Digital Dentistry

Exercise 2: E4D Telio CAD FDP 27-29
Preparation, Scanning, Designing & Milling

Tarek El-Kerdani DDS, MSD, FACP.

Learning objectives

- Be familiar with the Telio CAD material, its properties and application.
- Learn the steps for teeth preparation, scanning and designing of a multi unit fixed dental prosthesis including pontic design using a CAD/CAM system (E4D Plan scan) as a pre-clinical exercise.
- Learn to mill, finish, polish and the custom characterization of a Telio CAD FDP.

Telio CAD Provisional restorations

- Manufactured by Ivoclar.
- Telio CAD offers blocks that are used for the CAD/CAM manufacture of medium to long-term provisional restorations (maximum wear period: 12 months).
- Telio CAD is a highly cross-linked PMMA block for the milling of temporary restorations and is characterized by its very high level of homogeneity.
- The restoration is capable of obtaining a very smooth surface structure which can be polished rapidly and effectively and can be characterized with stains. The incisal areas may be customized with light-curing layering materials or Telio Lab materials to achieve a highly esthetic restoration.

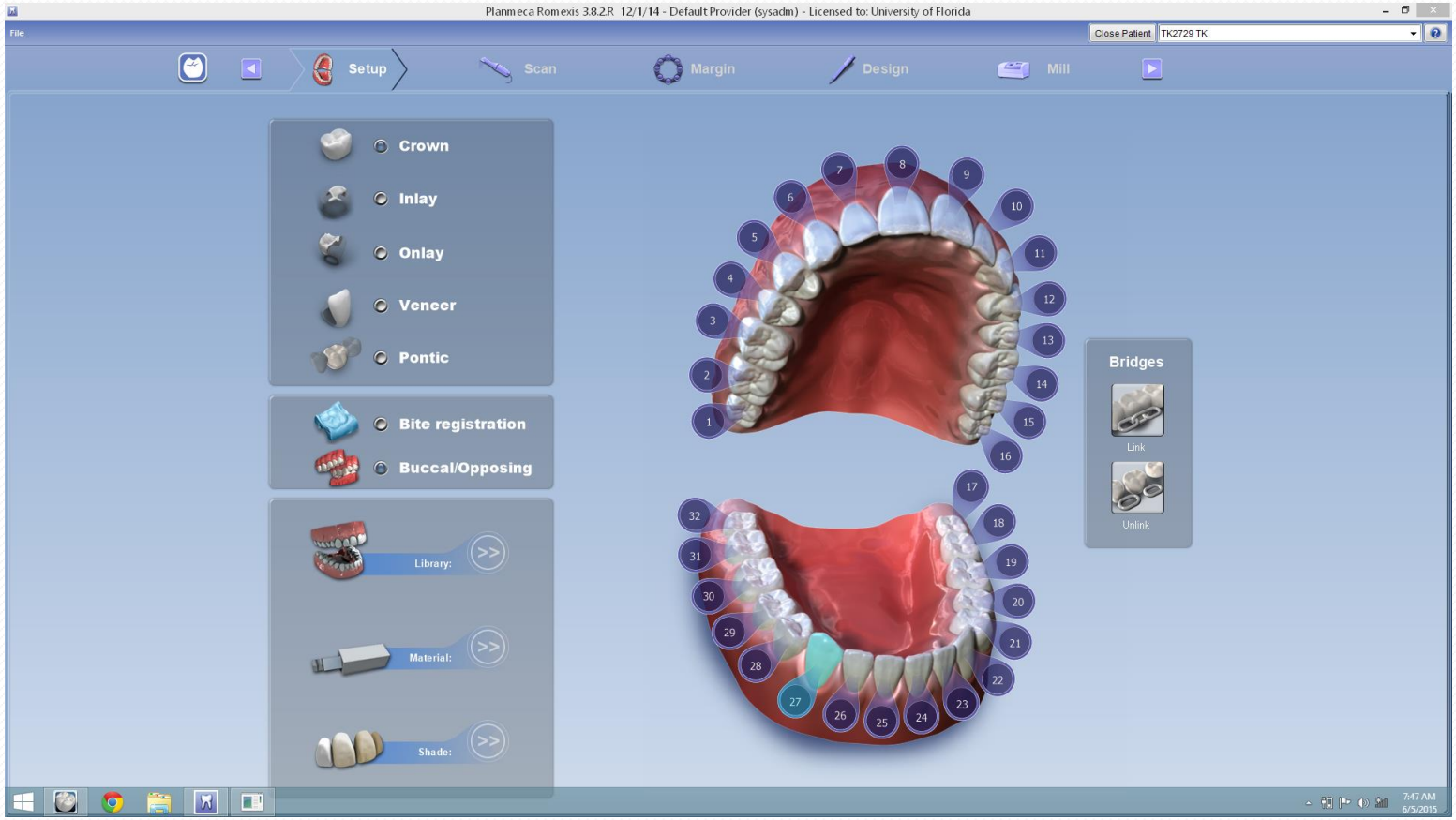
Preparation design guide lines

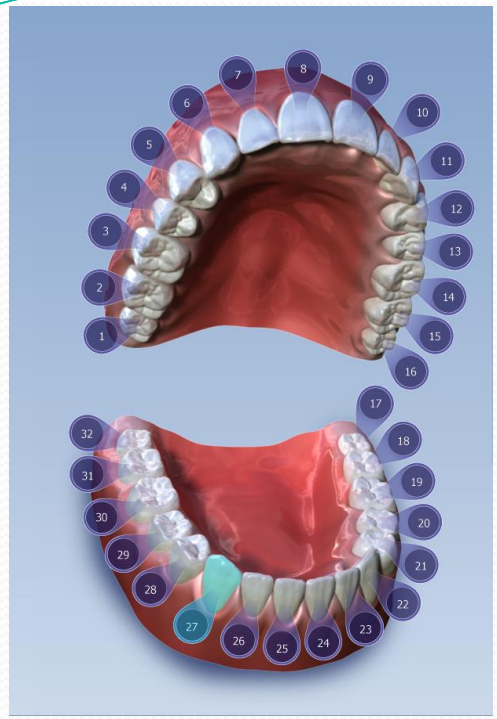
- Ceramic preparation for teeth #27-29
- A uniform 1 mm modified shoulder all around.
- 2 to 2.5 mm occlusal reduction.
- 6 to 16 total convergence.
- Smooth preparation, rounded angles and no sharp points or lineangles.
- 0.5-1.0 mm supragingival margins

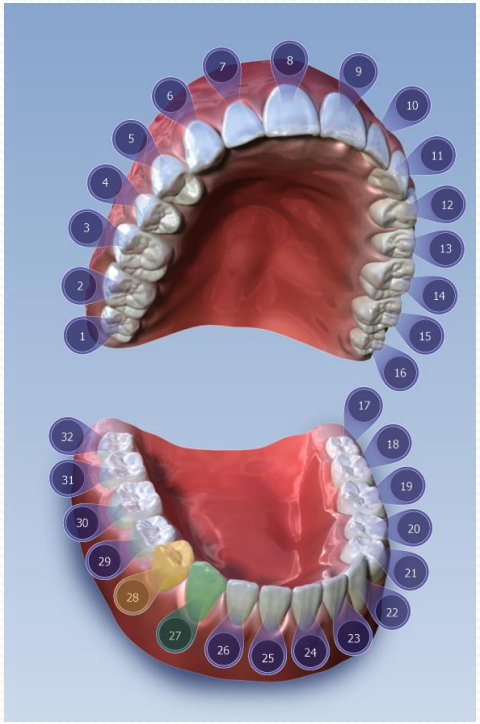
Evaluate the amount of reduction using a vacuum form matrix.

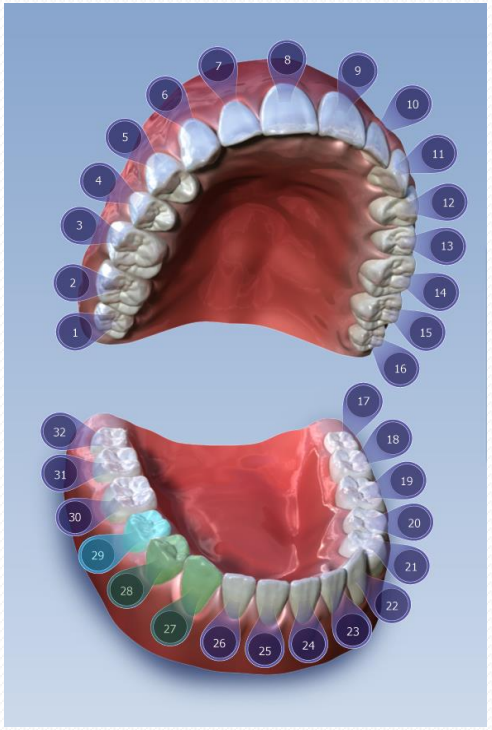
The vaccuform matrix can be used to verify the amount of reduction from every direction.

Restoration set up (E4D System)

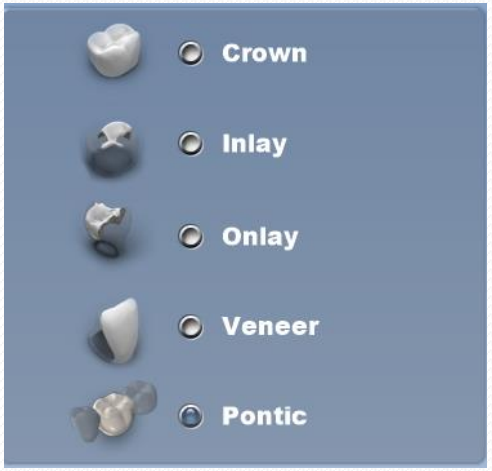






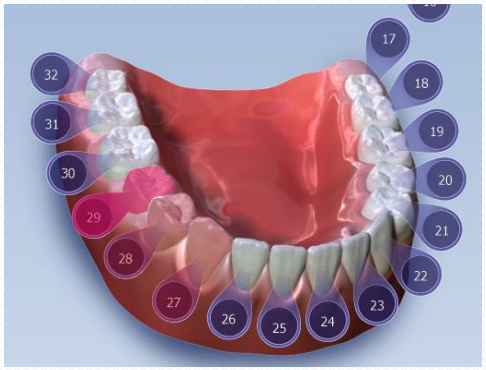


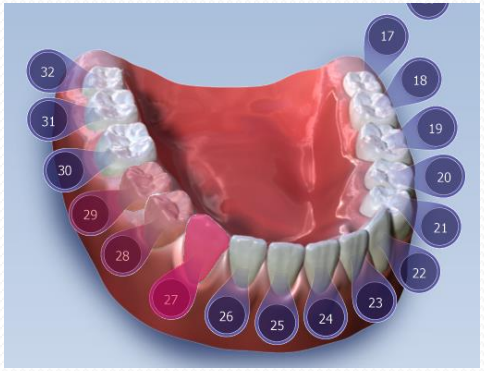
- **Select each tooth that is part of the FDP, the abutment(s) and the pontic(s).**
- Select the **Restoration Type** for each tooth. In this exercise, tooth 28 is a Pontic and the abutment teeth 27 & 29 are Crowns.



Setup

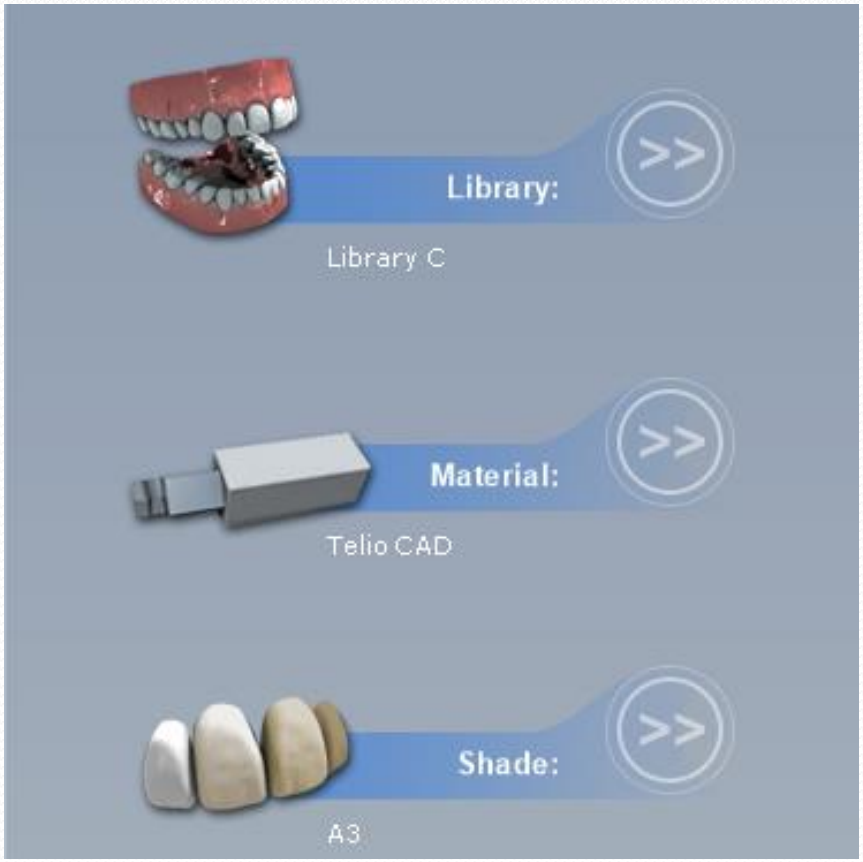
- Click **Link.** The cursor changes to a chain symbol.
- Click the mesial and distal teeth of the bridge. After each end of the bridge is selected, the teeth will turn purple.
- The teeth are now designated as a bridge.

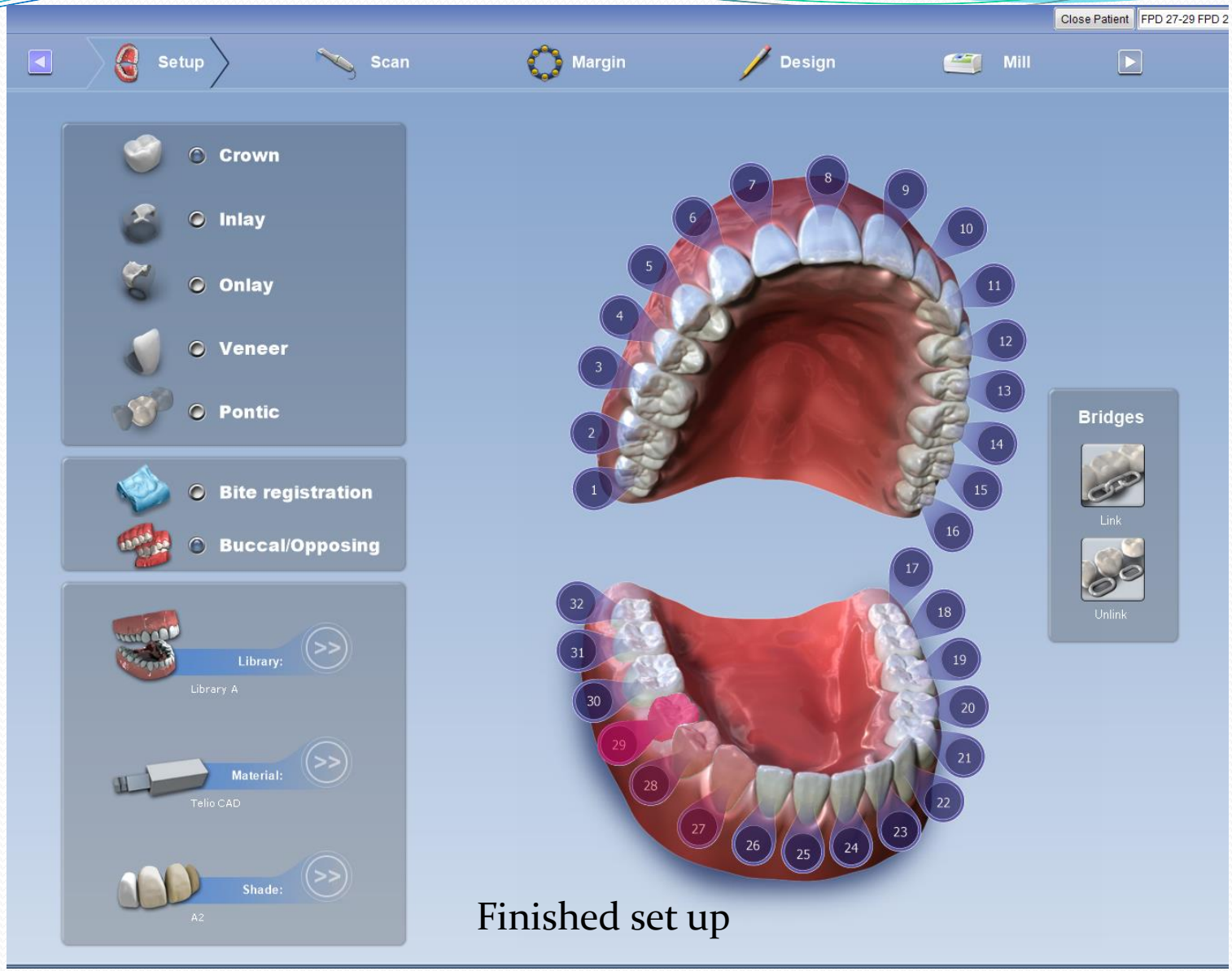




Setup

- Select the first tooth in the bridge and designate the Library, Material, and Shade.
- The material and shade is duplicated on the other teeth in the FDP when you click on them.
- Select the remaining teeth in the FDP and designate the Library.
- Library must be chosen for each restoration before you can proceed to the Scan Tab.





Finished set up

Scanning

- **Scanner Indication Lights**
- There are colored LED lights in the button on the scanner.
- Green - Ready for Use. Scanner is connected, but not actively scanning.
- Blue - Laser ON. Scanner is actively scanning.
- If scanner light is not illuminated, the scanner is not ready or it is not connected.

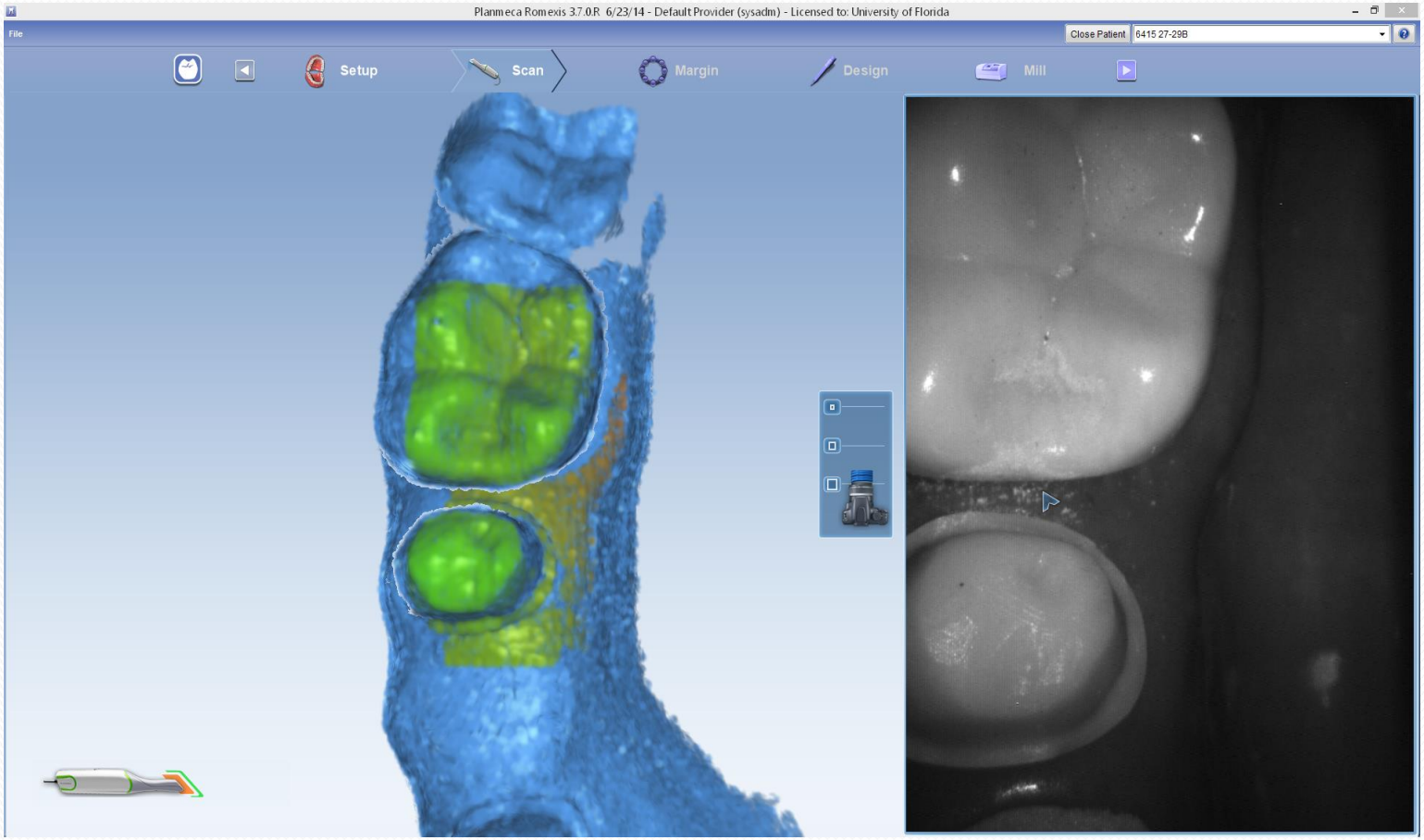
The scanner should always be touching / perpendicular to the occlusal surface of the teeth and smoothly gliding over the teeth from a **distal** to a **mesial** direction.

Scanning

All scanning in any area of the dental arches, should start from the tooth distal to the preparation and move toward the mesial.

Scanning the opposing

Scanning

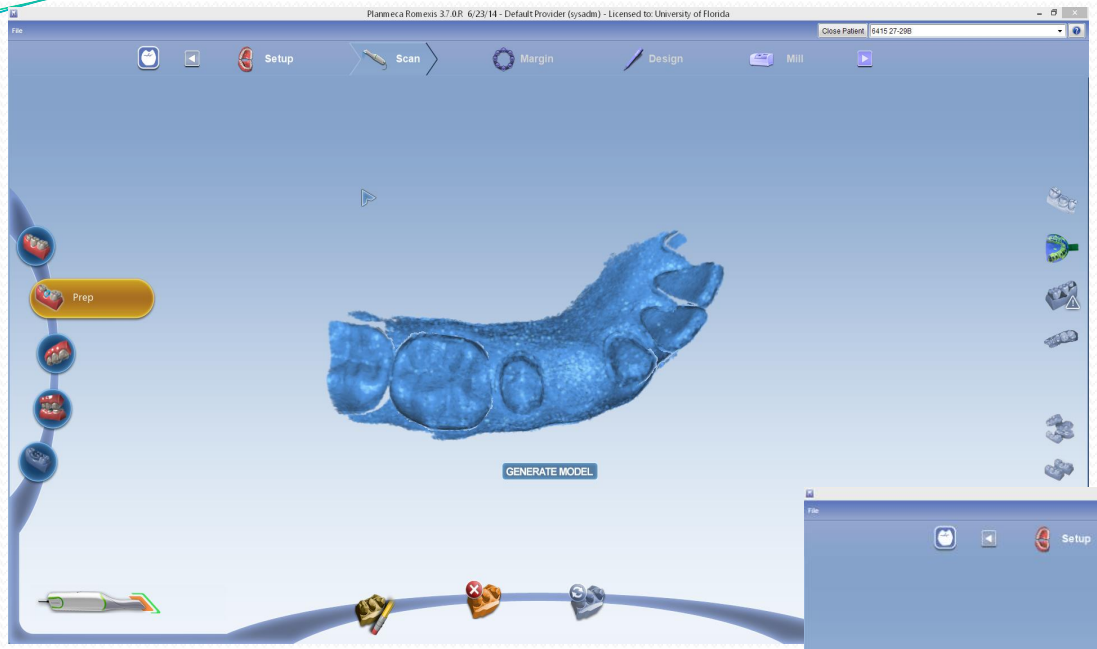


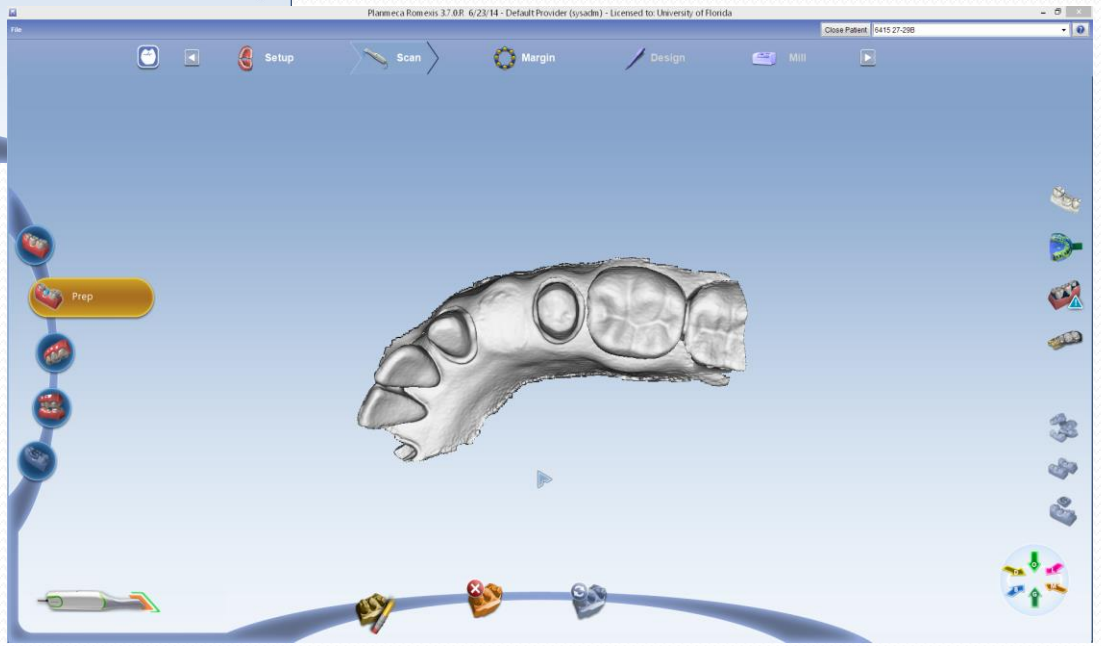
Follow the green shadow, the scanner can easily get lost. Newer software provide an audible beep indicating successful scanning. When the beep stops, this indicates that the scan is lost.

Data Density

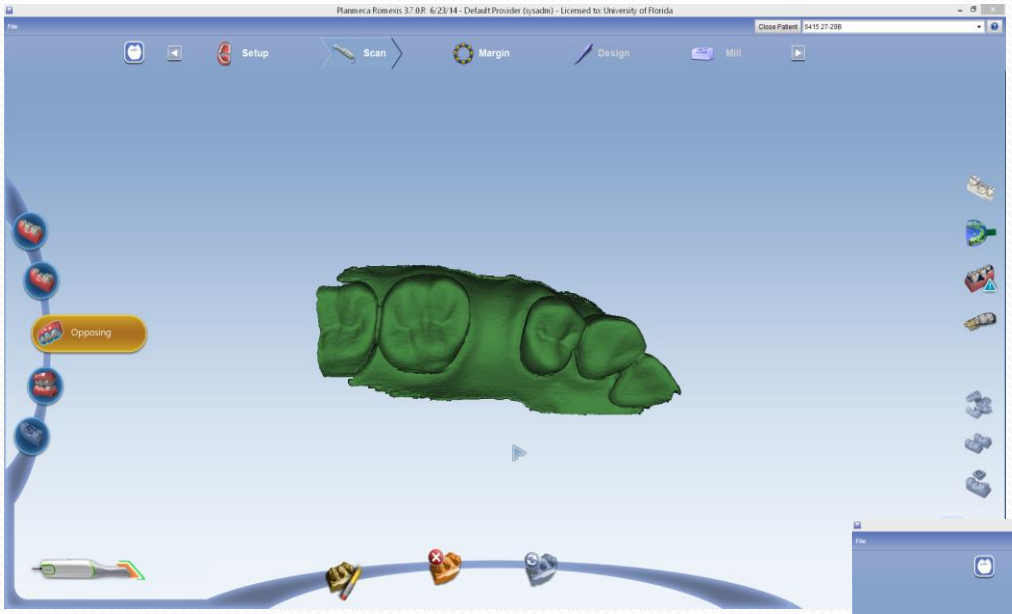
Working model should include one tooth mesial and one tooth distal to the prepared teeth. Generate model then check for data density. Blue areas indicate low density. Repeat scanning to fill low density areas.

