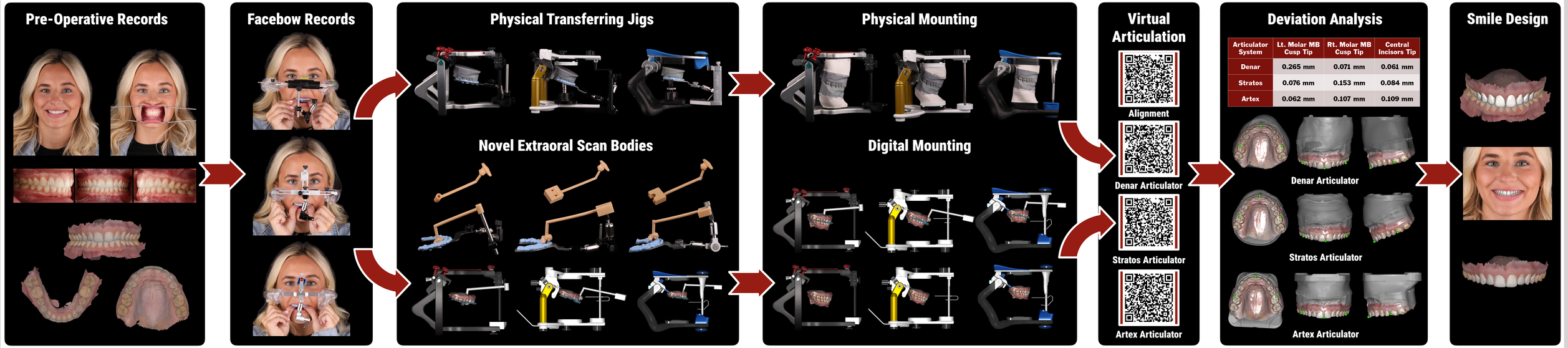
A Novel Extraoral Scan Body for Digitizing Mechanical Facebow Systems: A Case Report

Haya AlSharif. BDS[1], Osama Qadiri. BDS[1], Sophia Weigt[2], Chao-Chieh Yang, DDS, MSD[3], Mohamed Sherif Omar, BDS, MSD[4]

1. Graduate Prosthodontic Resident, Department of Prosthodontic, Indiana University School of Dentistry, Indianapolis, IN
2. Predoctoral Student, Indiana University School of Dentistry, Indianapolis, IN
3. Program Director of Post-graduate Prosthodontic Program, Department of Prosthodontic, Indiana University School of Dentistry, Indianapolis, IN
4. Director of Digital Innovation Laboratory, Department of Prosthodontic, Indiana University School of Dentistry, Indianapolis, IN

Aim: Despite the rapid integration of virtual articulators into digital prosthodontic workflows, existing virtual facebow techniques remain limited by inconsistent reference systems and reliance on soft tissue landmarks or CBCT, which adds unnecessary radiation. Furthermore, the indiscriminate use of horizontal reference planes, such as the Frankfort horizontal plane or the ala-tragus line, fails to account for the specific articulator system being simulated, thereby reducing the accuracy of maxillary orientation and precluding a true hinge-axis transfer in the virtual environment. In this case report, maxillary and mandibular IOS were obtained, models mounted with facebow records, and assemblies digitized for transfer into the CAD software. Novel extraoral facebow scan bodies were secured to each system's jig, digitized using an intraoral scanner, and subsequently aligned with the corresponding facebow scan body library within the CAD software's virtual articulator coordinate system, enabling precise transfer of the maxillary position into the virtual articulator. Linear measurements between anatomical landmarks (left and right first molar mesiobuccal cusp tips and central incisor edge) validated the accuracy of the digital transfer.

Analog & Digital Workflow Comparison:



Articulator System	Lt. Molar MB Cusp Tip	Rt. Molar MB Cusp Tip	Central Incisors Tip
Denar	0.265 mm	0.071 mm	0.061 mm
Stratos	0.076 mm	0.153 mm	0.084 mm
Artex	0.062 mm	0.107 mm	0.109 mm

Results & Conclusion: The extraoral scan bodies enabled accurate orientation and comprehensive virtual treatment planning, supporting integration of mechanical facebow records into digital workflows. This case demonstrates successful integration workflows enabling comprehensive virtual case design and execution. A detailed validation study will be performed for this facebow extraoral scan body system.

References:
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