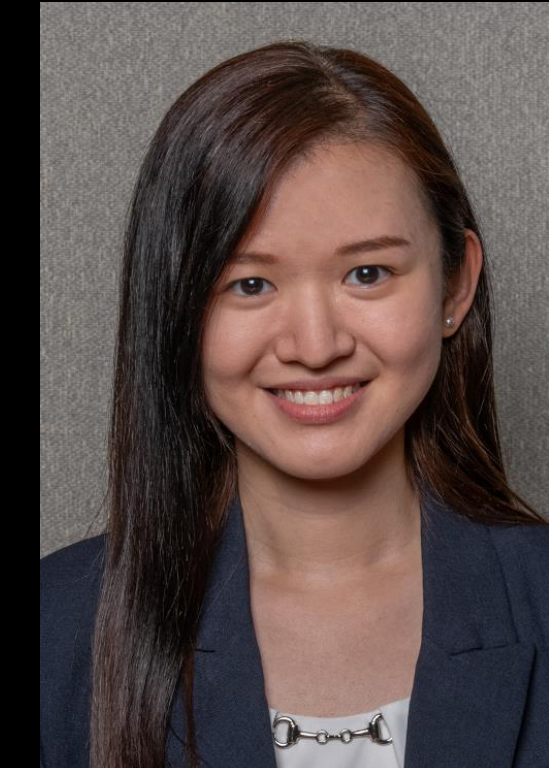


Maximizing Efficiency in Full-Arch Rehabilitation with CAD Boolean Tools: A Case Study



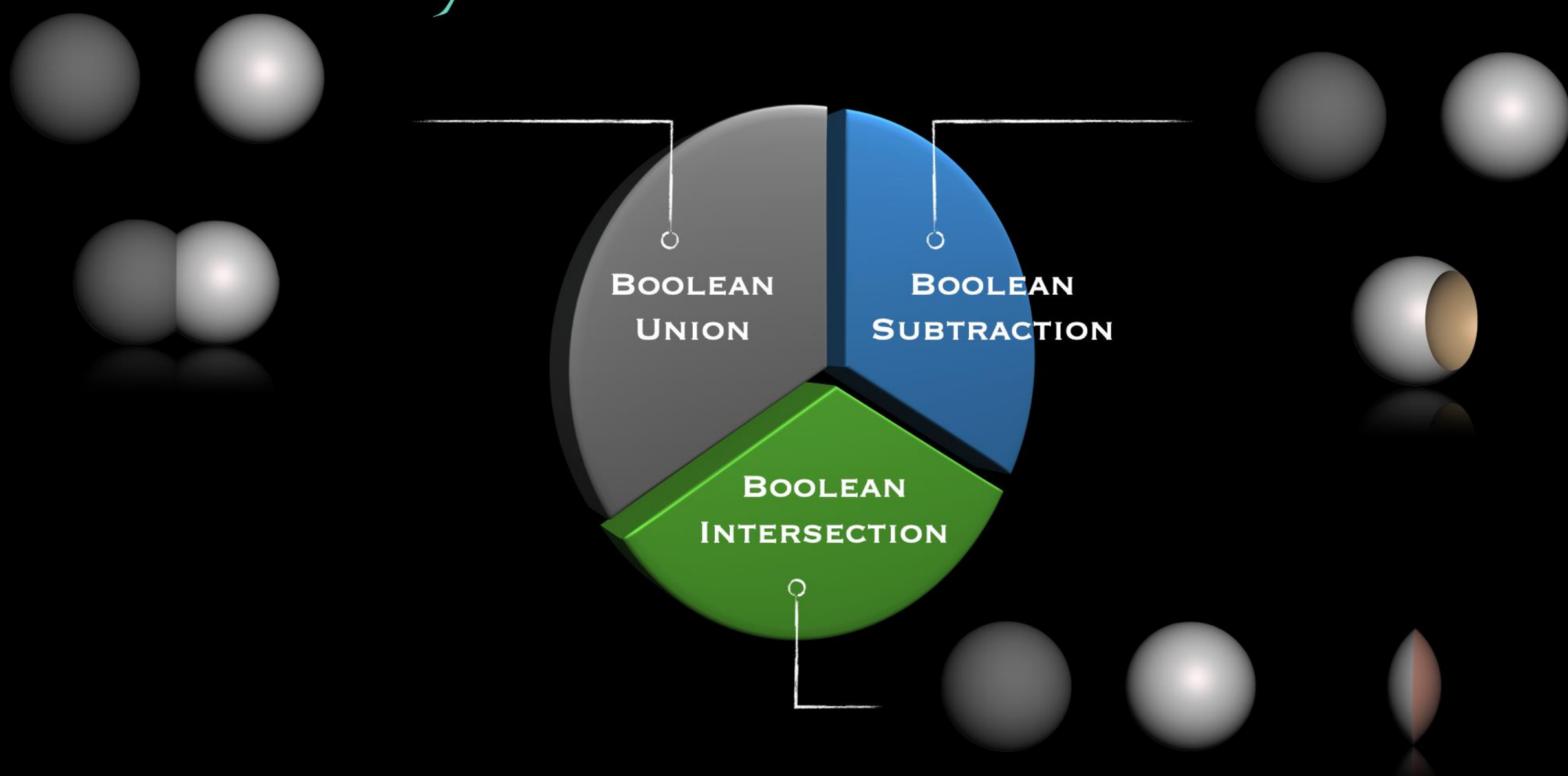
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Introduction

