

# A MODERN APPROACH TO A CLASSIC TECHNIQUE: FUNCTIONALLY GENERATED PATH

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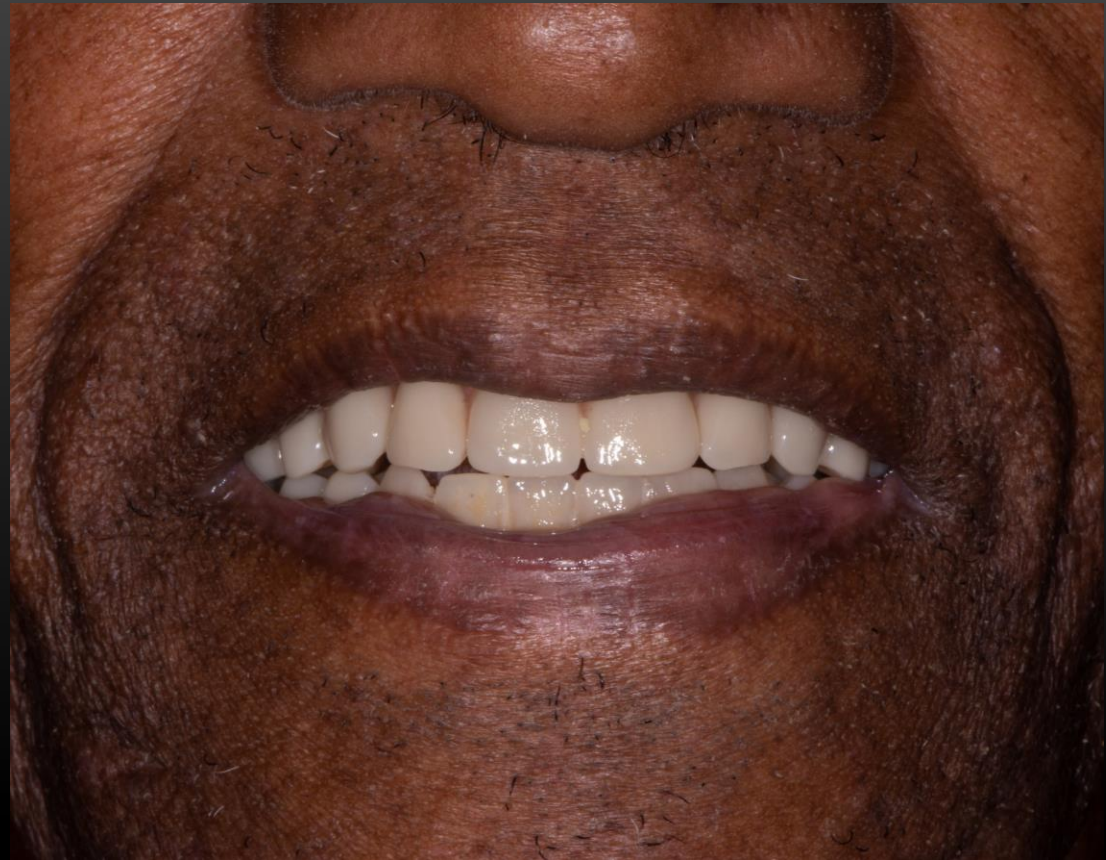


# DISCLOSURES

- I have no financial interests to disclose.
- The views expressed are my own and do not reflect the official views or policy of the Department of Defense or its Components

# OUTLINE

- Patient presentation
- Analog workflow
- Digital workflow
- Delivery
- Analysis of Result



# DENTAL HISTORY

- Definitive prostheses delivered approximately 6 months ago
  - Maxillary complete denture
  - Mandibular fixed hybrid prosthesis



## DENTAL HISTORY

- CC: “My upper denture doesn’t fit well. It doesn’t stay in, feels too big on the sides, doesn’t fully contact the roof of my mouth, and I have a hard time with my speech to the point other people notice”.
- Soft re-line completed by another provider one month prior but patient still unhappy with fit
- Pt satisfied with mandibular fixed hybrid prosthesis



# CLINICAL FINDINGS

- Patient presents with signs of combination syndrome
  - Resorption of anterior maxillary ridge
  - Downgrowth of maxillary tuberosities



# CLINICAL FINDINGS

- Redundant tissue in anterior maxilla
  - Patient declined surgical revision and vestibuloplasty



# TREATMENT PLAN

- Chairside soft re-line maxillary denture
- New maxillary complete denture with functionally generated path
  - ModJaw FGP tracing
  - Design denture teeth in ExoCad
  - Mill denture teeth and process denture base

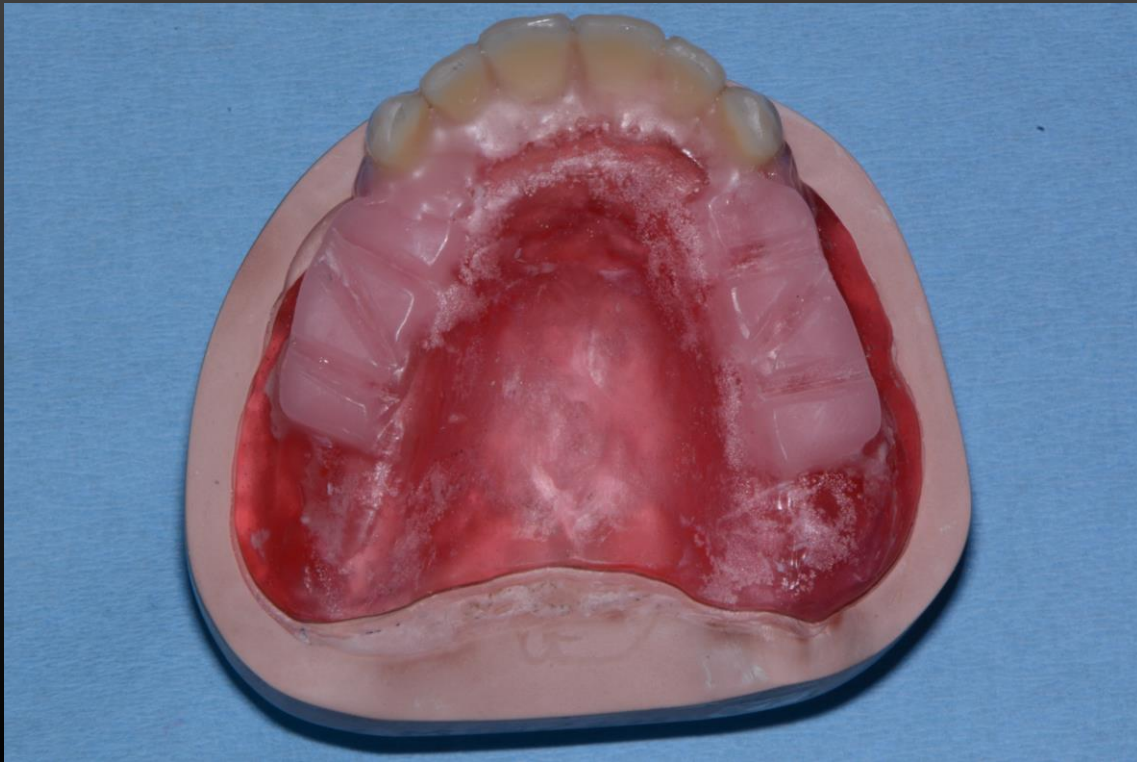


# WHY FUNCTIONALLY GENERATED PATH?

- Reduce destructive forces on residual ridges
- Distribute forces evenly
- Develop a stable and balanced occlusal relationship