Data Density: Identify the under-scanned areas and re-scan. Under-scanned areas are blue.

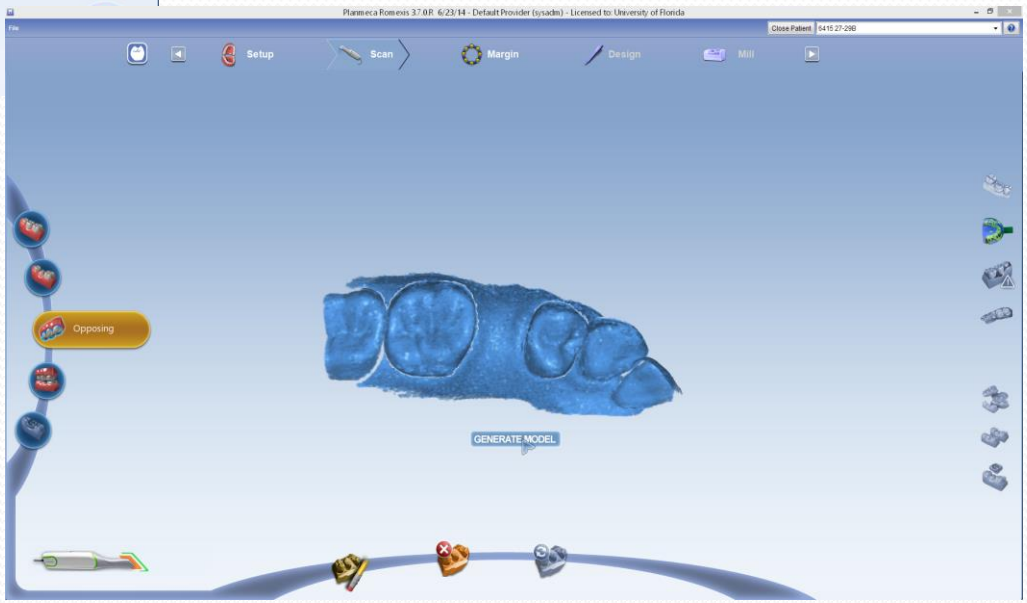


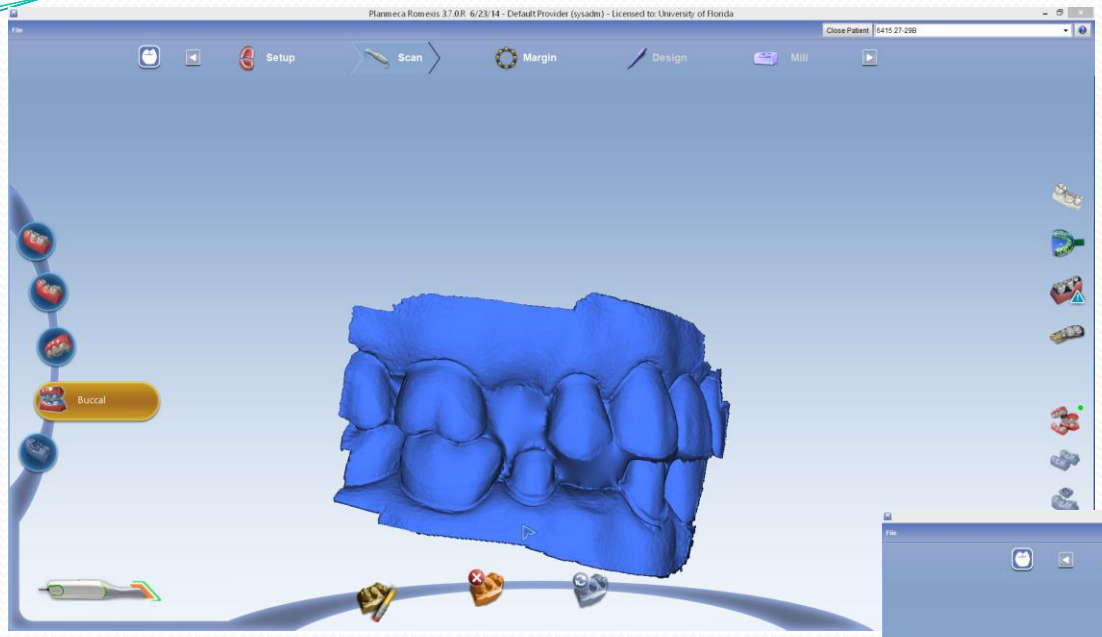


Generated model, after rescanning.

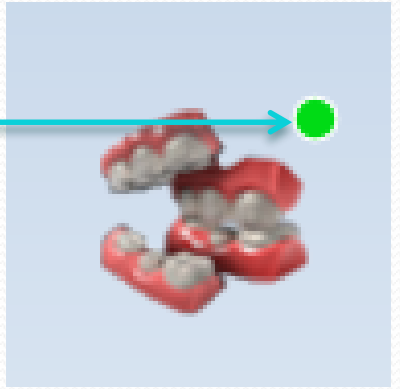


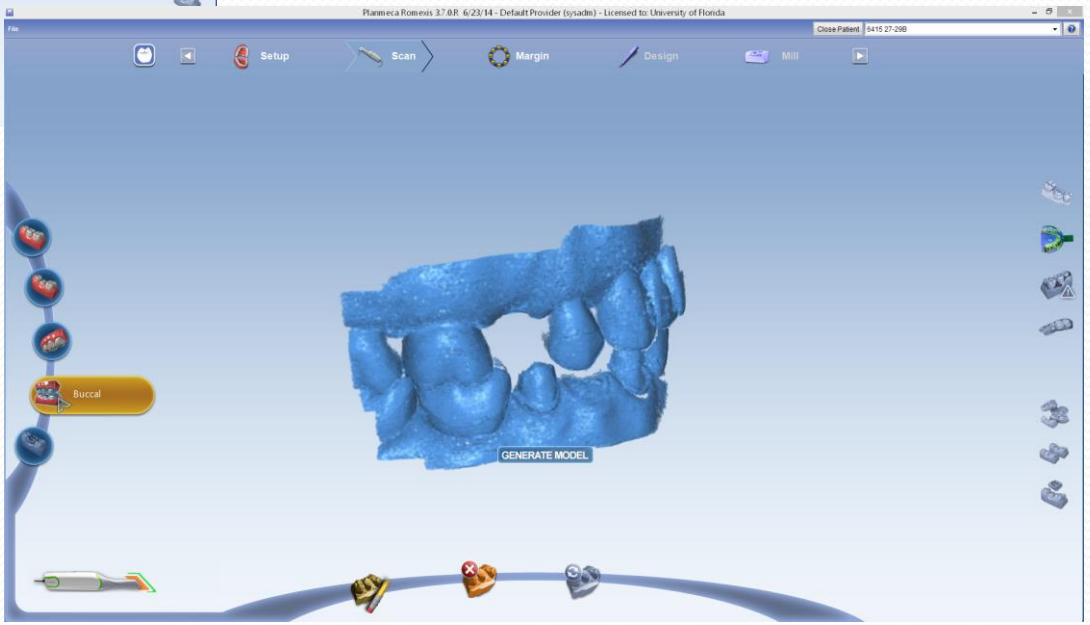
Scanning the opposing





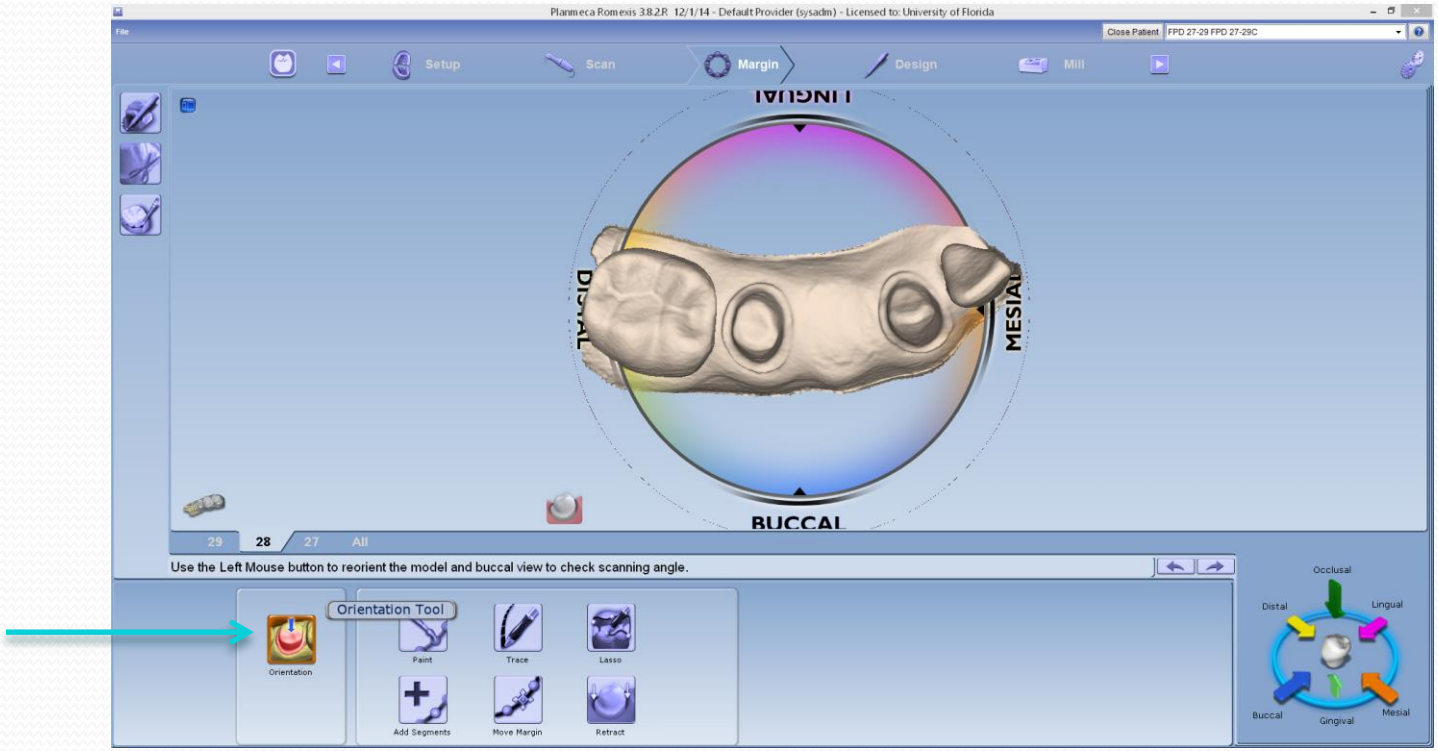
Green dot indicates correct articulation.



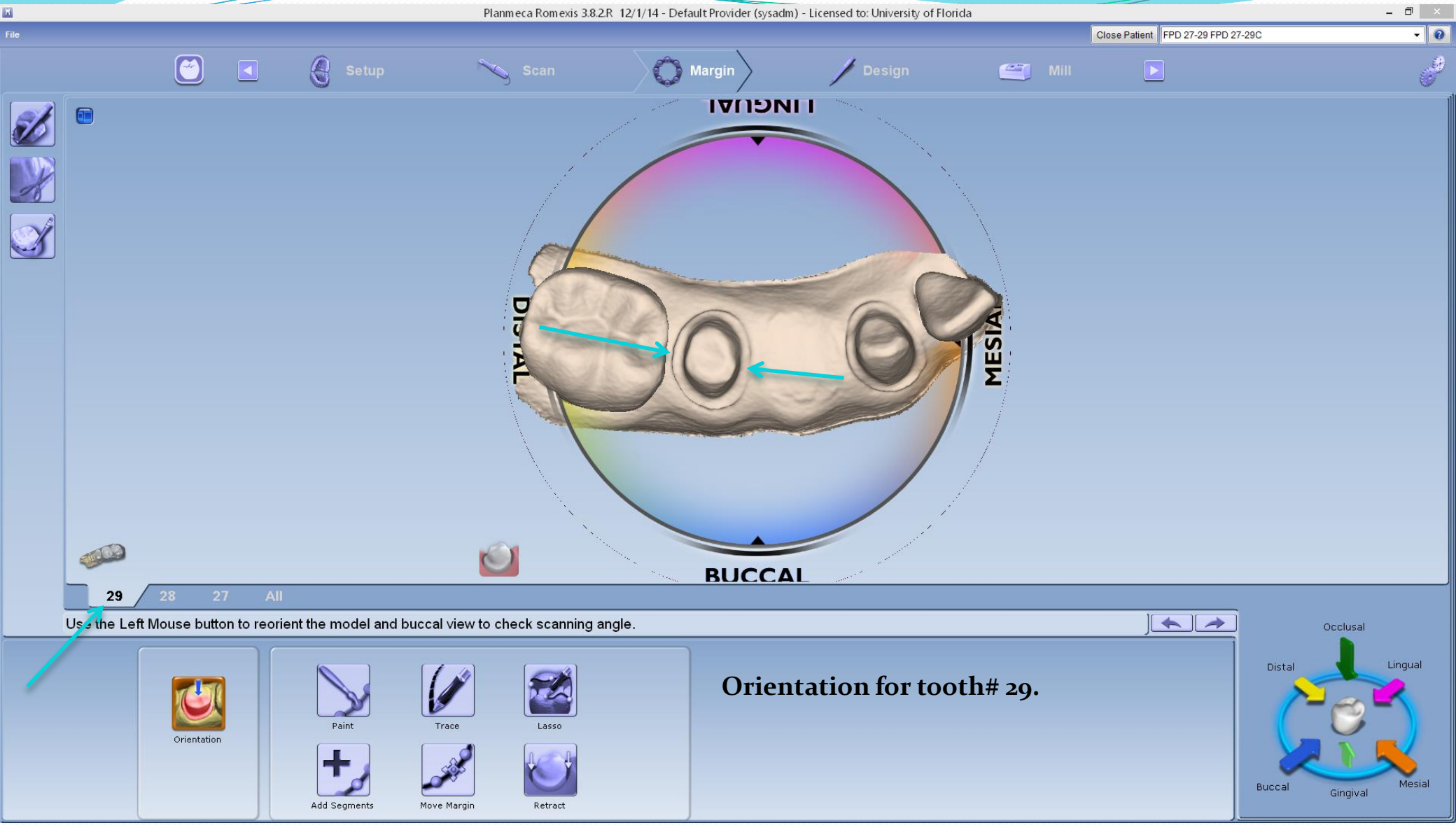


Scan the buccal bite and articulate models.

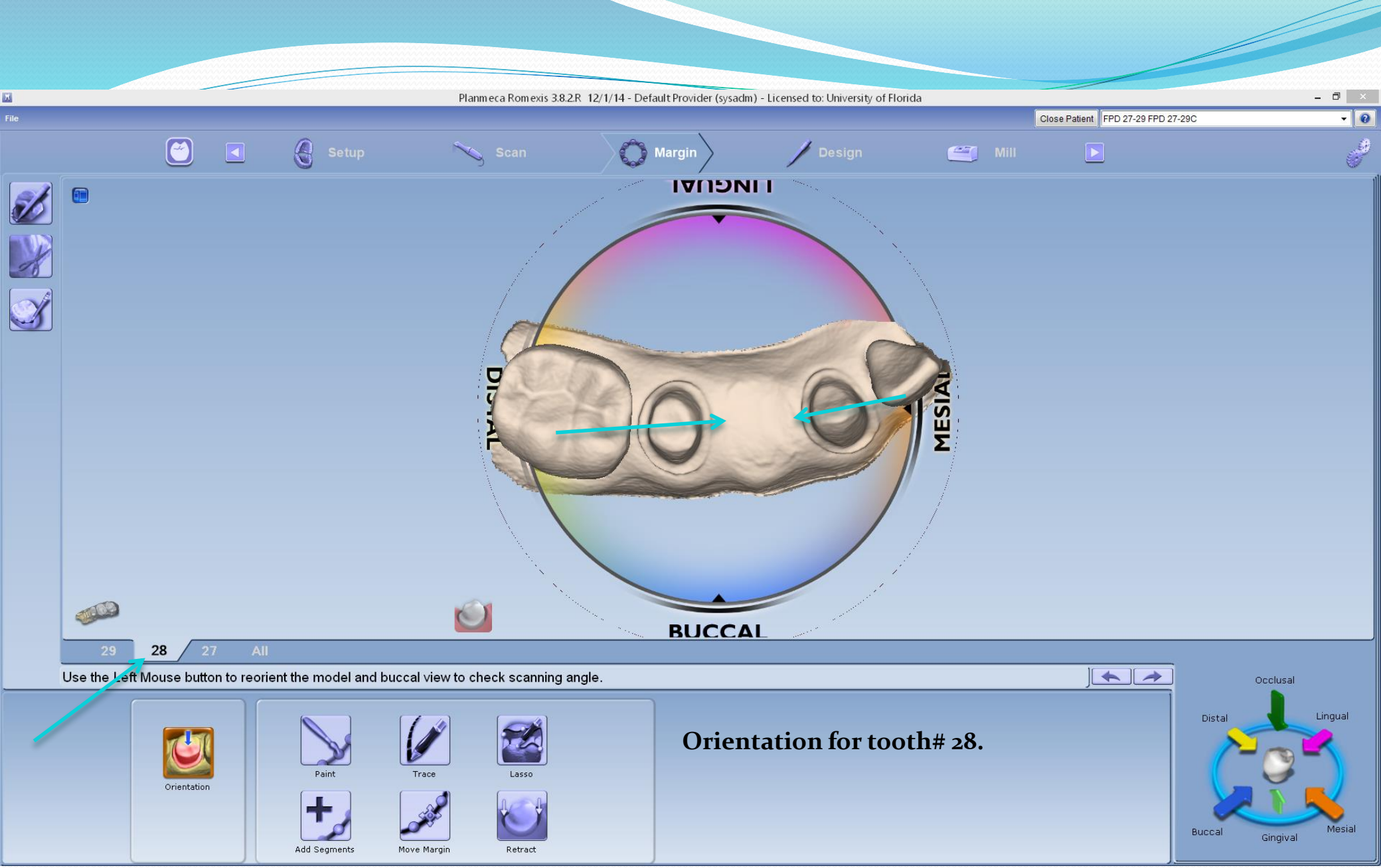
Model orientation



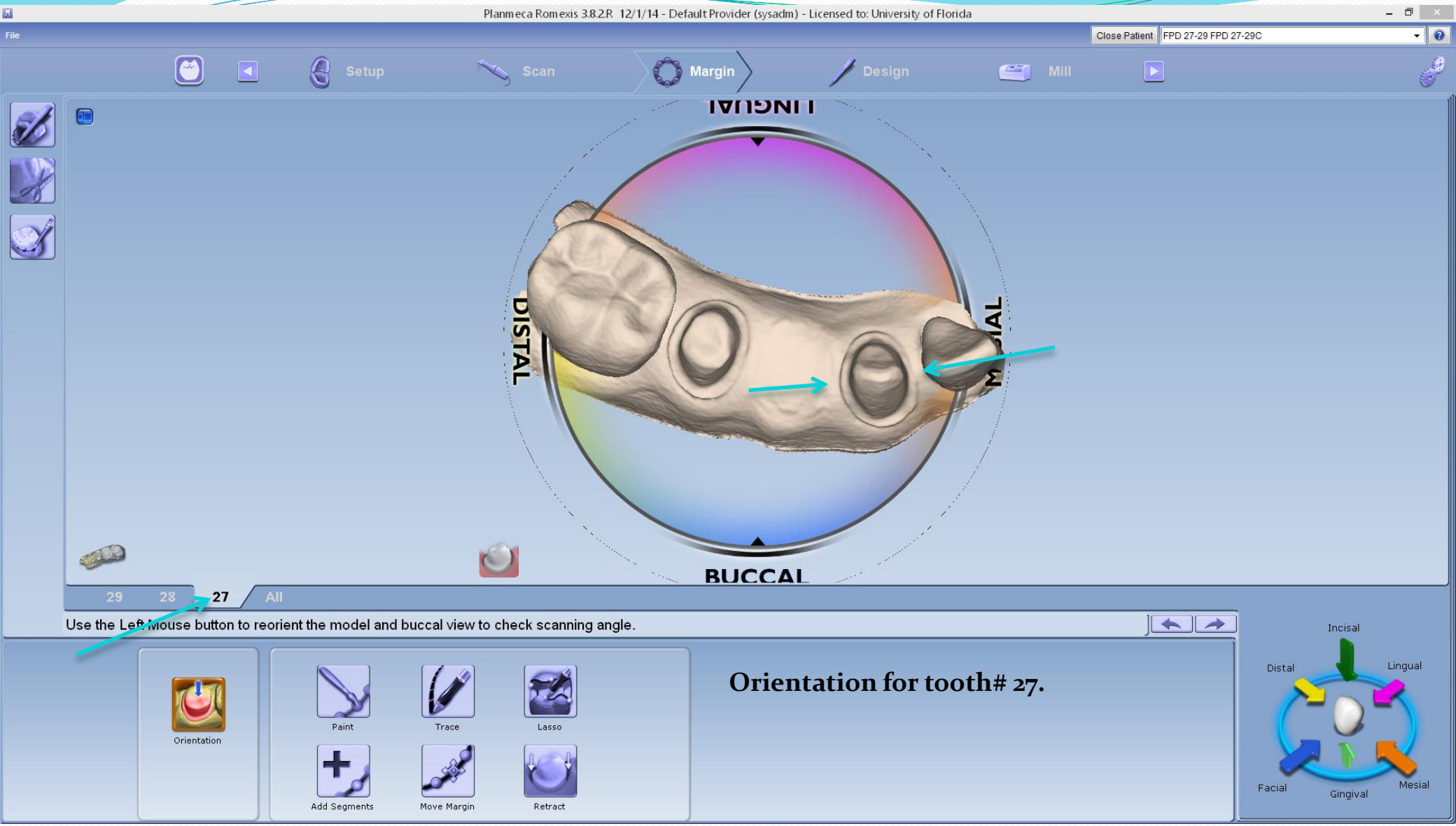
- Each tooth should have it's own orientation position, so the orientation step will be done three times, once for each tooth.



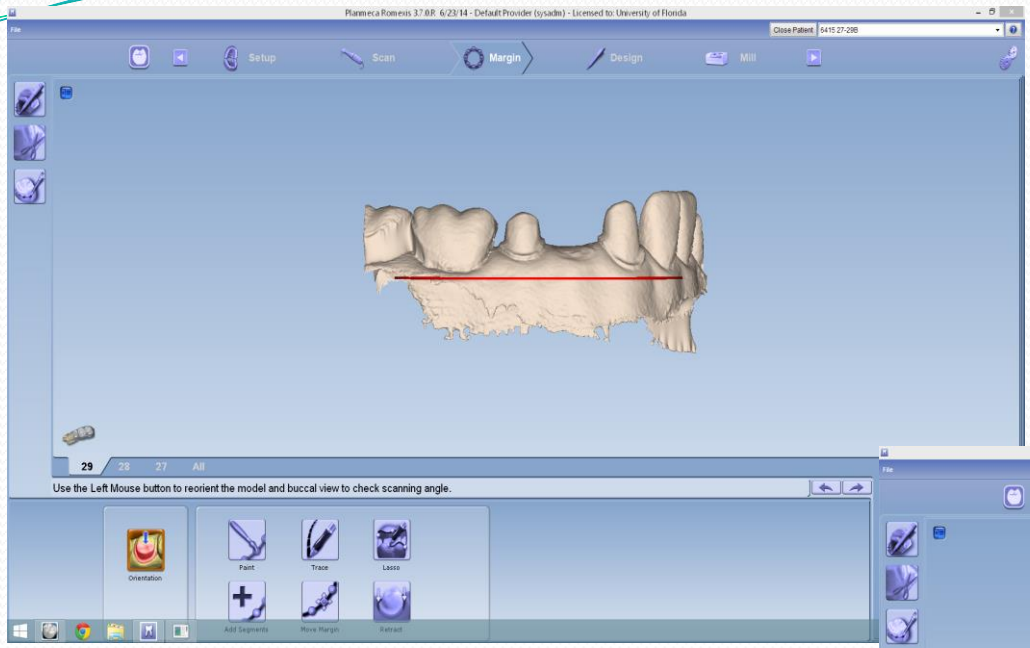
Orientation for tooth# 29.

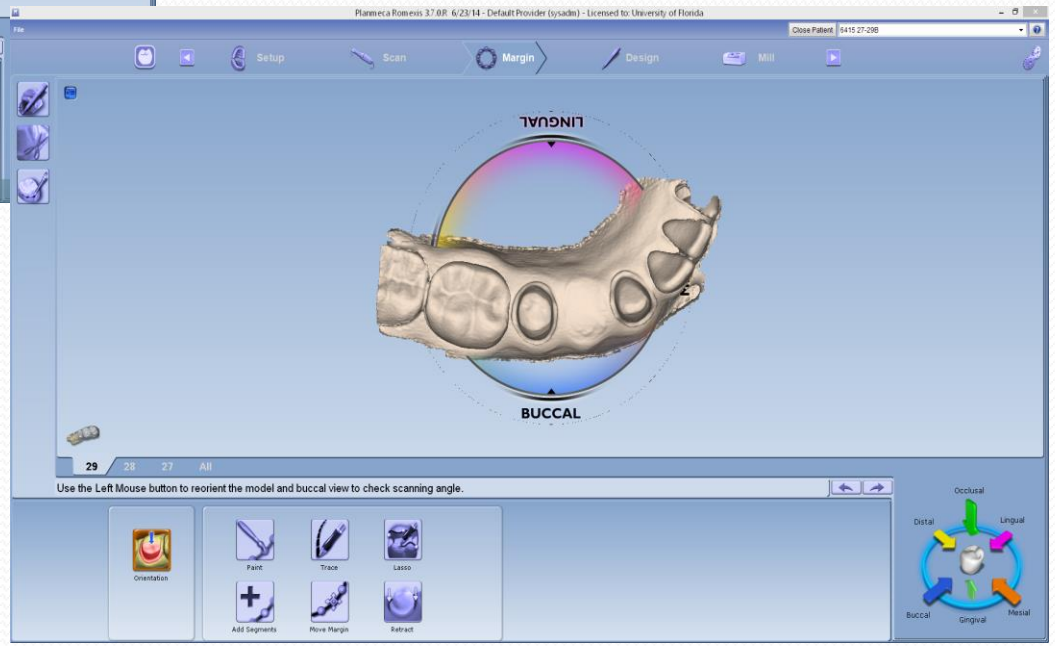


Orientation for tooth# 28.

