ORCHESTRATE 3D

THE CLEAR CHOICE FOR ALIGNER THERAPY

USER MANUAL VERSION 7.0.9.4

PARK DENTAL RESEARCH

Instruction Manual
Version 7.0.9.4

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ORCHESTRATE 3D

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CONTENTS:

1. Warnings, Cautions, and Contraindications

WARNINGS:

- A thorough understanding of the dental and orthodontic principles, clinical applications, and risks associated with orthodontic procedures is necessary before using this product. Use of this product is restricted to use by or under the supervision of a dental professional.
- Verify that any scan files imported into the system represent the specific patient's dentition and are of an adequate quality.
- Use the collision detection tool during the treatment planning process.

CAUTIONS:

- Federal law restricts this device to sale by or on the order of a dental professional.
- The use of Orchestrate 3D requires the user to have the necessary product training in Treatment Planning Software.
- Carefully read all instructions prior to use. Failure to observe all warnings and instructions may result in complications.

ADVERSE EVENTS:

While the use of this software by itself has no known adverse events for the user, this software is often used in conjunction with dental aligners and other related dental products. The use of those products has some known and theoretical adverse events. The adverse events that could theoretically be related to the use of this software in conjunction with dental aligners is included below:

CONTRAINDICATIONS:

There are no known contraindications to this product.

Poor Fit	Inappropriate Tooth Movements
Poor Fit	Nerve Damage
Infection	Pulpal Degradation
TMD	Gingiva Recession
Crown Removal	Tooth Extrusion
	Tooth Loss
	Root Resorption

Table 1: Theoretical Adverse Events from Dental Aligners used in conjunction with the Orchestrate 3D Software.

2. Overview

2.1 DESCRIPTION

The Orchestrate 3D Orthodontic Software is an orthodontic appliance design and treatment simulation software. This software is for use by dental professionals to diagnose and design solutions for patients. 3D digital scans of a patient's dentition can be loaded into the software and the dental professional can then create treatment plans for each individual patient and their needs. The system can be used to fabricate dental casts using standard stereolithographic (STL) files for use in 3D printers. Dental casts printed, can then be used to fabricate sequential aligner trays and retainers.

2.2 COMPATIBILITY

The Orchestrate 3D Orthodontic Software has been designed for use and compatibility with FDA registered, open-source intraoral scanners and 3D printers that utilize STL files. Specifically, compatible intraoral scanners should be capable of producing STL files in occlusion and 3D printers should be able to accept STL files and print in the XYZ dimensions with 200 micron or better accuracy.

For optimal results, we can verify maximum compatibility and have done the greatest amount of collaboration with the Shining3D scanners and the JUELL Production Printers, both available from Park Dental Research.

2.3 INDICATIONS FOR USE

The Orchestrate 3D Orthodontic Software is indicated for use as a front-end software tool for management of orthodontic models, systematic inspection, detailed analysis, treatment simulation, and virtual appliance design options, including dental casts, which may be used for sequential aligner trays or retainers. These applications are based on 3D models of the patient's dentition before the start of an orthodontic treatment. It can also be applied during the treatment to inspect and analyze the progress of the treatment. It can be used at the end of the treatment to evaluate if the outcome is consistent with the planned/desired treatment objectives.

The use of Orchestrate 3D requires the user to have the necessary training and domain knowledge in the practice of orthodontics, as well as to have received a dedicated training in the use of the software.

2.4 TRAINING

Before using Orchestrate 3D Orthodontic Software, all training materials should be reviewed. Users should review all sections of this manual. This manual was prepared with the assumption that the user has obtained prior training and knowledge of dentistry.

3. Description

3.1 REQUIREMENTS

The Orchestrate 3D Orthodontic Software has the following minimum system requirements.

Minimum Requirement	Orchestrate 3D
Operating System	Windows 10 (64 Bit)
Memory	8 GB RAM
Monitor Resolution	1280 X 800
Video Card Memory	1 GB
Hard Drive Space	10 GB
CPU	Intel compatible 2.6 GHz/dual or quad-core 2.6 GHz
Mouse	Any mouse with scrolling wheel or button

Table 2: Minimum Technical Requirements of Orchestrate 3D

3.2 CYBERSECURITY

The Orchestrate 3D Orthodontic Software has been designed with cybersecurity in mind. However, no software is completely secure. To protect against cybersecurity threats, the following guidelines are strongly recommended:

Use appropriate and up-to-date antivirus and malware protection

Install each O3D software update as it is released

Avoid using unsecure or public Wi-Fi networks

Be cautious if downloading apps or opening email attachments on the computer running the O3D software.

If alerted that the Orchestrate 3D Orthodontic Software may contain a virus or has been quarantined, please contact Park Dental Research to report this and for further assistance.

If the Orchestrate (DAPROJ) files have been damaged or corrupted, please delete them with the help of a trusted antivirus software.

3.3 ADDITIONAL RECOMMENDED SAFEGUARDS

Maintain regular backups of patient files in a separate location. These files will be useful in the unlikely event of a damaged file or corrupted system.

Additionally, the Windows Log In process should be used to limit access to the O3D software to only those that are authorized. Strong passwords should be used and changed regularly.

3.4 MOUSE CONTROLS

The Orchestrate 3D Orthodontic Software is a mouse-intensive program. Therefore, a high-quality, comfortable mouse is important.

Mouse Controls:

Function	Control
Rotate Model Right	Click and hold; move mouse
Zoom In/Out	Mouse Wheel
Bodily Move Model	Right and left click - hold

Table 3: Mouse Controls for Orchestrate 3D

3.5 TOOTH MOVEMENT OVERVIEW

Recommended process for approaching each malocclusion is the following three steps in order.

1) Rotations–Facial/Lingual/Mesial/Distal
2) Torque
3) Tip–Intrusion/Extrusion

3.6 RECOMMENDED TOOTH MOVEMENT VELOCITIES:

Direction	Amount/Setup
Facial – Lingual	0.3 mm
Mesial – Distal	0.3 mm
Intrusion – Extrusion*	0.1 mm
Rotation	1 to 3 degree(s)
Torque: Facial/Lingual 1 degree	1 degree
Tipping: Mesial/Distal 1 degree	1 degree

Table 4: Tooth Movement Velocity Recommendations for Orchestrate 3D.

* Attachments must be placed for extrusion

4. Installation

4.1 DOWNLOAD INSTALLER FILE

Figure 1: Installer File

4.2 OPEN INSTALLER FILE (.MSI)

The installation wizard will appear. (Figure 2) Follow the instructions on the installer. Install and setup Microsoft Visual C++, if necessary, along with any additional programs as prompted during setup. Read and agree to the license terms and conditions. Click "next" until O3D is successfully installed, then click "Finish". (Figure 3).

Figure 2: Installer wizard

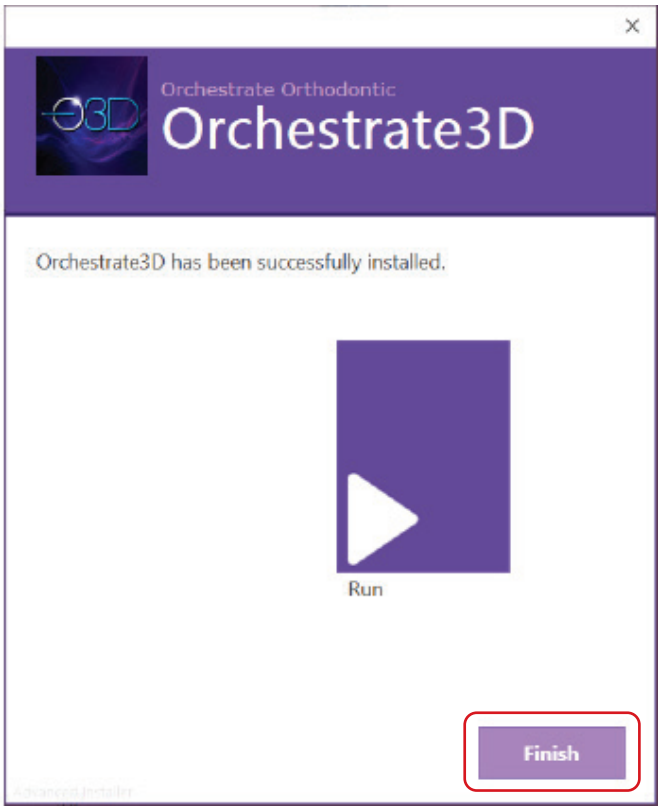

Figure 3: Successful installation

4.3 LAUNCH SOFTWARE

Once installed find the software icon on the desktop. (Figure 4) Double left click to launch the Orchestrate 3D Orthodontic Software.

Figure 4

4.4 APPLY LICENSE CODE—(See separate instructions provided at time of purchase)

5. Navigating the User Interface

5.1 OPENING SCREEN

The opening screen of Orchestrate 3D is the File tab. (Figure 5) From this tab, the user can begin a new project, open a file, save, close the file, exit the program, and view other open files. This menu also contains editing options including: orient, boundary editing of scanned data, add a base, auto segment teeth, name teeth, and removal of brackets and bonded retainers. Additional editing tools can be found in the Fix Defects tab.

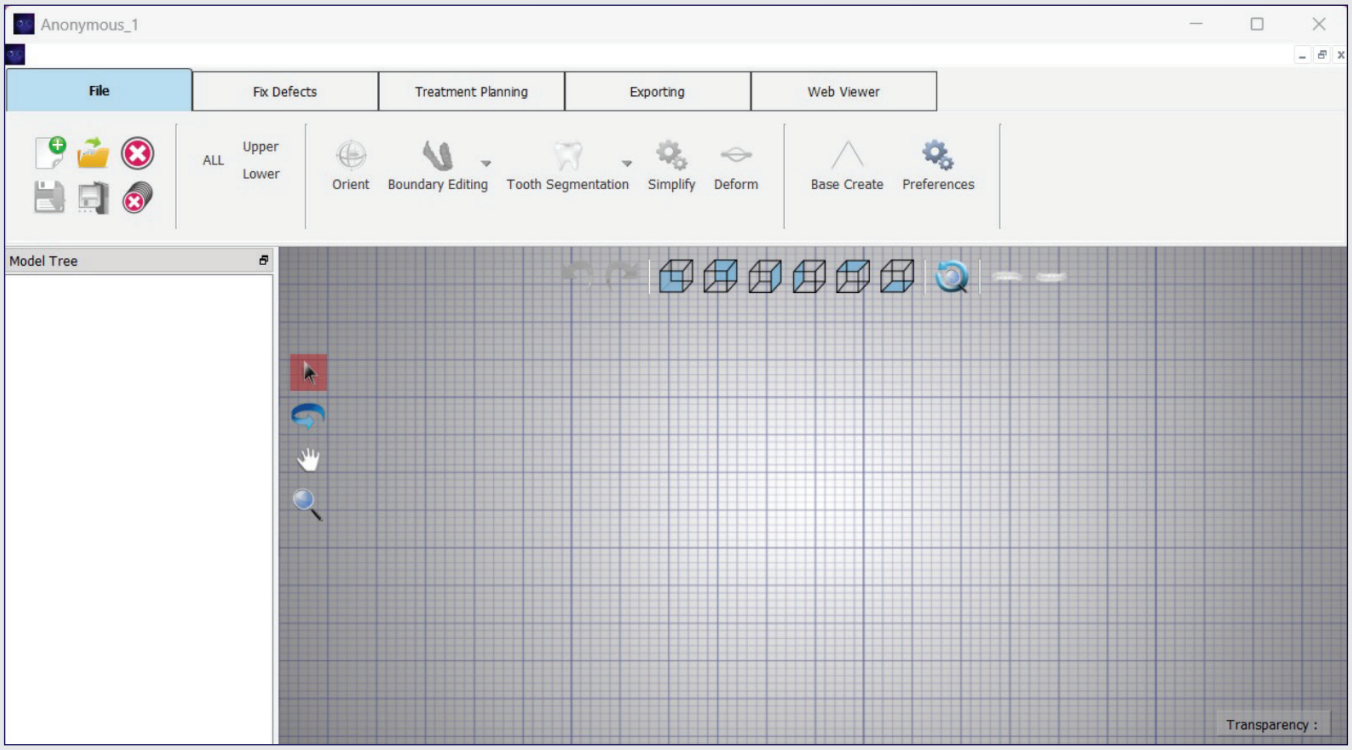

Figure 5: Opening Screen

5.2 VIEW OPTIONS

The toolbar on the File tab contains controls for the user to adjust the view of the model on the screen. Once the user sets the correct orientation of the model, this menu can be used to quickly change the perspective. (Figure 6)

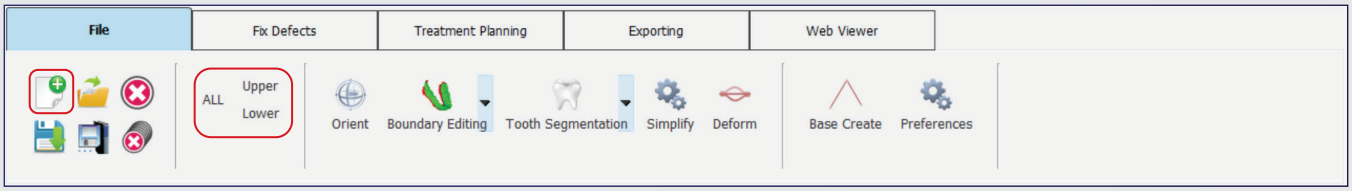

Figure 6: Model View Option

To begin, navigate to the location where raw STL scans are stored on your computer. (Figures 7 & 8) Double left click on the upper scan first, then double left click on the lower scan to bring them in Orchestrate3D Orthodontic Software. Uploading may take a minute as the files are checked for defects and simplified for easier processing.

