TxSTUDIO

TxSTUDIO5.3 Reference Manual

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TxSTUDIO software is dependent on its hardware requirements. The life-cycle is limited only by the availability of the required hardware.

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About Anatomage and TxSTUDIO Software

This version of TxSTUDIO was released as an update to the original TxSTUDIO software from Anatomage, Inc. In this document, TxSTUDIO refers to the latest version of the Anatomage TxSTUDIO. To learn more about Anatomage, access the Anatomage website (www.Anatomage.com).

Intended User

TxSTUDIO 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.

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

Indications for Use

InVivoDental is intended for use as a front-end software interface for the transfer of imaging information from a medical scanner such as a CT scanner. It is also intended for use as a planning and simulation software in the placement of dental implants, orthodontics, and surgical treatment.

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Introduction

TxSTUDIO 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 TxSTUDIO 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 TxSTUDIO 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. TxSTUDIO 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 a support representative. For correct and safe use, it is highly recommended that prospective users seek TxSTUDIO training from their support representative. In this document, TxSTUDIO refers to the latest version of the Anatomage TxSTUDIO software. For more information about the TxSTUDIO Reference Manual, please contact the Anatomage customer support team at info@anatomage.com.

System Requirements

Below are the minimal and recommended system configurations.

H aving an adequate computer system is essential to using TxSTUDIO 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.

TxSTUDIO has minimal system requirements; however, Anatomage recommends the following configurations to fully utilize all the features within the TxSTUDIO Software (updated January 2014):

PC Users

	Recommended
CPU	Intel Core i7 4000 series or comparable multi-core processor
RAM	4GB
GPU / Graphics Card	ATI Radeon R9 270X *or* Nvidia GeForce GTX 760
Hard Disk	500 GB
OS	Windows 7 64-bit

Mac Users

	OS	Hardware
Not Compatible	Apple OS, Parallels	MacBook Air, Mac Mini
Fully Compatible	Apple Bootcamp (requires a full license of Windows)	iMac, MacBook Pro (15"), Mac Pro

Graphics Cards / GPU

Brand	Model Series	Low Profile Option	Recommendations
ATI	Radeon HD 4600 – R9 290X	HD 6450 HD 7750	R9 270X (Excellent performance) R9 260X (Great performance) HD 7750 (Good performance)
Nvidia	GeForce GT 430 – Geforce GTX Titan	GT 430 GT 640	GTX 760 (Excellent performance) GTX 660 Ti (Great performance) GTX 650 (Good performance)

Notebook Recommendations
(NOTE: Avoid Intel HD graphics on laptops – incompatible with 3D rendering)

Dell

Sizes	Model Series	Graphics Processor Options	Weight
11", 14", 17", 18"	Alienware M	Note: Known issue with new GT 7XXM series drivers, will only work with "Nvidia driver 311.48.3.24.2" as of 1/29/2014	4.4 – 11.7 lbs
15", 17"	Inspiron R	ATI Radeon HD 8850M or Nvidia GeForce GT 750M	6.1 – 7.3 lbs
15", 17"	Studio XPS	Nvidia GeForce GT 730M or GT 740M	5.8 – 7.4 lbs

HP (Warning: HP brand laptops have a known issue with switchable graphics. A BIOS update from the HP website may be necessary to run TxSTUDIO with the intended graphics hardware.)

Sizes	Model Series	Graphics Processor Options	Weight
15", 17"	Envy	ATI Radeon HD 8750M or Nvidia GeForce GT 750M	5.6 – 7.5 lbs
15", 17"	Pavilion	ATI Radeon HD 8670M	5.5 – 6.6 lbs

For more information, please contact Anatomage Technical Support at (408) 885-1474.

Installing TxSTUDIO

About the License Type

The authorization code provided for activation should be one of the two license types below. The type of license determines which authorization codes can be used on each computer that requires a new installation. If the license type is not known, please contact the distributor of the license, which can be either Anatomage or a CBCT manufacturer that bundles TxSTUDIO/Invivo5 licenses.

If free upgrade licenses are going to be used, the user will also need to know if a network or perpetual authorization code has been used for each computer with a preexisting license. If this information is not known, open the existing TxSTUDIO/Invivo5 installation and click on Help in the menu bar. In "About TxSTUDIO…", the second line will identify it as a "Network Version" followed by the version number for Network licenses. Perpetual licenses will show "Version" followed by the version number.

Purchased Licenses
- This license type can be used to activate any computer that does or does not have an existing TxSTUDIO/Invivo5 software activation of any version.
- This includes computers with activated licenses of version 5.0 or lower that would not be compatible with a free upgrade license.

Free Upgrade Licenses
- This license type can only be used to activate computers that have an existing TxSTUDIO/Invivo5 software activation of version 5.1 or later (version 5.0 or earlier will require a purchased license type).
- Upgrade licenses can be either perpetual or network upgrade licenses. Perpetual upgrade licenses can only be used to activate existing perpetual activations of earlier (5.1 or later) TxSTUDIO/Invivo5 versions and similarly with network upgrade licenses. Upon upgrade license activation, the preexisting license on that computer will be automatically deactivated. If they do not match, an error will be displayed and the installation will terminate.

Website Installation Instructions
- Go to www.Anatomage.com

- Select "Dr. Login"

- Enter username and password

    o (Username and password can be obtained by calling ISI technical support at 1-800-205-3570)

- Click TxSTUDIO Installer

- Click Save File

- Run File

Prerequisite Component Checklist: TxSTUDIO Setup Wizard will check for certain components that are important to the performance of the software. A result of Pass or Fail will be provided as the components for that computer are compared to a list of the most compatible components. A "Fail" result will not prevent the installation from completing and is only intended as a warning of the possibility of less than optimal software performance as a result.

OpenGL Vendor: Associated with the manufacturer of the graphics processor

OpenGL Version: Associated with the driver version of the graphics hardware component

Memory: The quantity of RAM installed on the motherboard

Click Next to continue.

Welcome to the TxSTUDIO Setup Wizard

The Setup Wizard will allow you to change the way TxSTUDIO features are installed on your computer or even to remove TxSTUDIO from your computer. Click "Next" to continue or "Cancel" to exit the Setup Wizard.

The recommended graphics chips are Radeon HD6670, GeForce GT650 or higher. Your installed graphics chip is AMD Radeon HD 6900 Series.

Component	Installed	Requirement	Result
OpenGL Vendor:	ATI Technologies Inc.	ATI or NVIDIA	Pass
OpenGL Version:	4.2.12217 Compatibility Profile Context 12.10...	1.4 or higher	Pass
Memory:	8.0 GB	3 GB or higher	Pass

< Back   Next >   Cancel

Enter the numerical Authorization code. If you have an alphanumeric license key, click Advance and put in the key in the blank provided.

Click Next to continue.

Please enter Authorization code.
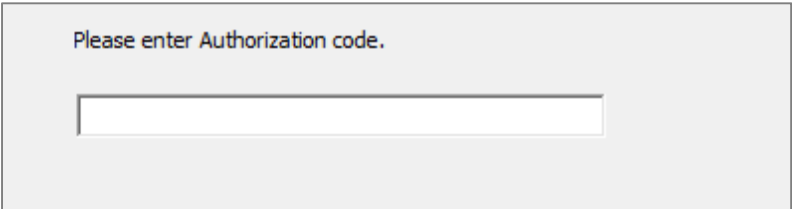
Installation Preferences: The user can specify the folder for software installation as well as the level of functionality with which the software initially opens.

Validating 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.
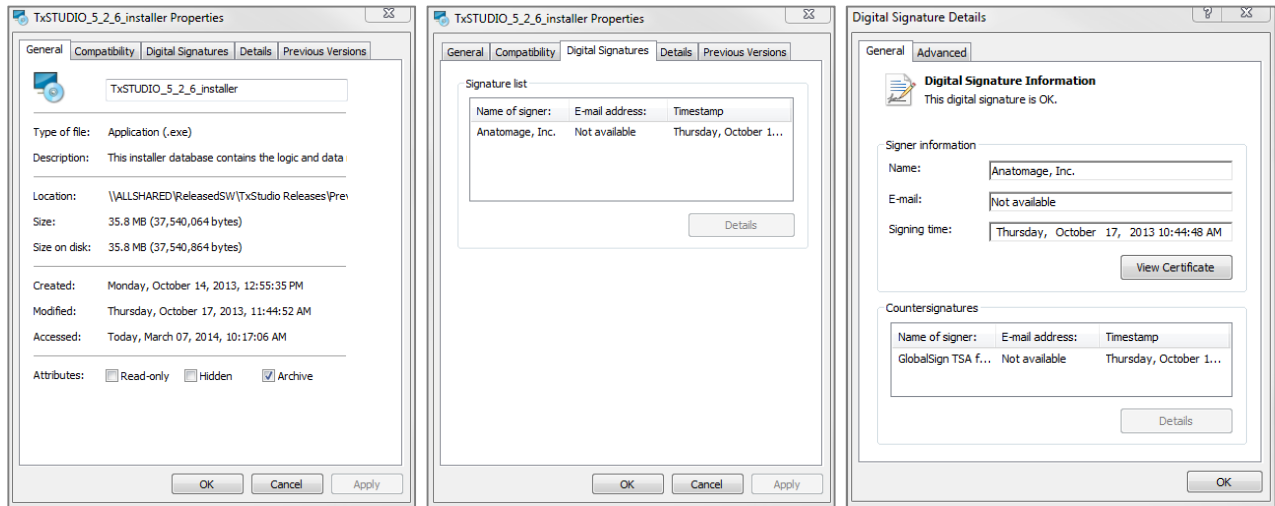
Feature List

An overview of the various features provided by TxSTUDIO.

- **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**

- **Report Generation**

*All measurements are performed with the metric system.

Software Layout

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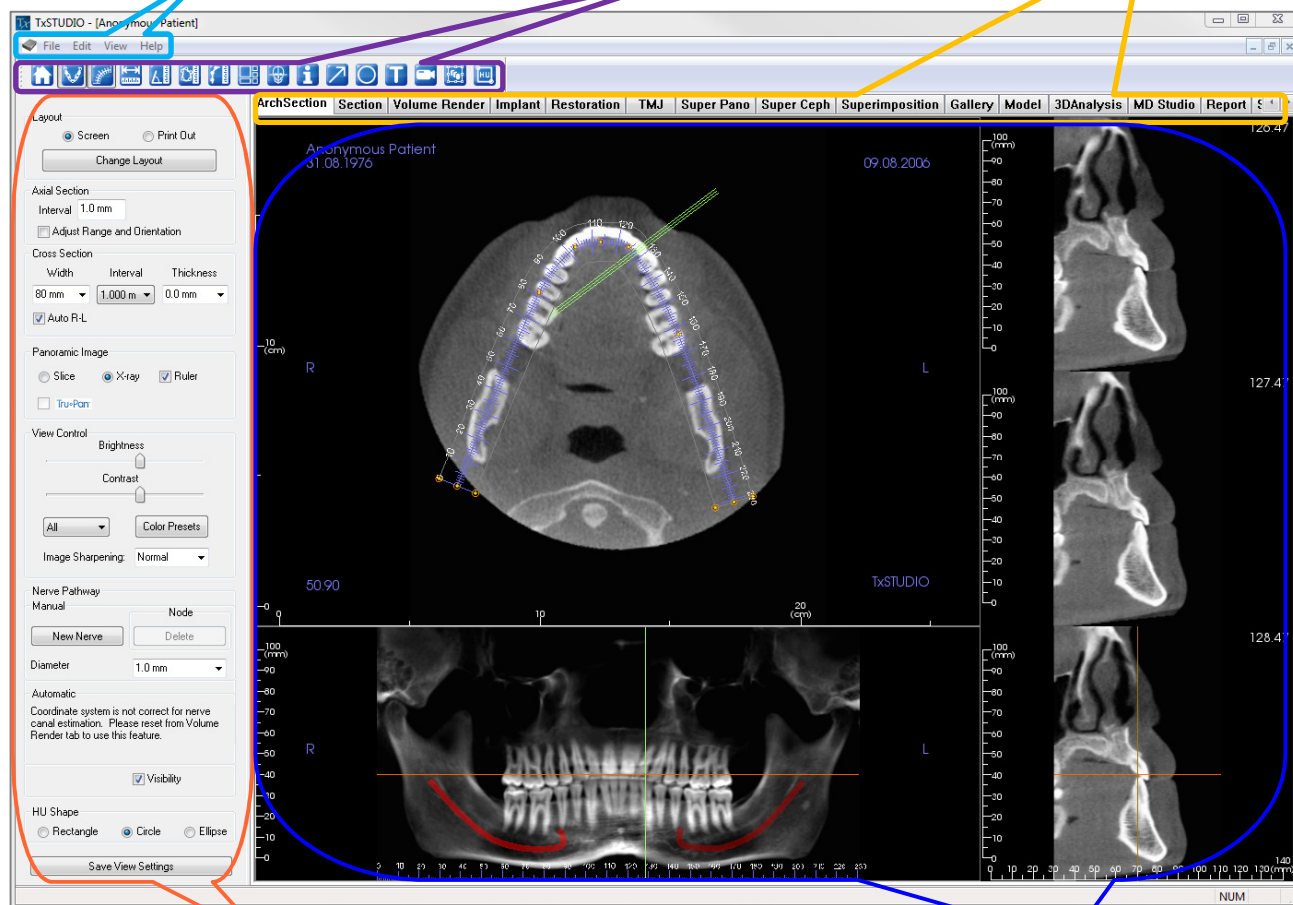
View Control
View Control is the region where patient images can be manipulated and controlled. The **View Control** is associated with a specific **View Tab**.

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**.

TxSTUDIO Preferences

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

Accessing the TxSTUDIO Preferences:
- In the Menu Bar of the TxSTUDIO, select "File".
- Select "Preference…" from the "File" dropdown.

Display Preferences
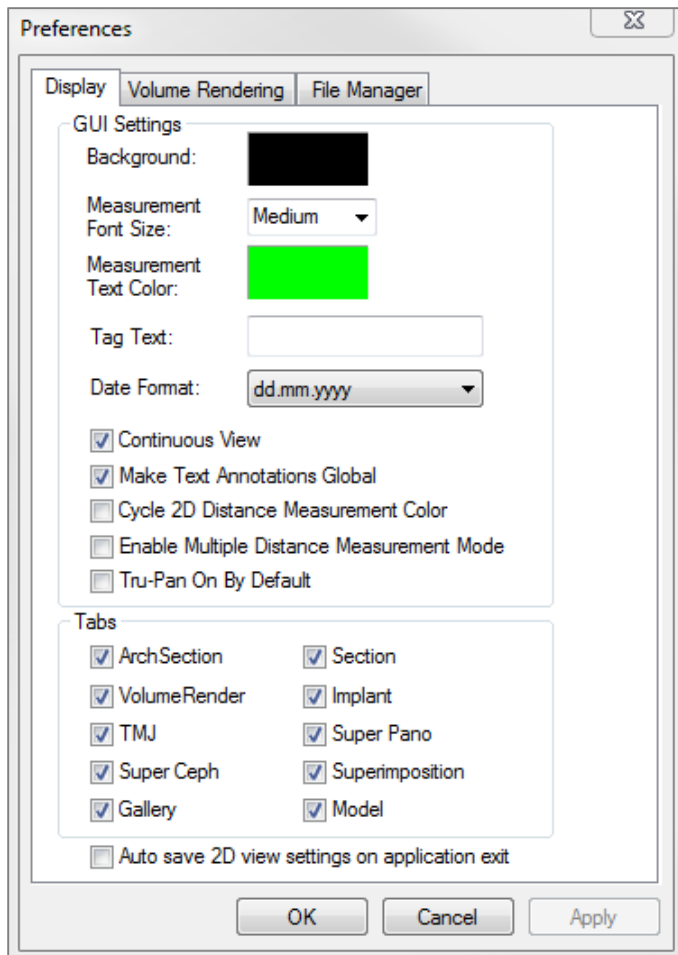
GUI Settings
- **Background:** Sets the background color for the Rendering Window.
- **Measurement Font Size:** Sets the measurement font size to one of three presets: small, medium, or large.
- **Measurement Text Color**: Sets the text color for measurement notations.
- **Tag Text**: Provides an additional label to the right hand corner of the rendering window.
- **Date Format**: Provides options for displaying the date in the patient information.
- **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:** Enabling this feature causes the color of 2D distance measurements to cycle between four colors with each measurement that is placed.
- **Enable Multiple Distance Measurement Mode:** Enabling this feature changes the 2D Distance Measurement button into a toggle on/off distance measurement button. When toggled on, multiple measurements can be placed continuously without having to select the 2D Distance Measurement button to begin every measurement.
- **Tru-Pan On By Default:** This setting determines if a scan will initially have Tru-Pan enabled in specific tabs.
- **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. Changes will

be made after restarting the program.

- **Auto save 2D view setting on application exit:** This setting will determine if 2D view settings made in each of the applicable tabs will be saved automatically upon program closure and be reloaded with the next opened case. If left unselected, the user will have to manually save the configuration by clicking **Save View Settings** in the working tab. The specific 2D view settings that will be saved in each tab is given in the table below:

ArchSection	Slice Interval, Cross Section Width/Interval/Thickness, Auto R-L, Pano Image Type, Pano Ruler Enabled, Brightness/Contrast mode, Layout (including Axial vs. Cross Series and Print Layout), Sharpen Filter, Color Preset, Nerve Diameter, and Nerve Visibility
Section	Rendering presets, custom Brightness/Contrast (if the Dental preset is chosen), Sharpen Filter, Volume Clipping, Slice Thickness
Implant	Layout, Restoration Lock, View Preset, Brightness/Contrast, Sharpen Filter, Volume Clipping, and Remove Crown
TMJ	Lateral Width/Interval/Thickness, Pano Ruler, Brightness/Contrast mode and settings, Layout (including sequence type and Print Layout), Sharpen Filter, Color Preset, Focal Trough Thickness and Symmetry, Pano Render Mode

Volume Rendering Preferences
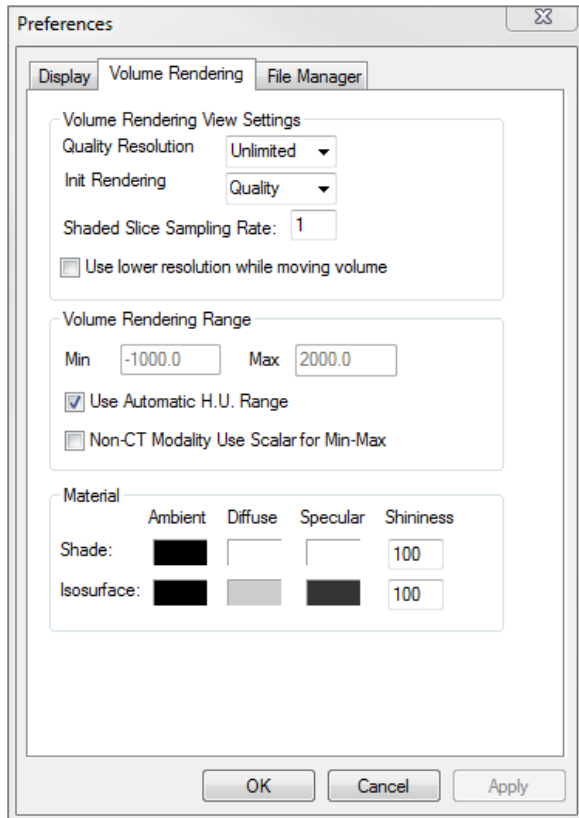
Volume Rendering View Settings

- **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 TxSTUDIO.
- **Shaded Slice Sampling Rate**: Sets the sampling rate for the volume rendering (higher is more detailed).
- **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
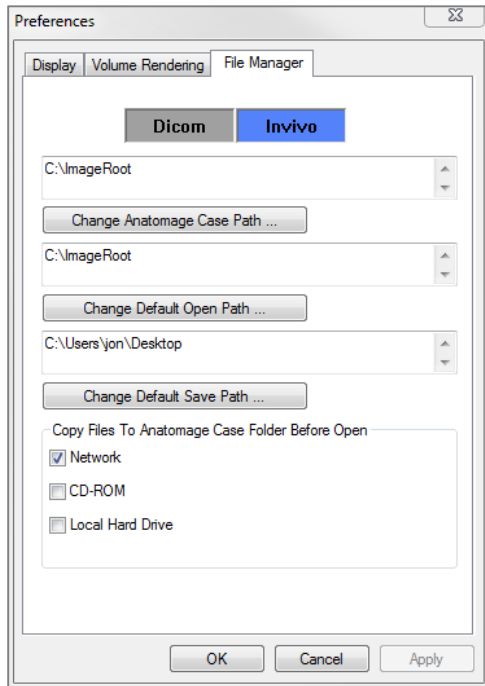
Dicom/Invivo File Path Settings

When the DICOM File button is selected, the user can set preferences for DICOM using file menu preferences to default open path, default case path, or default save path. Open paths and Case paths are defined by pushing control buttons "Change Anatomage Case Path...", or "Change Default Open Path..." and then selecting a new location. When "Change Default Save Path..." button is pushed, or when the user checks either "Network", "CD-ROM", or "Local Hard Drive" checkboxes, a copy of the case file is saved to a defined default location when opening a case.

User-Specific File Path Settings

If there are multiple user accounts, the default file path settings for new non-administrator accounts will initially reflect the settings within the administrator account. The file path settings on the guest account can be changed from these default settings.

Folder Paths

- **Anatomage Case Path:** The Anatomage Case path serves as a backup case folder. Backups are made when cases are opened from locations set in the "Copy Files to Anatomage Case Folder Before Open". In DICOM File Manager mode, the Anatomage Case path will also serve as a DICOM directory for the File Manager window.
- **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 TxSTUDIO.

Copy Files to Anatomage Case Folder Before Open

This section allows the user to save a copy of a case that is to be opened in the Anatomage 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 TxSTUDIO.

DICOM & Invivo File Loading with the File Manager

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

DICOM Directory Function: The files displayed in the patient list corresponds to the contents of the DICOM Anatomage Case path (in DICOM File Manager mode). Only DICOM files will be shown in the list and the list will automatically refresh upon reopening of the software.
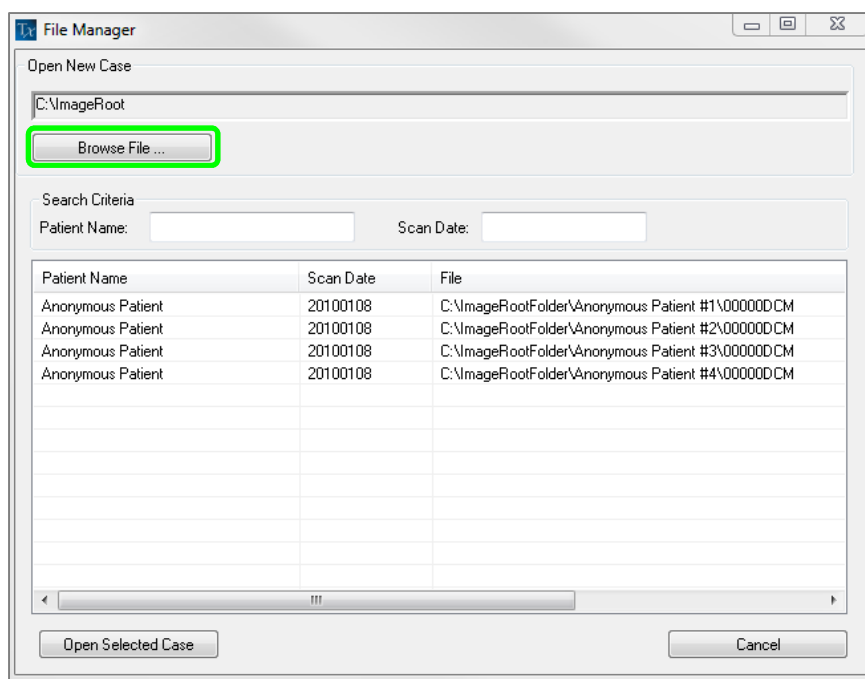
Click the Browse File box to manually search for the data you would like to open. If you are opening DICOM data, as shown to the right, simply highlight one of the .dcm files and click open. **It does not matter which DICOM file you choose**, just click one and the software will open all the files within the data set present in that folder. If you are opening an Invivo file just click it and press open.
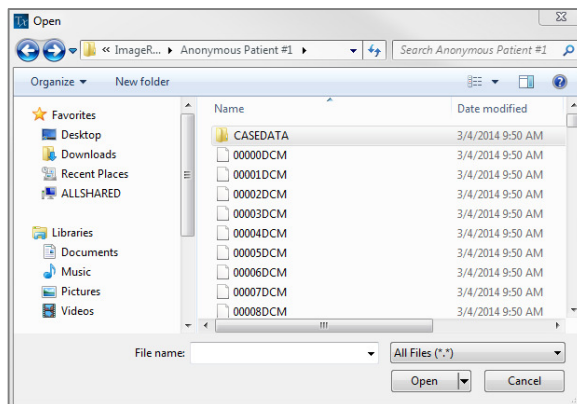
The File Manager allows you to automatically store and reopen recently viewed cases. This allows for quicker access to current cases. The automatic saving of the files is placed in a folder in your "My Documents" folder called "Anatomage_Cases". This location can be changed or turned off completely in the following location of the software: Menu Bar/File/Preferences/File Manager.

TxSTUDIO allows you to quickly search through your DICOM file directory by typing in the Patient Name or Scan Date in the search fields (shown right).
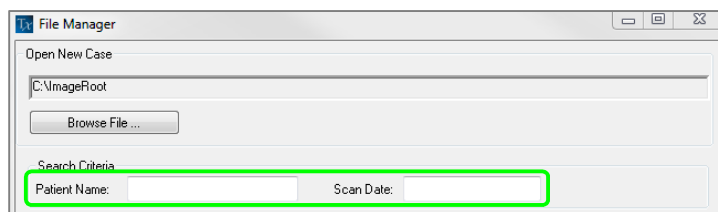
If you close a case and want to reopen another one, click on Menu Bar/File/Open and the File Manager will appear again.

Invivo/DICOM File Saving

Invivo

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
- †Models imported from MDStudio
- †Tracings performed in 3DAnalysis

†These functions require the installation and activation of additional software modules

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 user may also specify the file type of the file they would like to save.

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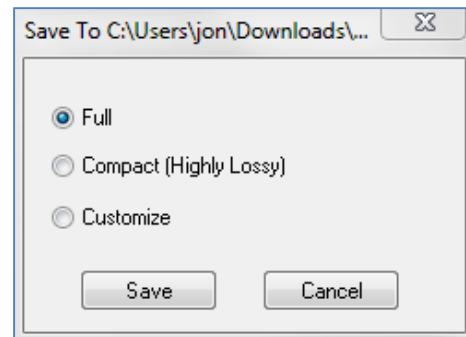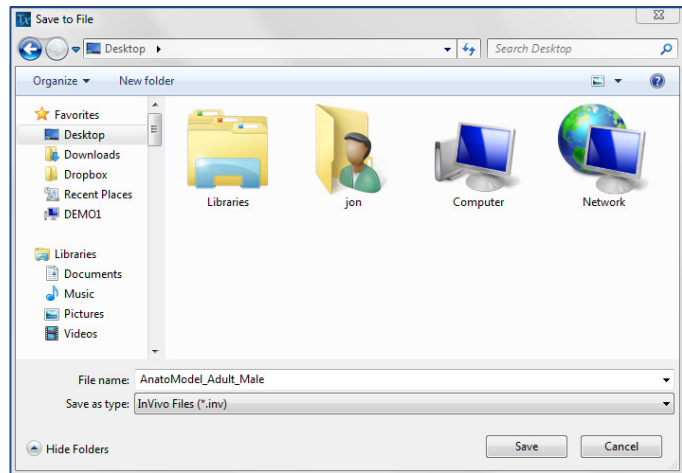
DICOM

When the DICOM file type is chosen, the output files will be a either a single lossless DICOM or multi-file DICOM (with DICOMDIR) accompanied with an Invivo workup file containing workup data and a folder of exported Gallery images in DCM format.

For single-file DICOMs (Figure 1), the save dialog will ask for a location to save the files. For multi-file DICOMs (Figure 2), you will have to create or choose a folder to save the slices and DICOMDIR file. The DICOMDIR file presents the directory of slices to Invivo to accelerate the loading speed.
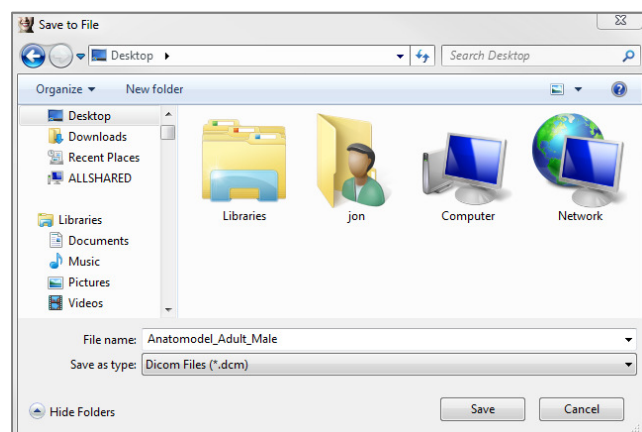
Figure 1: Single-file DICOM Save Dialog

The DICOM File Save Option dialog (Figure 3) will present numerous options for saving the file. Compression will reduce the size of the file (at the cost of increased saving and loading speed), Lossless or Lossy determines the quality (amount of data) of the file that is saved, and resampling will change the resolution by the selected factor in each orthogonal plane.
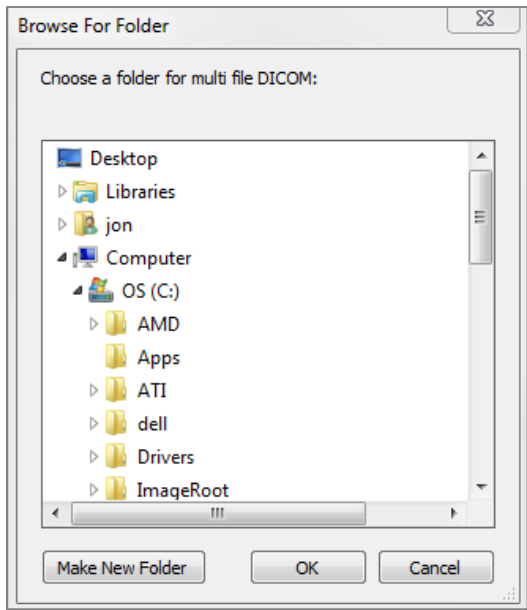
Figure 2: Multi-file DICOM Save Dialog
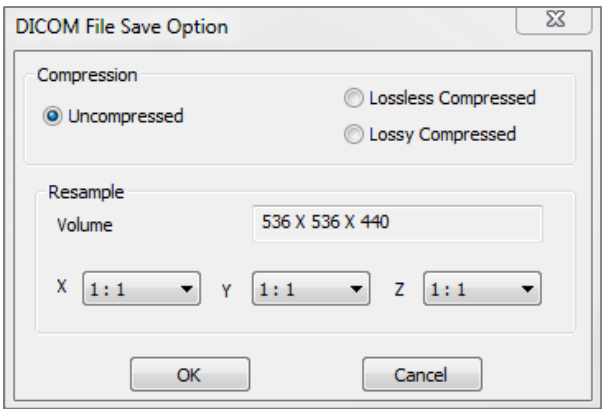
Figure 3: DICOM File Save Options

Custom Saving Dialog

Available for Invivo file saving: 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.
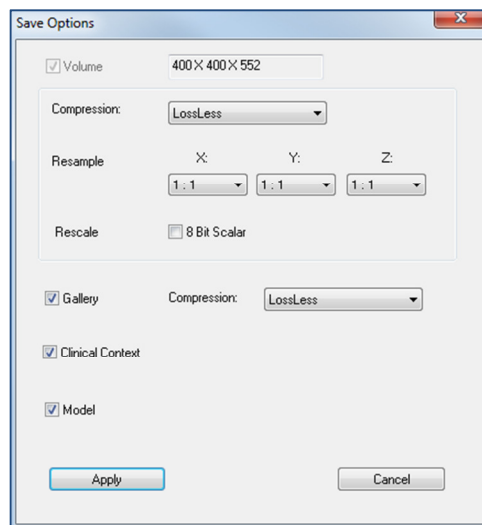
Saving As an Invivo Project File

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 TxSTUDIO 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.

