



Reference Denture Scan Strategy

Designed for the optimal scan experience of reference dentures with 3Shape TRIOS

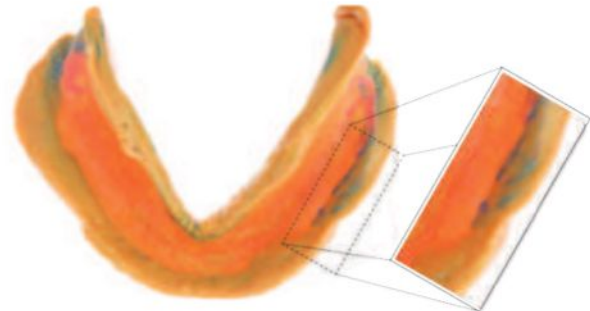
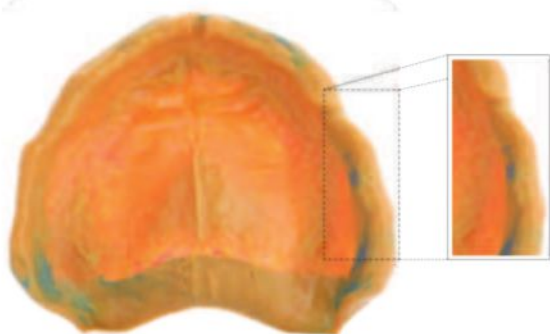


Introduction

Using 3Shape TRIOS scanners, you can scan impressions within a patient's existing complete removable prosthesis reliably, predictably, and efficiently. While these scanners have been optimized to effectively scan these impression surfaces in a seamless, integrated manner, a designated scan strategy will render excellent scan results and a high-quality definitive prosthesis. The reference denture technique is preferred by clinicians and technicians globally for its seamless, technically and clinically integrated workflow. This scan strategy delivers increased patient acceptance and satisfaction, reduces postoperative adjustments, and ultimately improves the patient experience as it requires fewer visits to the clinic. To understand how to obtain the best possible scans, you must designate distinct strategies for the maxilla and mandible, which will be described in detail on the following pages.

Getting Started:

1. Before you begin scanning, evaluate the prosthesis for its distinct characteristics, considering undercuts, the depth, height, and width of the alveolar ridges, peripheral border thickness, and overall size and shape. Go over the strategy in your mind. Visualize the win; by which I mean a perfect scan.
2. Important: Remove any excess impression material on the facial, occlusal, and lingual aspects of the prosthesis to avoid misalignment of scans and inaccuracies in occlusion.
3. Under the order form creation it is imperative that you select the removeable scanning indication. Once you have selected the removeable indication and selected the arches you wish to scan, the system will prompt you and ask you, "how do you wish to Scan the Lower Jaw"/"How do you wish to scan the Upper Jaw". Since we are scanning reference denture impressions we will be selecting the impression scan.
4. Depending on your design software, you should probably leave your scanned model open to prevent any import fails due to a so-called "watertight" model.



Quick Tip

After you have captured the internal alveolar ridge width and depth, allow these scans to render. When you begin to re-scan the peripheral borders, keep the 2D live image, so that at least one third of the window is positioned over the already aligned alveolar ridge scans and no more than two thirds positioned over the new scans.

Maxilla

Proper strategy is required to achieve global accuracy in scanning the maxillary impression within the prosthesis due to its wide surface and anatomical features, including palate shape, undercuts, and ridge form. Fortunately, this can be handled easily.

Quick Tip

Take your time. Scan capturing can be stopped at any time and easily restarted, if needed.

Path #1:

1. Start the scanning process from the tuberosity area of one side of the prosthesis and proceed along the center of the residual ridge towards the tuberosity area of the opposite side.
2. Continue to bring the scanner back across to the incisive papilla (midline point) area and then begin to finalize the palatal “swipe.”

NOTE: You are scanning a wide area, so the scanner should be moved in such a way that new images are easily and accurately stitched to the already captured surface.

3. Rotate your scanner on a 45-degree angle and scan the internal/buccal portion of the alveolar ridge.
4. Stop the TRIOS scanner and allow the scans to render completely. This waiting period is paramount, as it allows for better global accuracy and for the scans to better align themselves in the upcoming passes.

Paths #2 and 3:

NOTE: These steps can be accomplished in a single pass, but this is often challenging. If you are new to scanning reference dentures, I recommend you work in stages. In this sequence, which side is scanned first is of no reference and you can develop a process that works best for you.

