Hybrid Intra-oral and Extra-oral Scanning Techniques: Revolutionizing Articulation in complete-arch Implant-Supported Restoration.

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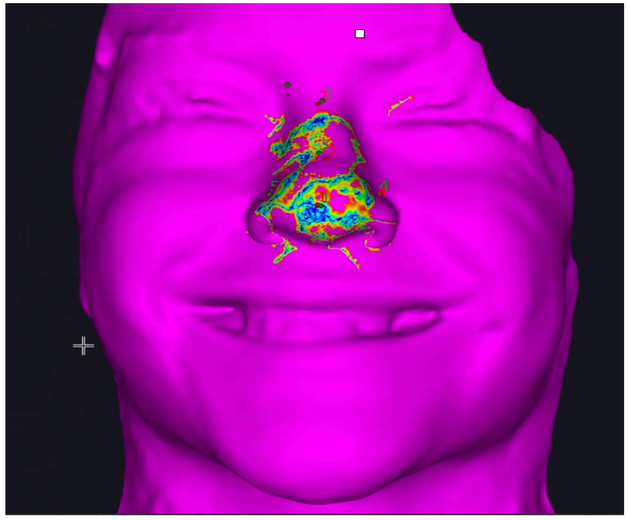
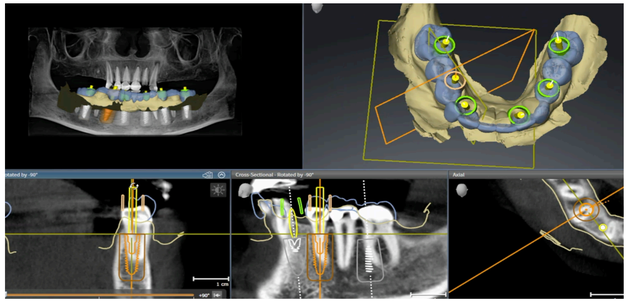
Introduction:

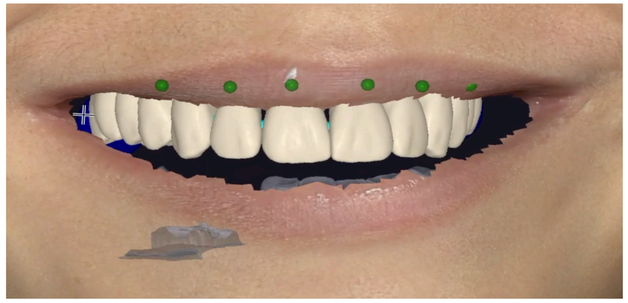
Accurate occlusal records are crucial for successful full-arch implant restorations. Traditional techniques relying on impression materials and multiple visits can be time-intensive and prone to inaccuracies from material distortions. Hybrid intraoral and extraoral scanning introduces a fully digital workflow, enhancing precision, reducing treatment time, and improving patient comfort. By integrating both scanning techniques, clinicians can achieve superior accuracy in capturing the occlusal relationship, minimizing vertical discrepancies and optimizing articulation. This study explores the impact of hybrid scanning on full-arch restorations, offering a streamlined, efficient solution that enhances outcomes for both clinicians and patients. 3