Export DICOM & Viewer to CD...

This function will create an executable file containing the 3D volume data from the scan that is currently open as well as a 2D TxSTUDIO viewer program. This function is designed to allow the sharing of scan data from a TxSTUDIO user to a non-TxSTUDIO user on shareable media such as a CD, DVD, or flash drive. Note that some antivirus programs may detect the file as a virus due to its executable format.

TxSTUDIO Viewer: Running this file will initialize the viewer program and then load the embedded scan data. The TxSTUDIO Viewer contains Section, ArchSection, and Gallery functionality
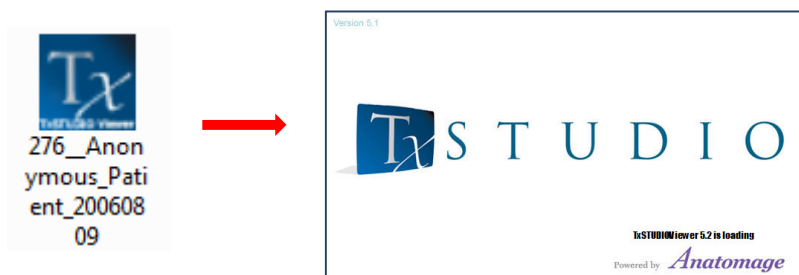
Export DCM Only to CD...

This function will export the currently opened scan as a compressed or uncompressed DICOM or a full, compressed, or customized setting Invivo file. The exported image file will be placed in the temporary burn location in the computer.
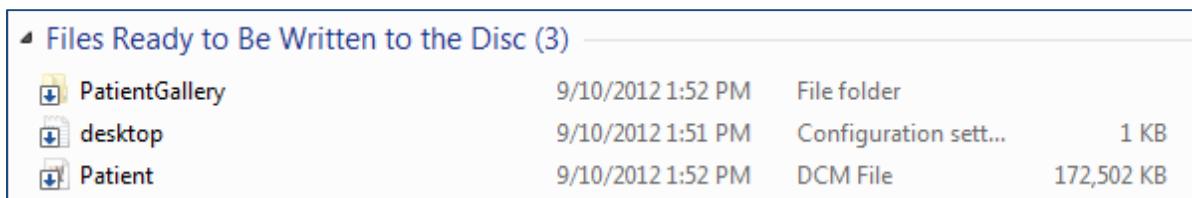
Case Information Display

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.
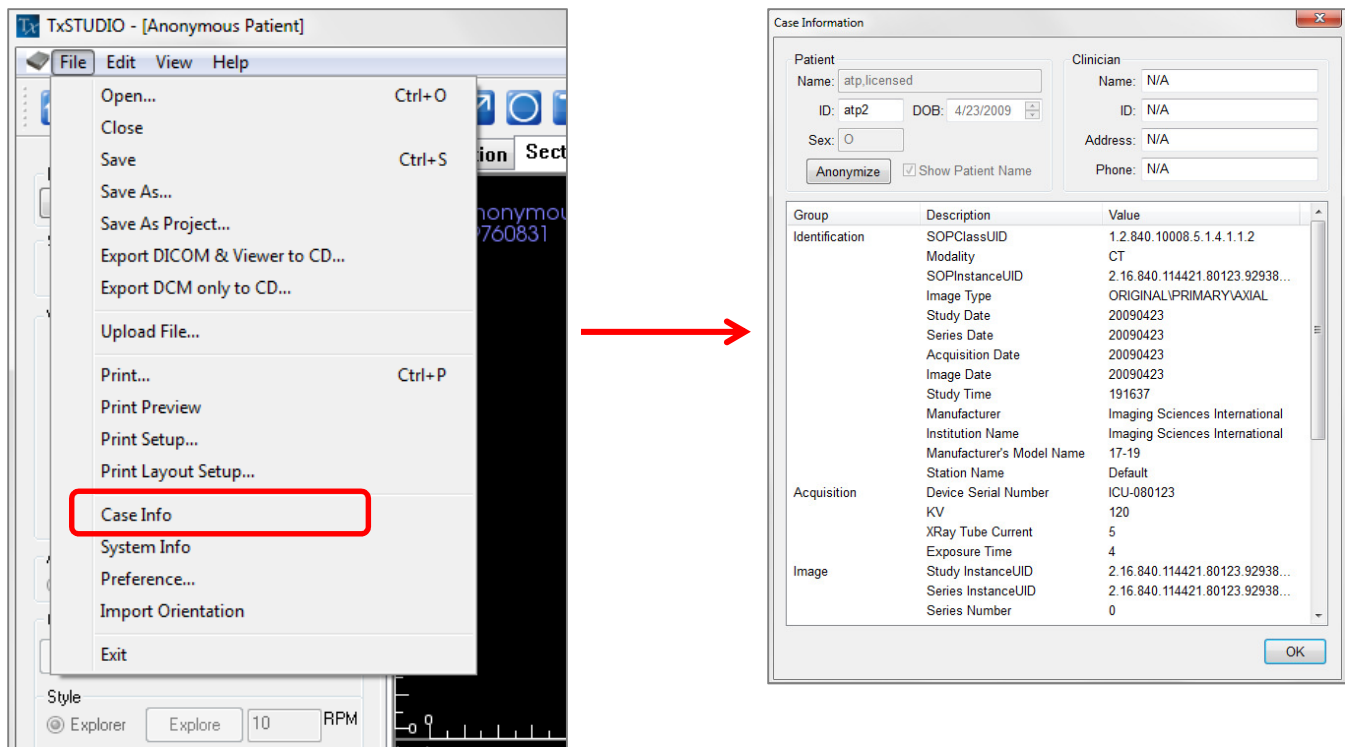
Image Capture to File

⭐ 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 type in the line "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.
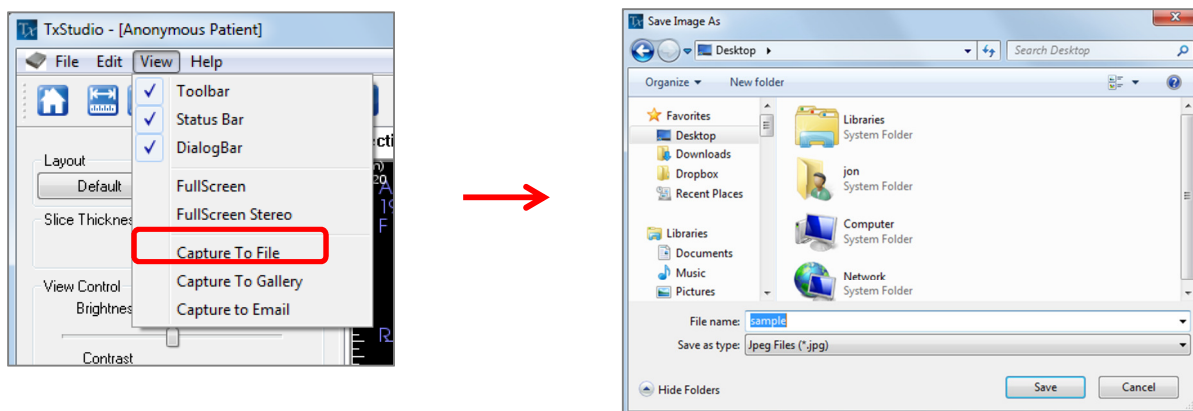
Image Capture to Gallery

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).
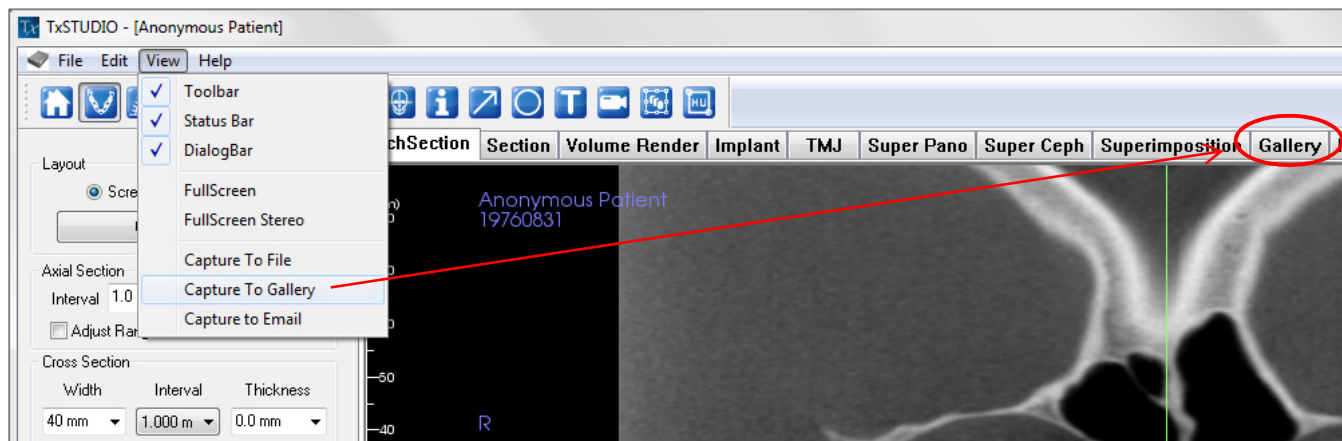
Image Capture to an Email

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).
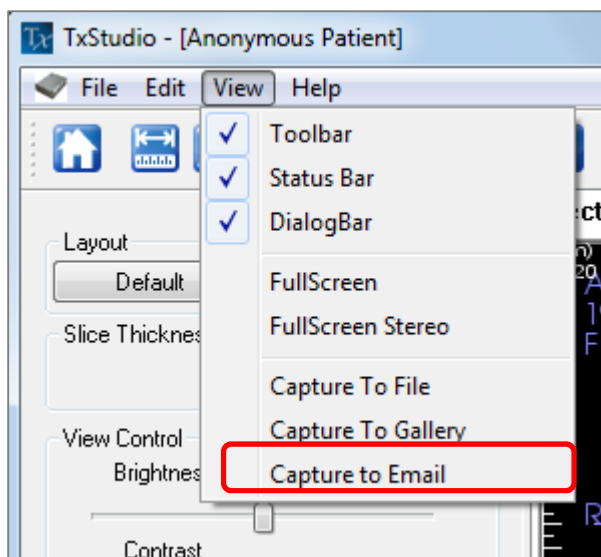
Image Navigation

Below is an explanation showing how to manipulate images in the Rendering window with the keyboard and mouse.
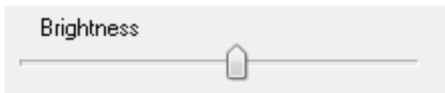
Slider Bar Scroll 🖱

- 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.**
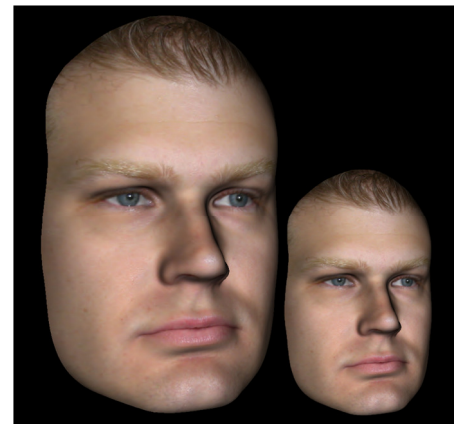
Pan (Shift) ⌨🖱

- 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 ⊖

Only applicable 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.
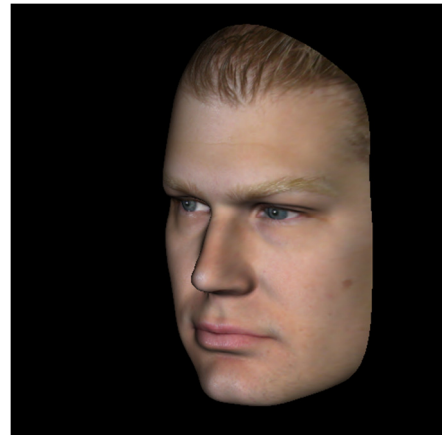
Free Rolling ⌨⊖

- 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.
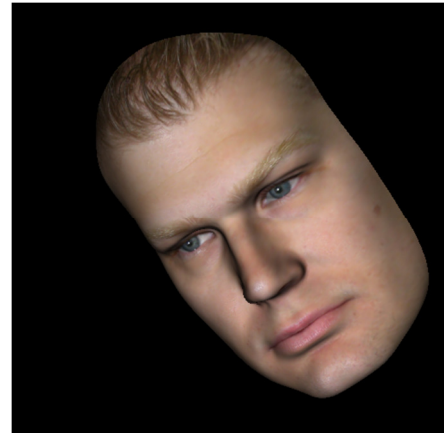
Increment Rotate ⌨

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 ⌖

Only applicable 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.
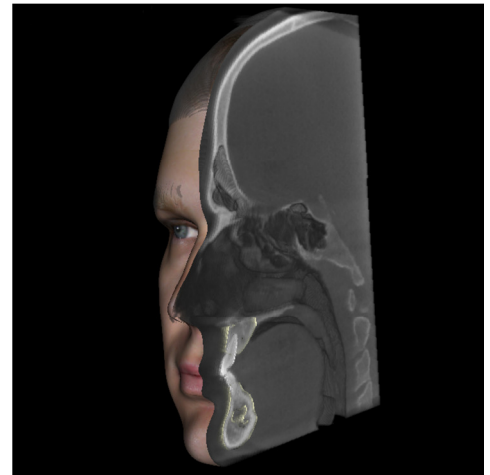
Scroll Slice ⌖

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.*
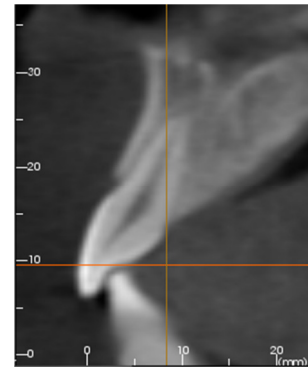
Move/Rotation Widget ⌖

- **Superimposition 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.
- **Model View:** Use to move a model through a portion of the volume for simulation creation. Click on either the ring or the arrows circling the model and move/rotate it in the direction you want the it to move.
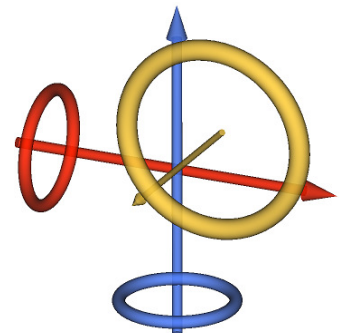
Full Screen Mode and Keyboard Shortcuts

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 shortcuts are available in volume rendering view:

Category	Keyboard Shortcut	Description
View Preset	*1*	Inverse Volume Rendering
	2	Soft-Tissue 1
	3	Soft-Tissue 2
	4	Soft-Tissue + Bone 1
	5	Soft-Tissue + Bone 2
	6	Teeth
	7	Bone
	8	(unassigned)
	9	(unassigned)
	0	Gray Scale
Clipping Control	*P*	Toggles Clipping-Plane on/off
	A	Axial clipping set
	S	Sagittal clipping set
	C	Coronal clipping set
	F	Flip the clipping direction
	Page Up / Page Down	Move the clipping plane
	Q	Open Free-Sculpt Tool
	W	Open Point-to-Point Sculpt Tool
Copy/Paste	*Ctrl+C/Ctrl+V*	Text/Circle/Arrow notations can be copy and pasted
Delete	*Del*	After selecting a measurement, comment marker, notation, airway volume, or nerve, pressing this key will delete

Keyboard Shortcuts for Report Design

Category	Keyboard Shortcut	Description
Report View	*t*	Add Text Control
	i	Add Image Control
	s	Add Slice Control
	n	Next Page
	p	Previous Page
	r	Insert Page
	d	Remove Page
	g	Toggle Printing of Page
	Ctrl + s	Save Template
	Ctrl + o	Load Template
	Ctrl + n	New Template
	Delete	Delete Currently Selected control
	Esc	Cancel Control Creation
	f	Move Control to Foreground
	b	Move Control to Background
Slice Capturing in ArchSection and TMJ Views	*Hold s + Left Mouse Click*	Select Single Slice
	Hold a + Left Mouse Click	Select Group of Slices

The View Tabs:

Arch Section View Features

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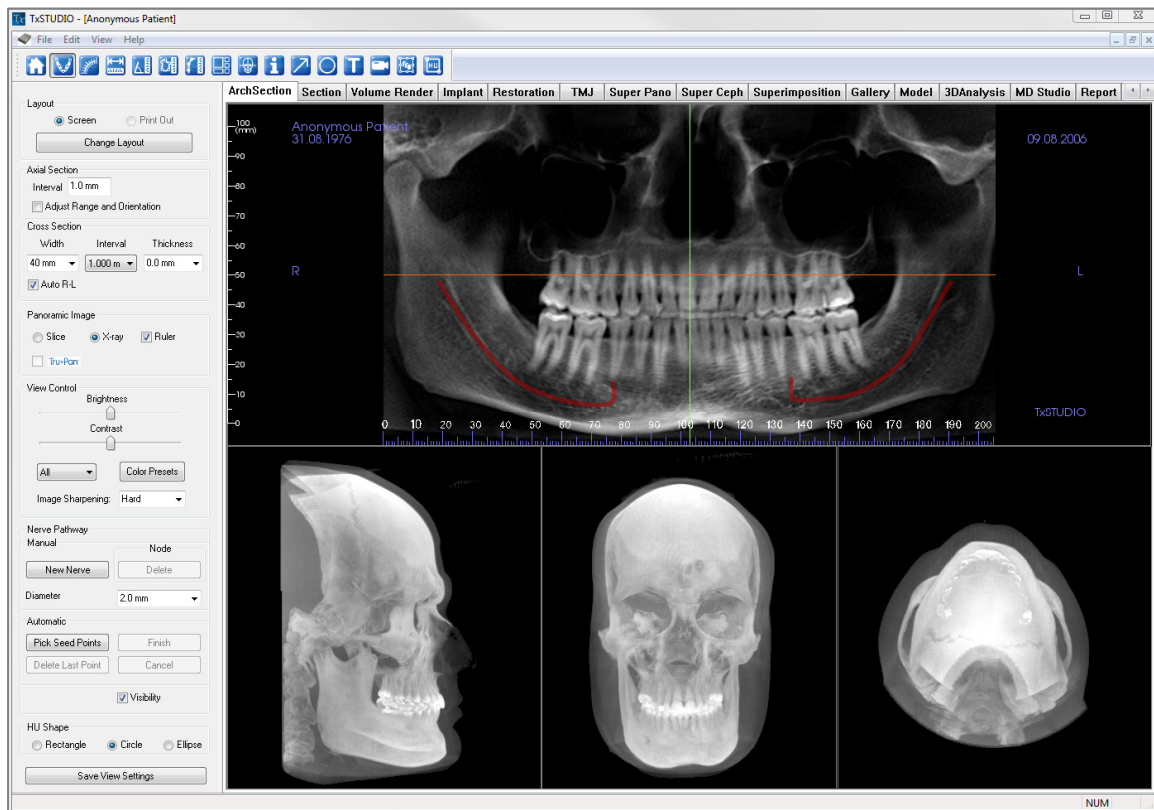
Arch Section: Toolbar

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: 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 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. 51) 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 (see **Report: Features** and **Report: Group Management Creation** for details).

HU Measurement: Allows for a calculation of the HU value of an area within a bounding box. The user can create multiple HU measurements on a single image. Measurement information is displayed next to the defined measurement area that the user creates, and the text can be repositioned by clicking and dragging the text box with the left-mouse button. The font color and size of the measurement text can be changed using the preference settings from the File menu. The HU measurement will also display the calculated area and standard deviation for the region chosen.

Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

Arch Section: Control Panel

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 the view that you can change 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). It is used for drawing the nerve.
- X-ray will show you the ray sum (reconstructed x-ray) in the focal trough.
- Tru-Pan™: This option enables the one-click volumetric pan that can be created from scans taken by a i-CAT© Cone Beam 3D system. See more information in the Tru-Pan™ section of the manual.

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.
- Image Sharpening: Applies the selected sharpening filter from the dropdown menu to the 2D slice renderers

Nerve Pathway:

A nerve pathway can be created manually or by using the Automatic Nerve feature:

Manually Create Nerve

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.

Create Automatic Nerve

- Click **Pick Seed Points.**
- Pick at least two points with the left mouse click on the axial, cross section, or pano (Slice or Xray) view.
- Click **Delete Last Point** to remove the most recently placed seed point. Click **Cancel** to cancel nerve creation.
- Click **Preview** to preview the nerve tracing. Clicking F**inish** will complete the nerve tracing. Click **Modify Points** to remove points.

Deleting a Nerve Pathway

- Picking the nerve and pressing the "Delete" key on the keyboard 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.

HU Shape:

The shape of the HU measurements can set to Rectangle, Circle, or Ellipse. Each shape is defined by two left-mouse clicks and allows adjustments to the size to be made by first left-clicking to select the image and then left-clicking and dragging the red dots to adjust the position or size.

Save View Settings

Saves the current 2D View settings to be reloaded upon opening any case. See the Display Preferences section in **Preferences** for more information on which settings are saved for this specific tab.

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 preform 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

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. TxSTUDIO also integrates 3D functions in the Section View Tab.*
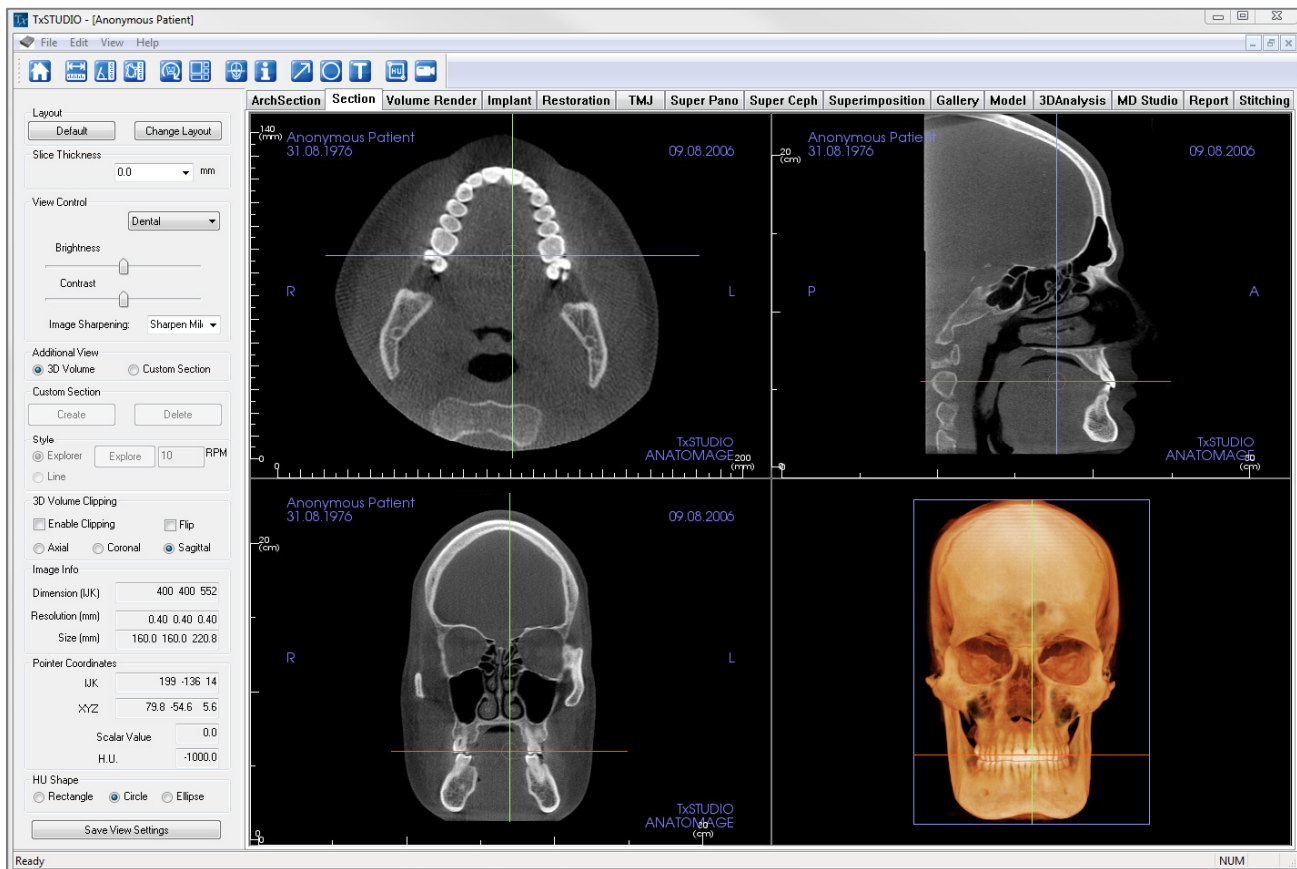
Section: Toolbar

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.

HU Measurement: Allows for a calculation of the HU value of an area within a bounding box. The user can create multiple HU measurements on a single image. Measurement information is displayed next to the defined measurement area that the user creates, and the text can be repositioned by clicking and dragging the text box with the left-mouse button. The font color and size of the measurement text can be changed using the preference settings from the File menu. The HU measurement will also display the calculated area and standard deviation for the region chosen.

View Sequence: Allows for the creation of custom camera sequences and AVI file movie capturing. Refer to the Volume Render View Sequence (p. 51) 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 off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

Section: Control Panel

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. &
- Rendering Preset (drop down list): The presets either load a brightness/contrast setting that is optimized for a particular tissue type or a color preset
  - Brightness/Contrast Presets: Dental (custom), Abdomen, Bone, Brain CT, Liver, Lung, Mediastinum, and Grayscale
  - 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. &
- Sharpening Filter: Applies the selected sharpening filter from the dropdown menu to the 2D slice renderers

Additional View:
- 3D Volume: This option allows 3D volume rendering in the fourth corner of the window.
- **Create** 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.

Style:
- The Explorer style allows the user to freehand rotate and move the custom section. By clicking two points, a customized section can be created on any cross section to better visualize anatomy along that axis. The custom section can be navigated by clicking and dragging the arrows to rotate, the endpoints to lengthen, or the center point to freely drag the entire section.
- The Line style allows the custom section to be dragged along the 2D section renderer back and forth in only a direction perpendicular to the custom section.

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 are summarized.

Pointer Coordinates:
   - IJK or XYZ: coordinates give the user the ability to examine the coordinates 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.*

HU Shape:
   The shape of the HU measurements can set to Rectangle, Circle, or Ellipse. Each shape is defined by two left-mouse clicks and allows adjustments to the size to be made by first left-clicking to select the shape or measurement value and then left-clicking and dragging the red dots to adjust the position or size.

Save View Settings
   Saves the current 2D View settings to be reloaded upon opening any case. See the Display Preferences section in **Preferences** for more information on which settings are saved for this specific tab.

Section: 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.
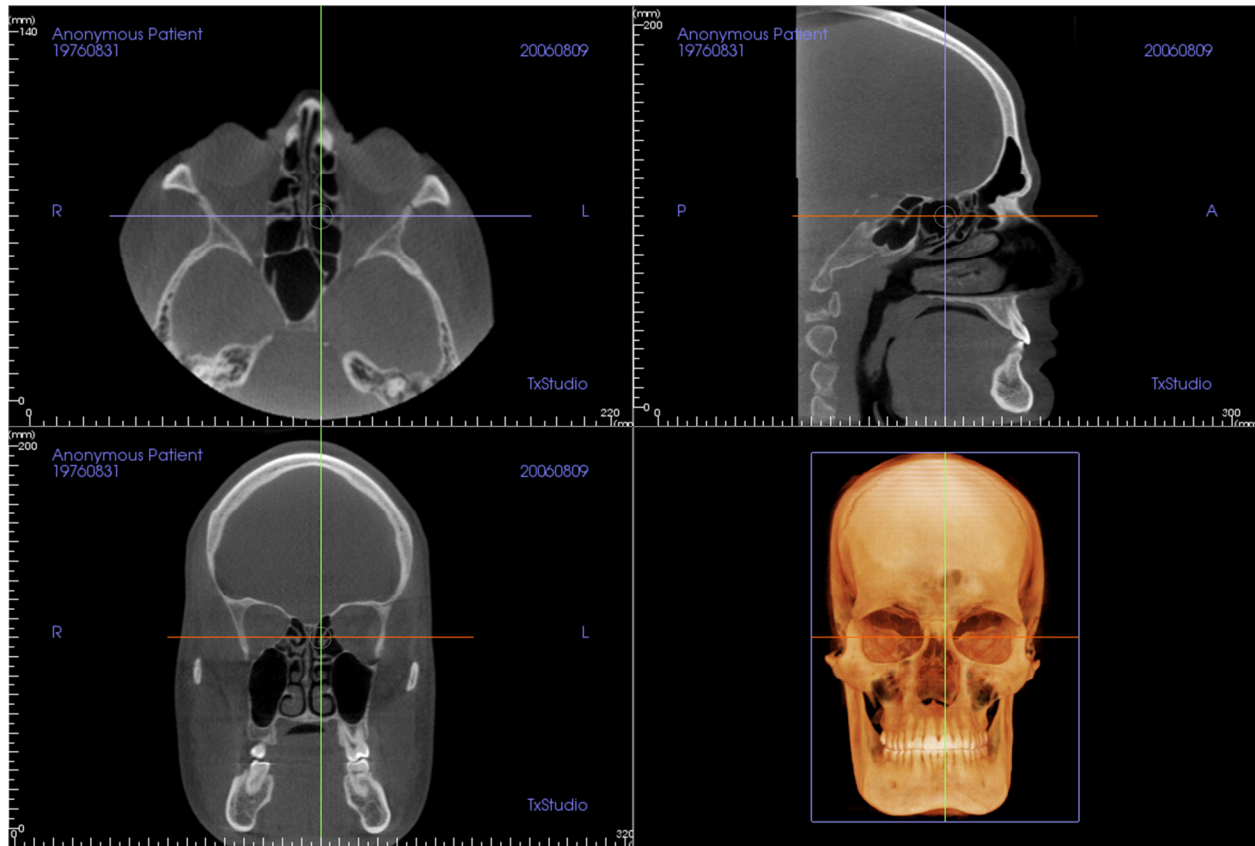
There are three ways to navigate the image:

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 two images will be updated.

