



Digital Denture Design in 3Shape For Printed or Milled Dentures



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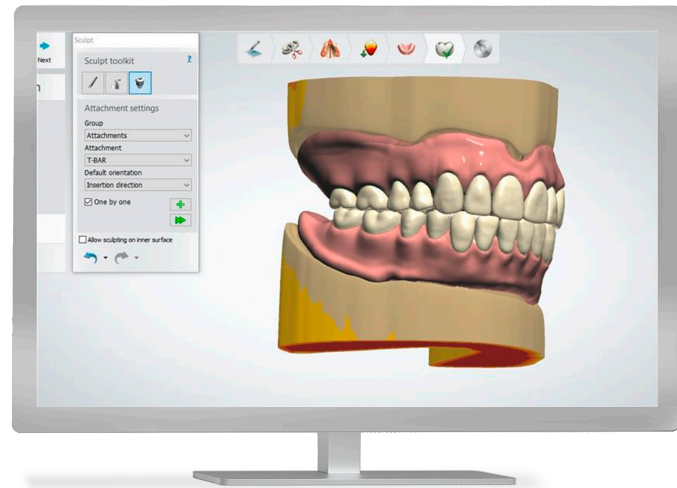
Introduction

The purpose of this guide is to assist the denture designer in using Dentsply Sirona tooth libraries and denture base materials in the 3Shape design software. This section is not intended to replace in-depth training provided by a 3Shape reseller.

The 3Shape Dental System enables denture design and output through printing or milling.

Denture Tooth Library	Dentsply Sirona Materials		
DS Digital Genios®	<ul style="list-style-type: none"> DS Multilayer PMMA Disc (Milling) Lucitone Digital Value (Printing) 	Mill	Print
DS Digital Portrait®	<ul style="list-style-type: none"> DS Multilayer PMMA Disc (Milling) Lucitone Digital Value (Printing) 	Mill	Print
DS IPN 3D™ Portrait Inspired	<ul style="list-style-type: none"> IPN 3D denture teeth 	Carded	

1.0 Access to Digital Genios and Digital Portrait Tooth Libraries



Libraries are dongle encrypted. To obtain access:

- Contact your Dentsply Sirona sales representative and provide your 3Shape dongle number.
- Dentsply Sirona sales representative will review associated fees and coordinate activation.
- Once activated, download the libraries from the 3Shape Download Center and perform a dongle update.

IPN 3D

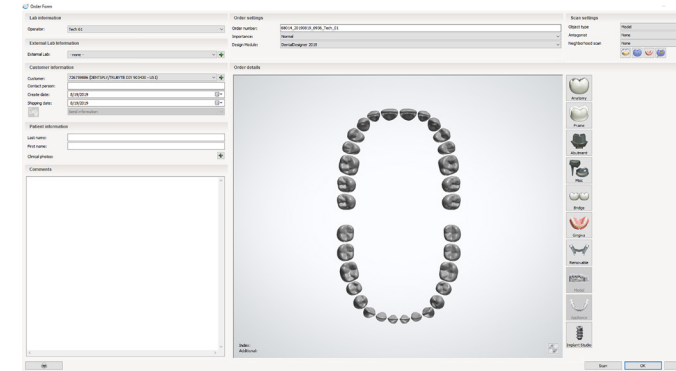
- No dongle activation required.
- Download the library from the 3Shape Download Center, then perform a dongle update

TECHNICAL RECOMMENDATION: DME Design Thickness and Space Settings

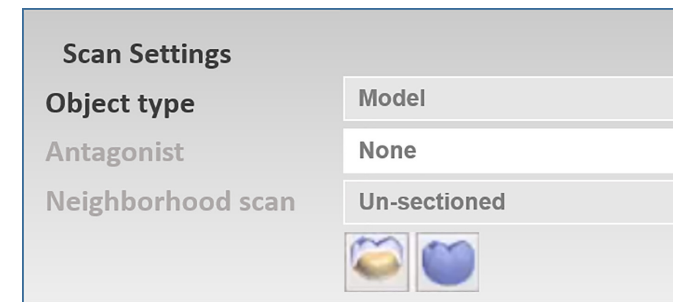
Material DME files default settings:

- Fuse space: 0.17mm - for printed, milled or IPN 3D carded teeth.
- **DO NOT** change Fuse space default setting. Modifying this default setting could compromise tooth fit in the pocket.
- Upper arch minimum denture base thickness: 2.5mm (Manual adjustment required)
- Lower arch minimum denture base thickness: 3.5mm (Manual adjustment required)

2.0 3Shape Dental System Order Form



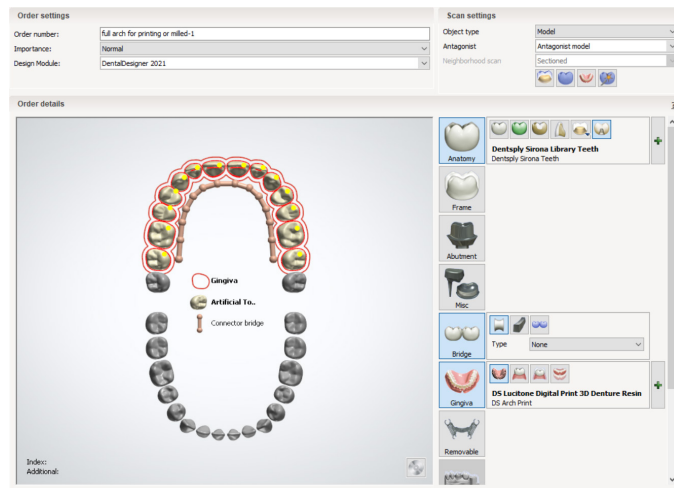
2.1 Set up and order form for the patient case



2.2

In the upper right-hand corner, under Scan Settings, select the object type to be scanned:

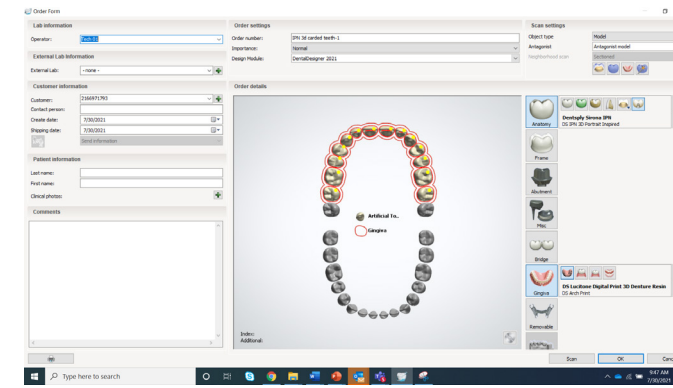
- Model
- Impression
- Digital impression



2.3a Bridge Full Arch: Printed or Milled Teeth

Please ensure your selections match the images below.

- | | |
|------------------------|-------------------------------|
| Material: | Dentsply Sirona Library Teeth |
| Color: | Any color |
| Type: | Dentsply Sirona Teeth |
| Manufacturer: | 216697 |
| Manufacturing process: | Printing/Milling |
- | | |
|------------------------|--------------------------------|
| Material: | Digital Print 3D Denture Resin |
| Color: | Any color |
| Type: | DS Arch Print |
| Manufacturer: | Dentsply Sirona |
| Manufacturing process: | Printing |
- Select all teeth for a full arch.



2.3c IPN 3D: Carded Teeth

Please ensure your selections match the images below.

- | | |
|------------------------|-----------------------------|
| Material: | Dentsply Sirona IPN |
| Color: | Any color |
| Type: | DS IPN 3D Portrait Inspired |
| Manufacturer: | Dentsply Sirona |
| Manufacturing process: | Premanufactured Teeth |
- | | |
|------------------------|--------------------------------|
| Material: | Digital Print 3D Denture Resin |
| Color: | Any color |
| Type: | DS Print |
| Manufacturer: | Dentsply Sirona |
| Manufacturing process: | Printing |

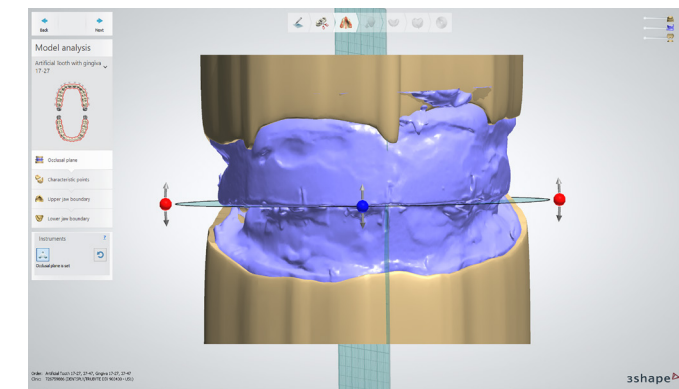


2.3b Bridge Tooth Segments: Printed or Milled Teeth

Please ensure your selections match the images below.