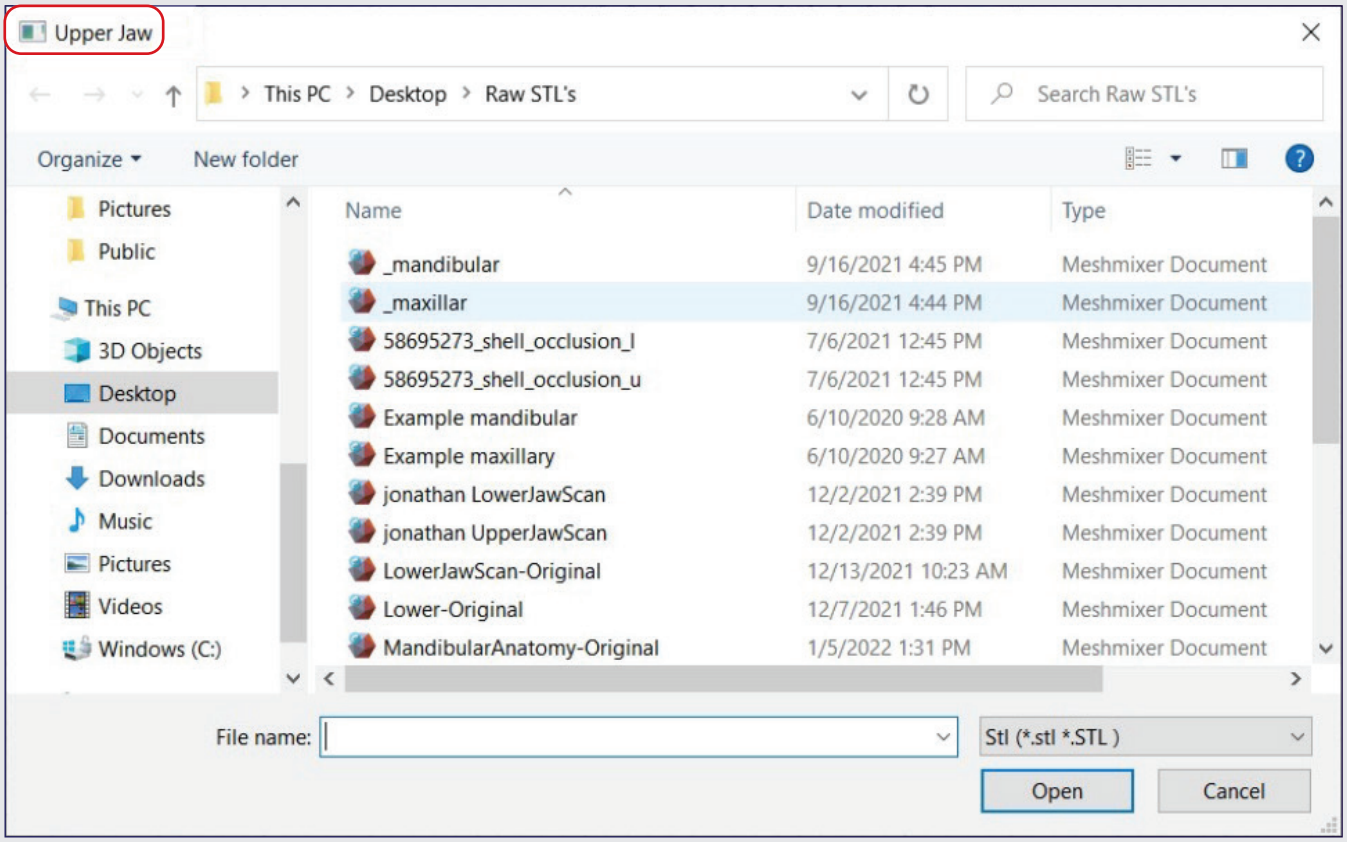

Figure 7

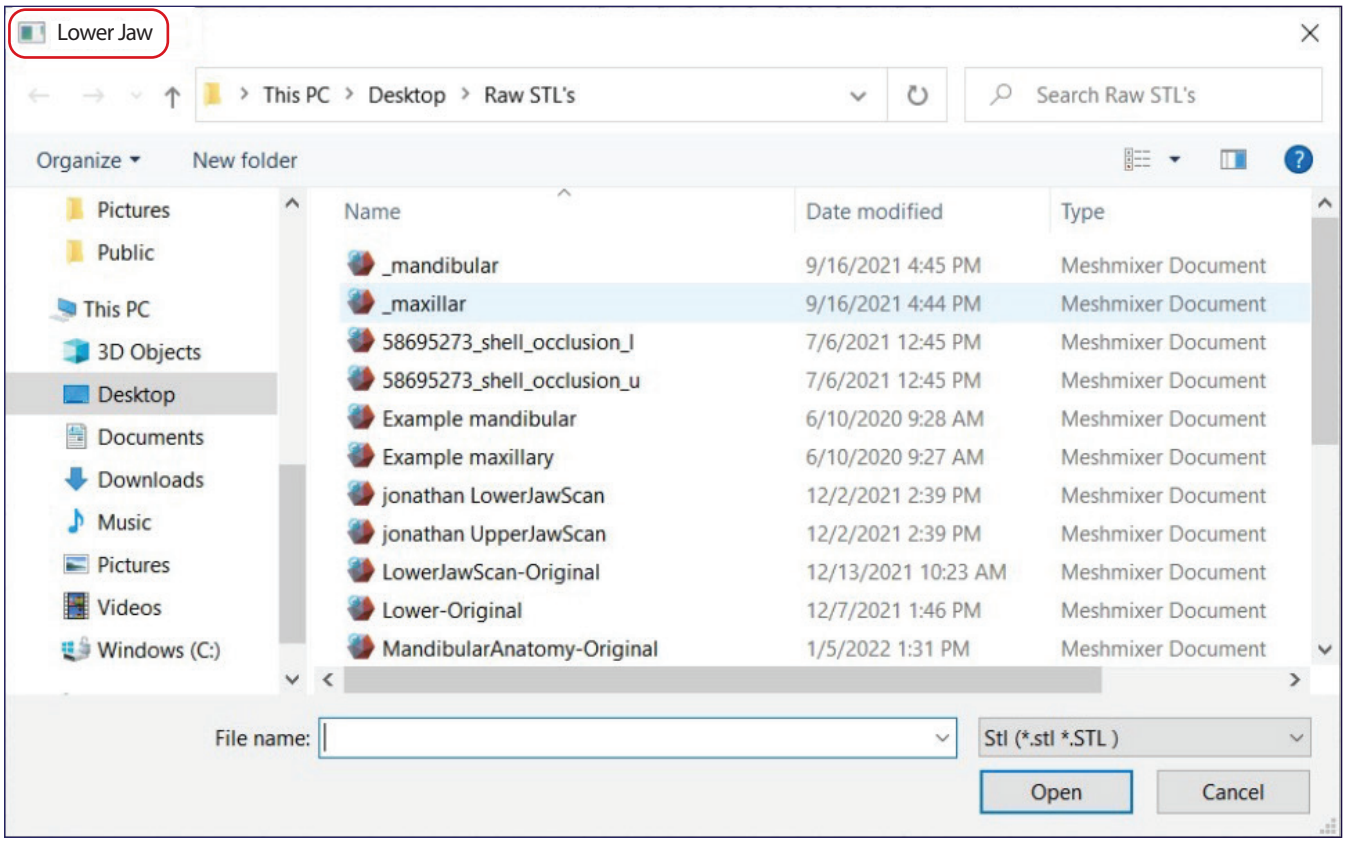

Figure 8

NOTE: The patient's raw STL scans should show the exterior surface of the scanned impression as pink. (Figure 9a) If the scans show a gray exterior (Figure 9b), click the "Flip Face" tool within the "Fix Defects" tab.

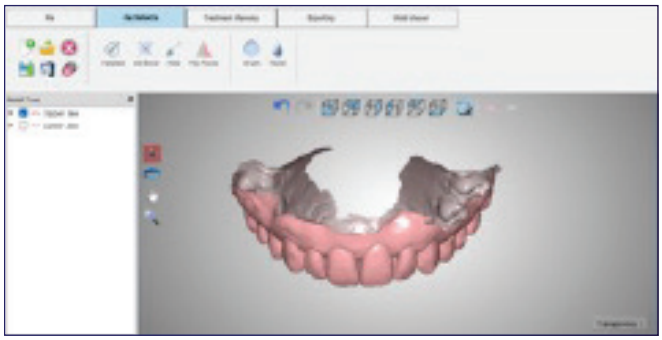

Figure 9a

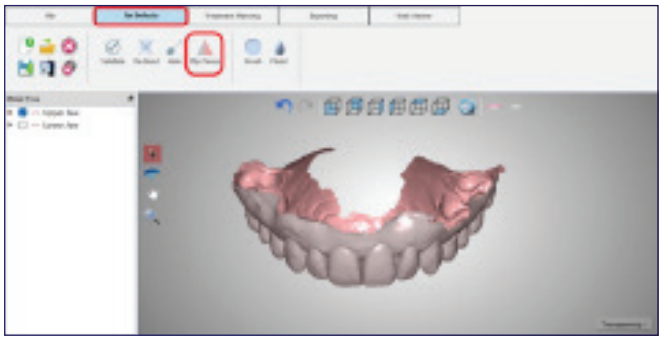

Figure 9b

To open an existing (DAPROJ) file: Left click the O3D icon from the desktop to open the software. Click on the Open Folder icon (Figure 10) and navigate to the O3D DAPROJ file folder and double left click on the appropriate patient's saved file.

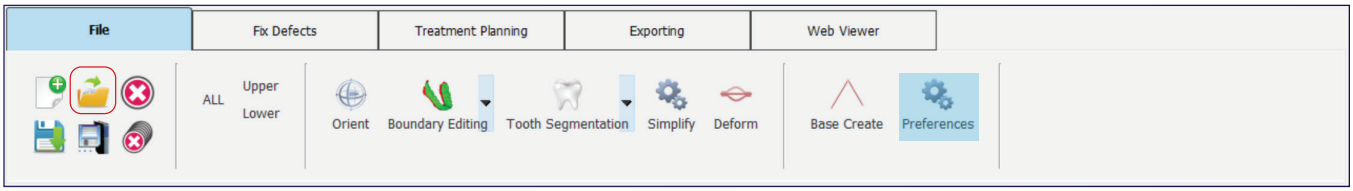

Figure 10

Turn OFF (or deselect) the lower arch by clicking on the lower arch icon. (Figures 11 & 12)

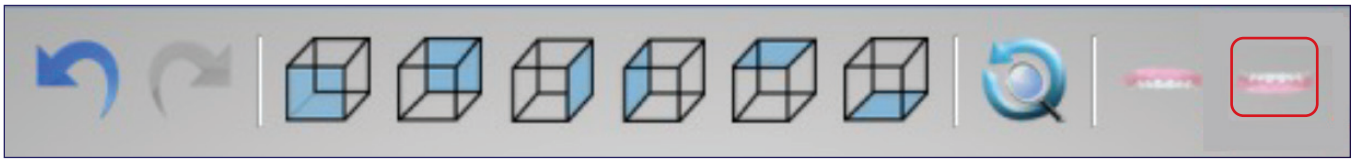

Figure 11: Blue arrow = undo | Blue shaded box = "Snap View" of model | Highlighted arch(es) = on/off

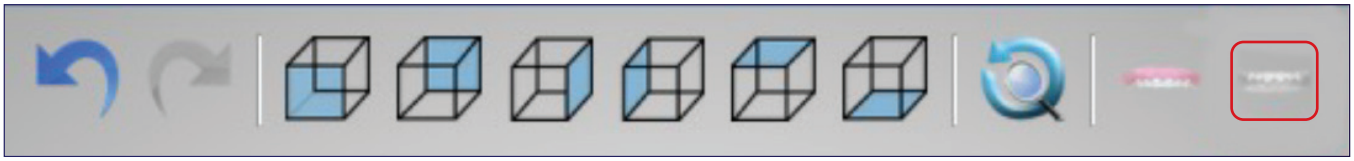

Figure 12: Blue arrow = undo | Blue shaded box = "Snap View" of model | Highlighted arch(es) = on/off

Preset Custom Preferences:

Use the Preferences icon to enable Auto Save, set Tooth Movement Velocities, and/or set Tooth Segmentation to 'On Server" for faster, more accurate results. (Figure 13)

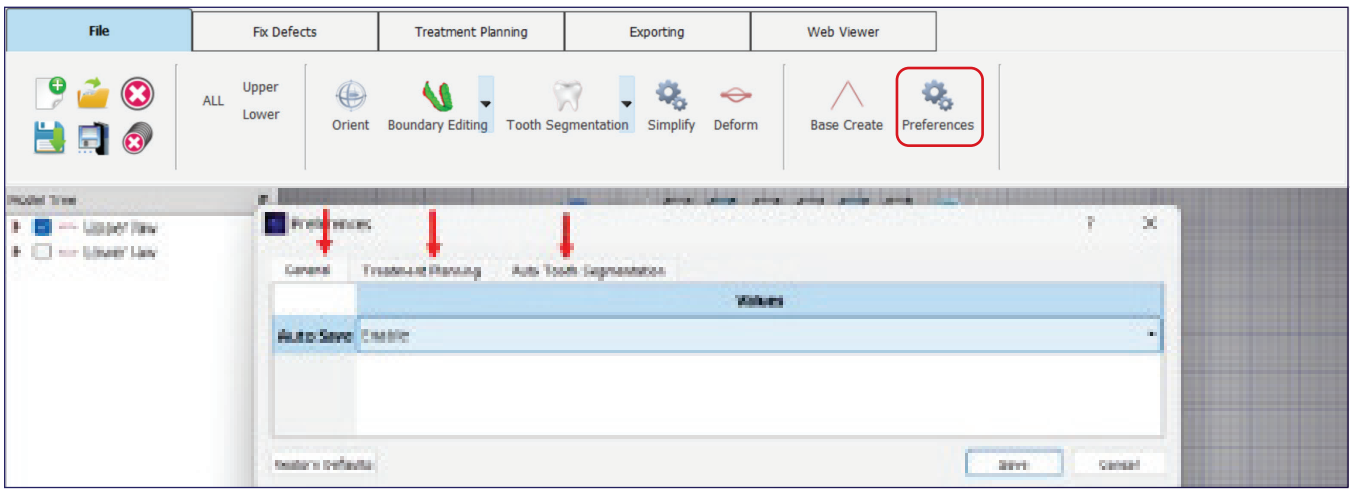

Figure 13

6. Orientation

Once the scans have been uploaded, left click on the Orient icon to orient the arches to the Snap View boxes. (Figure 14) Left click on the upper arch then hold the ctrl key and left click on the lower arch to select both arches at the same time. Using the Gyroscope, position the arches to ideal front view. (Figure 15) Once positioned, click the front Snap View box, then click the green OK button.

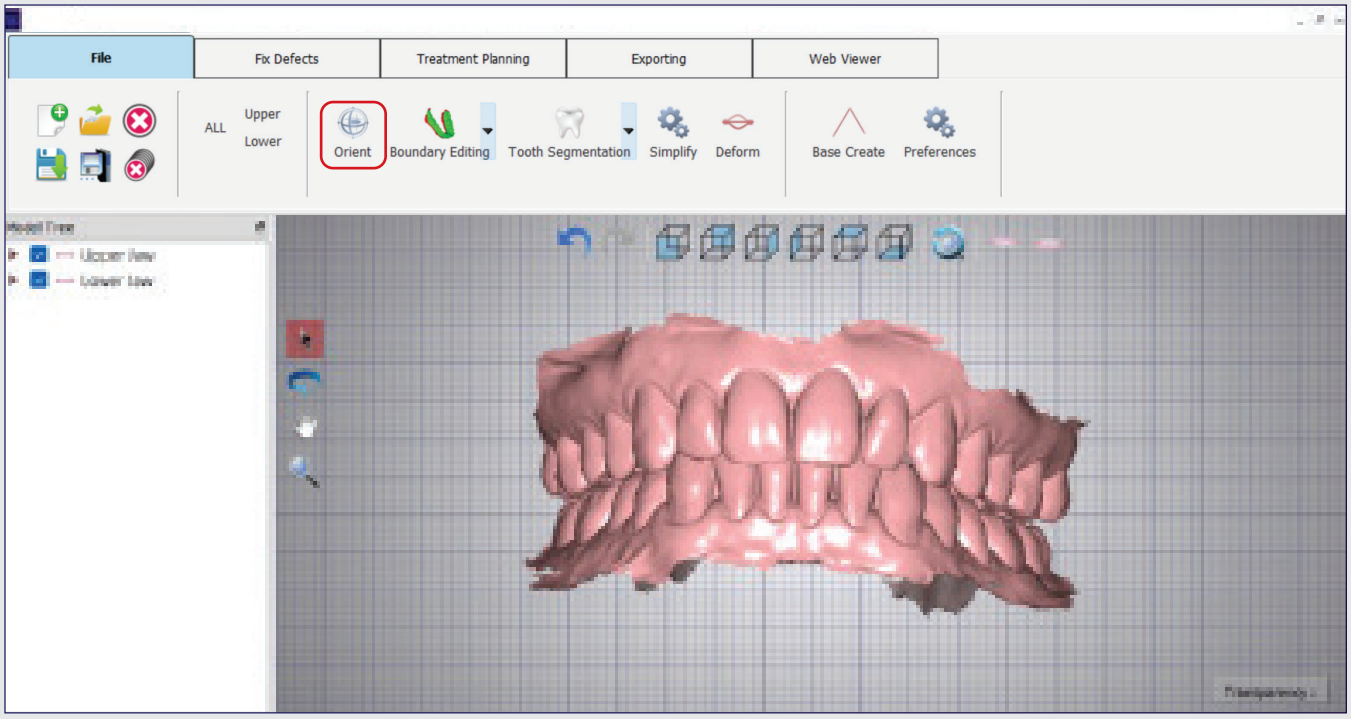

Figure 14

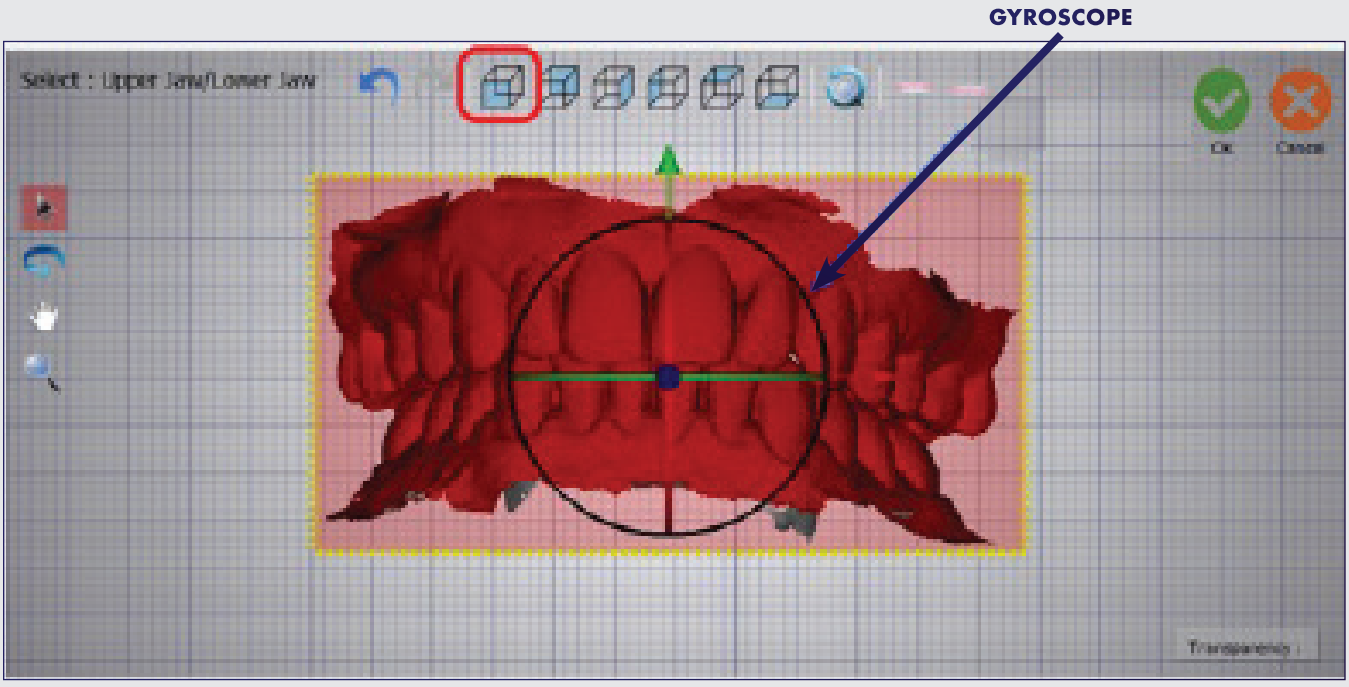

Figure 15

7. Model Boundary Editing Tools

Boundary Editing is necessary for each model in order to add a base, regardless of how clean the scan is.