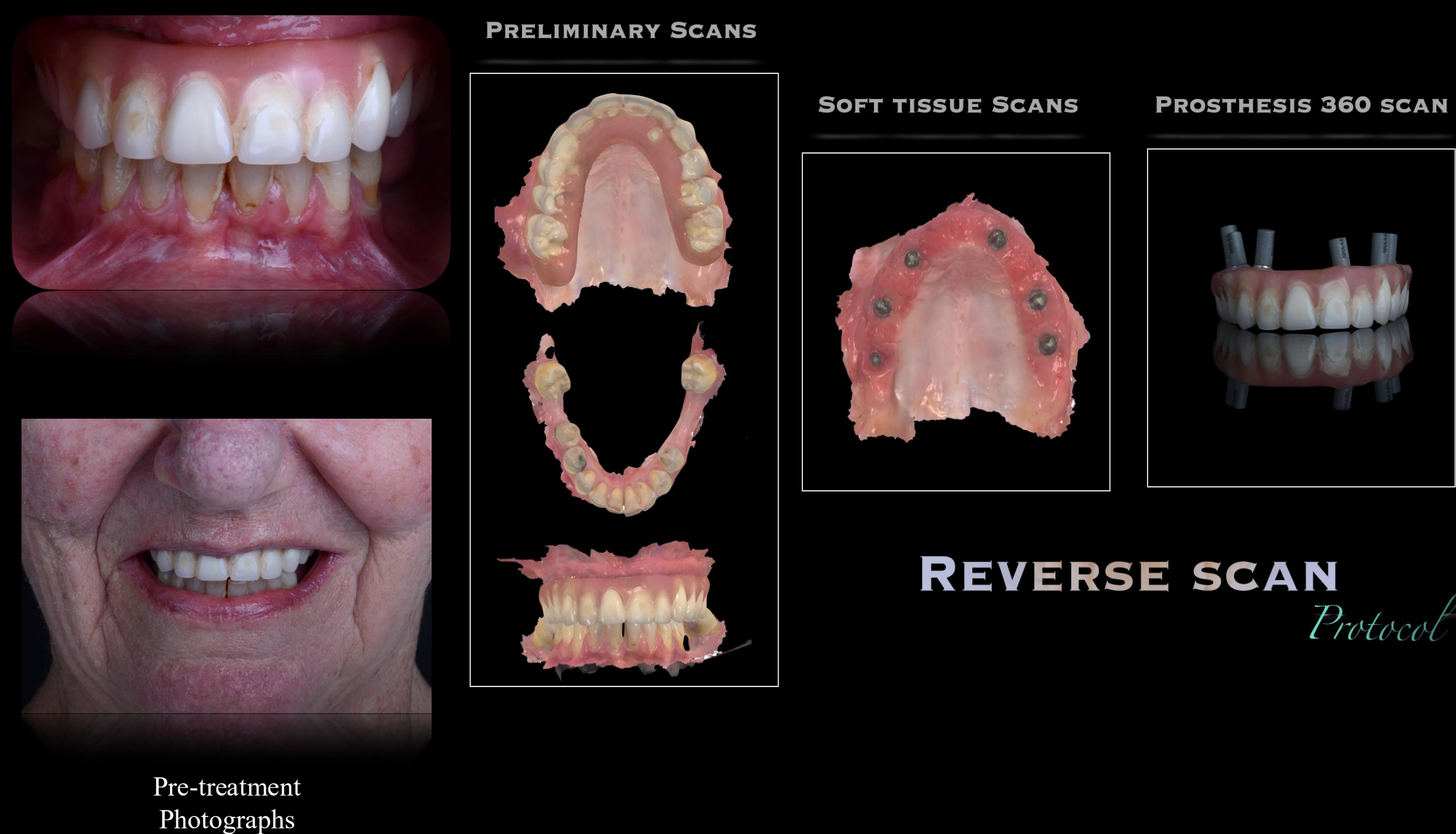
The CAD Boolean Tool refers to a computational technique used in Computer-Aided Design (CAD) to combine or subtract 3 dimensional shapes, especially in digital dental design workflows. A Boolean operation in 3D modeling is a mathematical method used to combine or modify 3D objects based on their overlapping volumes.