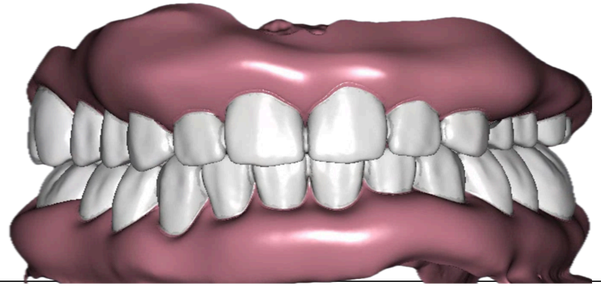
PRE-TREATMENT



PRE-PLANNING







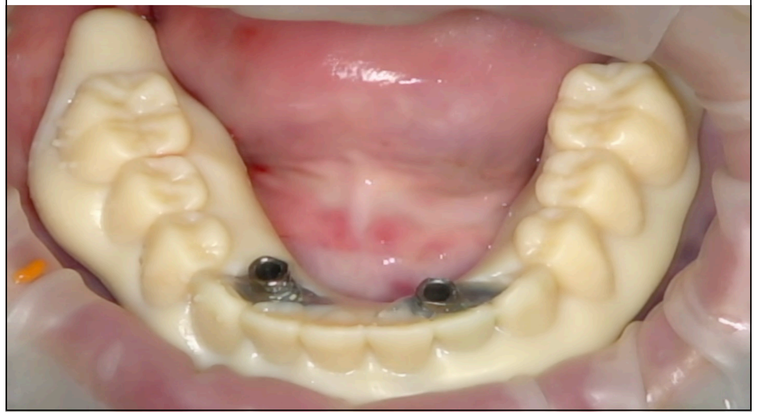
Method

The goal of this technique is to collect all the digital data necessary to design a digital conversion using only the intraoral scanner, eliminating the need for photogrammetry while achieving the same results of delivering same-day or second-day conversions.

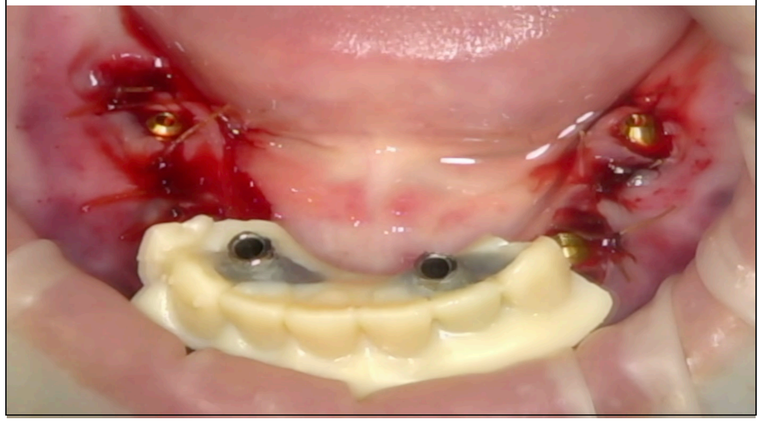
This hybrid scanning technique is centered around a verified model of the arch planned for full-arch restoration. A custom anterior scanning device (ASD), which can be the anterior part of an immediate temporary denture, is secured to two anterior implants, providing a stable reference point for capturing the occlusal relationship with precision. The process involves the following key steps:

1. **Intraoral Scanning:** The opposing arch is scanned first, followed by the anterior scanning device and the occlusal relationship. This initial intraoral scan ensures accurate bite alignment and proper data acquisition.

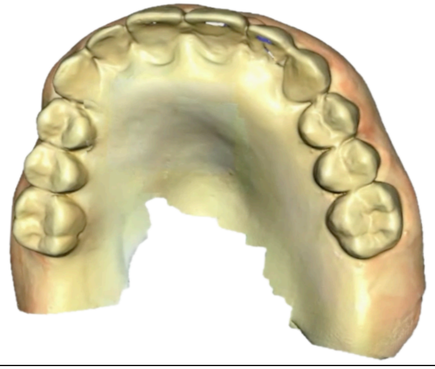
LOWER TEMPORARY DENTURE



ANTERIOR SCANNING DEVICE



INTARA ORAL SCAN

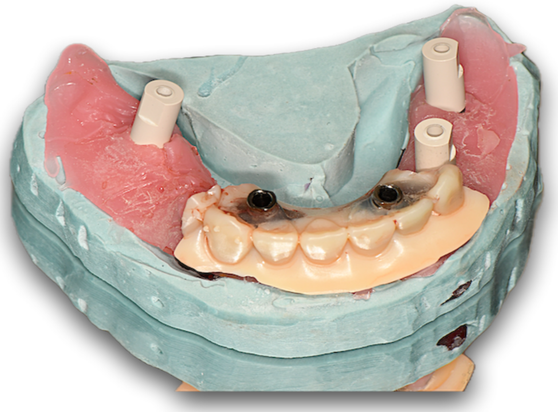


2. **Transfer to Verified Model:** Once the intraoral scan is completed, the ASD is transferred to the verified model of the arch. This allows for additional extraoral scanning to capture necessary data outside the oral cavity, enhancing the accuracy of the final model.