There are two main ways to accomplish this step:

7.1 The first option is to use the "Boundary Editing" feature. (Figure 16) Select only one arch at a time. The boundary will auto-populate, eliminating the need to manually draw a line around the model.

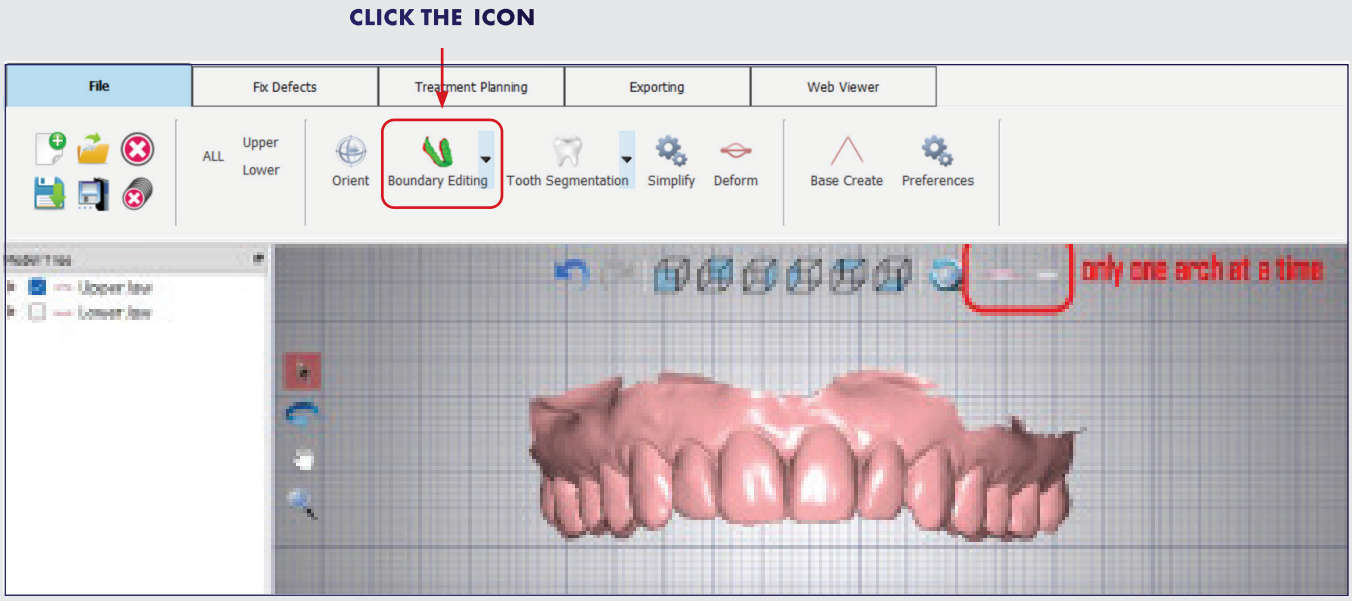

Figure 16

With the "Move Point Group" selected (Figure 17), the user can begin adjusting the different color groups of the boundary. Color groups are blue, red, yellow, and green. Select one dot within a color group and move to desired position. The remainder of the dots within that color group will move as well.

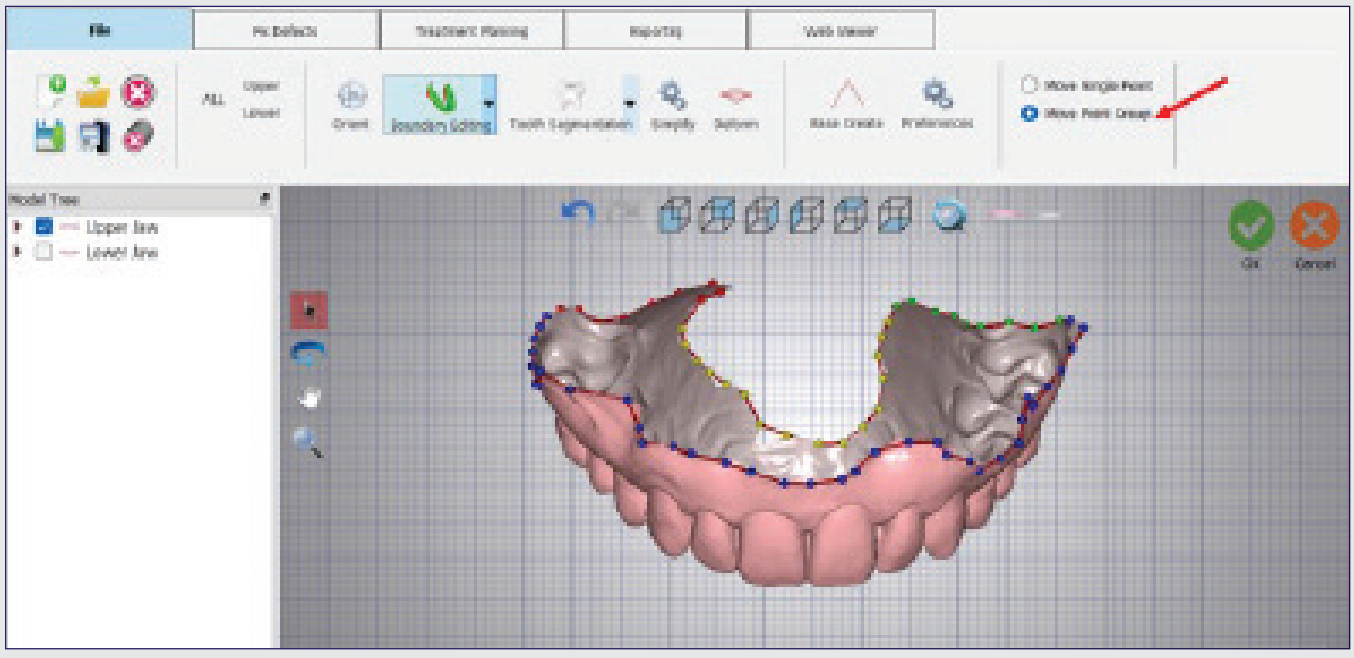

Figure 17

The user may select “Move Single Point” (Figure 18) to move to move individual dots to adjust the boundary line in a specific area. Remember, the boundary line must be away from the edge of the scanned image to properly prepare the model to build a base.

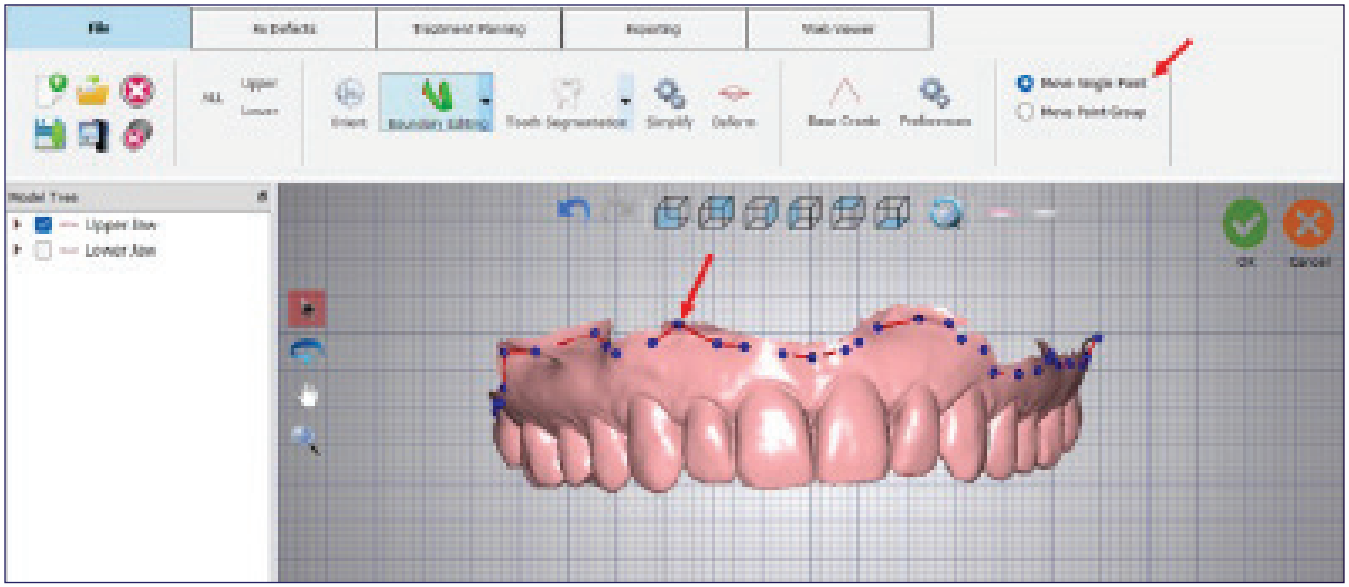

Figure 18

Once the boundary is positioned for deleting, double left click off the model (within the grid area). The model will be shown in two parts: green = keep / red = remove. Click “Done” if the model is correct. (Figure 19) If the portion you would like to keep is red, click “invert selection.” Repeat these steps for the opposing arch.

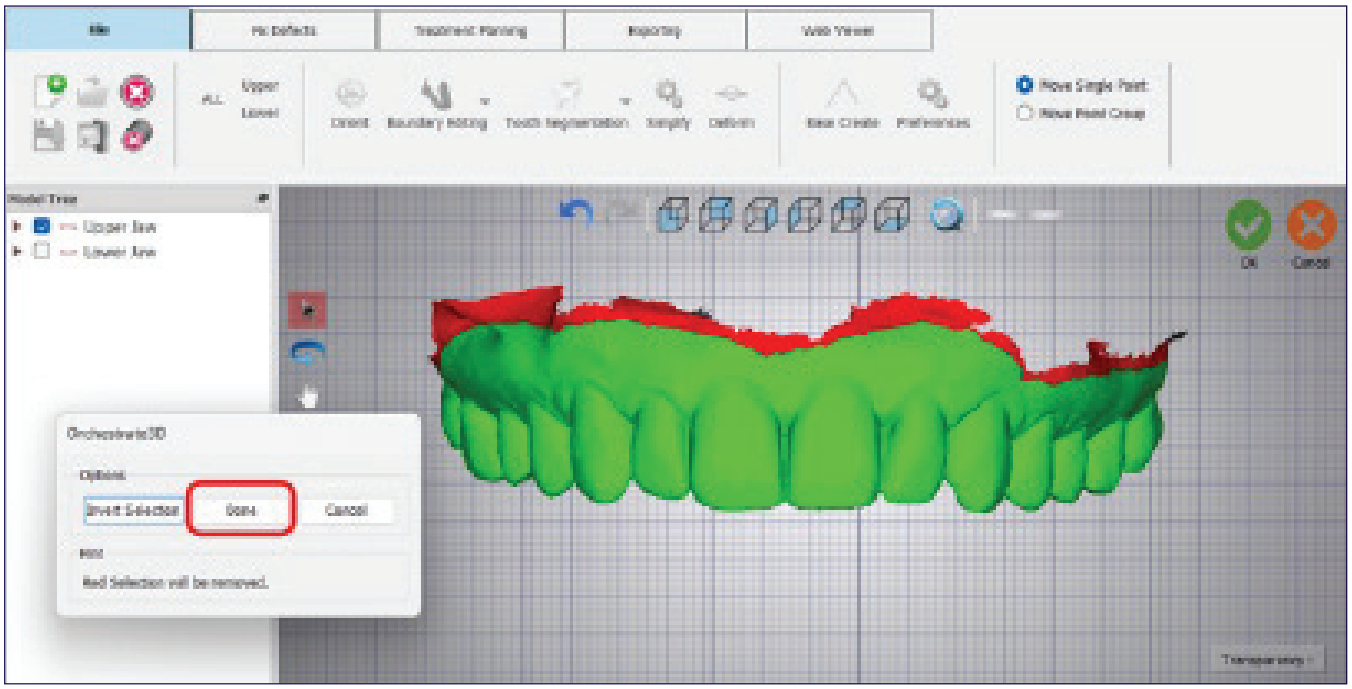

Figure 19

7.2 The second option, is to left click on "Polyline Cut-Remove" within the "Boundary Editing" drop-down menu (Figure 20) to edit the boundary around the upper arch.

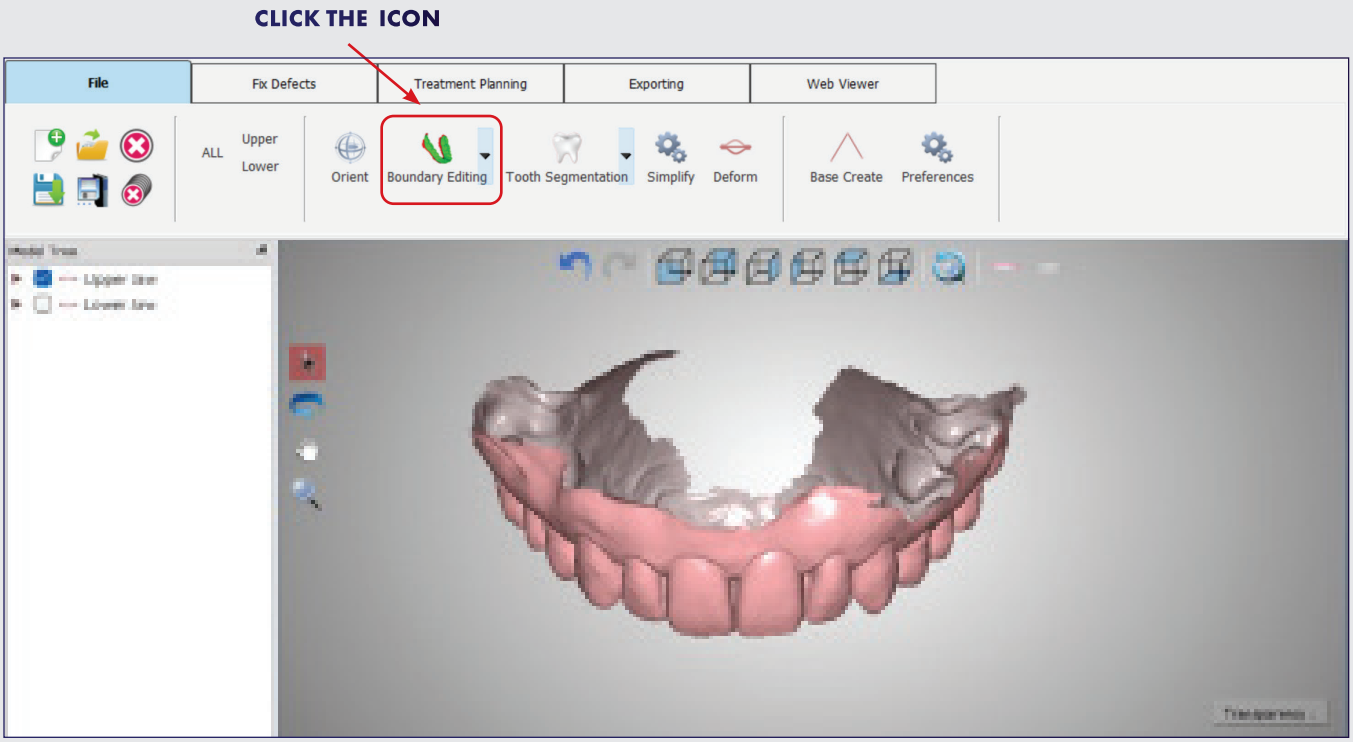

Figure 20

Begin by left clicking directly on the model. Continue left clicking and moving the mouse around the arch to make a black outline around the model. (Figure 21) Make sure that the polyline is NOT touching the edge of the model, it needs to be AWAY from the edge of the model to get a clean cut. Without a clean cut around the model there may issues when we use the "add base" feature. (left click + hold and drag NOT necessary)

Use the Snap View boxes to help orient the model in the occlusal view before beginning. It is also possible to rotate the model by right clicking and dragging (for rotation) and holding both left and right mouse keys at the same time to move the entire model bodily left, right, up, or down. Use the scrolling function on the mouse to zoom in and out. The arrow keys on the keyboard will also allow users to rotate a model.