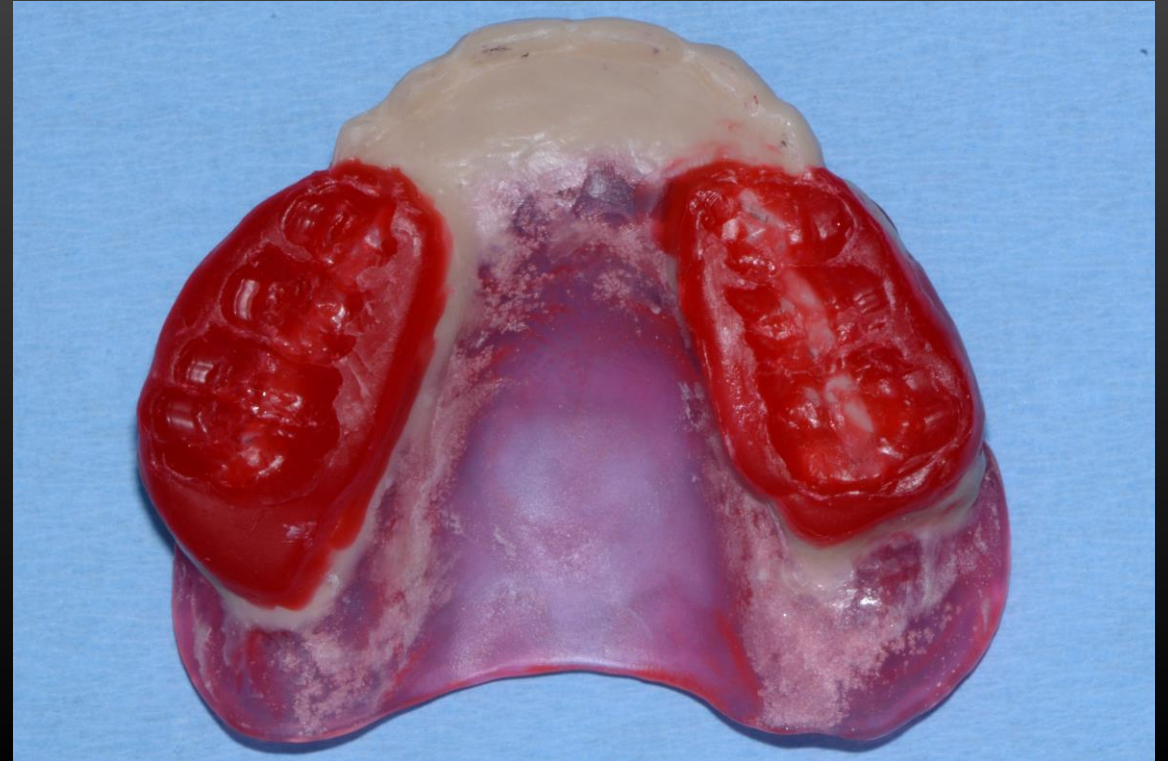
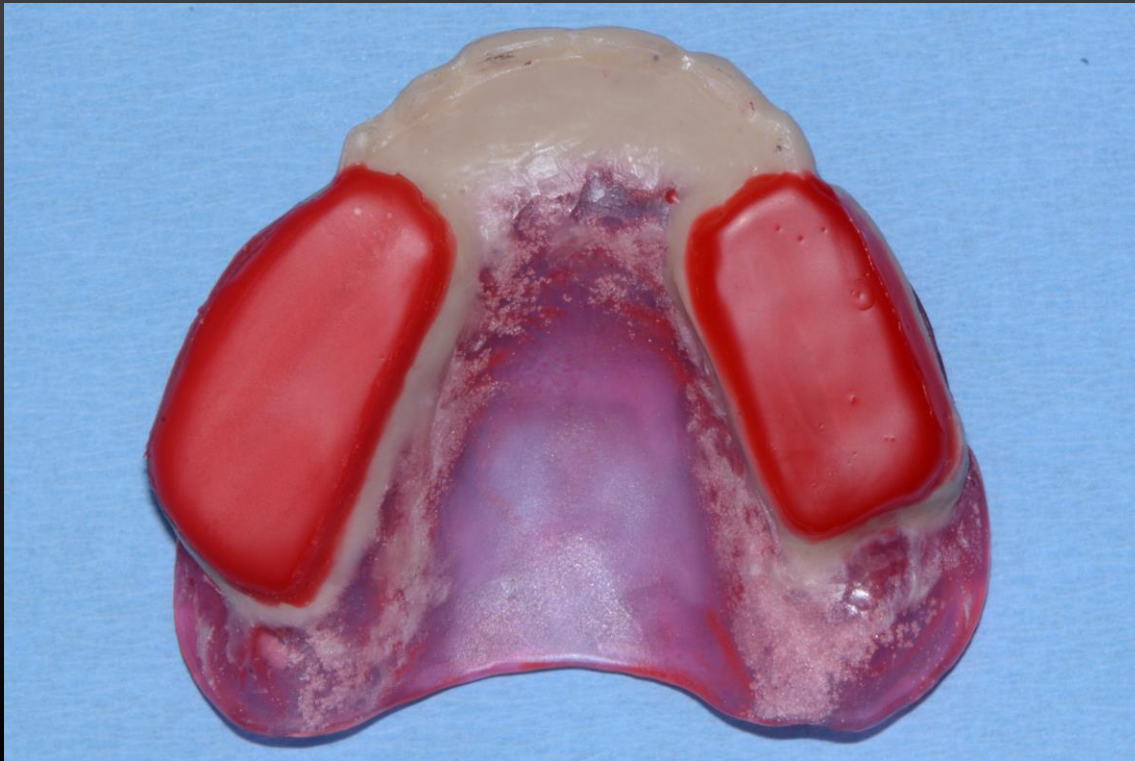
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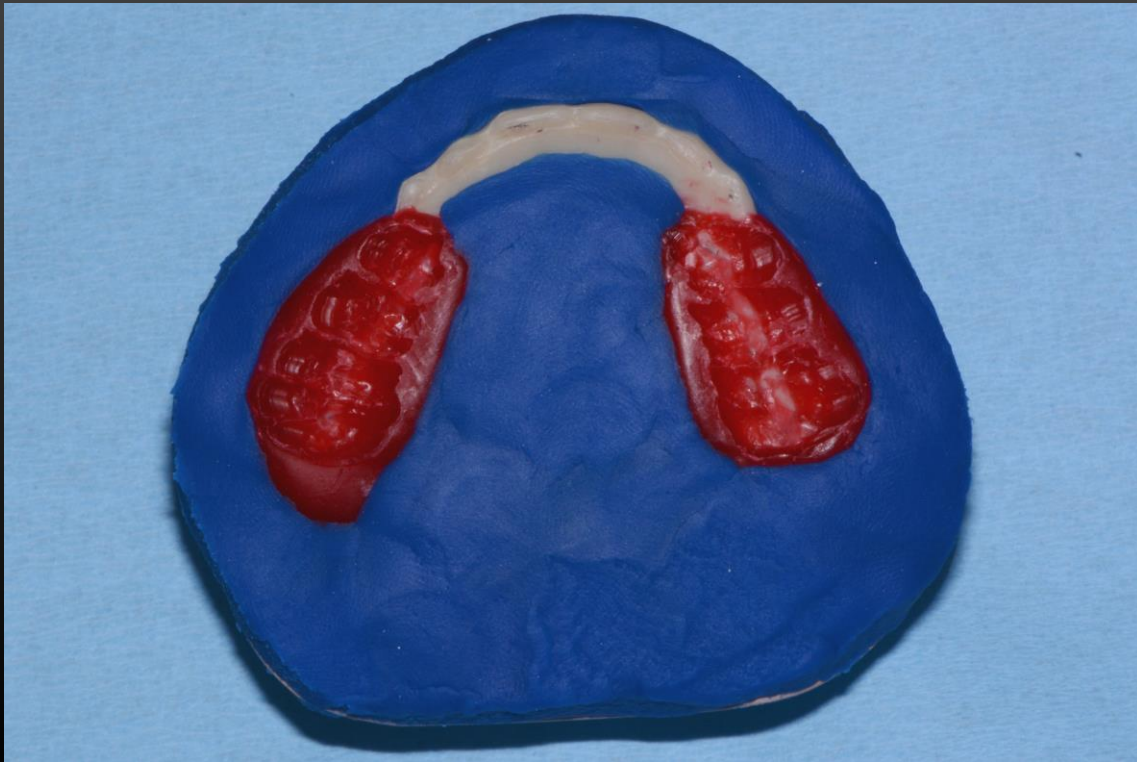
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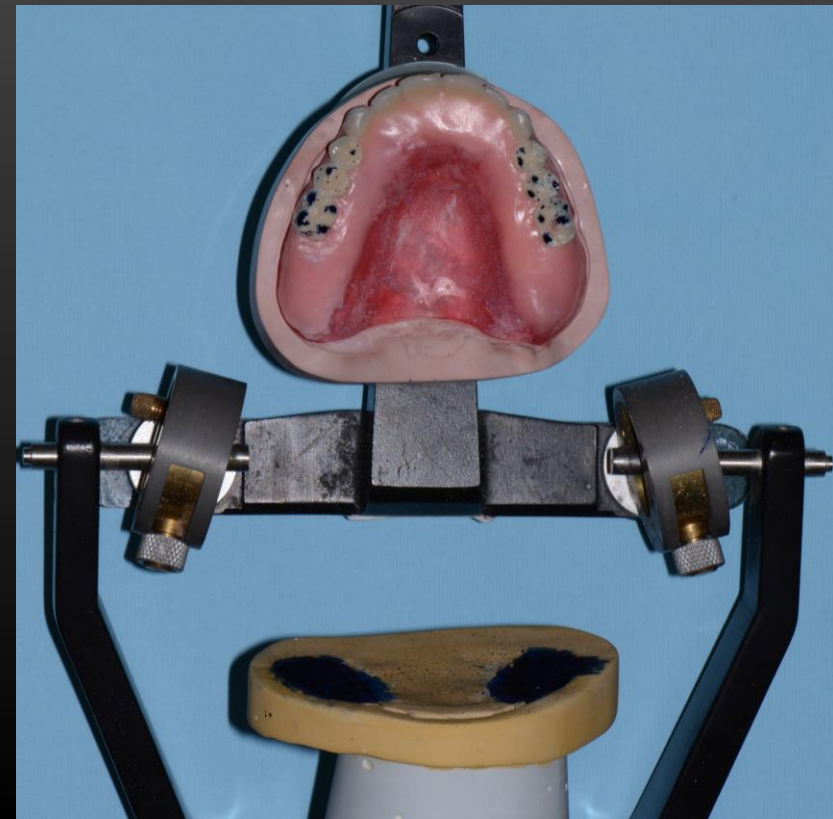
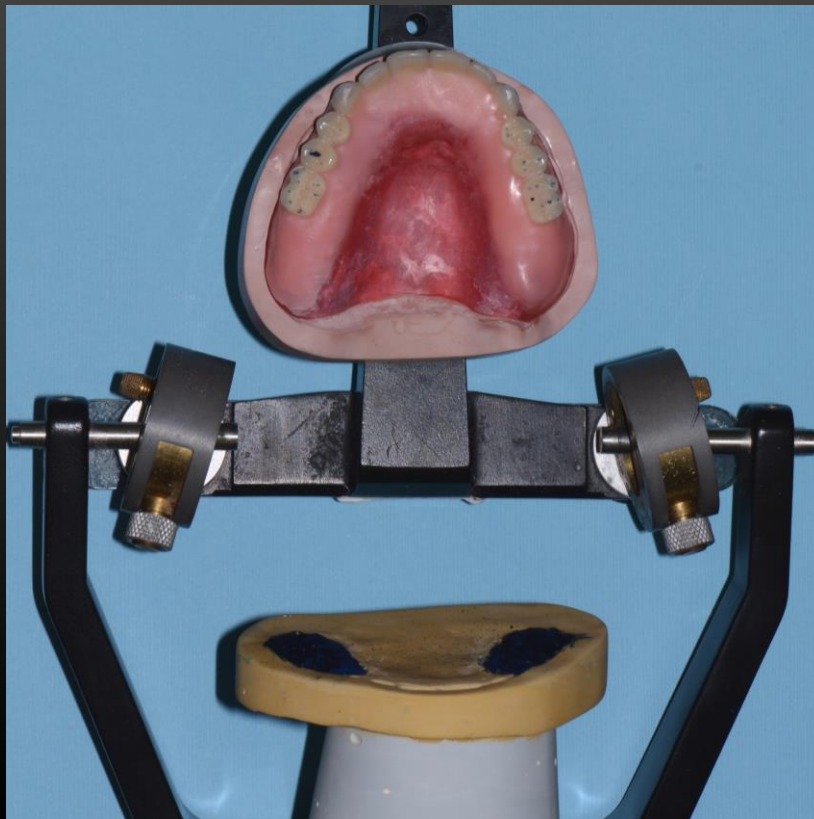
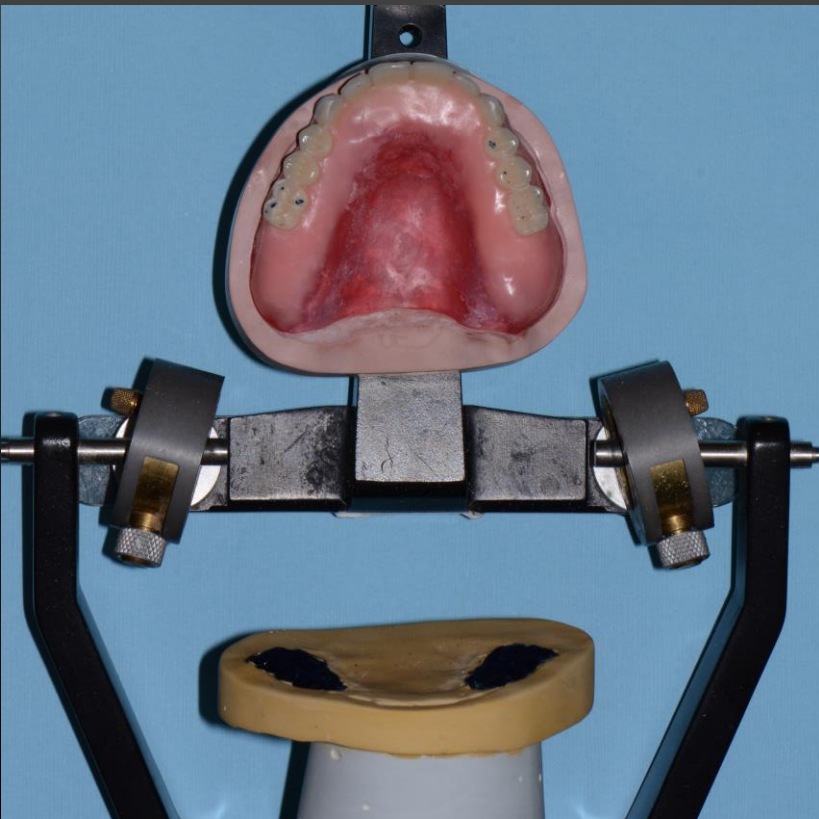
## FGP – TRADITIONAL WORKFLOW