Section: Light Box
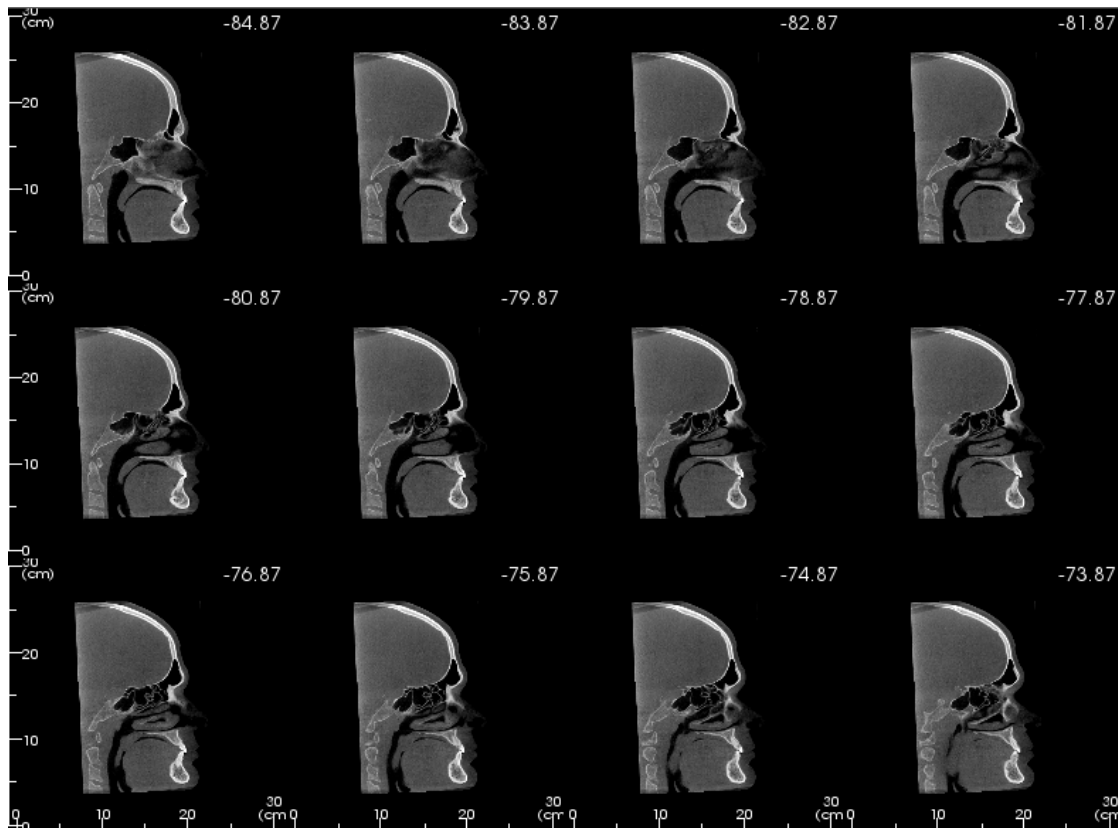
Change Layout has the option to change the Section view format to a "Light Box" style.

- The Light Box is composed of 4-32 sections of either Axial, Sagittal, or Coronal views.

- The user may also define the Slice Interval by selecting a dropdown option between 0.1-20.0mm or by manually entering a number within that interval on the keyboard.

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.* 📖
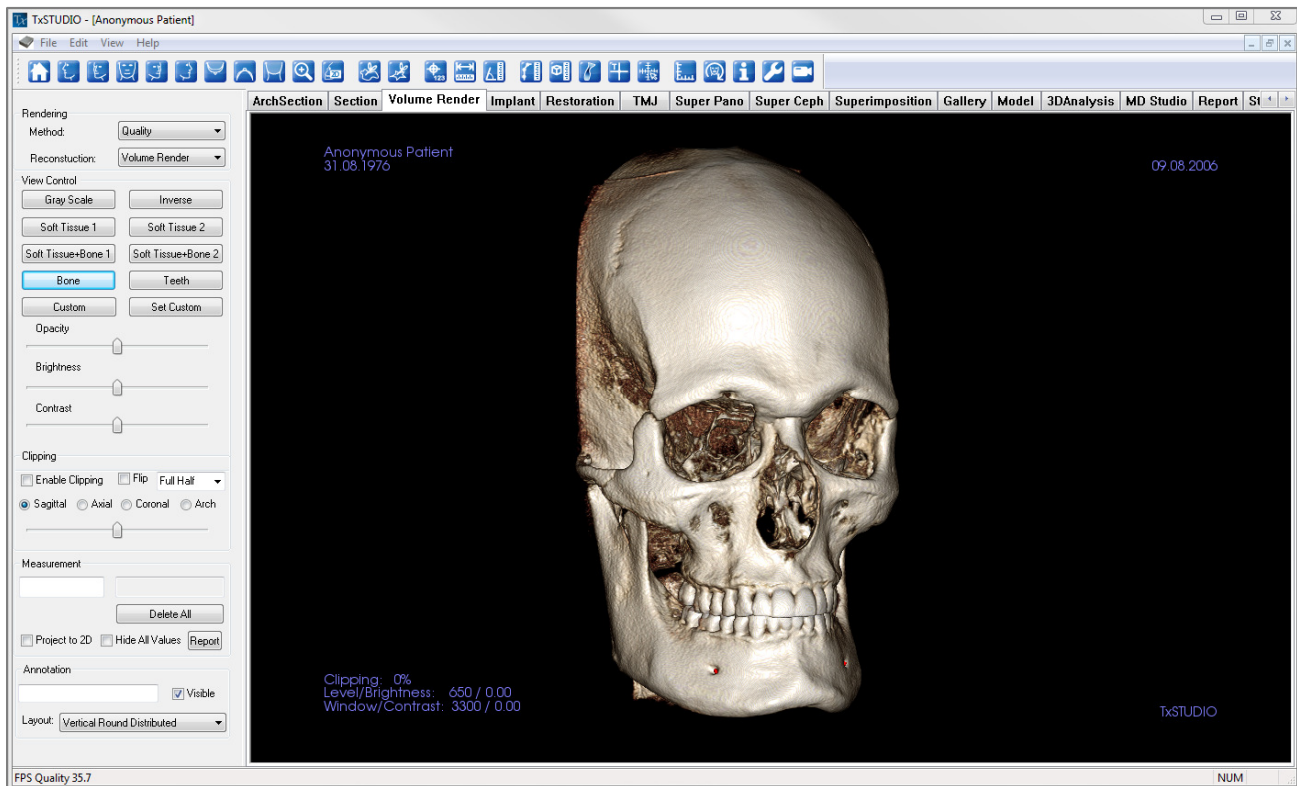
Volume Render: Toolbar

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 ¾ View: Automatically orients the volume so the patient is facing 45° left sagittal.

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

Right ¾ View: Automatically orients the volume so the patient is facing 45° 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.

Quick Slice: Once activated, clicking on a point on the volume will open a 2D zoom window in that location. The zoom window can be scrolled through using the mouse wheel and also shows the profile of any implants on that slice.

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. 51)

Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

Volume Render: Control Panel

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: Reorientation

The reorientation tool provides the user a way to orient the volume through each orthogonal view (sagittal, coronal, axial) using references lines. Also, it provides the only method in the program (besides using the 3DAnalysis plug-in) to reset the image to the default coordinate system after reorientations in Section, Volume Render, ArchSection, or TMJ.

- After selecting the reorientation icon in the toolbar, left-click and drag each reference line to the approximate proper location on the volume (ex. Frankfurt Horizontal in Sagittal View).

- Left-click and drag the rotation handles to rotate the volume to match the reference line. Continue through each view until the desired orientation is achieved.
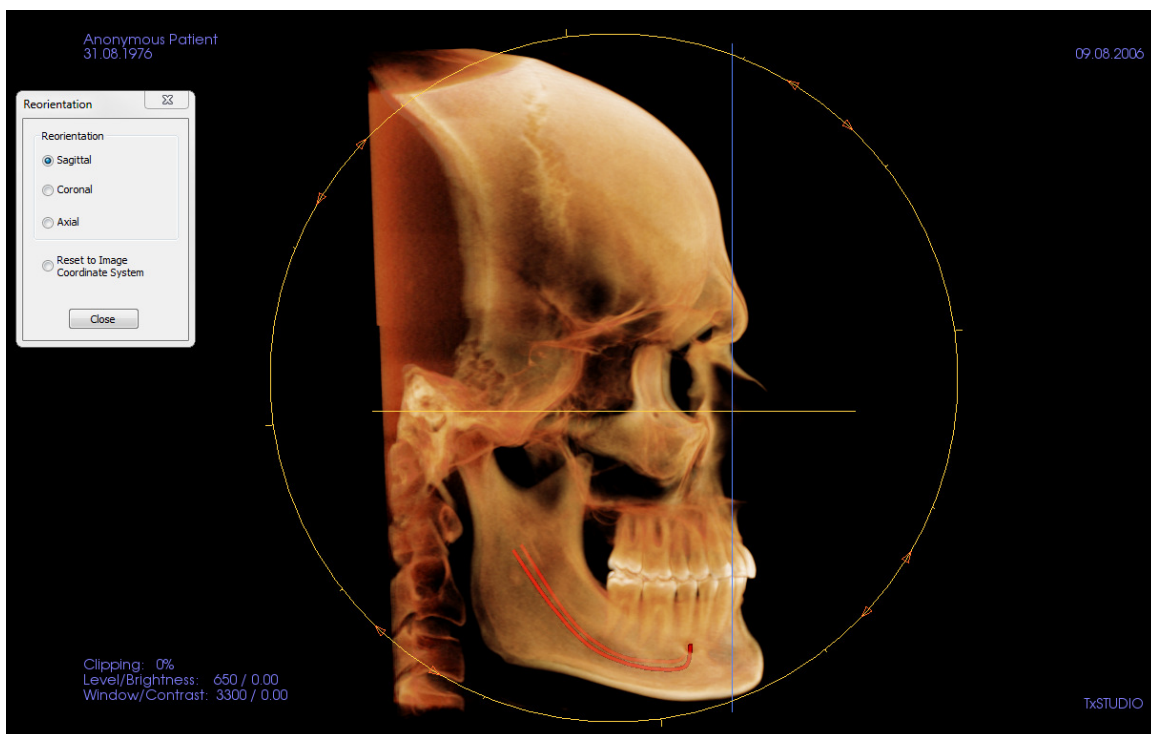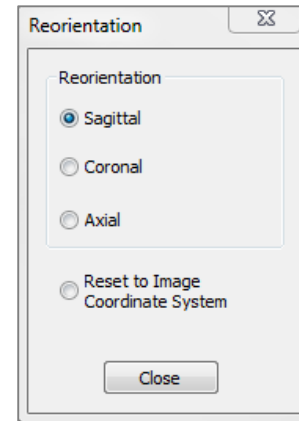
Volume Render: Rendering Window

One of the most powerful features of TxSTUDIO 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 information (if desired), and the opacity, brightness and contrast values.
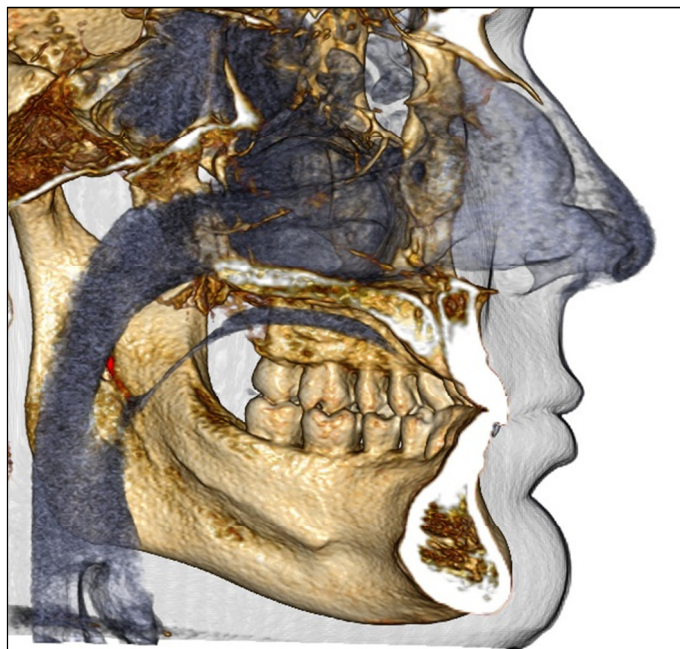
Please refer to Image Navigation (p. 26) for information about controlling and adjusting these images.

Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

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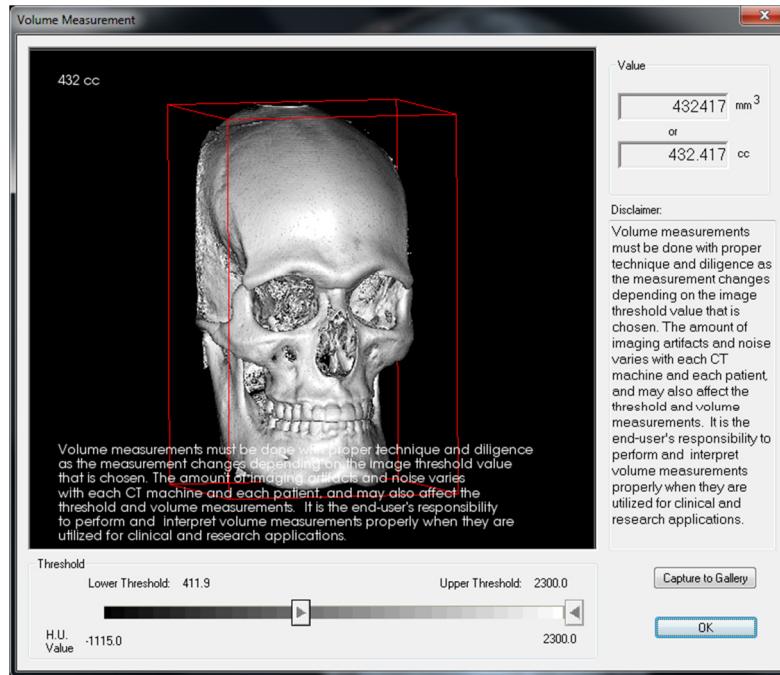
The Volume Measurement interface allows you to estimate displaced volume (cc or cubic millimeters) of a specific anatomical structure. You must first perform sculpting operations to isolate the desired anatomical structure.

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 off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

Volume Render: Airway Measurement

Airway Measurement: Selecting the icon will prompt the dialog box (below). Select OK to continue.
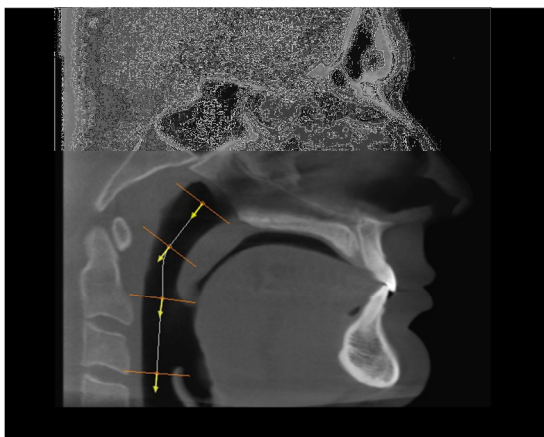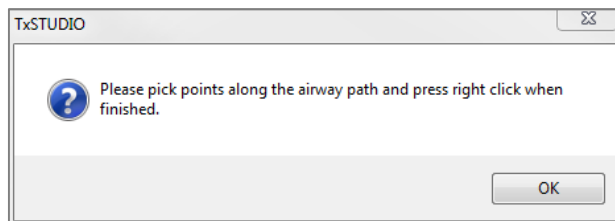
Tracing the Profile:
- Use the scroll-wheel to locate the Mid-Sagittal Plane
- Pick points along the airway to define your measurement path with the Left-click button
- Right-click when finished

The image (left) shows a completed profile tracing for a typical airway measurement, but the above steps will work for other air volumes too.
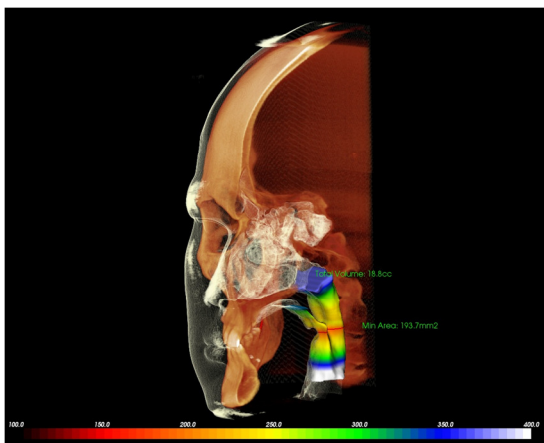
Viewing the Volume Measurement:
- TxSTUDIO will convert your profile tracing into a volume rendering and superimpose it onto the scan data.
- The minimum cross-sectional area and total volume are displayed next to the airway measurement
- The color range and threshold can be adjusted by selecting the Setup View icon in the Toolbar:

Volume Render: Movie Capturing and Customized View Sequences
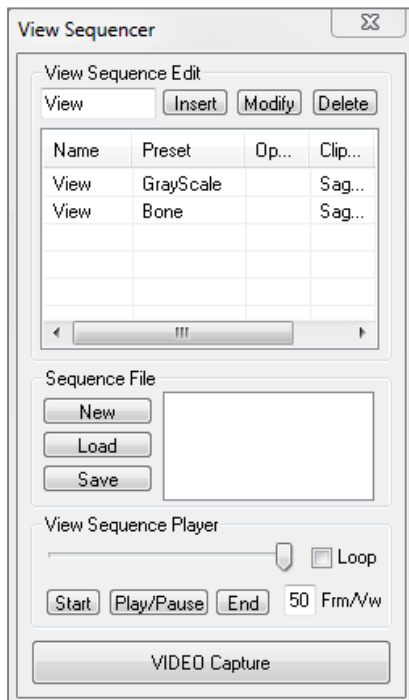
View Sequence:

- 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 View Sequence frame 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.
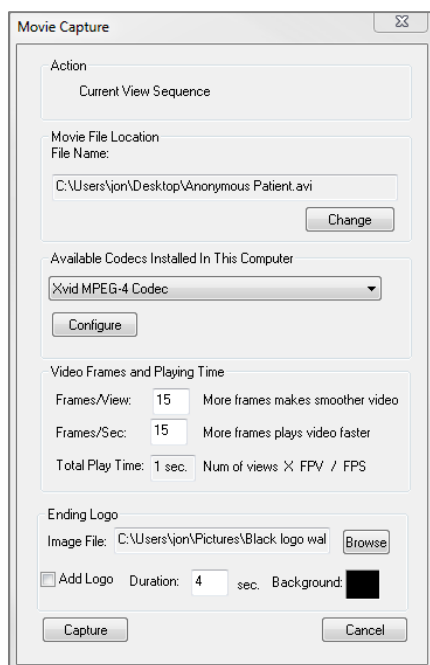
Movie Capture:

The MOVIE 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 videos 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.

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 ¾ View: Automatically orients the volume so the patient is facing 45° left sagittal.

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

Right ¾ View: Automatically orients the volume so the patient is facing 45° 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 that is added to the Gallery. Images contain ID(FDI), implant product, diameter, and length information in the lower right hand corner of the screenshot. The user will also be given an option to print a reference chart which lists the implants placed (including implant site, manufacturer, product name, diameter and radius) for each arch.

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.

Check Sleeves: The program will search for collisions between the sleeves, instruments, and stone models.

Export Abutment: Opens a dialog that provides options for abutment design and STL exporting.

Generate View Sequence: Opens a dialog that provides view sequence presets to create a video.

Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

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

Implant: Control Panel

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.

Planning Layout:
- 3D Implant: Place and adjust individual implants on 3D volume.
- Pano Implant: Add multiple implants using the Pano view; select "3D Implant" to exit Pano view and re-adjust individual implants.
- Restoration: After placing one or more implants, clicking Restoration will transfer the current progress to the Restoration tab for advanced crown placement and design. See the section Implant: Advanced Restoration Design for more information.

Restoration:
- Lock to Implant: When selected, the implant and restoration will move as a single unit.
- Remove All: 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.
- Tru-Pan™: This option enables the one-click volumetric pan that can be created from scans taken by a i-CAT© Cone Beam 3D system. (This setting is only displayed in the Control Panel when a Tru-Pan™ case is currently loaded.)
- Sharpening Filter: Applies the selected sharpening filter from the dropdown menu to the 2D slice renderers.

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:

The implant section can be configured to only show specific implants as defined by the user. For more information, look at the Preferred Implant settings further in this section.

- 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 manufacturer, diameter and length.

Visibility:
Hide/show various features in the Rendering Window. *(Note: The visibility checkboxes in Model Object Settings will not always match the checked/unchecked status of the visibility checkboxes in the Control Panel.)*
- Profile Only: Controls the visibility of the solid implant cross section in the 2D renderers. When activated, the currently selected implant will have a red profile and the unselected implants will have blue profiles. When not activated, the selected implant will show an opaque cross section of the implant and the unselected implants will show as blue profiles.
- Density: When selected, the lowest 2D slice renderer (view state is perpendicular to the A-B line) will be replaced by a real-time volume density indicator of the immediate surrounding area.
- Restoration: Controls the visibility of the 3D waxup models in the volume renderer and the colored profile in the 2D section renderer. The colored profile of the selected restoration or restoration associated with the selected implant will be red while the unselected restorations will be pink.
- Abutment: Controls the visibility of the abutment 3D model in the volume renderer or the colored profile in the 2D slice renderers.
- Surrounding: Displays the surrounding volume around an implant. The collision zone is determined by the Allowance defined in the Preferences.
- Long Axis: Displays a colored rod running through the long axis of the implant in the volume render
- Nerve: Displays a 3D nerve in the volume render or a cross section of the nerve in the 2D section renderers
- Angles: Controls the visibility of the angle between the long axes of adjacent implants as well as the angles of the abutment for each implant.
- Sleeve: Controls the visibility of the profiles in the 2D renderers and 3D models on the volume. Option is only available if the mandibular and maxillary models are available as well as after the Check Sleeve action has been performed.
- Trajectory: Displays the simulated trajectory of the implant during surgical placement
- Mandibular/Maxillary Models and Waxups: Controls the visibility of the profiles in the 2D renderers and 3D models on the volume. Option is only available after they have been added by an Anatomage technician as part of a surgical guide case workup.

Save View Settings
Saves the current 2D View settings to be reloaded upon opening any case. See the Display Preferences section in **Preferences** for more information on which settings are saved for this specific tab.
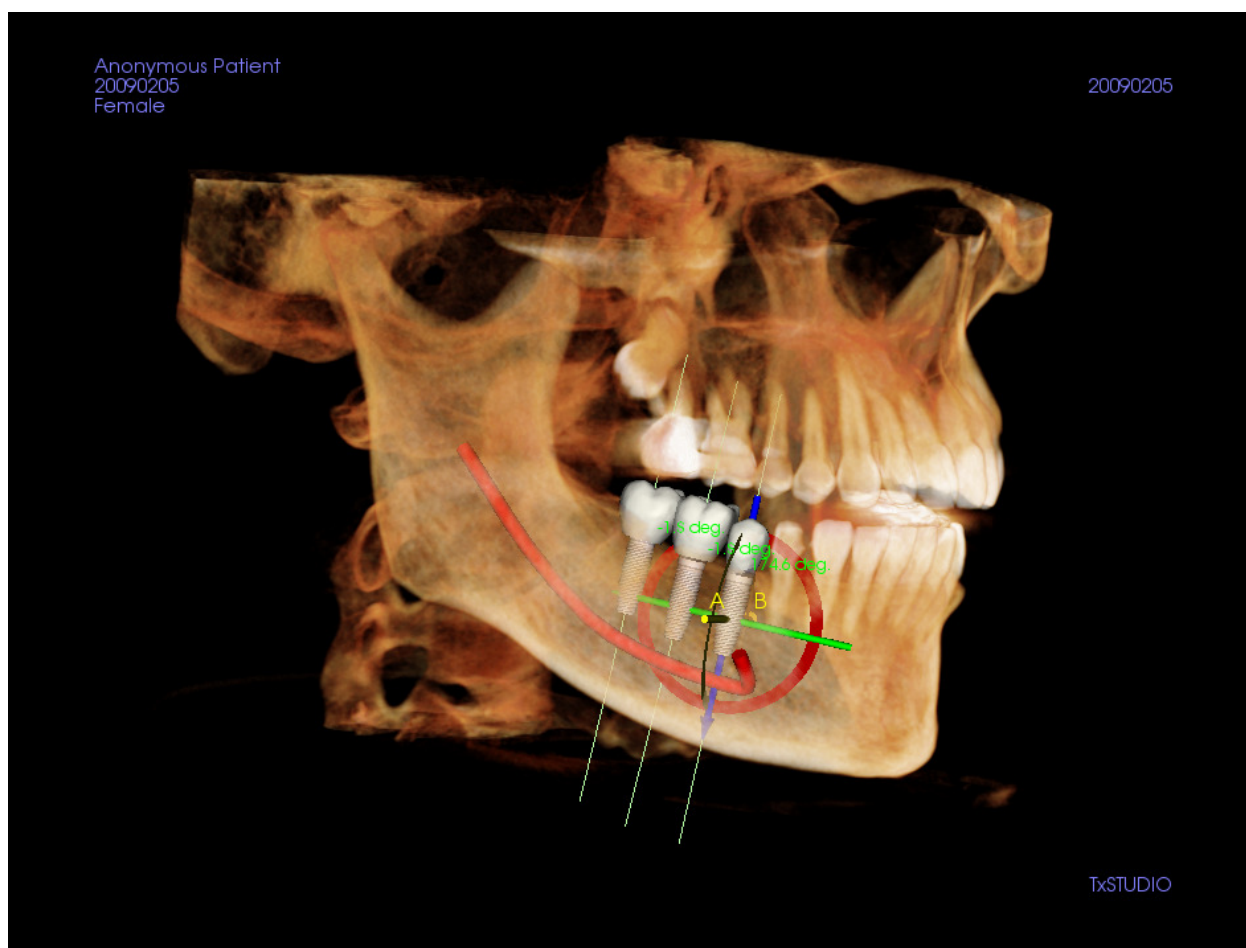
Implant: Rendering Window

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.

⚠️ 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

Implant: Model Visibility

The Model Visibility function will open the Model Object Settings dialog.

- The Mandible and Maxilla checkboxes control all of the model visibility options (except Profile Only and Density) and allow the user to turn off the set of models for each jaw independently. *Note: The visibility checkboxes in Model Object Settings will not always match the checked/unchecked status of the visibility checkboxes in the Control Panel.*)
- The Stone Model and Waxups Opacity can be adjusted for both jaws.
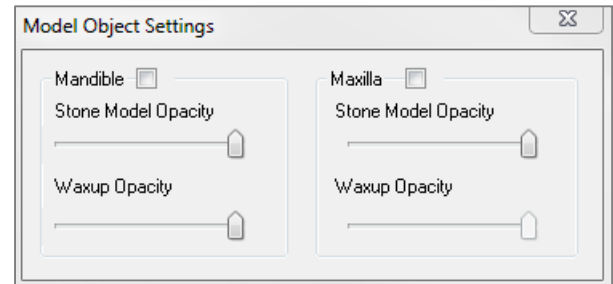
Implant: 3D Implant Widget🖱

The 3D implant widget is designed to minimize obstruction in the renderer but still provide a high level of versatility in implant positioning in 3D. The arrows can be dragged to reposition the implant transversely. The colored arrows only appear when the camera perspective is close to orthogonal.

- The yellow arrow (not shown) is parallel to the A-B line
- The blue arrow is orthogonal to the green and yellow arrows
- The green arrow runs through the long axis of the implant
- The rotation circle appears on the same plane as the two arrows that are close to orthogonal to each other and to the camera perspective and feature eight handles for rotation.
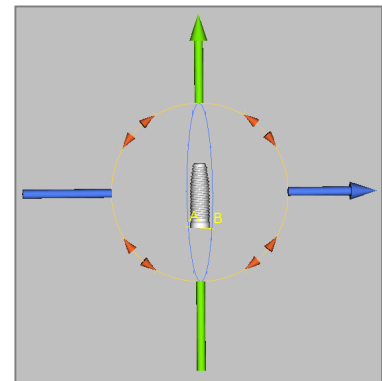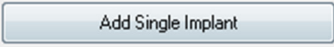
Implant: 2D Implant Widget🖱

The 2D implant widget is designed to minimize obstruction in the slice renderer but still provide a high level of versatility in implant positioning as well as sizing.

- The rotation circle has eight handles for implant rotation along the same plane as the currently displayed slice.
- The two red handles can be selected and dragged towards/away the implant to reduce/expand the diameter of the implant sequentially through any available options for that implant model.
- The two blue handles can be selected and dragged towards/away the implant to reduce/expand the length of the implant sequentially through any available options for that implant model.
- The implant model itself can be selected and dragged in any direction along the same plane as the currently displayed slice.
- A rotation circle appears when the product cross section is selected that allows for implant rotation about the long axis of asymmetrical implants (STL) in the top left section renderer. Please contact Anatomage for an updated list of asymmetrical implants (STL).
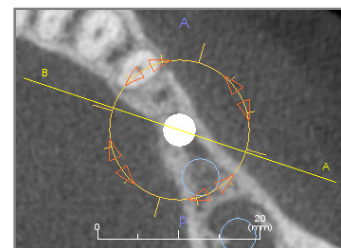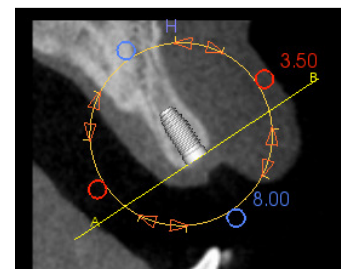
Implant: 3D Implant Planning

- In the View Controls, click the **Add Single Implant** button [Add Single Implant].
- 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 should be removed.
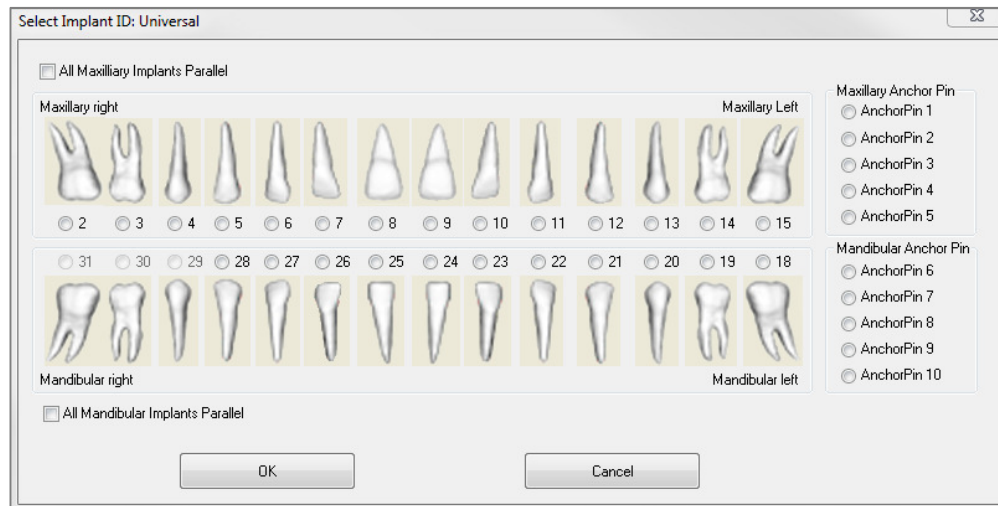
A similar procedure can be done to add anchor pins to your 3D volume. Select which anchor pin you would like to add and follow similar steps for adjusting its position.