1. Position the scanner on the maxillary tuberosity and slowly rotate it toward the peripheral border extension in this region.
2. Once you have captured that initial peripheral border, continue to scan the entire peripheral border along the maxillary arch.
3. Roll the opposing tuberosity peripheral border to ensure cross-arch alignment of the tuberosities.

NOTE: It is ideal to have one third of the scanner capturing the palatal or ridge portion from path #1 during this entire scan if possible.

1. Scan the facial/labial/buccal and occlusal surfaces of the prosthesis. This will allow for a reference in the bite scan alignment as well as provide the necessary information to the dental technician using 3Shape Dental Systems.
2. Once you have captured all the occlusal surfaces, do not scan the palatal portion of the prosthesis to avoid a “watertight” scan, which can create issues for the dental technician disseminating the scans in dental systems.



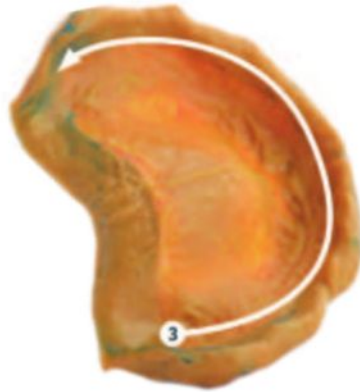
Step by step:

1. Start the scanning process from the tuberosity area of one side of the prosthesis and proceed along the center of the residual ridge towards the tuberosity area of the opposite side.
2. Return to the midline and complete the scan of the palate using smooth side-to-side movements.
3. Proceed with the buccal aspect of the ridge at a 45-degree angle.
4. Allow the scans time to render.
5. Scan the peripheral borders, buccal/facial, and occlusal of the teeth. I recommend working in two phases, beginning on either side; whichever is scanned first is of no relevance.