When the boundary has been marked all the way around the model, connect the last dot to the first dot by double left clicking on the first dot. The portion of the model to be removed should turn red, then click "Done" to remove it. If the portion of the model to be kept is red, click on "Invert Selection", then left click "Done".

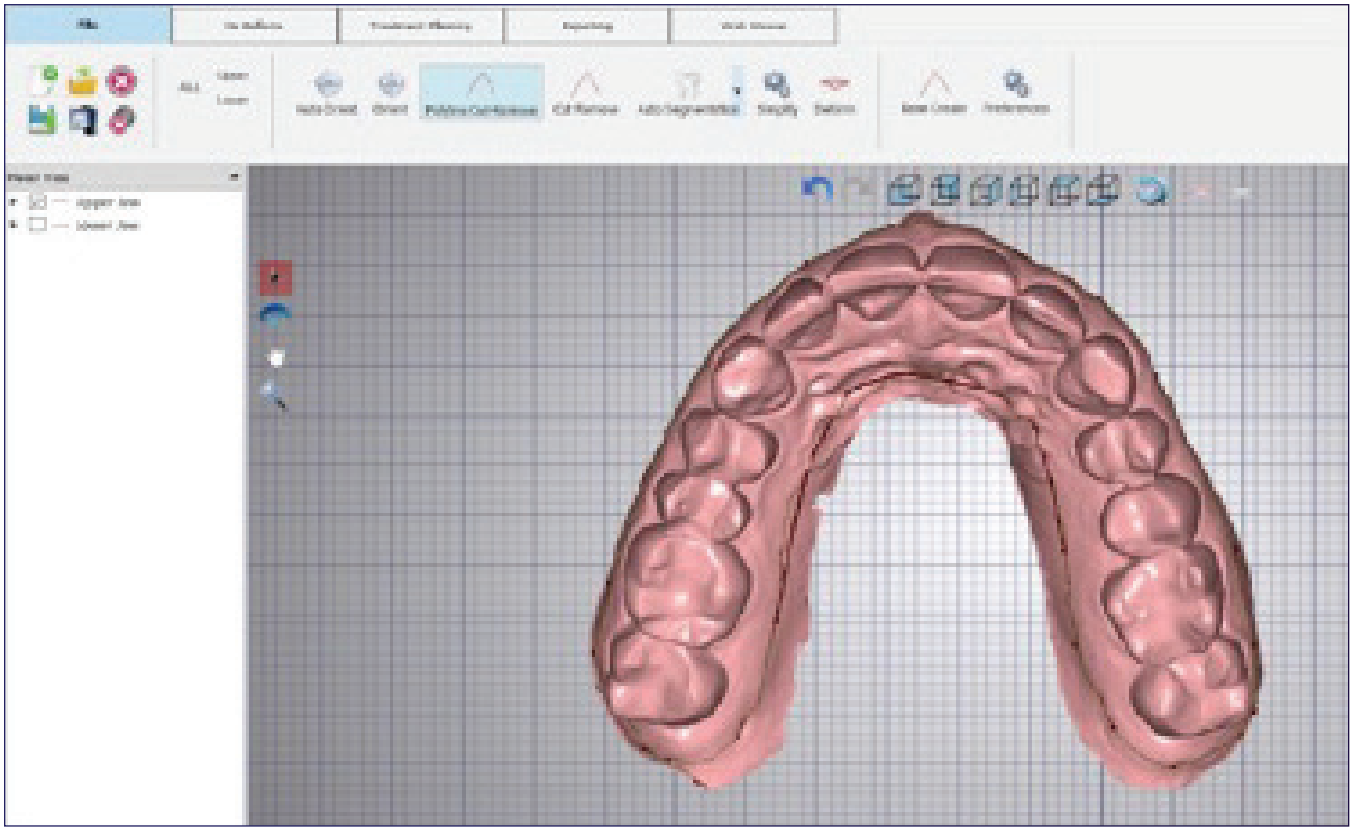

Figure 21

Left click the green OK (upper right) to finalize the "Polyline Cut-Remove" step. It is recommended to perform a Quick Save after each completed task in the model preparation, tooth movement, and label/export stages. This will save over the original with the updated information. Complete a Quick Save by clicking the "Save Active Patient Document" icon. (Figure 22)

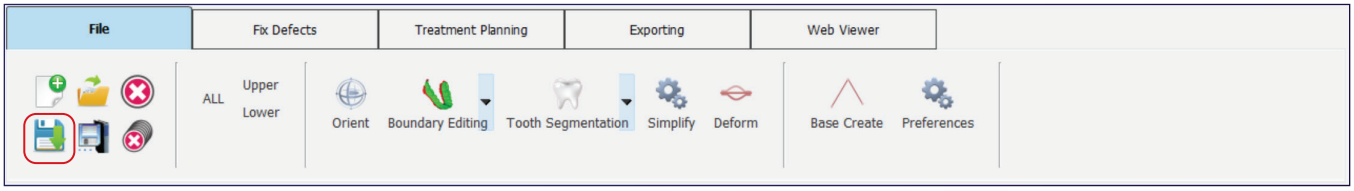

Figure 22

Next, left click the lower arch ON and left click the upper arch OFF and repeat the steps for "Polyline Cut-Remove" on the lower arch.

8. Auto Tooth Segmentation

Next, with both arches visable, click the "Tooth Segmentation" icon. (Figure 23)

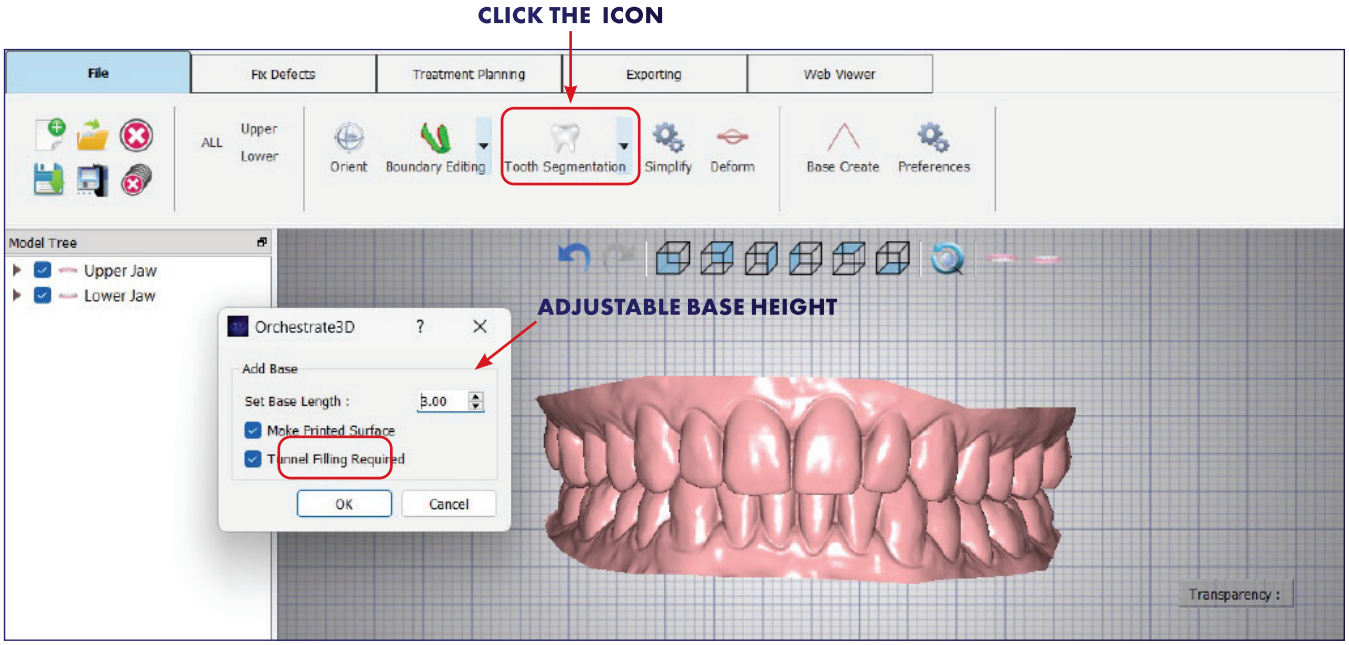

Figure 23

Select desired base height and keep the boxes checked for "Make Printed Surface" and "Tunnel Filling Required". Left click "OK". (Figure 23)

AI will begin to automatically identify each tooth with an adjustable boundary. (Figure 24) This may take a few minutes based on computer and internet speeds. Once all teeth have a boundary, examine each model/tooth to make sure each tooth has an accurate boundary.

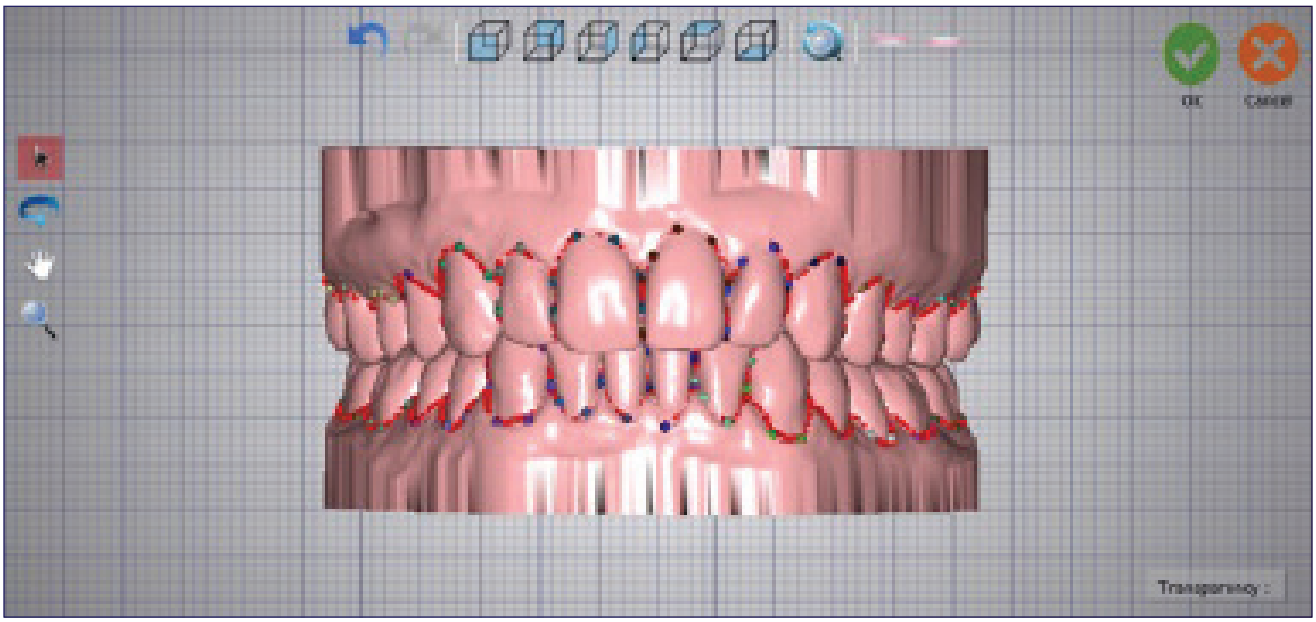

Figure 24

Adjust any boundaries that are incorrect by left clicking and dragging the dots into the correct position. (Figures 25 & 26)

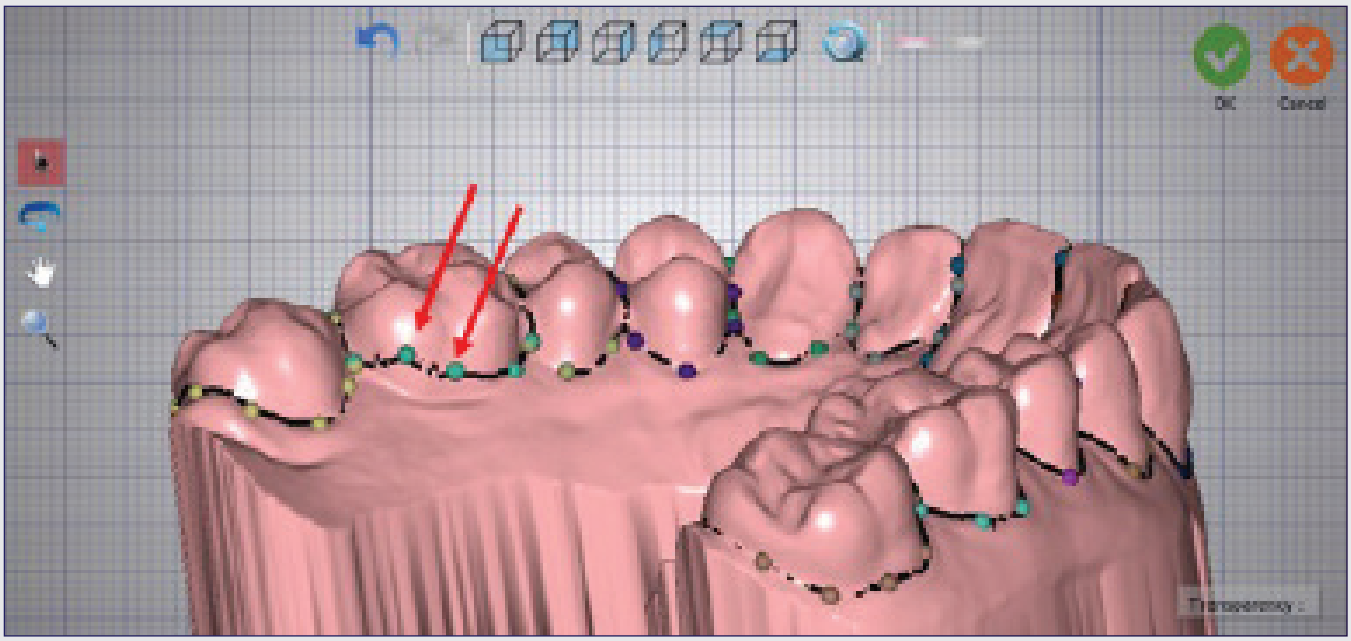

Figure 25

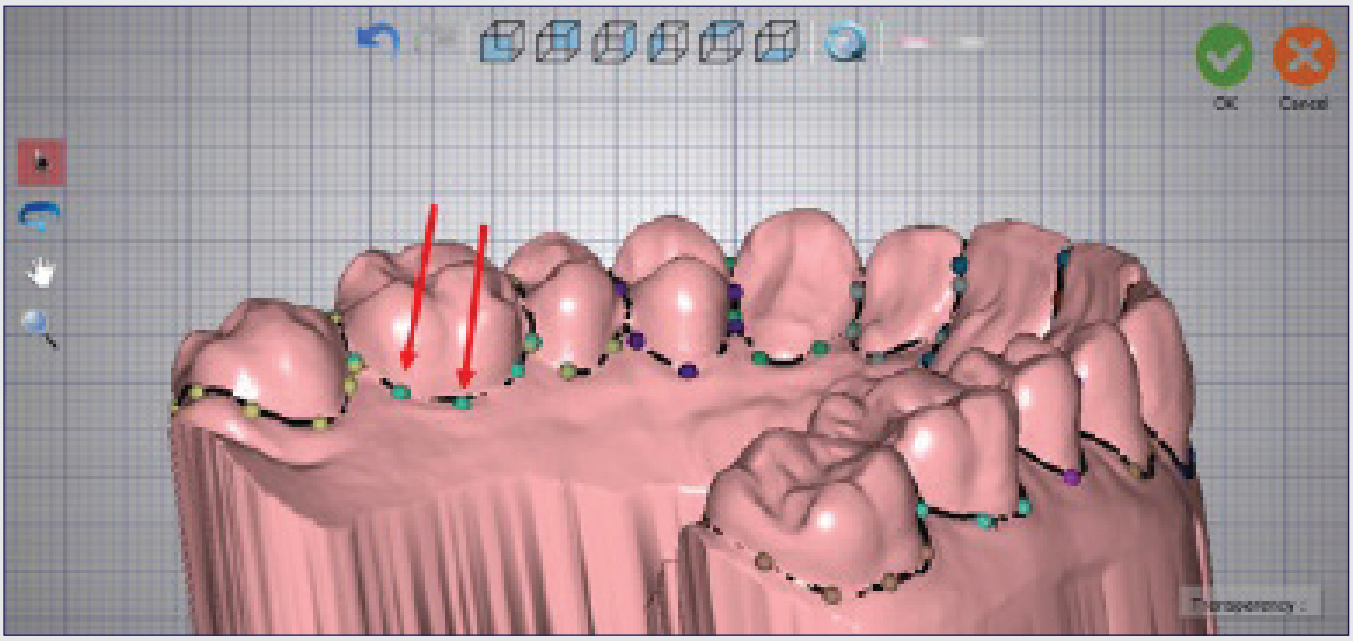

Figure 26

Once all tooth boundaries have been inspected and all necessary adjustments have been made for both arches, double left click off the models.