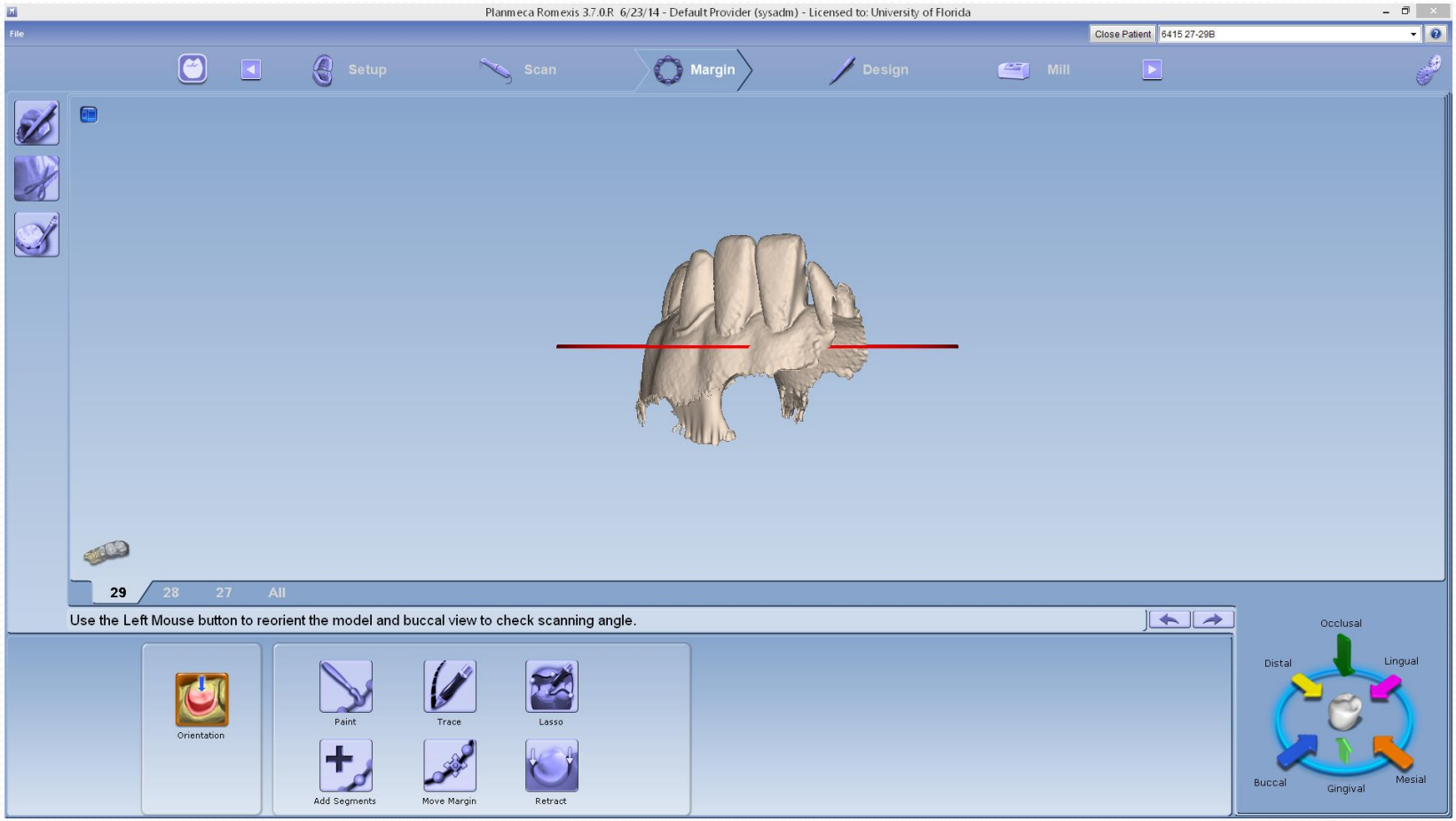


Orientation for tooth# 27.





Use the orientation tool to show a buccal view, align along the M-D axis.

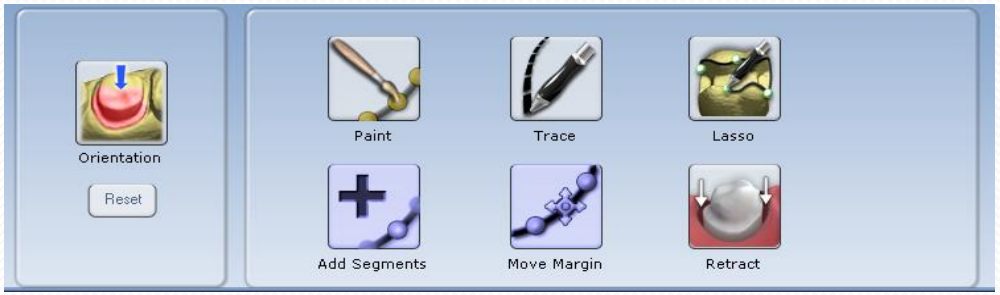


Repeat the procedure to align in different views.

Margins tools

- Clicking the **Margin Tool** activates the margin editing mode in which various methods are available to create and edit the margin.

- There are three aids available when working with the margin:



- • View ICE Preparation
- • Show Features
- • Toggle Margin

- There are three options for creating your margin:

- Paint - Create the margin using a broad brush stroke.
- **Trace - Create the margin using individually marked points along the edge.**
- Lasso - Create the margin by marking several points along the edge

Trace tool

In this exercise only the trace tool will be used to trace margins.

The Trace tool can be used on any margin:

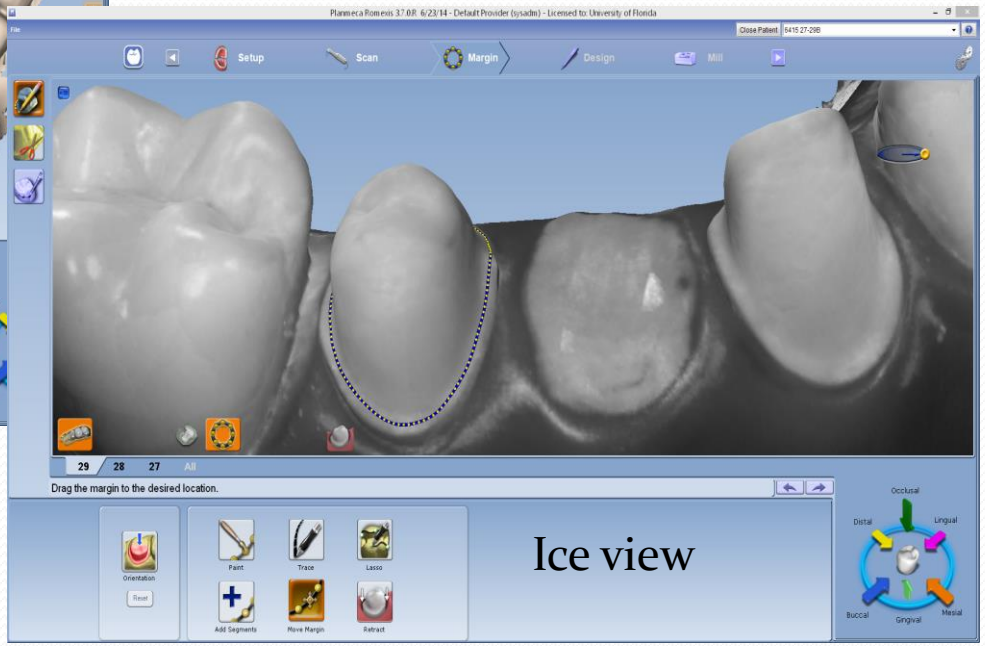
1 Click the **Trace** button.

The pointer changes to .

2 Click **Show Features** to highlight high contour areas in green.

3 Zoom in and rotate the model until there is a good view of the margin.

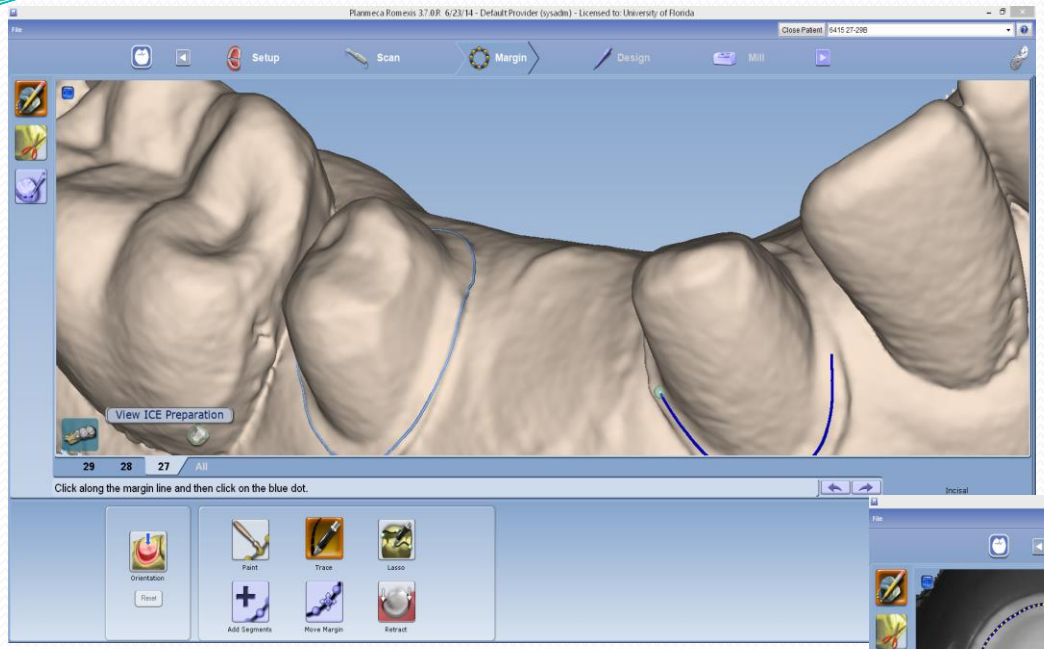
4 Position the Trace tool in the middle of the green high contour indication on the margin.

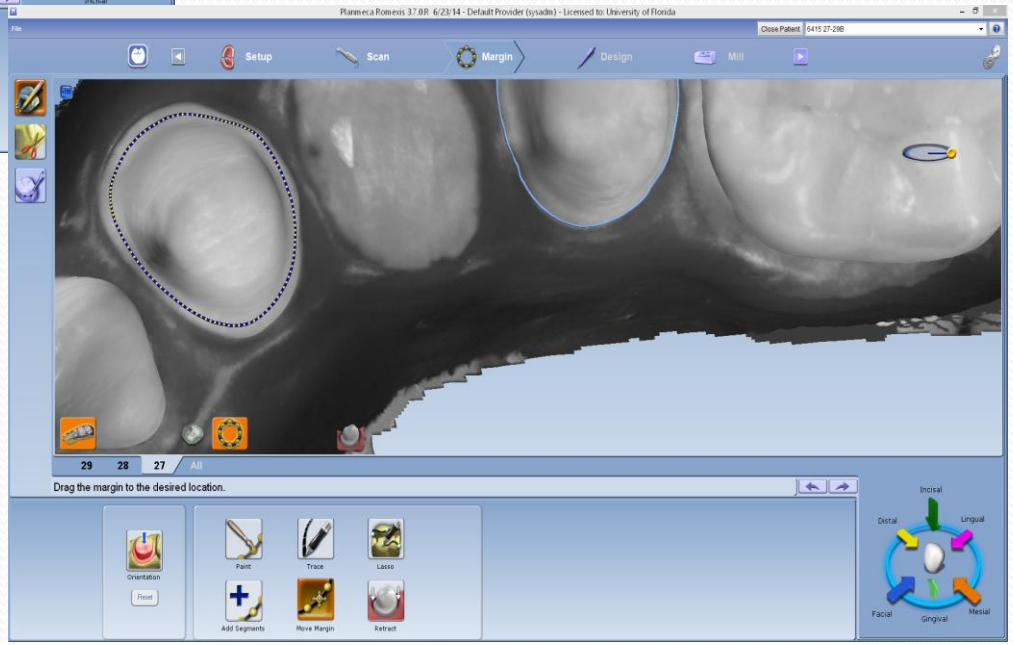


Tracing tooth # 29

Use the margin drawing tool to draw the preliminary margin trace, well inside the finish line. This procure can be done either on the stone model view or the ice view. The procedure will be repeated for each tooth, including the pontic area.

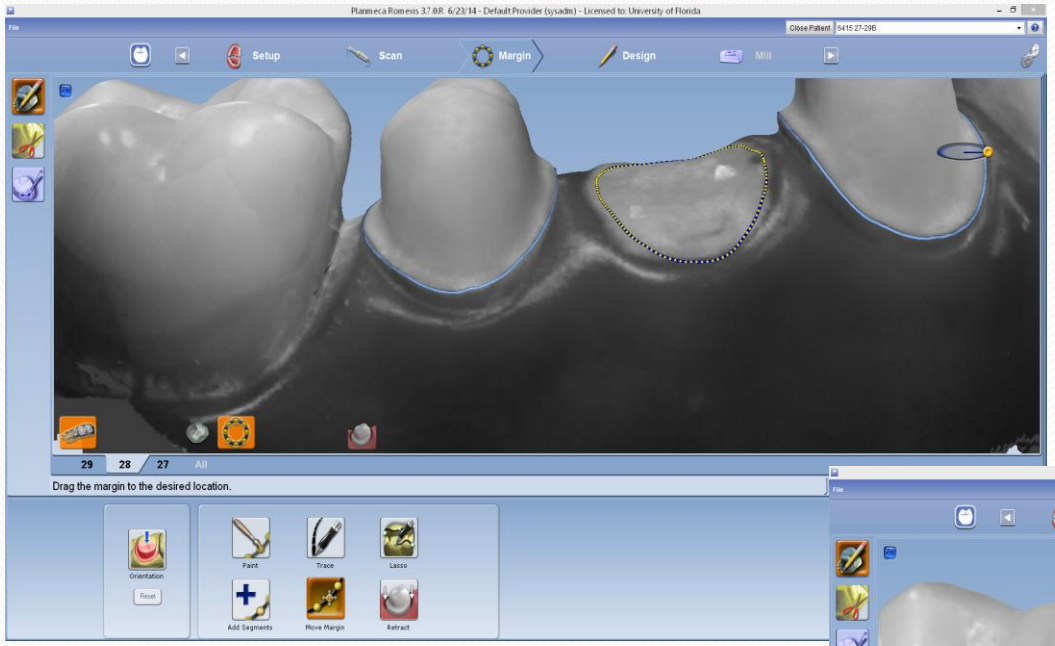
Once the trace line is connected to form a circle, fine yellow beads will appear along the line. Click and drag any bead to the edge of the margin to mark the edge of finish line.

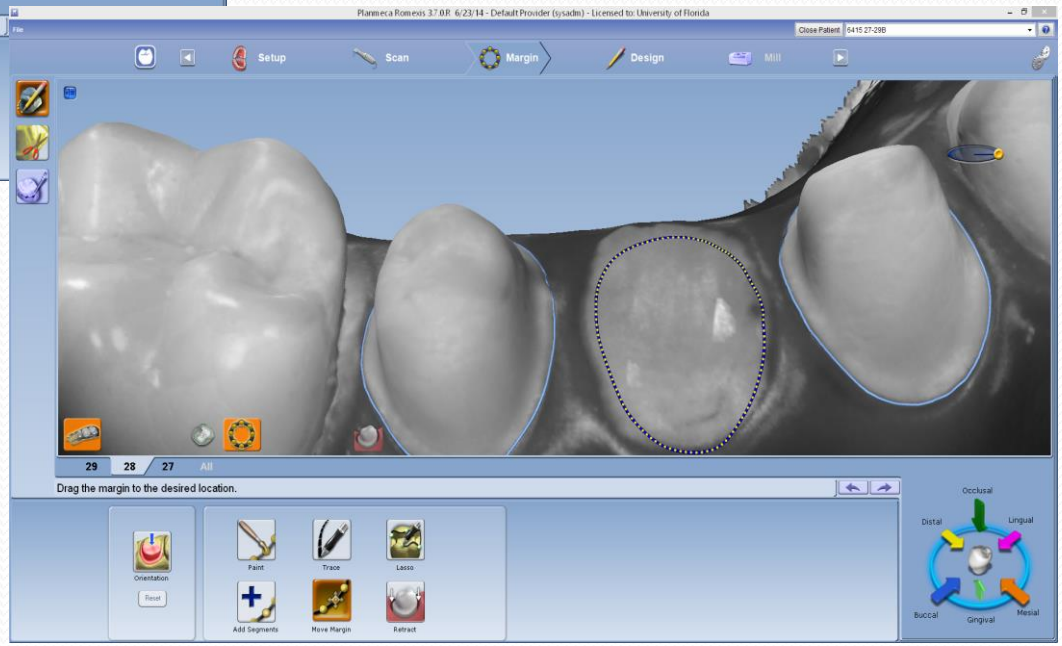




Tracing tooth # 27

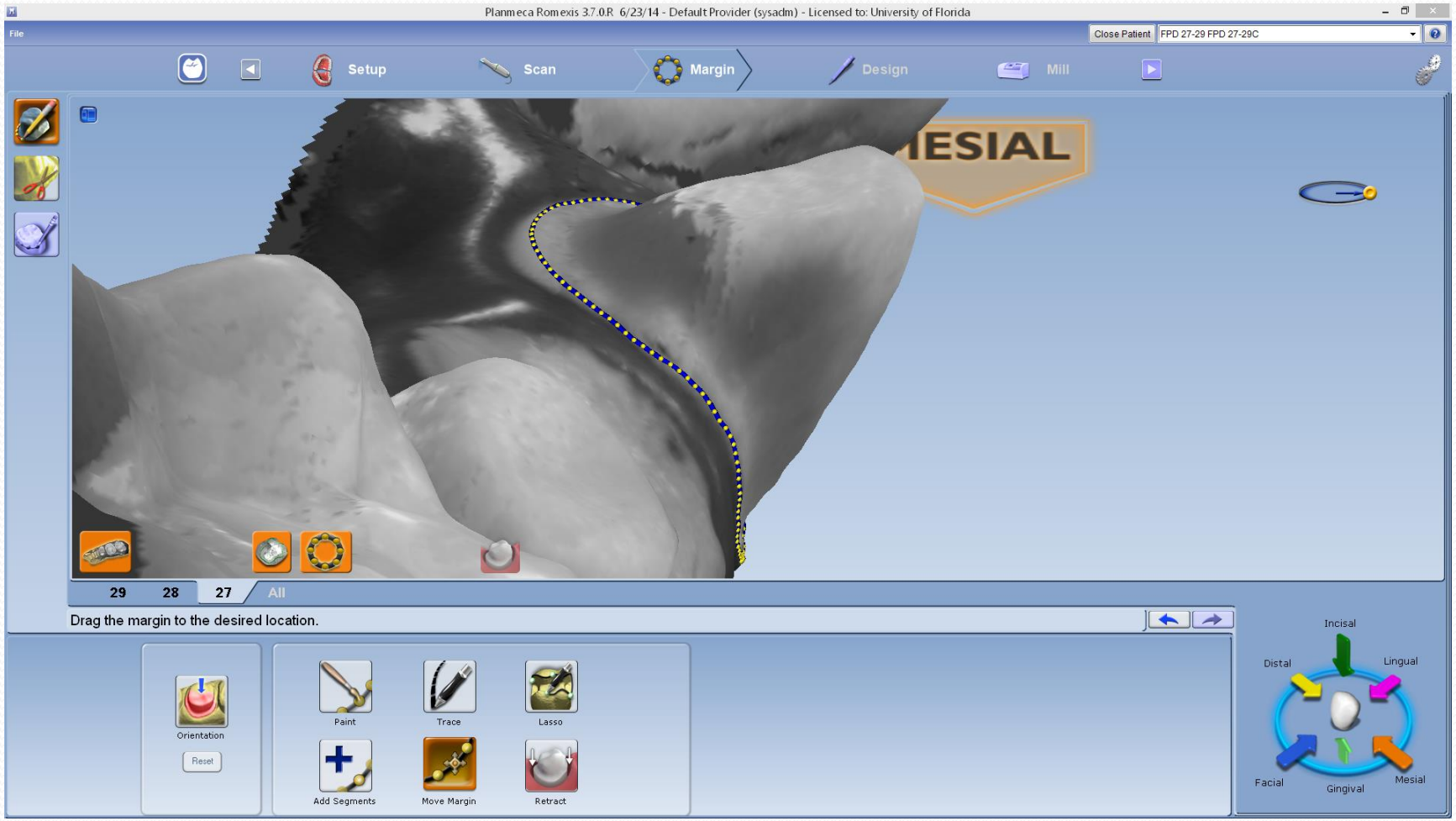
You can alternate views to identify the margins clearly.





<u>Tracing pontic area # 28</u>

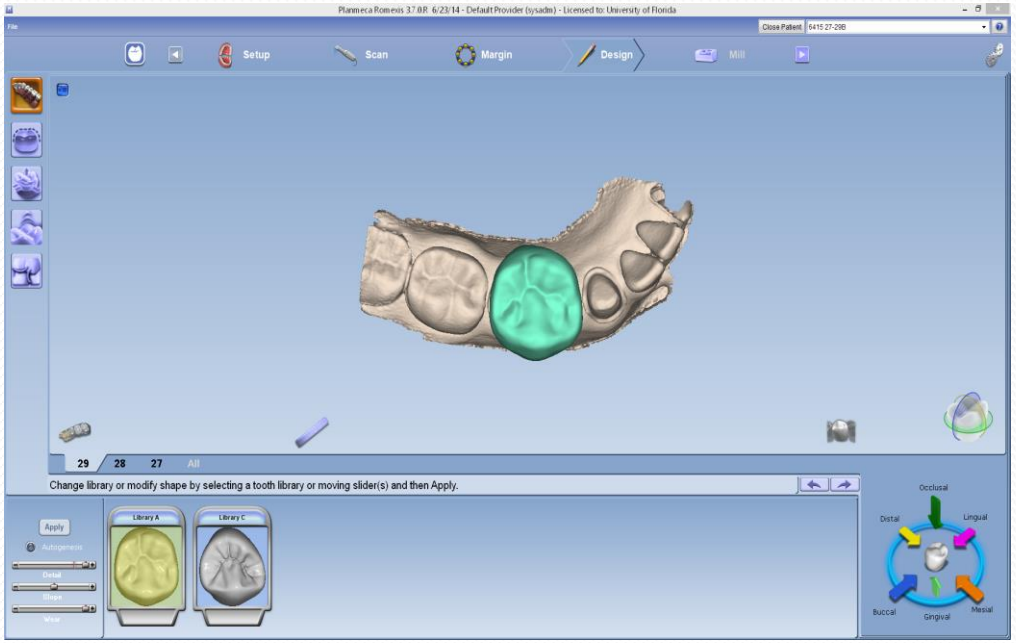
Ice views help to identify the margins more clearly.

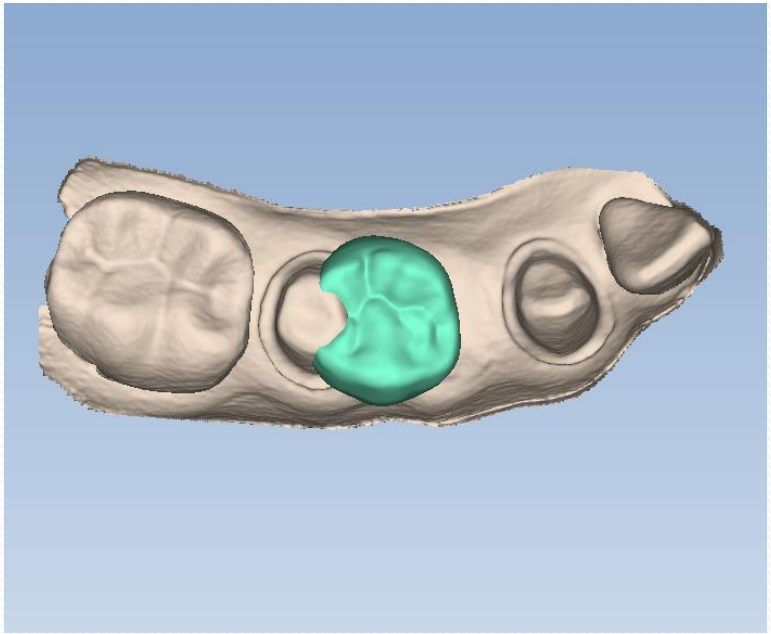


Evaluate margins accuracy in both the solid cast and the ice mode.

Marking the margin for the pontic will be the whole area covered by the ridge lap.

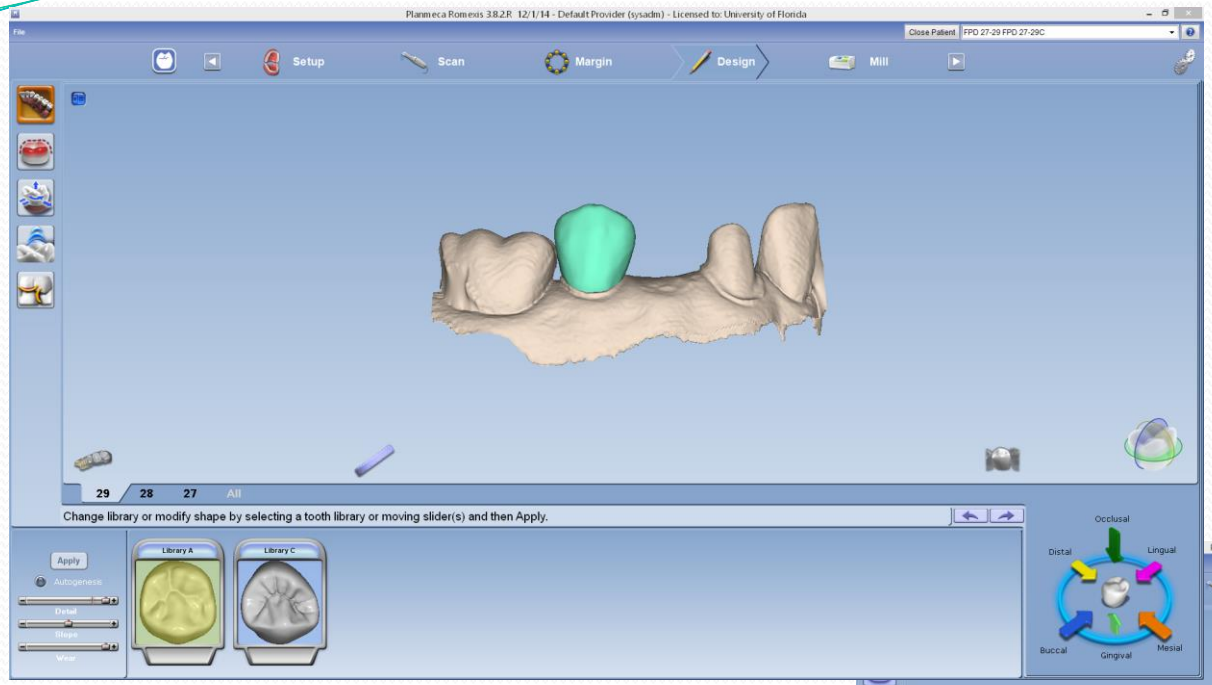
Applying proposals

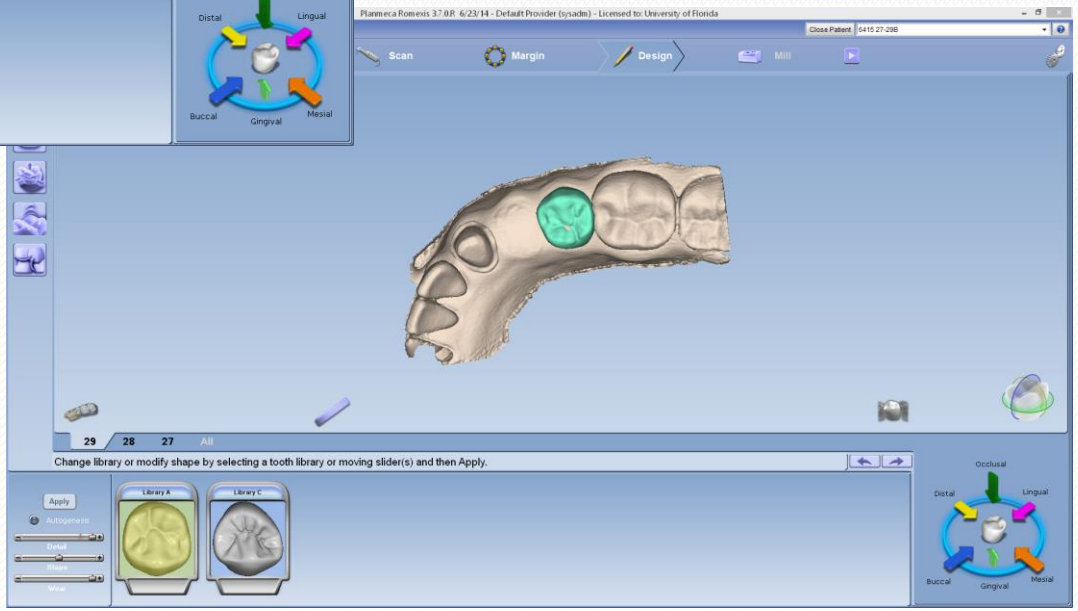




In cases with multiples restorations, it is generally best to start the autogenesis process on a tooth with an existing neighbor. In a bridge case, that means starting with one of the abutments.

The proposal sometimes may come up to be of a larger dimension.

