

Integrating Digital and Analog Techniques in Designing a Full Arch Hybrid Prosthesis: A Case Report

Amir R Bahador, BDS ; Niranjan Joshi, MDS, MS, FACP ; Jack Piermatti, DMD, FACP
Nova Southeastern University

Introduction

There are several approaches to restoring a full arch with a hybrid prosthesis, each with unique considerations regarding surgical technique, materials, and costs 1,2.

Purpose/Aim

This case report aims to illustrate the effectiveness of combining digital and analog techniques in the design and fabrication of a full arch hybrid prosthesis. The objective is to showcase how this integrated approach can enhance precision, efficiency, and patient outcomes in complex full arch rehabilitation cases.

Materials & Methods

A 60-year-old female patient presented at the NSU Prosthodontics Clinic with an edentulous maxillary arch requiring full arch rehabilitation (Fig1,2, and 3). Five implants were placed in the maxillary arch (Fig 4), and the patient's existing maxillary denture was converted into a provisional hybrid prosthesis (Fig 5). This converted prosthesis was picked up using elastomeric impression material, and a verified master model was created (Fig 6). The model was then digitized and merged with intraoral scans of the patient. These scans were used to digitally design and fabricate a prototype, while the verified model ensured accurate cementation of the Ti-bases in the correct position within the prototype. The prototype was delivered to the patient, and after confirming its esthetics and function, it was used to fabricate the final zirconia hybrid prosthesis.

Prep operative



Fig 1, maxillary arch(occlusal view)



Fig 2, Mandibular arch(occlusal view)