The following Tooth Naming Chart will pop up. (Figure 27) Deselect any missing teeth by clicking on the blue area around each tooth. Select/Deselect all teeth by clicking on the black square next to the arch name. Once all teeth are selected, left click OK. When processing finishes, both arches should have white teeth.

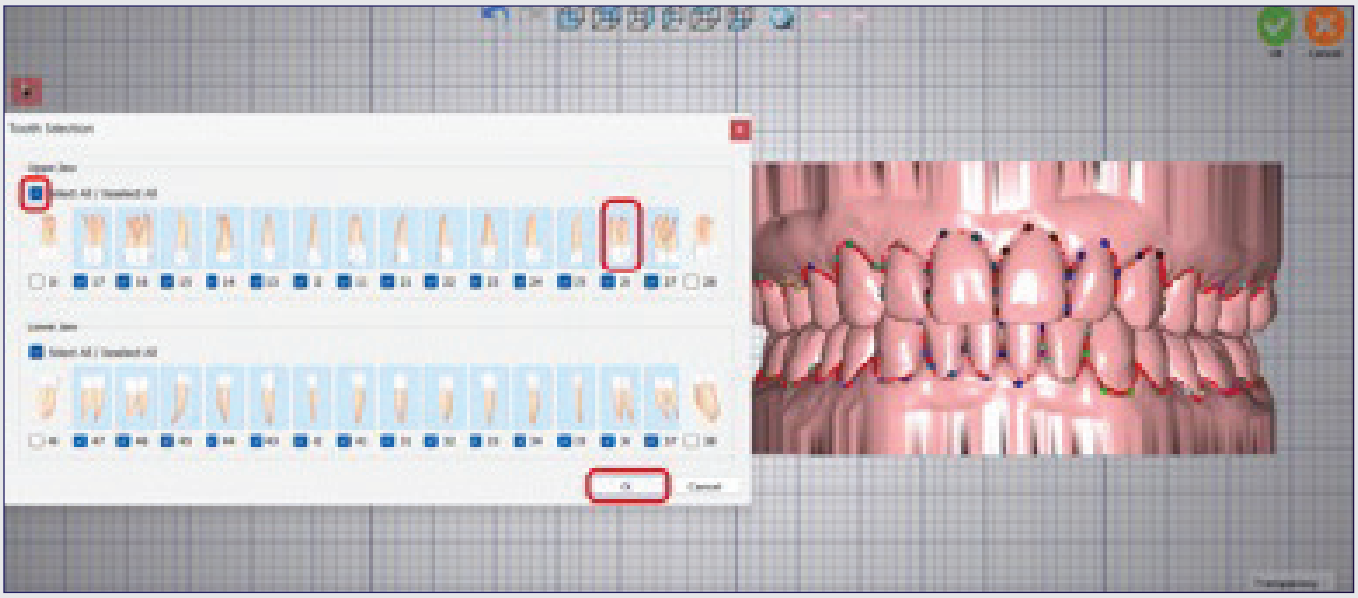

Figure 27

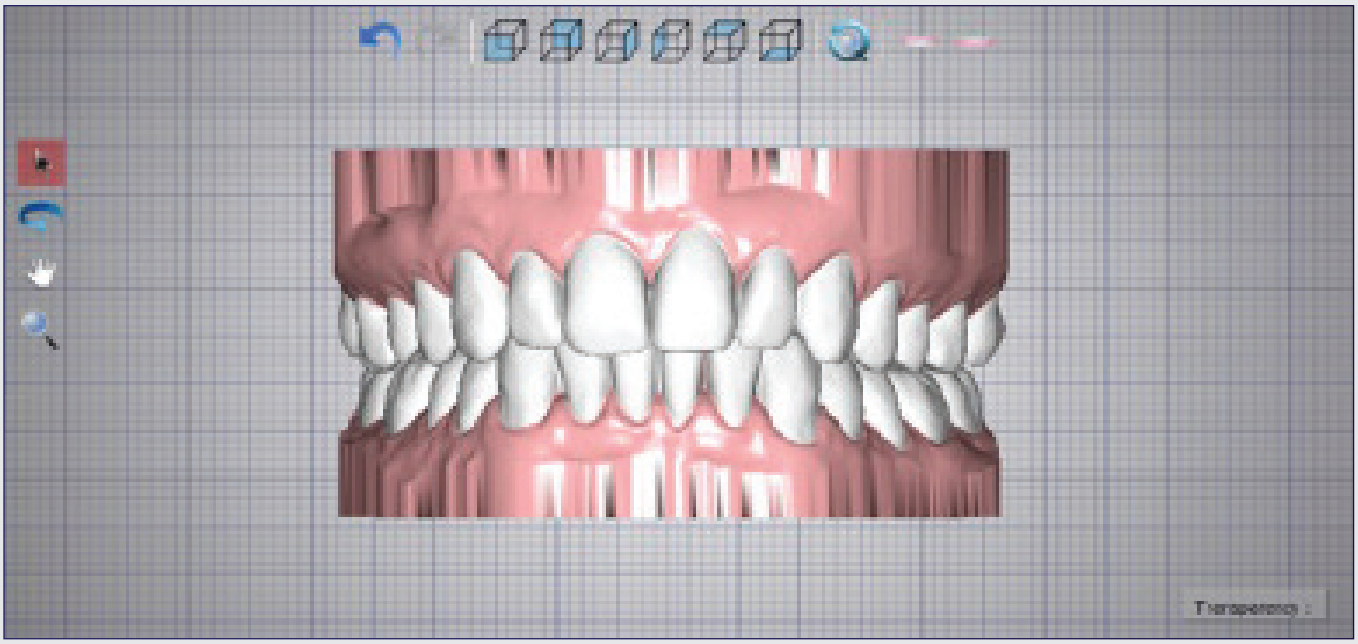

Figure 28

If some teeth do not segment (remain pink), click the "Fix Defects" tab. Double left click off the model to delete.

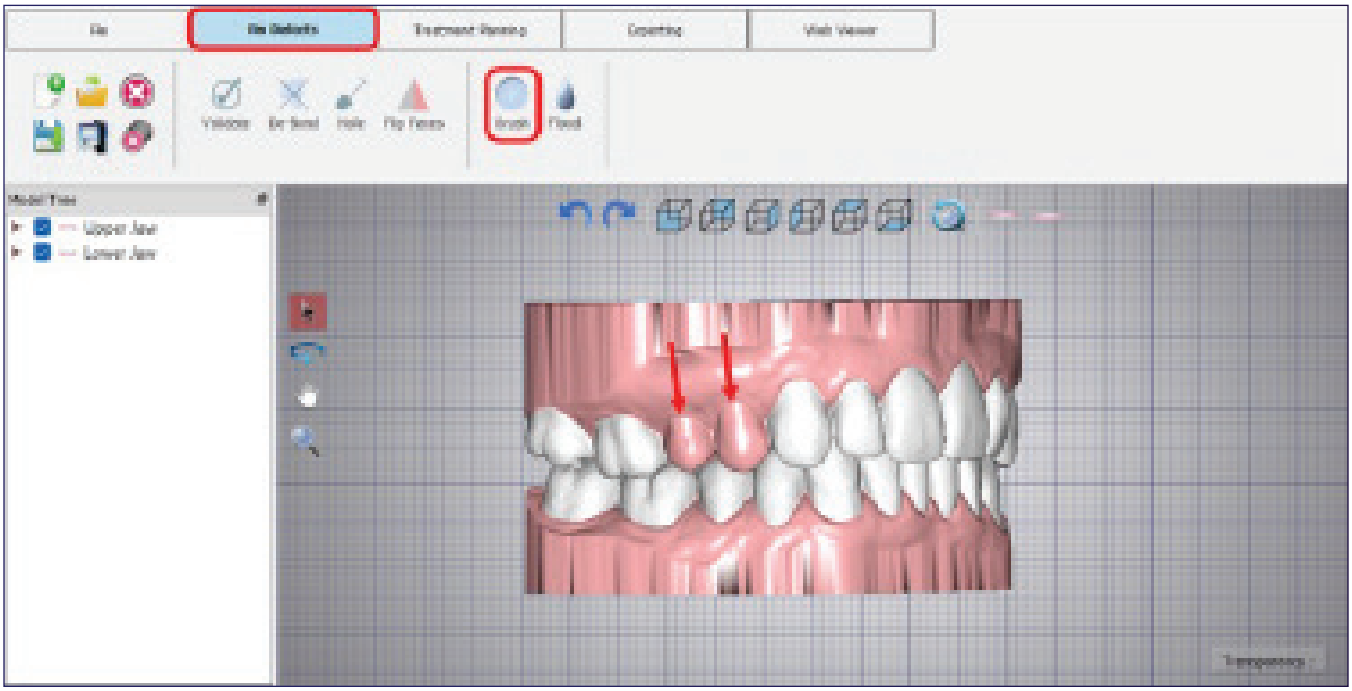

Figure 29

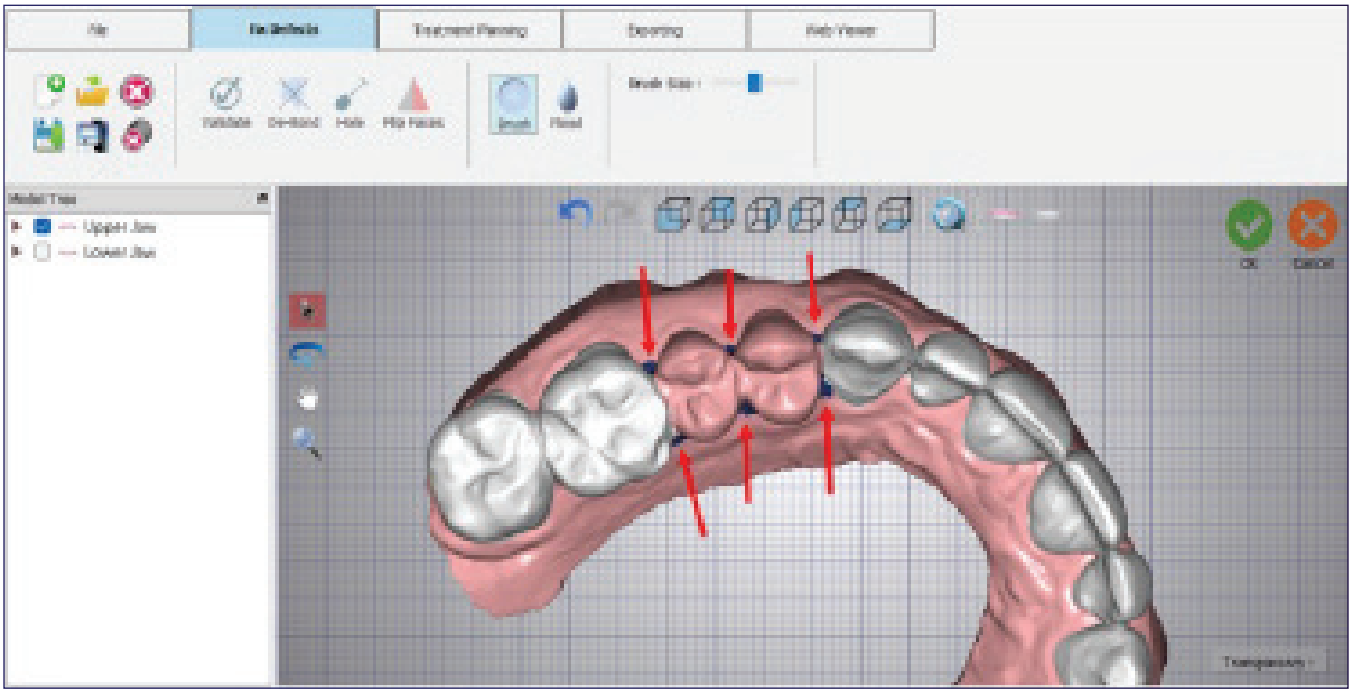

Figure 30

Make sure that the areas to be deleted are red, then click "Done". (Figure 31) If the areas to be deleted are green and the model is red, click "Invert Selection", then click "Done". Click "Hole" to fill in the holes. (Figures 32 & 33)