- | | |
|------------------------|-------------------------------|
| Material: | Dentsply Sirona Library Teeth |
| Color: | Any color |
| Type: | Dentsply Sirona Teeth |
| Manufacturer: | 216697 |
| Manufacturing process: | Printing/Milling |
- | | |
|------------------------|--------------------------------|
| Material: | Digital Print 3D Denture Resin |
| Color: | Any color |
| Type: | DS Arch Print |
| Manufacturer: | Dentsply Sirona |
| Manufacturing process: | Printing |
- Select quadrants of teeth for segments.

3.0 Scan



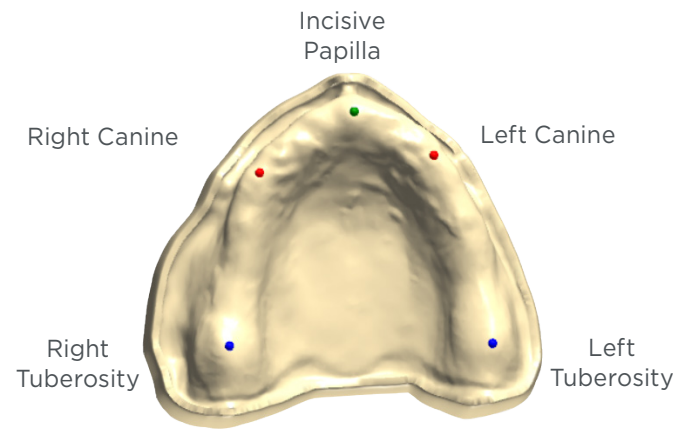
3.1 Define the occlusal plane

Place three control points by following the line between the maxillary and mandibular rims. The second point defines the anterior tooth placement.

The tilt and angulation of the occlusal plane follows the bite rim or records provided by the clinician.

- A three-point alignment to connect bite rim scan to the model scan.

4.0 Model Analysis

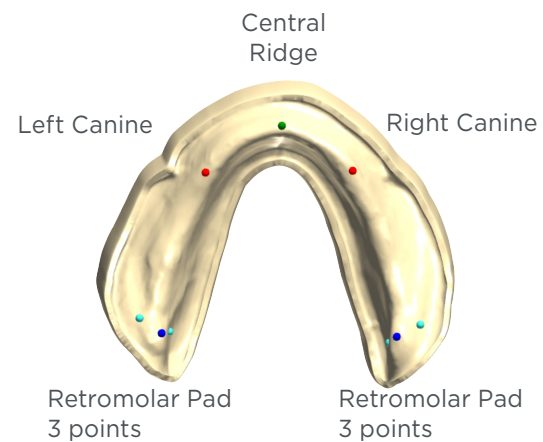


4.1 Mark the landmarks for the maxillary arch

1. Right Tuberosity
2. Incisive Papilla
3. Left Tuberosity
4. Right Canine
5. Left Canine

NOTE: If the bite rim does not indicate the canine placement:

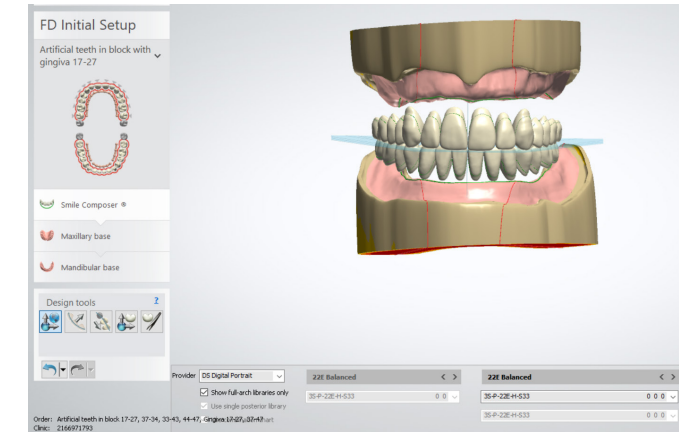
- Approximate the position slightly anterior to the buccal frenum
- Place the marks approximately 4mm back from incisive papilla
- Measure from the central mark on the wax rims
- Place in relationship to the most prominent rugae
- It is not necessary to be exact. The software allows for general area placement of landmarks.



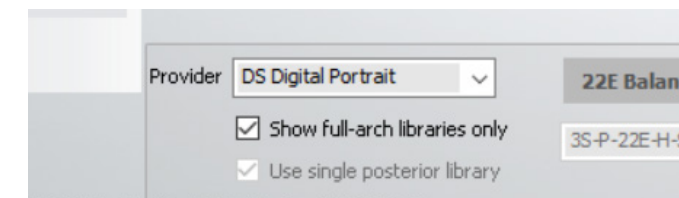
4.2 Mark the landmarks for the mandibular arch

- Retromolar pad (3 points: central, buccal, and lingual)
- Central ridge
- Second retromolar (3 points: central, buccal, and lingual)
- Right canine
- Left canine

5.0 Smile Composer



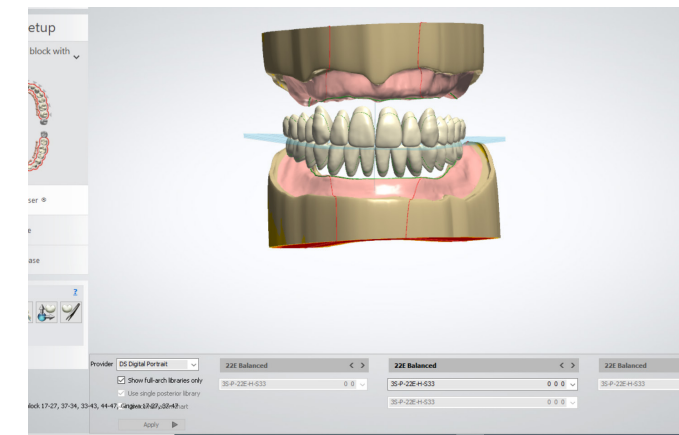
Follow these steps when using DS DIGITAL GENIOS or DS DIGITAL PORTRAIT libraries.



5.1a Select Provider:

DS DIGITAL GENIOS or DS DIGITAL PORTRAIT

5.1b Select: Show Full Arch Libraries Only



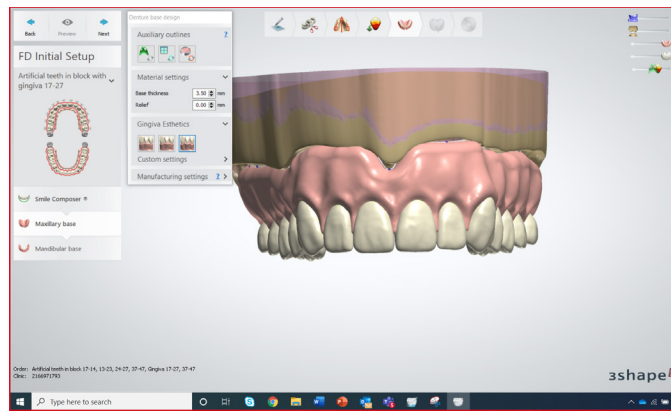
5.2 Select: Anterior Mould and Occlusion

11H Balanced			
3S-P-11H-S-332	50.5	9.35	0
3S-P-11H-S-332	50.5	9.35	0
3S-P-11H-S-32M	50.5	9.35	0
3S-P-11H-S-334	50.5	9.35	0
3S-P-11H-S-34M	50.5	9.35	0

5.3 Select: Anterior Posterior Combination:

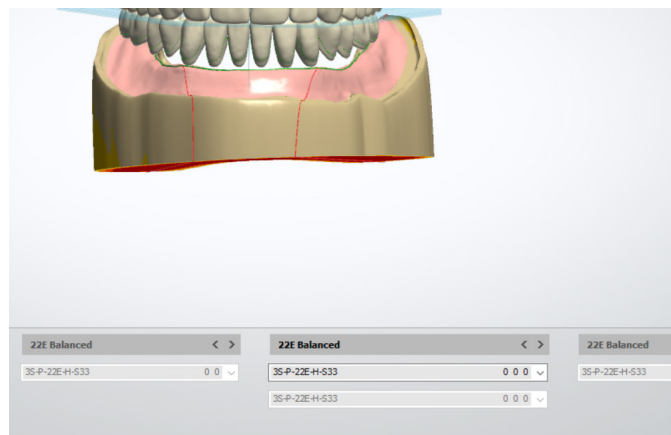
In the previous step, the Maxillary Anterior Mould Form was selected. Following that Maxillary Anterior mould form, choose which Posterior teeth you want for the denture design.