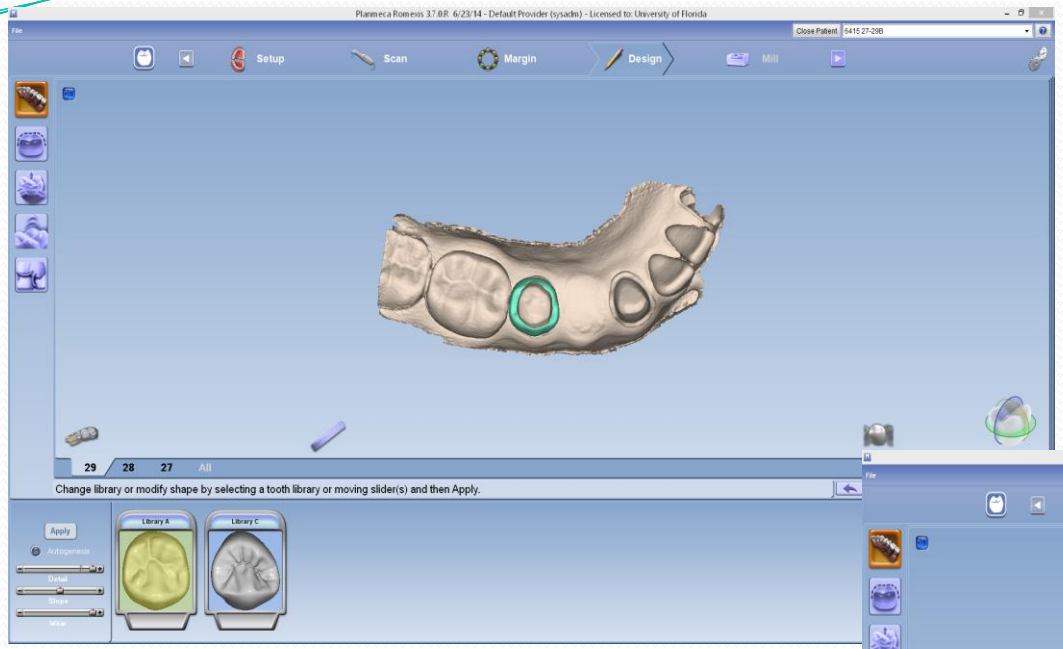


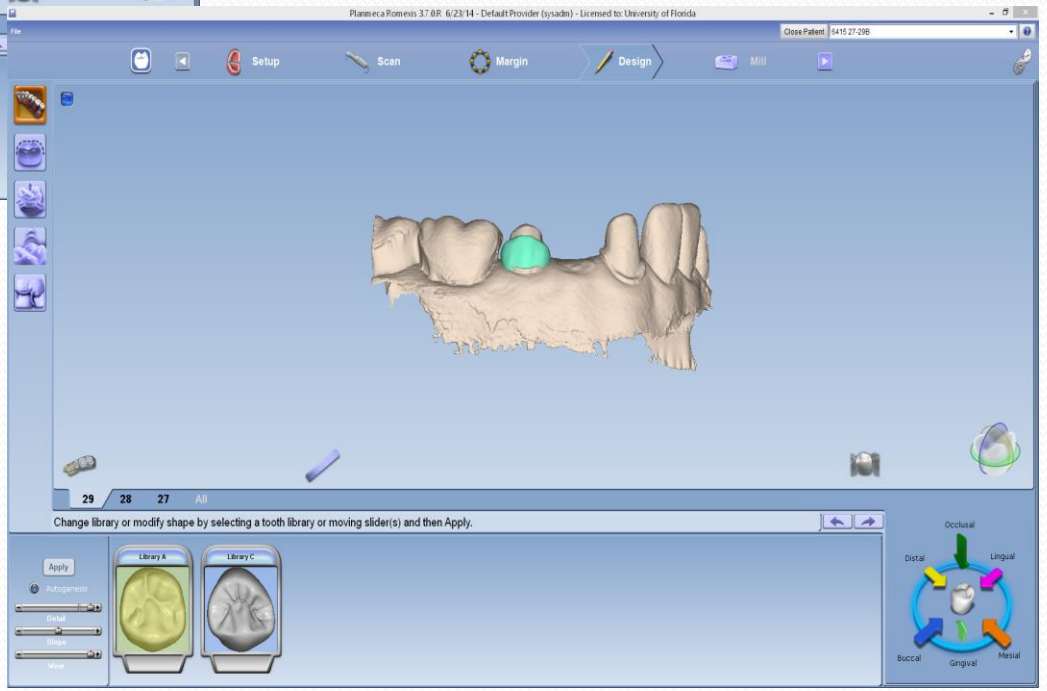


Resize **(Alt + arrows)** and move **(drag and drop)** as needed.

The down button will move the proposal down and make it smaller.

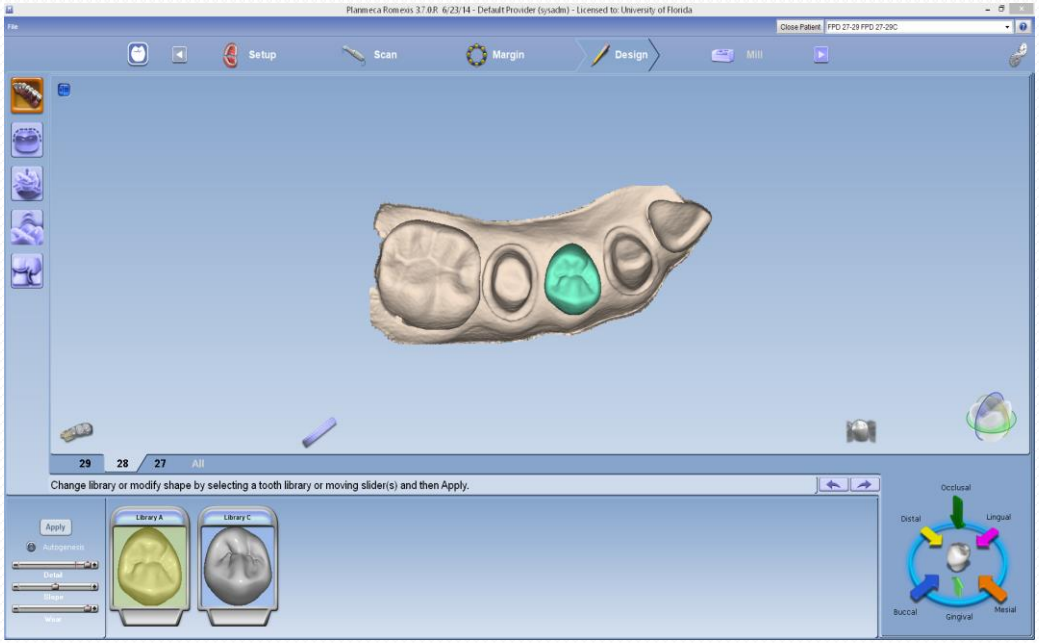
The up button will move the proposal up and make it larger.



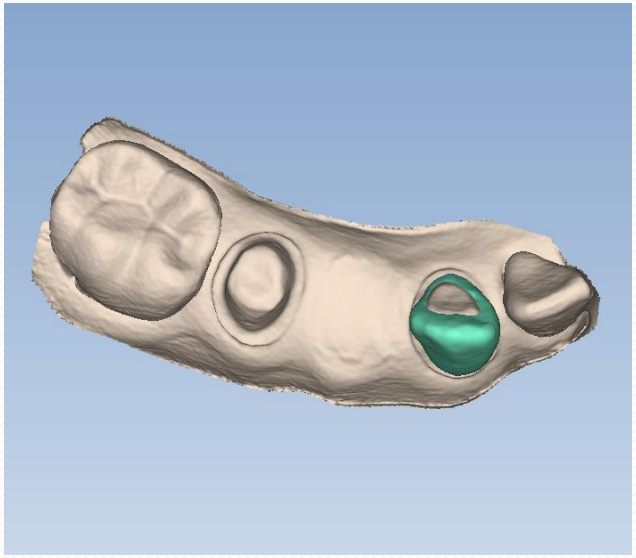


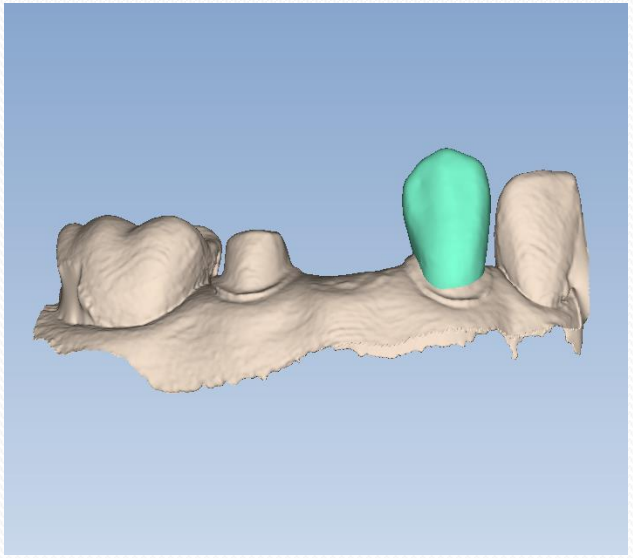
1. Rotate to evaluate the position of the preview library tooth.
In this example, the preview tooth is high because the system is attempting to match the height of the higher mesial data. This will result in a distorted initial proposal.

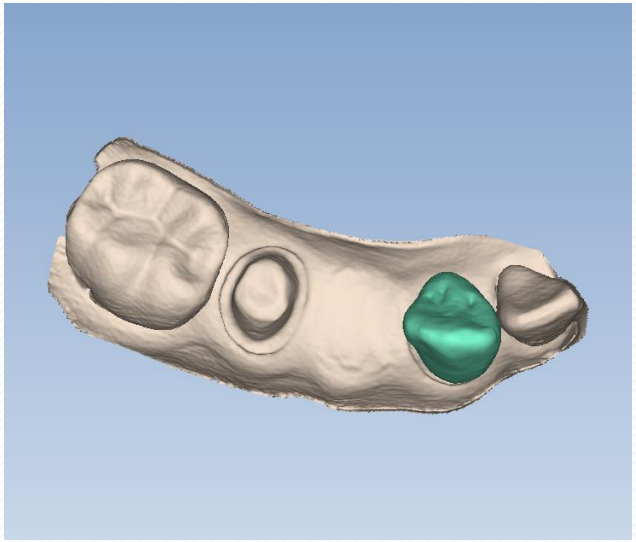
- The size and position of the preview tooth is important when Autogenesis is deactivated.
- **2.** Resize (**Alt + arrows**) and move (**drag and drop**) as needed.
- **3.** Click **Apply.**
- **4.** Repeat these steps for the other abutment.

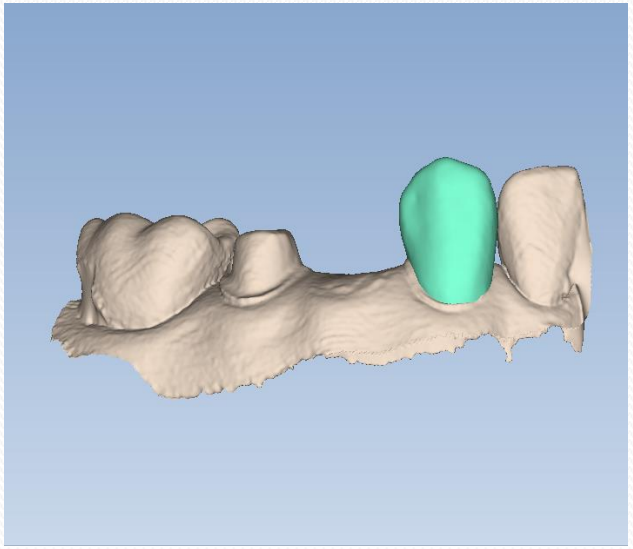


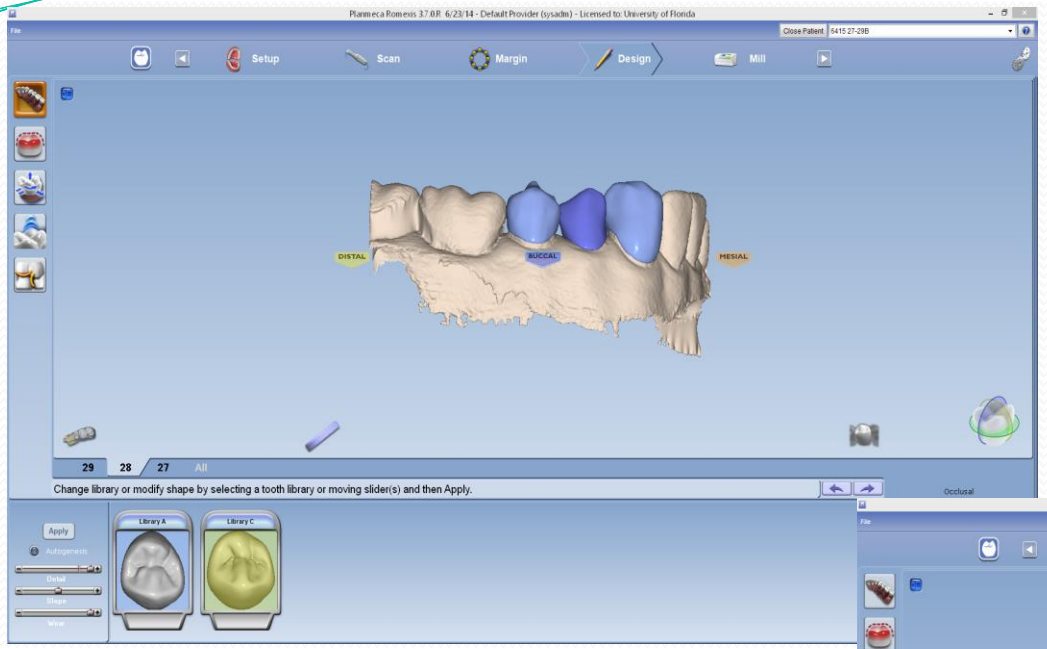
Alternate the use of up and down buttons to size and position each proposal properly.

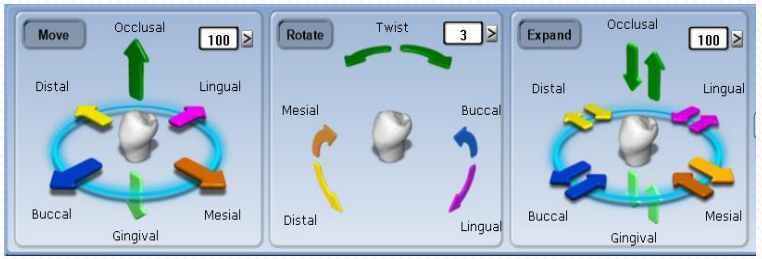






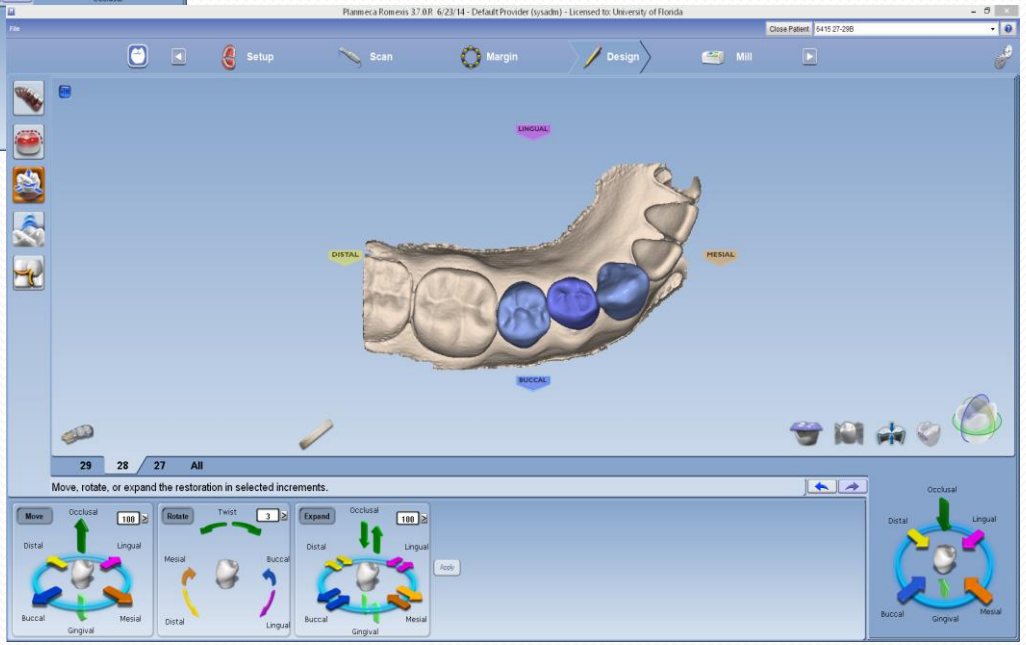


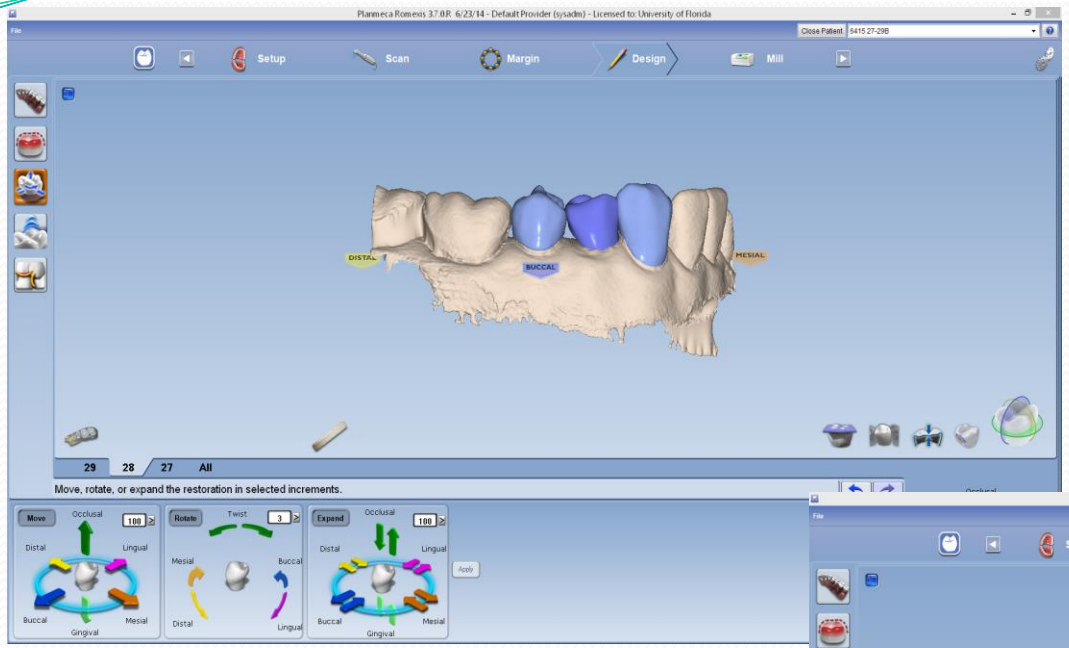




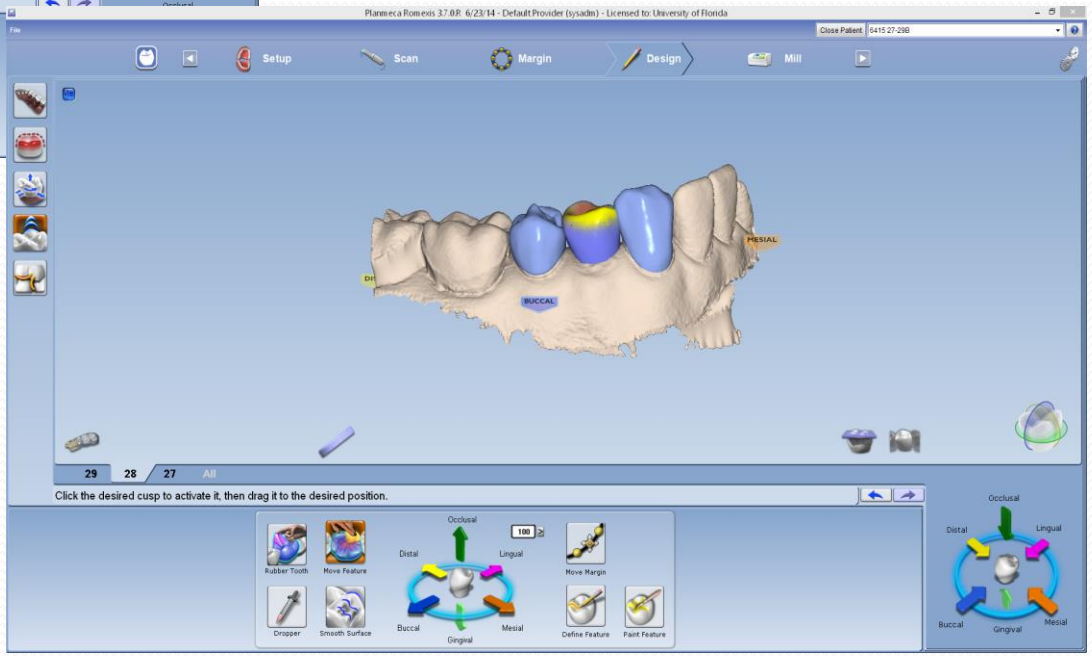
Incremental change tools.

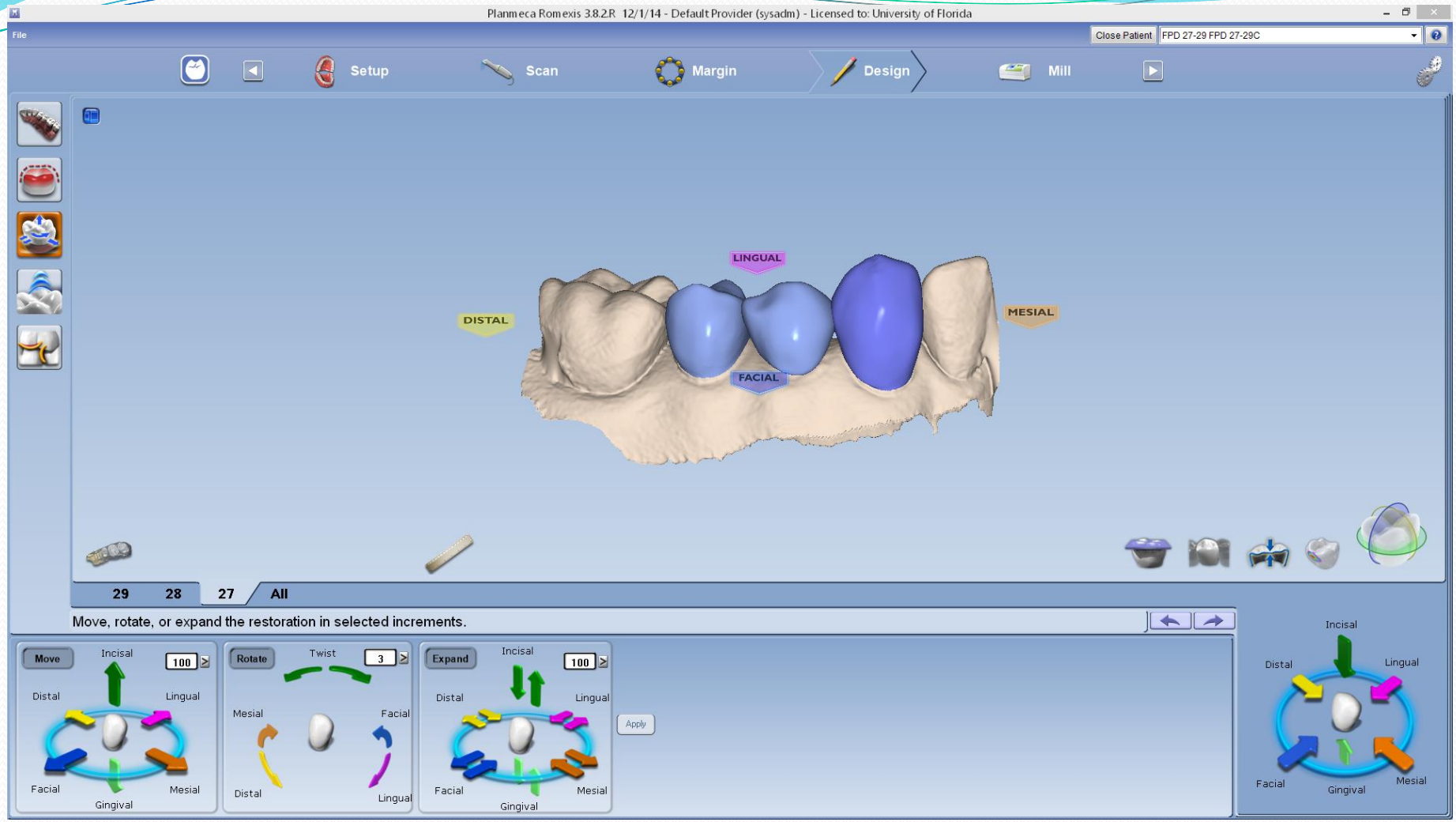
Autogenises may give you a distorted anatomy on your proposal. You can un-click Autogenises, they apply. This way you will get marginal adaptation and an undistorted proposal. Use the incremental change tool or freedom change tool to restore anatomy.



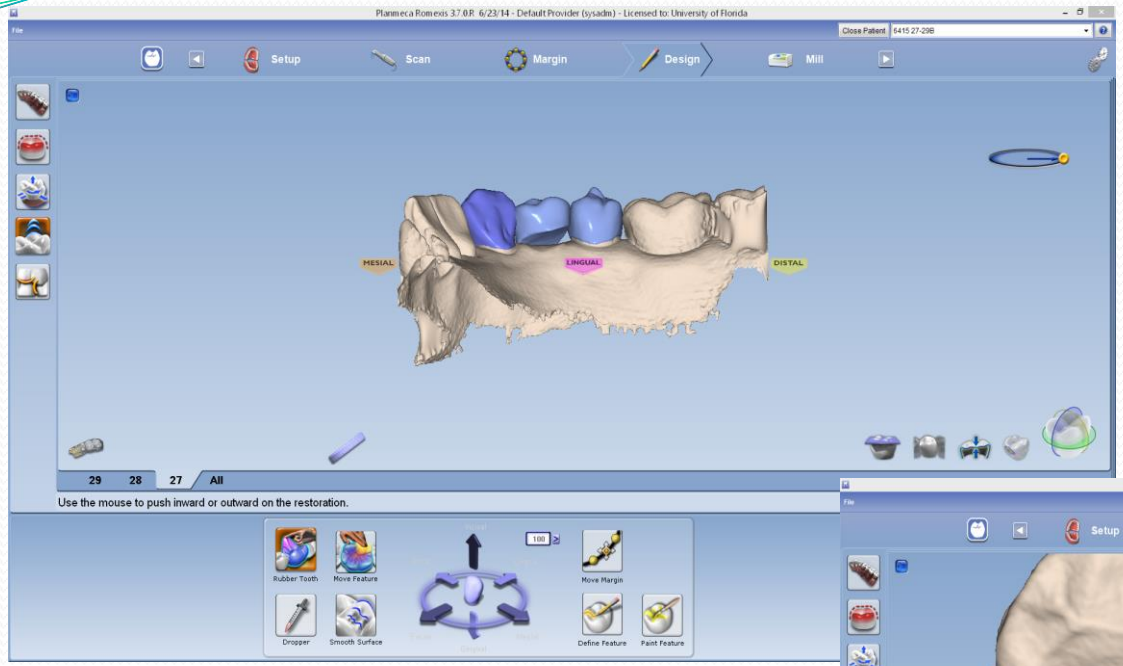


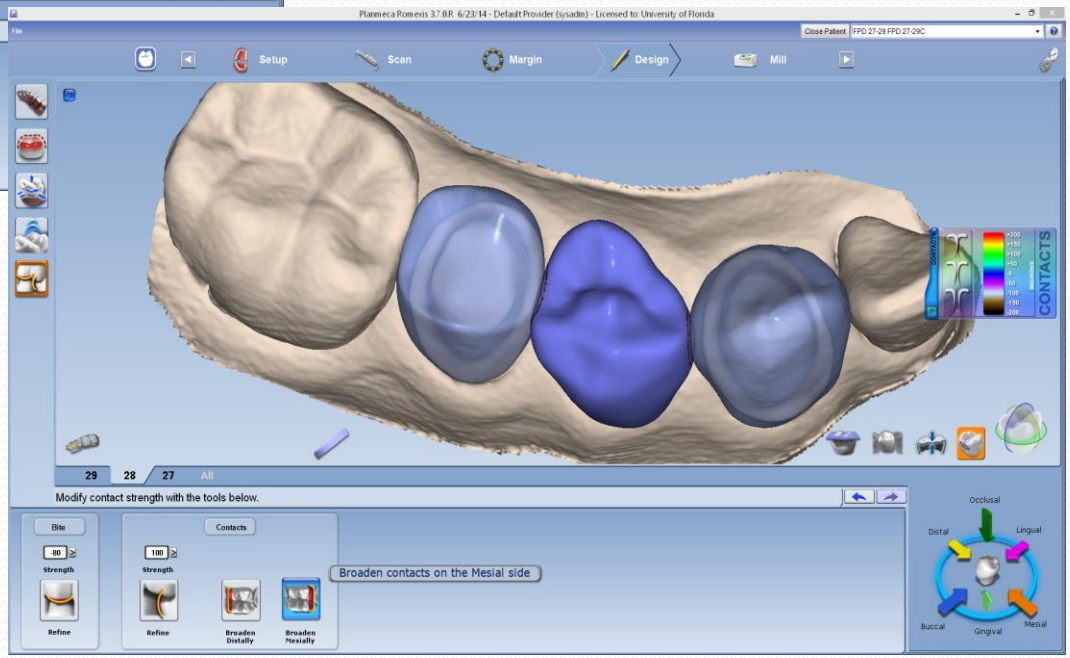
Move feature works the same way as rubber tooth, but is capable of moving bigger sections.