Implant: Pano Implant Planning
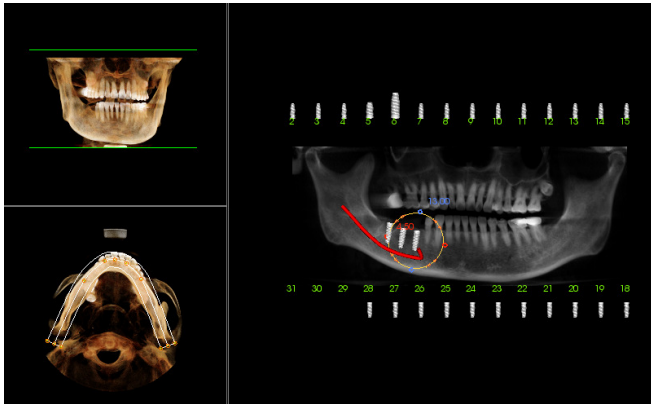
- Select Implant Planning: Pano under the View Controls in the Implant Tab.
- Rendering Window updates to Pano view (shown below).
- Adjust the Arch-Section focal trough such that the middle profile passes through the dentition.
- Drag implant to its desired location and adjust the angle of the implant.
- Repeat for all desired implants.
- Select Implant Planning: 3D to exit Pano-Mode and adjust individual implants.
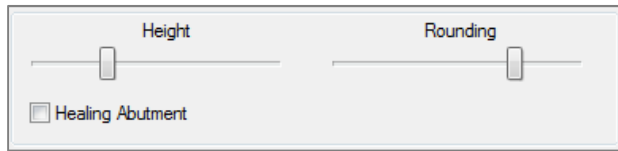
Implant: Abutment Planning
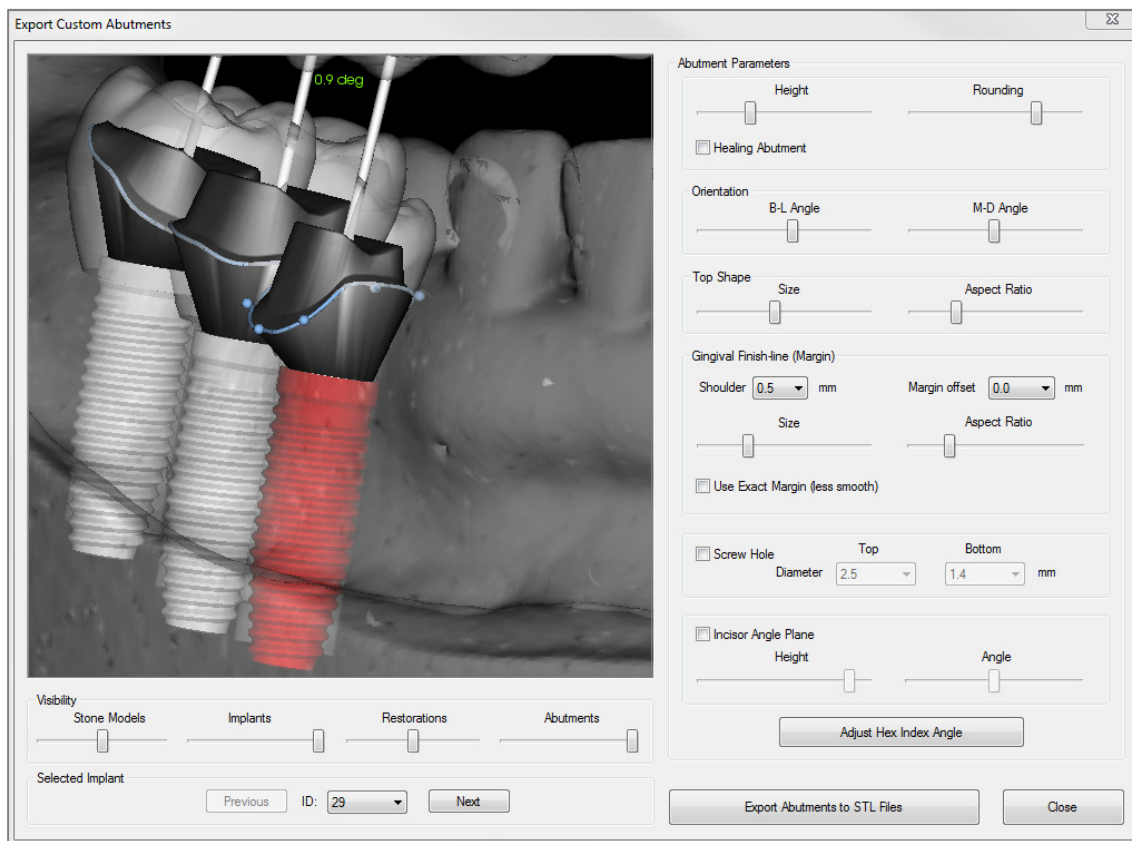
- The abutment automatically connects the restoration model with the implant model in the Rendering Window. (A healing abutment will automatically be selected when no crowns are present.) The Export Custom Abutments dialog allows for custom abutment design for each implant for immediate export as an STL file. *The abutment design will not save after exiting the dialog.*
- The currently selected abutment will be displayed in red as well as shown in the Selected Implant drop down.

Implant: Abutment Planning Dialog
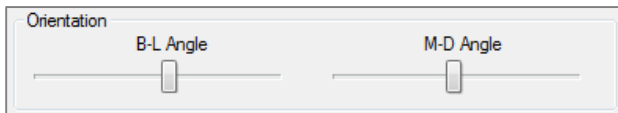
Abutment Parameters

- Height: Adjusts the length of the abutment.
- Rounding: Adjusts the rounding of the abutment.
- Healing Abutment: Replaces the current abutment with a healing abutment.
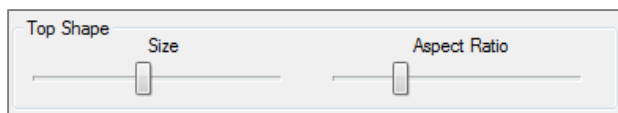
Orientation

- B-L Angle: Adjusts the buccal-lingual angle.
- M-D Angle: Adjusts the mesial-distal angle.
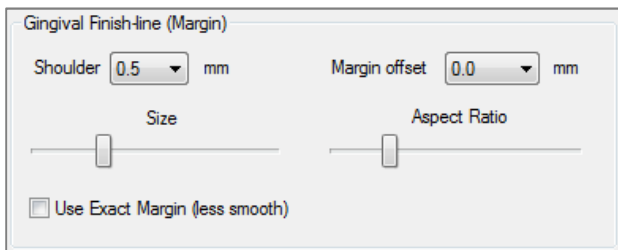
Top Shape

- Size: Adjusts the size of the top of the abutment.
- Aspect Ratio: Adjusts the aspect ratio of the top of the abutment.

Gingival Finish-Line (Margin)
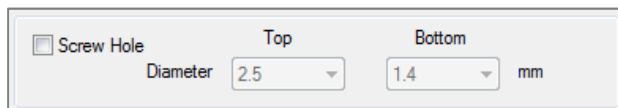
- Shoulder: Adjusts the margin between the axial (abutment) tooth surface and finish line.
- Margin Offset: Sets a -2 to +2 mm offset value between the finish line and the connection surface.
- Size: Adjusts the size of the finish line shape.
- Aspect Ratio: Adjusts the aspect ratio.
- Use Exact Margin (less smooth): The finish line is calculated to the exact surface of the stone model without smoothing on the curved line.
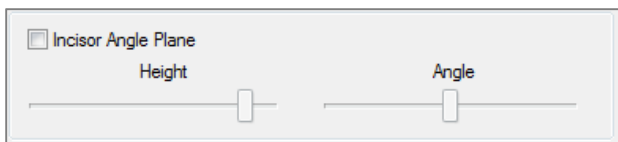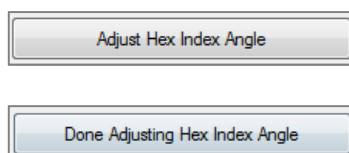
- Screw Hole: Adds a screw hole that exits through the top and bottom of the abutment.
- Diameter (Top and Bottom): Adjusts the diameter of the top and bottom exit holes.

- Incisor Angle Plane: Clips the incisal abutment above the finish line at a specified height and angle.
- Height: Adjust the height of the plane.
- Angle: Adjusts the angle of the plane.

Adjust Hex Index Angle: Inserts a new widget into the renderer to allow rotation of the hex.

Done Adjusting Hex Index Angle: Removes the widget from the renderer.

Visibility, Selected Implant, Export Options
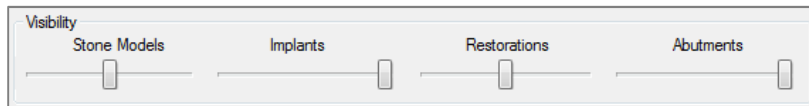
Visibility

Adjusts the opacity for Stone Models, Implants, Restoration, and Abutments.
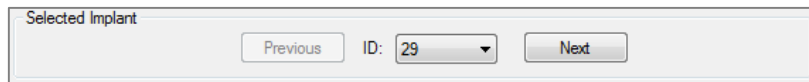
Selected Implant

Allows switching in sequence from one implant to the next or by direct selection using the drop down.
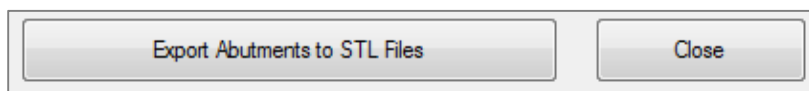
Export Abutments to STL Files:

Exports STL files for each abutment. **Close** will close the dialog.

Implant: Advanced Restoration Design

TxSTUDIO features advanced restoration design functions located in the Restoration tab (see the Restoration section for more information on this tab). Compatibility between files saved in different TxSTUDIO/Invivo5 versions will cause certain behavior that accommodates this new functionality, as described below:

Scenario:

1. Opening an INV file containing a restoration workup from any earlier version:

Consequence:

1. The Implant tab will display these restorations as they were last saved. Upon going to the Restoration tab, however, the program will attempt to convert the original restorations into crowns from the new library. If the user chooses not to convert the restorations (**No**), they will be brought back to the Implant tab.
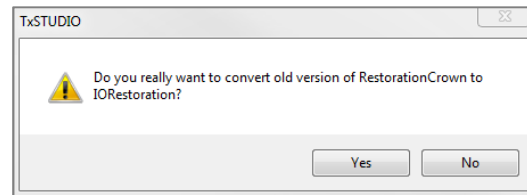
2. Opening an INV file saved in TxSTUDIO 5.3 with an implant and restoration workup in earlier versions of TxSTUDIO/Invivo:

2. The earlier version of TxSTUDIO will not be able to display the restoration crowns in the Implant or Model tabs.

3. Opening an INV file saved with implants from any earlier version, but no restorations:

3. The implant workup will be loaded, and the user will be able to add restorations from the Restoration teeth library.

Implant: Check Sleeves
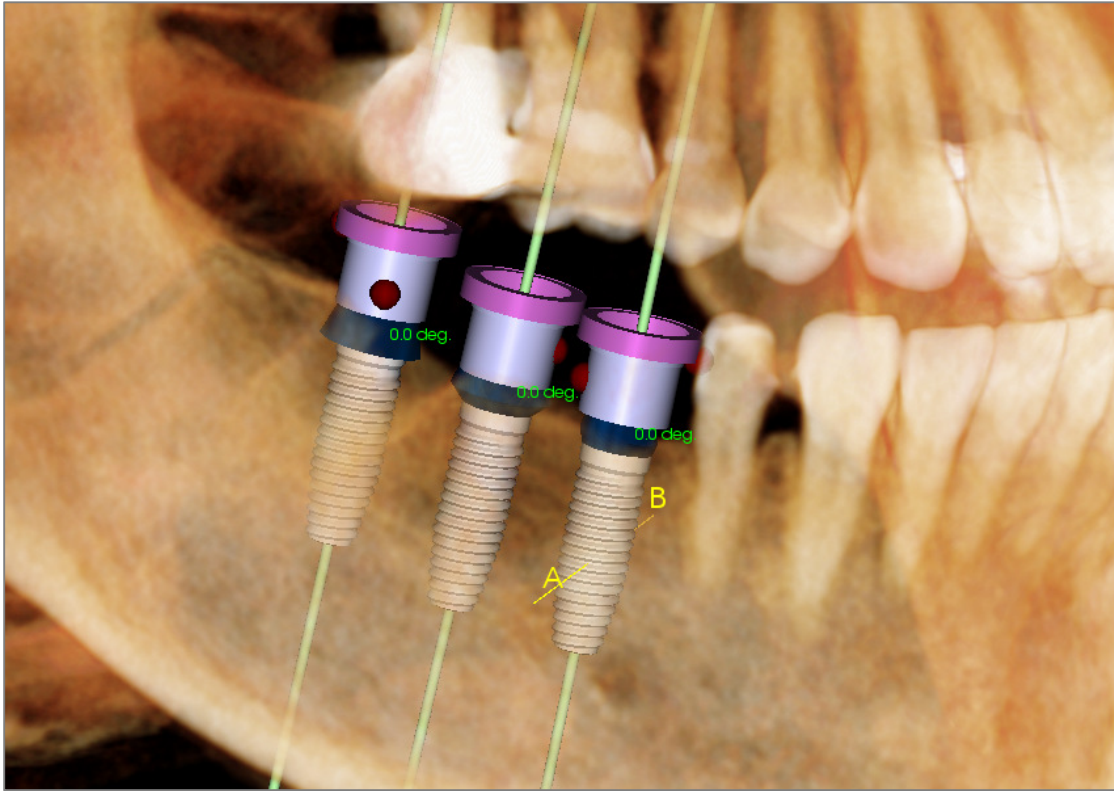
The Check Sleeves function can be performed to determine the position of where sleeves would be if a surgical guide was produced for implant placement. This function will simulate possible collisions that may occur between:

- Sleeves and other sleeves
- Sleeves and the instrument
- Sleeves and the stone model
- Instrument and the stone model

Interference: Demonstrated visually by a dark red colored sphere. **These interference indicators are not updated in real-time and will only be rechecked after each instance that Check Sleeves is performed.**

Check Sleeve Interference: The user can change certain preferences to better simulate the actual procedure that will be performed, such as sleeve system, instrument, sleeve size, and drill. Solution options are to change implant planning, change sleeve preferences, or to allow a technician to try to resolve the interference.
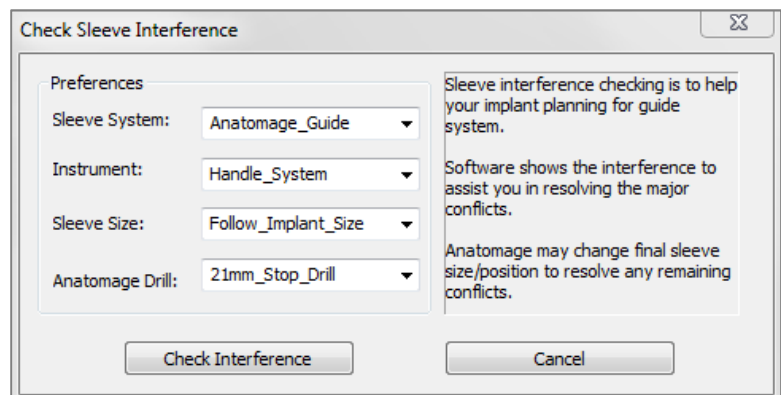
- The implant view sequencer is a movie-creating tool that contains both an axial and buccal (shown above) preset sequence of view positions and rotations.
- The sequence is adapted to be used with any case and immediately played as a preview.
- A movie file (.avi) that resembles the preview can be captured.
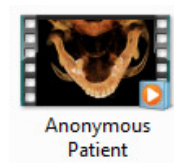
View Sequencer
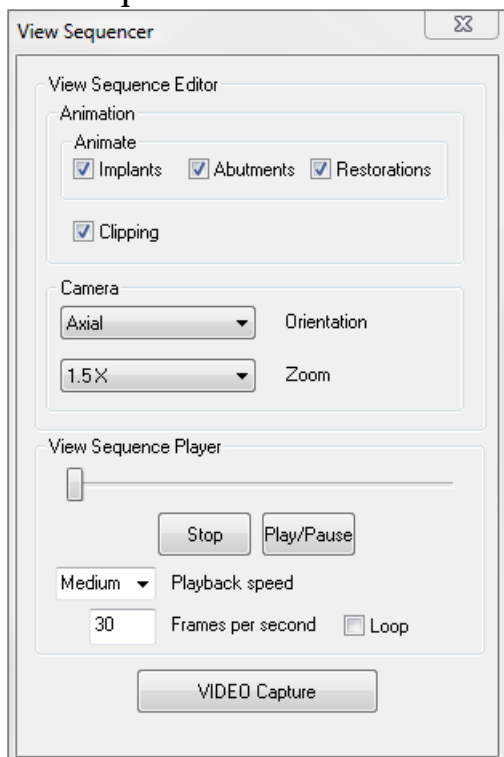
Animation

- Animate: Set the sequence to include the placement of implants, abutments, and restorations.
- Clipping: Set the sequence to include the preset clipping actions.

Camera

- Orientation: Set the orientation to be axial or buccal
- Zoom: Set the zoom level of the rendering window (None, 1.5X, 2.0X)

View Sequence Player

- Slider: Shows the current progress through the video while allowing navigation through the preview by clicking and dragging
- **Stop:** Stop the preview
- **Play/Pause:** Starts the video/pauses the video/resumes the video
- Playback speed: Speed of playback (slow, medium, fast)
- Frames per second: Sets the smoothness of the preview playback
- Loop: Sets the preview to loop at the end of playing the sequence

Action

> The current view sequence will be captured into a movie file.

Movie File Location

> Choose the location to save the file by clicking **Change**.

Available Codecs Installed In This Computer

> Choose from a drop down list of the available codecs installed on the computer. Click **Configure** to choose from more Recording Options.

Video Frames and Playing Time

- Seconds/Implant: length of sequence for displaying each implant
- Frames/Sec: Smoothness of the video
- Total Play Time: Calculates the total play time for the options selected

Ending Logo

- Image File: Click **Browse** to select the location of the logo file.
- Add Logo: Select the checkbox to add in a logo segment to the movie.
- Duration: Set the length of time to show the logo
- Background: Set the background color for the logo segment.

Capture

> Creates a video file from the selected sequence and video recording settings. Click **Cancel** to exit this dialog without recording the video.

Implant: Settings and Preferences

By selecting the **Preferences** icon [icon] you can open up a customization window within the Implant Tab:
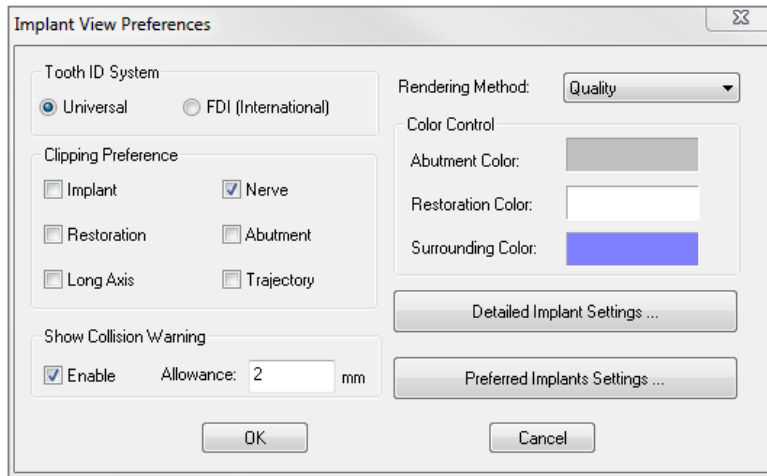
Tooth ID System:

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

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, and Quality) you would like to use in the Implant View Tab.

Color Control:

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

Detailed Implant Settings:

Adjust default settings for individual implants. See more information below.

Preferred Implants Settings:

Used to modify which implants will be displayed in the dropdown menus in the control panel. See more information in the Preferred Implant Settings section on page 69.

Detailed Implant Settings

When you select **Detailed Implant Settings**, you are able to adjust the default settings for individual implants in the Implant Planning Preference Window.
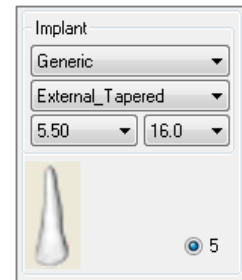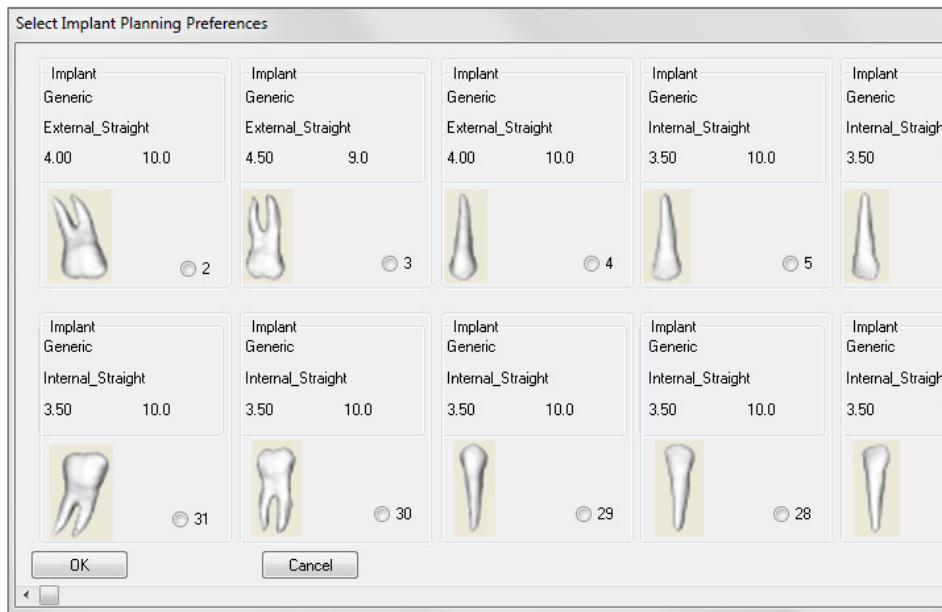
Clicking once anywhere in the region above will activate dropdown menus for the various implant characteristics. *Options will not appear for implants not in the preferred list (see below).*

Click OK to save these preferences and the designated implant will be selected automatically when choosing a tooth in the Add Single Implant menu.

Preferred Implants Settings

The user can hide certain implants from populating the lists to simply the dropdown menus. By default, all implant manufacturers and types are selected as "preferred". **To remove an implant, select it in the list on the right-hand side and use the left arrow button to remove it from the list.**
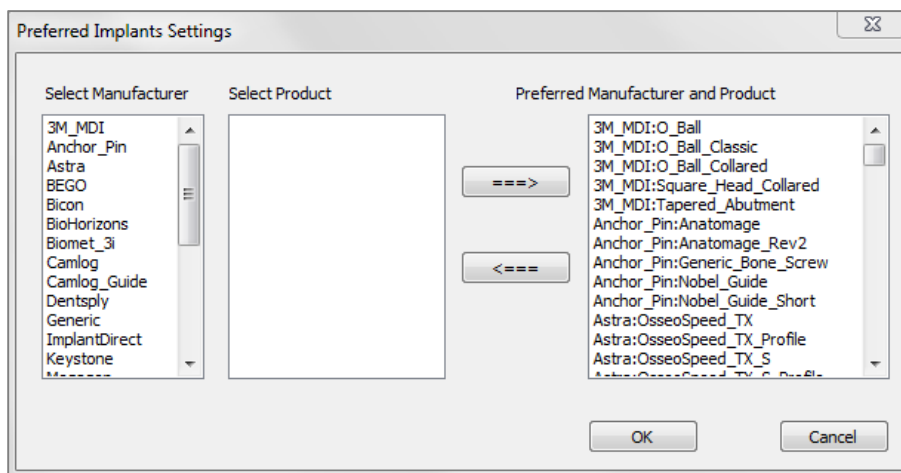
Settings will take effect in the dropdown menu options for Detailed Implant Settings as well as in the Implant section of the control panel. If there is a case open with implants that are not in the preferred list, the implant will still show up correctly in the renderers and the control panel. However, the specific settings for this implant cannot be changed and implants of the same type cannot be added.

Adding implants to the preferred list can be accomplished by selecting the implant manufacturer on the list on the left-hand side, selecting the specific product in the middle column, and pushing the right arrow button to add.

By selecting the **Density Profile Control** icon [icon] you can adjust the settings for the Density Profile.
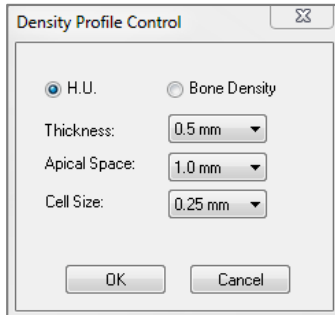
H.U.: Shows the bone density in Hounsfield units

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.

Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

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

Restoration View Features

The **Restoration View Tab** is an advanced tool that bridges the gap between implantology and restoration crown design. Users can register the stone models and add on teeth directly or onto existing planned implants. With the model collision visibility options, numerous full teeth libraries, and mesh editing features, this tab aims to guide implant surgery with the goal of achieving perfect occlusion.
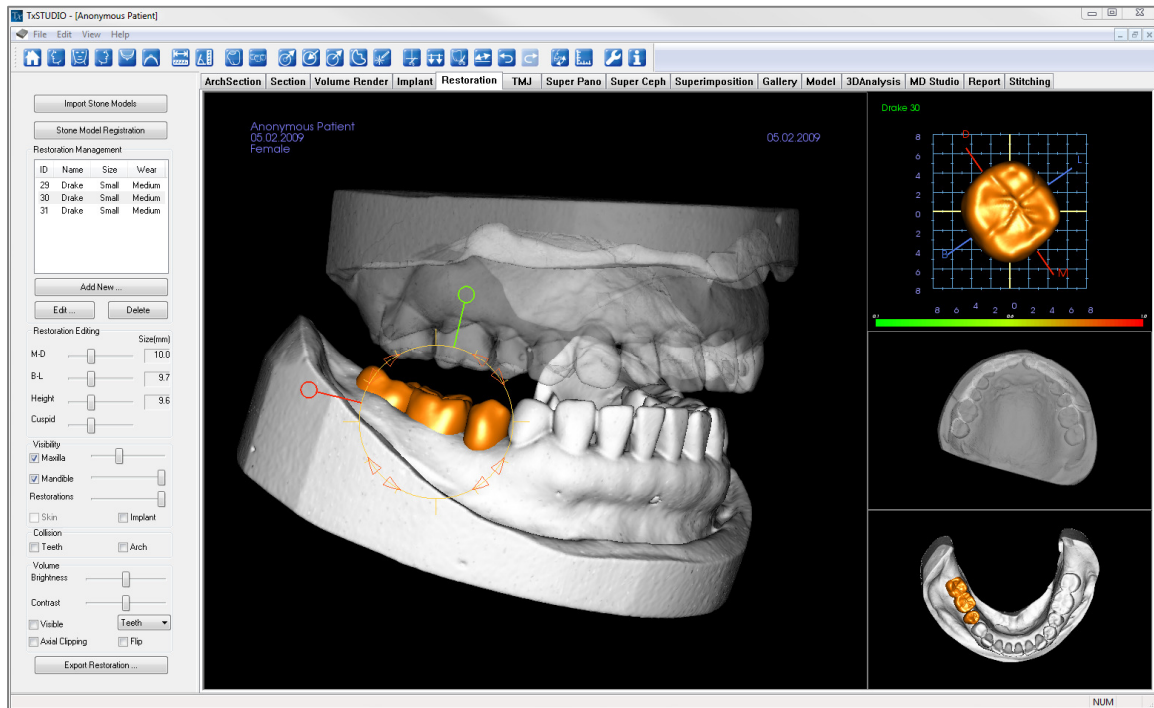
Restoration: Toolbar

Shown below is the Tool Bar and tools that are loaded with the Restoration 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.

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

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.

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.

Show Collision: Turns on/off the collision between teeth restorations and the opposing/working stone models or restorations.

Show inter-arch collision: Turns on/off the visibility of collisions between the stone models

Area Drag: Turns on the area drag tool in the rendering and the single tooth renderer windows

Push Mesh: Turns on the push mesh tool in the rendering and the single tooth renderer windows

Pull Mesh: Turns on the pull mesh tool in the rendering and the single tooth renderer windows

Smooth: Turns on the smooth tool in the rendering and the single tooth renderer windows

Auto collision resolution: Turns on the auto collision tool in the rendering and the single tooth renderer windows

Plane Cutter: Activates a polygonal cutting tool to cut and close the mesh of stone models in the rendering window

Cap Model: Applies a capping function to the available open mesh stone models

Tooth extraction: Enables a polygonal mesh cutting tool for use on a stone model in immediate extraction cases.

Adjust occlusion: Turns on the stone model adjustment widget for manually moving the stone models and their dependent restorations in the rendering window

Undo: Pressing this button will undo the previous operation, including mesh transformations and

manipulations. Sequential presses of this button will undo the next most recent operation.

Redo: Pressing this button will redo the next operation, including mesh transformations and manipulations. Sequential presses of this button will redo the next most recent operation.

Articulation: Opens the Articulation dialog to open/close the jaws with a simulated biting motion.

Toggle Grid: Turns on/off the 2D grid for simple assessment of size, measurement, and spatial location

Preferences: Opens the Preferences dialog for selecting color, collision, and default tool size settings.

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 apparent 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

Restoration: Control Panel

Import Stone Models

Initiates a sequence of steps to import and register a stone model. For more information, see the Restoration: Stone Model Registration section on page 75.

Stone Model Registration

Opens the Register Stone Models to Volume dialog to restart the registration for the imported stone models.

Restoration Management

- **Add New…**: Opens the teeth library for restoration selection and placement
- **Edit…**: Opens the teeth library to change the current restoration selection
- **Delete**: Removes the currently selected restoration from the rendering window

Restoration Editing

- M-D Size(mm): Adjusts the mesial-distal dimension of the restoration
- B-L Size(mm): Adjusts the buccal-lingual dimension of the restoration
- Height (mm): Adjust the height of the restoration
- Cuspid: Adjusts the cusp dimensions from low to high

Visibility

- Maxilla: Adjust the visibility/opacity of the maxilla
- Mandible: Adjust the visibility/opacity of the mandible
- Restoration: Adjusts the opacity of the restorations
- Skin: Turns on/off the face photo wrap from the Anatomodel workup file or 3DAnalysis
- Implant: Turns on/off the implant visibility

Collision

- Teeth: Turns on the visibility of collisions between the restorations and the opposing/working stone model or restoration
- Arch: Turns on the visibility of collisions between the stone models

Volume

- Brightness & Contrast: Can be adjusted for each of the presets to enhance your image.
- Visible: Turns on/off the visibility of the DCM volume
- Axial Clipping: Turns on/off the Axial clipping and the Axial Clipping widget
- Rendering (drop down): Chooses the rendering preset between the options of Teeth and Bone
- Flip: Flips the clipping direction

Export Restoration…

Opens the Export Restorations to File dialog to select how to export the restorations.

Restoration: Stone Model Registration

The **Import Stone Model** function will guide you step-by-step through the importing and registration of upper and lower stone models. If stone models are already present in the workup, this function will serve to replace the existing models.