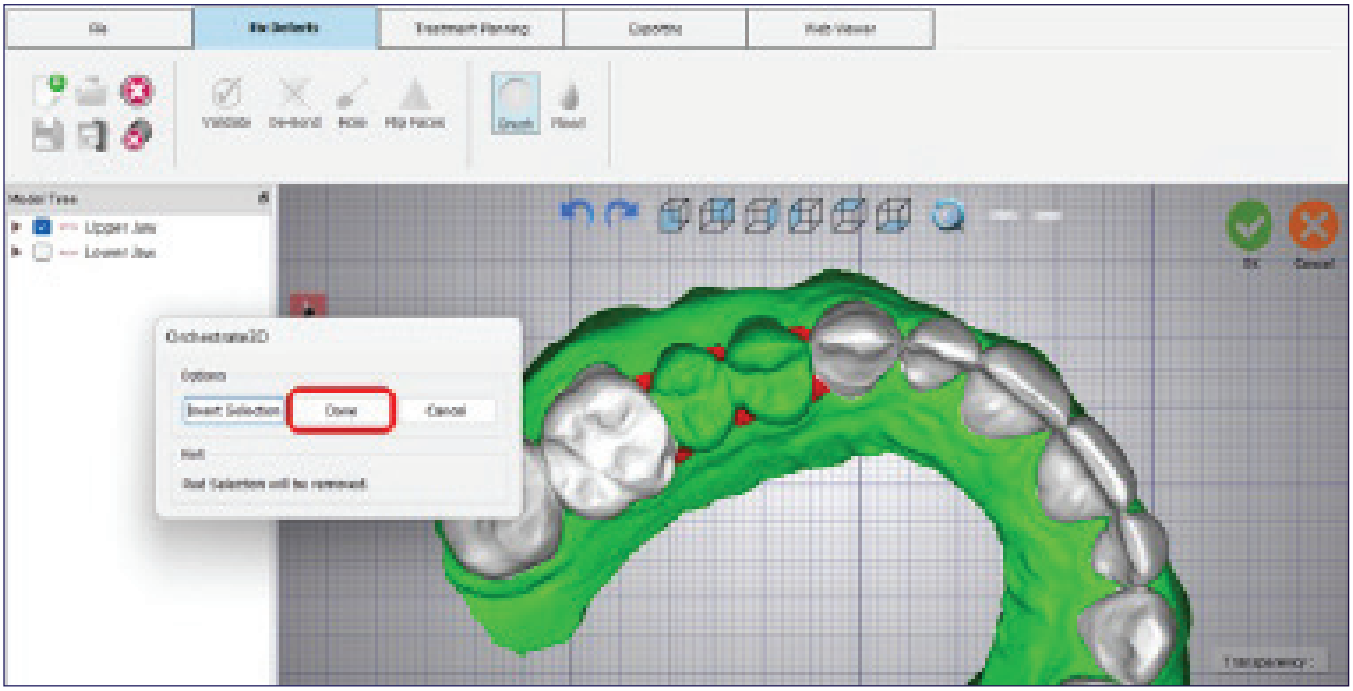

Figure 31

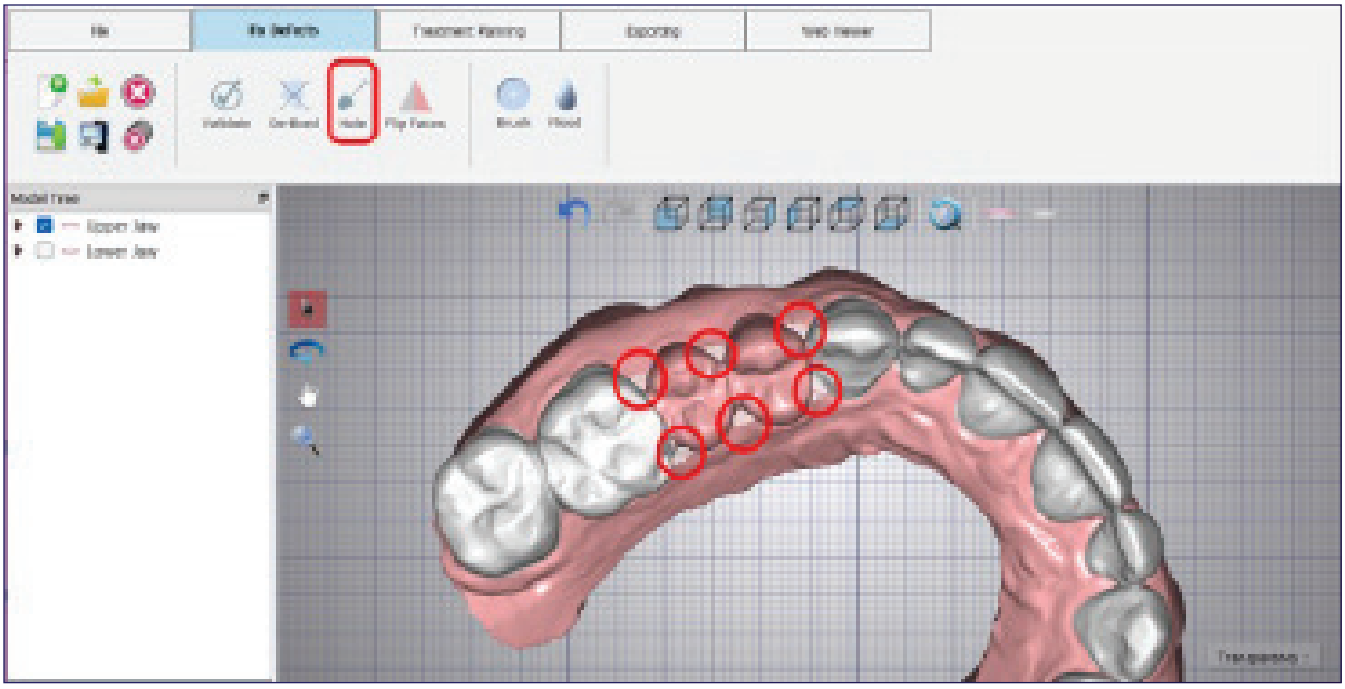

Figure 32

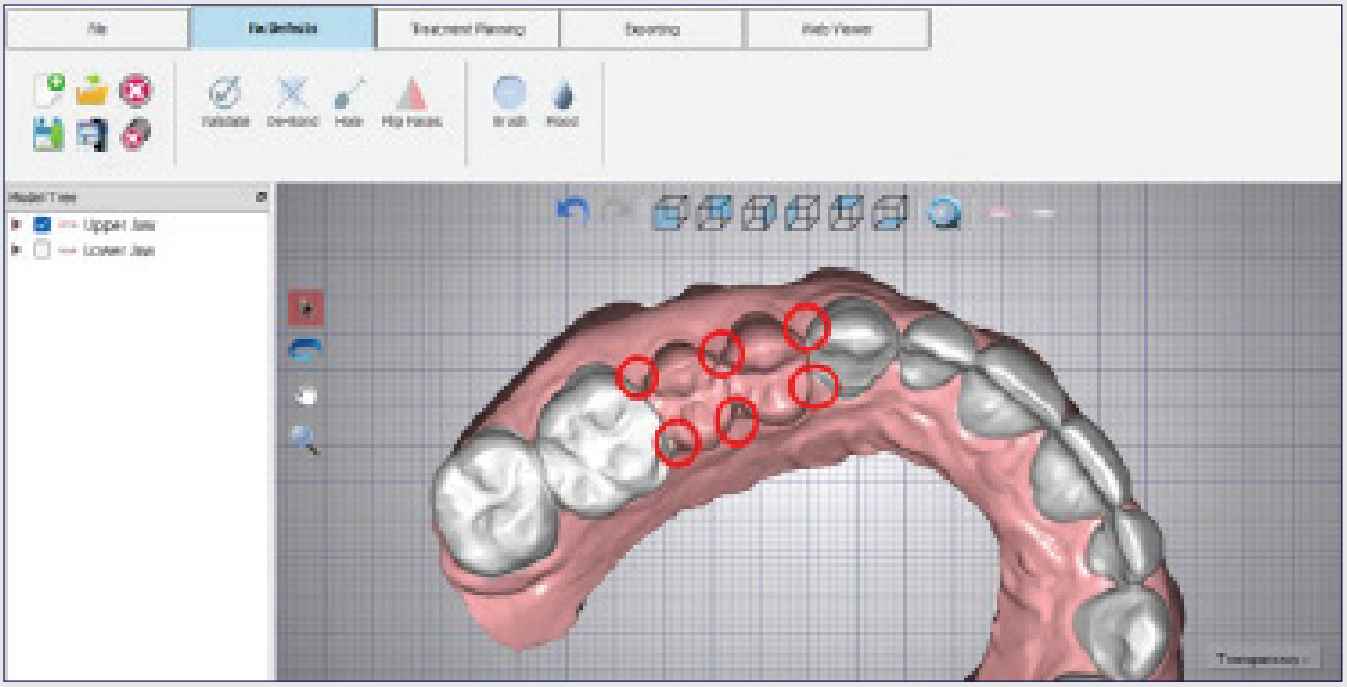
File
Fix Defects
Treatment Planning
Exporting
Help/Viewer
Model Tree
Upper Jaw
Lower Jaw

Figure 33

Return to the "File" tab and click the "Tooth Segmentation" drop-down list and select "Segmentation". Begin placing dots from (the patient's) left to right around the arch.*

DOT Placement: (Figure 34)

1. First Sequence - Place one dot at each interproximal

2. Second Sequence - Place one dot on each on the facial of each tooth

3. Third Sequence - Place one dot on the lingual of each tooth.

*Always begin dot placement from the patient's left and move around the arch to the right.

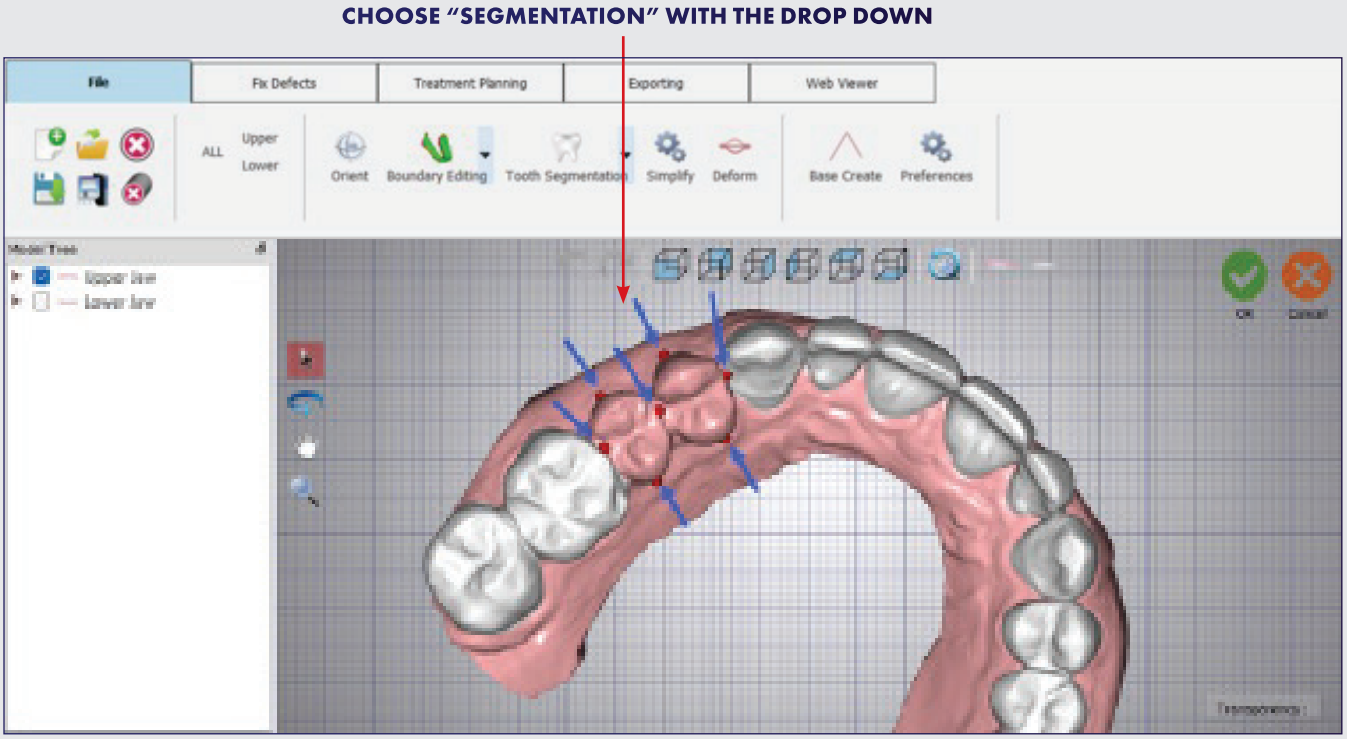

Figure 34

Double left click off the model. New tooth boundaries should appear. Make any necessary adjustments to the boundaries. Double left click off the model. The Tooth Naming Chart will pop up. Make sure only teeth that are present are selected then click OK. All teeth should be white. (Figure 35)

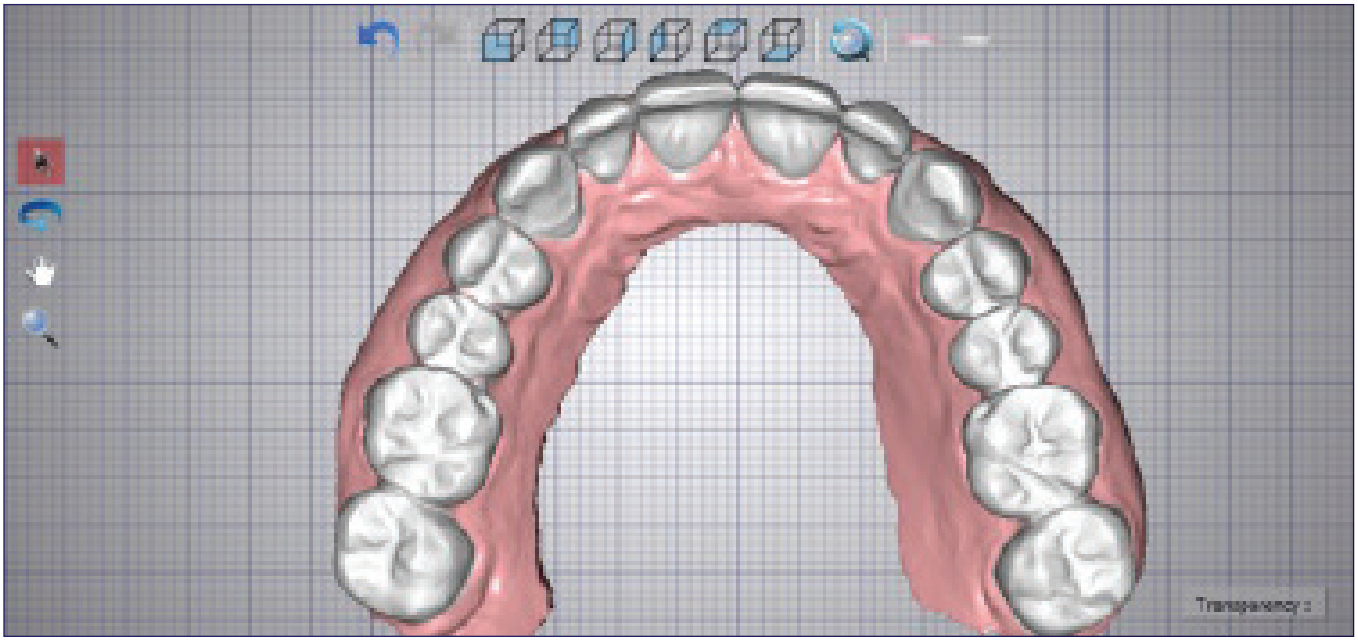

Figure 35

With both arches segmented, turn ON both arches and left click the front view box. Left click the "Simplify" icon. Change "set approx. Max project file size (MB)" to .2 and left click OK. (Figure36) This reduces the file size for faster processing.

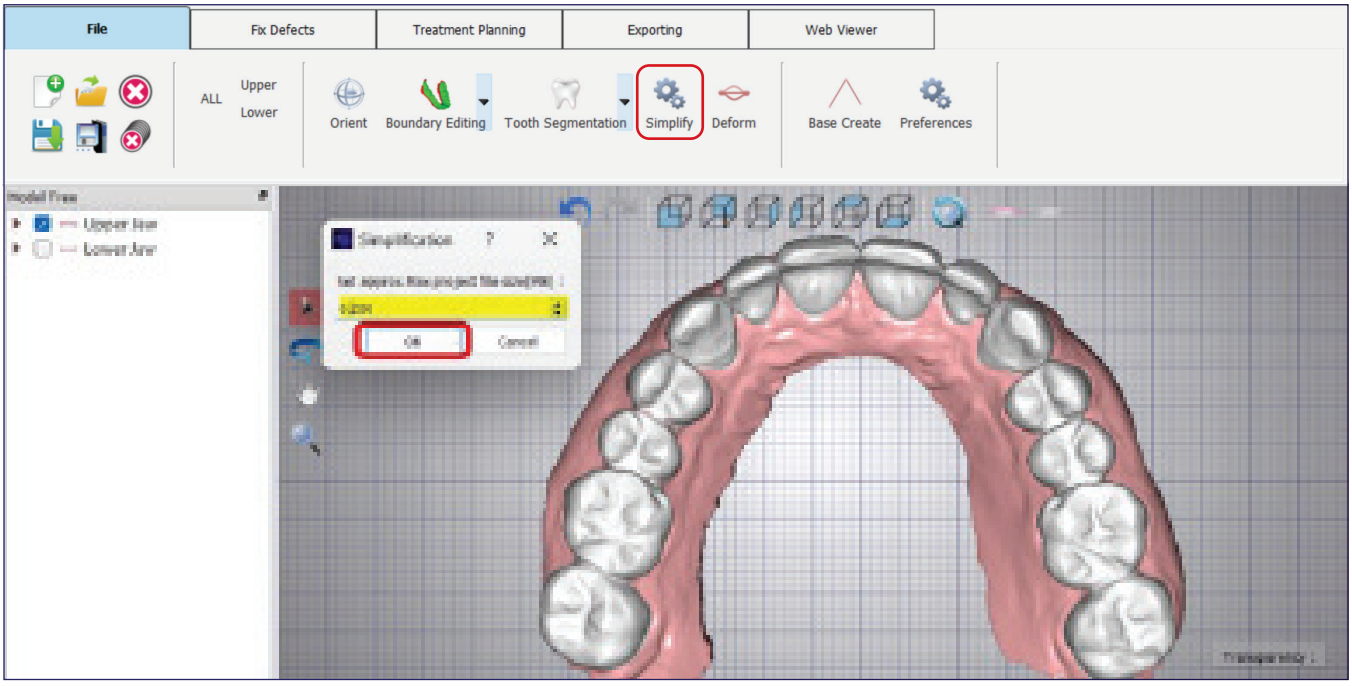

Figure 36

9. Deform Icon

Turn OFF lower arch and place upper arch in bottom Snap View. Check occlusal for any pink that may be present. If none present, turn OFF upper arch, turn ON lower arch, and place in top Snap View to check the lower arch for any pink that may be present on occlusal surfaces. If there is pink on either arch, left click the "Deform" icon to remove it. (Figure 37) This tool will ONLY remove pink and will not remove white (tooth surface).

Left click, hold, and drag the yellow ball over the pink on the occlusal of each tooth surface in once motion. The pinkwill turn yellow. Once all of the pink has been turned yellow, double left click off the model to delete it. Left click thegreen OK. Quick Save.