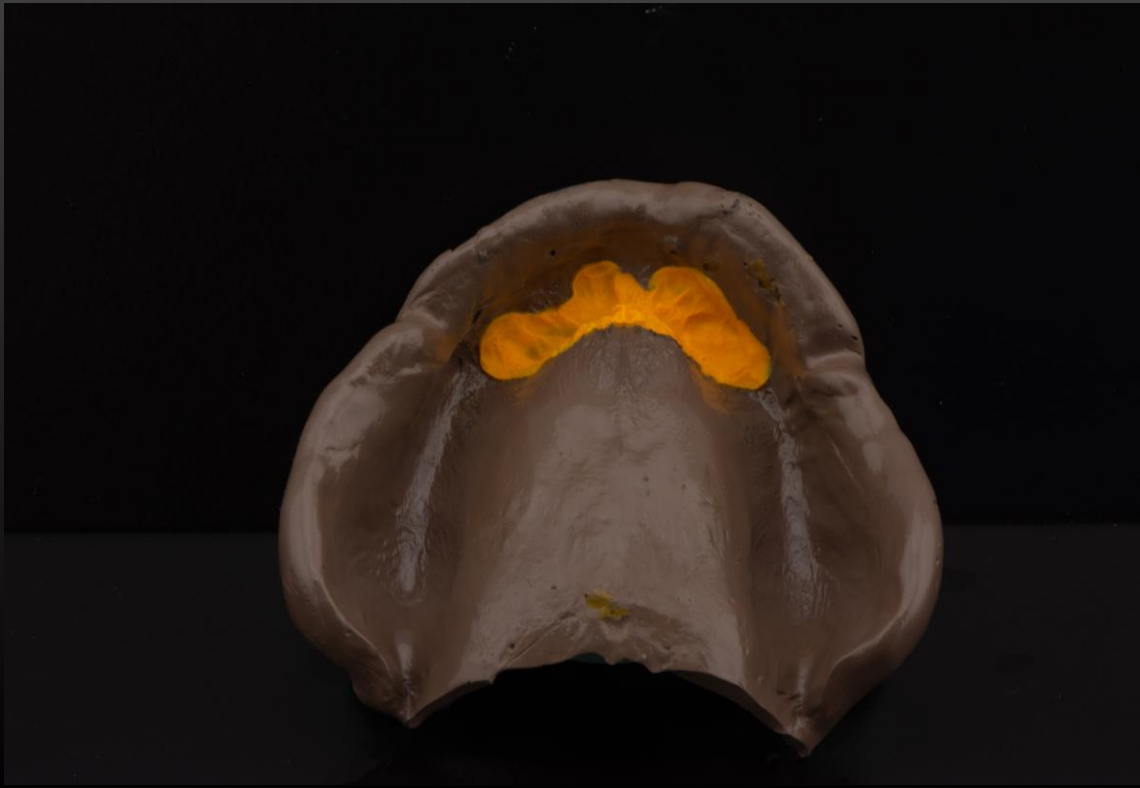
## FGP – TRADITIONAL WORKFLOW



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# IMPRESSION



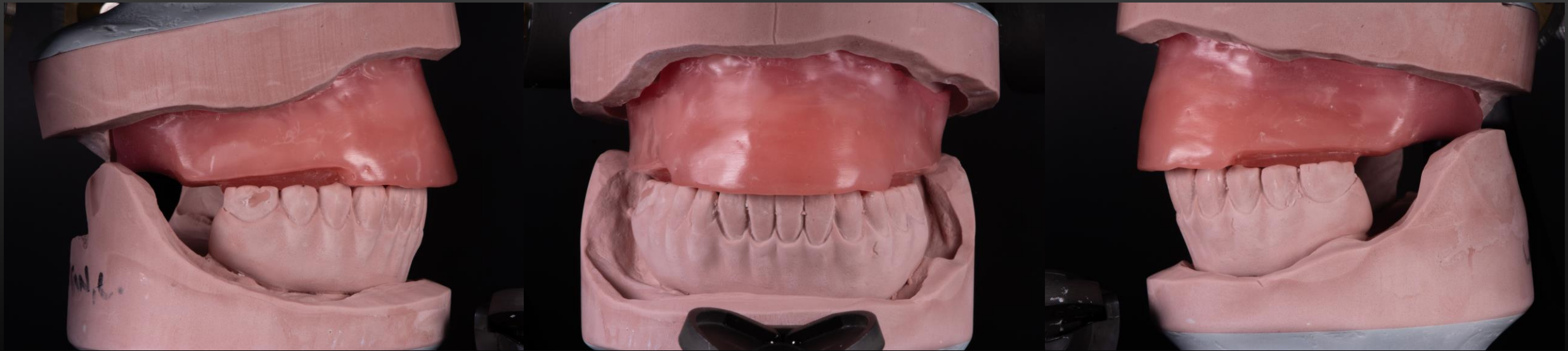
# DIAGNOSTIC MOUNTING



## ANTERIOR WAX SET UP



# SULCI RIDGE



## SULCI RIDGE



# MODJAW MOTION TRACKING

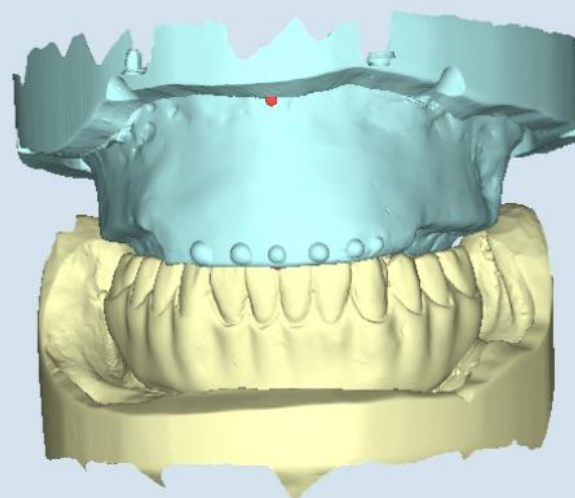
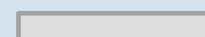