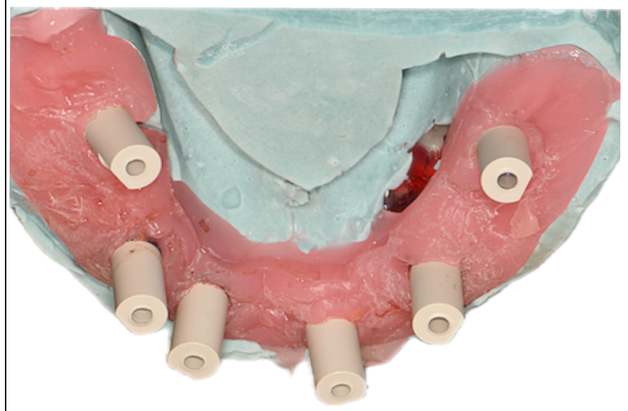
3. **Virtual Articulation:** The intraoral and extraoral scans are seamlessly combined. Since the intraoral scanner stitches images together, it can accurately recognize the anterior scanning device both intraorally (to capture the bite) and extraorally (to articulate the verified model in occlusion). The scanner processes the data as a continuous scan without detecting any transition or changes, creating a precise and comprehensive virtual model. This protocol eliminates the need for a traditional physical articulator.

4. **Additional Extraoral Scan:** In the next step, the anterior scanning device is removed from the model, and scan bodies are attached to the implant analogs. An additional extraoral scan is performed on the model, which is automatically articulated in occlusion. These three scans provide all the necessary information to design a conversion that can be printed or milled.