Step 1-2



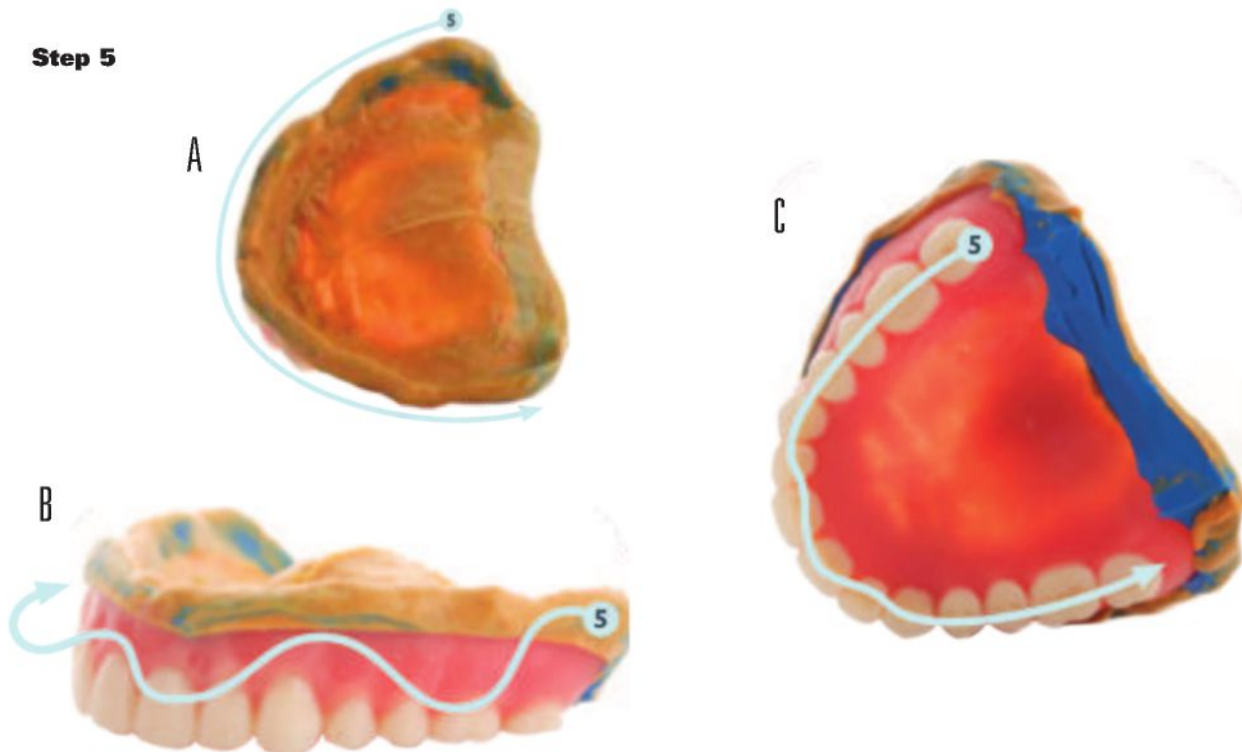
Step 3



Step 4



Step 5



Mandible

The goal of scanning the mandibular impression within the prosthesis is to achieve global accuracy. This goal is achievable, but it requires a proper strategy due to the mandibular impression's narrow surface and anatomical features, like the retromolar pad, alveolar ridge, lingual borders, and undercuts.

Quick Tip

Take your time. Scan capture can be stopped at any time and restarted easily, if needed.

Path #1:

1. Start the scanning process from the first molar region, transitioning back to the retromolar pad area of one side.
2. Proceed along the center of the residual ridge while rotating the scanner from side to side.
3. To maximize capture of the entire buccal and lingual aspects of the impression, focus on the alveolar ridge as well as some of the peripheral borders, if possible, for both buccal and lingual aspects.
4. Continue in this style toward the retromolar pad on the opposing side. Note: You are scanning a narrow area, so the scanner should be moved in such a way that new images are easily and accurately stitched to the already captured surface.
5. Stop the TRIOS scanner and allow the scans to render completely. This waiting period is paramount for achieving optimal global accuracy and for the scans to better align themselves in paths #2 and 3.

Paths #2 and 3

NOTE: These steps could be accomplished in a single pass, but this can be challenging. If you are new to scanning reference dentures, I recommend you work in stages. Whichever side you scan first is of no relevance; develop whichever process works best for you.

1. Position the scanner on the retromolar pad and slowly rotate it toward the lingual peripheral border extension in this region.
2. Once you have captured that initial peripheral border, continue to scan the entire lingual peripheral border along the mandibular arch. Roll at the opposing retromolar pad peripheral border to ensure cross-arch alignment.

NOTE: It is ideal to have one third of the scanner out capturing the ridge portion from path #1 during this entire scan, if possible.

3. Scan the facial/labial/buccal and occlusal surfaces of the prosthesis. This will allow for a reference in the bite scan alignment as well as provide the necessary information to the dental technician using 3Shape Dental Systems.
4. Once you have captured all the occlusal surfaces, do not scan the lingual flange portion of the prosthesis to avoid a “watertight” scan, which can create issues for the dental technician disseminating the scans in the design stage afterwards.



Step by step:

1. Start the scanning process from the first molar area on one side of the mouth and proceed to the retromolar pad. Move back along the center of the residual ridge and constantly rotate across the ridge towards the area of the opposing side.
2. Allow the scans time to render.
3. Re-start the scan at the retromolar pad, roll the scanner to the lingual peripheral borders, and scan the entire lingual border.
4. Position the scanner back on the retromolar pad. Rotate the scanner across the buccal peripheral borders, and scan the buccal borders and facial portion of the prosthesis.
5. Scan the buccal and occlusal surfaces of the teeth.

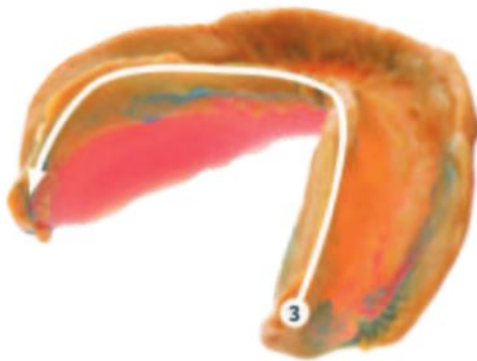
Step 1



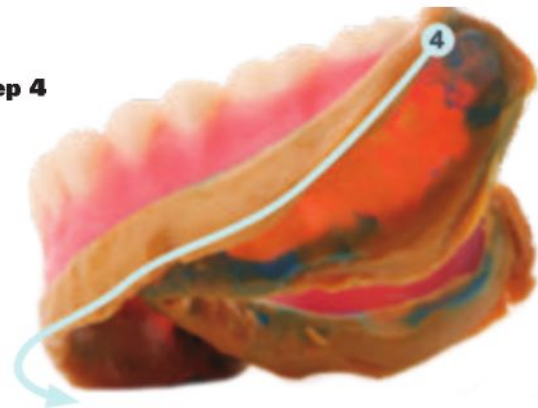
Step 2



Step 3



Step 4



The goal of scanning the mandibular impression within the prosthesis is to achieve global accuracy.