Kinematics

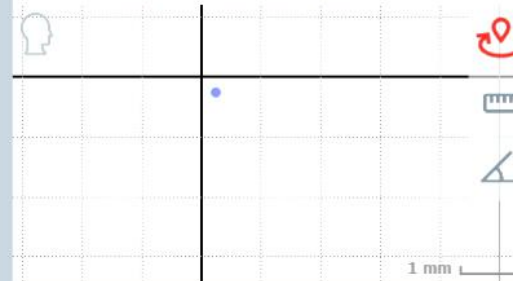
REPLAY

Chauncey JACKSON  
0028

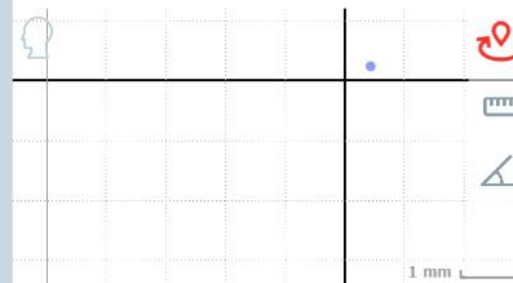


COURSE

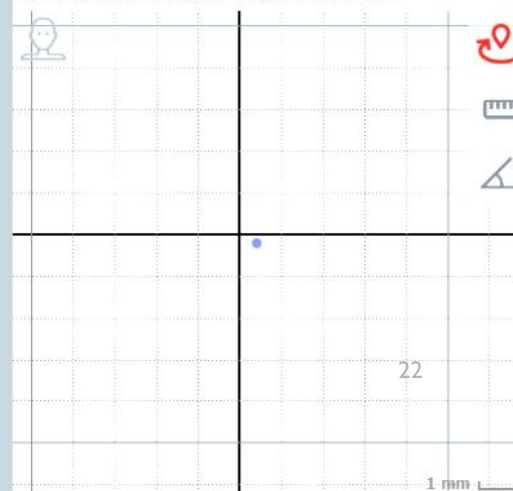
RIGHT CONDYLE SAGITTAL PLANE



LEFT CONDYLE SAGITTAL PLANE



INTERINCISAL POINT FRONTAL PLANE



Horizontal border  
movements 09h57\_crop



FRAME -1



PLAY



FRAME +1



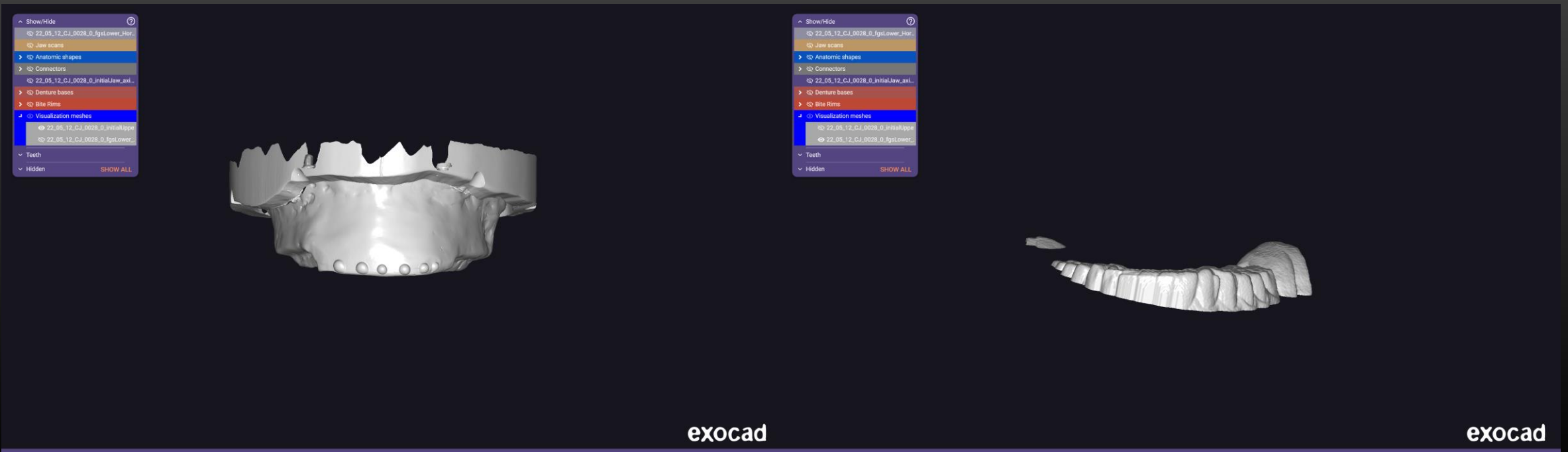
CROP



EXPORT



# DIGITAL DENTURE DESIGN



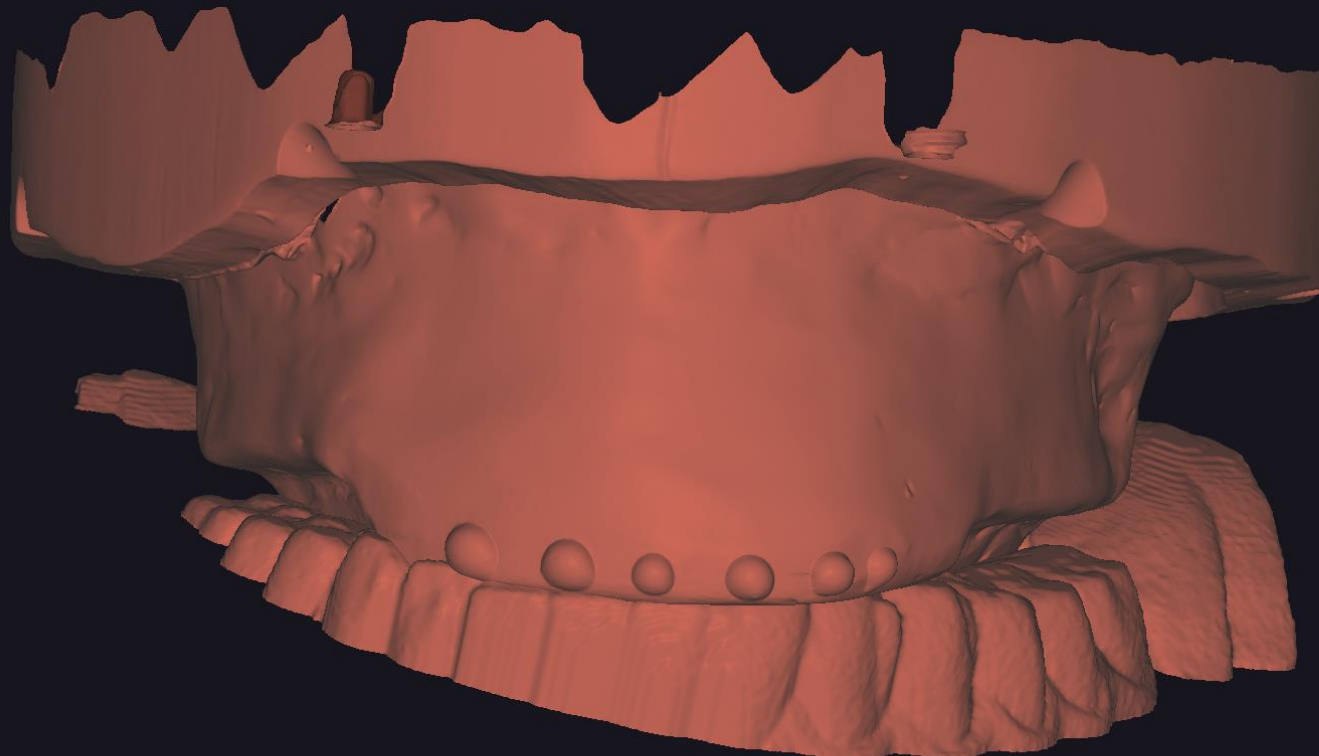
^ Show/Hide ?

- 22\_05\_12\_CJ\_0028\_0\_fgsLower\_Hor..
- Jaw scans
- > Anatomic shapes
- > Connectors
- 22\_05\_12\_CJ\_0028\_0\_initialJaw\_axi...
- > Denture bases
- └ Bite Rims
  - Bite Rim (3-...-14)
  - anterior try-in\_UpperJaw.stl (3-....
  - FGS Alignment.stl (3-...-14,18-...-3
- Teeth
- Hidden SHOW ALL

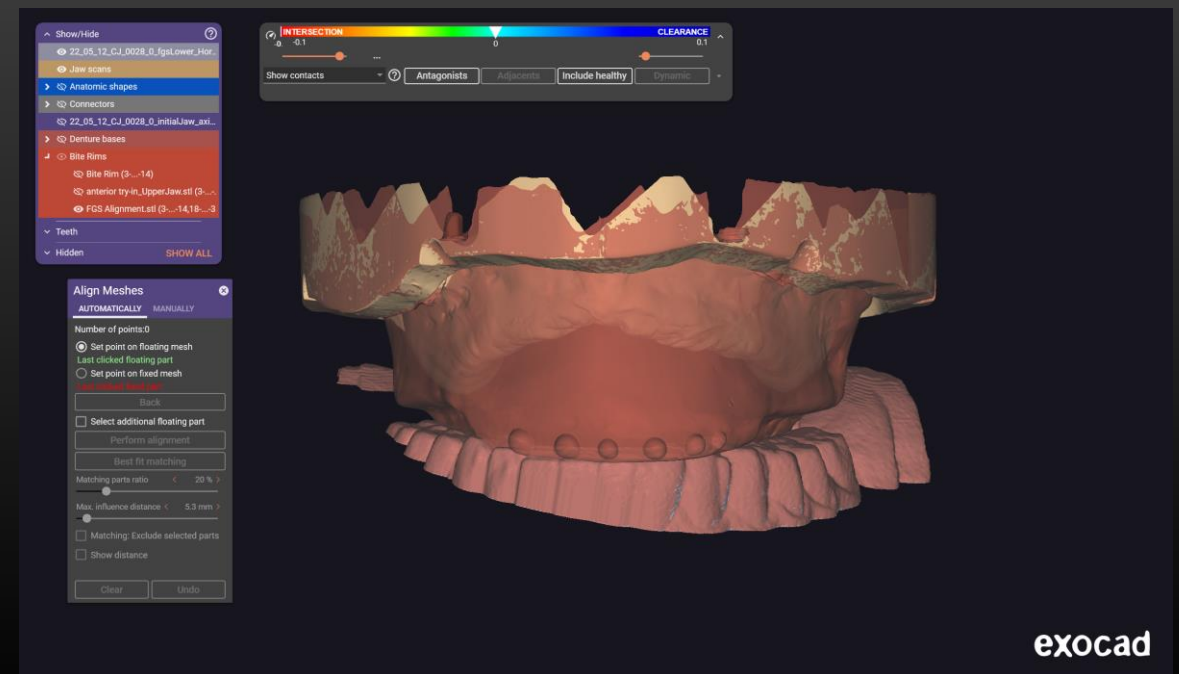
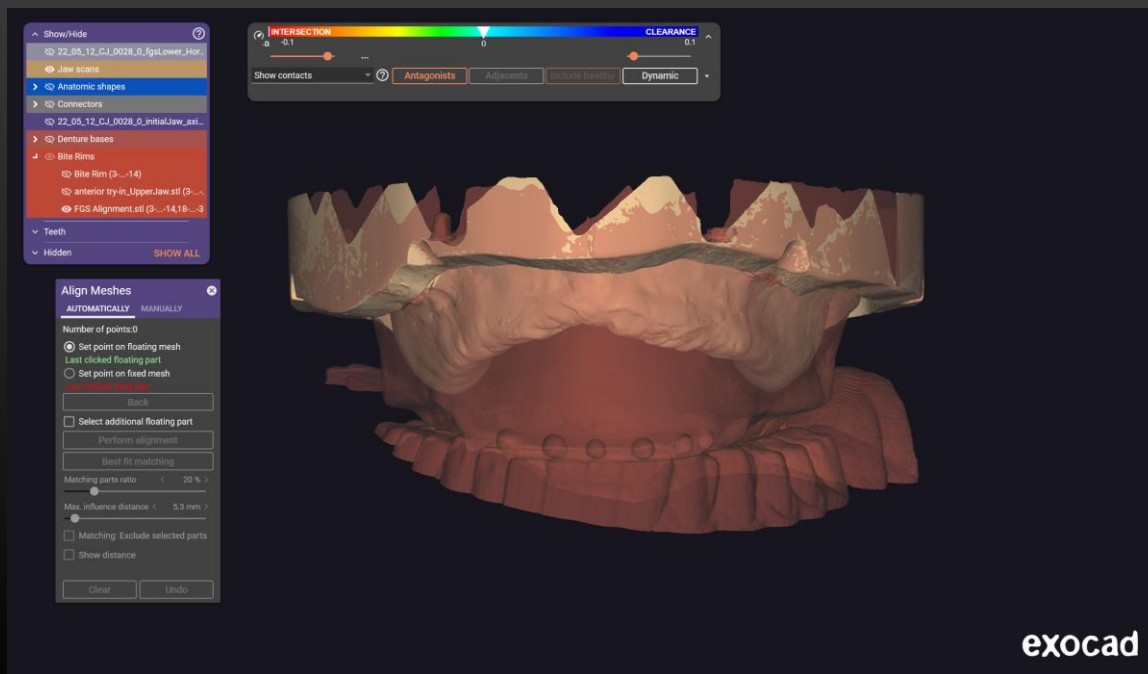
INTERSECTION CLEARANCE

-0.1 0 0.1

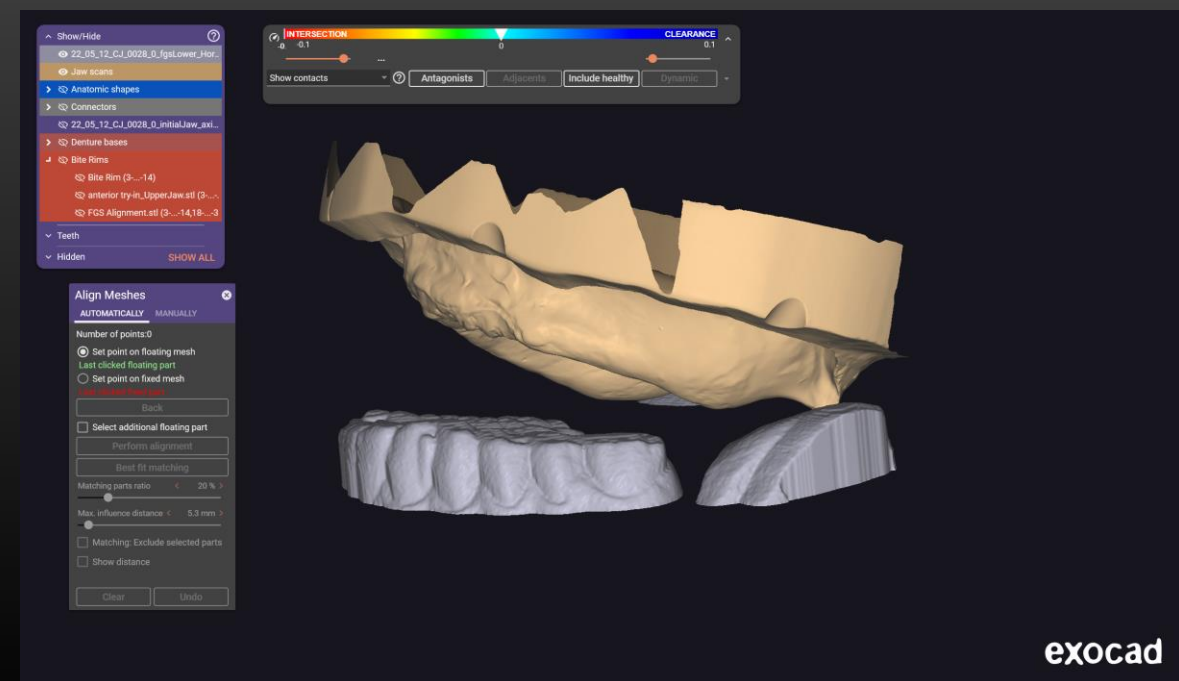
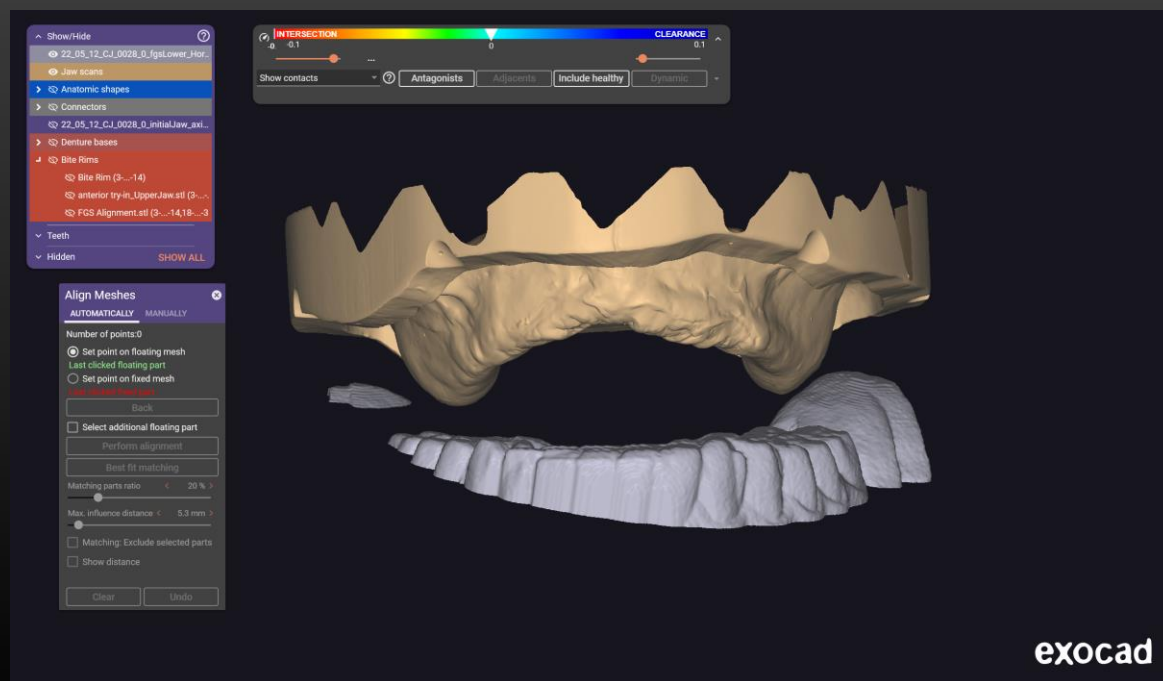
Show contacts ? Antagonists Adjacents Include healthy Dynamic