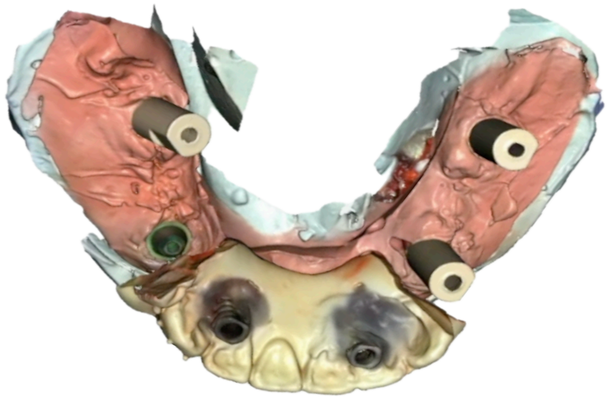
ASD ON MODEL



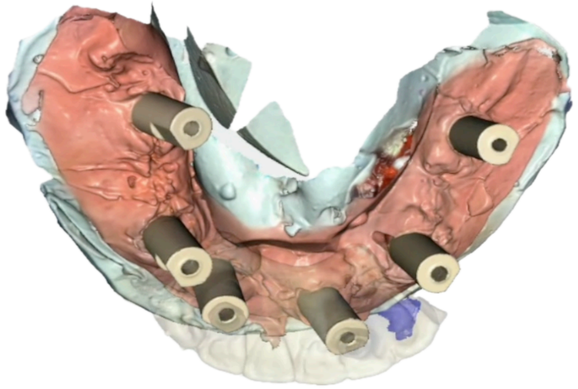
SCAN BODIES ON MODEL



HYPRID INTRAORAL EXTRAORAL SCAN



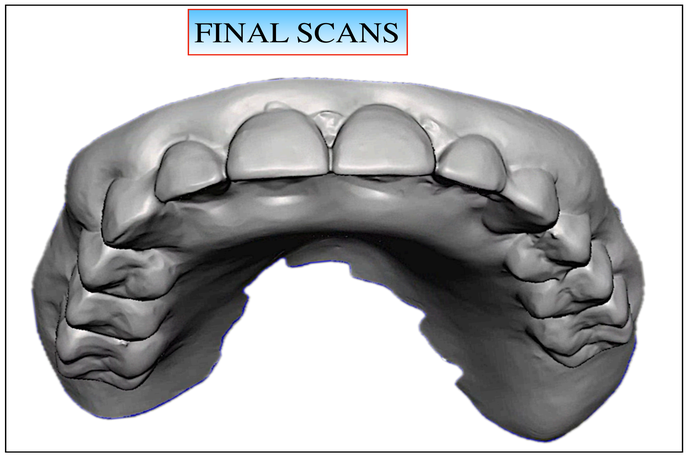
EXTRAORAL SCAN

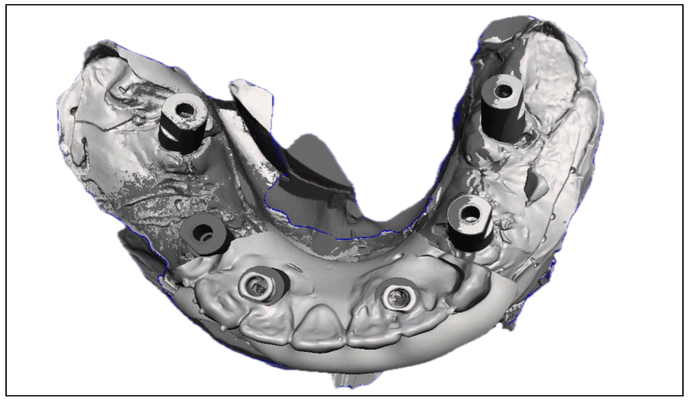


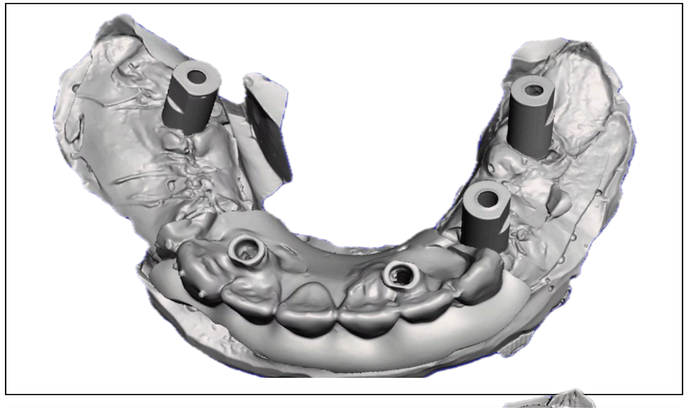
This hybrid approach maximizes the strengths of both intraoral and extraoral scanning, resulting in more reliable articulation, enhanced digital accuracy, and a streamlined workflow.

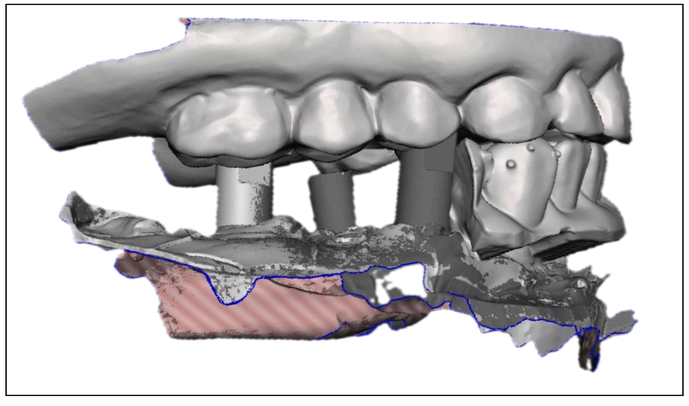
Results

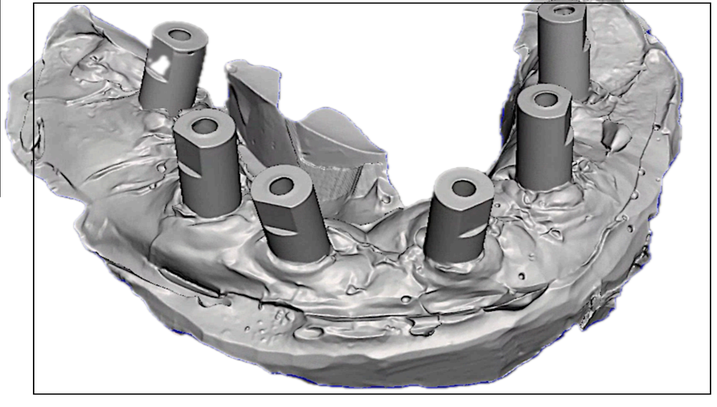
The data demonstrate that incorporating hybrid intraoral and extraoral scanning significantly improves alignment precision and ensures consistent, reproducible outcomes. Patients who underwent this technique experienced notable improvements in the accuracy of occlusal record capture, validating its effectiveness in delivering reliable results for full-arch restorations.





