point and repeat sculpting operations.
- After the desired airway is isolated, increase Opacity
- Adjust Brightness and Contrast to set the right visualization.
- (The new Airway measurement tool also shows a positive airway view that is color coded based on area. This Inverse method lets you see the airway without color coding)

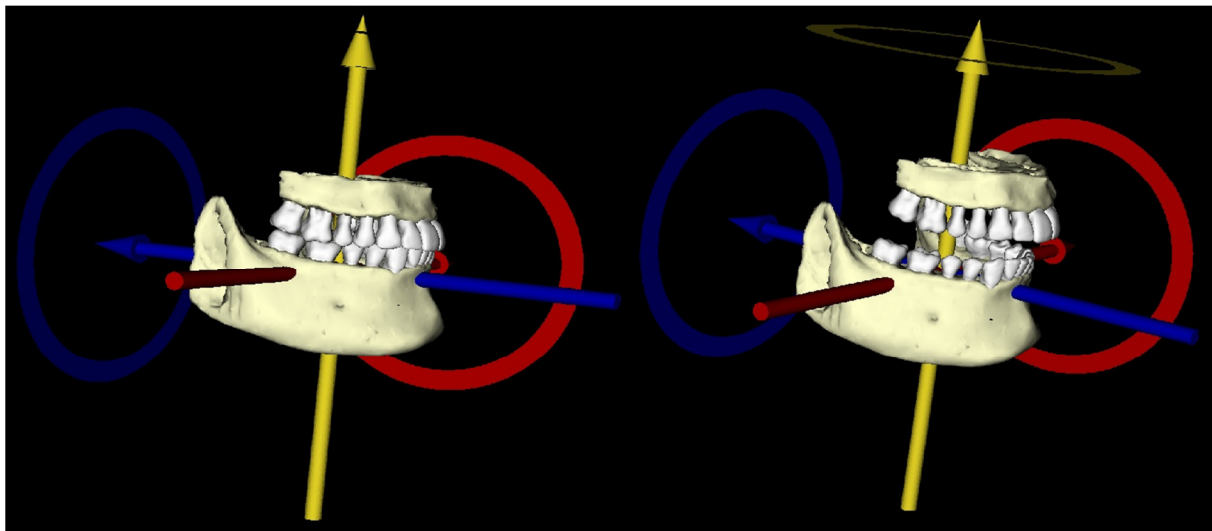
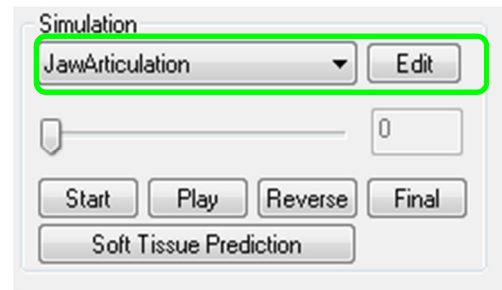
## How to Create an AnatoModel Simulation and Video

*Simulations require the use of the AnatoModel service provided on a case-by-case basis from Anatomage. The AnatoModel service may include some or all of the following features:*

- Individually segmented, digital models of patient dentition
- Segmented digital models of patient mandible and maxilla
- 3D photograph overlayed onto patient soft-tissue profile

*For additional information about the AnatoModel service, please contact Anatomage at (408)-885-1474 or email us at [info@anatomage.com](mailto:info@anatomage.com).*

- Go to Model View Tab
- In the Model View Controls: Simulation, from the drop menu choose an existing Simulation (TeethMovement, JawArticulation) or create your own (select Edit).
- Move the Slide Bar to the very end (Frame 100)

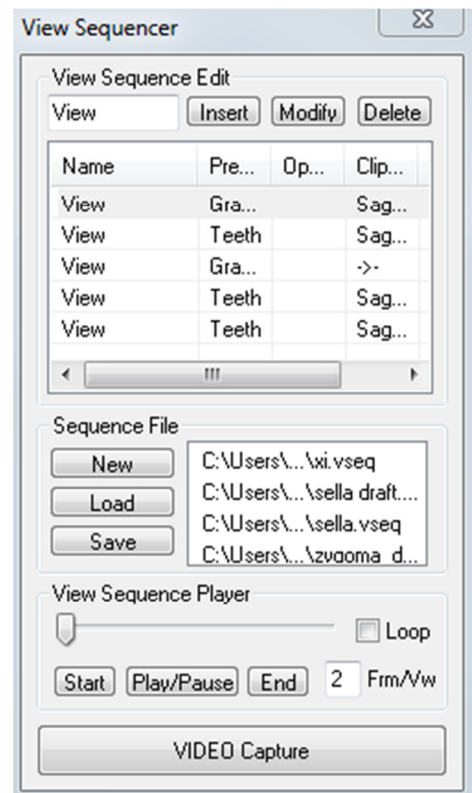


- Select a model adjust and the Move-Widget should appear
- Use the Move-Widget to adjust the final position of the model
- Moving the Slide Bar (Frame 0 to 100) will move the model between the initial and final positions
- To adjust intermediate model positions, move the Slide Bar to an intermediate frame (between Frame 0 and 100). Use the Move-Widget to adjust the model position
- Moving the Slide Bar (Frame 0 to 100) will move the model from the initial position, through intermediate positions and to the final position.