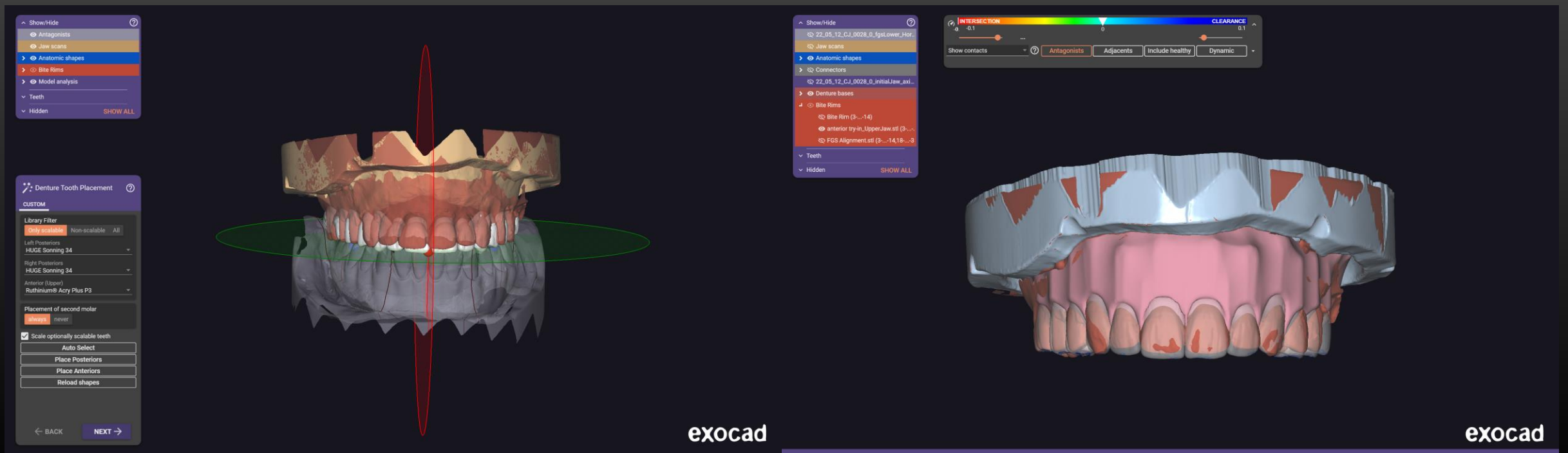
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**INTERSECTION** **CLEARANCE**

-0.1 0 0.1

Show contacts ? **Antagonists** Adjacents Include healthy **Dynamic**

**Free-Forming** ? x

FREE **ANATOMIC** ADAPT ATT.

Presets

Cusps Tooth parts

**Entire tooth** Ridge

Movement restrictions

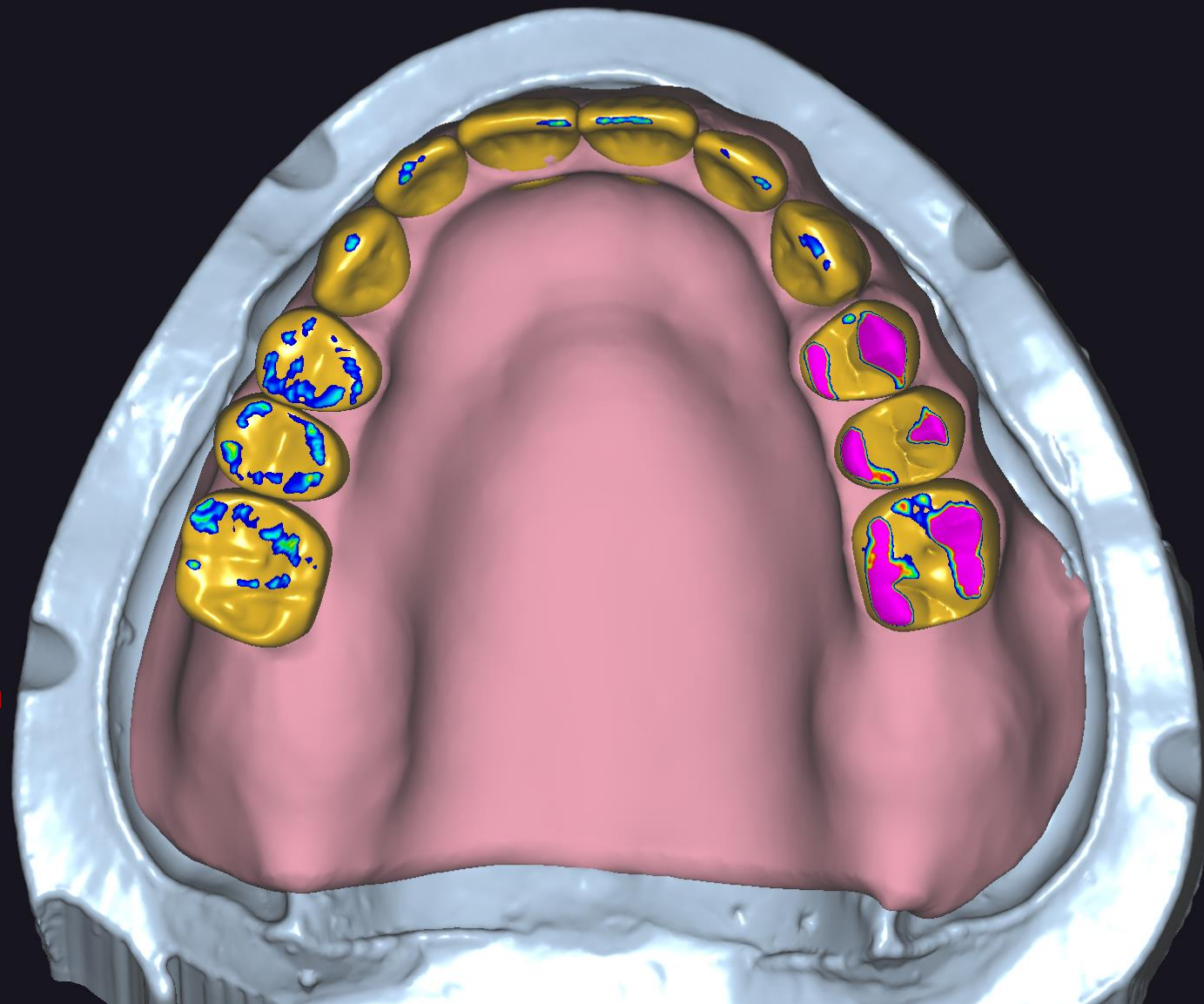
Occlusal only Lock cusp tips Lock equator

Paint & Pull

Cut all intersections

UNDO REDO

OK Cancel



^ Show/Hide ?

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**INTERSECTION** -0.1 0 0.1 **CLEARANCE**