6.0 Anatomy Design



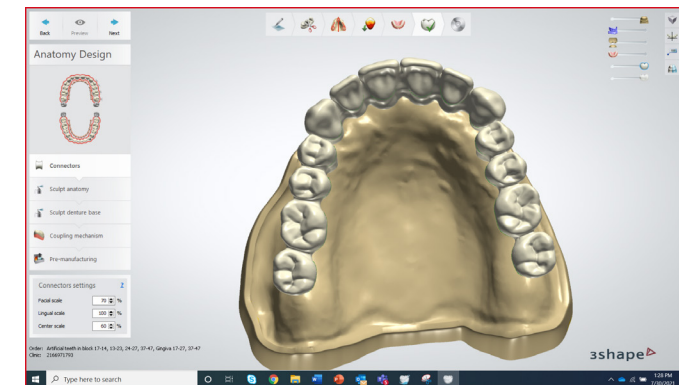
5.4 Gingiva Esthetics

Select Delicate, Natural, or Intense.



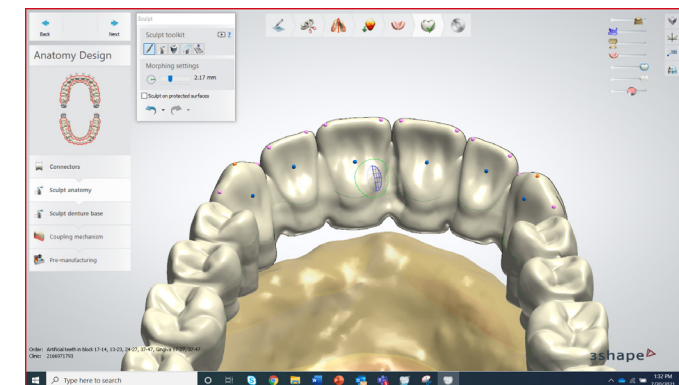
5.5: Review

Review to verify that all of your selections are correct.



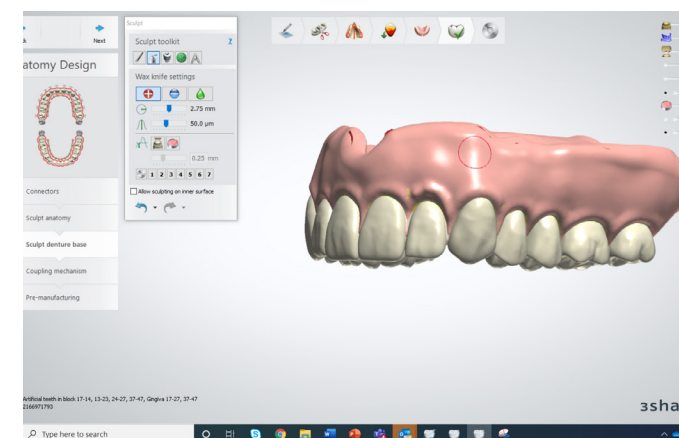
6.1 Connectors

Adjust connectors as necessary



6.2 Sculpt tooth anatomy

Sculpt/resize/adjust teeth as necessary



6.3 Sculpt denture base anatomy

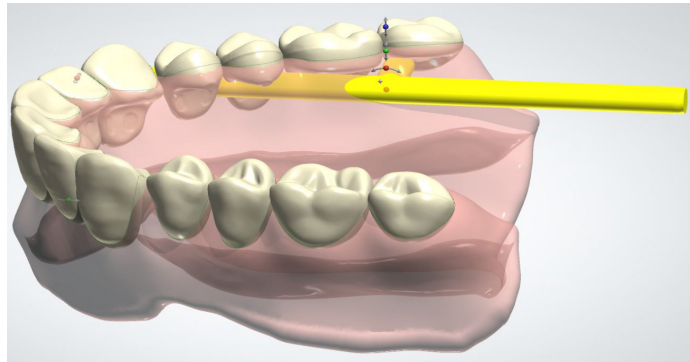
Sculpt denture base anatomy as necessary.

IMPORTANT: Denture Base Support

Please follow the steps in section 6.4 to add the necessary support structures to the denture base.

