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JPD DIGITAL – VIDEO ARTICLE

Seamless integration: Hybrid intraoral-extraoral scanning techniques redefining articulation in complete arch implant-supported restorations with rapid digital conversion

Rami Salloum, DDS[a]

SUMMARY

This video presentation introduces a breakthrough approach in full-arch implant restorations, highlighting the transformative impact of hybrid intraoral and extraoral scanning techniques. Traditional methods for capturing occlusal records relied heavily on a combination of wax, resin, and impression materials, which often resulted in inaccuracies due to material distortions and necessitated multiple appointments.[1,2]

By contrast, this cutting-edge digital workflow,[3,4] eliminates these inefficiencies, allowing clinicians to achieve more accurate and reliable results in a shorter time frame.[5–7] A critical factor for the success of this approach is having a single verified model for the arch being restored.

ABSTRACT

Accurate occlusal records are vital for the success of full-arch implant restorations. Traditional methods, relying on impression materials and multiple patient visits, are often time-consuming and prone to errors due to material inconsistencies. The introduction of hybrid intraoral and extraoral scanning techniques marks a significant advancement by offering a fully digital workflow that improves precision, shortens treatment time, and enhances patient comfort. By integrating both scanning approaches, clinicians can achieve greater accuracy, minimizing occlusal vertical dimension discrepancies and optimizing articulation. This article explores how hybrid scanning is transforming full-arch restorations, offering an efficient and simplified solution that benefits both clinicians and patients, while ensuring optimal outcomes. (J Prosthet Dent 2025;133:1115-1117)

Central to this method, as detailed in the provided Table 1, is the use of a custom-made device named Anterior Scanning Device (ASD) attached to 2 anterior implants intraorally, facilitating the precise capture of the occlusal relationship with the opposing arch. Once the intraoral scan is complete, the ASD is transferred to a verified model, enabling continuation of scanning to achieve virtual articulation in occlusion. This hybrid intraoral-extraoral scanning process merges intraoral and

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[a]Private practice, Bright Dental Practice and Implant Center, Bethlehem, PA; Attending Faculty, Dental Department, Lehigh Valley Health Network, Bethlehem, PA; and Master's Candidate, Soft Tissue Management around Teeth and Implants, University of Bologna, Bologna, Italy.

Table 1. Steps for rapid digital conversion

Step	Description
Step 1	Ensure the presence of a single verified model for the arch to be restored. This serves as the foundation for accurate digital data acquisition.
Step 2	Attach the Anterior Scanning Device (ASD) to two anterior implants intraorally to capture the occlusal relationship with the opposing arch.
Step 3	Complete the intraoral scan of the opposing arch and the ASD to collect bite and alignment data.
Step 4	Transfer the ASD to the verified model and continue the scan, starting intraorally and completing extraorally. The scanner automatically merges the intraoral and extraoral data seamlessly.
Step 5	Using this hybrid scanning approach, the ASD captures the bite intraorally and allows for the virtual articulation of the single model in occlusion extraorally.
Step 6	Perform a biocopy scan of the verified model with the ASD in place, ensuring an exact replica.
Step 7	Trim the ASD data digitally from the biocopy scan, attach scan bodies to the implant replicas on the model, and rescan the specific area with the scan bodies attached, ensuring accurate capture of implant positions and soft tissue information for the verified model that is virtually articulated because it is superimposed with the model scan with the ASD.
Step 8	Export the occlusal data to a CAD-CAM system for the design of precise prostheses.
Step 9	Proceed with fabricating the prostheses, allowing for either same-day or second-day conversion based on the clinical scenario.

Figure 1. A, Anterior Scanning Device: A custom-made device (Resin Rim) created by the dentist is shown attached to two anterior implants in the maxillary arch. B, The same device is now attached to the equivalent implants on the maxillary verified model. C, The final data collected using the intraoral scanner, which includes the mandibular scan, the hybrid maxillary scan showing the device attached to the model and virtually articulated,and a third scan of the verified model with scan bodies attached, superimposed with the maxillary model scan.

Figure 2. A, The anterior portion of a mandibular immediate denture, created by the dentist, is shown attached to two anterior implants in the mandibular arch. B, The same portion of mandibular immediate denture is now attached to the equivalent implants on the mandibular verified model. C, The final data collected using the intraoral scanner includes the maxillary scan, the hybrid mandibular scan showing the anterior portion of the mandibular immediate denture attached to the model and virtually articulated, and a third scan of the verified model with scan bodies attached, superimposed with the mandibular model scan.

extraoral data seamlessly, providing an enhanced digital solution that surpasses traditional analog techniques.

This protocol is equally valid for osseointegrated implant supported prostheses (Fig. 1) as well as for immediate loading (Fig. 2), allowing for same-day or second-day conversion,[8] making it highly versatile in clinical practice.

The video outlines the key advantages of this hybrid approach, which include improved accuracy, reduced occlusal vertical dimension discrepancies, and a marked reduction in chairside time. By digitally recording both the intraoral and extraoral structures,[9] clinicians can ensure better vertical alignment, optimize articulation, and significantly reduce patient discomfort.[10] The fully digital workflow enables clinicians to transfer the occlusal data directly into CAD-CAM systems,[11] allowing for precise fabrication of prostheses with minimal need for post-fabrication and post-placement adjustments.

Beyond improving the technical workflow, this method also enhances the overall patient experience. Patients benefit from fewer appointments, more comfortable procedures, and higher-quality restorations, all of which contribute to greater satisfaction with the treatment process. Clinicians, in turn, can provide more predictable outcomes and deliver superior functional and esthetic results.

This hybrid scanning technique represents a substantial advancement in full-arch implant restoration, showcasing how digital dentistry is revolutionizing the field.[12–14] By simplifying complex workflows, this innovative method not only optimizes clinical precision but also reinforces the move toward patient-centered solutions, ushering in a new era of personalized, efficient dental care.

CONCLUSIONS

Hybrid intraoral-extraoral scanning techniques introduce a streamlined and precise approach to full-arch implant restorations, overcoming the challenges of traditional methods. By leveraging a fully digital workflow with tools like the Anterior Scanning Device (ASD), clinicians can achieve accurate occlusal relationships while minimizing errors and chairside time. This method emphasizes efficiency, predictability, and patient comfort, reflecting the ongoing evolution of digital dentistry toward more effective and patient-focused solutions.

APPENDIX A. SUPPORTING INFORMATION

Supplemental data associated with this article can be found in the online version at doi:10.1016/j.prosdent.2025.01.022.

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Corresponding author:
Dr Rami Salloum
3740 Fairview Street
Bethlehem, PA 18017
Email: info@truesmiledesign.com

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