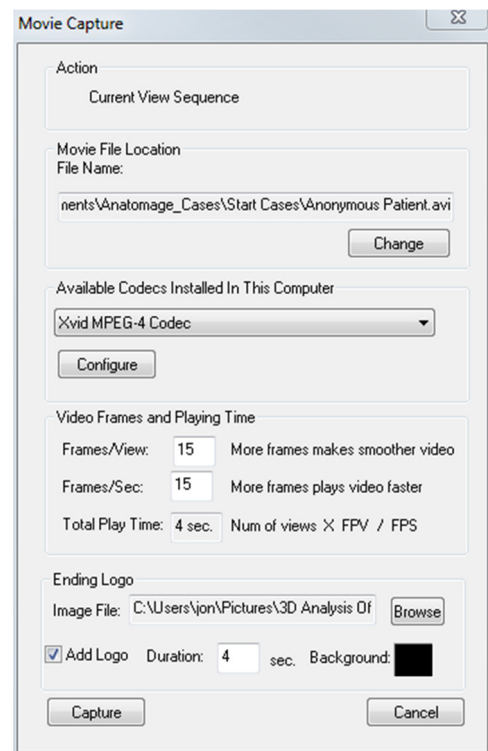
### View Sequence:

- To create a video of your simulation, select the **View Sequence** button from the **Model Toolbar** to open the **View Sequencer Window**
- Much like the **Volume Render View Tab** (p. 38), you can insert scenes with various volume orientations, clippings, colorizations, etc.
- Adjust Rendering Window image to desired settings (orientation, volume colorization, etc.) and move the Simulation Slide Bar to Frame 0
- Press **Insert** in View Sequencer Window
- Adjust Rendering Window image to desired settings (orientation, volume colorization, etc.) and move the Simulation Slide Bar to Frame 100
- Press **Insert** in View Sequencer Window
- Test the video using the **Start**, **Play/Pause** and **End** buttons in the View Sequencer Window



### Movie Capture:

- If you are unsatisfied with the test video and View Sequence, make the necessary changes (**Insert** new Views or **Modify/Delete** existing Views).
- If you are satisfied with the test video and View Sequence, select **VIDEO Capture** to open the **Movie Capture Window**.
- Please refer to **Volume Render View Tab View Sequence Section** (p. 38) for additional descriptions
- **Capture** the View Sequence to save your simulation as an AVI movie file.





# InVivoDental 5.1 Software Troubleshooting

Category	Error	Solution
General	Error Message: <i>InVivoDental 5.1 Application has encountered a problem and needs to close. We are sorry for the inconvenience.</i>	Click “Don't Send” Button Check if there are old versions of optional plug-ins, remove them or upgrade them to be compatible with InVivoDental 5.1. Launch InVivoDental 5.1 application again. Warning: treatment information can only be manually saved. All information added after last saving will be lost.
	Cannot launch InVivoDental 5.1	Open Task Manager and check if multiple instances of InVivoDental 5.1 is already running Close other InVivoDental 5.1 processes Launch InVivoDental 5.1 application again.
	Computer failure	Launch InVivoDental 5.1 application again. Warning: treatment information can only be manually saved. All information added after last saving will be lost.
Installation	Error Message: <i>Server is not Responding</i>	Check Internet connection. If Internet is connected, try again later.
	Error Message: <i>Please run as administrator to activate software</i>	Run the installer/application as administrator
	Error Message: <i>Failed to verify the license code!</i>	Check license code and try again. (or) Check internet connection and try again.
	Error Message: <i>Wrong License Code!</i>	Check license code and try again.
	Error Message: <i>Invalid Authorization code</i>	Check license code and try again.
	Error Message: <i>Actual size of the image can't fit to the paper size!</i>	Change printer setting or create an image with smaller size.
File Operations	Error Message: <i>Failed to create process. Please close other applications and try again.</i>	Close all the other applications. Launch InVivoDental 5.1 application again
	Error Message: <i>Error: Cannot read this file</i>	Check if this file is supported by InVivoDental 5.1
	Message: <i>Not enough memory</i>	Close all the other applications. Launch InVivoDental 5.1 application again
	Error Message: <i>Can't create temporary save file!</i>	Check if the remaining disk capacity for the temporary folder is big enough.
	Error Message: <i>Failed to read DICOM file!</i>	Check if this file is supported by InVivoDental 5.1
	Error Message: <i>Can't read Dicot's Image Data!</i>	Check if this file is supported by InVivoDental 5.1
	Try to open a file but nothing showing up	Check if this file is supported by InVivoDental 5.1
	Error Message: <i>Cannot save file!</i>	Check if the file is the correct type. Check if the file path is correct and folder is writable.
Image Rendering	Error Message:	Check if graphics card meets system requirements

<i>Can't detect hardware acceleration for OpenGL support!</i>	Check if latest driver is installed for graphics card
Image is distorted	Switch to another view and switch back
Grayscale image shows up for all rendering presets	Check if graphics card meets system requirements Check if latest driver is installed for graphics card
Warning Message: <i>3D reconstruction may not work!</i>	Check if the DICOM files are exported correctly.

All other issues, please contact Anatomage Inc. Customer Support at (408) 885-1474.

# Index

*This comprehensive list below provides quick and easy way to find the relevant information that you would like to examine.*

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