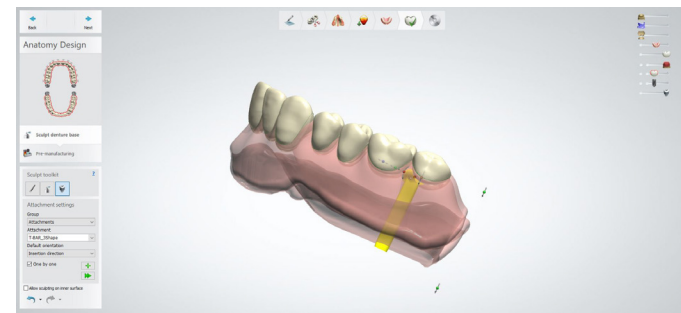
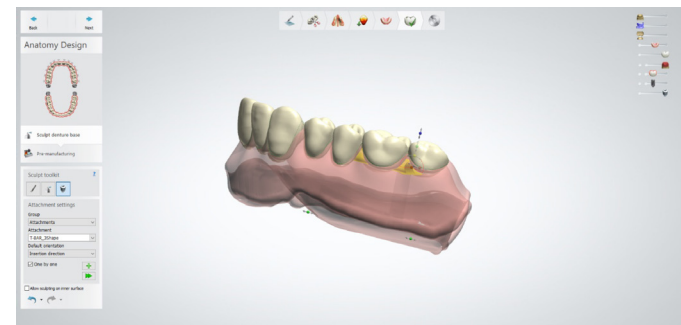
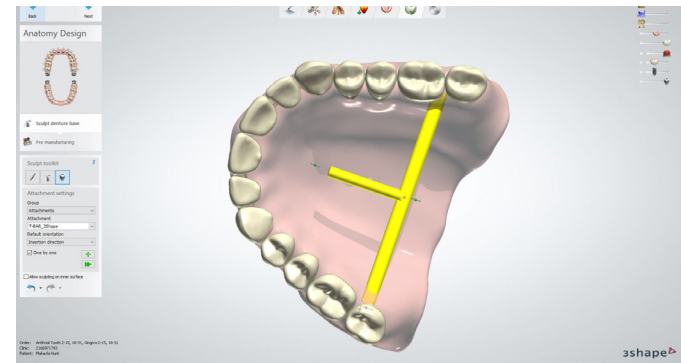
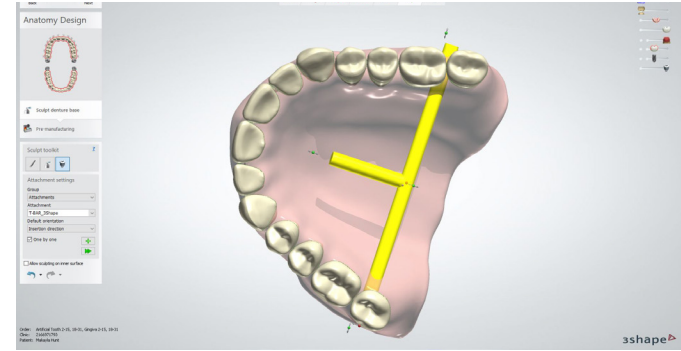
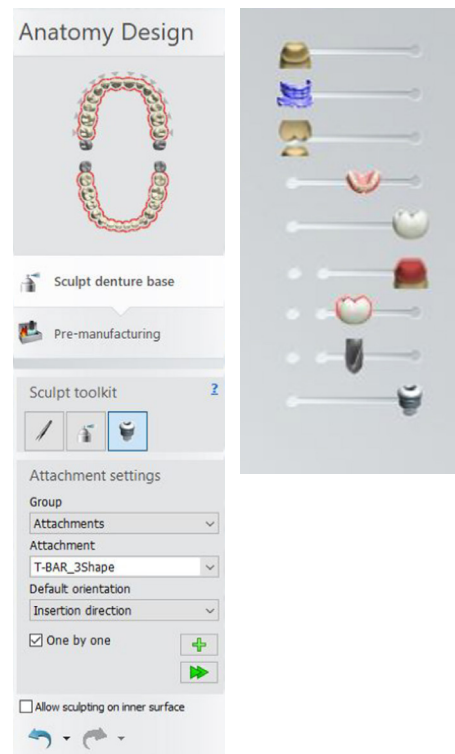
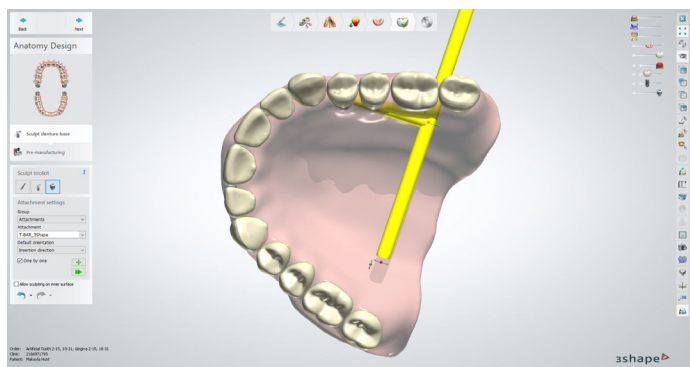
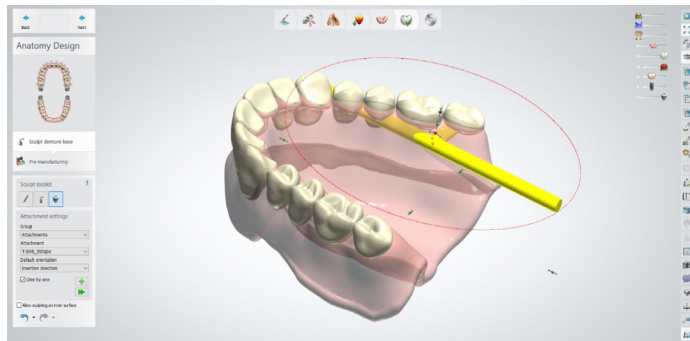
6.4 Adding the 3Shape T-bar

After adding/removing material using the max knife settings for the upper bar.

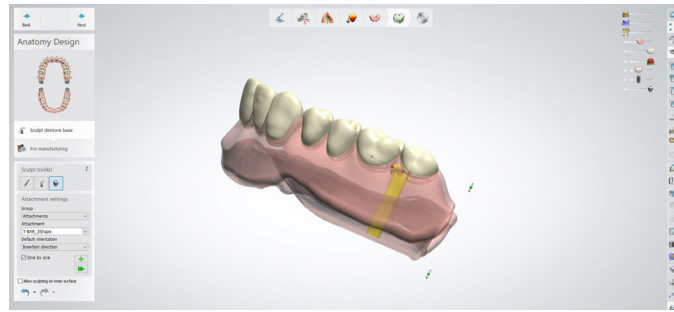


6.4a Maxillary Arch Bar Supports

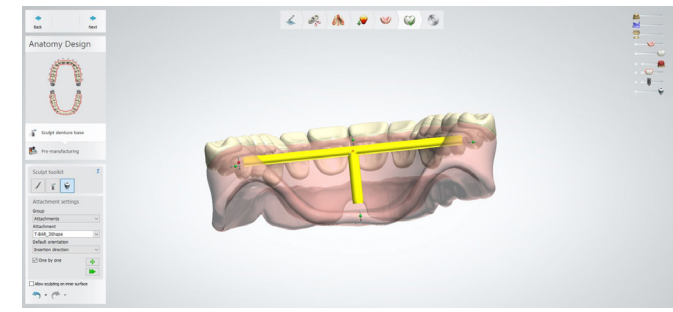
1. Under the "Sculpt Toolkit," select "Attachment"
2. The "Attachment Settings" should be as follows:
 - a. Group > Attachments
 - b. Attachment > T-BAR_3Shape
 - c. Default orientation > View direction
3. Hide the "Preparation" block.
4. Make the "Full Dentures" partially transparent.
5. Hide the "Minimum thickness (2.50mm)".
6. Rotate the denture so that the view is from the side:
 - a. Note: Right click to rotate the view of the denture.
 - b. Note: Click and hold the mouse wheel to move/center the denture base on the display screen.
7. Click to place the first bar:
 - a. This bar should be placed between the first and second molars of the denture base.
 - b. The bar should be placed **3mm below the gingival line**.
8. Click the red dot at the end of the bar to rotate the bar so that the long edge of the bar is perpendicular to the molars.



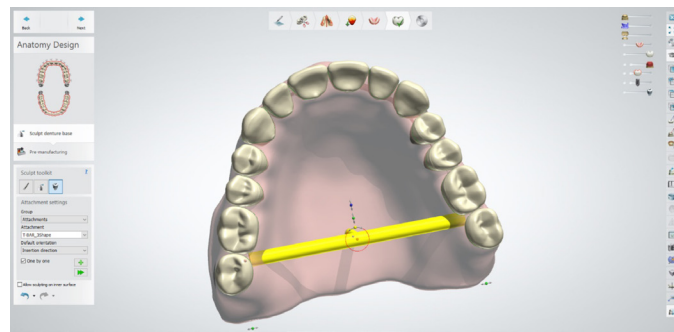
9. Use the yellow dot in the middle of the bar to move the bar to the correct location on the lingual side of the denture base.
10. Going forward with the T-bar placement, use the green dots (located at the end of the long bar):
 - a. The green dot lengthens and shortens the bar so that it spans the denture base without going all the way through to the intaglio surface.
 - i. The bar will lengthen/shorten on both sides.
 - b. Note: The yellow dot can also be used to move/center the bar at any time.
11. Use the red dot in the middle of the bar to rotate the short bar such that it is perpendicular to the surface of the denture.
12. Use the green dot to lengthen/shorten the short part of the T-bar so that the T-bar is embedded in the denture base without sticking out of the base.



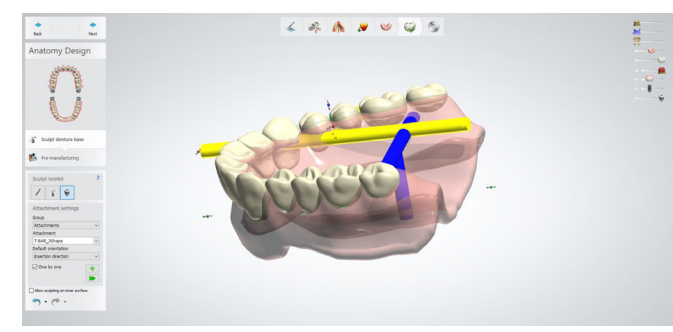
13. If the long bar is not centered between the first and second molars, click the red rotational dot (in the center of the T-bar) to straighten the bar such that the bar is horizontal from left to right on the denture.