0.1

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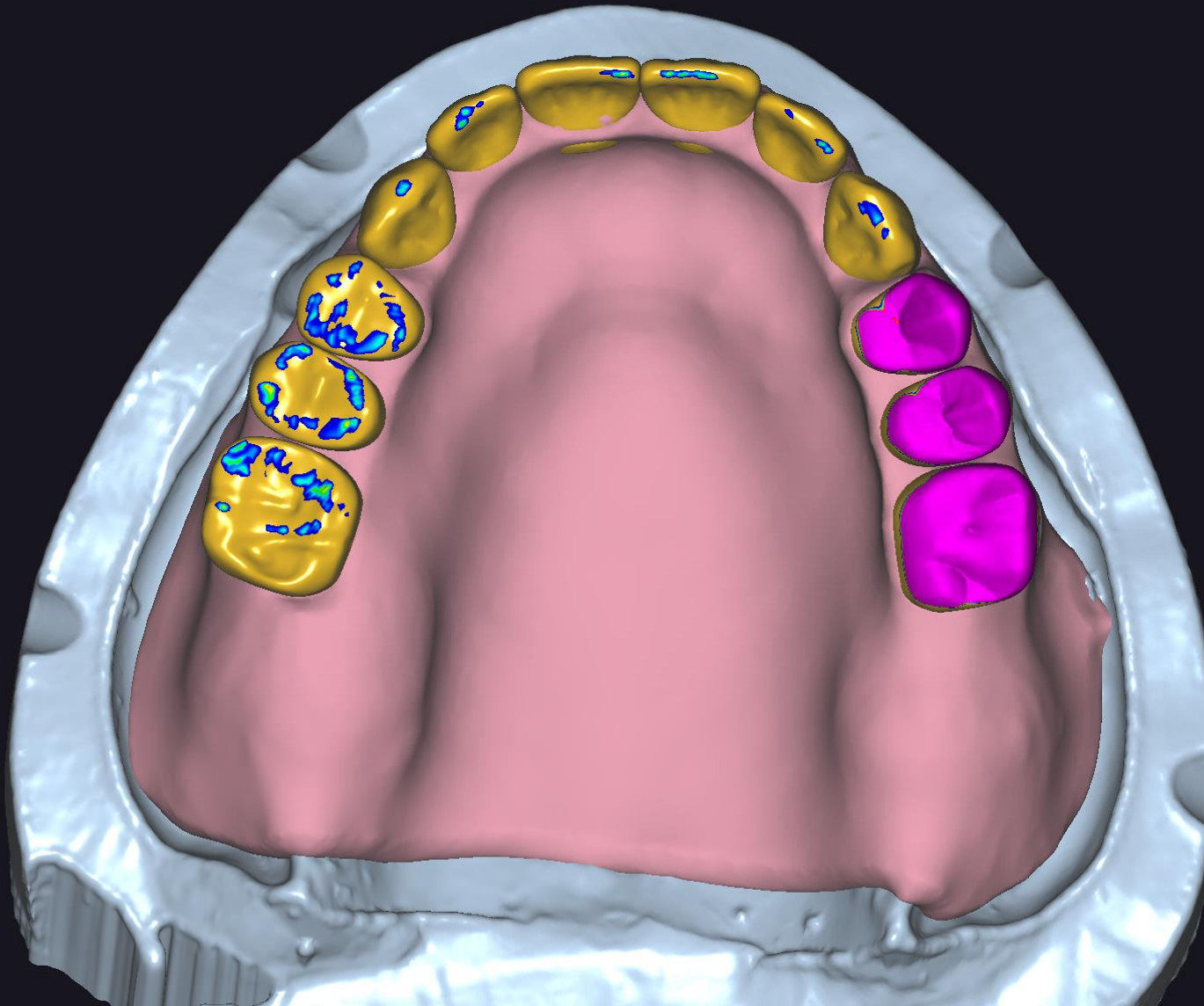
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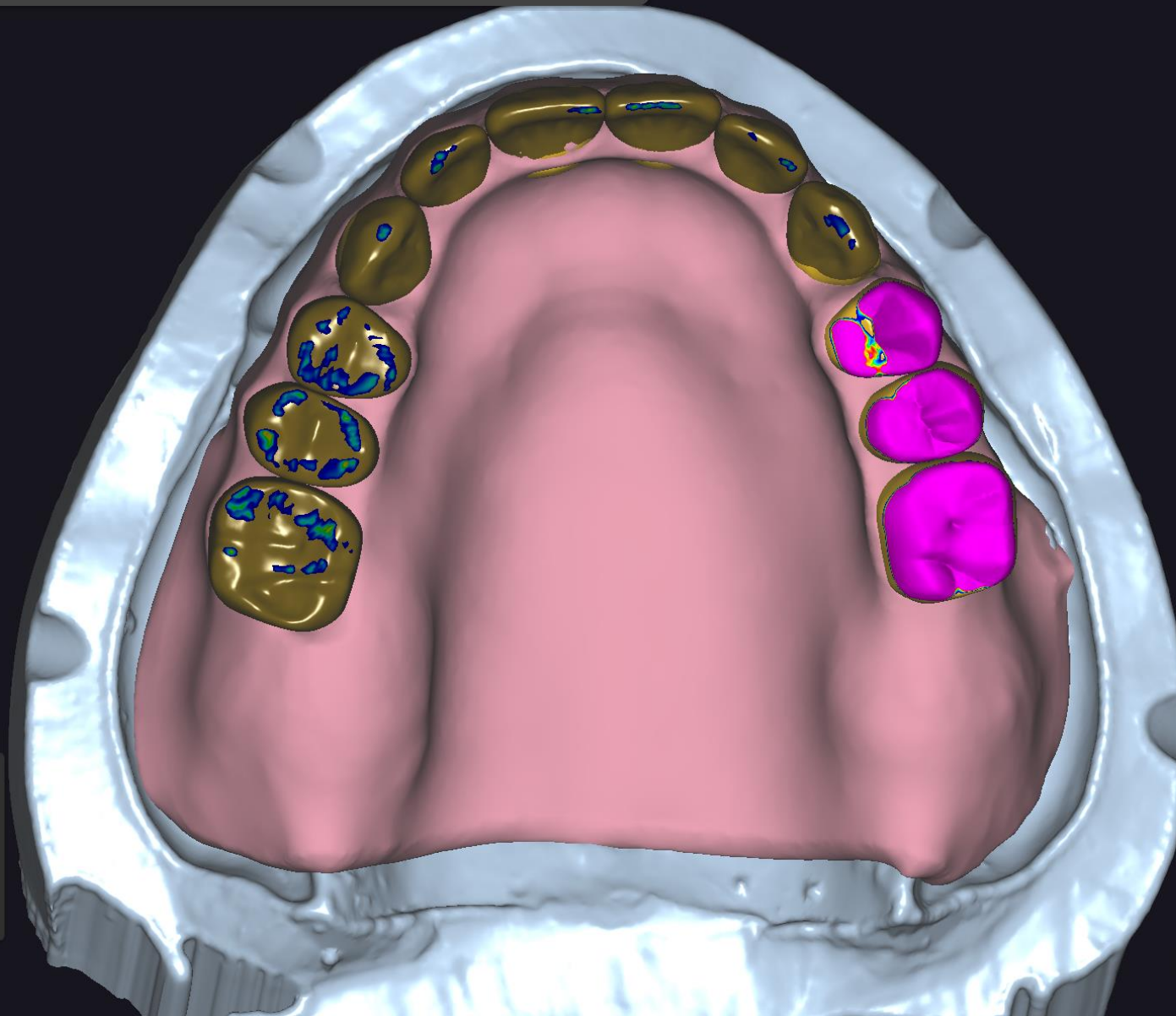
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**Free-Forming** ? x

FREE ANATOMIC **ADAPT** ATT.

Select type of adaptation:

**Occlusal** Approx.

Cut intersections

Shape-preserving adaptation

Desired distance (negative=intersection):

Full contour parts < 0.1 mm >

Occlusion Type

☒ static

☐ dynamic

☒ Exclude selected parts

Cut all intersections

UNDO REDO

OK Cancel

Brush size < >

Select all

Deselect all

Invert selection

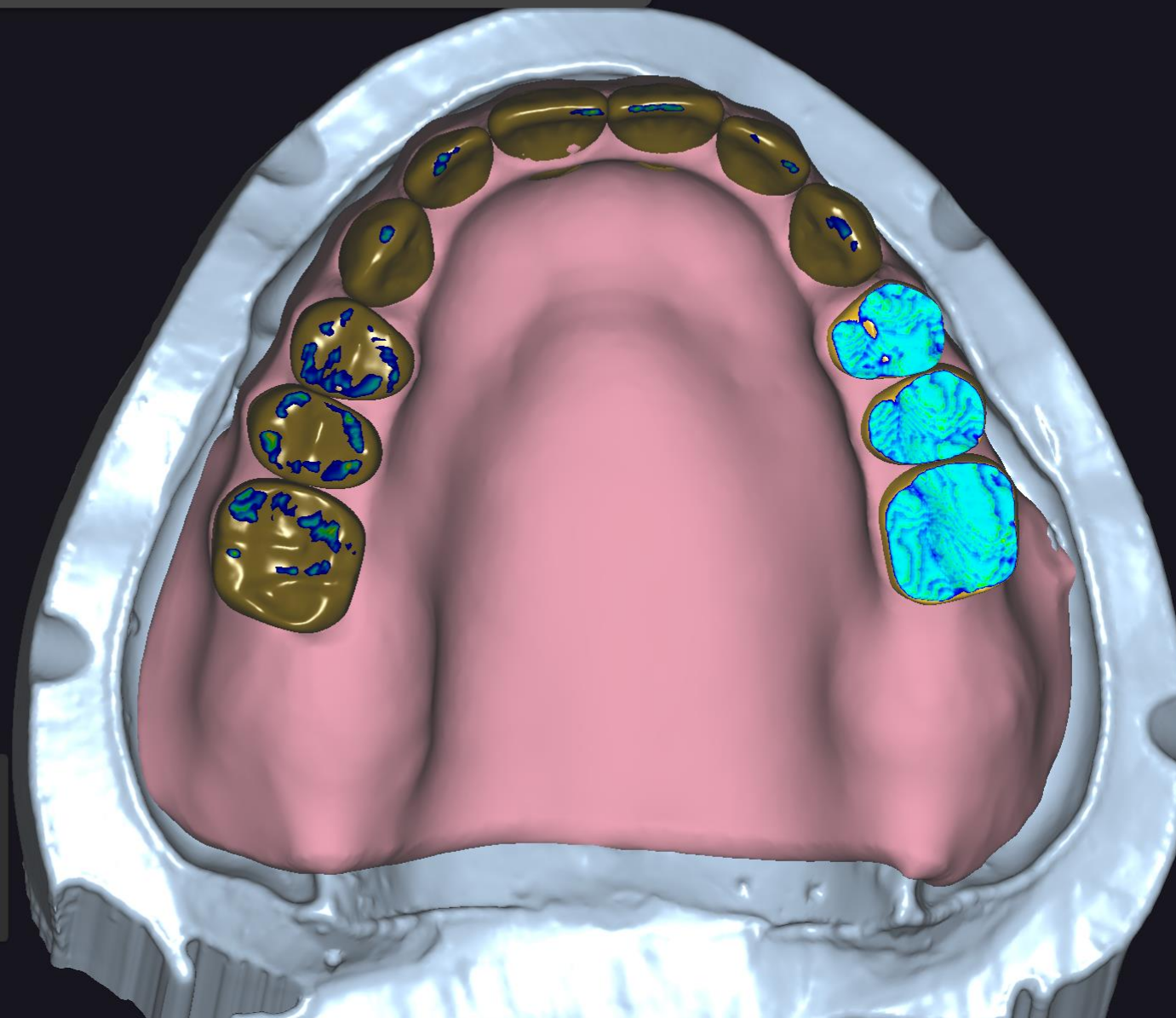
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**Free-Forming** ? x