Step 5



Occlusion

The goal in scanning the occlusion is to ensure adequate alignment of the maxillary and mandibular reference dentures in centric occlusion. This can effectively be accomplished by conducting the occlusion scan in two manners:

1. Utilizing the bite scan feature
2. Conducting a 360 bite scan alignment.

Personally, I prefer the bite scan feature for its predictability, efficiency, and accuracy. The feature involves simply scanning the maxillary and mandibular reference dentures either intra or extra-orally. I prefer to conduct this method by using a rigid bite registration material and capturing the patient's repeatable unstrained centric relation record.

IMPORTANT: Ensure you do not have an excessive amount of registration material on the buccal aspect for the buccal bite scan. You may trim any excessive portion away with a scalpel blade to ensure you see the buccal surfaces of the posterior teeth.

Bite Scan (intra- or extra-orally):

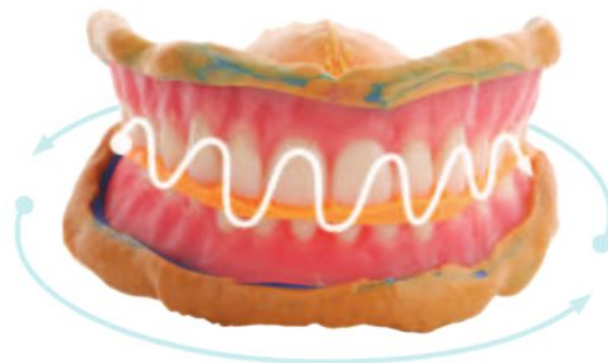
1. Scan right side bite by positioning the scanner 50% on the upper arch and 50% on the lower arch. Continue the bite scan for an additional three seconds after the bite has aligned.
2. Scan left side bite by positioning the scanner 50% on the upper arch and 50% on the lower arch. Continue the bite scan for an additional three seconds after the bite has aligned.



Right Bite



Left Bite



360 Bite Scan

360 Bite Scan

1. Important: Conduct a very stable and secure bite registration that inhibits the possibility of any movement of the registration as you are scanning it in your hands.
2. If possible, scan the entire maxillary prosthesis in the same manner as the maxillary impression scan without stopping the scanner.
3. Proceed to scan the entire facial portion of the maxillary arch, and transition to the lower facial.
4. Once you have scanned the entire facial portion, commence scanning the buccal peripheral border of the mandibular arch, and transition to scanning the alveolar ridge and lingual peripheral borders in the same manner as the maxillary arch.

Step by step:

5. Scan the maxillary impression surface.
6. Roll the scanner over the entire front side.
7. Roll the scanner over the peripheral border of the lower.
8. Scan the internal impression surface in its entirety.
9. Align the 360 Scan with three-point alignment for the maxillary arch and mandibular arch.

Conclusion



Reference Denture Impressions

Monoblock Try-in

Final Digital Dentures



For More Information

Download Eric Kukucka's free eBook on the reference denture protocol at:

<https://www.3shape.com/en/ebooks/digital-dentures-reference-protocol>



About the Author

Eric D. Kukucka is Vice President of Clinical Removable Prosthetics & Design Technologies at The Aspen Group, Chicago. Kukucka helps develop protocols and materials used by practicing clinicians in Aspen's 1,000 locations across the US. The first denturist in North America to beta test digital dentures with Ivoclar Vivadent, Kukucka is a global expert on the integration of digital technologies in removable prosthodontics. A faculty member of the Digital Dentistry Institute, he has authored dozens of publications and delivered more than 50 keynote lectures (in two languages) including at the IDS in Cologne, Germany, the leading global trade fair of the dental industry. Kukucka is best known in dentistry for collaborating on the development and innovation of monolithic milled digital denture workflows and paradigm-shifting intra-oral scanner strategies for digitizing dentures. Notably, Kukucka co-developed the influential "Reference Denture" scan strategy with 3Shape. In 2020, he was the first denturist appointed to the company's Global Corporate Advisory Board. In 2022 he joined SprintRay as an Advisory Board Member at Large. He was the 32nd person in the world certified to teach Dr. Jiro Abe's Suction Effective Mandibular Complete Dentures (SEMCD) methodology. Kukucka also authored the inaugural JPD (Journal of prosthetic dentistry) JPD Digital article. **JDT**



QUIZ

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