BOOLEAN Operation

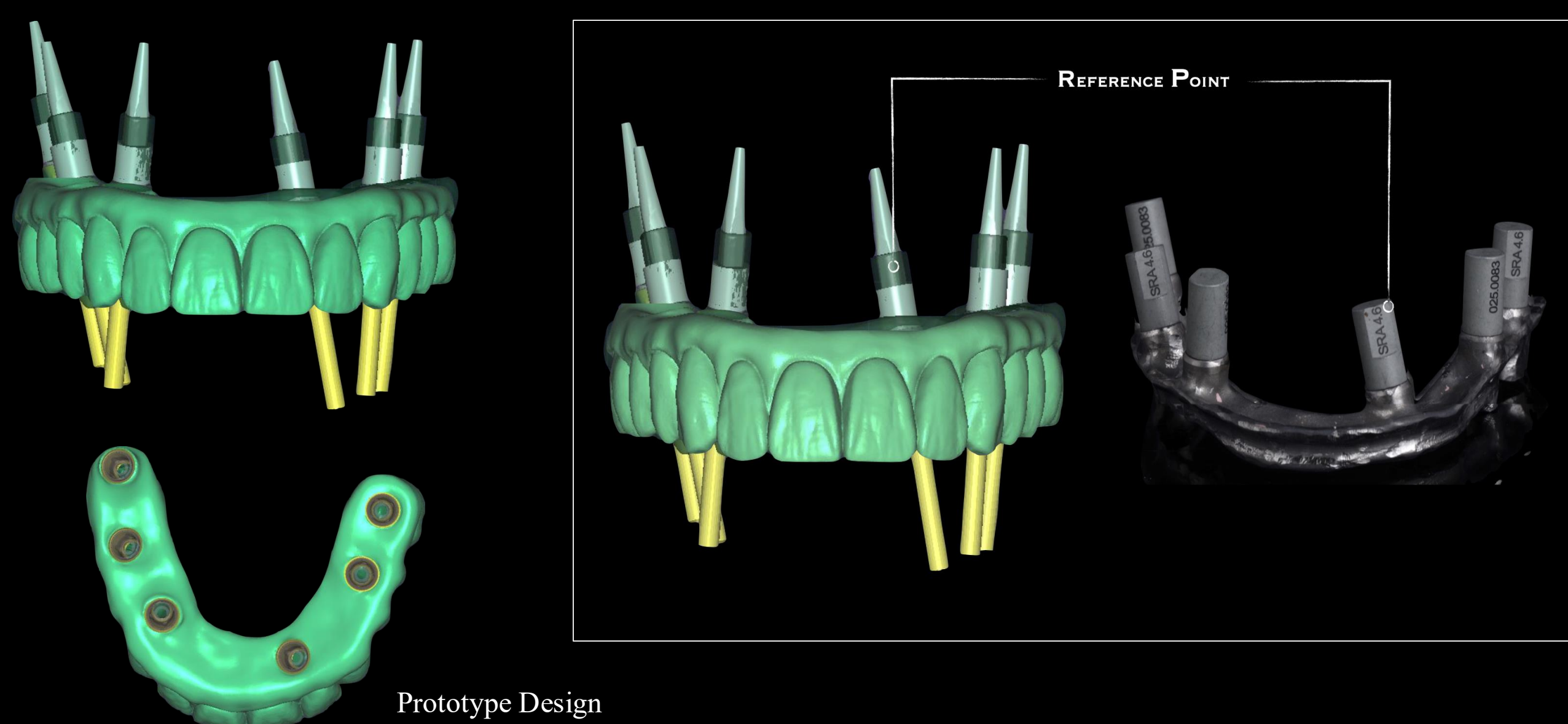


Abstract

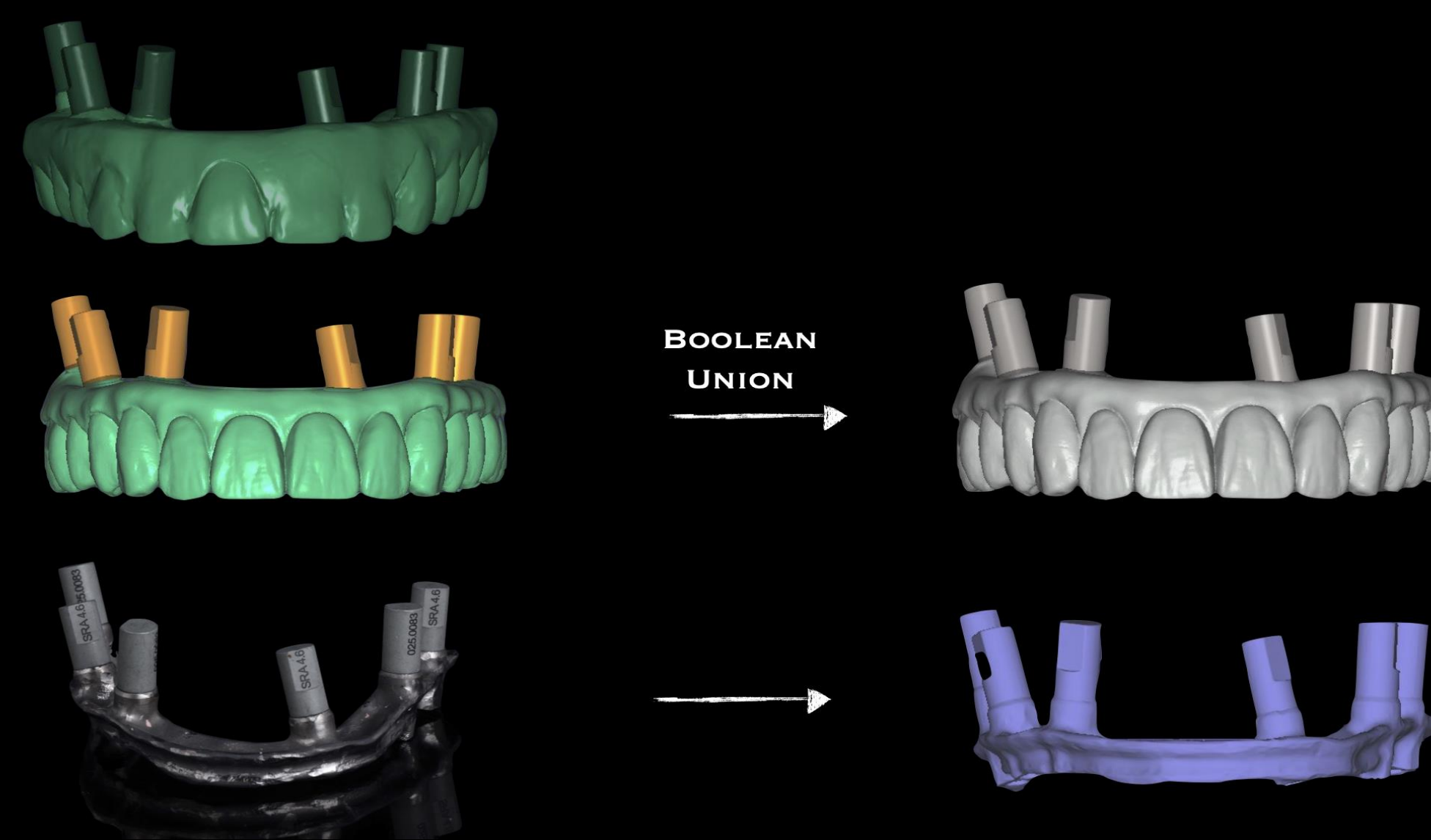
A 70-year-old female patient had maxillary metal-resin IFCDs delivered 7 years ago, presenting with generalized resin tooth wear. The prosthesis had been repaired multiple times due to acrylic teeth debonding from the resin base. The patient was dissatisfied with the aesthetics and functionality of the maxillary metal-resin IFCD. The prosthesis was repaired by replacing it with a new set of milled splinted resin teeth while using the existing metal bar as the superstructure of the IFCD. Reverse scan bodies were used for prototype fabrication. The first scan involved a preliminary scan with the prosthesis in place, an opposing arch scan, and a bite scan, while the second STL file was the soft tissue scan. Next, a 360-degree scan of the prosthesis with reverse scan bodies was taken. All the scan files were superimposed to fabricate the prosthesis prototype with abutment-level Ti-bases. The patient was satisfied with the prototype design. Then, a 360-degree scan of the existing metal bar along with the reverse scan bodies was obtained and superimposed with the prototype design. The prototype design and metal bar design were superimposed, and the "Boolean Subtract" tool in the CAD software was used to obtain a design for PMMA overlay fabrication. The PMMA overlay design was milled with a gingiva cutback and then cemented onto the existing metal bar. The space beneath the metal bar and the gingival cutback region was processed with PMMA using the injection molding technique.