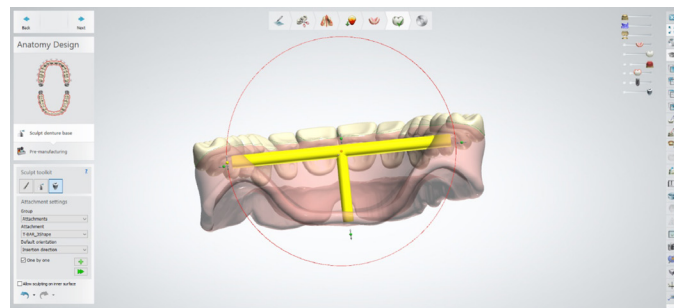
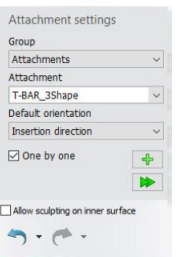
16. Once the final adjustments are made, it is time to place the second T-bar.



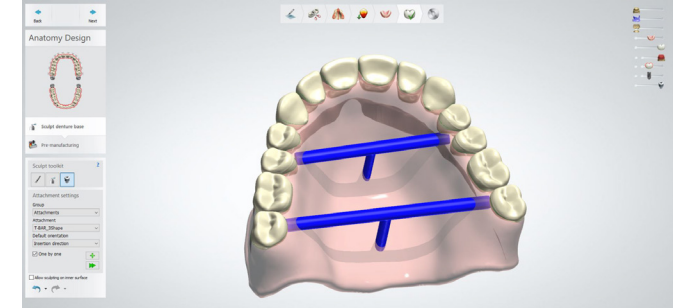
14. If the short bar is not exactly perpendicular to the denture base, click the red rotational dot (at the end of the T-bar) to straighten the bar such that the bar is vertical on the denture.



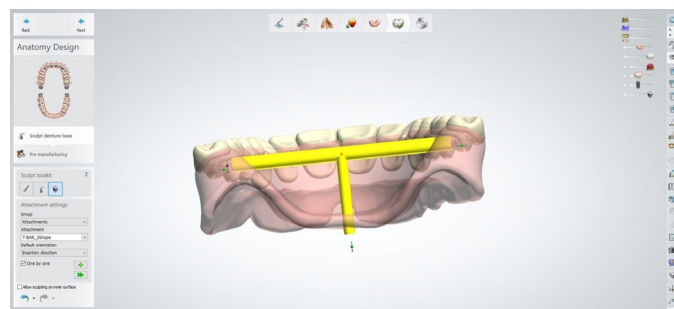
17. Rotate the denture base so that the view is from the side; press the "+" button to "Add new attachment".
18. Click to place the second T-bar.
- This bar should be placed between the first and second premolars of the denture base.
 - This bar should be placed approximately 3 mm below the gingival line.

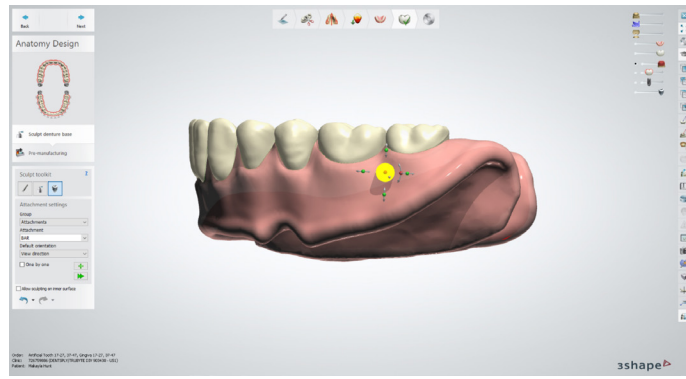


15. Finally, ensure the location of the bar is correct using the yellow dot to make any final adjustments such that:
- The long end of the T-bar is between the first and second molars of the denture base.
 - The long end of the T-bar is approximately 3 mm below the gingival line.
 - The short end of the T-bar is centered and perpendicular to the denture base.
 - Also, ensure the T-bar is fully attached to the denture base without going through the denture base – use the green dots to lengthen or shorten the bars as necessary.



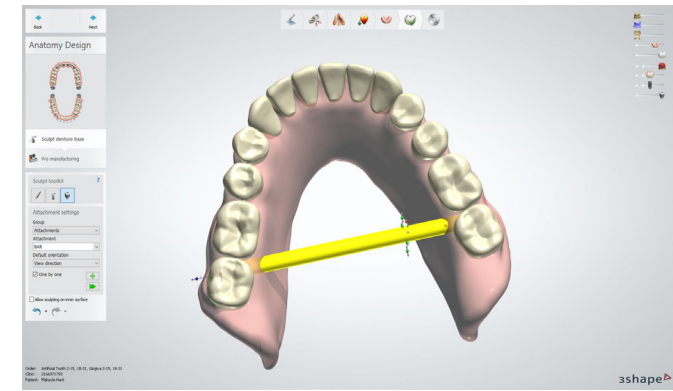
19. Follow the same procedure for the second T-bar as the first T-bar (steps 8-15). The only difference between the placement of these two bars is that the second bar is located between the first and second premolars and the first bar is located between the first and second molars.



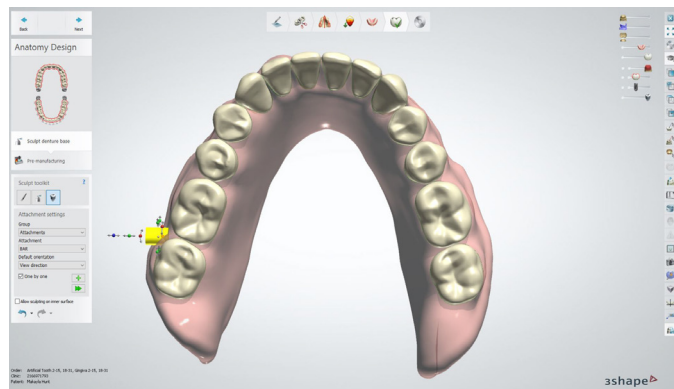


6.4b Mandibular Arch Bar Supports

- The "Attachment settings" should be as follows:
 - Group -> Attachments
 - Attachment -> Bar
 - Default orientation -> View direction
- Hide the "Preparation" block.
- Make the "Full dentures" partially transparent.
- Rotate the denture so that the view is from the side.
- Click to place the first bar on the lower denture:
 - This bar should be placed between the first and second premolars of the denture base.
 - The bar should be placed approximately 3 mm below the gingival line.

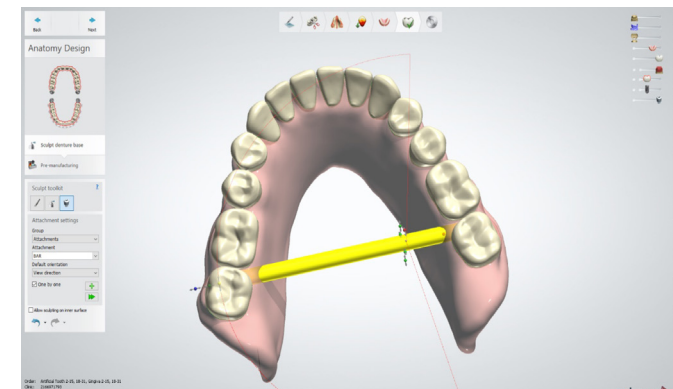


- If the bar is not straight across, click the red rotational dot (on the end of the bar next to the green and blue dots) to straighten the bar such that the bar is horizontal from left to right on the denture.



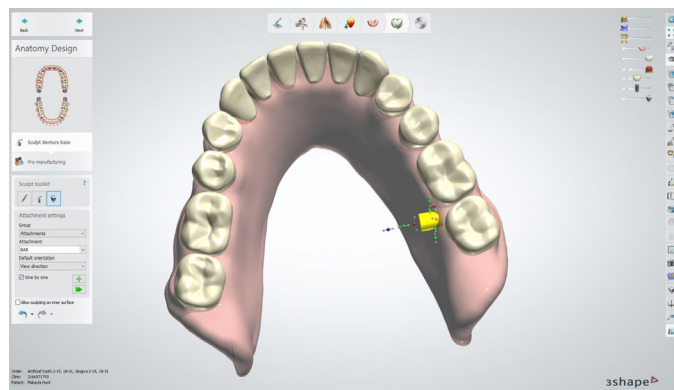
- Rotate the denture base so that the view is looking down on the cameo surface of the denture.

- Use the yellow dot in the middle of the bar to move the bar to the correct location on the lingual side of the denture base.