Step 1: Import Stone Models

- Click **Import Stone Models** in the Control Panel.
- Choose the .stl or .ply file in the Select Stone Model File dialog.
- Select the type of model as Upper (maxilla) or Lower (mandible).
- Move onto the next step. At the end of registration, click **Import Stone Models** once more if the opposing stone model needs to be imported or if a stone model registration needs to be redone.
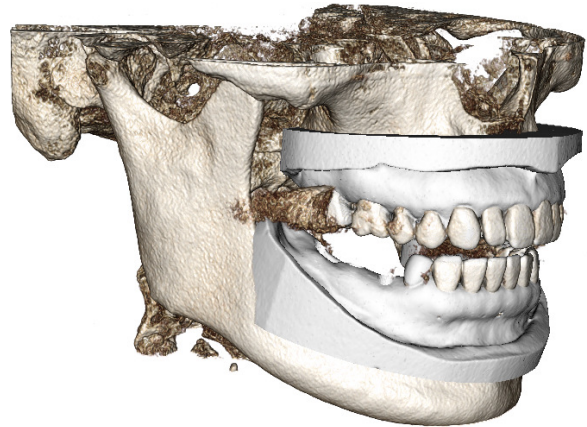
Step 2: Select Type of Registration

- **Maintain Position**: The software will apply the transformation data from the registration of the opposing arch to this STL. This option is useful if a pair of STLs (upper and lower) have been registered in another program (intraoral scans may have close bite registration data). In this case, after registering one STL to the DCM (see Register to CT), the second STL can be imported and be loaded so that the close bite registration is restored. This will most likely result in an incorrect position relative to the DCM scan for the second STL, since many CBCT scans intended for implant/restorative workups are taken with open patient bites.

- **Register to CT**: This will initiate the first step in registering the STL file to the DCM. The dialog (right, lower) shows the three steps needed to complete the registration. The layout (Figure 1) shows the STL on the left of the rendering window and the DCM on the right with the adjacent clipping tool. Click **Help** to read the embedded document describing how to register different cases.
  - Clean Scan: Use on DCMs with low scatter in the dentulous regions. The point registration will use additional points where selected for a more accurate registration.
  - **Restart**: Resets the user back to Step 1 in the dialog.
  - **Perform Registration**: matches the STL to the DCM based on the points selected.
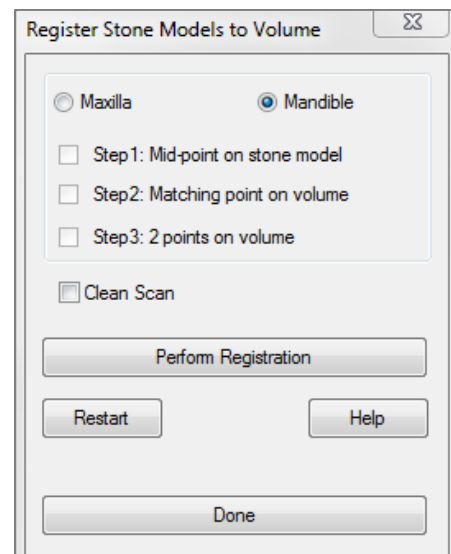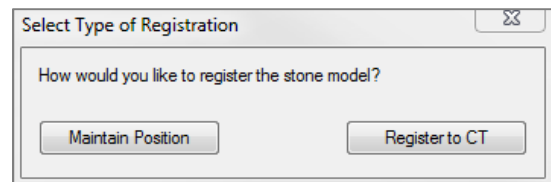
o **Done**: Closes the dialog
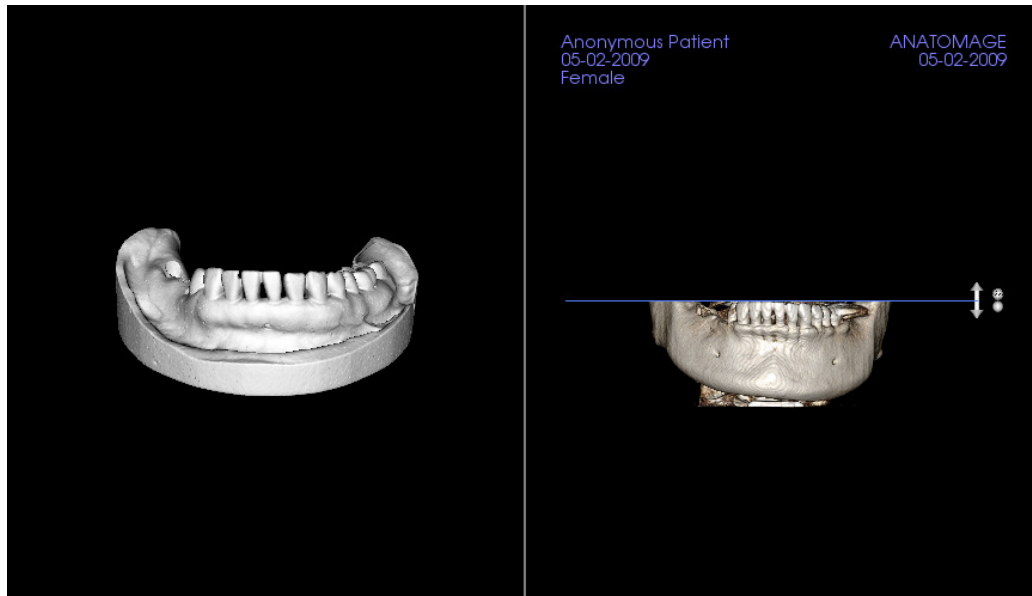
Figure 1

o After clicking **Perform Registration**, the user will be brought to a new layout (Figure 2), which features two volume renderers and three grayscale slice renderers. Use the yellow arrows in the DCM renderer to center the mid-point in the correct position at the front of the scan. After verifying this point in the sagittal grayscale renderer, continue using the other widget arrows and slice renderers to rotate the STL around this mid-point and achieve the proper orientation.
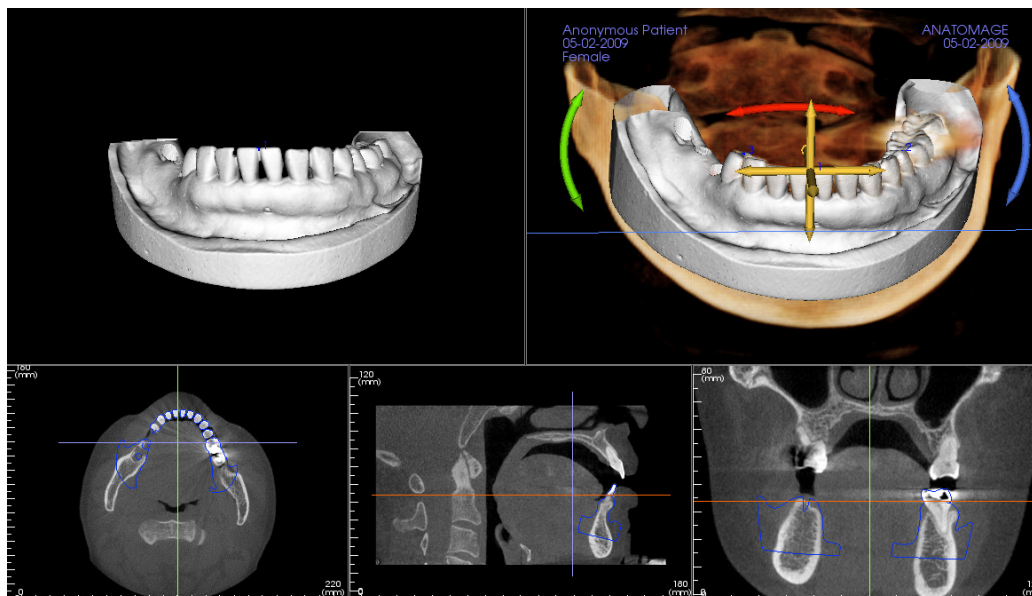
Figure 2

Restoration: Rendering Window & Mesh Manipulation
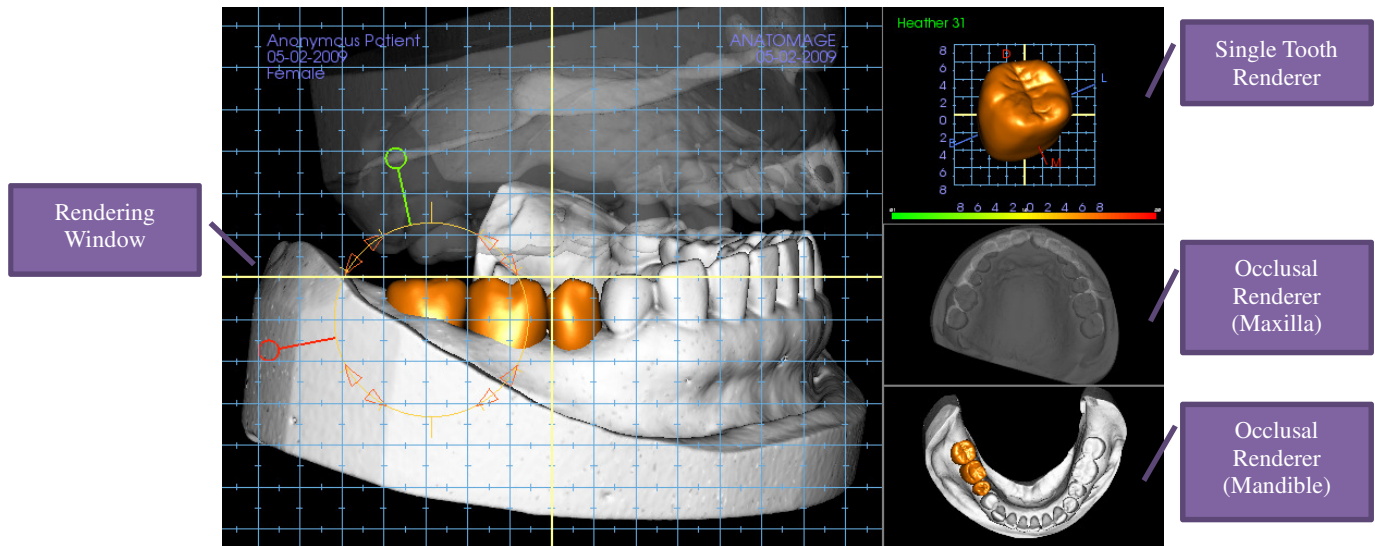
Rendering Window:

- Displays the STLs, restorations, DCM volume, implants, and skin models.
- The restoration can be moved by first left-clicking to select the tooth and then left-clicking and dragging the model to a new location from any view. The angle in which the tooth is viewed determines on which plane the restoration will translate.
- All the mesh editing functions except Auto collision resolution will function in this window.
- Plane cutter, Cap model, Tooth extraction, Adjust occlusion, and Articulation can be performed in this window.

Single Tooth Renderer:

- The tooth model can be independently rotated and zoomed in this view. Clicking on the **D** (distal), **M** (mesial), **B** (buccal), or **L** (lingual) letters will move the restoration in short steps in the selected direction within the rendering window.
- The tooth library type and tooth number will be displayed in the upper left.
- The color scale at the bottom will indicate the depth of the collision with the opposing stone model when Tooth collision is activated. The interval for depth(mm) is set to 0.1 to 2mm and can be changed in the Preferences.
- All mesh editing functions including Auto collision resolution will function in this window.

Occlusal Renderer (Maxilla and Mandible):

- These renderers will display the STL models, restorations, and the collisions (depth or boundaries) between them. It is intended for viewing purposes and the models cannot be zoomed or rotated but opacity changes will take effect.

Restoration: Articulation and Adjust Occlusion

Articulation

The Articulation function will determine a closed bite orientation for the two STL models and define an occlusal plane. The STL models can then be opened, closed, or slid across each other to simulate anatomical jaw operations. (The closed bite registration is determined by a best-fit of the two STLs during specified interactions.)

Activation of this feature will turn on:

- A widget for editing the position of the condyles as well as displaying the occlusal plane. The condyle handles can be left-clicked and dragged to the correct positions.
- The Articulation dialog box (below)
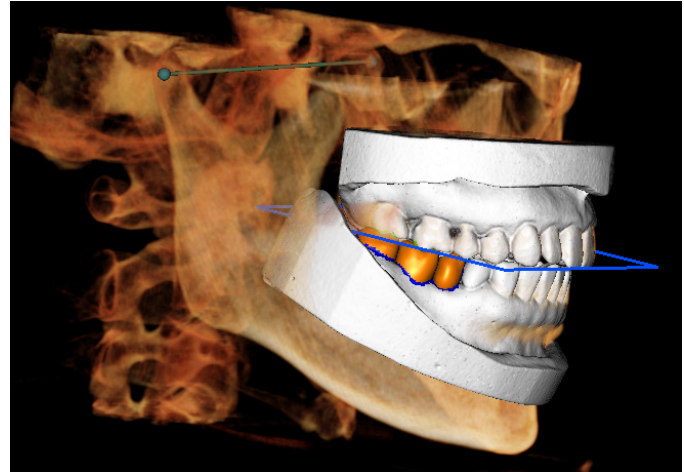
Articulation Dialog

Condyle Angle

This determines the angle of the plane below the occlusal plane on which the mandible STL will slide. (Example: if the Condyle Angle is set to 0 deg, the mandible will slide on the occlusal plane.)

Protrusion Distance

This determines the maximum range in millimeters that the mandible will slide forward using Sliding On Occlusal as well as Left and Right Condyle Sliding.

Movements

- Open/Close: Changes the angle of "jaw" opening between 0 and 15 degrees
- Sliding on Occlusal: Slides the mandible along the occlusal plane with an adjusted angle determined by the Condyle Angle
- Left Condyle Sliding: Slides the left condyle forward along the occlusal plane with an adjusted angle determined by the Condyle Angle
- Right Condyle Sliding: Slides the right condyle forward along the occlusal plane with an adjusted angle determined by the Condyle Angle
- Show Occlusal Plane: Displays the blue frame of the occlusal plane in the rendering window

Close

Closes the dialog box and returns the STLs and restorations to the original registered position

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.*
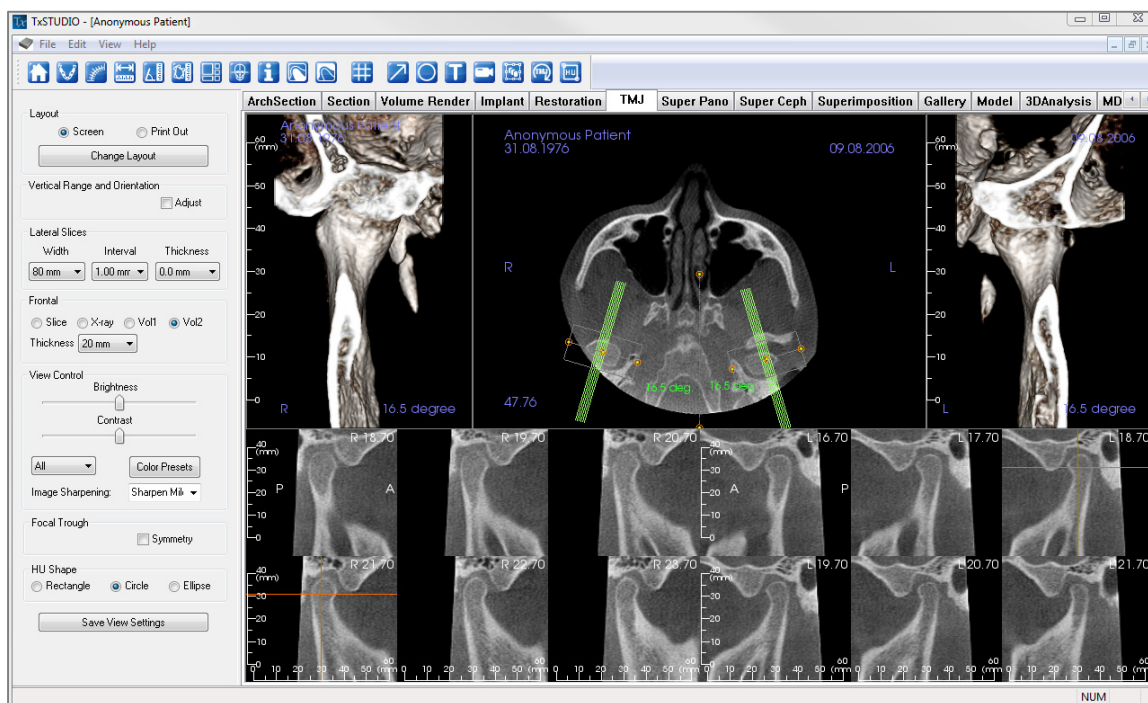
TMJ: Toolbar

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. 51) 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 (see **Report: Features** and **Report: Group Management Creation** for details).

Rotate Focal Troughs: This function will rotate the focal troughs 90 degrees in opposite directions. Warning: Sequence direction depends on focal trough direction. Medial and Lateral may be flipped if the focal trough angle is in the opposite direction.

HU Measurement: Allows for a calculation of the HU value of an area within a bounding box. The user can create multiple HU measurements on a single image. Measurement information is displayed next to the defined measurement area that the user creates, and the text can be repositioned by clicking and dragging the text box with the left-mouse button. The font color and size of the measurement text can be changed using the Preference settings from the File menu. The HU measurement will also display the calculated area and standard deviation for the region chosen.

Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

TMJ: Control Panel

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
  - o Slice – Gray Scale rendering
  - o X-ray – X-ray rendering
  - o Vol1 – Teeth rendering
  - o 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.
- Image Sharpening: Applies the selected sharpening filter from the dropdown menu to the 2D slice renderers.

Focal Trough

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

HU Shape

The shape of the HU measurements can set to Rectangle, Circle, or Ellipse. Each shape is defined by two left-mouse clicks and allows adjustments to the size to be made by first left-clicking to select the shape or measurement box and then left-clicking and dragging the red dots to adjust the position or size.

Save View Settings

Saves the current 2D View settings to be reloaded upon opening any case. See the Display Preferences section in **Preferences** for more information on which settings are saved for this specific tab.
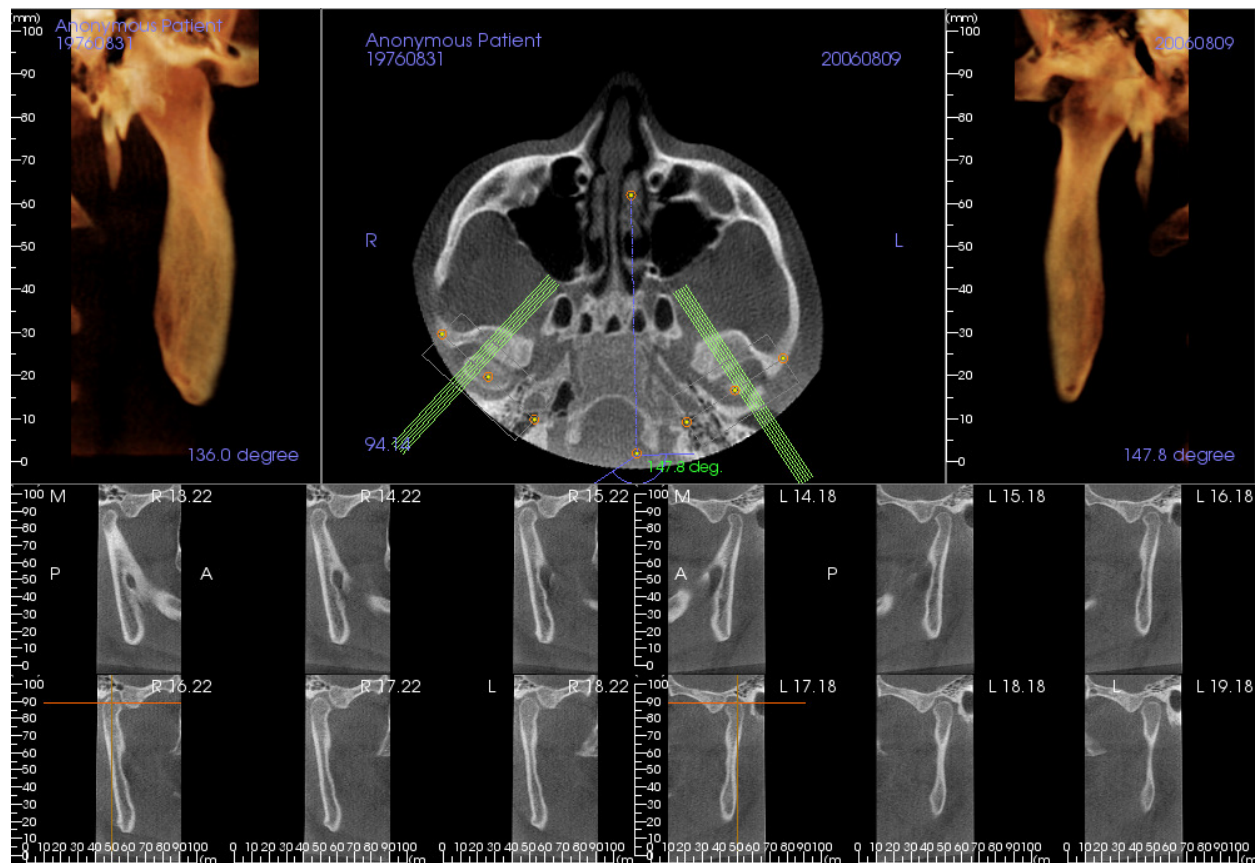
Please refer to **Image Navigation (pg. 26)** for information about controlling and adjusting these images.

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.*
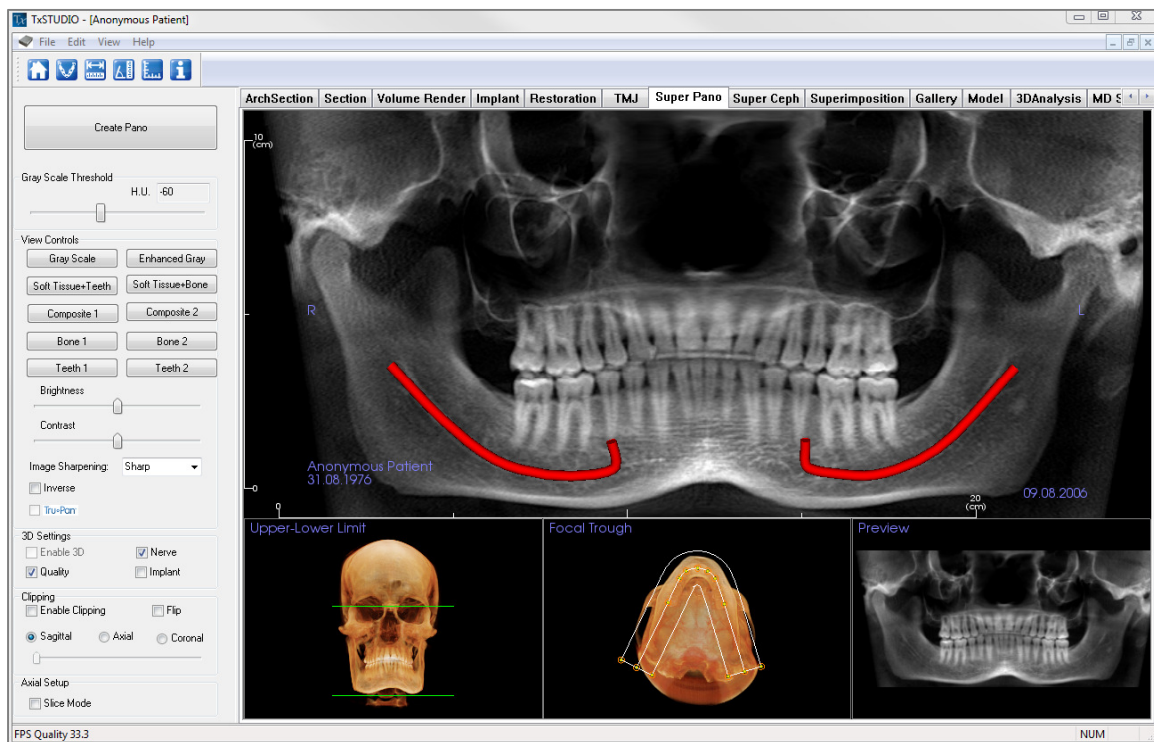
Super Pano: Toolbar

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 off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

Super Pano: Control Panel

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.
- Image Sharpening: Applies the selected sharpening filter from the dropdown menu to the 2D slice renderers.
- Inverse: switches the background to white (switches coloring for Gray Scale Rendering).
- Tru-Pan™: This option enables the one-click volumetric pan that can be created from scans taken by a i-CAT© Cone Beam 3D system. See more information in the Tru-Pan™ section of the manual.

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. 26).
- 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.
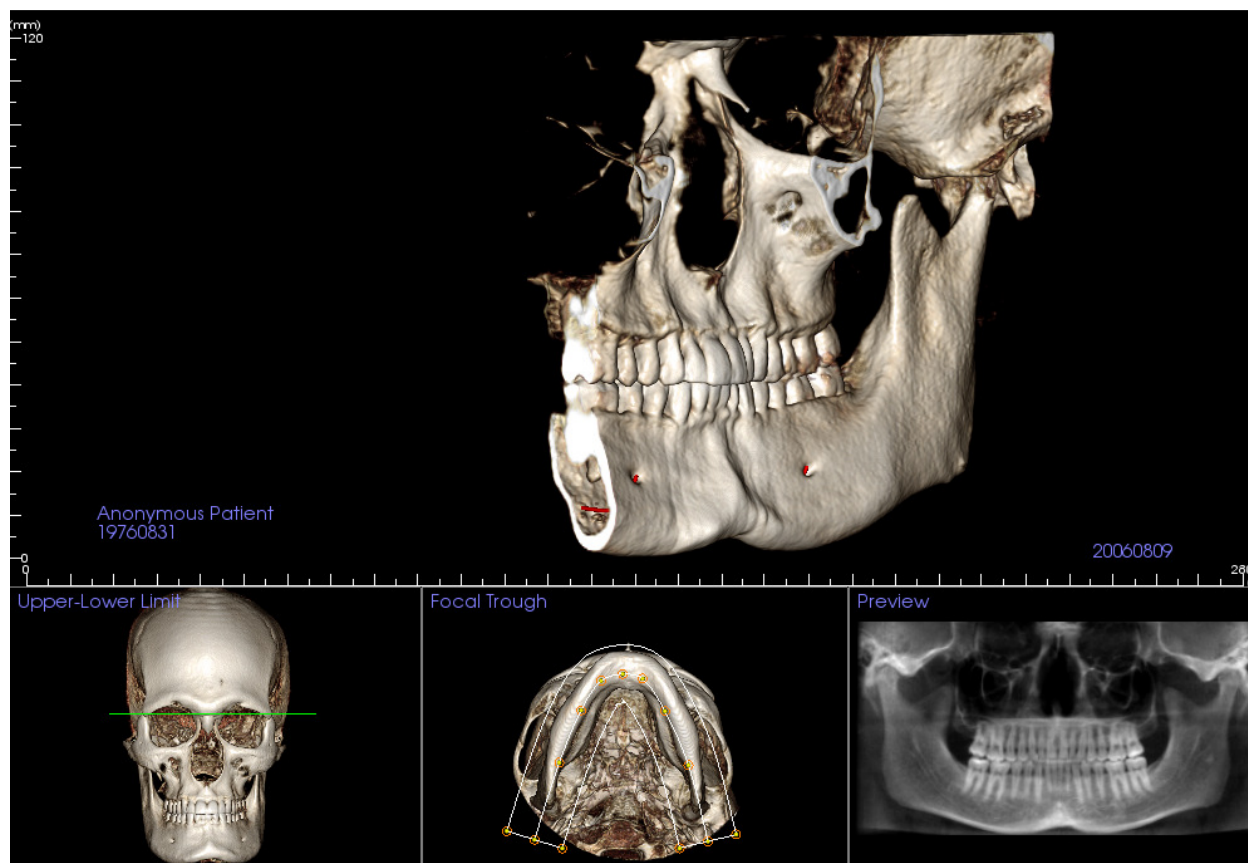
How to make a good Pano:

- 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. 26)** 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.*
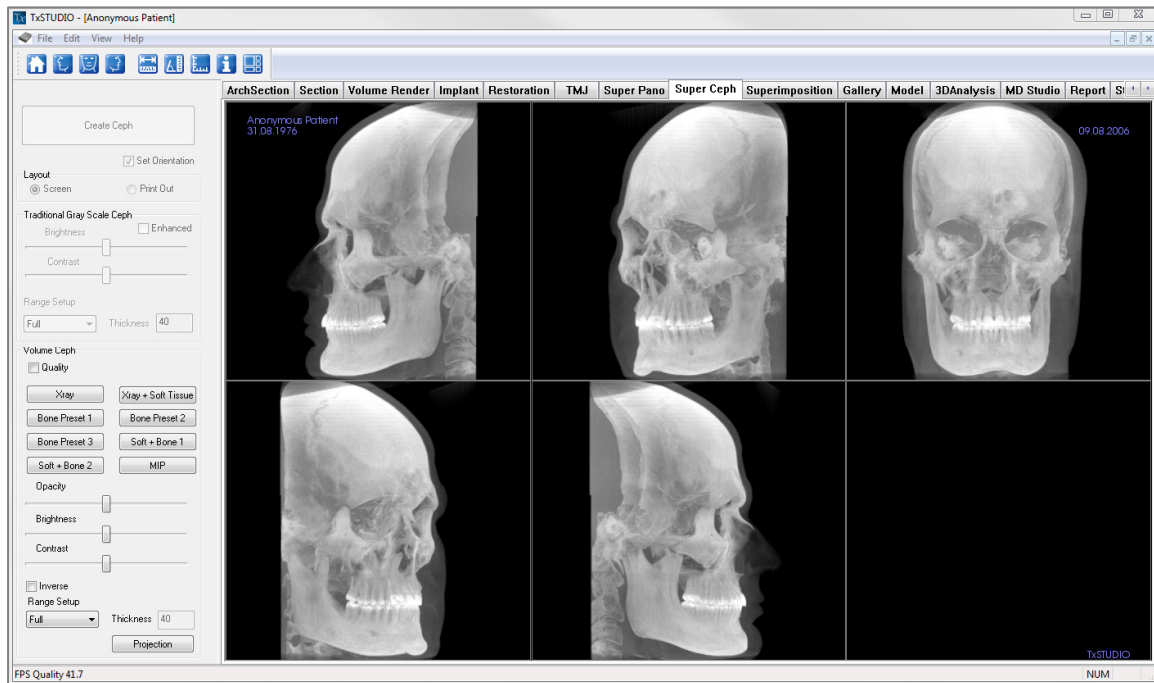
Super Ceph: Toolbar

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.

Change Layout: Toggles between different Super Ceph layouts. "Set Orientation" must be enabled to allow toggling between layouts.