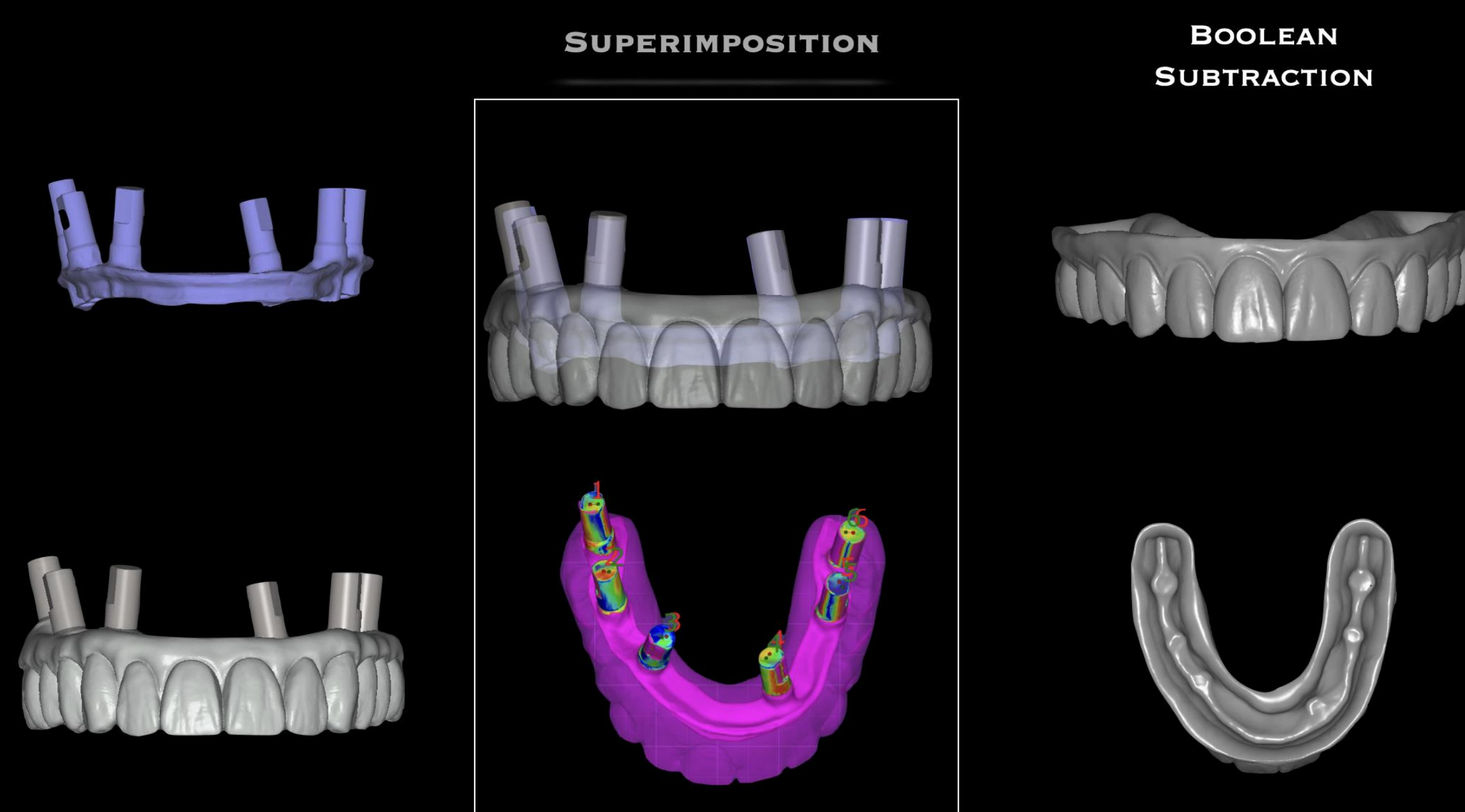
CAD Design



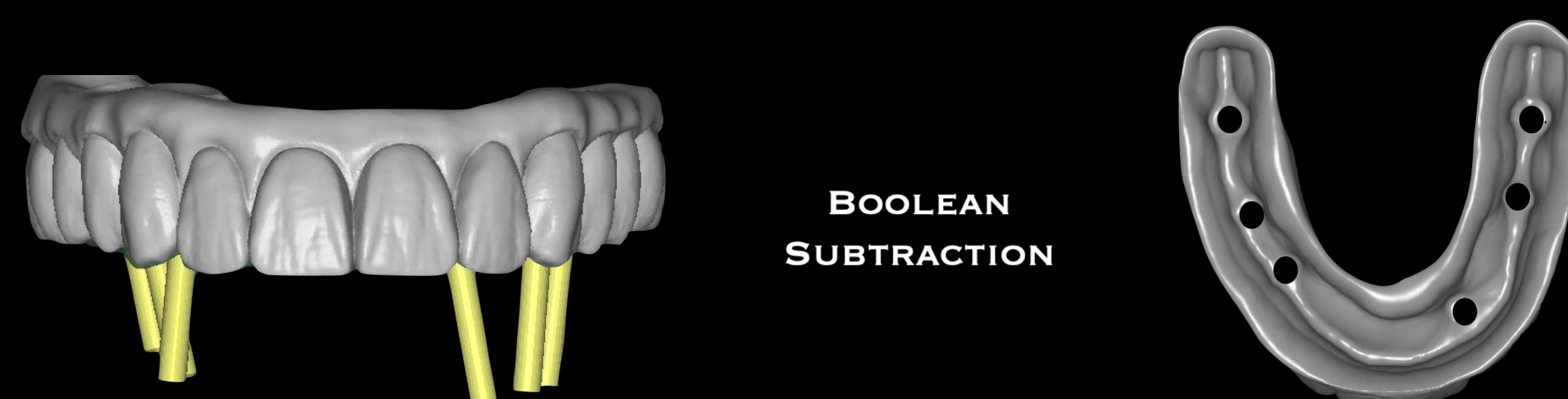
Boolean Operation 1



Boolean Operation 2



Boolean Operation 3



Definitive Prosthesis Fabrication



Conclusion

The efficacy of the workflow can be enhanced by utilizing the "Boolean Subtract" or "Boolean Union" tools in CAD software, offering more versatility in prosthesis design and the designing workflow.

Reference

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3. Charton J, Laurentjoye M, Kim Y. 3D Boolean operations in virtual surgical planning. *Int J Comput Assist Radiol Surg.* 2017 Oct;12(10):1697-1709. doi: 10.1007/s11548-017-1637-y. Epub 2017 Jul 12. PMID: 28702927.