**FREE** ANATOMIC ADAPT ATT.




Mode

**Add/Remove** Smooth/Flatten

Brush

Strength (CTRL + mouse wheel) < >

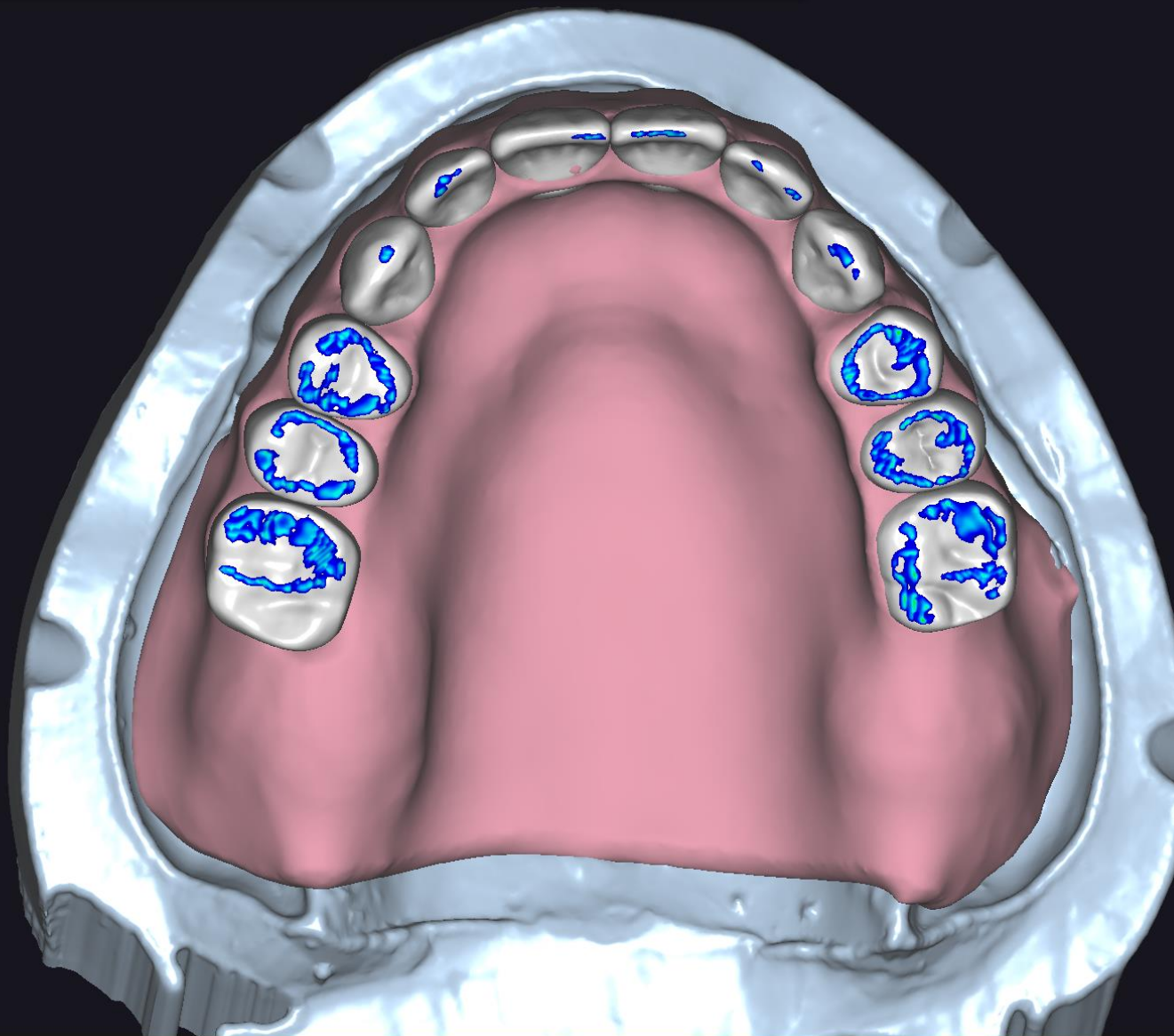
Brush size (SHIFT + mouse wheel) < >

Type:   

Cut all intersections

UNDO REDO

OK Cancel



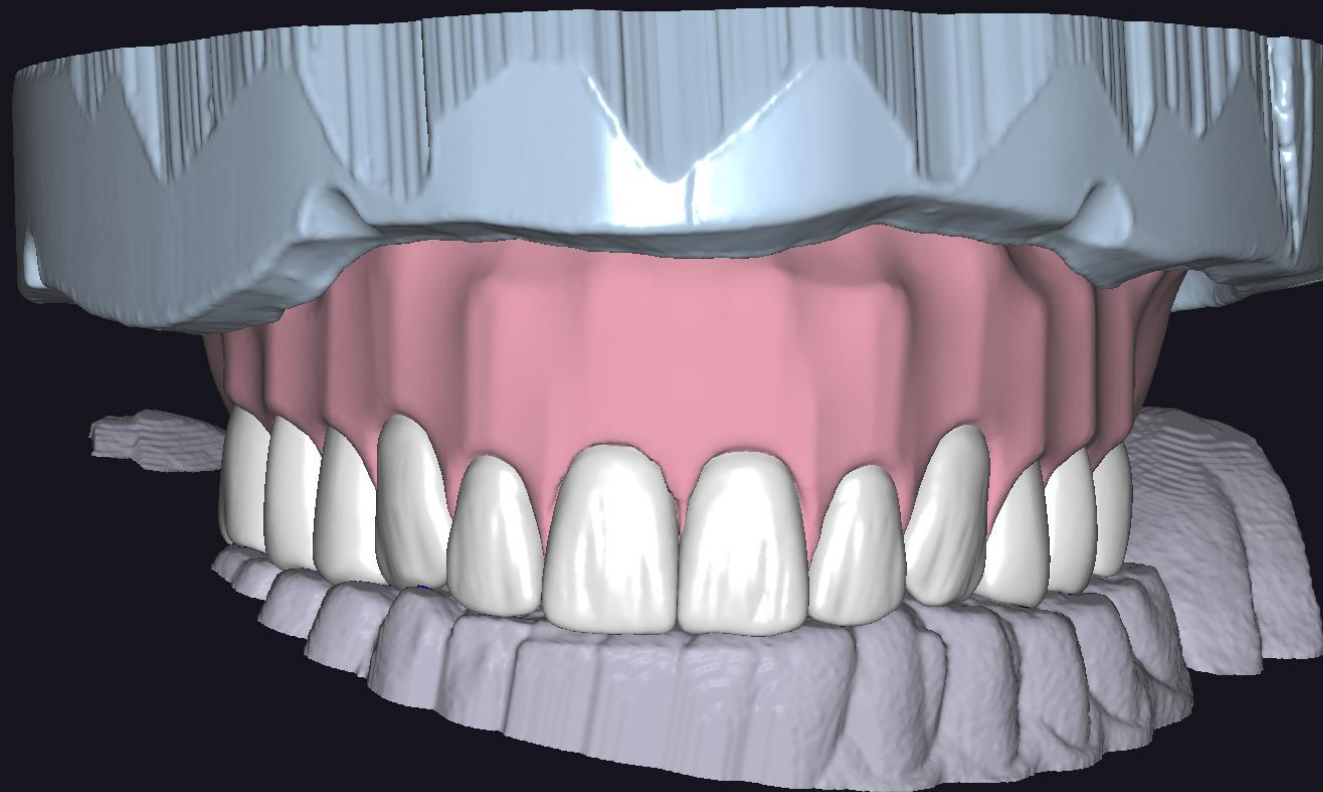
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Show contacts ? Antagonists Adjacents Include healthy Dynamic



# PRINTED TRIAL DENTURE



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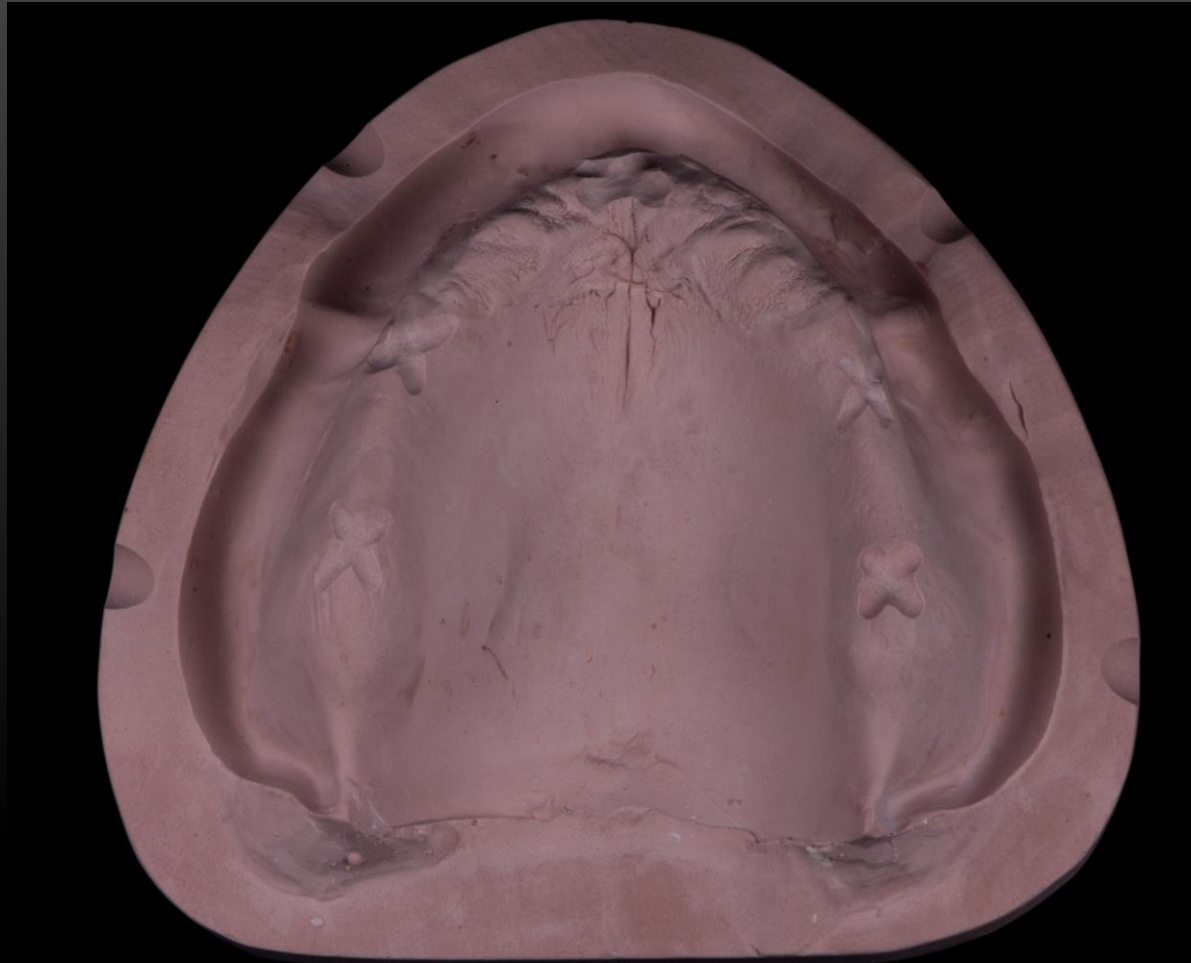
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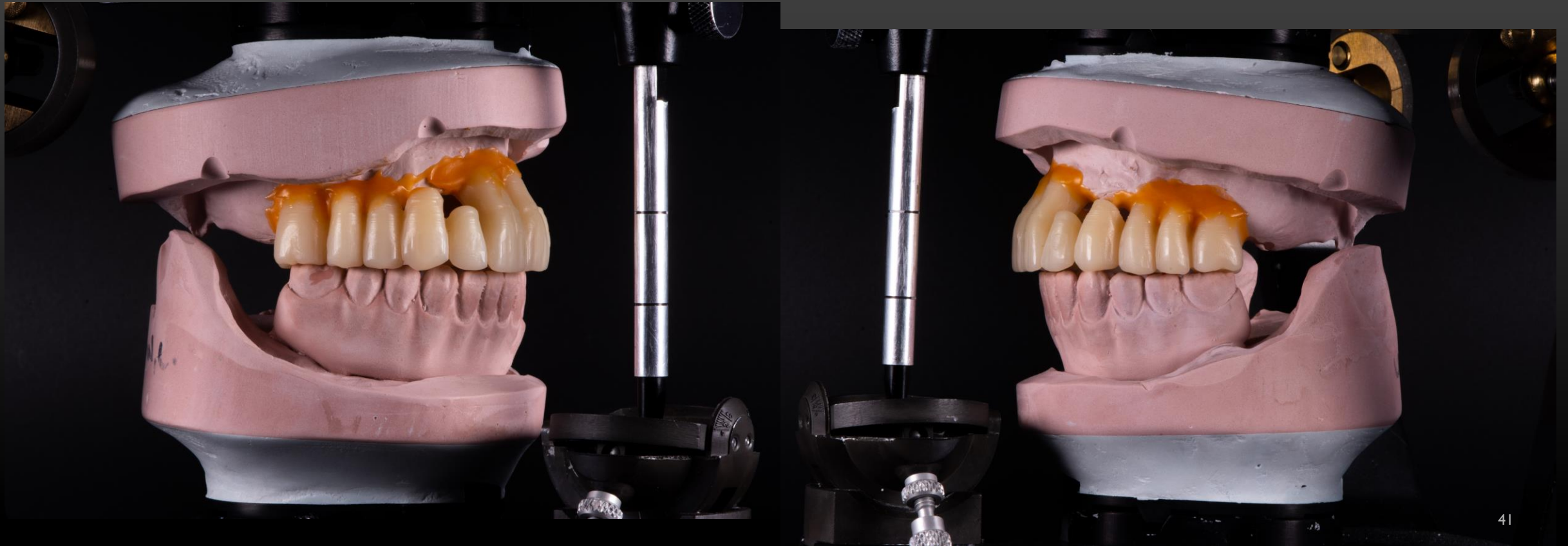
## PRINTED TRIAL DENTURE