Warning: Any measurement that is incorrect can lead to surgical complications if diagnosis, treatment plans and/or actual treatment is based off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

Super Ceph: Control Panel

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 Control Panel, 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.
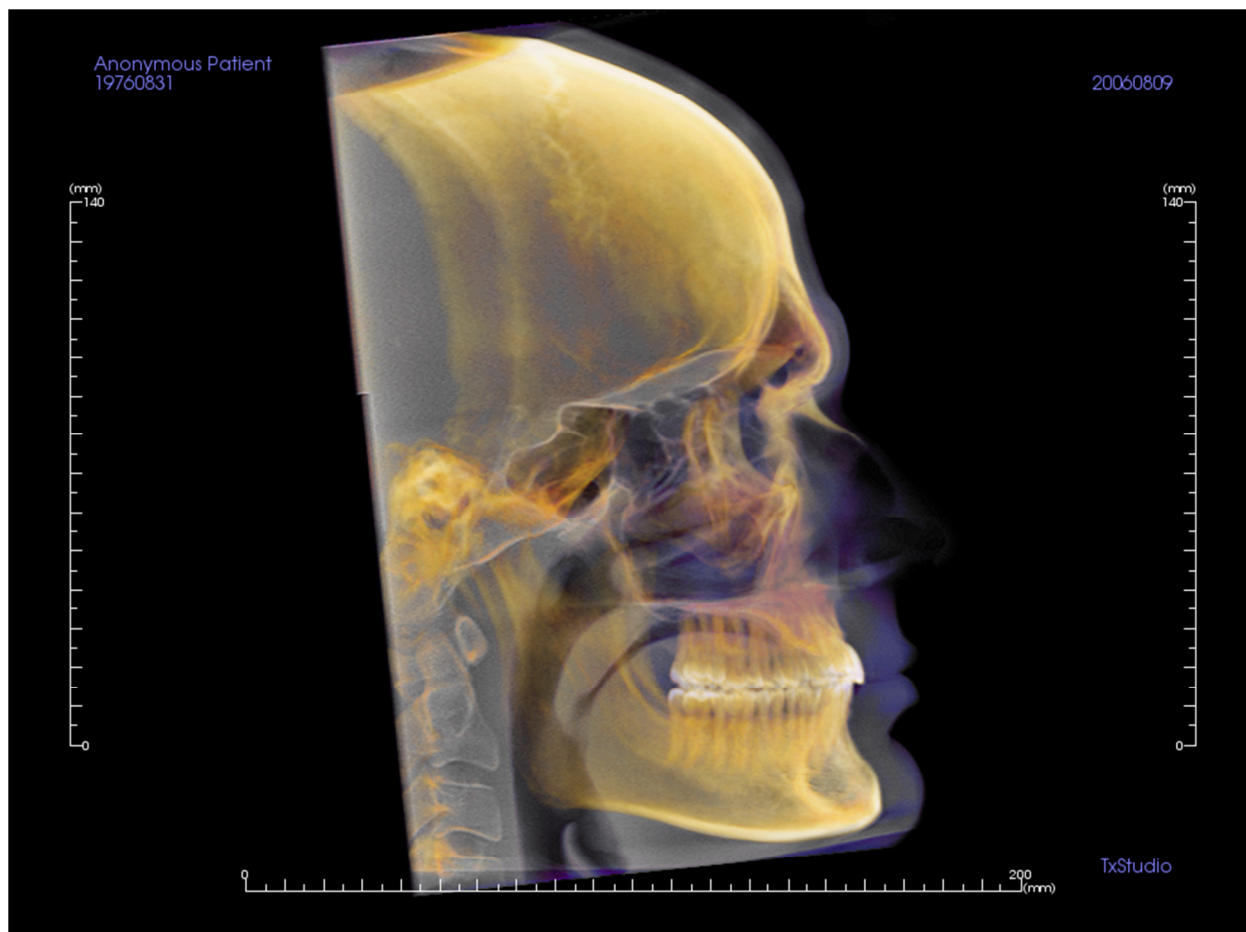
Please refer to Image Navigation (pg. 26) for information about controlling and adjusting these images.

Change Layout

The default rendering layout for the Super Ceph tab is a five-volume view with a shared rendering preset. Each volume will initially be oriented at a different angle from the other volumes but can be rotated, panned, zoomed, or free-moved to a new orientation independent of the other volumes.

The user can switch to the Create Ceph layout by clicking the **Change Layout** button, ![icon]. Switching back to the five-volume layout can be done by clicking once more on the **Change Layout** button when "Set Orientation" is enabled. (This will delete your current ceph, so it is recommended that you capture the ceph to the Gallery before selecting "Set Orientation".)
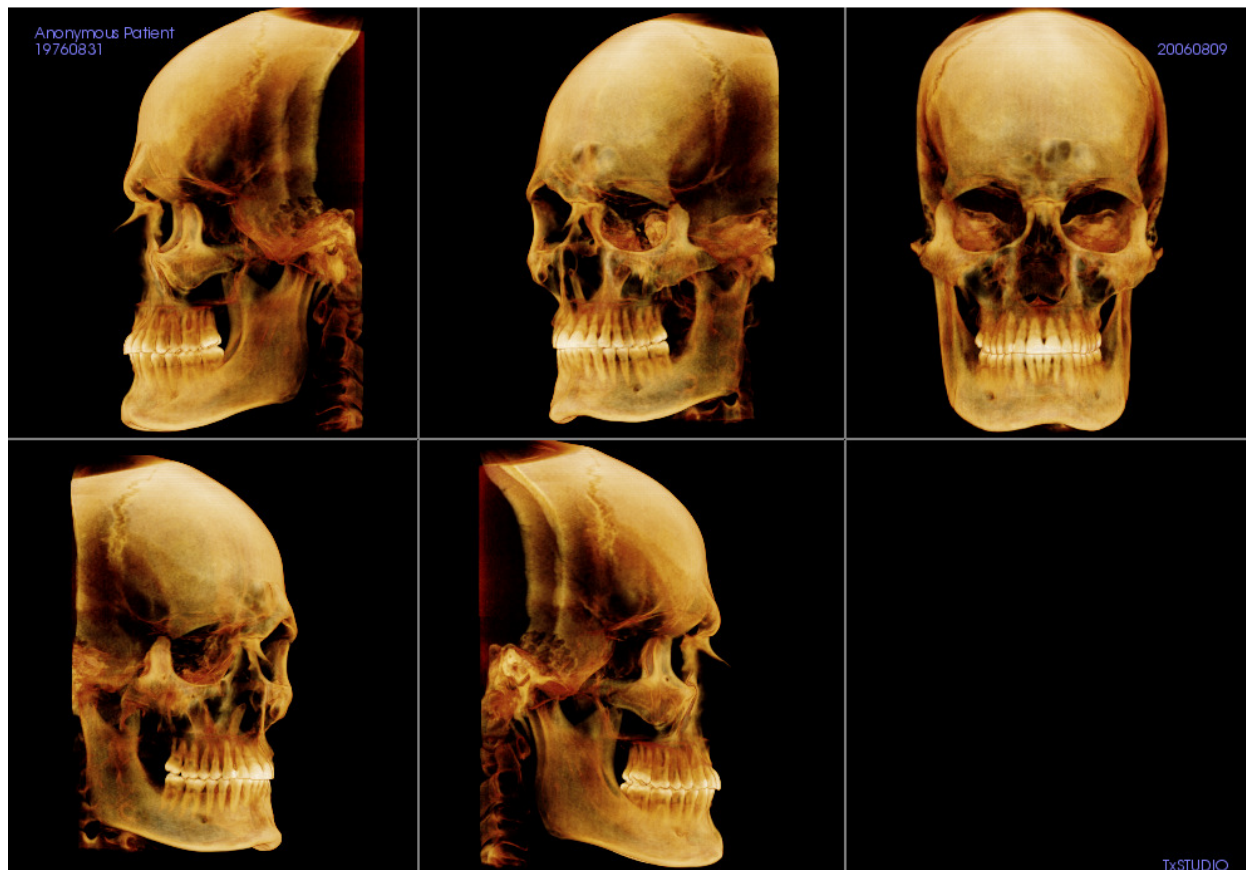
Superimposition Features

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.
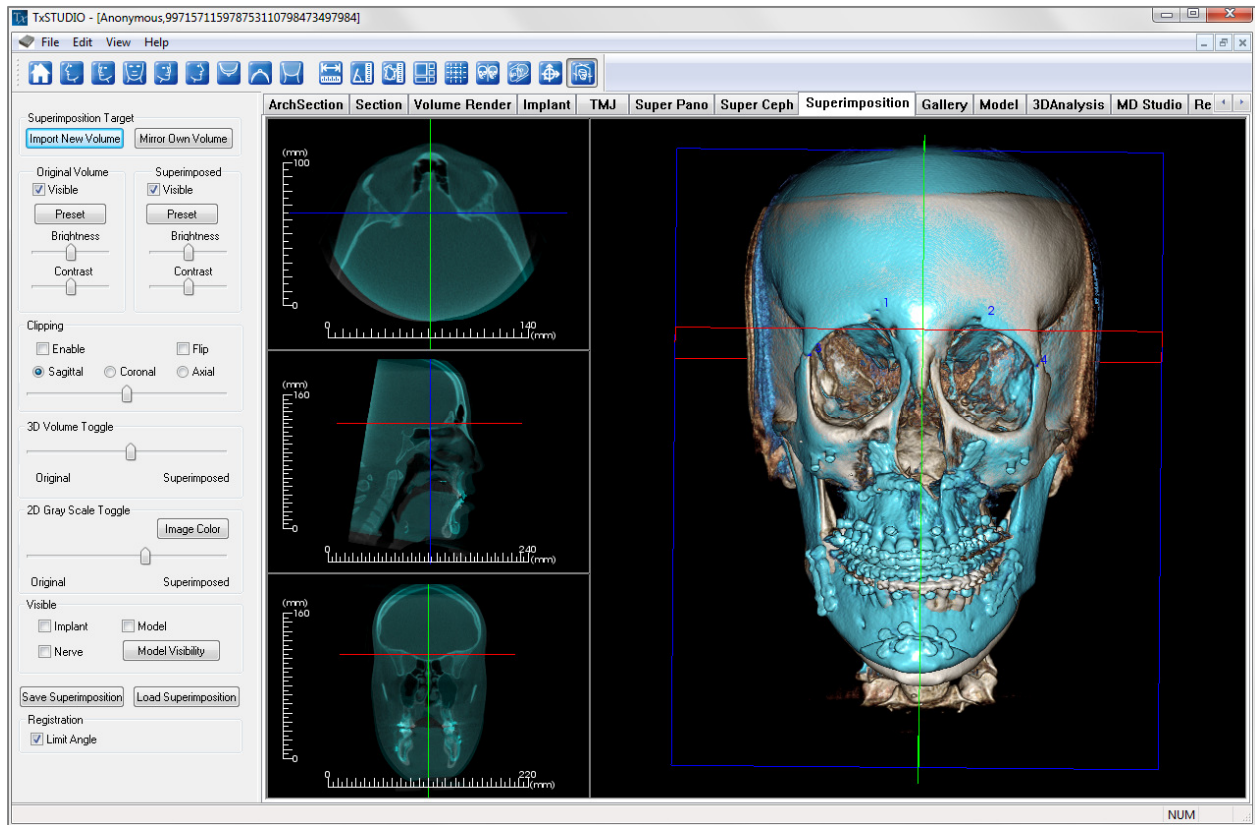
Superimposition: Toolbar

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 ¾ View: Automatically orients the volume so the patient is facing 45° left sagittal.

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

Right ¾ View: Automatically orients the volume so the patient is facing 45° 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 off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

Superimposition: Control Panel
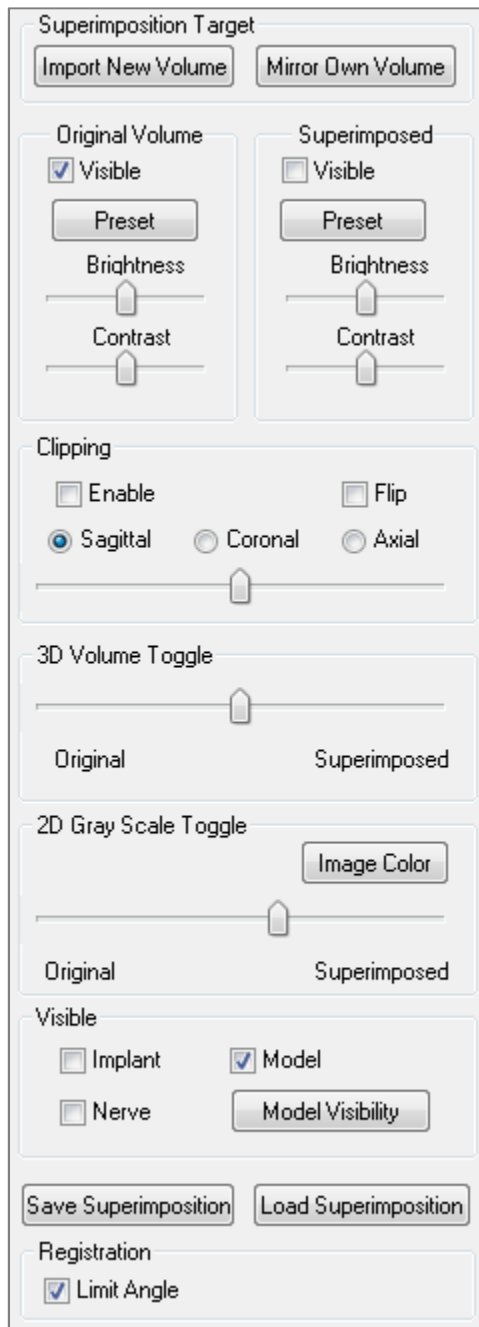
Superimposition Target:

- 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 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.

3D Volume Toggle:

This slider allows you switch between the original volume and superimposed volume. Set the slider in the middle to visualize the both volume 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 file name to save.
- TxSTUDIO will save two files: .vdata and .odata
    - .vdata: stores the registration points and superimposed volume information

        o   .odata: stores the original scan's volume orientation information

Load Superimposition:

- **Save 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

TxSTUDIO 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. This next sections discusses 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. 19) 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 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
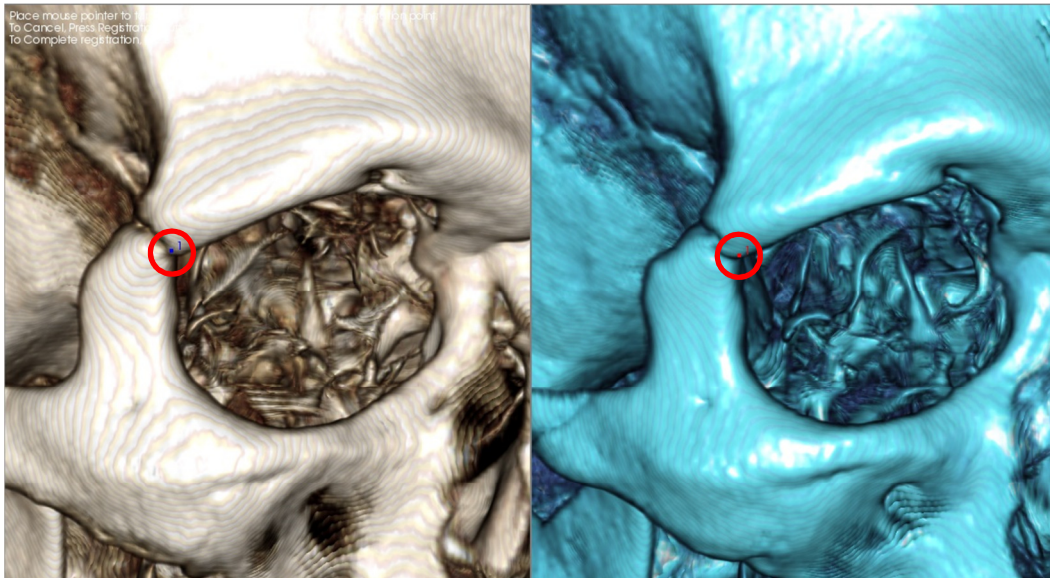
The image above shows a registration point (Registration Point 1) located on the anterior point of the right zygomaticofrontal suture. The point has been added to both the original scan (white, left) and the new scan (blue, right).

Step 5. 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 there is between the two registered scans.

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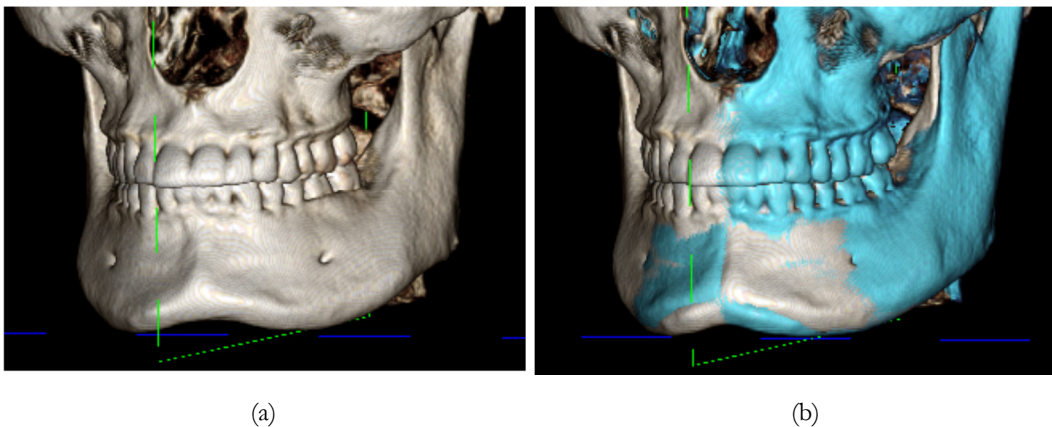
(a) The above image on the left is of two identical data sets that are registered to each other precisely. Notice there are no overlapping areas of different colors.

(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.
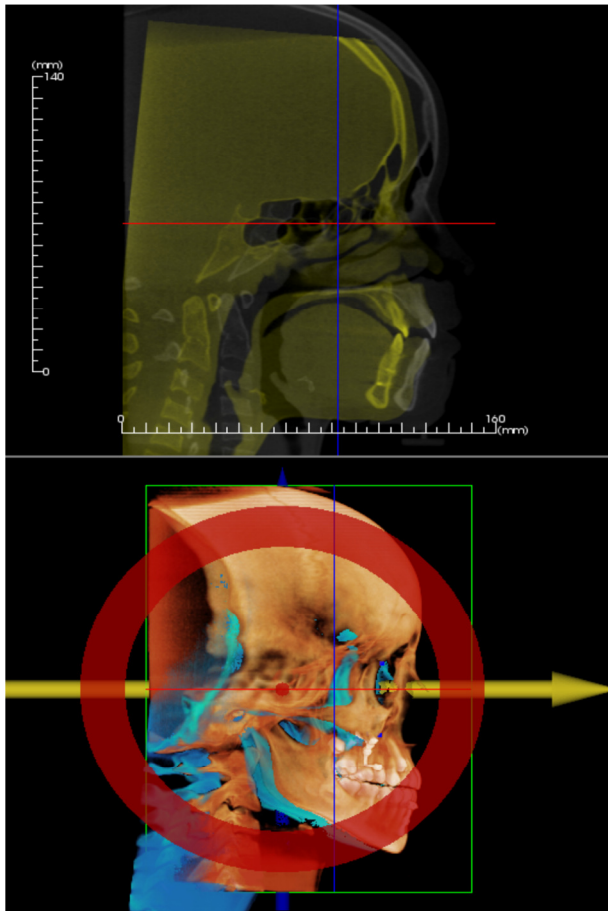
For example, notice in the sagittal section shown to the left that the superimposed volume is not totally overlapped. Using the Adjust tool, all you would need to do is move the volume in the anterior-posterior direction until the sections align. This is done by clicking on the yellow arrow in the Aligner 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, <u>it is strongly recommended that you first use the **Registration** tool before using the **Volume Registration** tool</u>.

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.
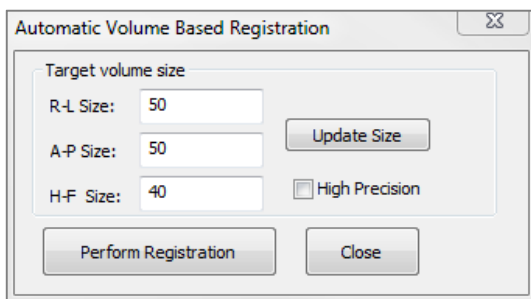
Target Volume Size:
- R-L Size: defines the lateral width (mm) of the Volume of Interest (VOI) Box
- A-P Size: defines the anterior-posterior width (mm) of the Volume of Interest (VOI) Box
- H-F Size: defines the inferior-superior height (mm) of the Volume of Interest (VOI) Box
- Press **Update Size** 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) = 50mm x 50mm x 40mm.
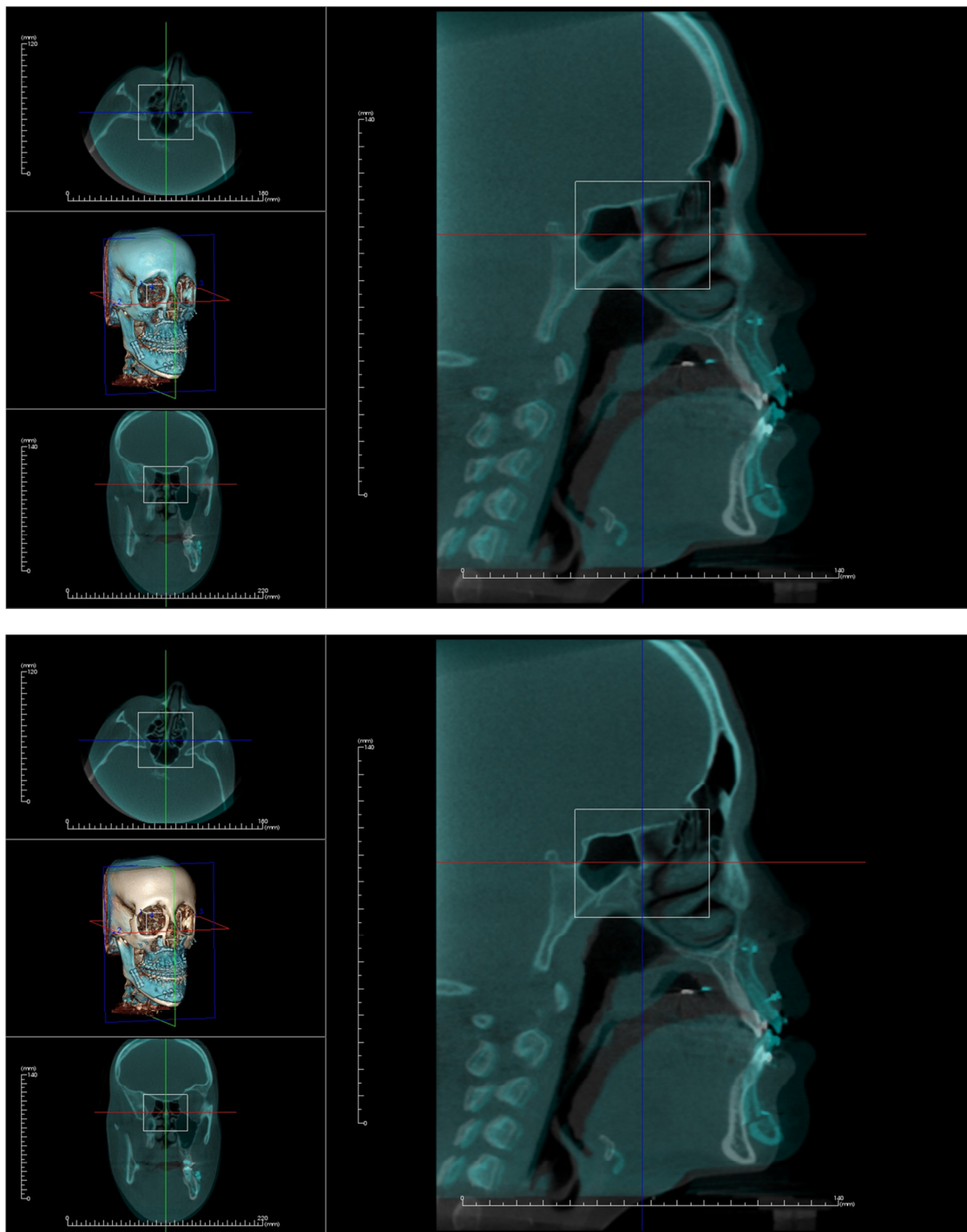
Superimposition: Difference Between .vdata Files and .odata Files

After you have successfully registered a different scan to your original volume data, TxSTUDIO 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 Orientation". Choose your desired .odata file and your case will automatically reorient itself.
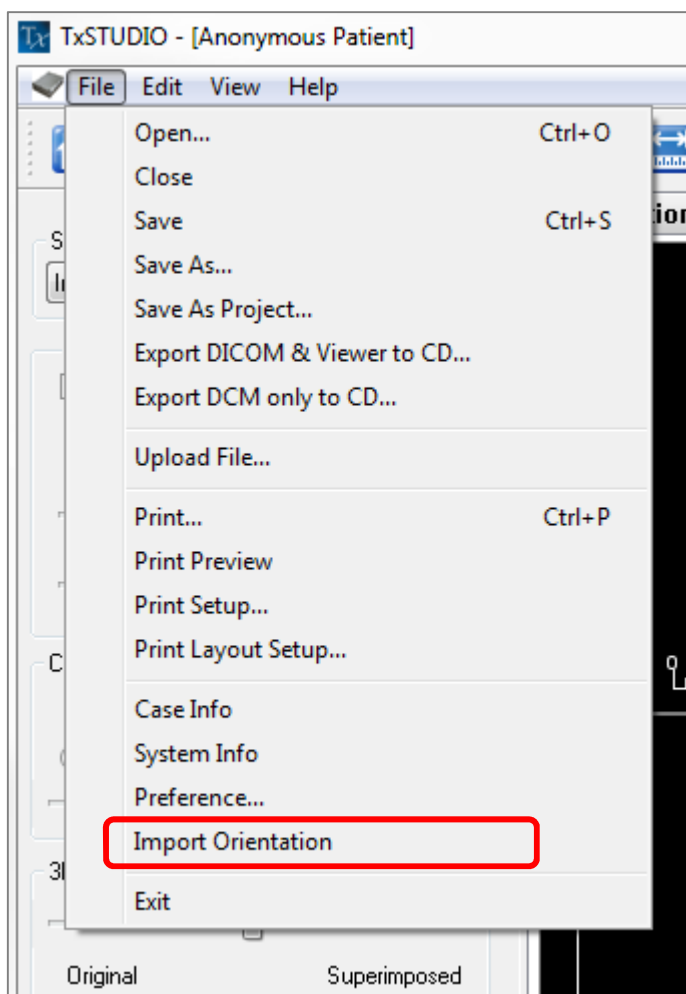
Gallery Features

*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.*
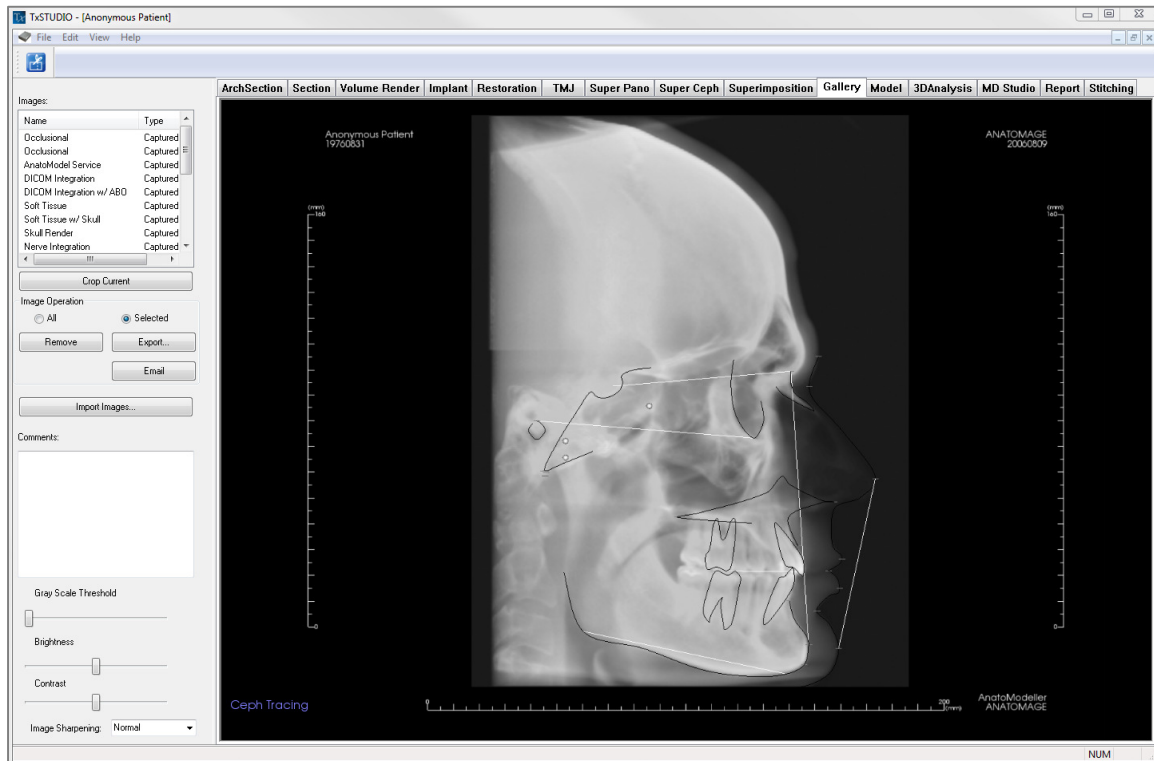
Gallery: Toolbar

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: Control Panel

Images: 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.

Crop Current:

Allows you to crop the image that is currently selected in the Images list. Clicking this button will display a border on each side of the image that can be dragged. Right-clicking on the image will crop the image along the current positions of the borders and prompt the user to decide whether to replace the current image with the cropped image or create a new one.

Image Operation:

- All: Selecting this option will apply **Remove**, **Export…**, and **Email** operations to all the images in the list.
- Selected: Selecting this option will apply **Remove**, **Export…**, and **Email** operations to only the selected images in the list. (Images can be selected by using the Ctrl+Left-Click command to choose them individually or by using Shift+Left-Click to select a set of sequential images.)
- **Remove:** Removes All or Selected images from the list.
- **Export…:** Exports All or Selected images from the list into the selected folder. The Image Format options are: JPG, BMP, PNG, TIF, and DCM.
- **Email:** Creates .jpg email attachments for All or Selected images on the list using the default email application.

Import Images…

Select to import images (.jpg, .bmp, .png, .tif, .dcm) from an external source into the Gallery Tab.

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.

2D Image Options:

Controls settings for 2D images. See more information in Gallery: 2D Image Options.

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. 26) 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 TxSTUDIO view is currently displayed; the following example is the dialog that appears within the ArchSection view:
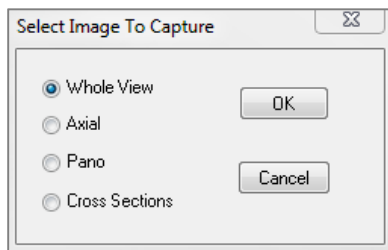
This is the Image to Capture dialog that appears in the ArchSection view

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 - Pano - Axial - Preview Pano

	• Front Volume	
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:

- **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

Gallery: 2D Image Options

The Gallery tab is compatible with 2D DICOM images and has several features that allow it to better handle this image format.

Opening 2D DICOM

When instructed to open a 2D DICOM image, TxSTUDIO will automatically enter a mode that disables 3D functionality. Only the Gallery tab will be available within the software and the DICOM will appear as a Gallery image.

If a 2D DICOM is associated with a 3D volume as a scout image, opening the volume will automatically import that scout image into the Gallery tab.

Grayscale Image Options

For grayscale images in the Gallery, the user has the option to adjust several settings such as Gray Scale Threshold, Brightness, Contrast, and Sharpening.