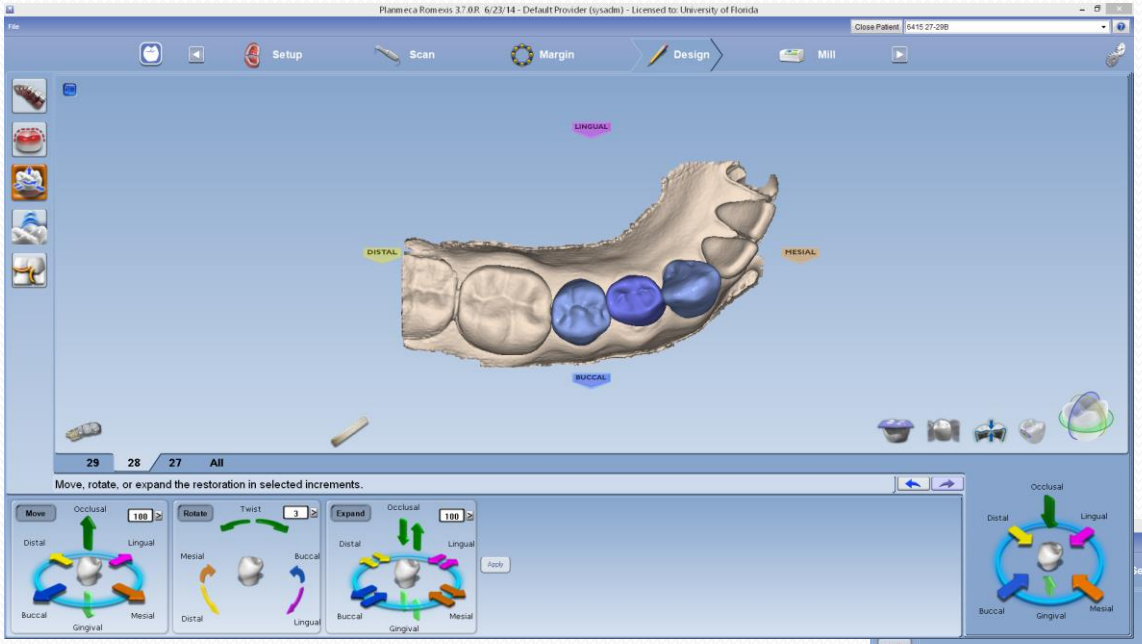


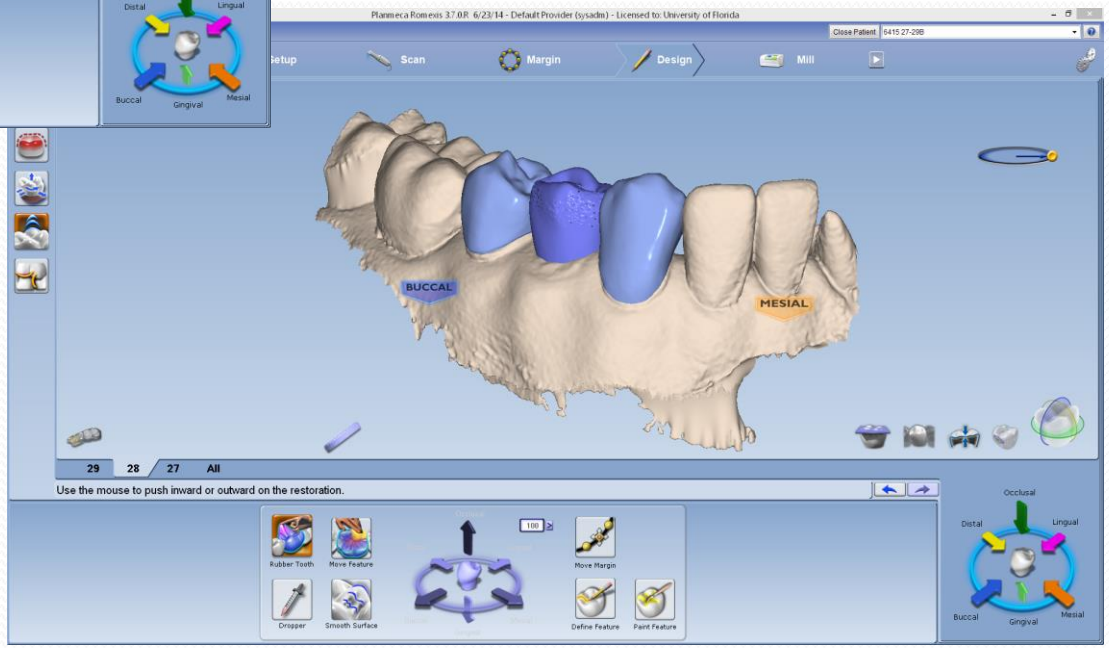


Incremental change tools

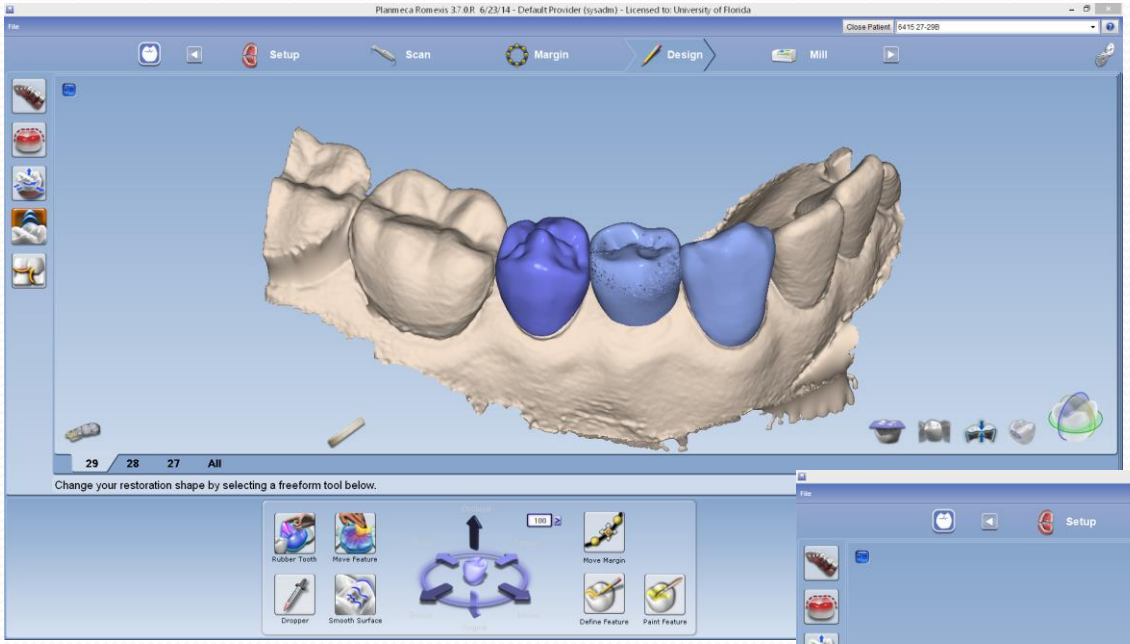

Planmeca Romexis 3.7.0.R 6/23/14 - Default Provider (sysadm) - Licensed to: University of Florida
Setup
Scan
Margin
Design
Mill
MESIAL
LINGUAL
DISTAL
29
28
27
All
Use the mouse to push inward or outward on the restoration.
Rubber Tooth
Move Feature
Move Margin
Dropper
Smooth Surface
Define Feature
Paint Feature

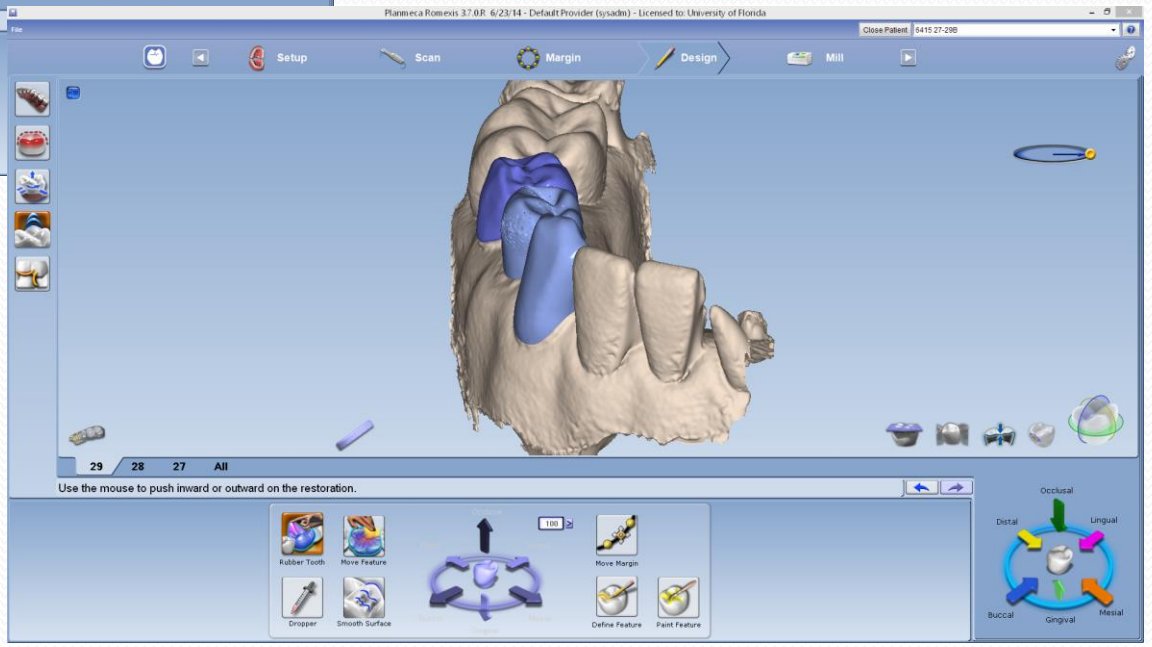

Planmeca Romexis 3.7.0.R 6/23/14 - Default Provider (sysadm) - Licensed to: University of Florida
Setup
Scan
Margin
Design
Mill
29
28
27
All
Modify contact strength with the tools below.
Bite
Strength
Refine
Contacts
Strength
Refine
Broaden Distally
Broaden Mesially
Broaden contacts on the Mesial side
Occlusal
Distal
Lingual
Buccal
Gingival
Mesial
CONTACTS



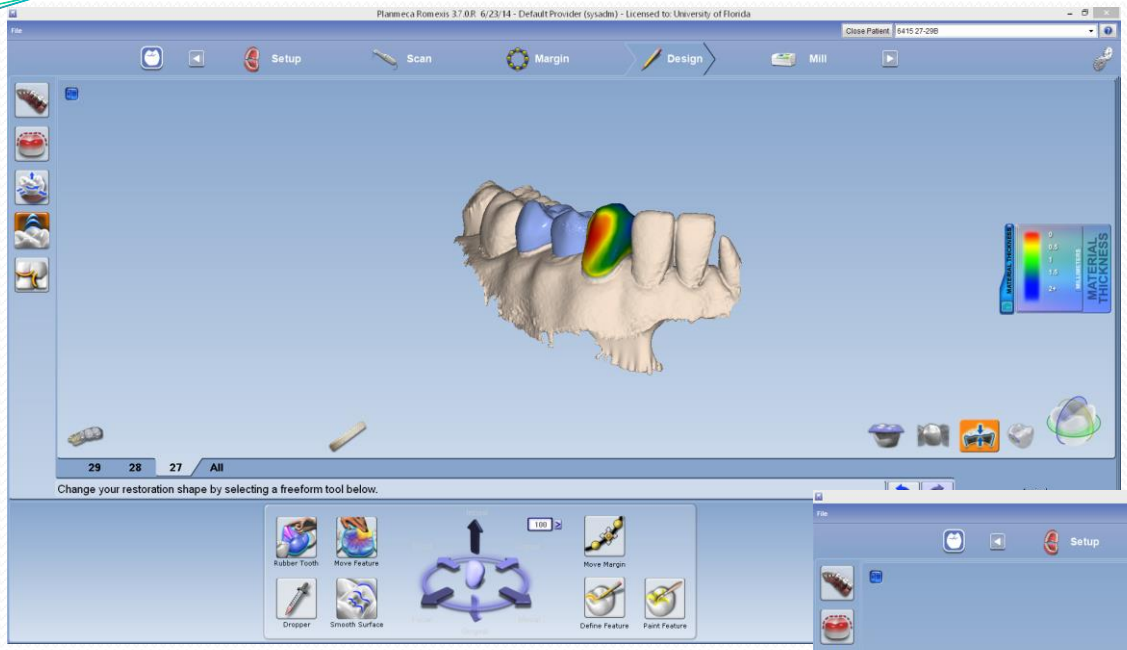


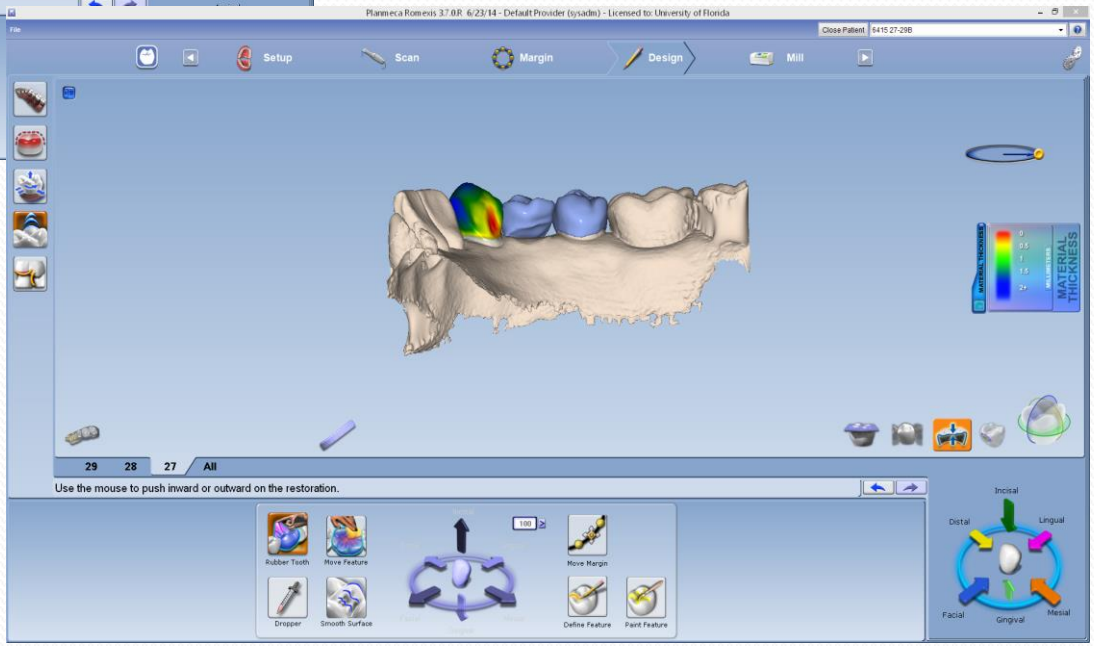
Use the Rotate icon in the incremental change tool to rotate the pontic to a more anatomical position.



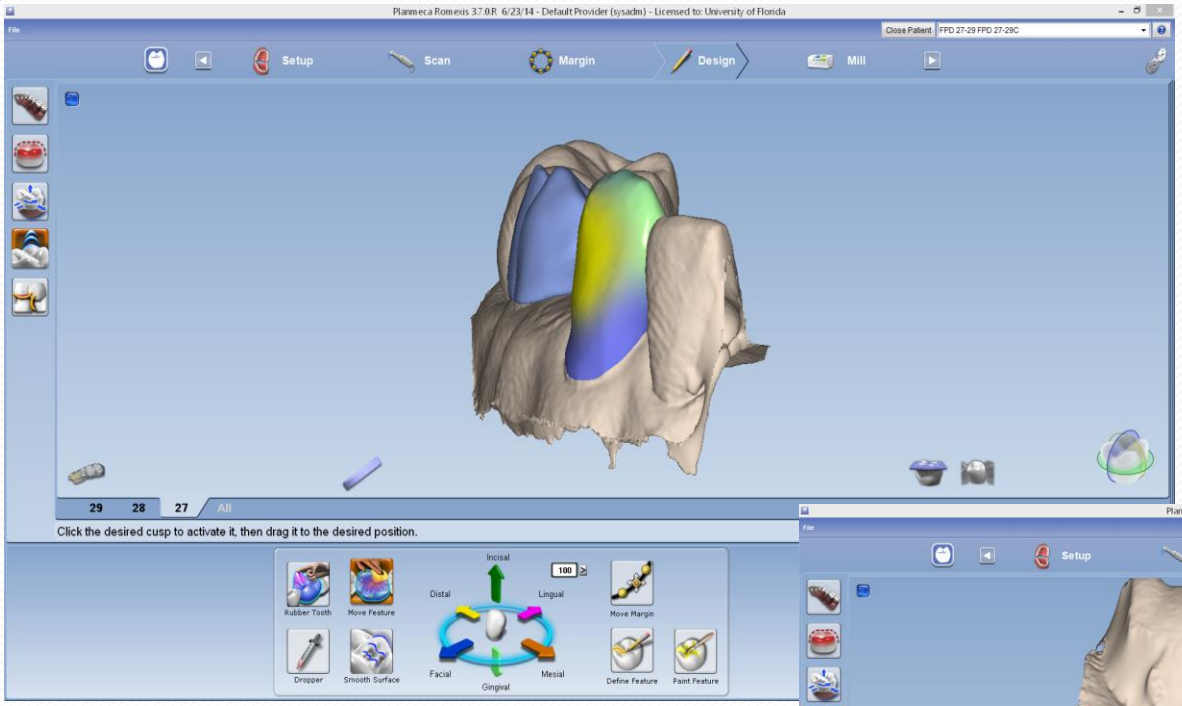


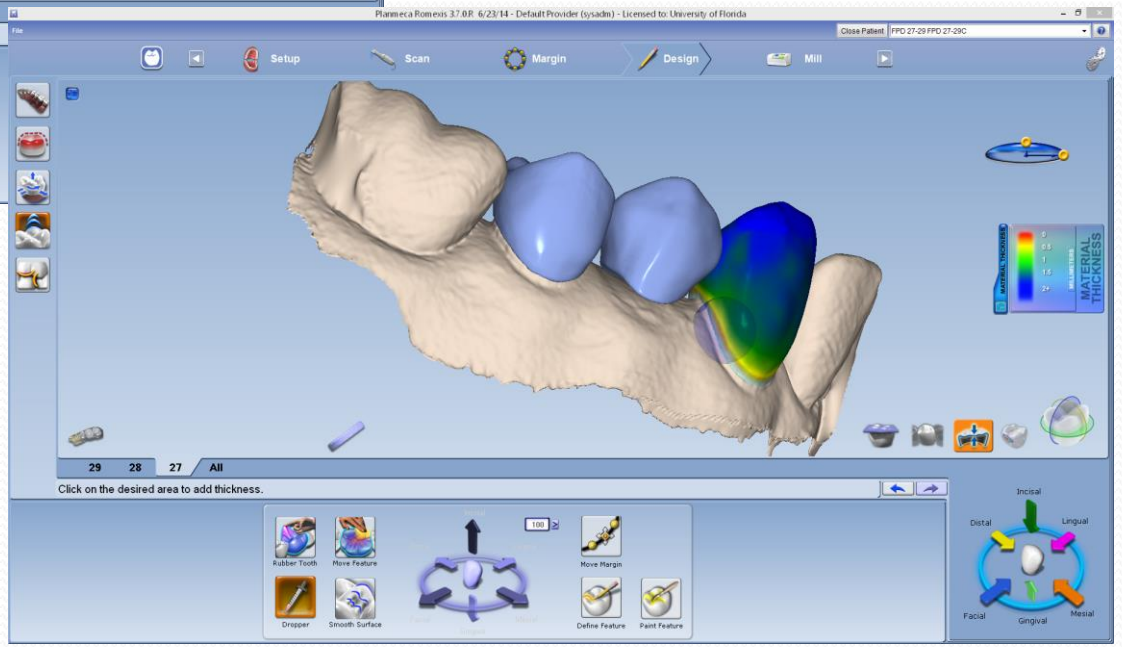
Use smooth surface to remove irregularities on pontic surface



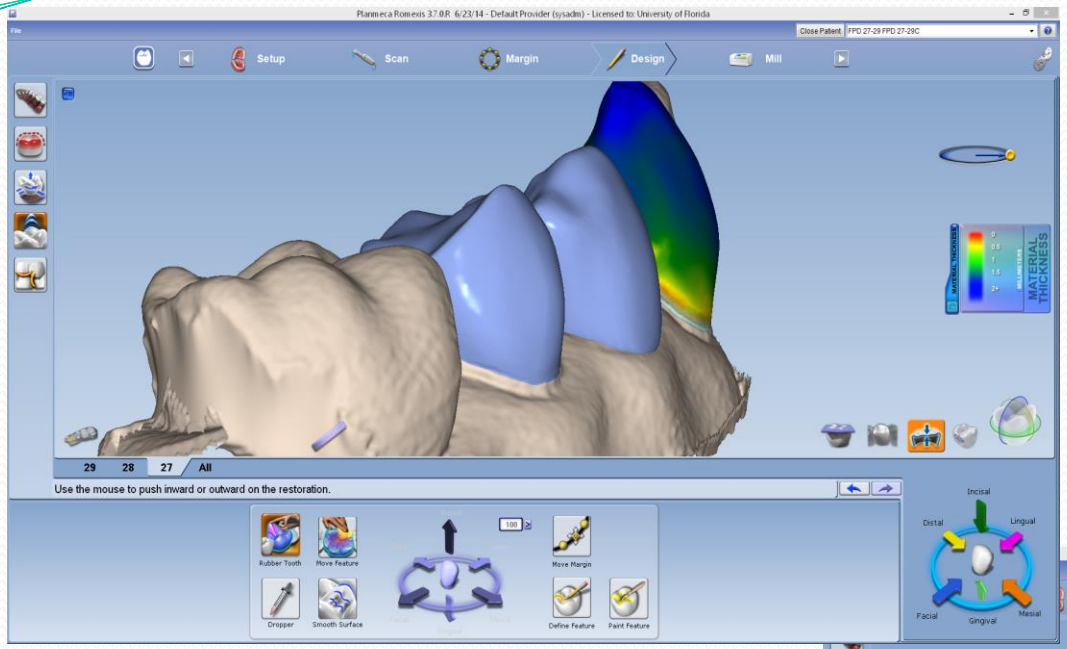


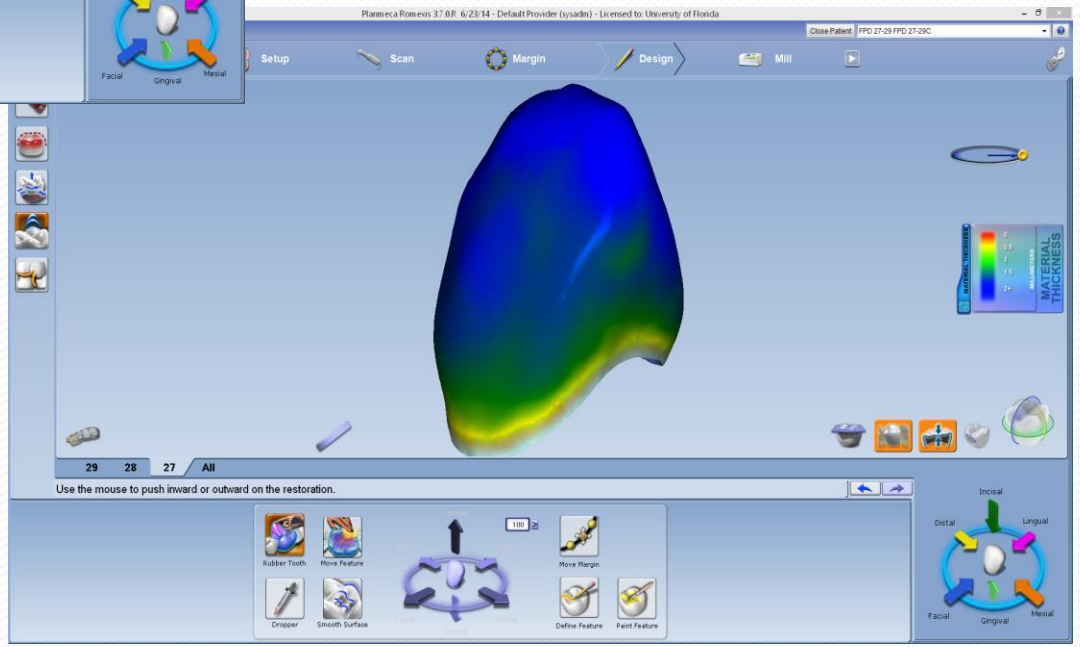
Evaluate material thickness for every tooth.



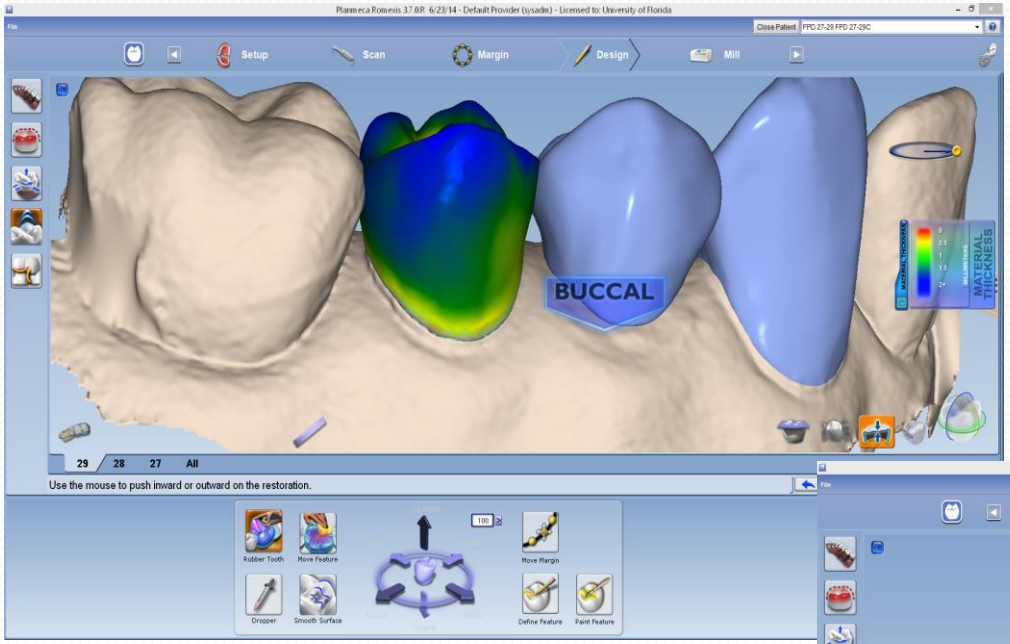


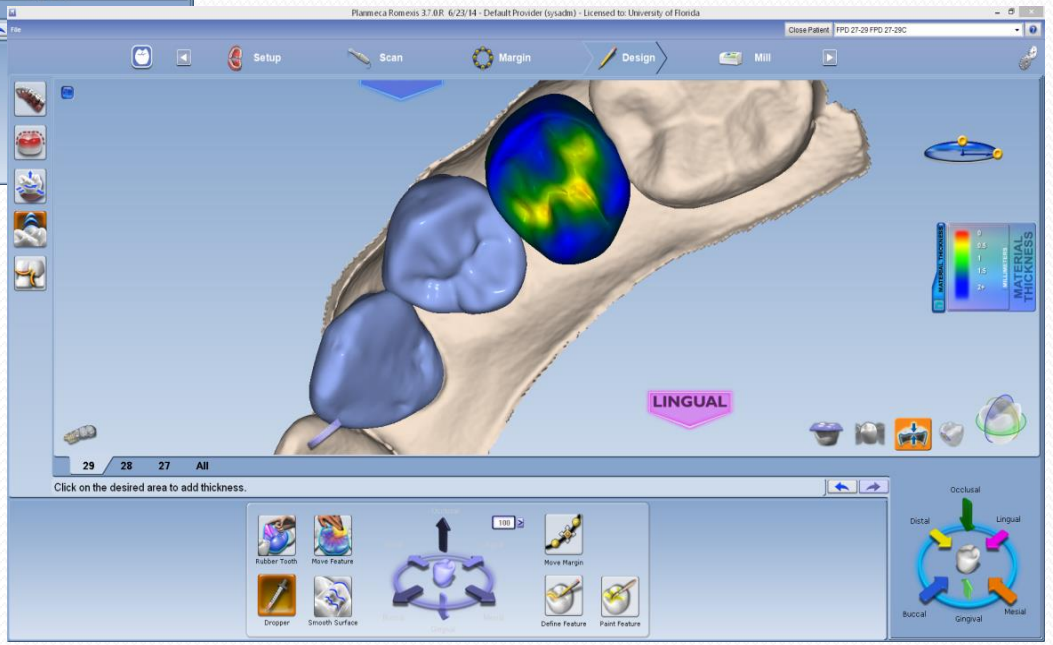
Use the move features or the rubber tooth to add material thickness. You can also use the dropper to add material thickness at the margins.