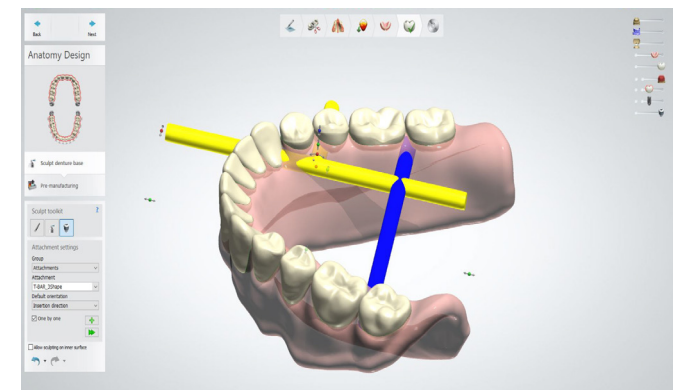


- If the bar is too close to or far away from the gingival line and/or the bar is not between the first and second molars, left click and drag the bar into the proper location.
 - Alternatively, click the yellow translational dot and move the bar to the correct location.

- Rotate the denture base so that the view is from the side.



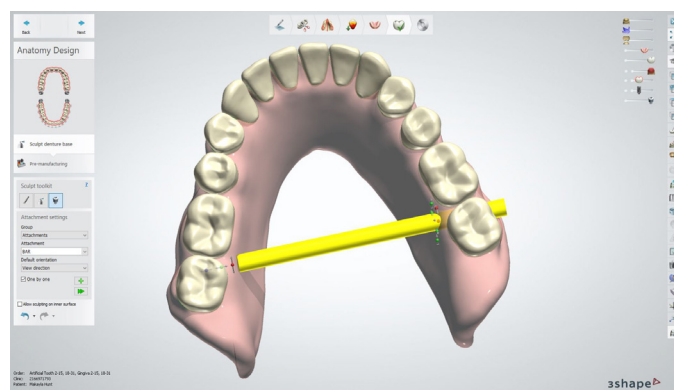
- Going forward with this bar placement, use a combination of the green and blue dots (located next to each other on the end of the bar):
 - Use the green dot to lengthen and shorten the bar so that it spans the denture base without going all the way through to the intaglio surface.
 - The bar will lengthen on both sides.



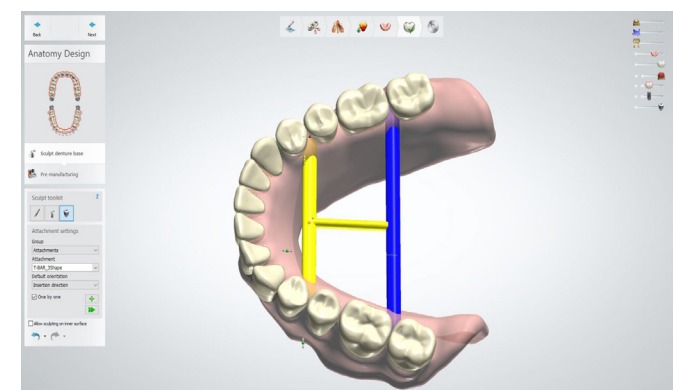
- The "Attachment settings" should be as follows:
 - Group -> Attachments
 - Attachment -> T-BAR_3Shape
 - Default orientation -> Insertion direction

- Press the "+" button to "Add new attachment".

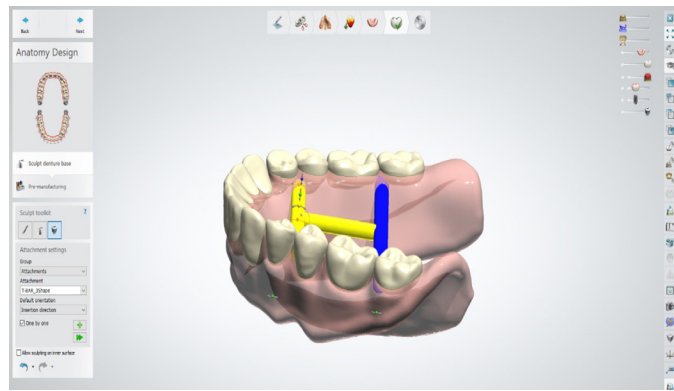
- Click to place the T-bar:
 - This bar should be placed between the first and second premolars of the denture base.
 - The bar should be placed approximately 3 mm below the gingival line.



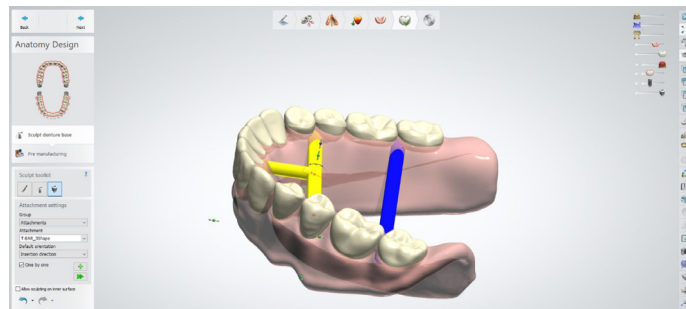
- Use the blue dot to move / center the bar.



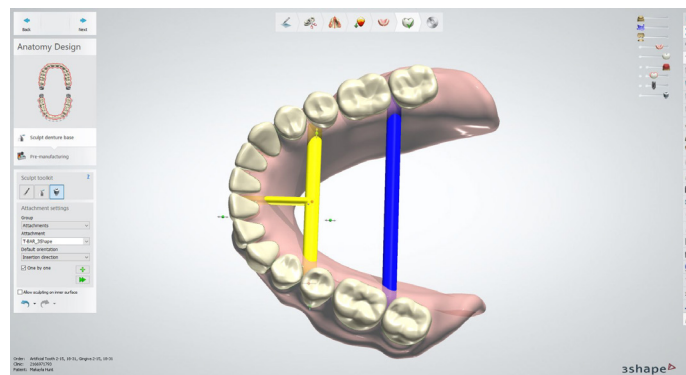
- Follow the same procedure for the third T-bar as the first T-bar (upper steps 8-10).
 - There are two differences between the placement of the third T-bar and the first T-bar.
 - The third T-bar should be placed between the first and second premolars instead of the first and second molars.
 - The placement of the short edge of the T-bar will be different as explained in the next steps.



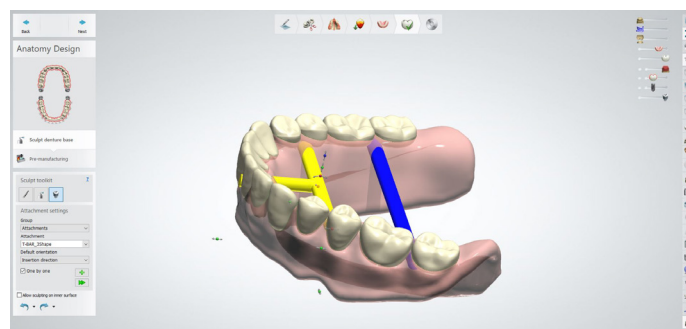
16. Use the red dot in the center of the T-bar to rotate the short edge of the T-bar such that the short edge of the T-bar is perpendicular with the anterior teeth of the lower denture.



17. Center the short edge of the bar between the centrals using the yellow dot.

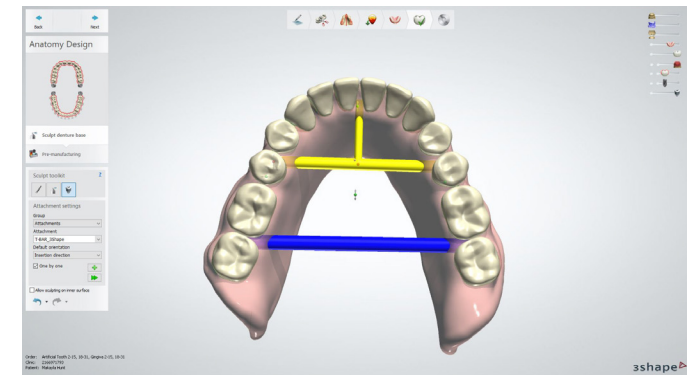


18. Use the green dot to shorten / lengthen the bar so that the T-bar is fully attached to the denture base without going through the denture base.