The updates to these images are saved and always reflect the updated settings when the image is selected in the Gallery and also after it has been saved/exported and then opened/imported back into Invivo.
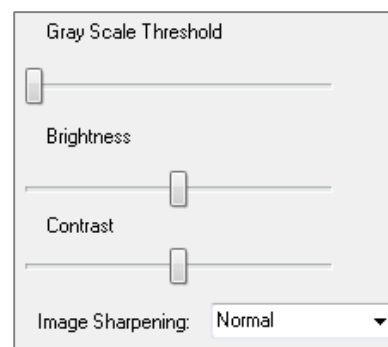
Export to DCM/JPG/PNG/TIF/BMP

An image in the Gallery can be exported into any of the above formats when using the **Export All Images…** button. When saving individual Gallery images to file, the following image formats will be available (JPG, PNG, BMP).
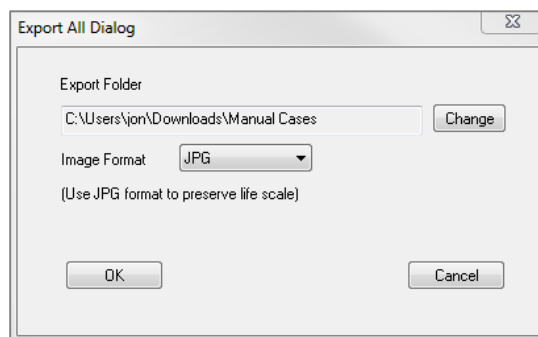
Model Features

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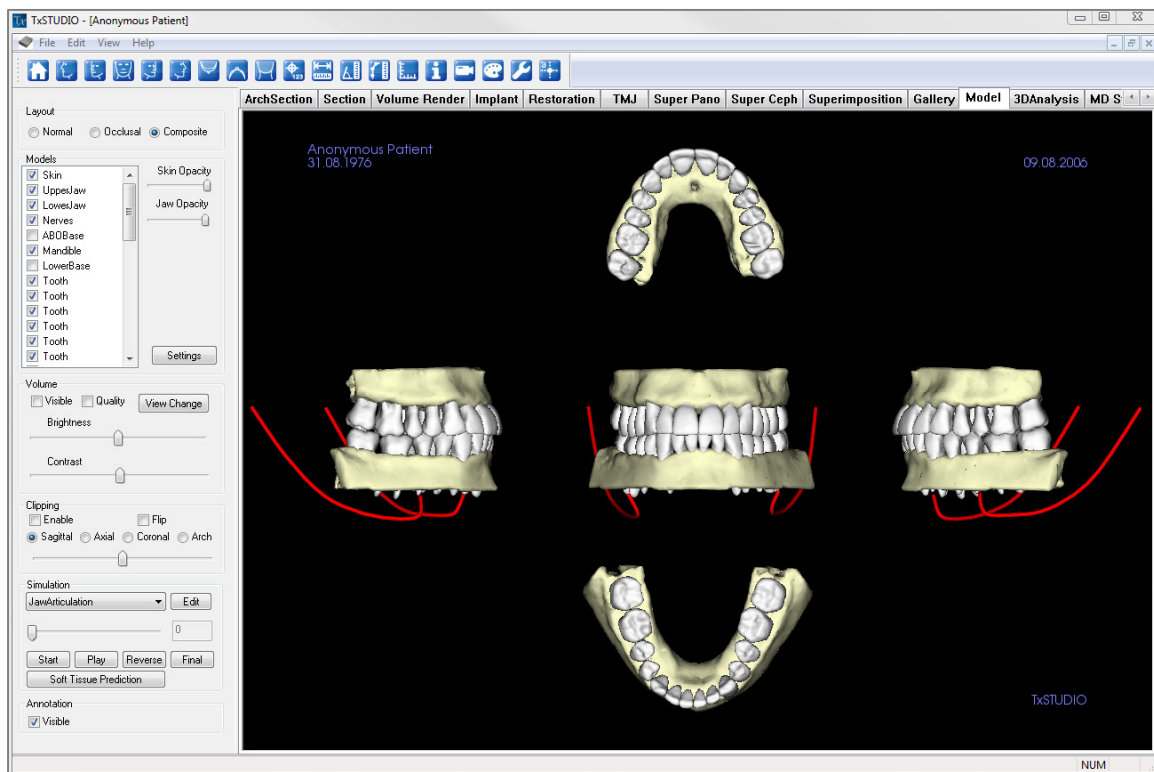
For more in depth information about the Model view tab and the AnatoModel services, please refer to the *AnatoModel Manual*.

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 45° 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 45° 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. 51) 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 off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

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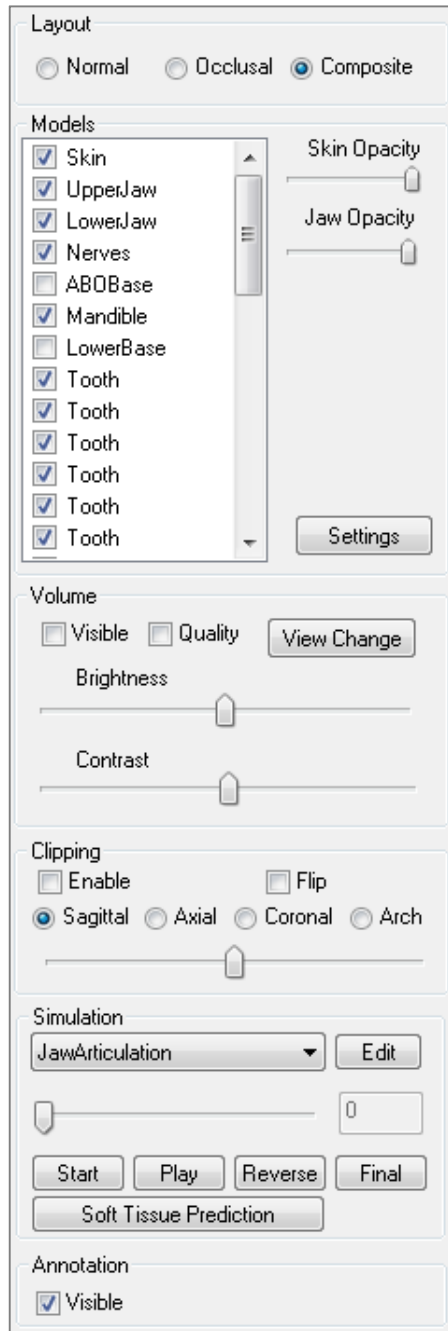
Layout:
- Normal shows the digital models in the normal patient orientation along with the volume rendering if wanted.
- Occlusal shows both arches from the occlusal perspective.
- Composite shows a composite of multiple views of the model all at once.

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 by using the checkbox next to each model name.
- **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 JawArticulation 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.

Annotation:
Controls the visibility of comment markers in the rendering window.

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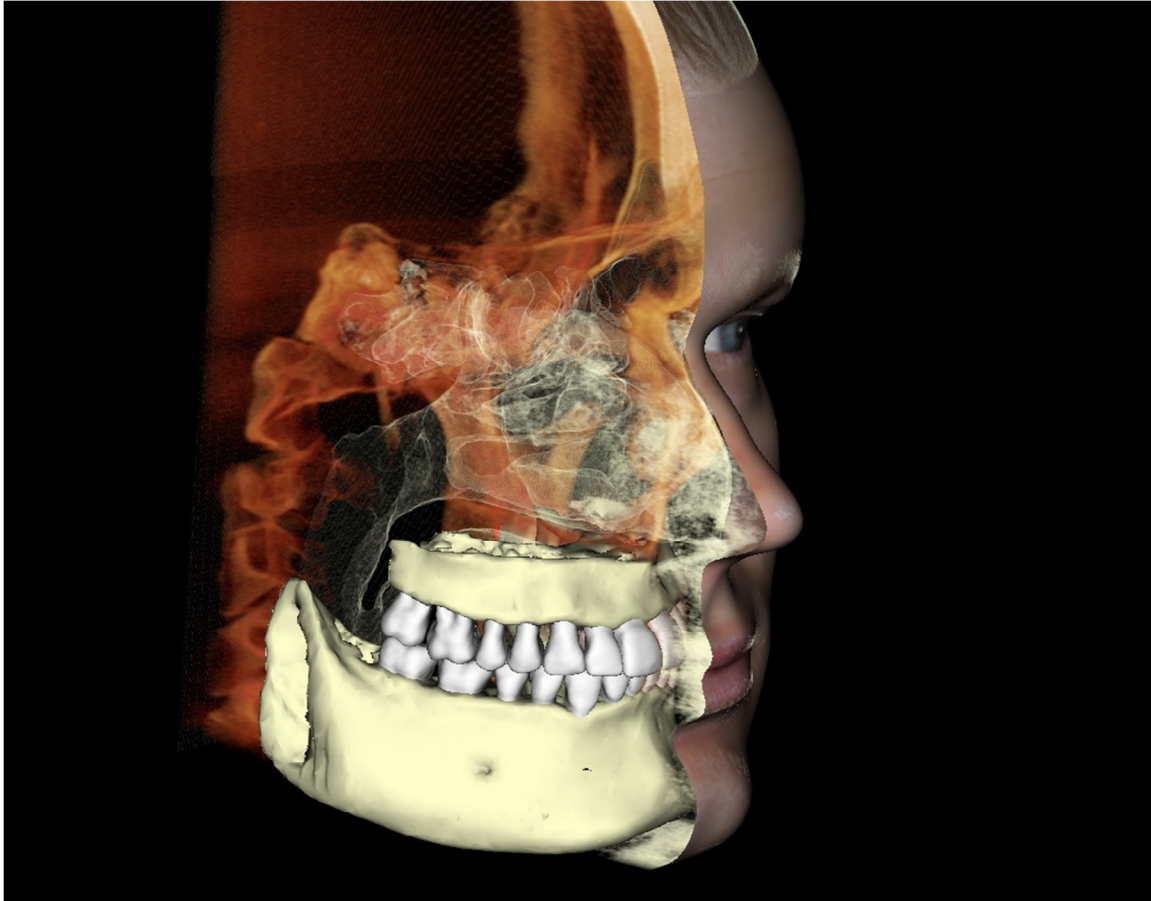
This window allows the viewing of AnatoModels, 3D photographs, and simulation, all of which are services that must be ordered per case for this feature to work. These services provide excellent diagnostic data and case presentation material.

Please refer to Image Navigation (pg. 26) for information about controlling and adjusting these images.

Report Features

The Report View Tab allows the creation of templates containing images and text. After creating and saving a template, it can be applied to any case using this tab. In this picture, the page background is black so the black rectangle represents the page. All controls must be placed within this page.
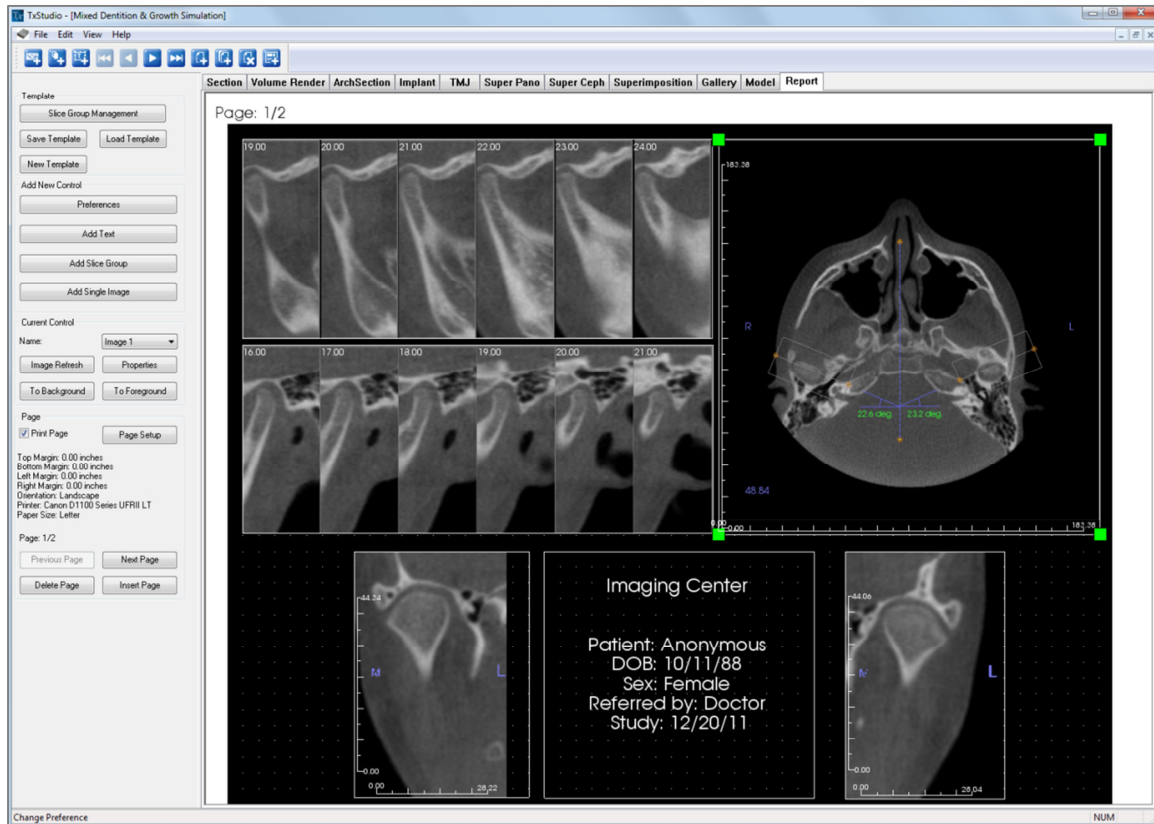
Report: Toolbar

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

Add Image: Adds a control containing a single image

Add Slices: Adds a control that contains single slices or a group of slices

Add Text: Adds a control that contains text

First Page: Takes you to the first page of your report

Previous Page: Takes you to the previous page of your report

Next Page: Takes you to the next page of your report

Last Page: Takes you to the last page of your report

Insert Page: Inserts a page after your current page

New Page: Adds a page to the end of your report

Remove Page: Deletes your current page

New Template: Creates a blank template

Report: Control Panel

Template

- **Slice Group Management**: Allows management of image groups for the template
- **Save Template**: Save the current template to your hard drive
- **Load Template**: Load a previously saved template from your hard drive
- **New Template**: Creates a new template, resetting all template information and changing page preferences back to default settings

Add New Control

- **Preferences**: Opens preferences for default colors, default image type, default page setup, grid alignment, and the template save path to be used
- **Add Text**: Adds a control containing text
- **Add Slice Group**: Adds a control containing slices
- **Add Single Image**: Adds a control for one image

Current Control

- **Name drop down**: Shows the name of the currently selected control from a list of controls on this page. The user can select a control from this dropdown menu instead of clicking the control
- **Properties**: Press to open the properties window for the current control
- **To Background**: Puts the image behind other images
- **To Foreground**: Puts the image in front of other images
- **Image Refresh**: Forces the contents of the selected control to refresh

Page

- Print Page: Enables the current page to be printed out
- **Page Setup**: Opens page setup to allow you to set printer, paper size, margins, and background/border properties of the page
- Page Information is displayed showing your current settings
- **Page**: Current Page/Total Pages is displayed
- **Previous/Next Page**: Page navigation controls
- **Delete Page**: Removes the current page
- **Insert Page**: Inserts a page after the current page
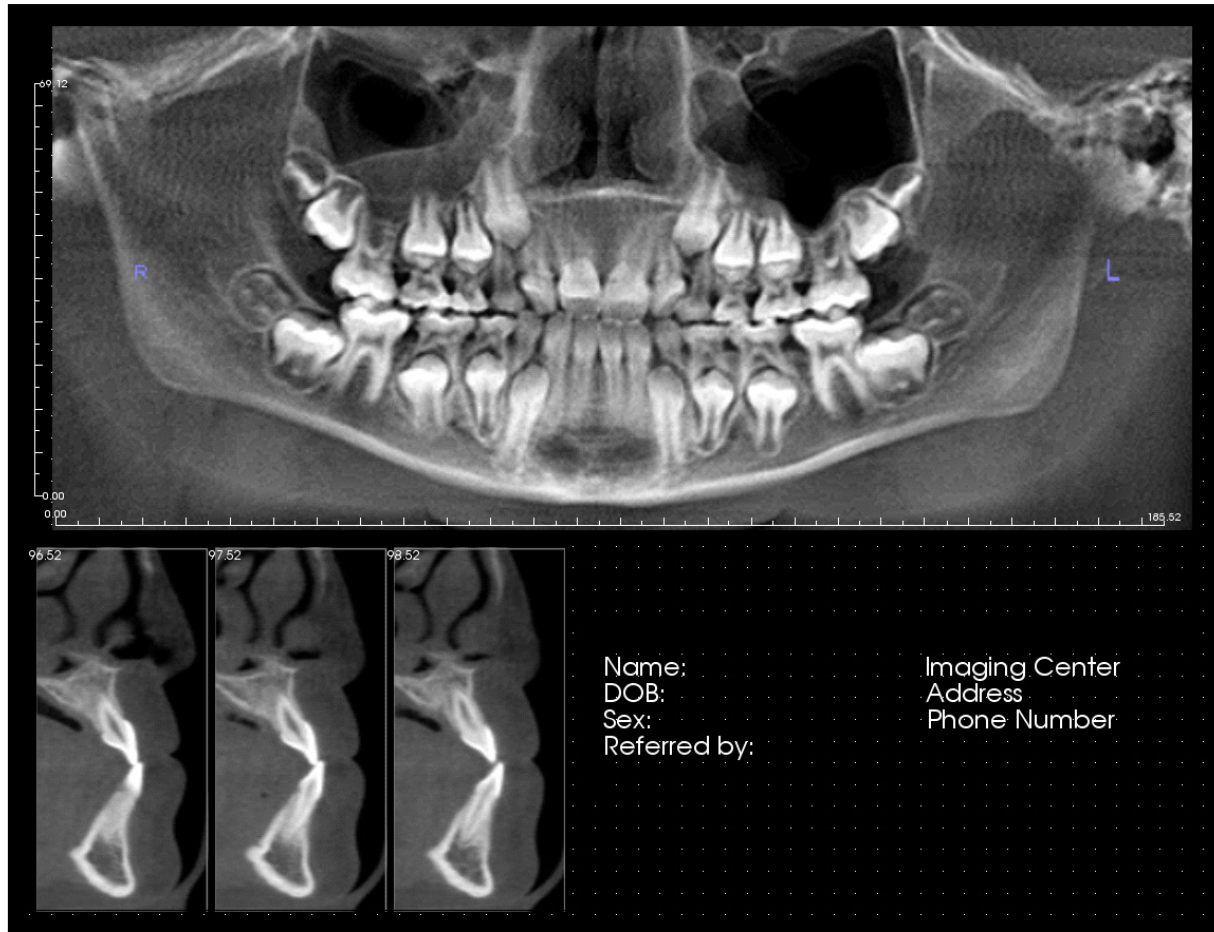
Report: Design Window

This section displays the report page and is the main area for designing and viewing reports and templates. The page navigation buttons in the toolbar allow the user to switch between pages in a multi-page report to determine which is to be displayed in the design window.

Adjusting the position and zoom of the report within the Design Window uses the same keyboard and mouse button combinations as in other TxSTUDIO tabs:

- **Zoom** – Ctrl + Left Click + Drag Mouse
- **Pan** – Shift + Left Click + Drag Mouse

For additional keyboard and mouse shortcuts relating to the Report View, see the section **Full Screen and Keyboard Shortcuts** (p.29) of this manual.

Report: Adding Text Controls

Text Controls are controls that can show text. The text will be on top of any images and can use case information. NOTE: Can view and edit Case Information from File -> Case Info.
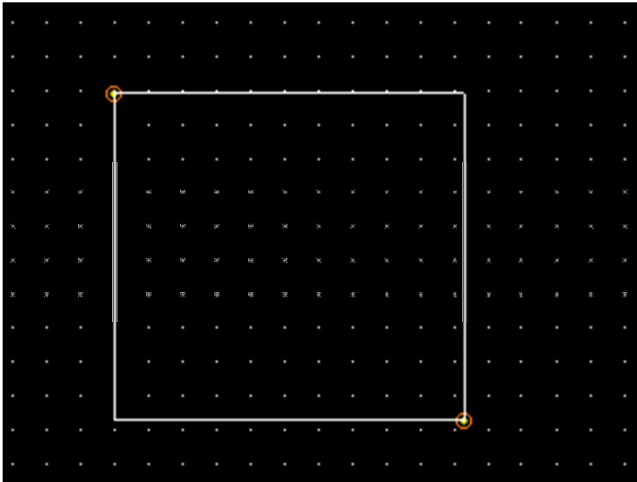

Adding and Sizing

- Navigate the mouse cursor to the View Control pane on the left and select the button labeled **Add Text**.
- **Size the control**. The image at the left shows the rectangle during creation. The control is created by two separate clicks and will not show up until the first click.

   Warning: If you create the control outside the page, you will receive an error message and the control will not be created.
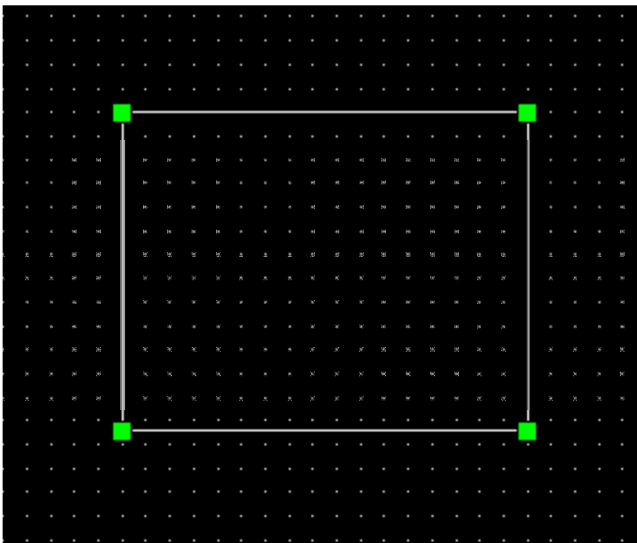
Resizing and Customization

- After successful creation of the control, it will change appearance to the image on the left. The green squares are the handles and represent that it is selected.
- **Resize the control.** Move the handles, move the lines that make up its border, or set the height and width from the properties window.
- **Move the control.** Hold down the left mouse button after clicking inside its borders or use the arrow keys.
- **Select a control.** Click it on the template or select it from the **Name** dropdown shown on the left. The names are discussed below with properties. Pressing the delete key will delete the control. To see the control's properties, press the **Properties** button while it is selected. Double-clicking the control also brings up the window.
- **Select multiple controls.** Click more than one control while holding Ctrl. Supported multi-control operations are movement and deletion.
- **Copy and paste controls.** Select a control, press Ctrl + C, then press Ctrl + V and choose the paste location. The point of paste location will be the center of the control.
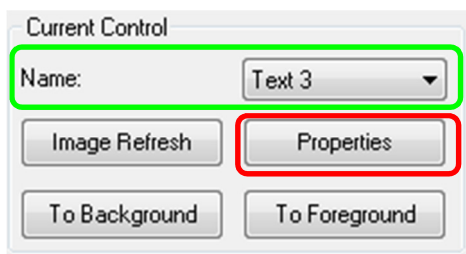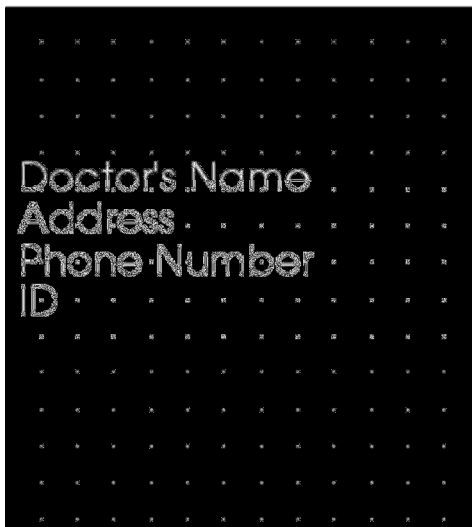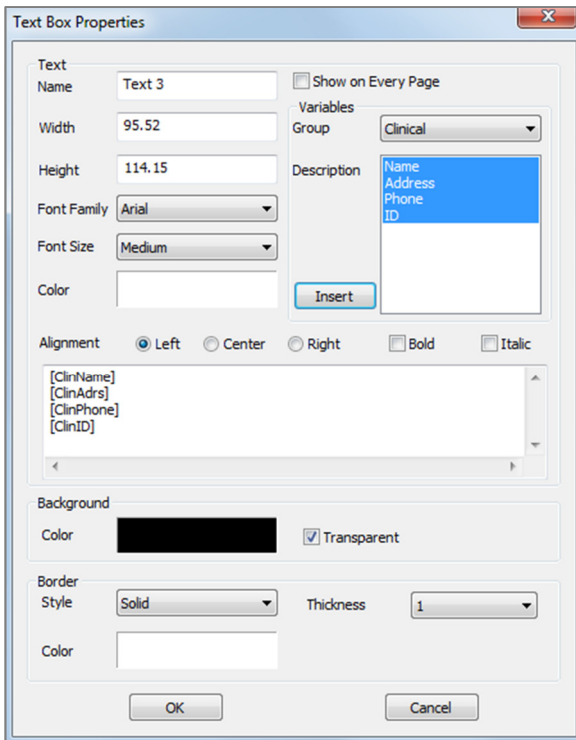
Text

- **Name**: Name of the control
- **Width**: Width of the control
- **Height**: Height of the control
- **Font Options**: Family, size, color, alignment, bold, and italic can be changed
- **Show on Every Page**: Check this option to make the text control show on every page like a header
- **Text Input**: This white control accepts text that will be displayed by this text box

Variables

- Allows the insertion of information pulled from Case Info or Gallery Comments
- To see the Case Info, go to File->Case Info. To see Gallery comments, go to Gallery and click through the images.
- **Group**: Select the type of information to be inserted from the dropdown: Clinical, Identification, Patient, and Gallery Comments
- **Description**: Exact Case Info or Gallery Image Comment to put into the text control. For example, if "Clinical" is selected, the choices will be: Clinical Address, ID, Name, or Phone number (see picture to the left). It will change for each group. For Gallery Comments, it will display image names.
- **Insert**: After choosing your variables, press insert. A variable will be added at your cursor position with a new line created for each variable. Can also double-click to insert.

Background

Checking transparent will not display the background of this control. It will show the chosen color otherwise.

Border

- Set the border color, thickness, and style
- Style can be dashed, solid, or none (not displayed)

Report: Adding Slice Group Controls

Slice Group Controls can hold a series of slices. Single slices as well as groups of slices can be added (see **Report: Group Management**). NOTE: If no slice groups exist, you will be prompted to create one until a slice group is created.

Adding a Slice Group:

- Click the **Add Slice Group** button.
- Control is added and controlled the same way as a **Text Control** (see **Report: Adding Text Controls**).
- Properties can be changed by clicking **Properties** in the Current Control section of the View Control.

⚠️ Warning: When resizing a Slice Group control, note that the slice numbers will disappear if the control is downsized past a limit (approximately the size that the numbers can no longer fit within each respective slice).

Image Group Box Properties:

Image

- **Name**: Name of the control
- **Height/Width**: determine the dimensions of the group box
- **Display Mode**: "Fit" will stretch the image to fit the control while maintaining aspect ratio. "Clip" will use clipping to fill the control space (see **Display Mode/Image Alignment** in the next section for details).
- **Images Per Row**: Number of slices per row. Same as number of columns. Input of 0 will create 1 row.
- **Image Alignment:** Determines how the image will be oriented within the control (see **Display Mode/Image Alignment** in the next section for details).
- **Show on Every Page**: Select to show this group box on every page of the template
- **Auto update image**: Select to update this group box with every instance that the Report view is activated. If disabled, images can be refreshed with the image refresh button.

Slice Image Source

See the end of this section for more information on **Slice Image Source**.
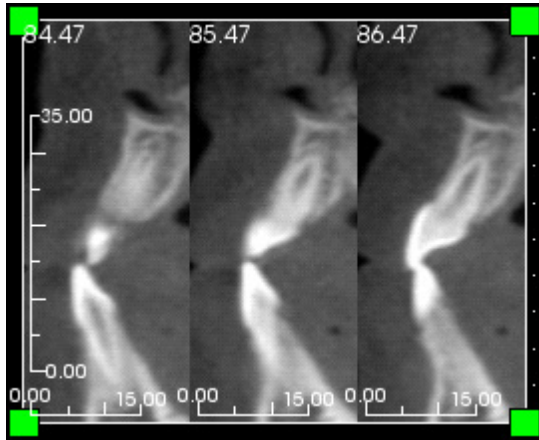
Ruler

- Position: Placement of the ruler to left, right, bottom, and/or top. Any combination can be selected. See example to the left.
- Color: Color of Ruler

Background/Border

Refer to the properties section of **Report: Adding Text Controls** for more information on these options.

Slice Image Source Details:

- **Single Group**: Use a single group to display slices. Refer to **Report: Capturing Slices** for more information on the restrictions and functionality of slice range.
    - o Selected Group: Selected group to use as input
    - o Start Slice: First slice to use for display within the group.
    - o End Slice: Last slice to use for display.

- **Multiple Groups**: Manually add captured slices one by one to display.
    - o Available Slices: All slices captured in the current case file
    - o Current Slices: All slices chosen to display in this control
    - o > Button: Moves selected Available Slice(s) to Current Slices for display
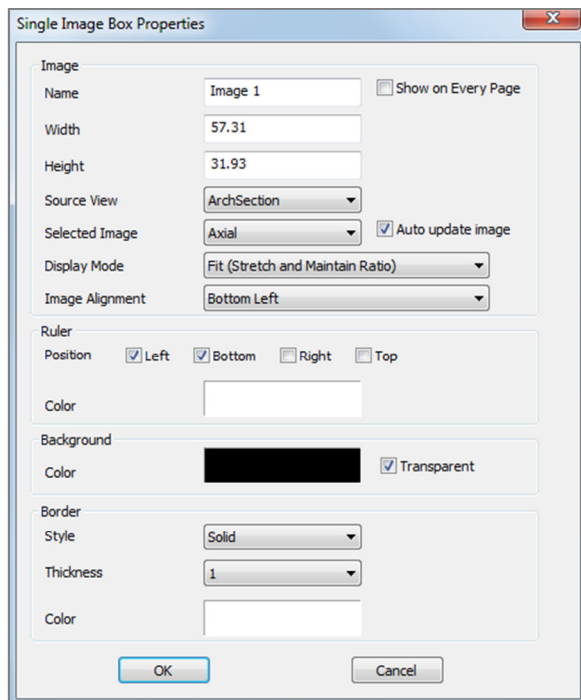   - o < Button: Moves selected Current Slice(s) to Available Slices to no longer display

Report: Adding Single Image Controls

Control that holds a single image from a selected source view

Adding a Single Image Control:

- Click the **Add Single Image** button.
- Control is added and sized the same way as a **Text Control** (see **Report: Adding Text Controls**).
- Properties can be changed by clicking **Properties** in the Current Control section of the View Control.

Single Image Box Properties:

Image

- **Name, Display Mode, Width, Height, Show on Every Page**, and **Auto update image** control the same properties as Slice Groups (see Report: Adding Slice Group Controls).
- **Source View**: This chooses the view for the image for this control. Selecting "From a File" will load an image from the hard drive and be stored as part of the template.

> Warning: Bitmaps under 24 bit may not display correctly.

- **Selected Image**: Determines the exact image to be selected from the Source View (NOTE: Images will not be available until the specified Source view has been "visited" to provide an image to load. See Report: Image Type Definitions for details on Dynamic images.)

- **Display Mode/Image Alignment**: This will choose where the image aligns to. For example, Bottom Left with Fit selected will always have the image positioned to the bottom left, and background will be shown above and to the right while sizing for fit (and maintaining aspect ratio). When the "Clip" display mode is chosen, alignment will only occur when an alignment option is actively selected. See the following page for more information on the "Fit" display mode.

Ruler, Background, and Border

- These sections control the same properties as in the slice group properties window (see **Report: Adding Slice Group Controls**).