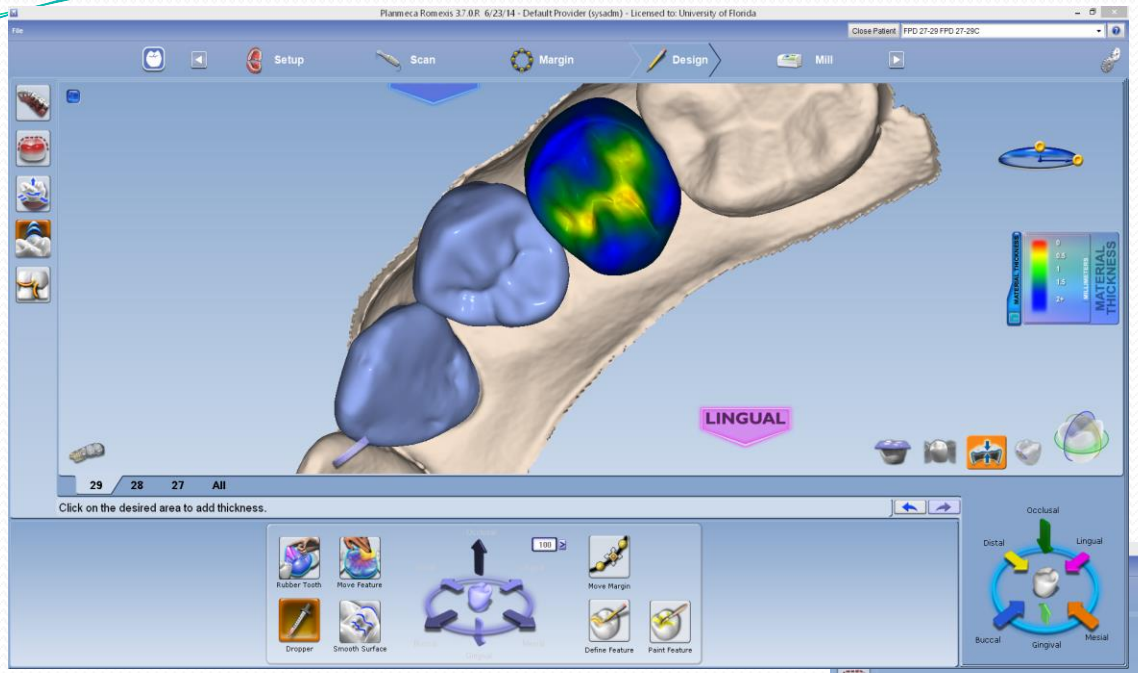


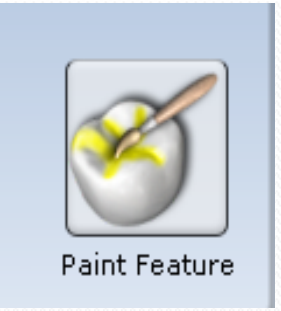
Use the Hide model feature to evaluate material thickness for every direction.

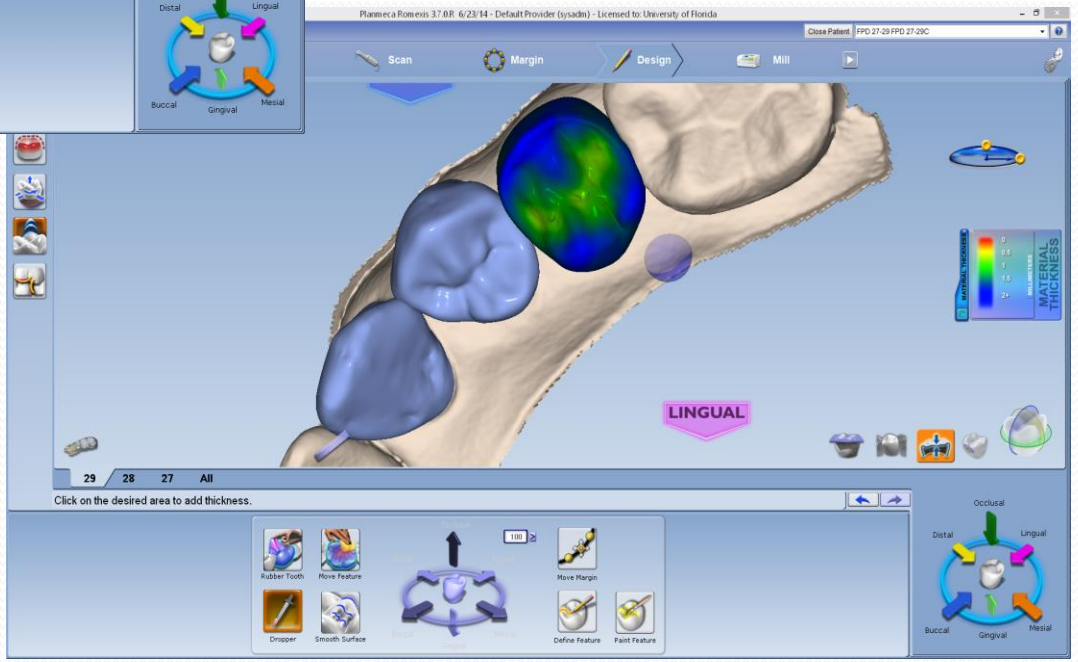




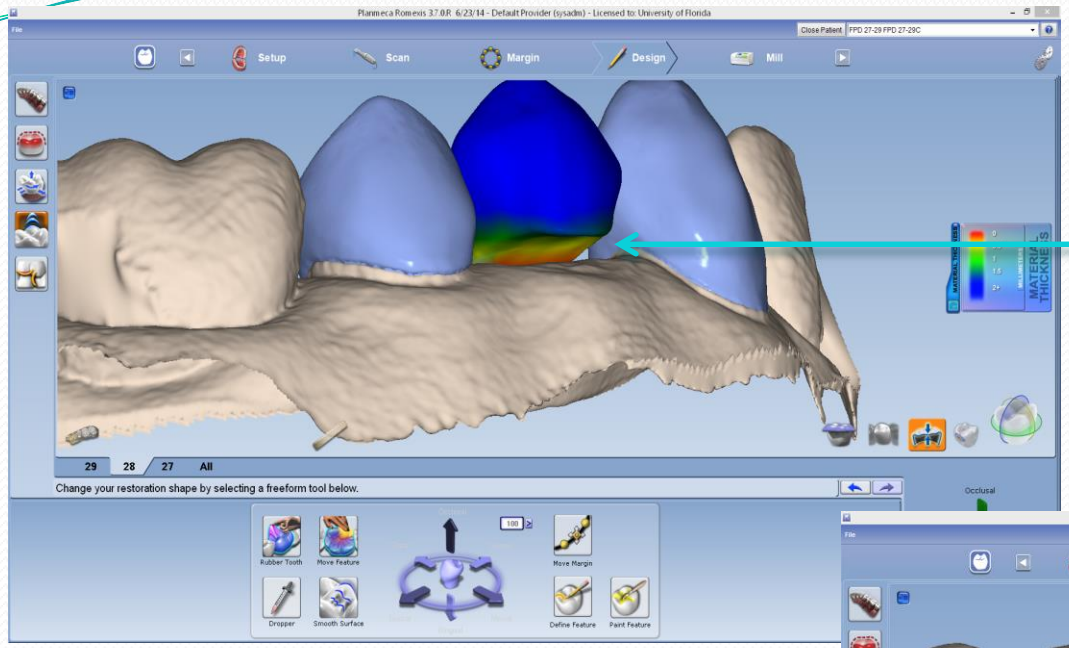
Rubber tooth can add material thickness to all the axial walls of the crown.

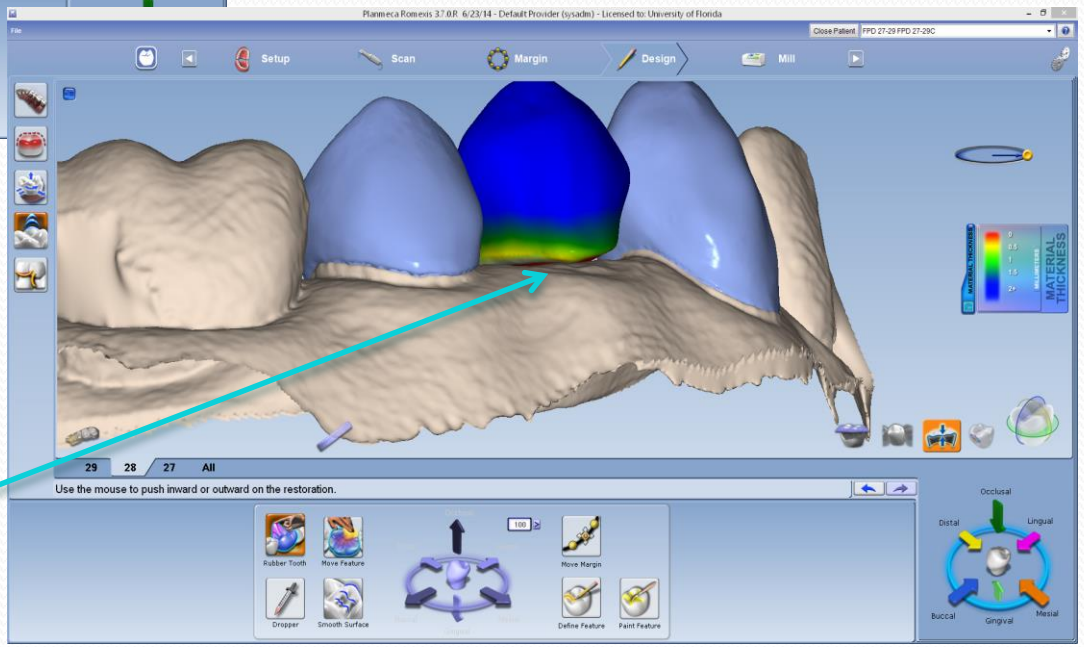




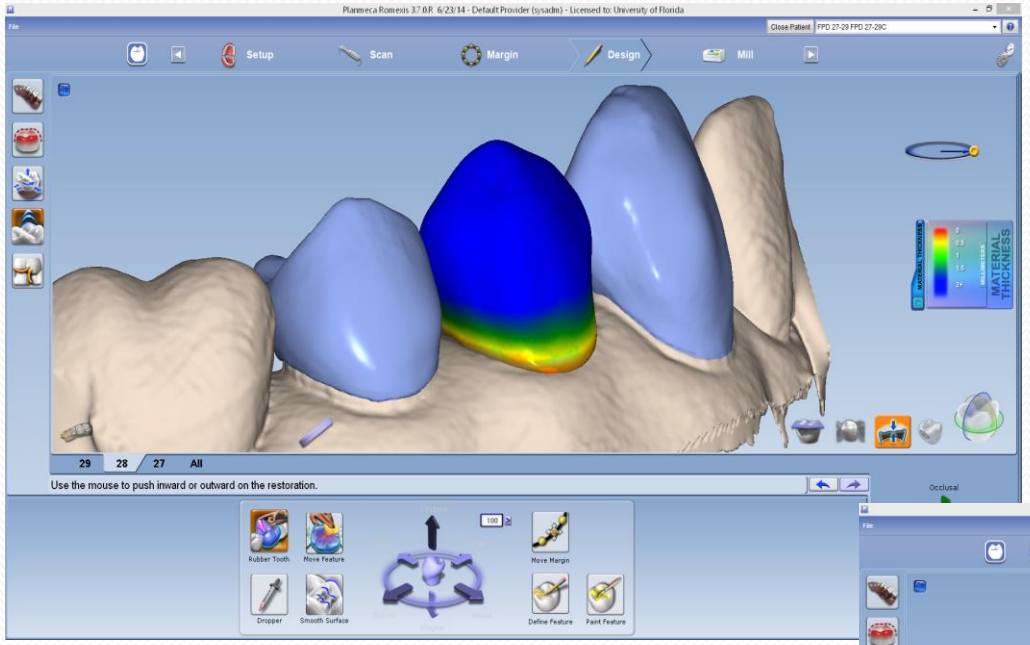


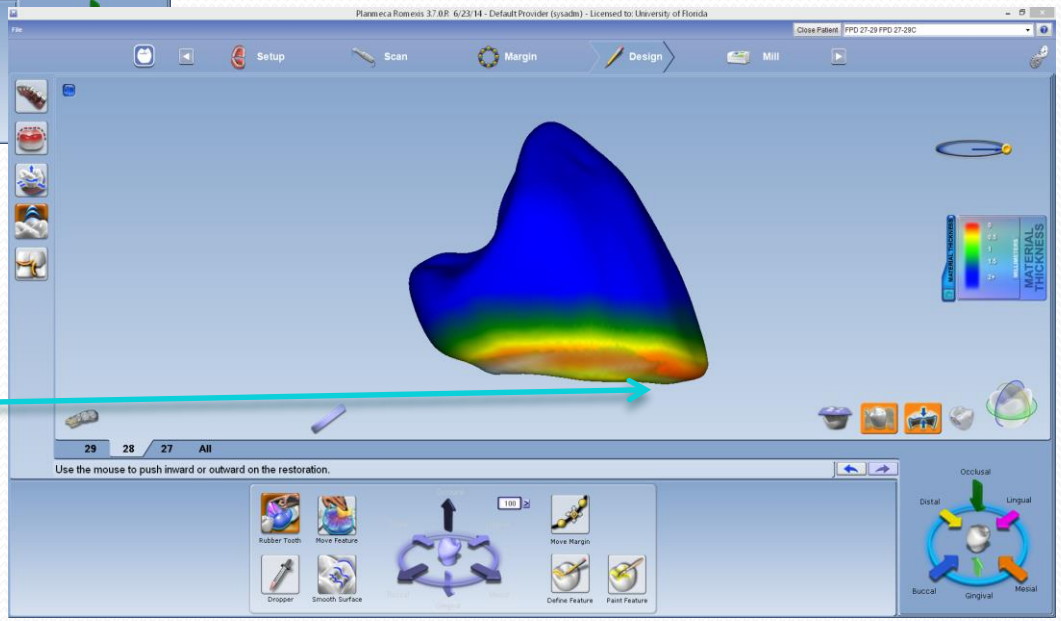
Either the dropper or the paint feature can be used to add material to the occlusal anatomy.
When paint feature is used, every click will raise the selected area by 100 microns





The pontic has a solid base and is raised above the gumline (0.75 mm). The gingival aspect of the pontic follow the contours of the edentulous tissue and can be adjusted utilizing the design tools. Use the rubber tooth to adapt the ridge lap area to the facial mucosa of the model.

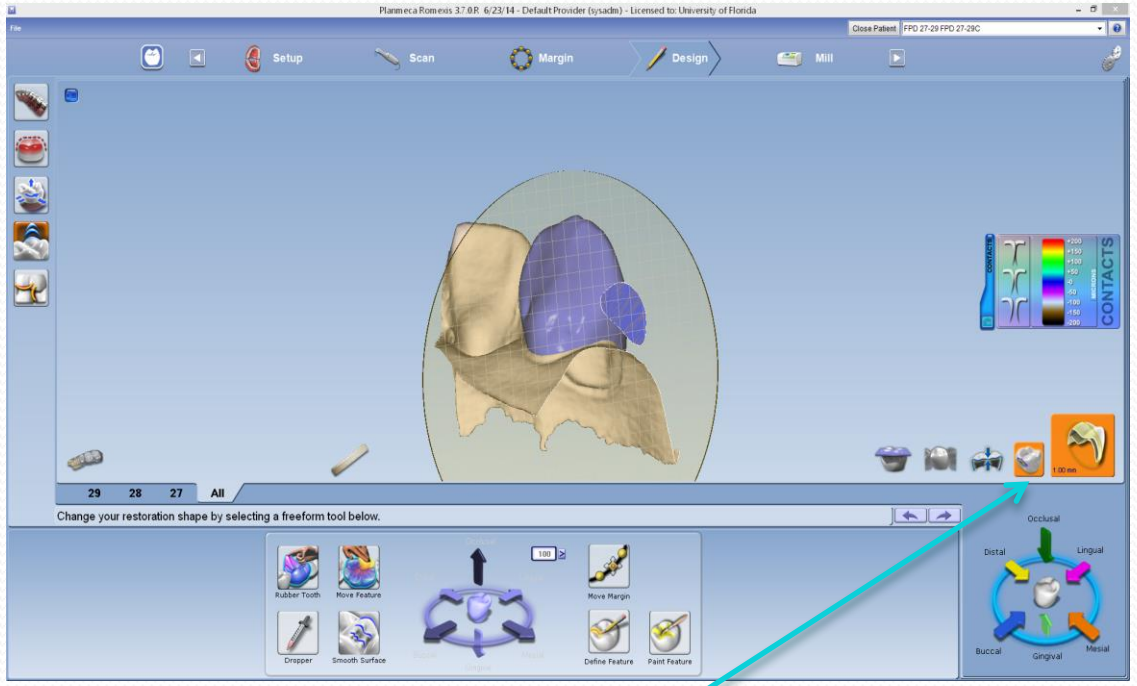




The pontic should have a modified ridge lap design and should touch the model in the facial area (red area).
Use hide model to evaluate the pontic form from different views.

Checking connector thickness.

1. Click **View Model** to hide the model.
2. Click **Sim.** When the Simulation is run, the connections between the teeth are displayed.
3. Click **Slice Plane** twice.
When Slice Plane is activated on a bridge mill simulation, the system measures the slice width. If the slice is thinner than the material guidelines, the slice displays as red. It is important to slice the simulation through the thinnest part of the connectors (orange lines in the examples). Any thin area should be evaluated.



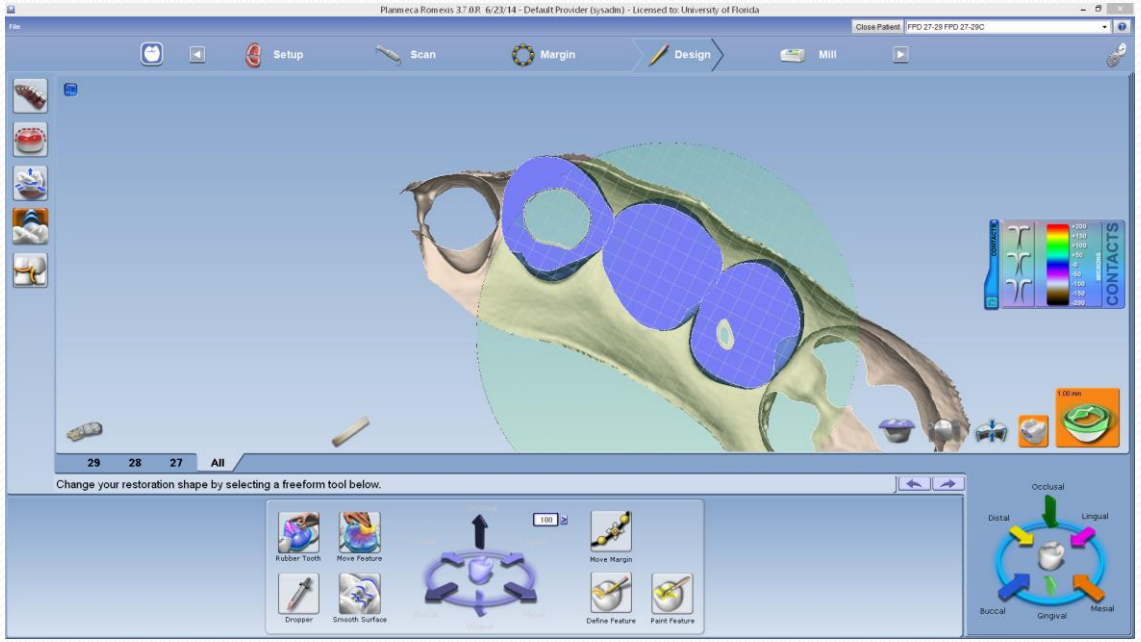
Sim and Slice Plane

4. Move the Slice Plane to a connector. If the Slice Plane needs to be rotated to slice through the thinnest part, hold down the **Ctrl** key while moving the mouse to rotate.

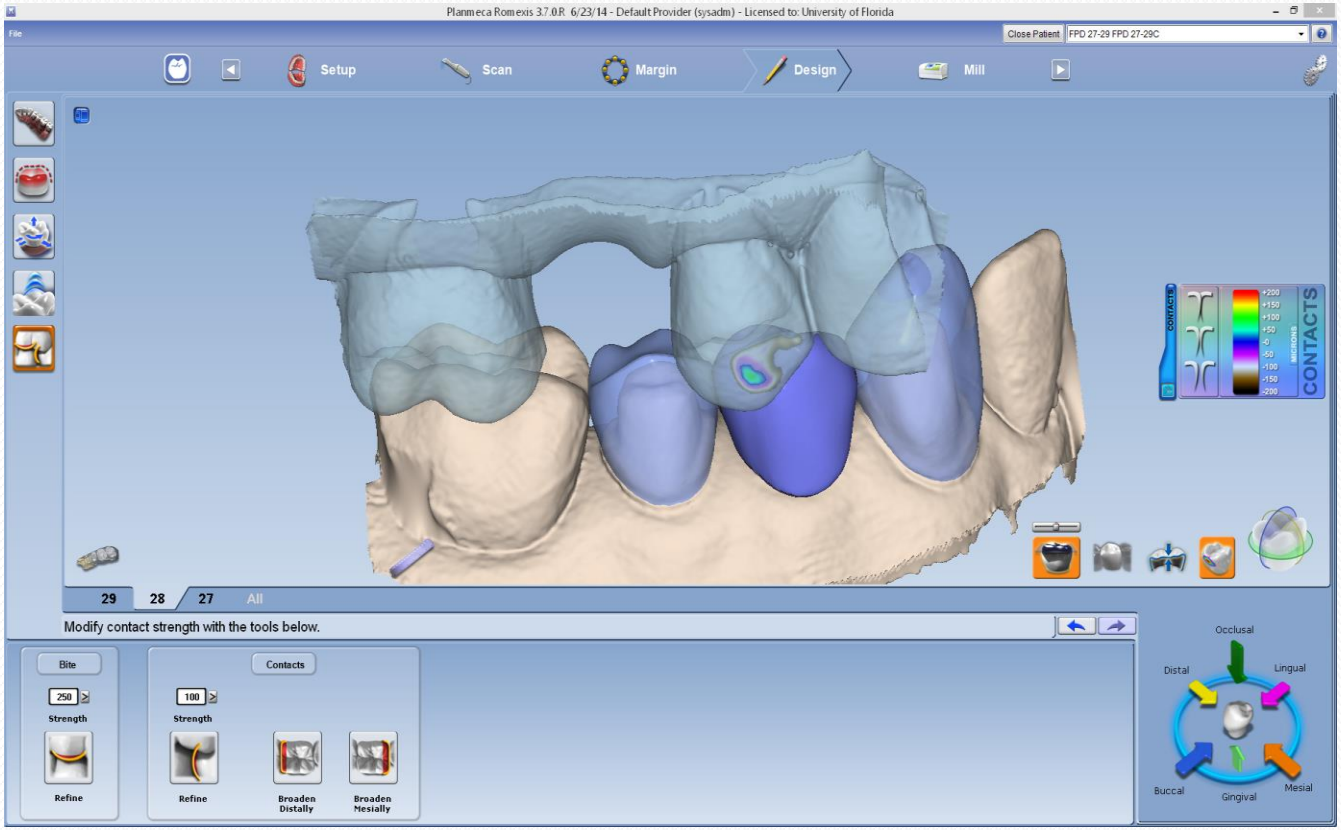
5. Rotate the model to view the slice.

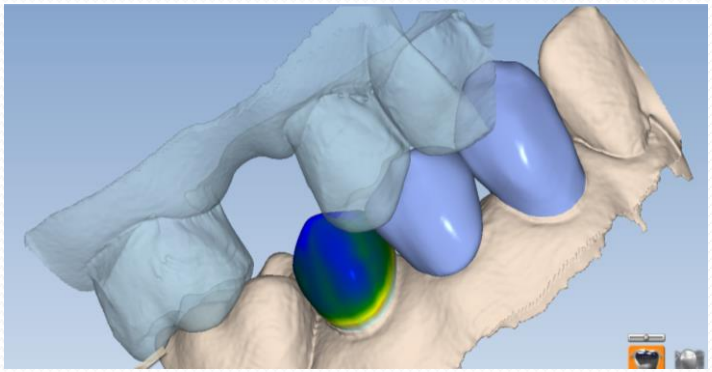
The optimum size of the connector for a Telio CAD restoration should be 12 mm^2, ideally 4x3 mm.

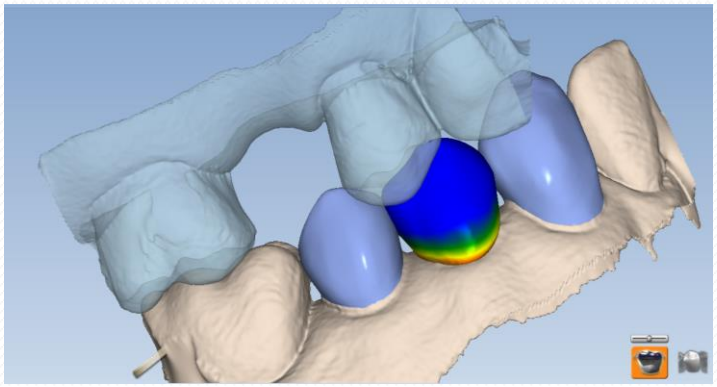
Hide the model to display the connector size in mm^2.