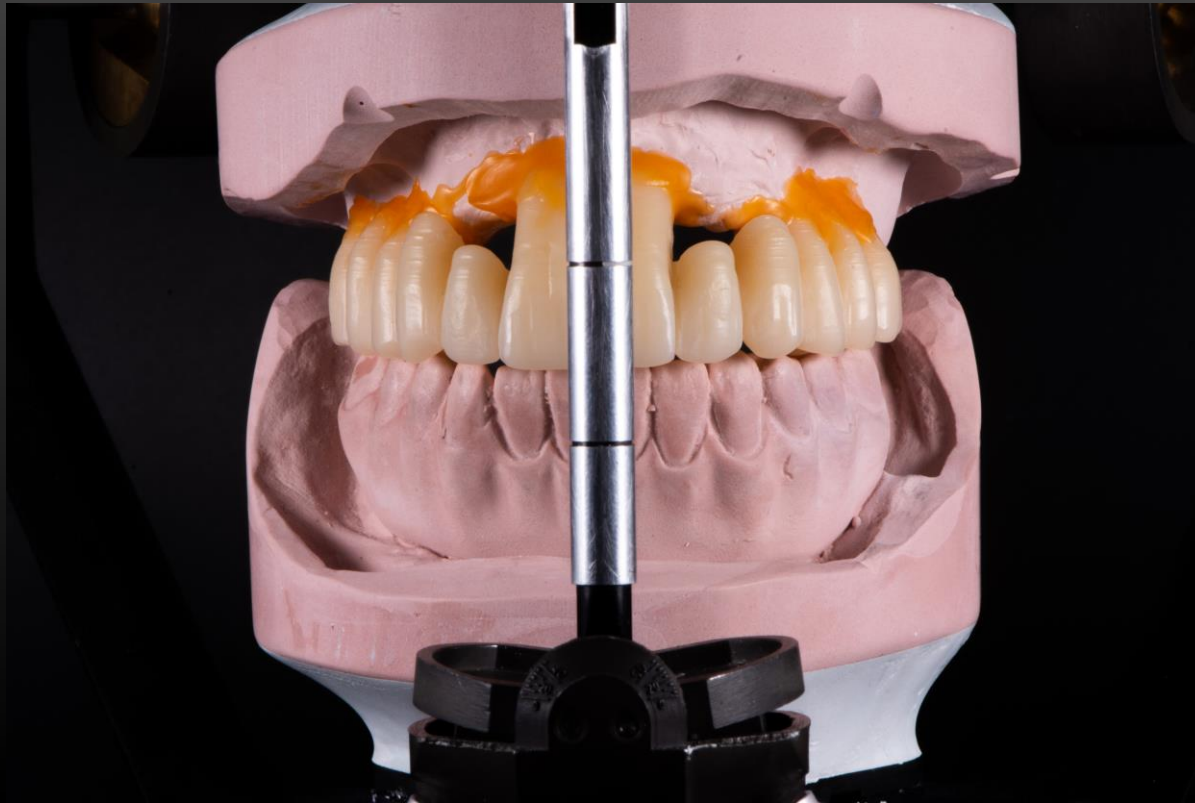
# FABRICATING THE DEFINITIVE DENTURE



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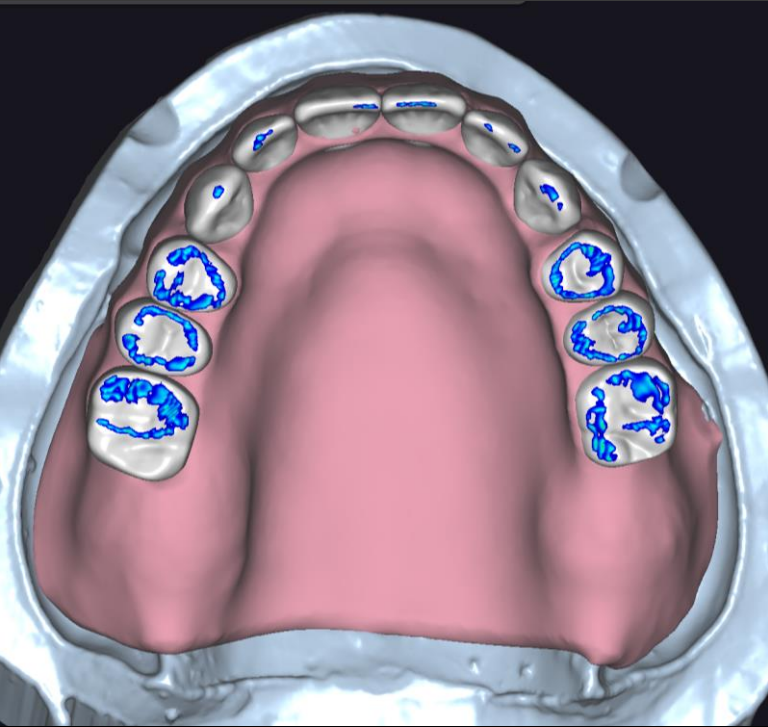
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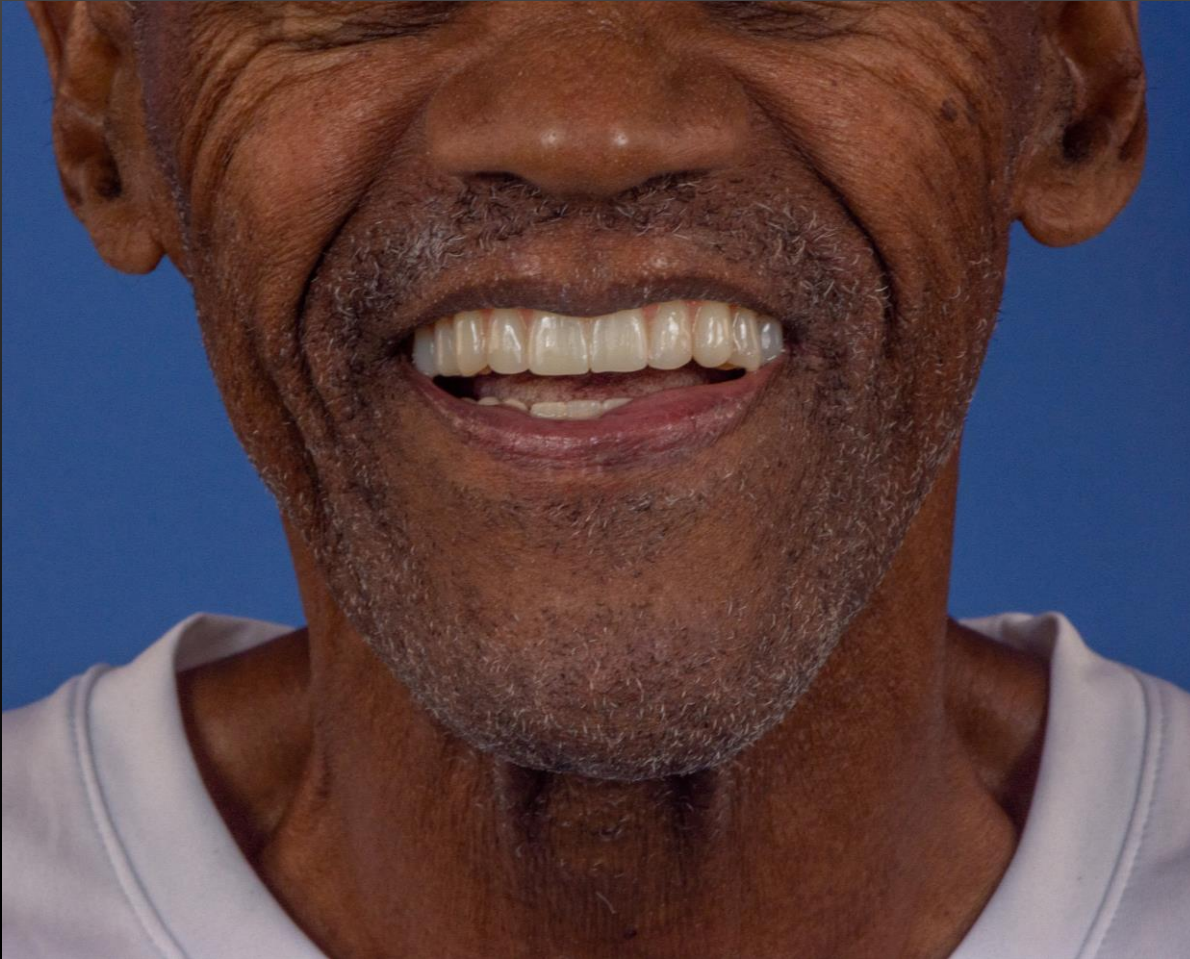
## DENTURE DELIVERY



## ANALYZING THE RESULTS



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## SOURCES

1. Kelly, E. (1972). Changes caused by a mandibular removable partial denture opposing a maxillary complete denture. *The Journal of Prosthetic Dentistry*, 27(2), 140–150. [https://doi.org/10.1016/0022-3913\(72\)90190-4](https://doi.org/10.1016/0022-3913(72)90190-4)
2. Meyer, F. S. (1959). The generated path technique in Reconstruction Dentistry. *The Journal of Prosthetic Dentistry*, 9(3), 354–366. [https://doi.org/10.1016/0022-3913\(59\)90064-2](https://doi.org/10.1016/0022-3913(59)90064-2)
3. Schmitt, S. M. (1985). Combination syndrome: A treatment approach. *The Journal of Prosthetic Dentistry*, 54(5), 664–671. [https://doi.org/10.1016/0022-3913\(85\)90246-x](https://doi.org/10.1016/0022-3913(85)90246-x)
4. Grant, A. A. (1962). Effect of the investment procedure on Tooth Movement. *The Journal of Prosthetic Dentistry*, 12(6), 1053–1058. [https://doi.org/10.1016/0022-3913\(62\)90160-9](https://doi.org/10.1016/0022-3913(62)90160-9)
5. Atkinson, H. F., & Grant, A. A. (1962). An investigation into tooth movement during the packing and polymerizing of acrylic resin denture base materials. *Australian Dental Journal*, 7(2), 101–108. <https://doi.org/10.1111/j.1834-7819.1962.tb01472.x>
6. Baba, N. Z., Goodacre, B. J., Goodacre, C. J., Müller, F. and Wagner, S. (2021), CAD/CAM Complete Denture Systems and Physical Properties: A Review of the Literature. *Journal of Prosthodontics*, 30: 113–124. <https://doi.org/10.1111/jopr.13243>