Example of Fit Image Alignment:

This example is done with a **Bottom Left Fit Alignment** position with a white background. Image always originates from the bottom left and will show the background above it or to the right when it doesn't fill the control.
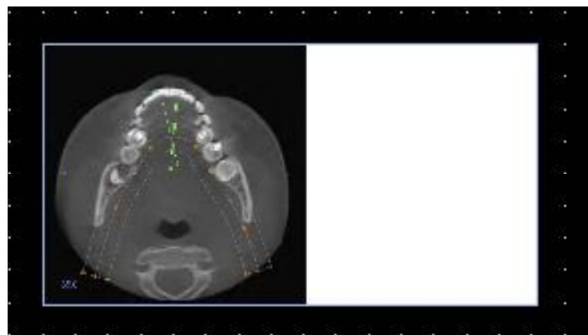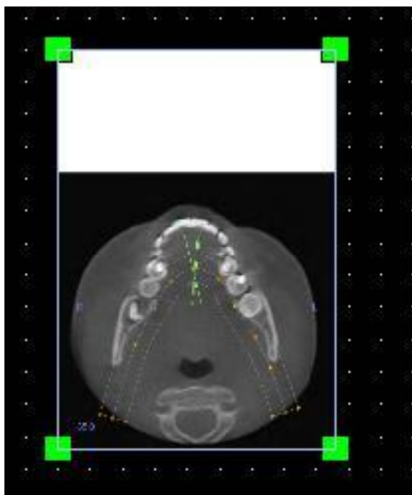
Report: Image Type Definitions

Dynamic Images:

These images will always be up-to-date with the latest changes to the viewing software. There are two types of dynamic images. When adding an image to a control, user can choose to not auto-update the image, keeping the current image until the auto-update setting is changed or the image is manually refreshed.

Note: Capturing images from specific layouts require that the layout is currently selected when leaving the aforementioned View Tab and reloading the Report View. Ex. The pano screen in the Implant view will not be captured unless the Pano layout is being viewed when leaving the view.

- Single Image view sources except Gallery and From a File are dynamic
    - To populate the Image source for images, you must go to a view tab. As you leave the view, images for that view are captured.
    - After an image has been added to a control, it will update if you make changes in the view. For example, if you use Section's Axial renderer and add a measurement then the image in the Report view will now have a measurement when you return.
    - These images are saved with the Case File.
- Slice images
    - These are captured manually and the process is described on the following pages.
    - These are the input for the Add Slice Control
    - They have the same dynamic update behavior as above.
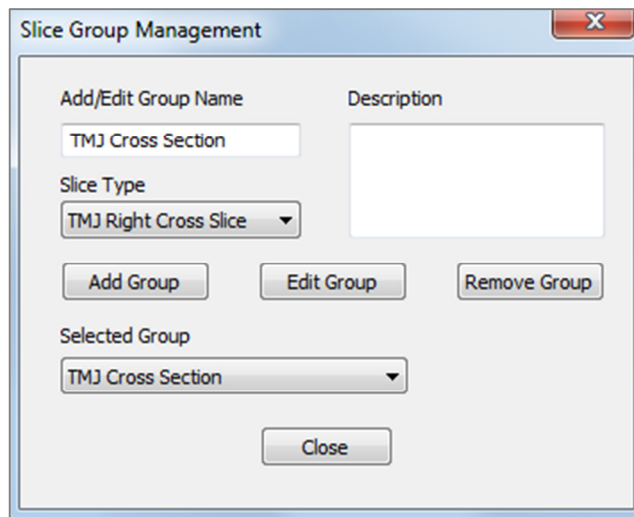   - These images are saved with the Case File

Static Images:

These images will never change unless you manually change the source image. There are two sources of static images.

- Gallery
    - All images in the Gallery are either captured from other Views or imported into the Gallery using the Import Images function. They will not always be life-size.
    - These images are saved with the Case File
- From a File
    - These images come directly from the user's hard drive. They will never be life-size.
    - These images are saved with the Template.
    - If user tries to add an image that already exists in a template, user will be prompted whether to replace the image or keep using the older one.

Report: Group Management Creation

Groups are created in the Report View and used in slice controls. The groups are populated from ArchSection and TMJ views only.
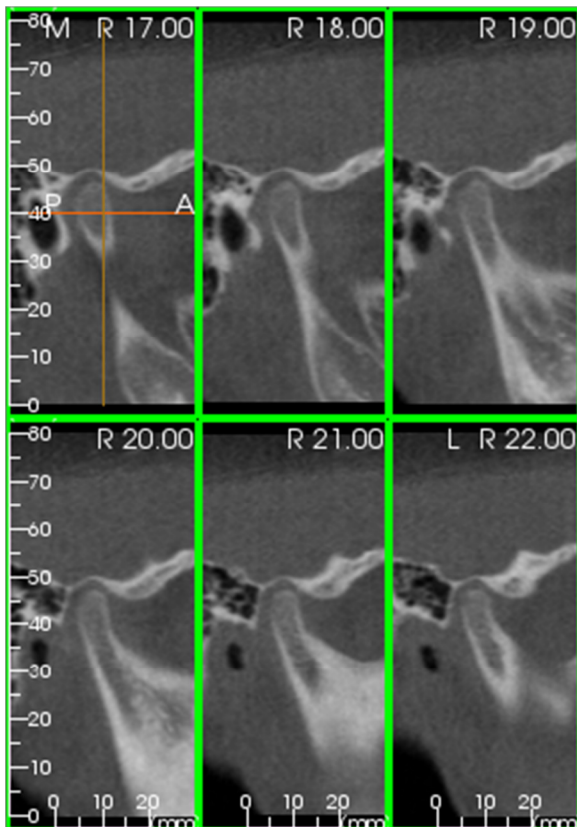
Slice Group Management: To add/modify groups, click the **Slice Group Management** button in the **Page** section of the View Control pane.

Add/Edit Group Name: Name of group that will be added as a new group or the new name of the selected group if choosing to edit the group.

Slice Type: Type of slice for this group
- Arch Axial Slice: ArchSection View's Axial slice mode
- Arch Cross Slice: ArchSection View's Cross Section slice mode
- TMJ Left Cross Slice: TMJ View's Left Cross Slices
- TMJ Right Cross Slice: TMJ View's Right Cross Slices

Description: Optional description for group

Add Group Button: Adds the new group to the template's groups

Edit Group Button: This will modify the currently selected group to the new group. If the slice type changes, it will remove itself from all slices. If any slices in this group have no other groups, they will also be removed from the case file.

Remove Group Button: This will permanently delete the currently selected group from the current template. If any slices in this group have no other groups, they will also be removed from the case file.

Selected Group: This holds all of the existing groups on the template. Can be selected for Edit and Remove operations.

The image on the left displays the corresponding slices for this particular slice group.

Report: Adding Slices to a Group

IMPORTANT: Only ArchSection and TMJ allow you to capture slices to a slice group.
ArchSection and TMJ have a new toolbar button (shown below) that will enable a Slice capturing mode. While in this mode, you can see all the captured slices for a selected group. It also allows you to add/remove slices from your slice groups.

Slice Capture Mode – This will open up the dialog that will enable you to capture slices to a group.

Capture Slices Dialog:
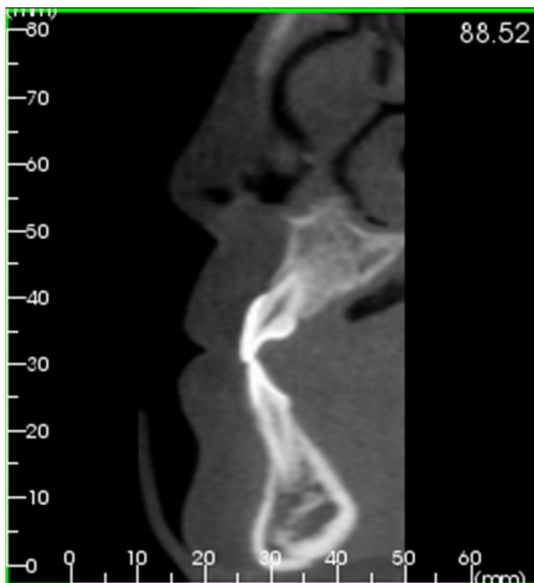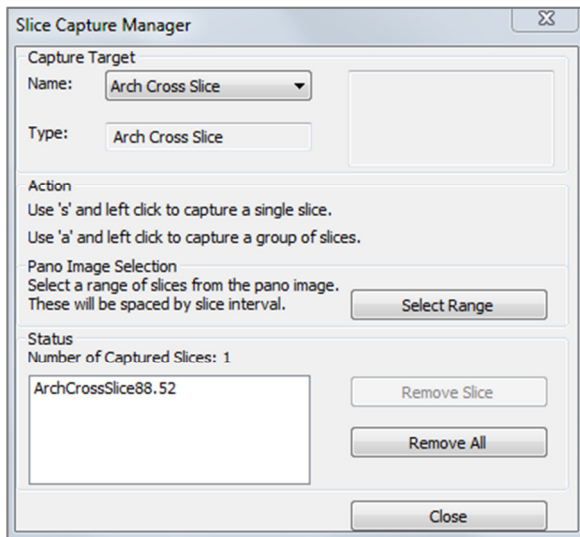
Capture Target: Allows selection of group to add/remove slices to. All parameters are read-only here. The selection of slices can be modified in the Slice Group Properties of the Report View
- Name: Name of the current group
- Type: This group's slice type
- Description: Optional description for this group

Action: Description of the capture slice options (discussed in more detail in the next section)

Select Range: Allows use of the Pano or Frontal Image to capture the slices. Press the select range button then you are prompted to select 2 points along the pano.

Status: Allows viewing of all slices in this group.
- Number of Captured Slices: List of all slices in the current group with a count of the total number
- Remove Slice: Remove the selected slice(s)
- Remove All: Removes all captured slices

The image on the left displays the corresponding slice that would be captured with this Slice Group.

Report: Capturing Slices

There are three ways to capture a slice once you are in capturing mode in ArchSection or TMJ. They are listed below: All captured slices for the current group will have their frames highlighted if they are in the current layout. Their locations will also be marked on the Pano and Frontal images. Arch Axial Slices will not be marked on the pano but they will highlight. NOTE: For the Arch Axial Slice type, ArchSection layout must be Section Series mode with Axial Section Series option chosen for capturing. Nothing will happen if try to capture anything but the selected group's slice type.

    Action: 3 action descriptions of how to select slices

- o **Single Slice Capture**: Hold down 's' and left click any slice that you wish to capture. Its frame will highlight and it will be added to the status section. NOTE: Can do this again to deselect slices directly.

- o **Group Slice Capture**: Hold down 'a' and left click any slice. This slice is immediately captured. Click on any second slice and all slices in between the two slices will be captured including the second slice.

- o **Select Range**: This will capture slices directly from clicking on the Pano Image or the frontal images depending on the view. NOTE: This is not available for Arch Axial Slice type.
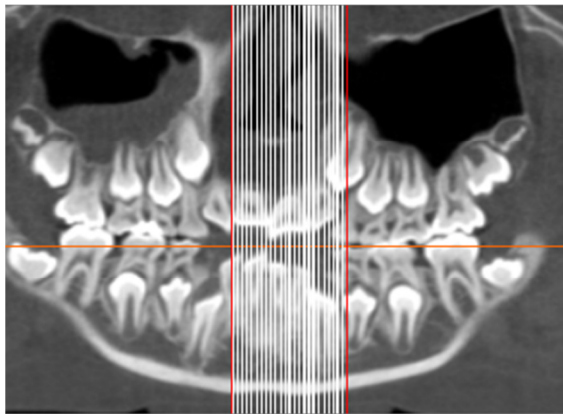

The image above shows the configured slice range on the ArchSection pano
NOTE: If slices have already been captured to the Report View, white lines denoting these slices will be seen on the pano even before the Select Range function is used. Use the Show/Hide Implant/Cursor/Nerve icon to hide these lines.

- A message will pop up to select 2 points along the Pano in ArchSection or Frontal Images in TMJ.
- After clicking once on the prompted image, a red line will appear. This is the starting slice of what you'll capture.
- When you click a second time, all slices between the red line and your mouse will be captured (based upon slice interval in control page). A second long red line appears. White lines will denote every captured slice. See image to the left.
- A Gallery Image with the Slice group name of the pano or frontal will be added. If it already exists, it will be replaced. NOTE: This will replace any other image with the same name regardless of how it was captured to Gallery.

Report: Navigating to Slices within a Group

After adding slices to a slice group, navigating quickly back to the added slices can be done simply. Open the Slice Capture Manager and place the plane cursor on one of the panes of a section series. Now select one of the captured slices and the pane containing the cursor (denoted by the two intersecting orange lines) will immediately switch back to the same numbered slice as the one in the Status section. See an example within ArchSection shown below:
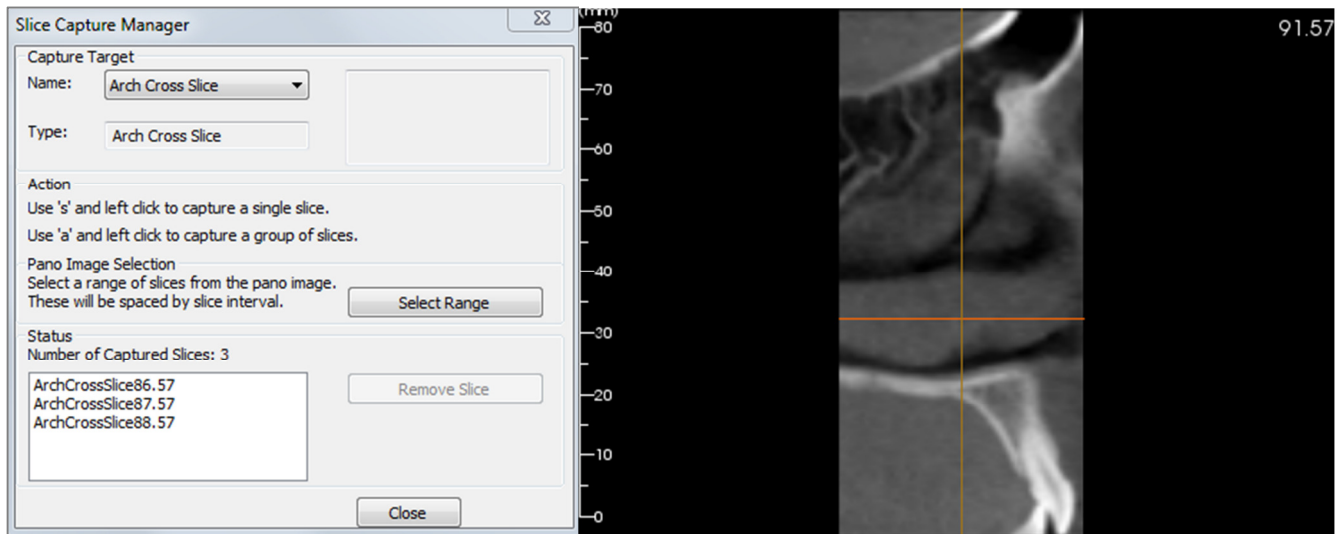
Slice Capture Manager opened with one of the three ArchSection Cross panes shown with the cursor.
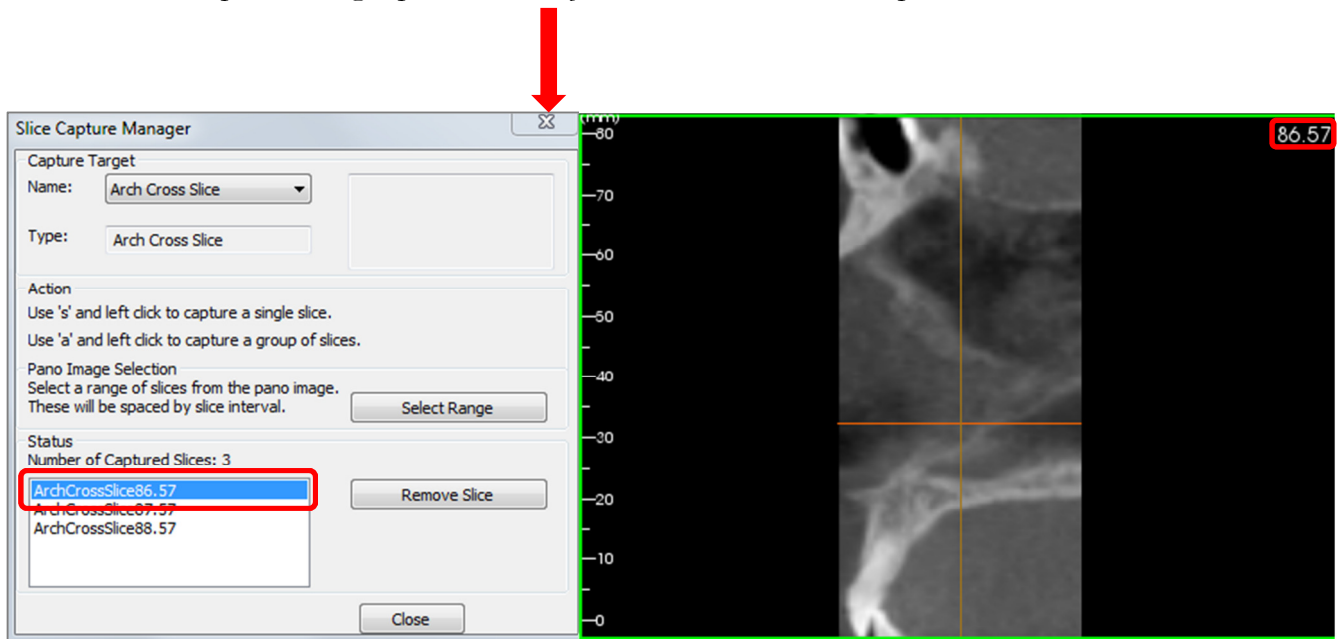
The same ArchSection Cross pane shown "jumps" to the arch section slice selected in the Status section of the Slice Capture Manager (jumps from slice 91.57 to 86.57).

The same quick navigation function can be applied in other layouts that contain a series of slices, such as:

ArchSection
- Layouts containing Cross section series or Axial section series

TMJ
- The lateral series of any layout

Report: Slice Control Selection Details

For Start and End Slice, they are determined by comparing their slice numbers. The first slice will always be the slice with the lowest slice number and the last slice will always be the largest slice number. This number can be seen on each slice in the upper right. This is only enabled for single groups.

Example: You have captured Slice numbers 30, 40, and 60. Regardless of the order that they were captured, 30 is the first slice, 40 is the second slice, and 60 is the third slice.
- Start Slice: What slice in group to start displaying. 0 defaults to the first slice.
- End Slice: What slice in group to stop displaying. 0 defaults to last slice.

Slice Range Examples:
- You can show the first two slices by setting Start Slice to 1 and End Slice to 2. You could also show the next two by setting the start to 3 and the end to 4.
- All slices can be shown by setting Start and End Slice to 0.
- If Start Slice > End Slice, only the End Slice will be shown.
- If Start Slice > Number of slices and End Slice = 0 or End Slice >= Number of slices, then only the last slice will be shown.
- If either is set to blank, they will default to 0.
- If End Slice > Number of slices, it will show up to the last slice.

Report: Preferences

Opens preference dialog for default colors, default image type, default page setup, enabling grid alignment, and the template save path to be used. Black background, white control borders, 0.25 margins, and Fit are defaults for first time opening the software.
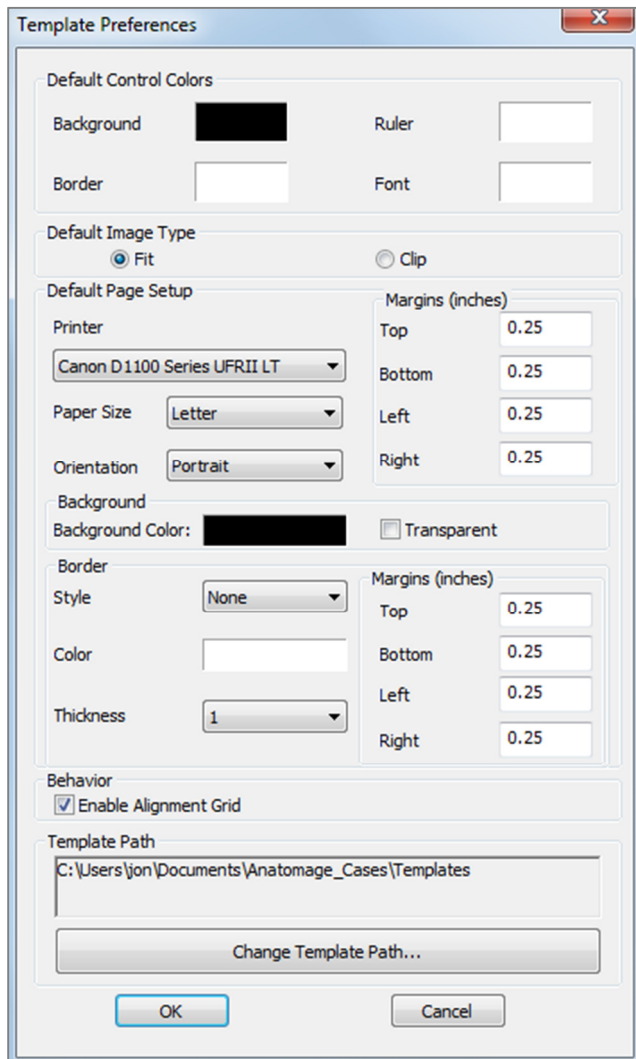
- **Default Control Colors**: Colors for border, background, font, and rulers
- **Default Image Type**: Whether new image and slice controls use Fit or Clip display mode
- **Default Page Setup:**
  - Printer: Printer the template is using. This changes the available Paper Sizes and helps to set the size of the page. This list includes all printers available to the computer.
  - Paper Size: Uses the printer drivers to set the height and width of the page.
  - Orientation: Template designed for Portrait or Landscape.
  - Margins: Margins (in inches) for the template. Used for where controls can be placed.
  - Background: Color and transparent option to make it invisible.
  - Border: Color, thickness, and style options for the border. Styles are solid line, dotted line, or no line at all.
    - Margins: Margins to display the border at. This can differ from the page margins.
- **Behavior**: Specifies behavior of the template during design.
  - **Enable Alignment Grid**: If checked, all controls will attach to their top-left corner to the nearest grid point. If unchecked, they will be placed wherever the user drags them.
- **Template Path**: Choose where templates are saved to and loaded from. Load/Save template will default to this directory but they can be saved elsewhere.

Report: Page Setup

This displays and lets you configure all page settings. These are the settings the template uses. It will not use the chosen printer and paper size at print time. User must choose the correct printer and paper size from the print setup while printing. NOTE: The first time the software loads, your default printer configuration is used for Printer and Paper Size for the report. Report defaults can be changed from Preferences.

Page Setup:
   To modify page settings, click the **Page Setup** Button in the Page pane in the View Control

Page Configuration: Page configuration to setup where the valid area to place controls is located.
- **Printer**: Printer to use for this template
- **Paper Size**: Current Paper Size. Default is letter. Only offers paper sizes for the currently selected printer.
- **Paper Orientation**: Portrait or Landscape orientation (NOTE: Margins will not change so paper may appear to have different proportions when switching between portrait and landscape.)
- **Margins**: Margins (in inches) for the page.

Background:
   Checking transparent will not display the background of the page. It will show the chosen color otherwise.

Border:
- Set the border color, thickness, and style
- Style can be dashed, solid, or none (not displayed)
- **Margins**: Margins of where to put the border.

Page Information of your chosen configuration will always display in the Page section of the View Control pane

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 preform 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

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\Anatomage\TxSTUDIO"

- 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 off of the incorrect measurements. It is critical for the end user to learn how to preform 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 apparent 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

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.

- 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)
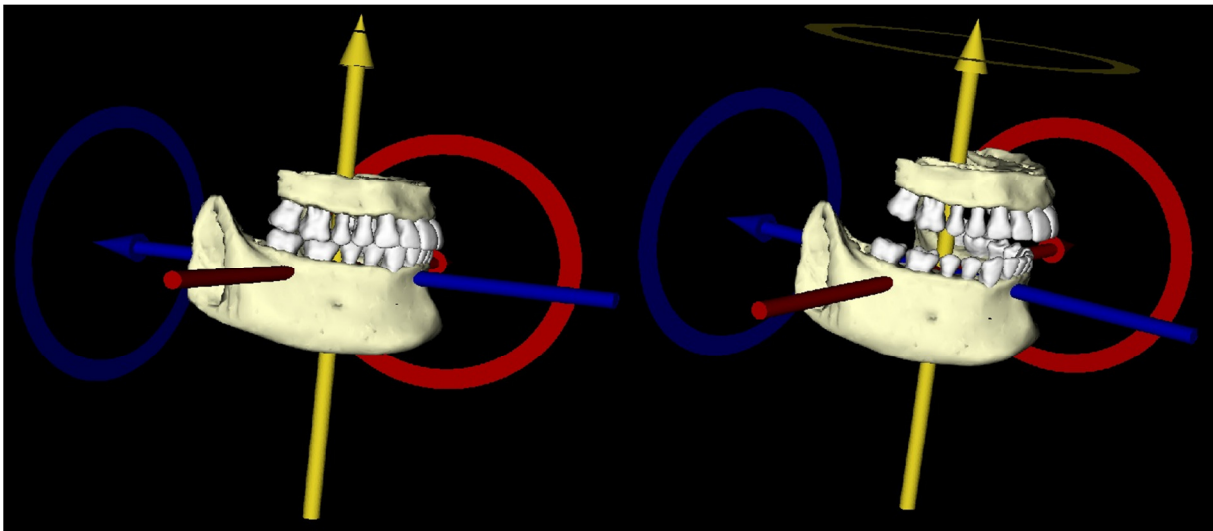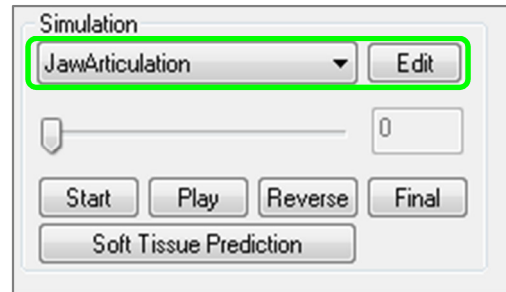
- Select a model adjust and the Move-Widget should appear
- Use the Move-Widget to adjust the final position of the model
- Moving the Slide Bar (Frame 0 to 100) will move the model between the initial and final positions
- To adjust intermediate model positions, move the Slide Bar to an intermediate 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. 51), 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
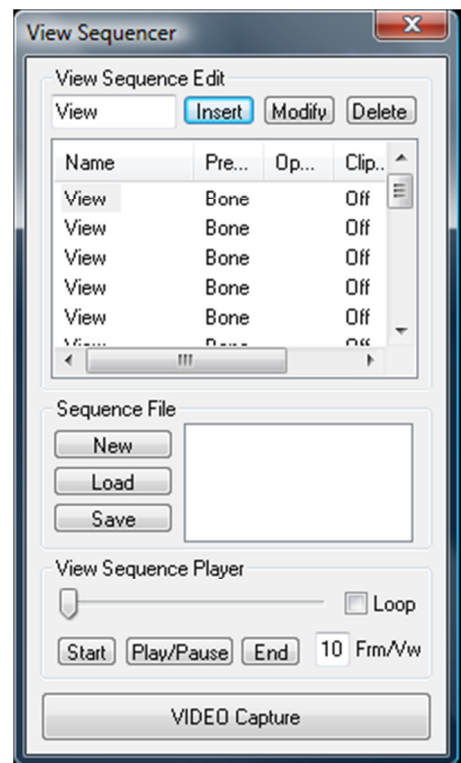
Movie Capture:
- If you are unsatisfied with the test video and View Sequence, make the necessary changes (**Insert** new Views or **Modify/Delete** existing Views).
- If you are satisfied with the test video and View Sequence, select **VIDEO Capture** to open the **Movie Capture Window**.
- Please refer to **Volume Render View Tab View Sequence Section** (p. 51) for additional descriptions
- **Capture** the View Sequence to save your simulation as an AVI movie file.
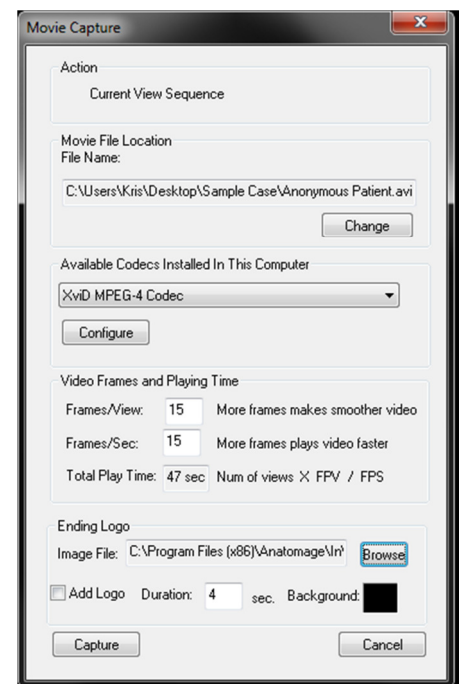
TxSTUDIO Software Troubleshooting

Category	Error	Solution
General	Error Message: *TxSTUDIO Application has encountered a problem and needs to close. We are sorry for the inconvenience.*	1. Click "Don't Send" Button 2. Check if there are old versions of optional plug-ins, remove them or upgrade them to be compatible with TxSTUDIO. 3. Launch TxSTUDIO application again. Warning: treatment information can only be manually saved. All information added after last saving will be lost.
	Cannot launch TxSTUDIO	1. Open Task Manager and check if multiple instances of TxSTUDIO is already running 2. Close other TxSTUDIO processes 3. Launch TxSTUDIO application again.
	Computer failure	Launch TxSTUDIO application again. Warning: treatment information can only be manually saved. All information added after last saving will be lost.
Installation	Error Message: *Server is not Responding*	1. Check Internet connection. 2. If Internet is connected, try again later.
	Error Message: *Please run as administrator to activate software*	Run the installer/application as administrator
	Error Message: *Failed to verify the license code!*	Check license code and try again. (or) Check internet connection and try again.
	Error Message: *Wrong License Code!*	Check license code and try again.
	Error Message: **Invalid Authorization code**	Check license code and try again.
	Error Message: **Actual size of the image can't fit to the paper size!**	Change printer setting or create an image with smaller size.
File Operations	Error Message: *Failed to create process. Please close other applications and try again.*	1. Close all the other applications. 2. Launch TxSTUDIO application again
	Error Message: *Error: Cannot read this file*	Check if this file is supported by TxSTUDIO
	Message: *Not enough memory*	1. Close all the other applications. 2. Launch TxSTUDIO application again
	Error Message: *Can't create temporary save file!*	Check if the remaining disk capacity for the temporary folder is big enough.
	Error Message: *Failed to read DICOM file!*	Check if this file is supported by TxSTUDIO
	Error Message: *Can't read Dicot's Image Data!*	Check if this file is supported by TxSTUDIO
	Try to open a file but nothing showing up	Check if this file is supported by TxSTUDIO
	Error Message: *Cannot save file!*	1. Check if the file is the correct type. 2. Check if the file path is correct and folder is writable.
Image Rendering	Error Message:	1. Check if graphics card meets system requirements

Can't detect hardware acceleration for OpenGL support!	2. 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	1. Check if graphics card meets system requirements 2. Check if latest driver is installed for graphics card
Warning Message: *3D reconstruction may not work!*	Check if the DICOM files are exported correctly.

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

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

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