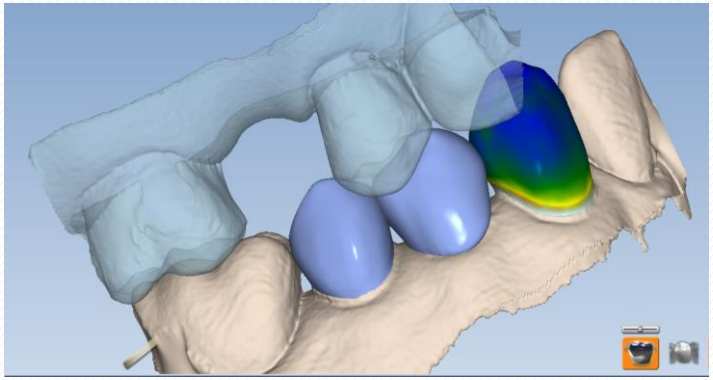


Checking occlusion and material thickness

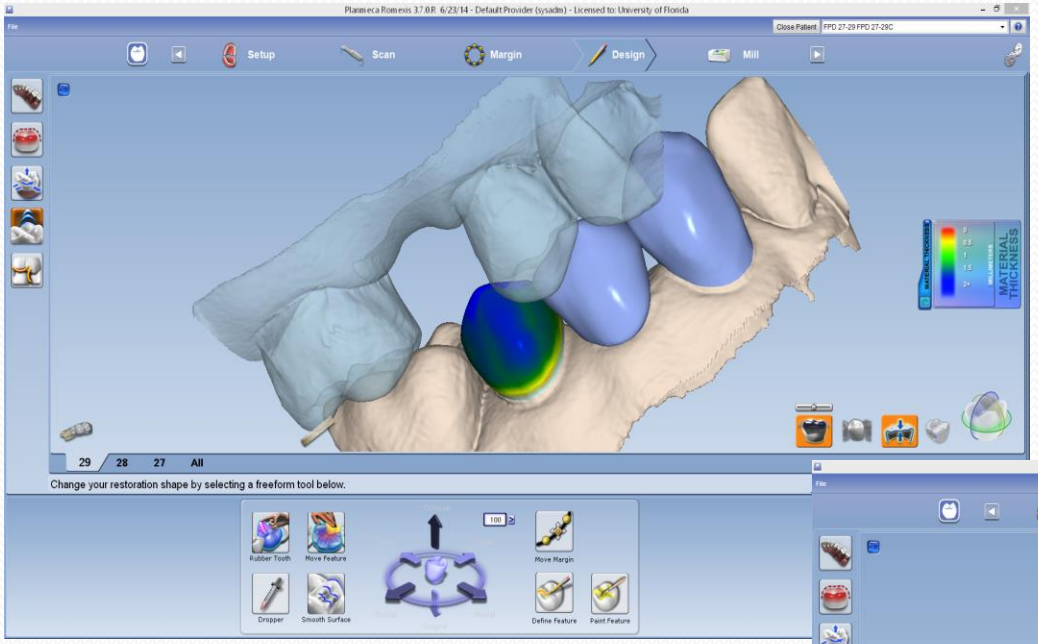


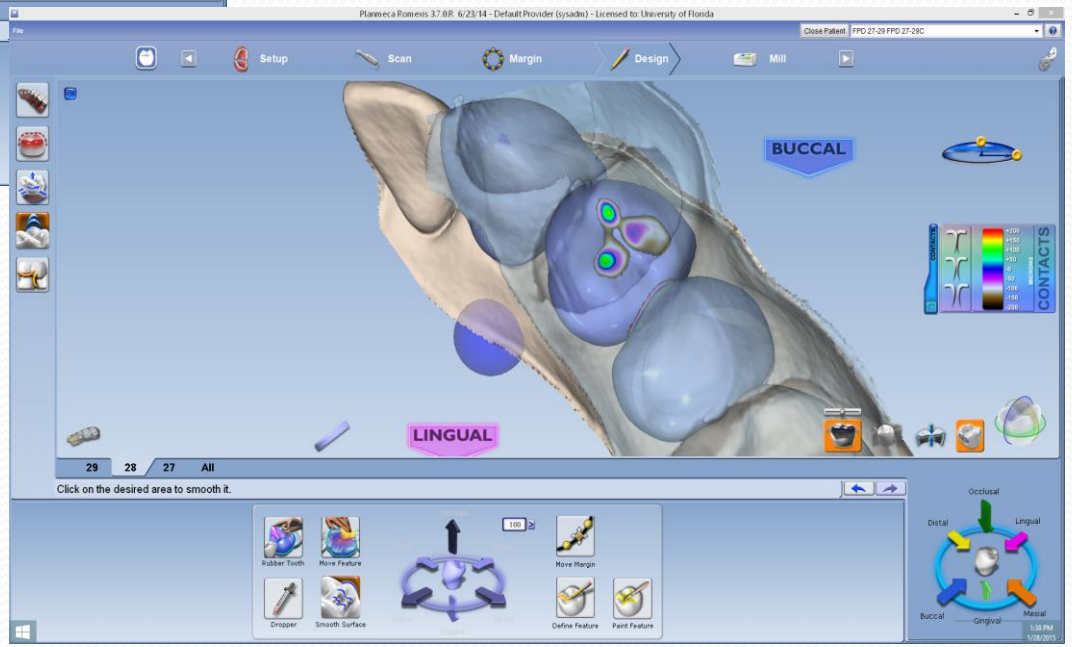


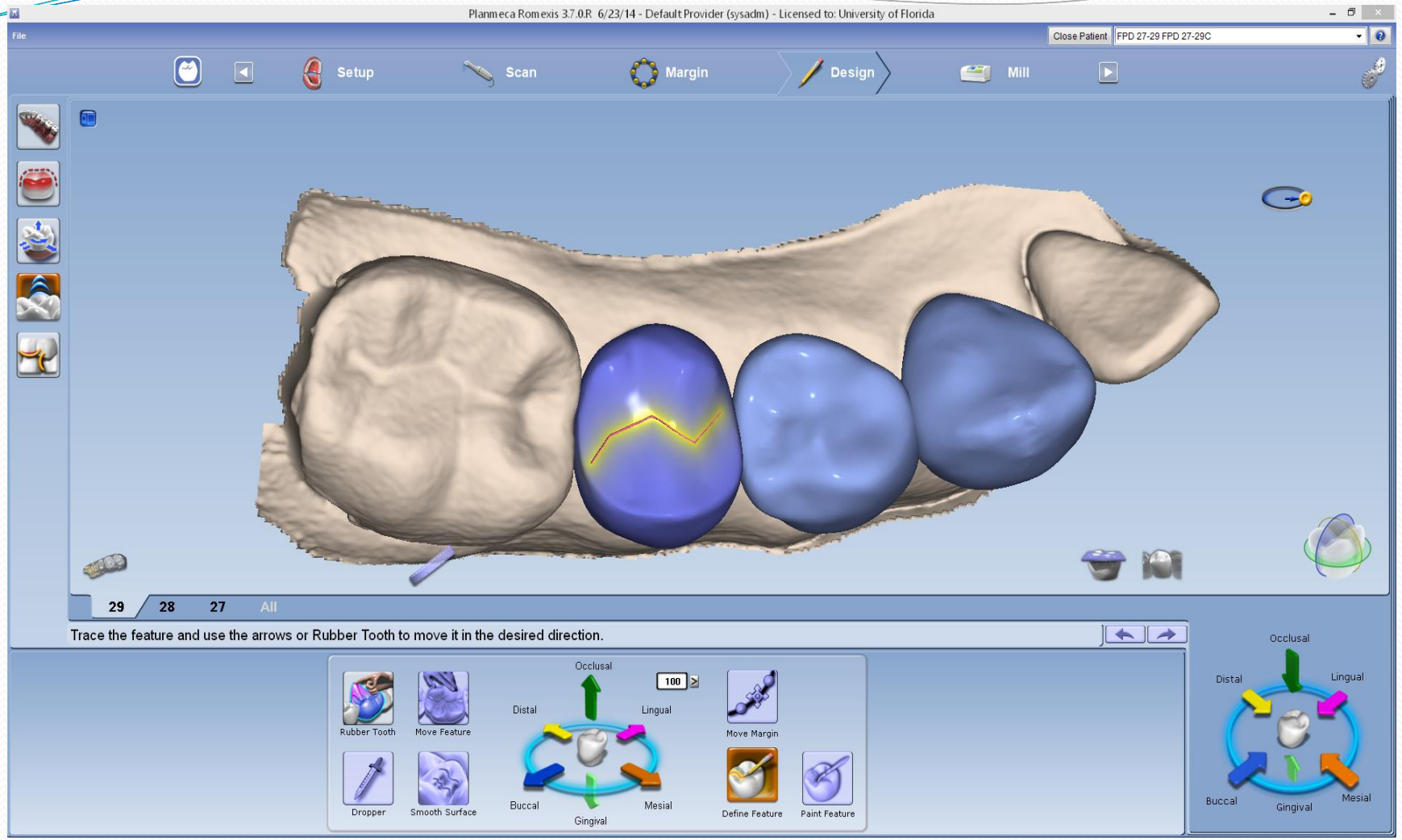




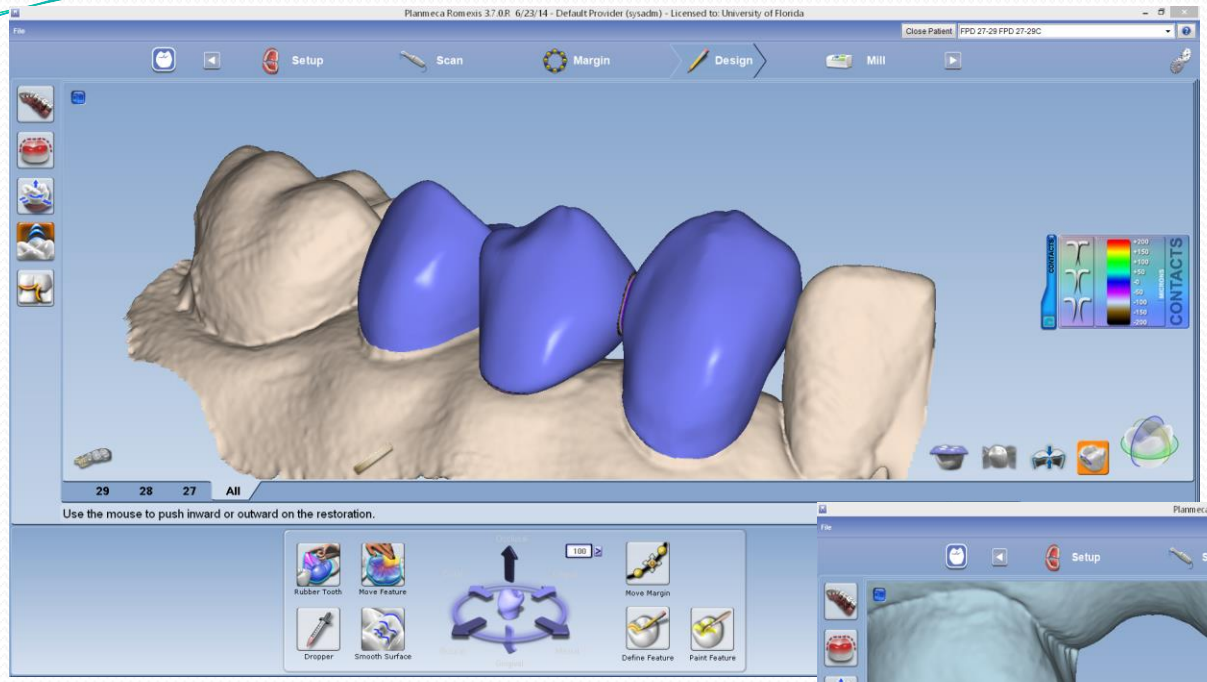
Check material thickness and occlusion for every tooth separately.

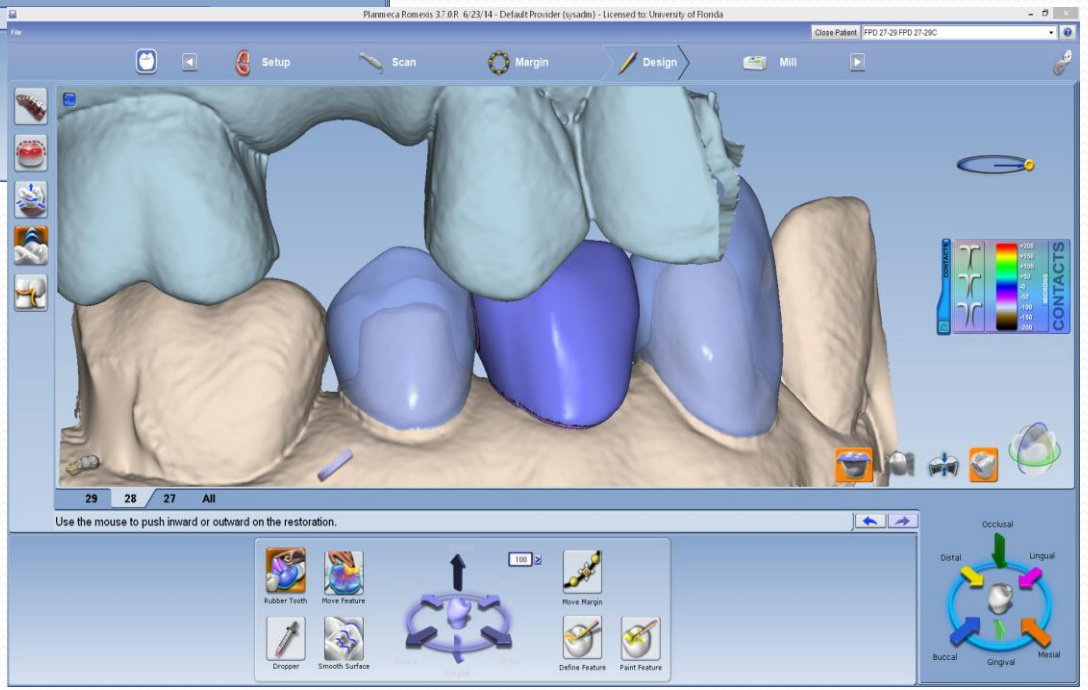

Planmeca Romexis 3.7.0.R 6/23/14 - Default Provider (sysadm) - Licensed to: University of Florida
Setup
Scan
Margin
Design
Mill
MATERIAL THICKNESS
29
28
27
All
Change your restoration shape by selecting a freeform tool below.
Rubber Tooth
Move Feature
Move Margin
Dropper
Smooth Surface
Define Feature
Paint Feature


Planmeca Romexis 3.7.0.R 6/23/14 - Default Provider (sysadm) - Licensed to: University of Florida
Setup
Scan
Margin
Design
Mill
BUCCAL
LINGUAL
CONTACTS
29
28
27
All
Click on the desired area to smooth it.
Rubber Tooth
Move Feature
Move Margin
Dropper
Smooth Surface
Define Feature
Paint Feature
Occlusal
Distal
Lingual
Buccal
Gingival
Mesial



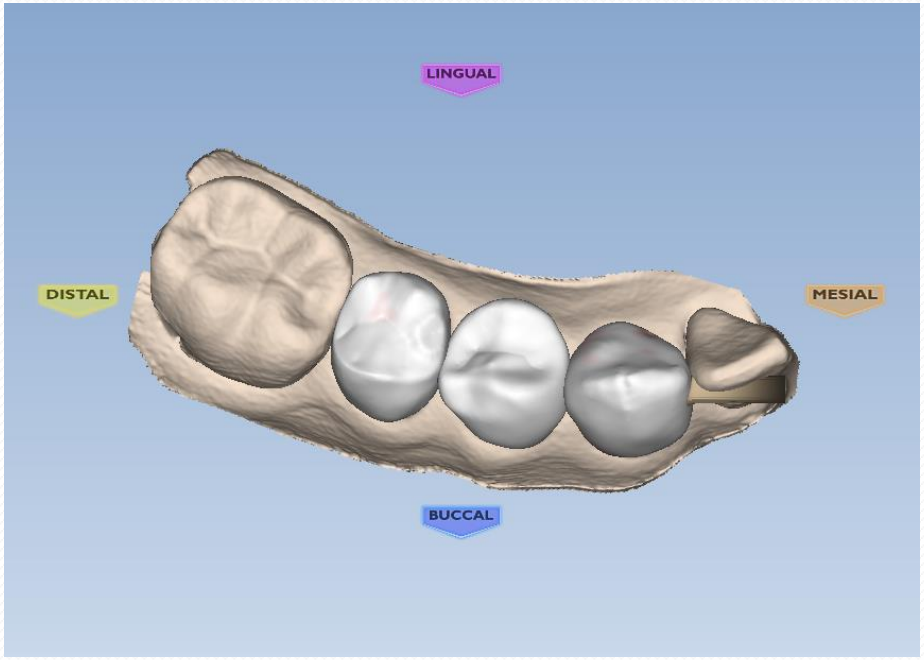
Use the define feature to make central grooves and restore occlusal anatomy. The tool is use the same way as the paint feature

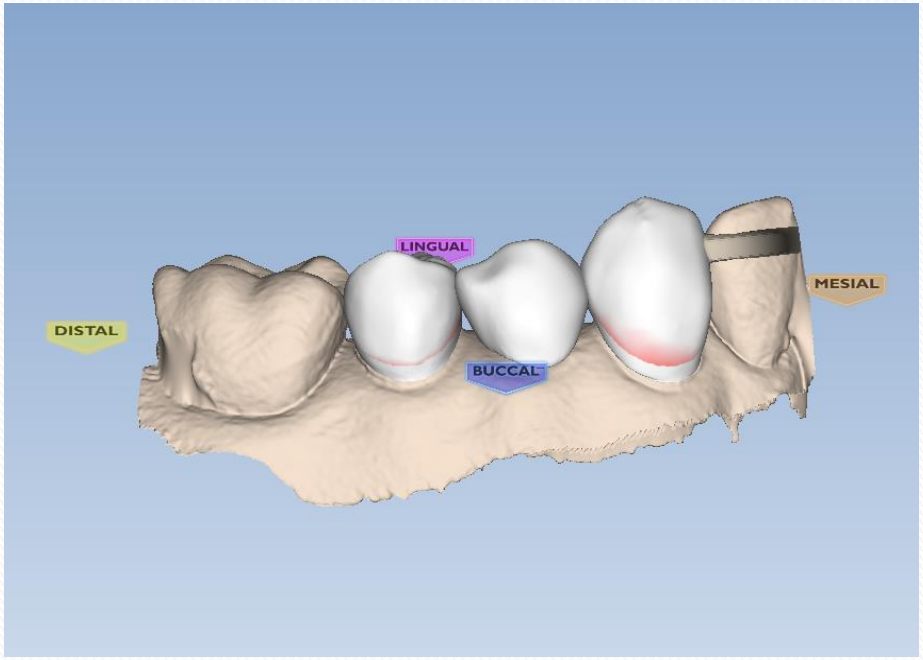




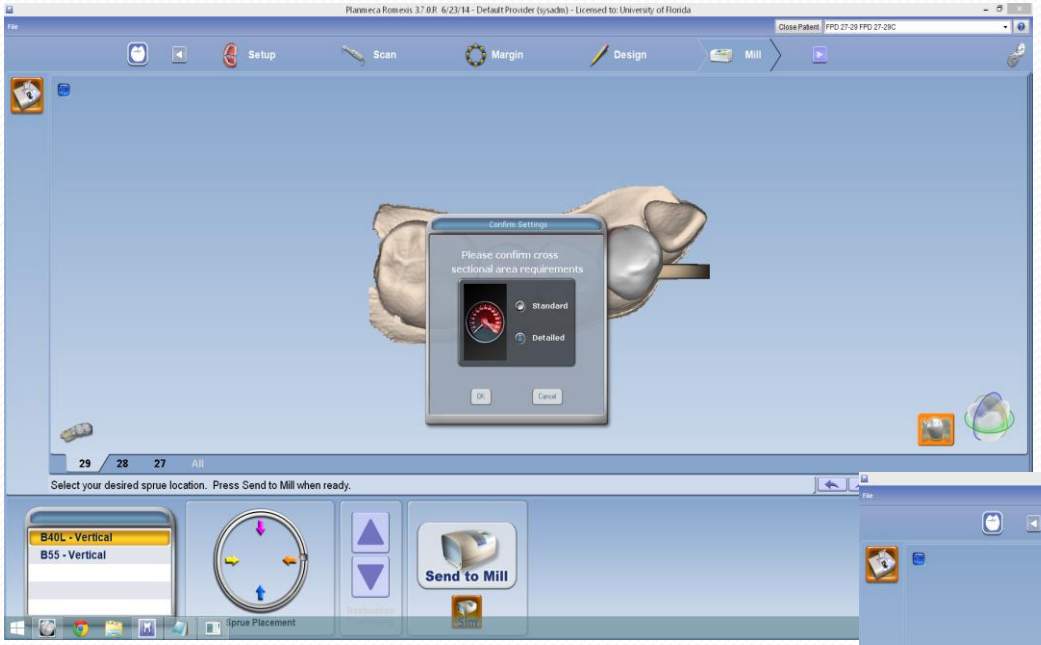
Final evaluation prior to moving to the milling tab.

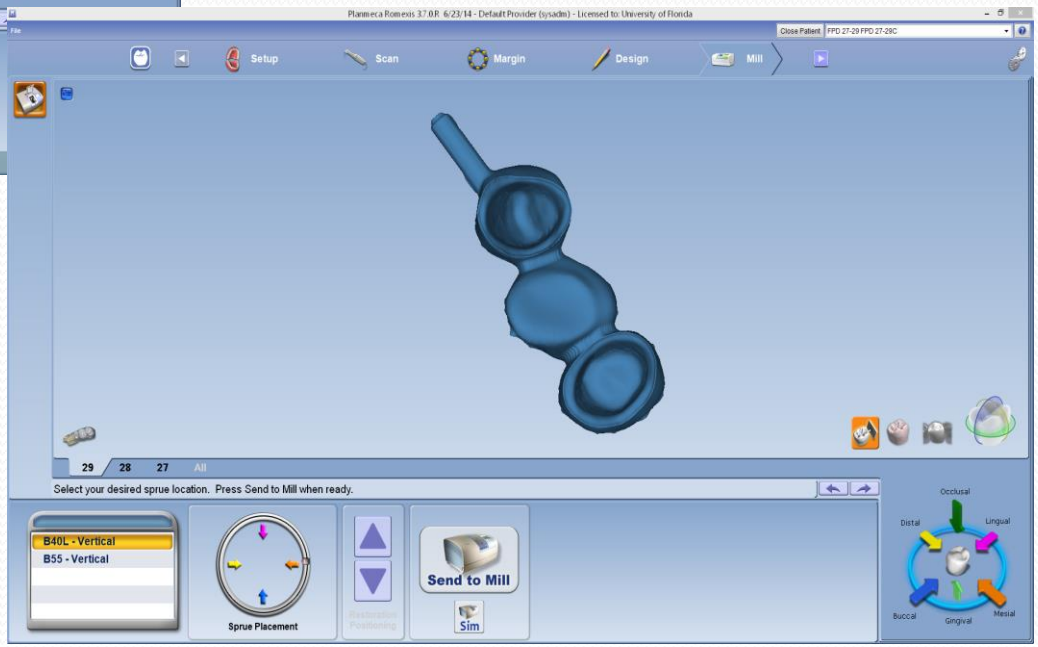
Milling



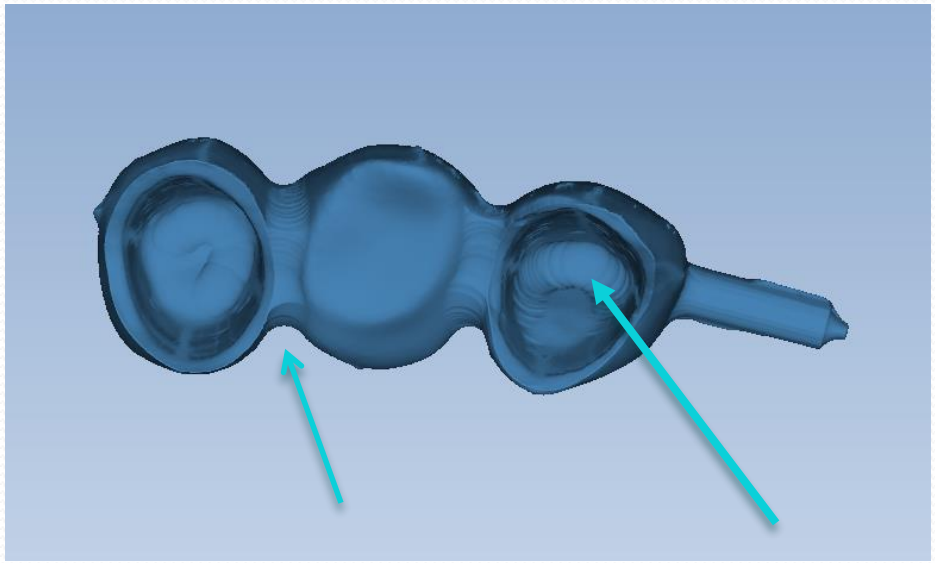


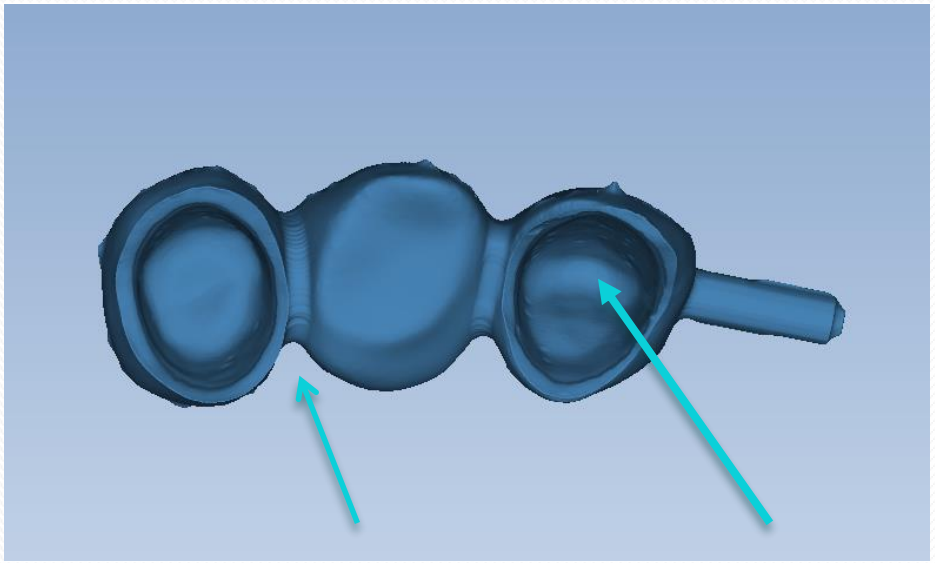
Red areas at the margins indicate thin material.



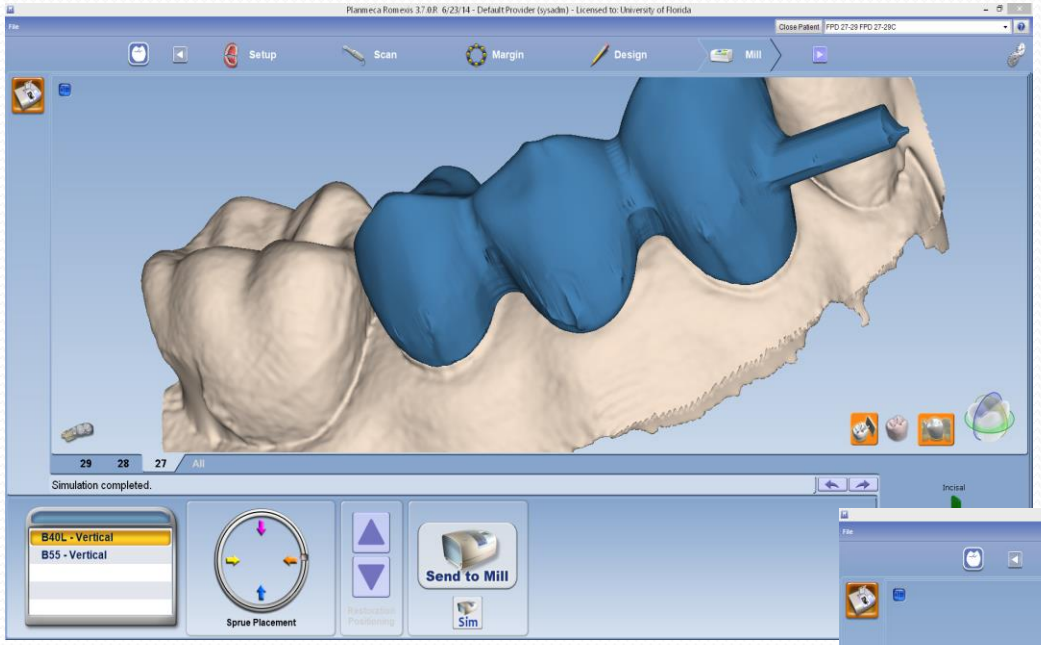


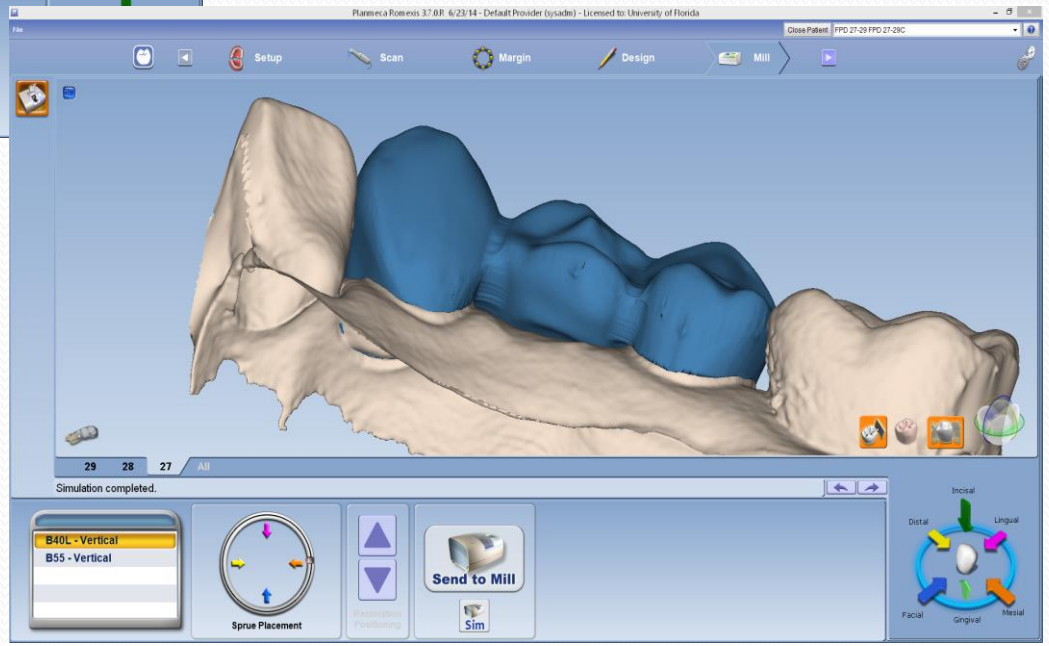
Milling simulation mode.