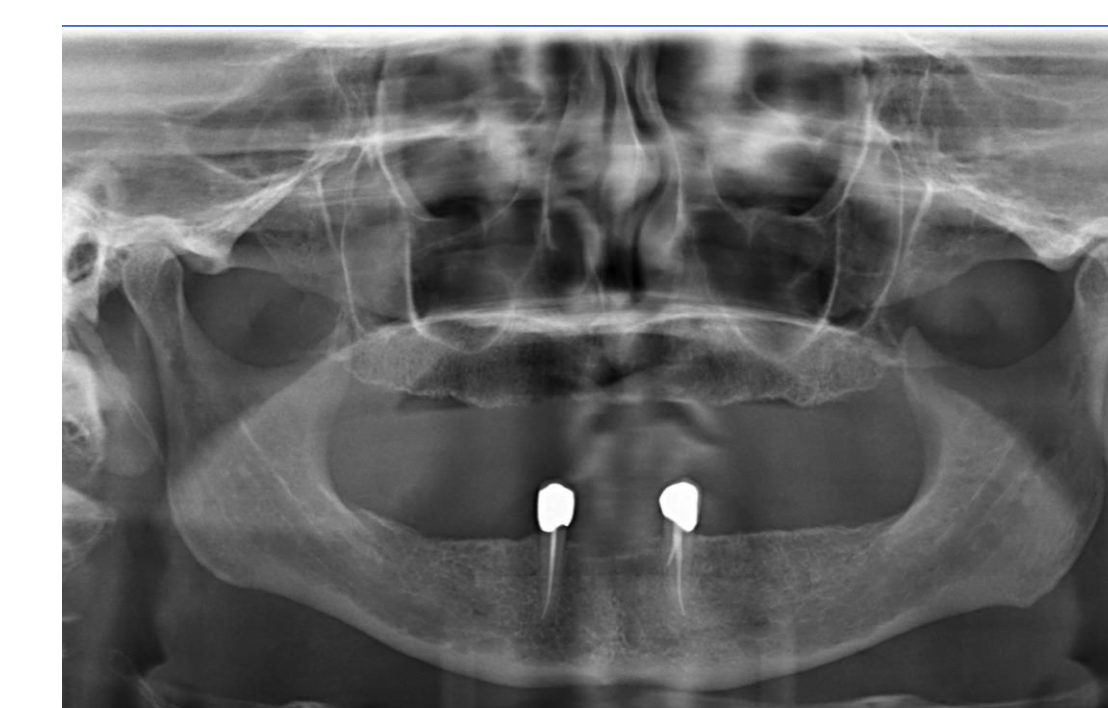


Fig 3, Initial radiographs



Fig 4, five implants placed



Fig 5, Implants were picked up with denture

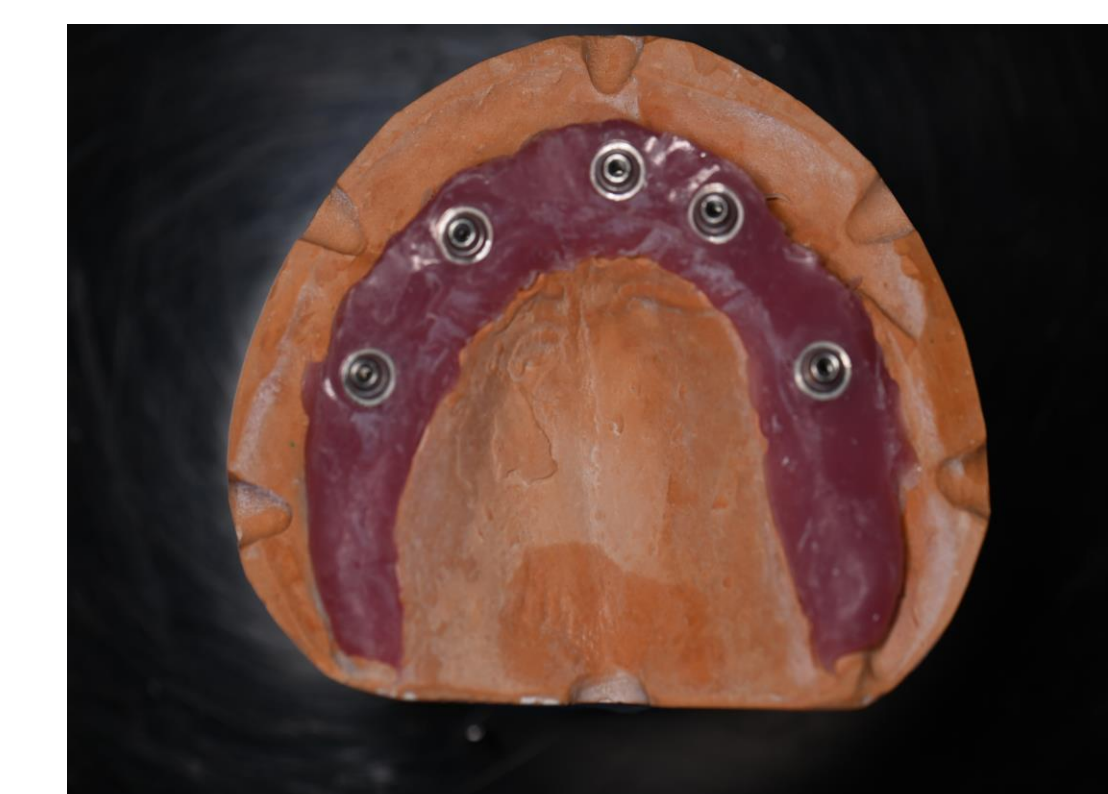


Fig 6, Verified model

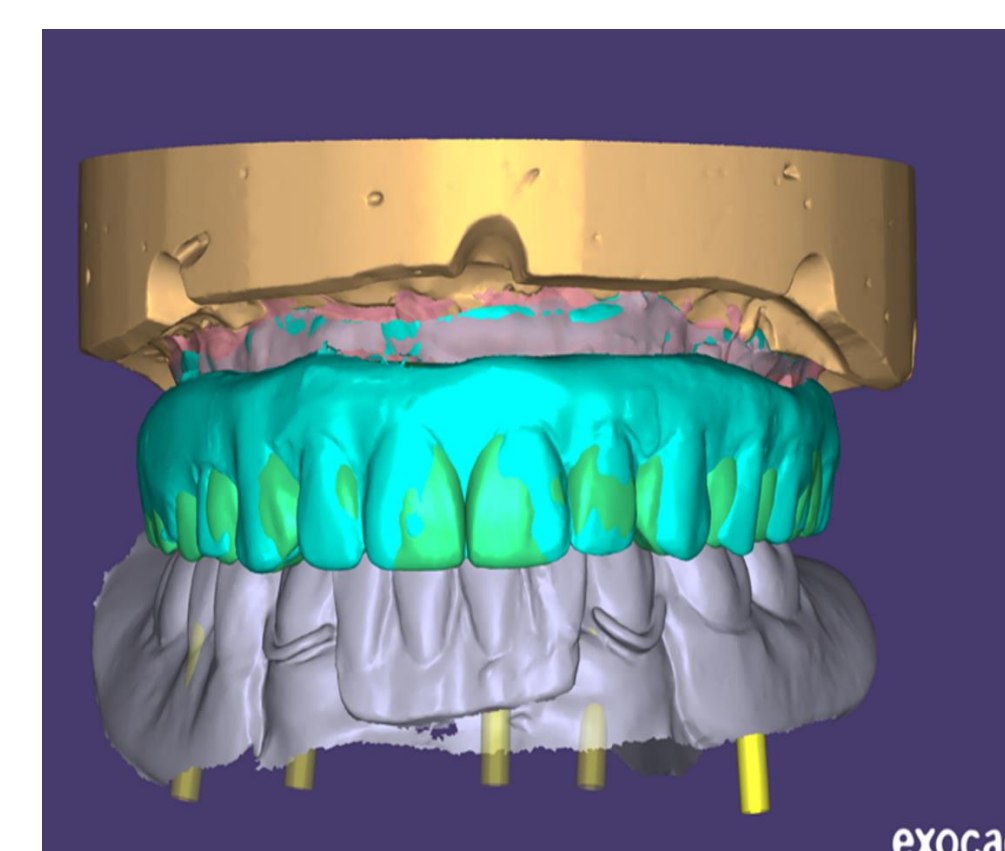


Fig 7, All the scans are merged

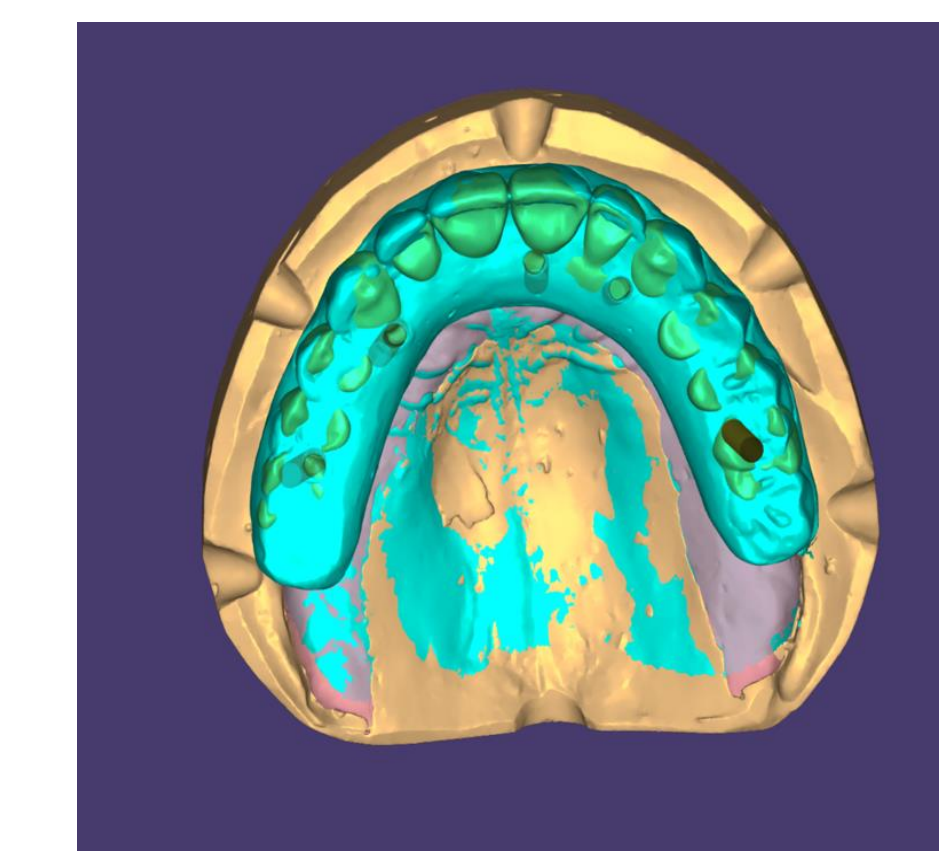


Fig 8, Converted hybrid on model



Fig 9, Milled PMMA prototype

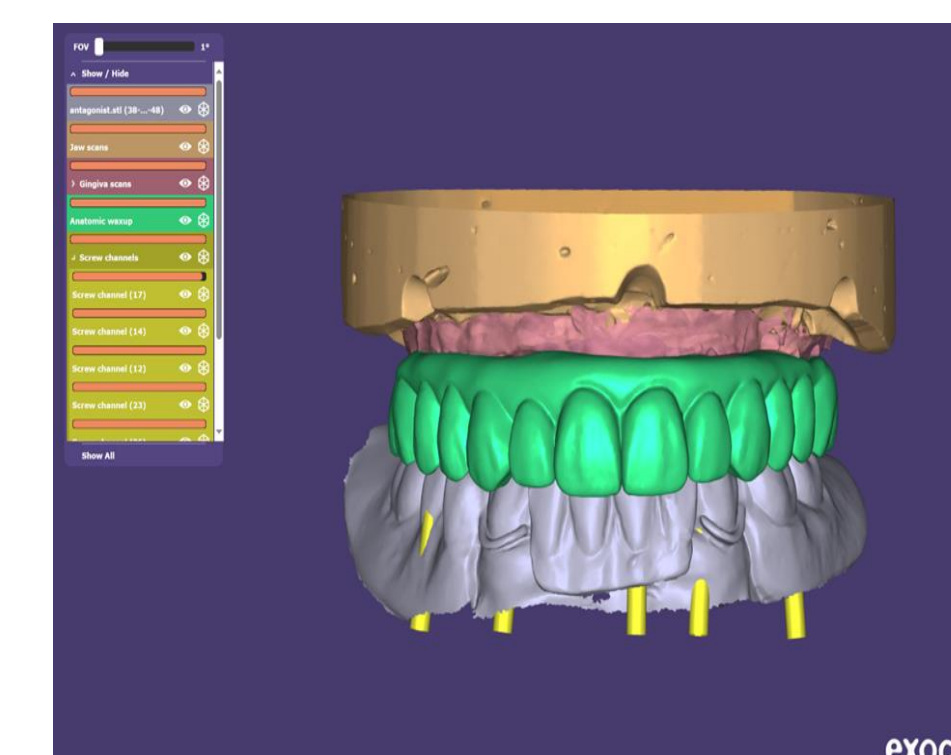


Fig 10, Final design

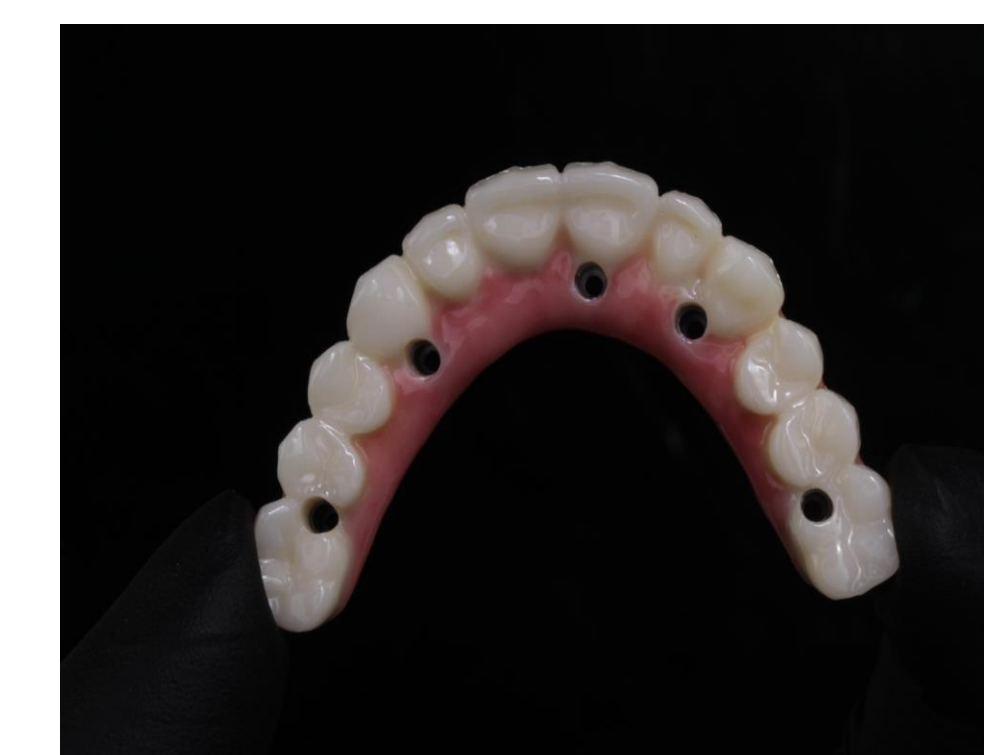


Fig 11, Final zirconia prosthesis



Fig 12, Final prosthesis(Smile view)

Workflow

Post operative

Sequencing

1. The existing maxillary denture was used to pick up the implants and create a converted prosthesis (Fig 5).
2. The converted prosthesis was picked up in the patient's mouth using elastomeric impression material, and a verified model was poured with Resin Rock (Fig 6).
3. An intraoral scan was taken of the converted prosthesis, the existing mandibular RPD, and the current bite (Fig7).
4. A 360-degree scan was performed on the converted prosthesis and the converted prosthesis was placed on the verified model, and both were scanned together (Fig 8).
5. By merging all scans, we were able to digitally relate the converted prosthesis to the mandibular RPD in exocad.
6. A new prototype was designed in exocad, with necessary adjustments made (Fig10).
7. The new prototype was milled from PMMA based on the design and delivered to the patient Fig 9).
8. After the patient used the prototype for a month and was satisfied, a final zirconia hybrid prosthesis was created (Fig11 and 12).

Results

The digital process enabled precise planning and visualization, while the analog techniques allowed for fine-tuning and adaptation to the patient's unique anatomical features, ensuring the final prosthesis achieved the desired passivity.

Conclusion

The combination of digital and analog workflows in the design and fabrication of full arch hybrid prostheses provides significant advantages, particularly in complex cases.

References