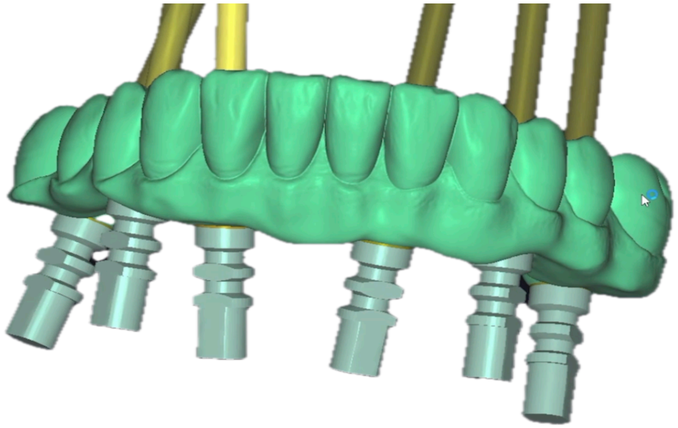
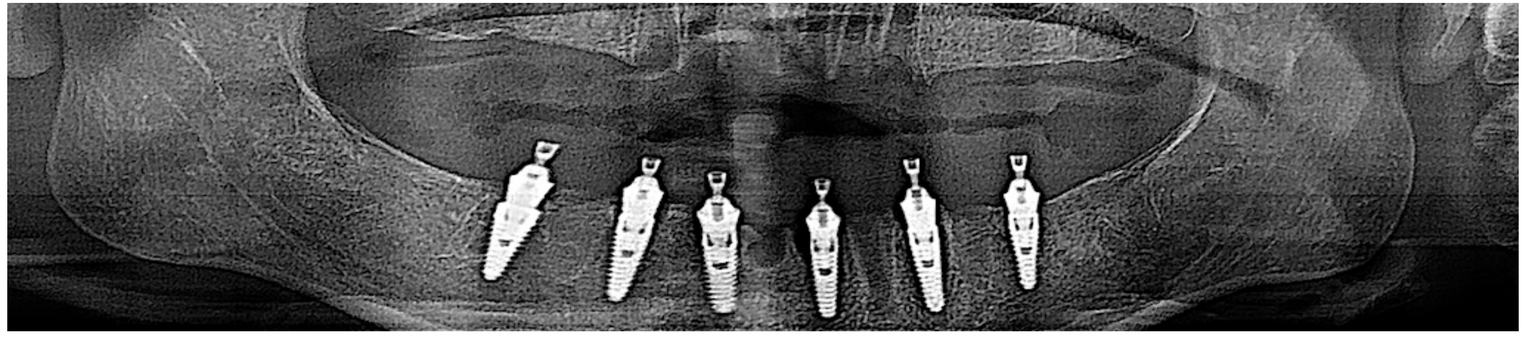






Conclusion

The incorporation of hybrid intraoral and extraoral scanning into the digital workflow marks a major advancement in precision, enabling clinicians to achieve superior accuracy in digital archiving and restorative procedures. By leveraging the seamless integration of intraoral scans, extraoral data, and virtual articulation, this method facilitates the efficient restoration of original dental aesthetics and functional alignment. The streamlined approach simplifies traditionally complex workflows, reducing treatment time and enhancing predictability. Additionally, this technique uniquely offers a verification process for the digital conversion using the verified model, ensuring that the restoration is accurate, reliable, and properly aligned—a capability not available with other techniques. As a result, hybrid scanning establishes a new benchmark for accuracy, efficiency, and patient-centered outcomes in full-arch implant restorations.



SECOND DAY CONVERSION