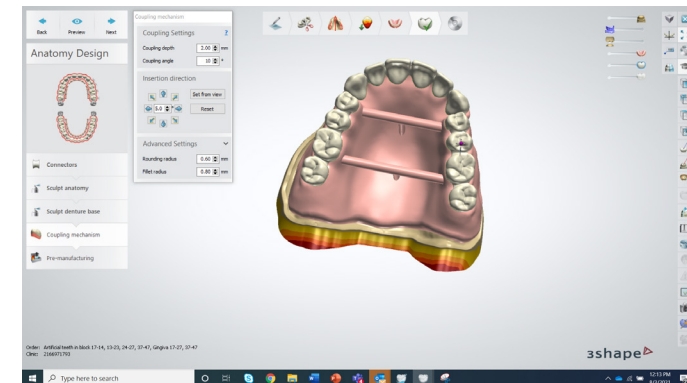


19. Finally, ensure the location of the bar is correct using the yellow dot to make any final adjustments such that:

- The long end of the T-bar is between the first and second premolars of the denture base.
- The long end of the T-bar is approximately 3 mm below the gingival line.
- The short end of the T-bar is centered and perpendicular to the denture base.

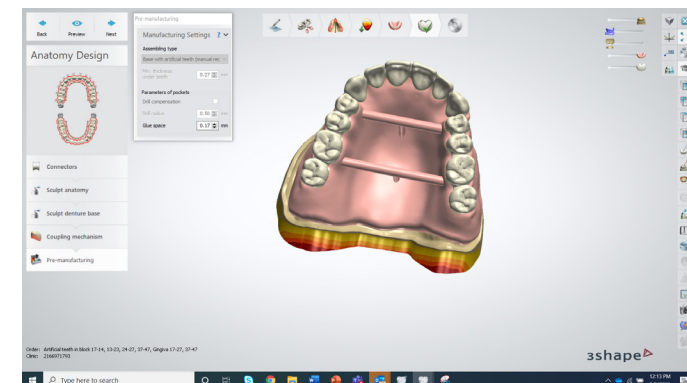


20. Click "Next".



6.5 Coupling

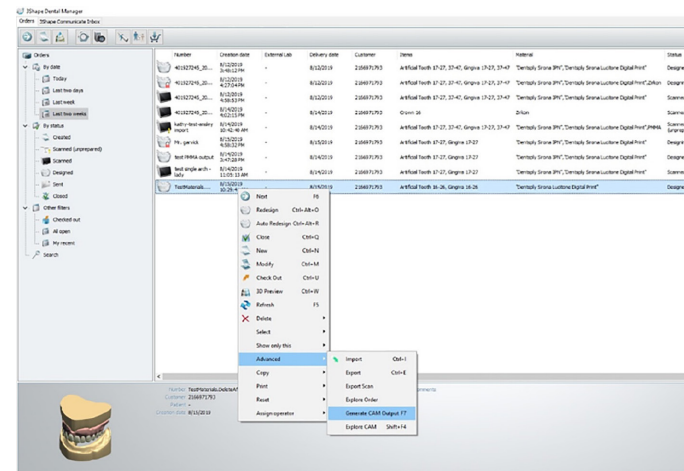
Adjust tooth and gingiva coupling as needed.



6.6 Pre-manufacturing

Ensure that the glue space is set to .17mm.

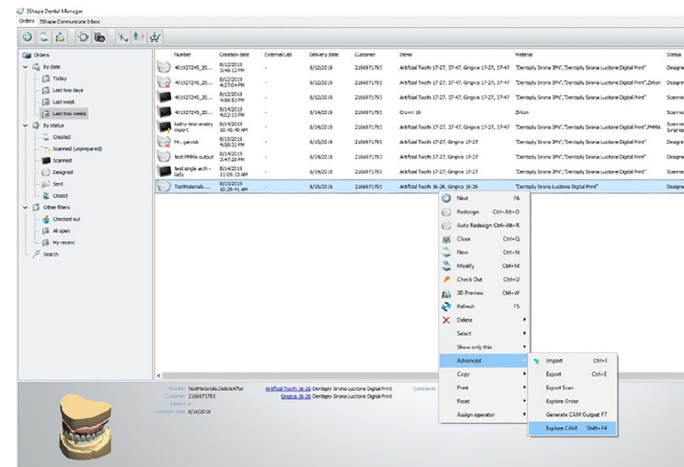
7.0 STL File Creation



7.1

When the denture design is complete, save and close.

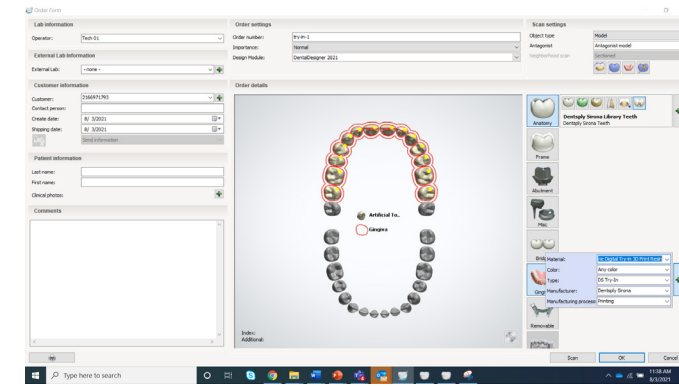
In Dental Manager choose the job you want to export, right click with the mouse. Select **Advanced**. Then choose **Generate CAM Output**.



The files will be exported to the 3Shape directory on your computer.

From this directory, the files are ready to be uploaded to a Carbon printer or CAM milling software.

8.0 Monoblock Try-In

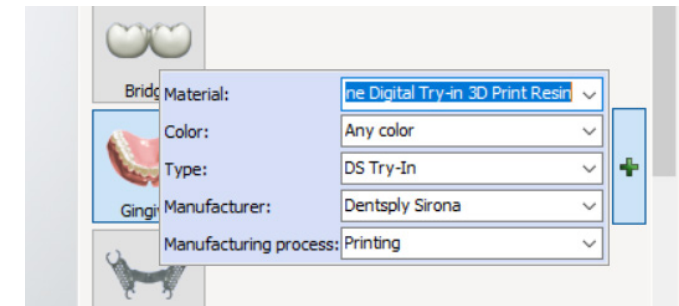


8.1

The Try-In appliance is an important element of the digital denture workflow. This permits the initial design to be placed with the patient to evaluate fit, occlusion, registration, and other aesthetic requirements. Providing feedback by the Clinician to the Designer is a critical milestone for achieving an optimal final appliance. Additionally, the Try-In is an excellent early experience for the patient to calibrate expectations on how the final appliance will appear when completed.

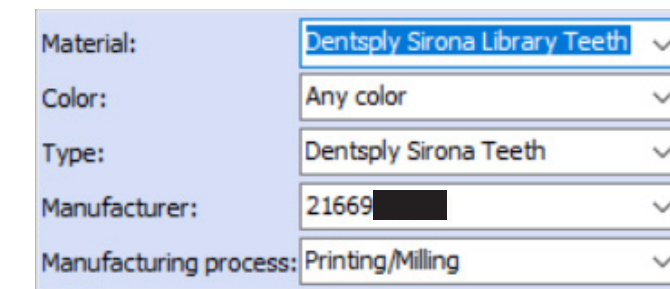
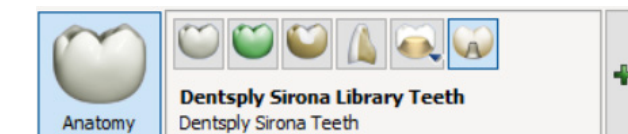
Designing a monoblock Try-In with 3Shape Dental System follows the same steps as a denture, with a few minor modifications.

- Model Analysis > Surveying and Blocking > Smile Composer > FD Initial Setup > Anatomy Design > Save.