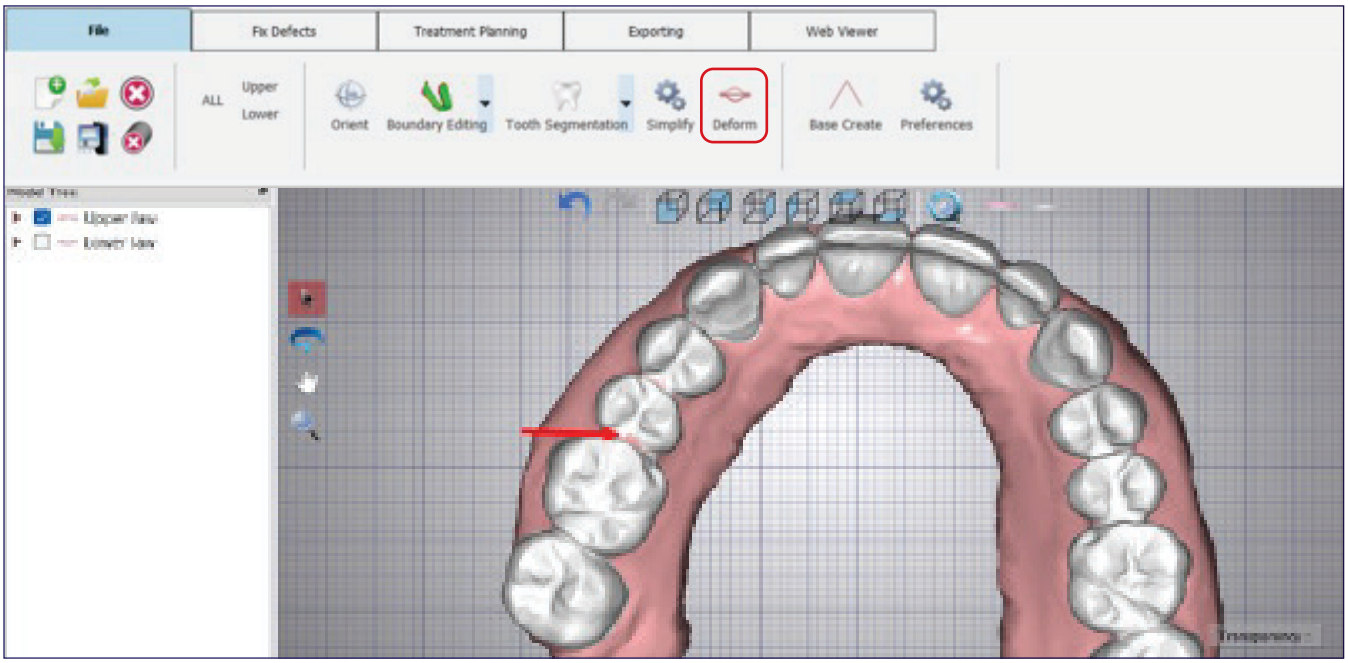

Figure 37

10. Align Gyroscopes

Left click the "Treatment planning" tab to begin aligning the gyroscopes (g-scopes). This is necessary for the teeth to move in the proper direction during alignment.. This also aids in positioning the model labels, just before export to 3D printing.

Turn lower arch OFF. Left click bottom Snap View (DO NOT rotate model) users can zoom out/in (using the scroll) or move model bodily up/down side/side (hold and drag both left and right mouse keys at the same time) but DO NOT rotate (right click, hold, and drag). Rotating the model will create more work for you as the g-scope will be misaligned.

Once your upper model is in a good occlusal bottom Snap View then left click the "Manual Align" icon. Left click the right second molar to begin. Position the g-scope with the blue arrow pointing facial/buccal and the green dot in the center of the tooth. (Figure 38) When these two are positioned correctly the red arrow will be where it needs to be. You should only have to use the outside circle of the g-scope and the outside arrows to adjust the g-scopes. Stay way from adjusting the inside blue and red cross in the center.

Once the g-scope has been adjusted for the right second molar, simply left click the adjacent tooth to bring up its g-scope and adjust it the same way, left clicking each individual tooth to align its g-scope. When you get to the incisors you will want to make sure that the blue arrow is facial and use the blue arrow to pull the g-scope forward so that the blue center line is parallel to the incisal edge.

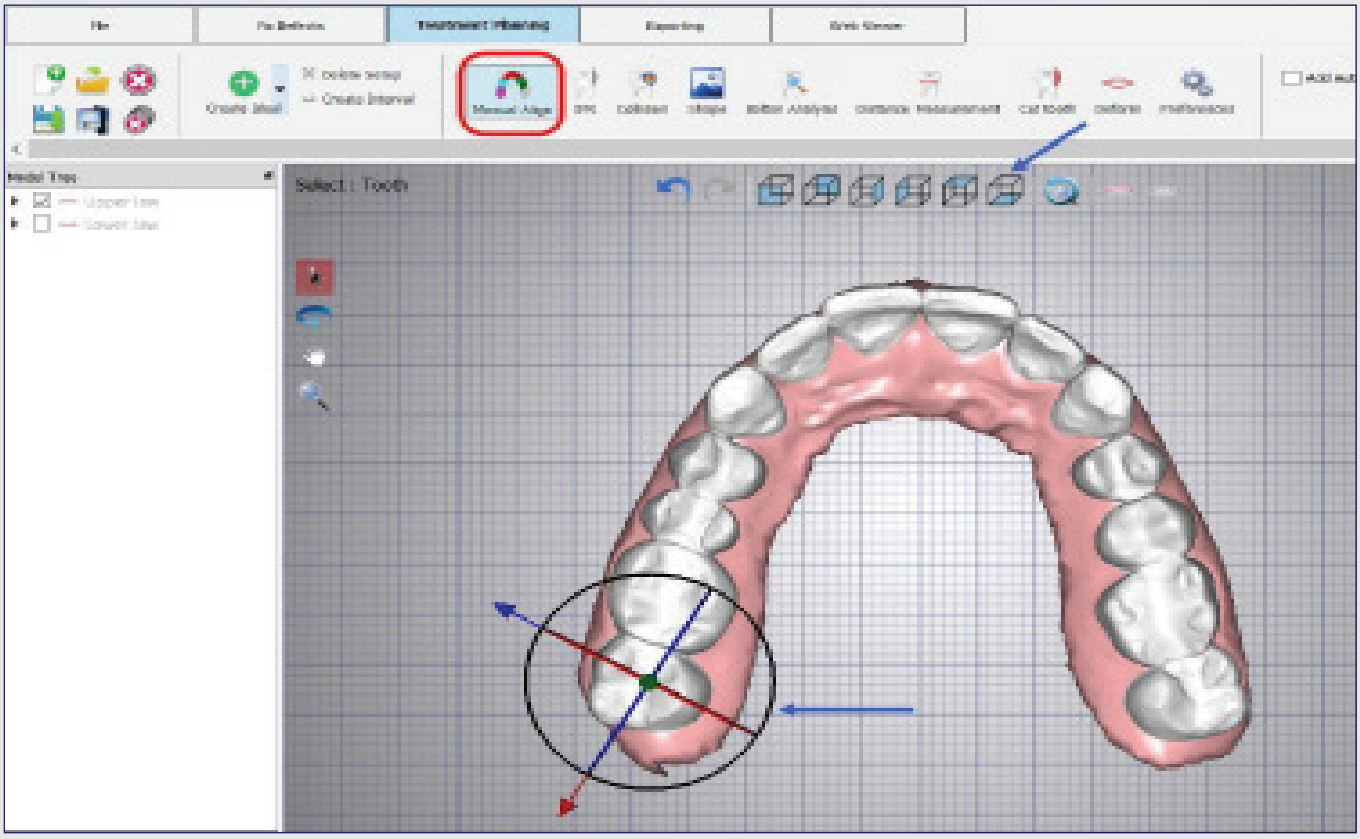

Figure 38

After working around the entire arch, click the green OK. Quick Save. Turn OFF the upper arch and turn ON the lower arch. Place the lower arch in the top Snap View.

Repeat the "align g-scopes" steps for the lower arch. Once finished click the green OK. Quick Save.

This file is now ready for tooth movement. Notify the doctor, letting them know that the patient's file is ready the treatment planning.

11. Aligner Treatment Planning Tools

The Treatment Planning Menu contains options for the user to create new setups for treatment planning. This menu will allow the user to designate the ideal tooth alignment and create intervals for exporting. Figure 39 also depicts the layout of windows within the Orchestrate 3D Orthodontic Software, which are outlined in red and described below:

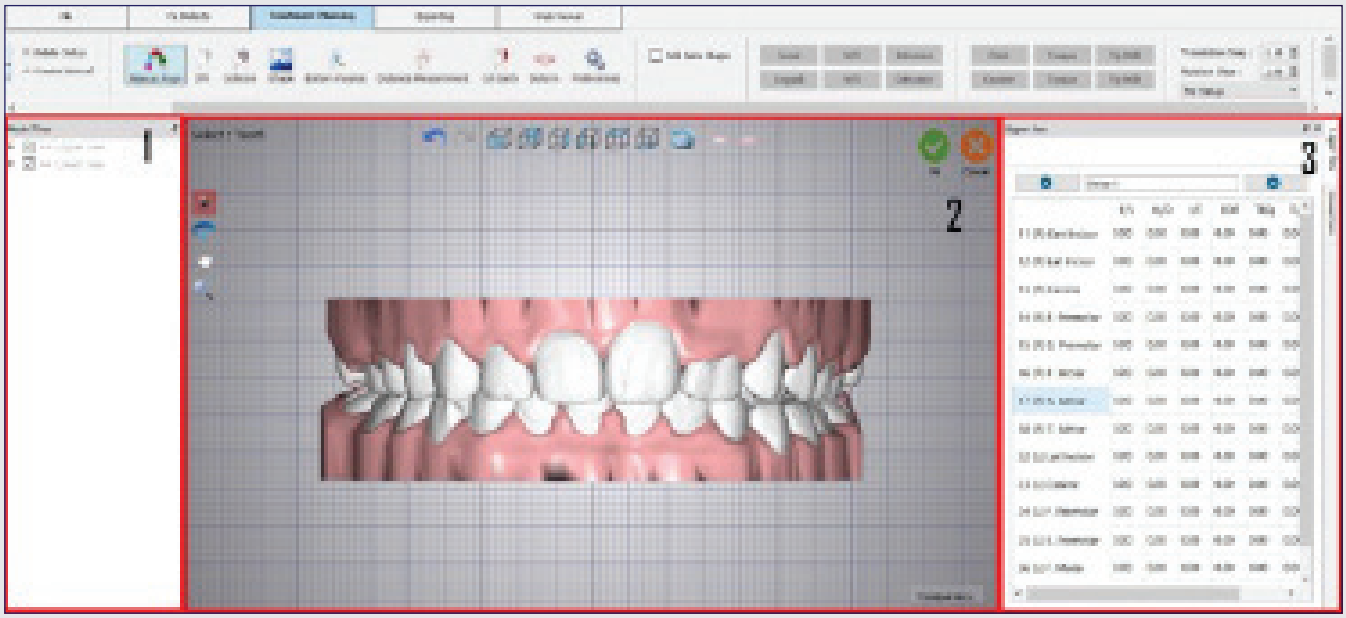

Figure 39: Treatment Planning Menu of Orchestrate 3D.

Manual Alignment Instructions: As a trained dental professional, the treatment plan is up to your discretion. Instructions that offer guidance for using the different functions available in the Orchestrate 3D Orthodontic Software are sent in videos that sent as part of the purchase package.

12. List of Additional Training Videos

DIGITAL PREPARATION OF SCANS

1. Data Processing/Tooth Segmentation
2. Labeling and Exporting
3. Bracket Removal
4. Retainer Model Prep
5. Tooth Extractions at the Digital Prep stage
6. Saving Setup Files

TREATMENT PLANNING VIDEOS:

1. Orchestrate 3D Introduction
2. Treatment Planning Sample Cases
3. Attachments
4. Attachment Placement
5. Collision Tool
6. Interproximal Reduction (IPR)
7. Lingual Bite Ramps
8. Tooth Extraction Extractions at the Treatment Planning stage
9. Labeling & Exporting
10. Digital Blockouts
11. DigiLine Direct Print Aligners

TROUBLESHOOTING GUIDES:

1. Segmentation Issues
2. Pink Teeth During Segmentation
3. Segmentation with Missing Teeth

13. Treatment Planning Tools

13.1 POINT-TO-POINT MEASUREMENT

Click the Distance Measurement Tool. (Figure 40)

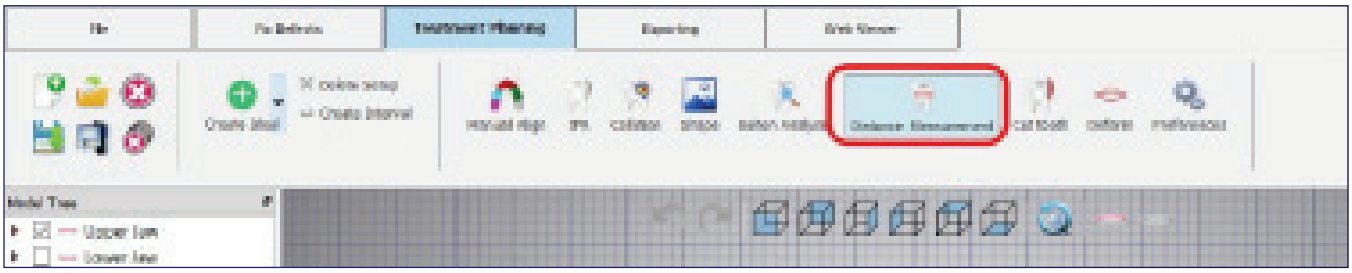

Figure 40

Click on the starting point and the ending point of the measurement. The distance in mm will be shown in the lower left corner of the treatment planning screen. (Figure 41)

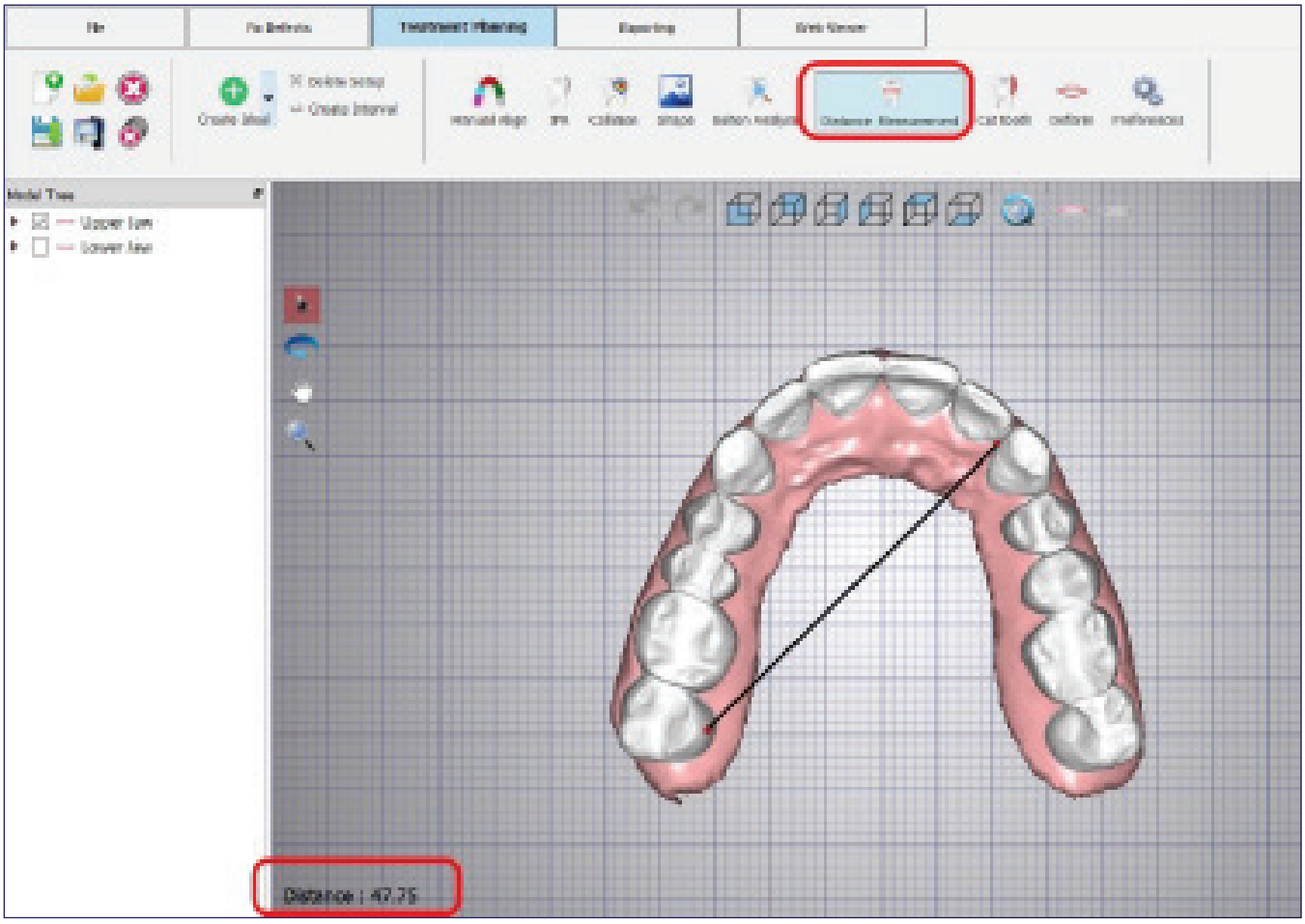

Figure 41

13.2 BOLTON ANALYSIS

To perform the Bolton Analysis calculation, click the “Bolton Analysis” button on the treatment planning screen. Select the tooth range for the calculation and the Bolton Analysis calculation will be displayed. (Figure 42)