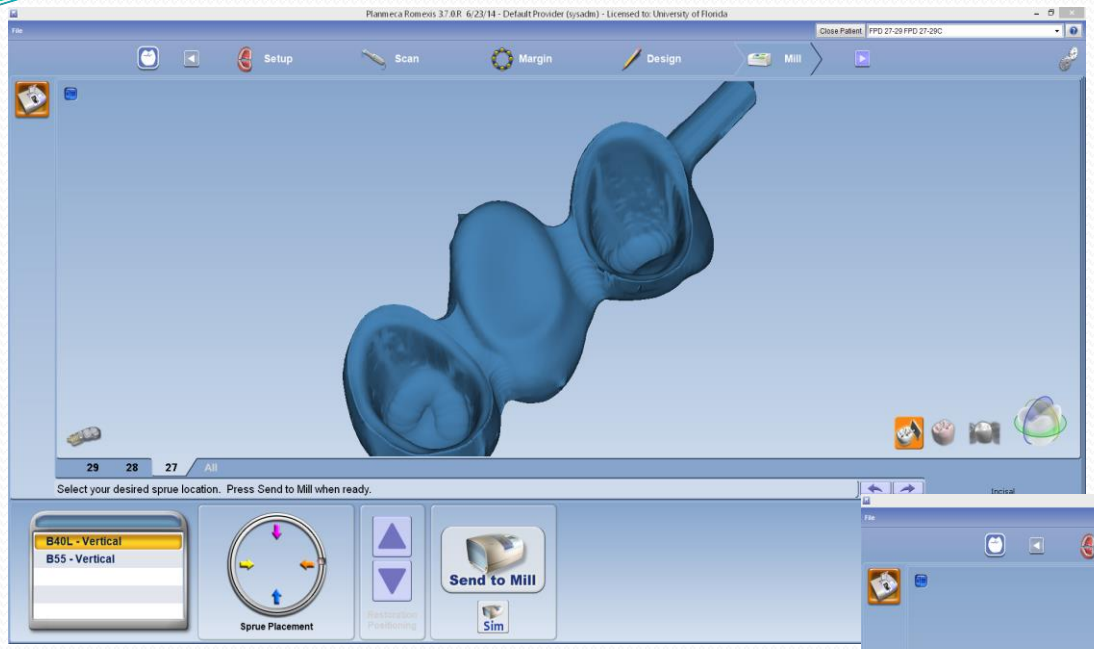


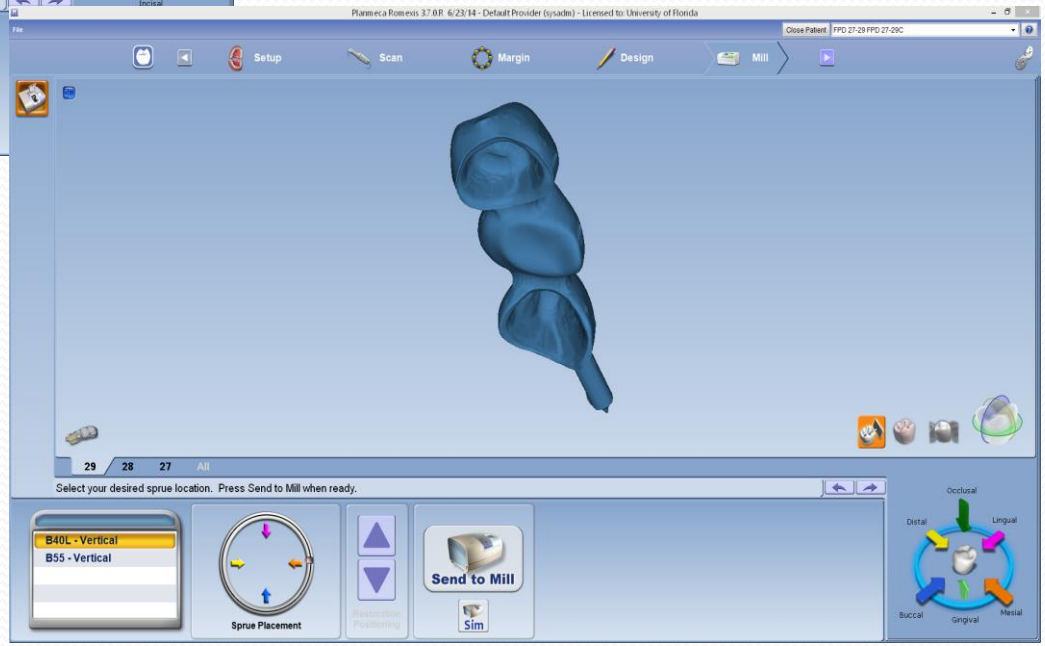
- Simulated milling in **Standard Mode**. Notice the connector thickness.
- Simulated milling in **Detailed Mode**.



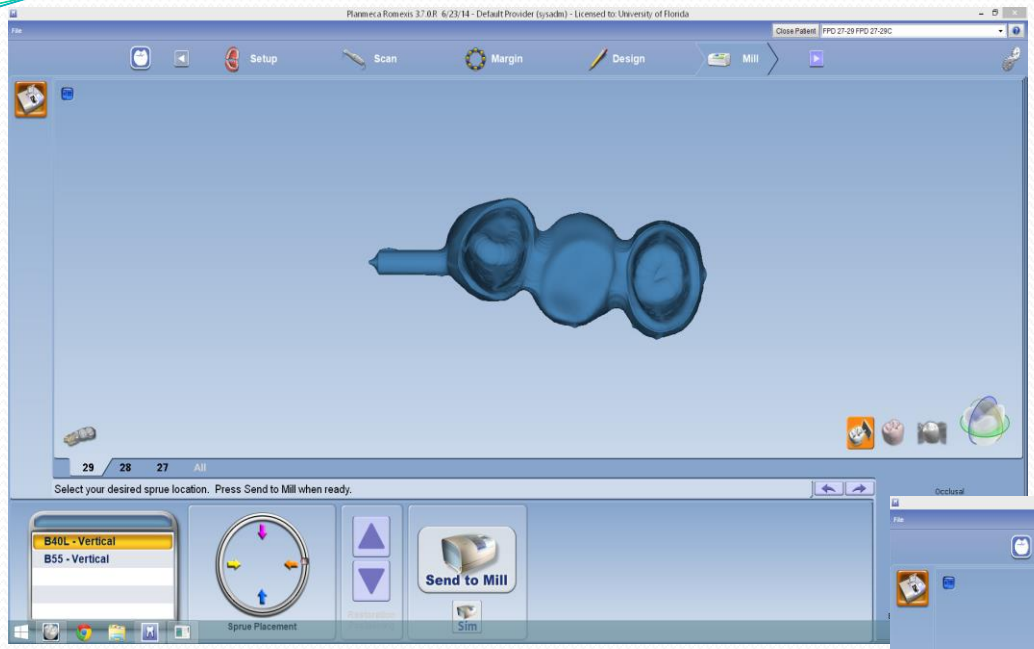


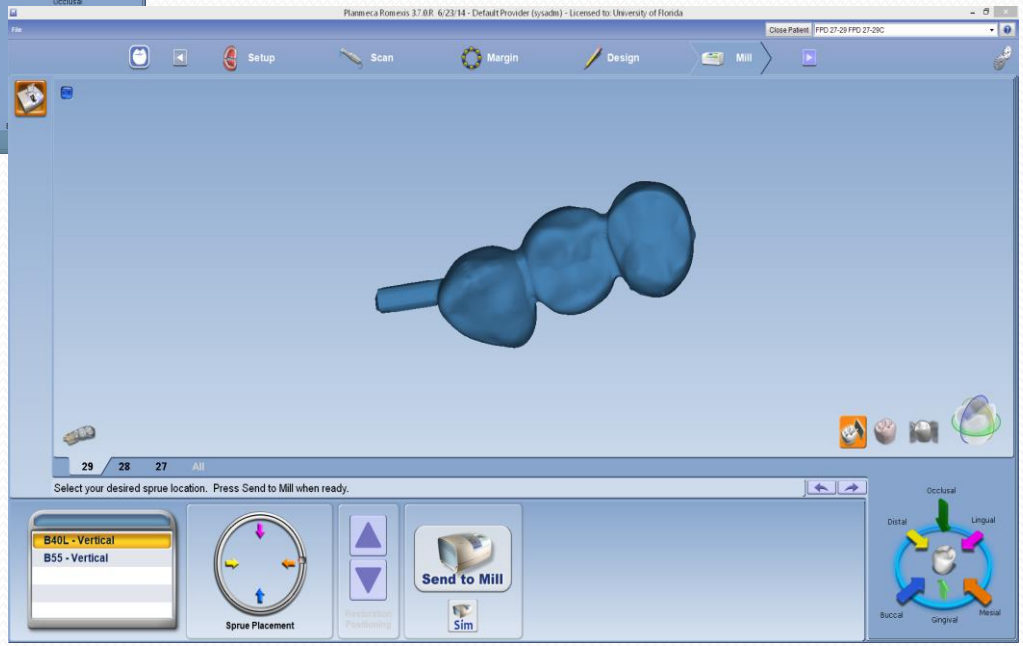
Buccal and lingual views of the restoration.

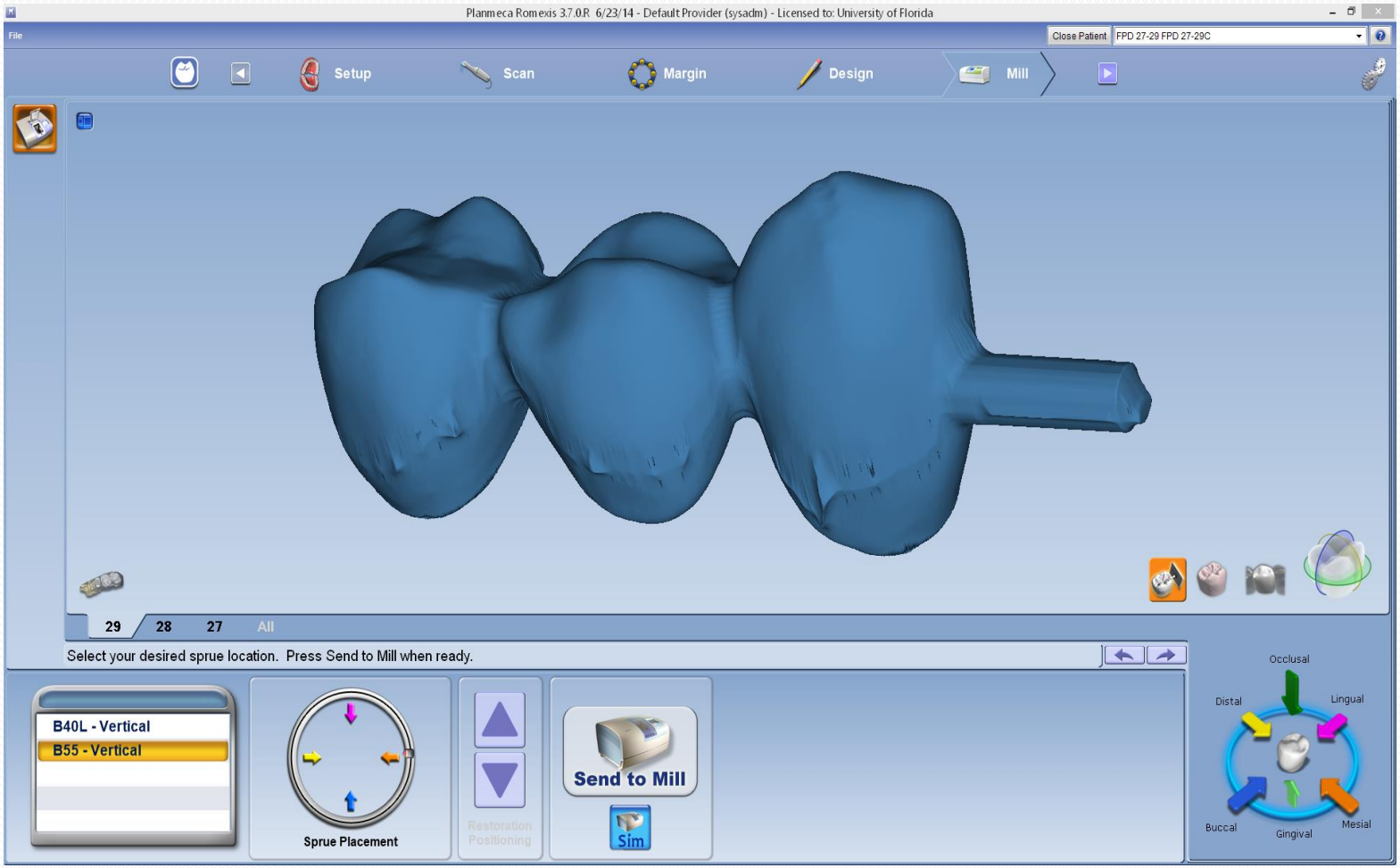




You have the choice of two block sizes:
B40L: Smaller block
B55: Larger block


Planmeca Romexis 3.7.0.R 6/23/14 - Default Provider (sysadm) - Licensed to: University of Florida
Setup
Scan
Margin
Design
Mill
29
28
27
All
Select your desired sprue location. Press Send to Mill when ready.
B40L - Vertical
B55 - Vertical
Sprue Placement
Send to Mill
Sim

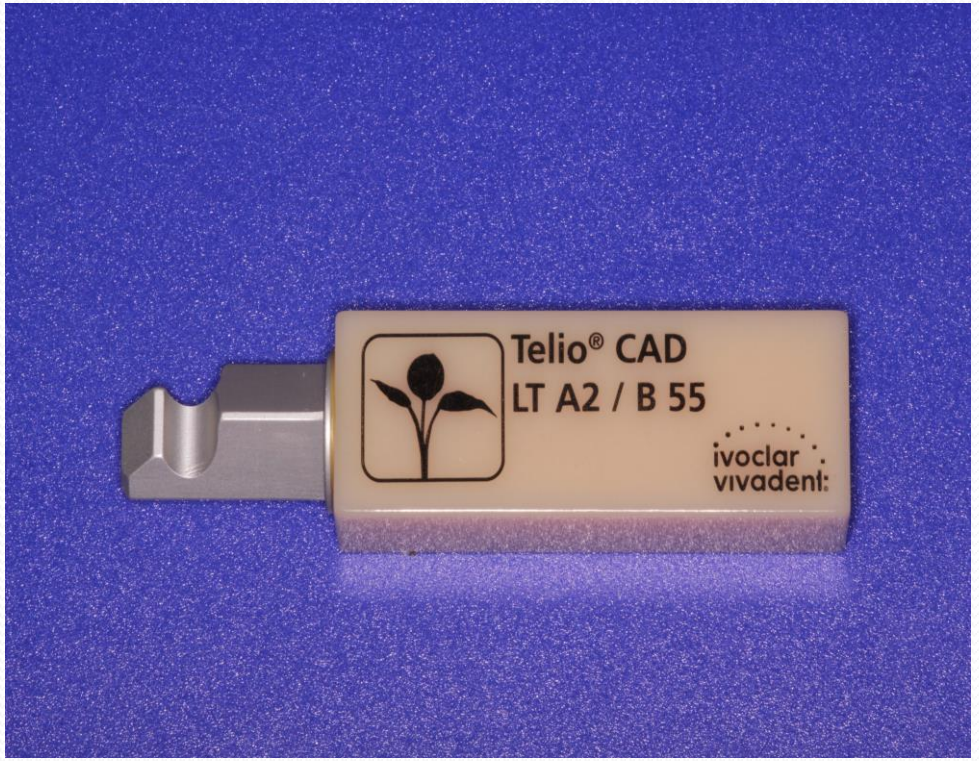

Planmeca Romexis 3.7.0.R 6/23/14 - Default Provider (sysadm) - Licensed to: University of Florida
Setup
Scan
Margin
Design
Mill
29
28
27
All
Select your desired sprue location. Press Send to Mill when ready.
B40L - Vertical
B55 - Vertical
Sprue Placement
Send to Mill
Sim
Occlusal
Distal
Lingual
Buccal
Gingival
Mesial

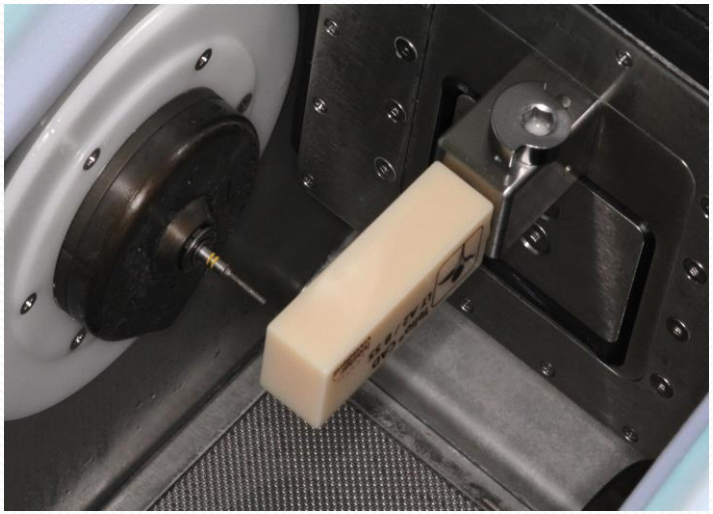


Final review prior to milling.

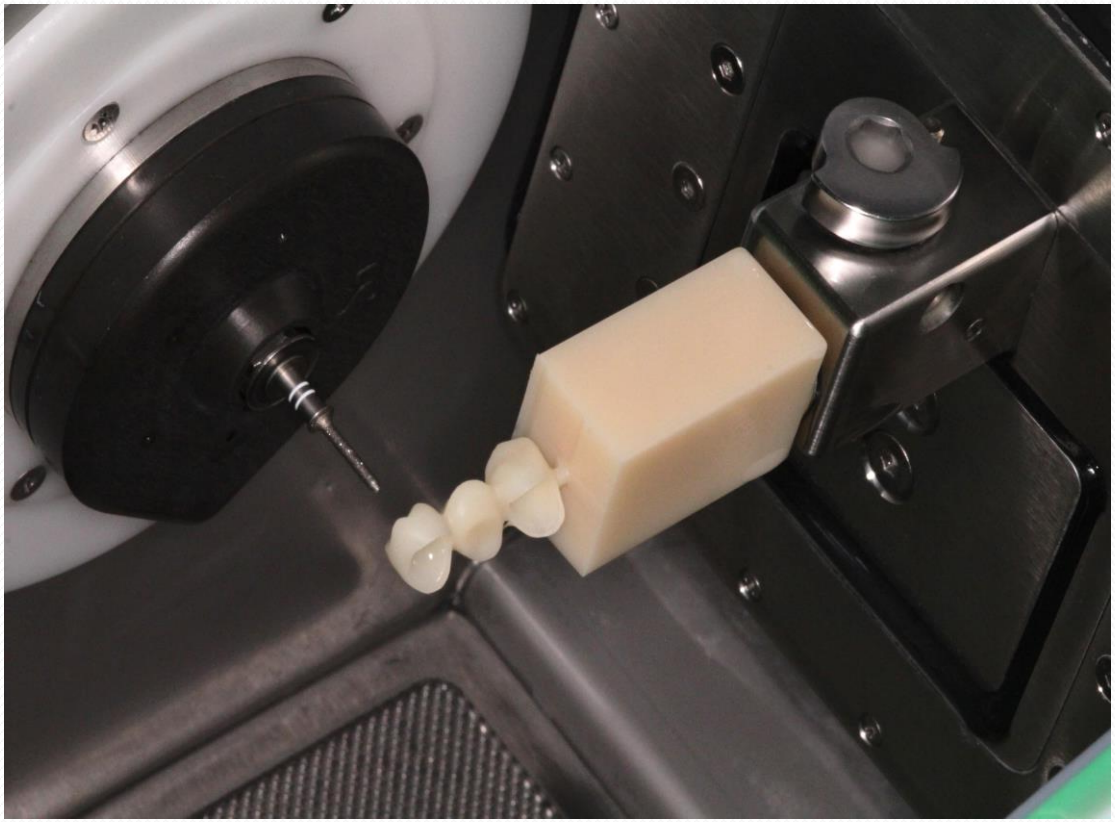
Milling the restoration

Milling job details on the window screen.

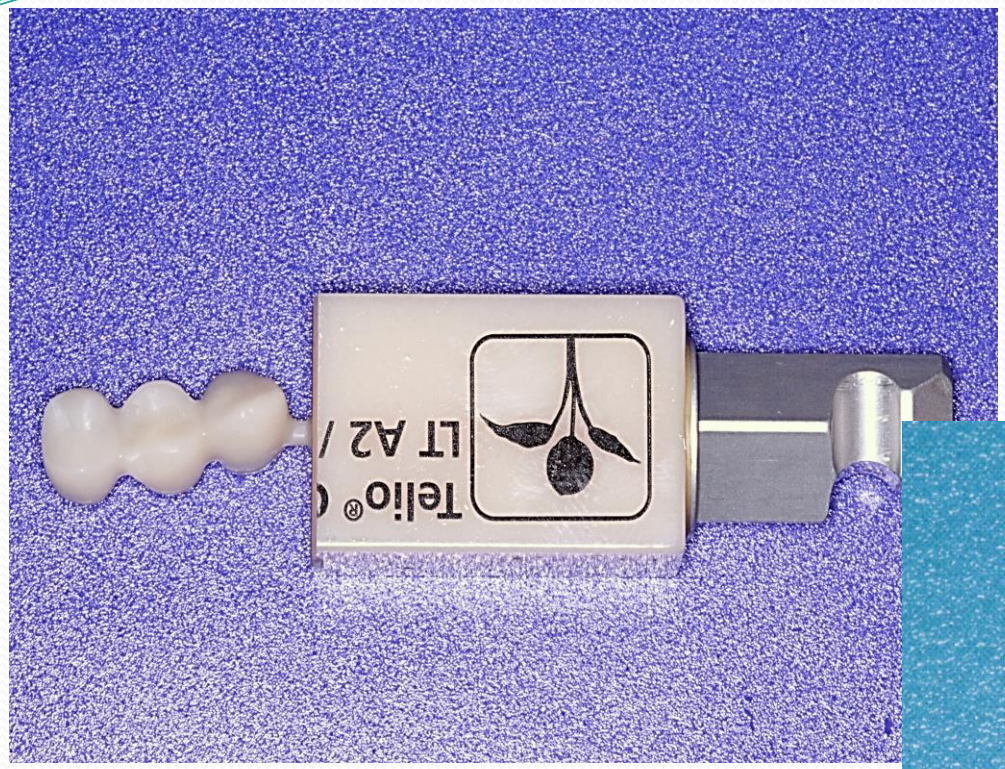




Inserting the block in a vertical position.



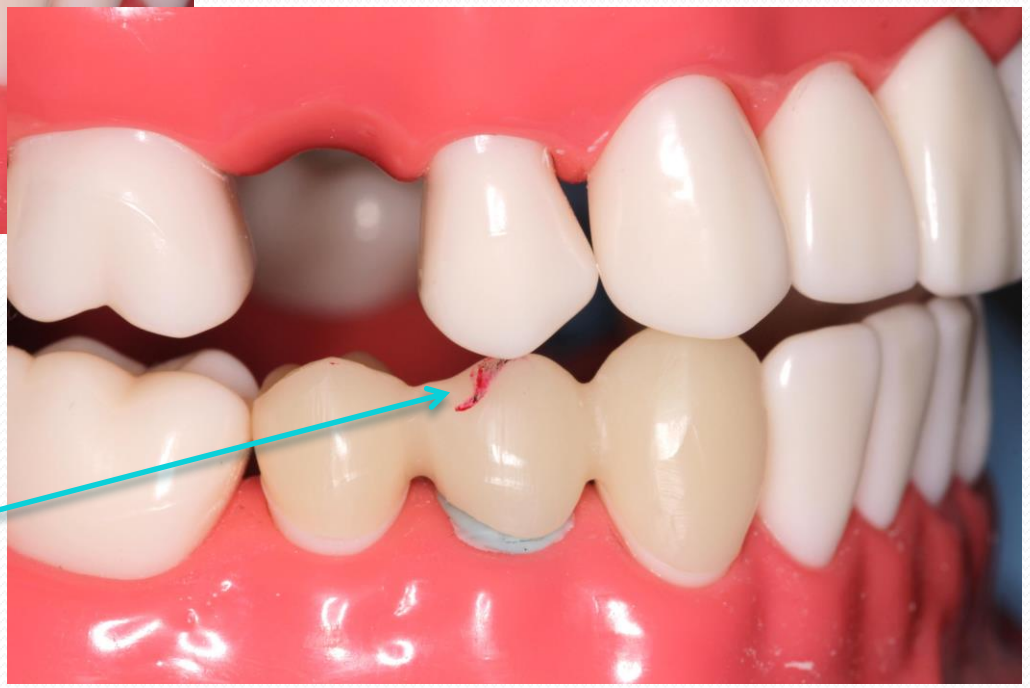
Freshly milled restoration.


Telio® c
LT A2 /

Notice that the incisal edge of the canine is too high. The contralateral canine was not scanned, so it was not represented on the working model for comparison. Designing the canine with a slightly taller incisal edge will allow for adjustments on the model to establish canine guidance.

Verifying centric occlusion. Adjust heavy centric occlusion contacts.

Adjust the incisal edge to be similar (mirror image) to the other side.



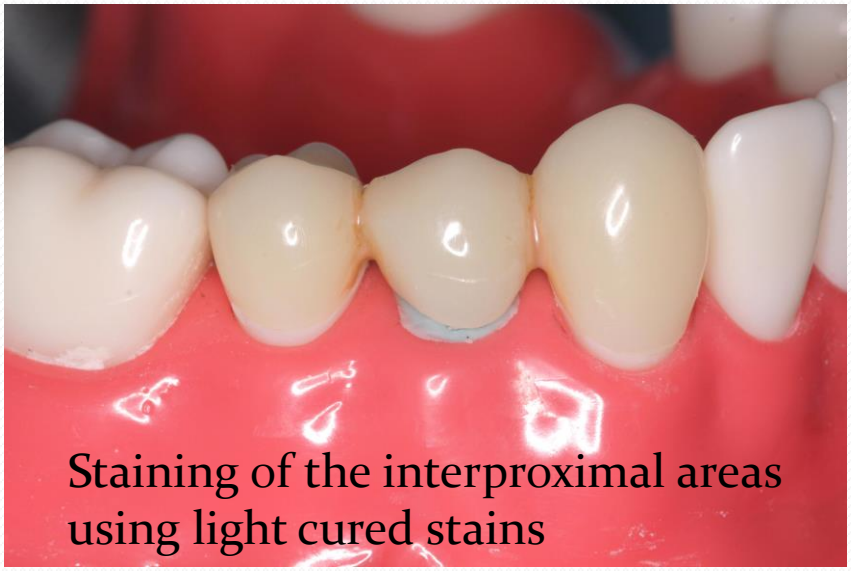
Evaluate canine guidance. An articulating paper can identify the working contacts on the premolars.

Final occlusal adjustment, canine guidance established.




Polishing the restoration using pumice and acriluster.

Final polish



Staining of the interproximal areas using light cured stains

Final staining and polish.
Final occlusion and fit verification.

Conclusions

- Using the E4D system, the Telio CAD blocks are capable of producing well fitting long term provisional restorations that are easily adjustable, can be polished to high luster and accepts surface staining and characterization.