8.2 Order Form for Monoblock Try-In

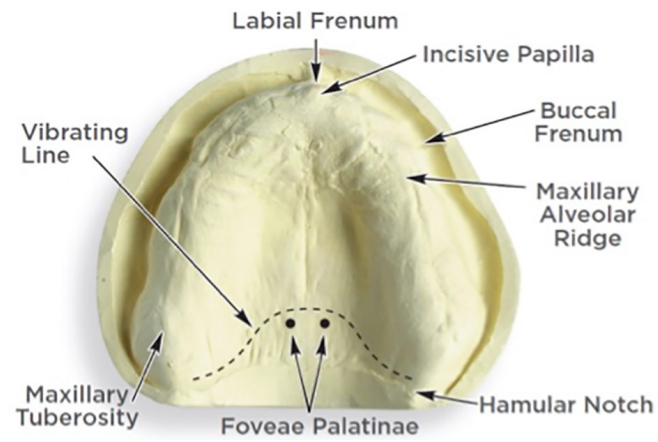
Select Gingiva and use the drop down lists to select the Dentsply Sirona materials.



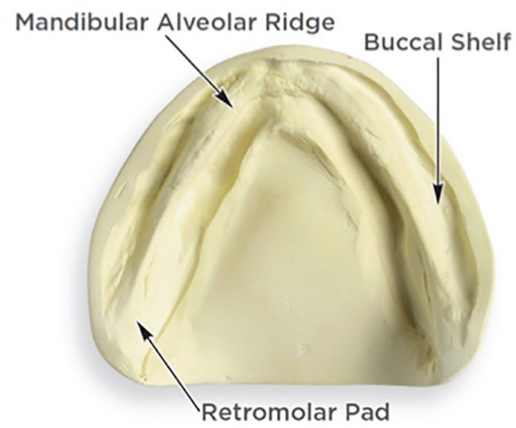
Next select Anatomy, Artificial Teeth the use the drop down to select the Dentsply Sirona materials.

9.0 Denture Basics

Maxillary Arch



Mandibular Arch



9.1 Model Landmarks

Model analysis is critical to design success. If your model or impression does not have the correct landmarks, it will negatively affect the design of the denture base.

At a minimum, ensure your scans include the following landmarks:

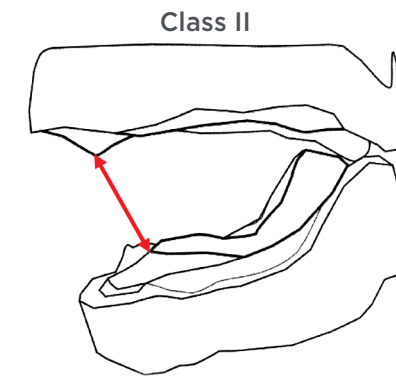
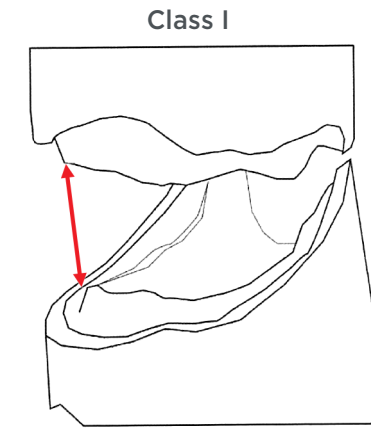
- Incisive Papilla
- Tuberosity
- Buccal Frenum

Additional landmarks shown in the examples are also helpful.

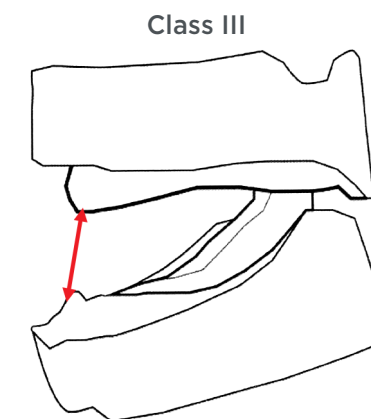
9.2 Determine Ridge Relationship Class

The patient's jaw position can influence denture design. The clinician should indicate if the patient has a Class I, Class II, or Class III ridge relationship.

- **Class I (normal):**
The maxillary alveolar ridge crest is directly above the mandibular ridge. This is usually the most favorable ridge relation for complete dentures. Class I patients have moderate mandibular horizontal range of movement.

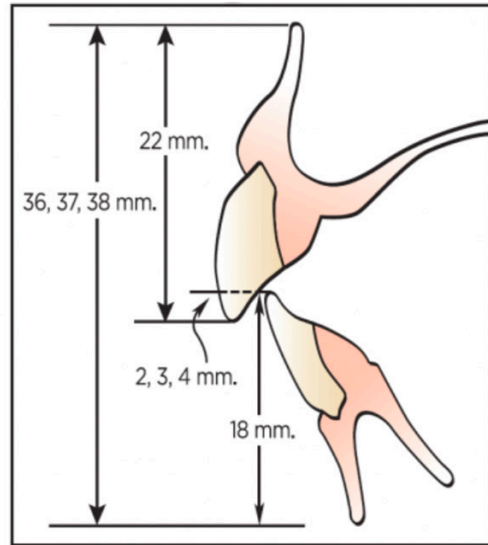


- **Class II (retrognathic):**
The mandibular ridge is narrower and shorter than the maxillary ridge. In some instances it may be as wide as the maxillae in the posterior. Class II patients will have the most mandibular horizontal range of movement that makes balanced occlusion important.



- **Class III (prognathic):**
The mandible is longer and wider than the maxillae. Such patients rarely show excessive jaw excursions but a straight opening and closing mandibular movement. Class III cases have no mandibular horizontal range of movement and posterior occlusal schemes tend to be in a cross-bite relationship.

For more information on ridge relationship classes, refer to the Ridge Relationship Rules.

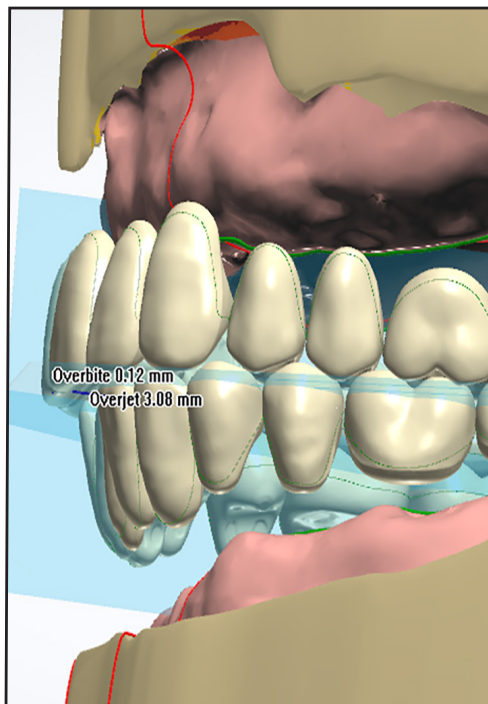


9.3 Vertical Positioning of Denture Teeth

Many factors such as ridge condition, class, size, aesthetic preferences, etc. will influence teeth positioning. The illustration shows the vertical positioning of anterior denture teeth based upon averages.

The tooth libraries will have preset overbites and overjets based upon the mould selected; this can be adjusted, if needed.

Use the 3Shape design feature, **Show Overlaps**, to review and adjust the overlap and overjet in the denture design.



9.4 Balanced Occlusion

Balanced articulation is the bilateral, simultaneous occlusal contact of the anterior and posterior teeth in excursive movements. These contacts with reciprocating nonworking-side occlusal contacts are developed for the purpose of stabilizing dentures.*

Digital Portrait Tooth Library:

Includes pre-occluded balanced set-ups for both semi-anatomical 10° posterior teeth, anatomical 33° posterior teeth.

Digital Genios Tooth Library:

Includes pre-occluded balanced set-ups for the G-Series posterior teeth.

9.5 Lingualized Occlusion

A posterior tooth arrangement method that eliminates tooth contact points on the buccal cusps to assure seating and minimize tipping of the lower denture upon contact. The upper posterior teeth are set in a turned-out position so that only the lingual cusps of the upper posterior teeth contact the center of the occlusal table (the fossa) of the lower posterior teeth.

Digital Portrait Tooth Library:

Includes pre-occluded lingualized set-ups 33° over 10°.

*Source: The Journal of Prosthetic Dentistry, The Glossary of Prosthodontic Terms, Ninth Edition.