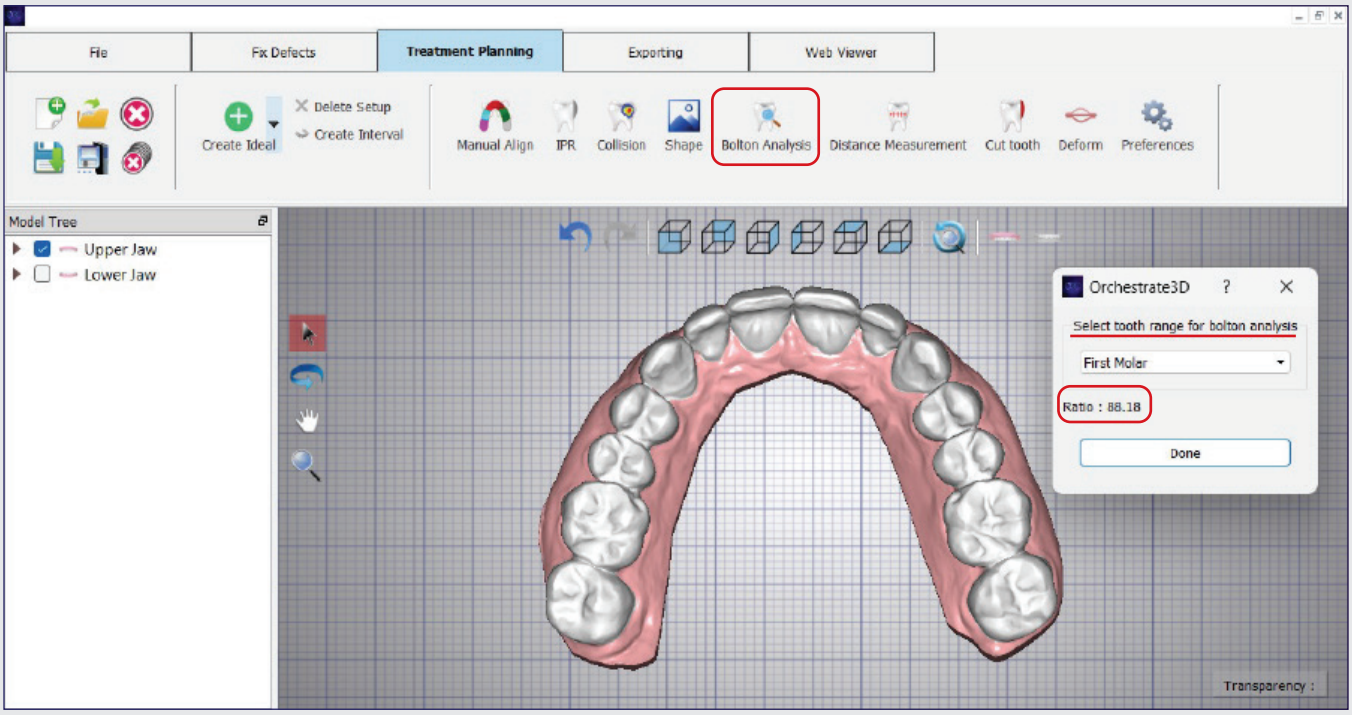

Figure 42

13.3 AUTO ATTACHMENT PLACEMENT

Set preferences for automatic placement of attachments, and attachment type based on tooth movements. Click the "Preferences" button on the Treatment Planning tab. (Figure 43)

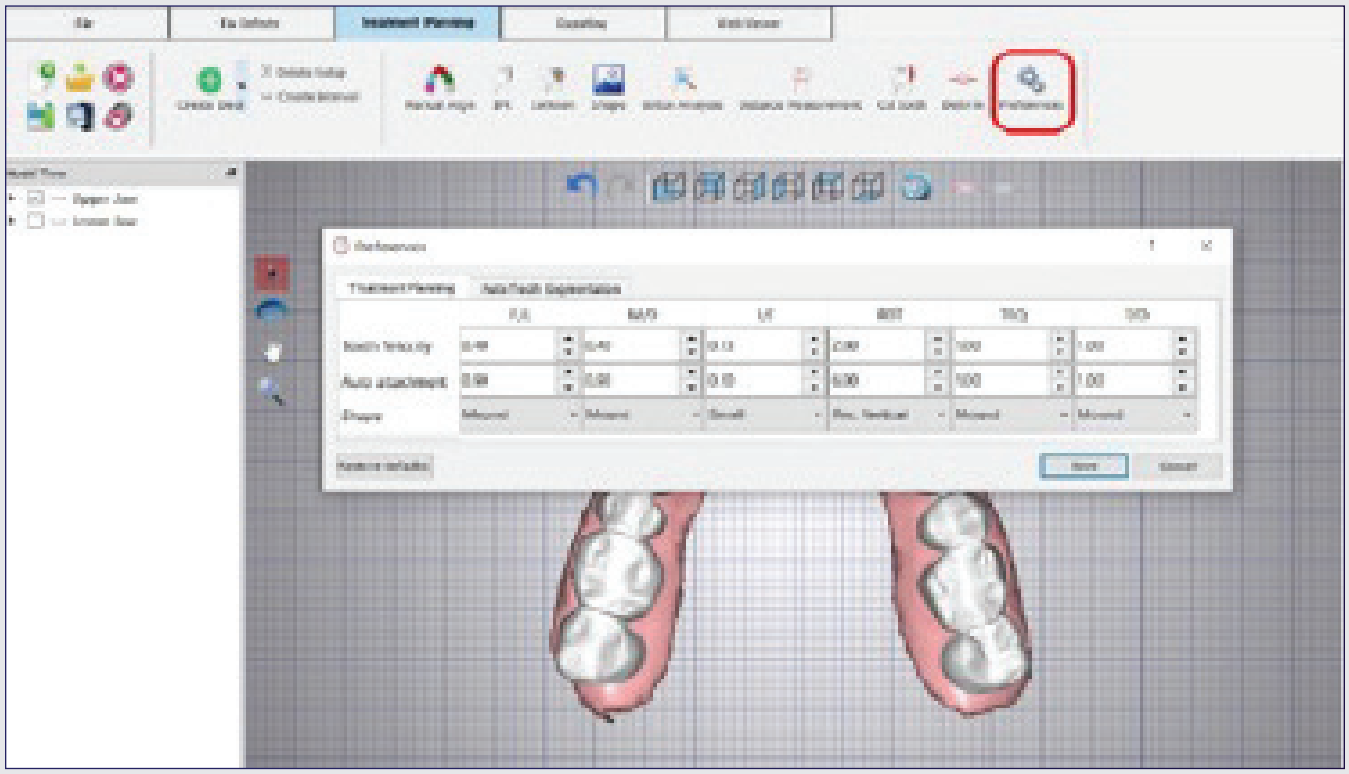

Figure 43

13.4 EXPORT PDF

Export a pdf that includes tooth movements, attachments, and IPR amounts by clicking the "Export Documents" button on the Export tab. (Figure 44)

This report includes the following: Patient name, aligner count, attachment placement and type, IPR locations and amounts, and total amount of tooth movements.

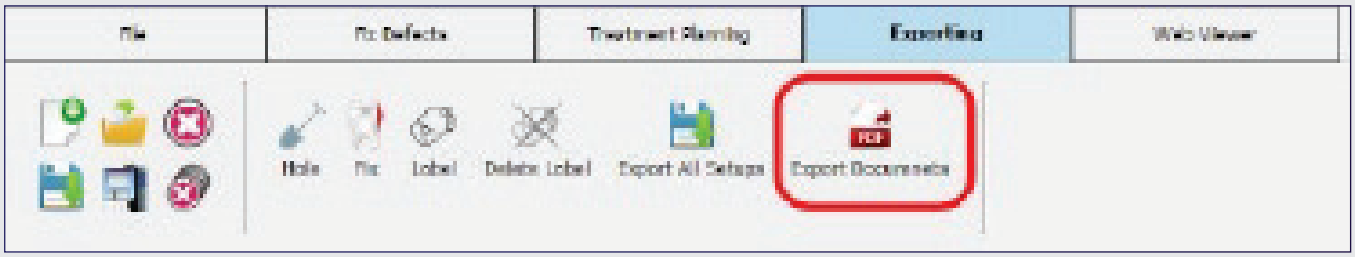

Figure 44

13.5 PUBLISH TO WEB VIEWER

To publish a visual representation of the treatment plan to a web viewer, click the "Create Link" button on the Web View Tab. (Figure 45)

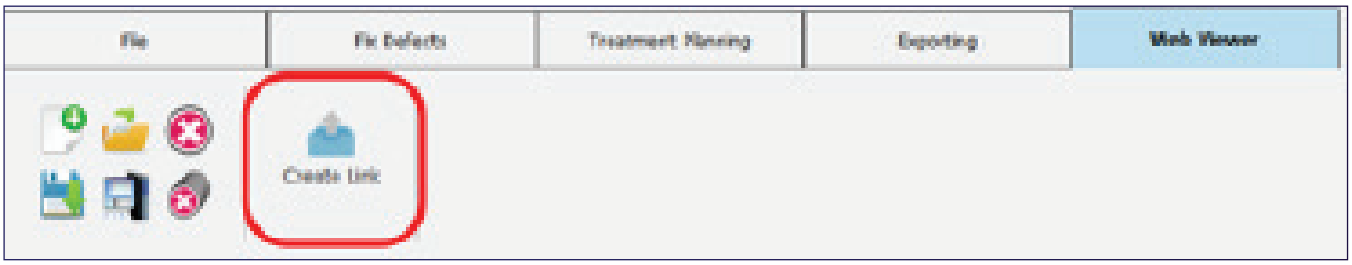

Figure 45

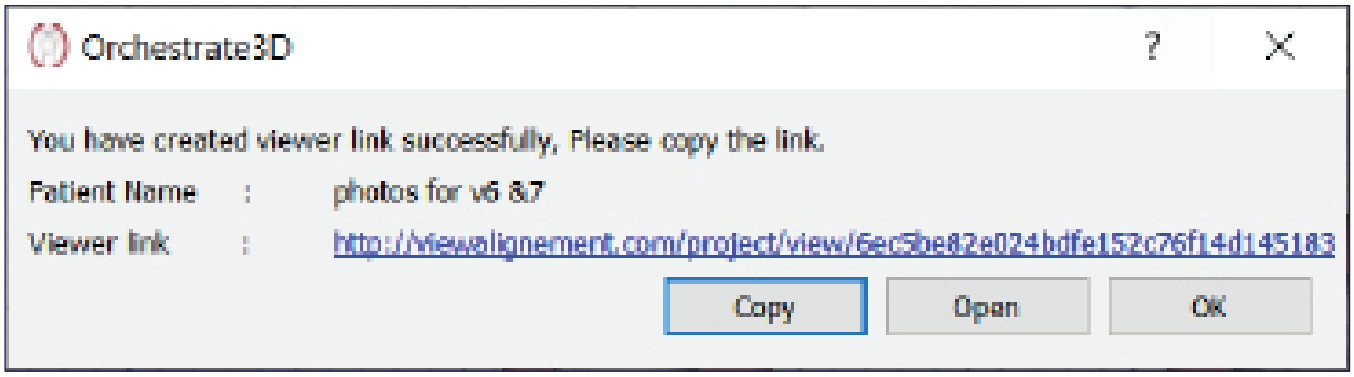

Figure 46

13.6 OPTIONAL GRID FOR TREATMENT PLANNING

Click the "Transparency" button on the far lower right of the screen. (Figure 47)
The background grid can be toggled on and off.

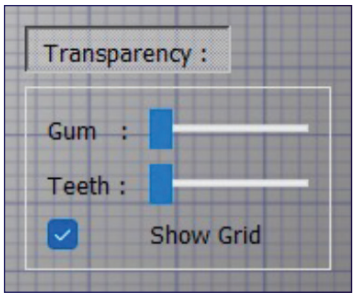

Figure 47

13.7 LICENSE EXPIRATION WARNING

A warning will be shown upon login, indicating that the software license will expire within the next 10 days. (Figure 48)

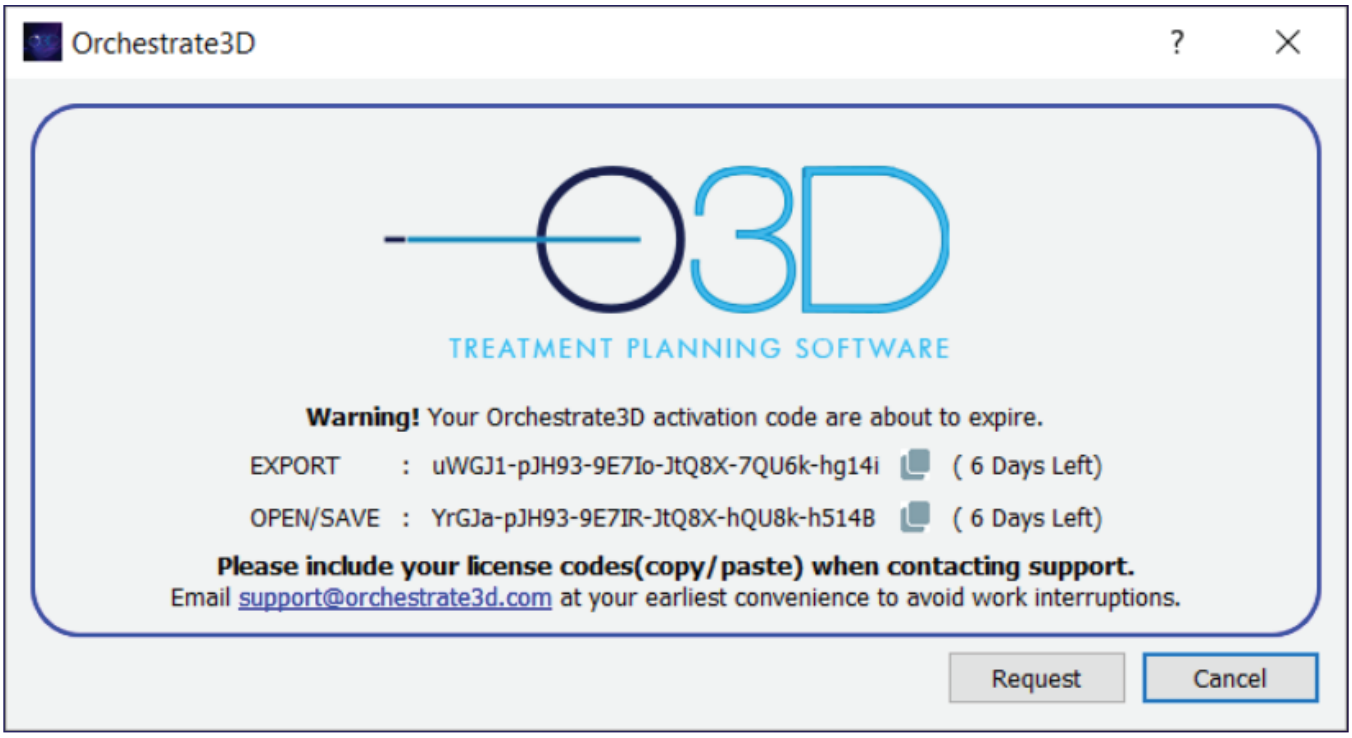

Figure 48

14. System Requirements

PROCESSOR & MEMORY:

Intel® Core i7-7700HQ Processor 2.8GHz
16GB DDR4 2400MHz RAM

DRIVES:

1TB 5400RPM SATA Hard Drive
128GB Solid State Drive No Optical Drive

OPERATING SYSTEM:

Microsoft® Windows 10 Home (64-bit)

GRAPHICS & VIDEO:

15.6" IPS Anti-Glare LED-Backlit 4K Ultra HD
Display 6GB NVIDIA® GeForce® GTX 1060 Graphics

Instruction Manual
Version 7.0.9.4

www.orchestrate3d.com
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