Alignment Protocol for Patients Wearing Complete Dentures.

Introduction.

In fully edentulous patients wearing complete dentures, digitally aligning the various records is a significant challenge. Because the denture covers most of the soft tissue structures typically used as anatomical references, including the residual ridges and, in the maxilla, a large portion of the palate, anatomy-based alignment alone becomes unreliable and unpredictable.

For this reason, we recommend a Dual Scan Protocol, in which the denture is scanned both intraorally and extra-orally, and the extraoral scan serves as the common reference for integrating all digital records.

Data Integration Principle.

In this protocol, no single record contains all the information required to design the definitive restoration.

- **The complete denture** provides the esthetics, tooth position, and existing vertical dimension.
- **Photogrammetry** provides the exact three-dimensional position of the implants and Multi-Unit Abutments.
- **The soft tissue scan** provides the information required to design the intaglio surface of the final prosthesis.

Integrating these three datasets enables the design of a precise, functional, and highly predictable AOX restoration.

Required Digital Records.

For patients wearing complete dentures, the following records are recommended:

1. Denture scan with the prosthesis seated intraorally.
2. Extraoral denture scan.
3. Digital bite registration.
4. Intraoral scan of the soft tissues and scan bodies.

5. Photogrammetry record.

Clinical Protocol.

Step 1: Relining the Complete Dentures.

Take the existing complete denture(s) and perform a reline using preferably:

- Medium-body PVS.
- Light-body PVS.

Verify that the denture is fully stable and properly seated before proceeding with the digital workflow.

Objective.

To obtain an accurate reproduction of the soft tissues while minimizing denture movement during data acquisition.

Step 2: Bite Registration.

With both dentures properly seated and stabilized in the patient's mouth, capture the digital bite registration.

Scanning Recommendations.

- Maintain the scanner tip approximately 2 mm away from the tooth surfaces.
- Ideally operate between 0° and 45° of angulation relative to the scanned surface.

Objective.

To record the patient's existing vertical dimension and maxillomandibular relationship.

Step 3: Extraoral Denture Scan.

Remove both dentures from the patient's mouth and perform a complete scan of each prosthesis.

The scan should include:

External Surface.

A complete 360-degree capture of:

- Buccal surfaces.
- Lingual or palatal surfaces.
- Occlusal surfaces.
-

Internal Surface.

A complete scan of the entire intaglio surface.

Objectives.

Internal Surface.

- Allows the generation of a digital soft tissue model (Digital Pour).

External Surface.

- Preserves all information related to tooth position and denture morphology.
- Provides common reference points for aligning the various digital records.

Step 4: Intraoral Scan of Soft Tissues and Scan Bodies.

After removing the dentures:

1. Place the scan bodies onto the Multi-Unit Abutments.
2. Perform a complete intraoral scan capturing:
    - Scan bodies.
    - Soft tissues.
    - Peri-implant tissues.

Objective.

Accurately record the soft tissue anatomy needed for intaglio surface design and integration with implant position data.

Step 5: Photogrammetry.

Perform the photogrammetry protocol using the system preferred by the clinician or laboratory.

Objective.

To capture the exact three-dimensional position of the implants, ensuring precision and passive fit of the definitive restoration.

Digital Alignment Workflow.

Once all records have been acquired, the datasets are integrated as follows:

1. Denture Alignment

The extraoral denture scan is aligned with the intraoral denture scan using the prosthetic teeth and external denture surfaces as common reference points.

2. Soft Tissue Model Generation

The relined intaglio surface generates an accurate digital model of the patient's soft tissues.

3. Photogrammetry Integration

The photogrammetry record is incorporated to establish the precise position of the implants and Multi-Unit Abutments.

4. AOX Restoration Design

Finally, the following datasets are combined:

- Esthetics and vertical dimension from the denture.
- Soft tissue information from the intraoral scan.
- Implant position data from photogrammetry.

This integration enables the design of a fully digital and highly predictable AOX restoration.

AOX Alignment Protocol for the Prototype Phase.

Introduction.

At this stage of treatment, the patient has fully osseointegrated implants and a provisional, full-arch, implant-supported hybrid prosthesis (AOX) already in function.

Unlike dentate patients, natural anatomical references such as teeth are no longer available to align digital records predictably. Additionally, surgical fiducial screws as artificial reference points are generally not recommended for this workflow.

For this reason, **non-surgical reference markers** are recommended to establish a relationship between the soft tissue scans and the scans obtained with the prosthesis seated in the patient's mouth.

The provisional prosthesis is the record that contains the critical information of the case:

1. Vertical dimension.
2. Intermaxillary relationship.
3. Tooth position.
4. Patient-approved esthetics.

Therefore, align all additional digital records to the prosthesis scans in occlusion.

Alignment Reference Options.

Option 1: Soft Tissue Scan Markers.

Sticker Markers.

Our primary recommendation is to use medical imaging adhesive markers such as **Beekley Medical CT-SPOT® 120** markers.

These markers adhere well to moist soft tissues and can serve as common reference points across multiple digital records.

PEEK Spheres

As an alternative, custom fiducial markers can be fabricated using:

- 3 mm PEEK spheres.
- Light-cured Gingival Barrier (Gingival Dam).

The gingival barrier acts as a temporary carrier that stabilizes the spheres on the soft tissues during the scanning procedure.

Option 2: Extraoral Scan Bodies.

Another alternative is the use of scan bodies specifically designed for extraoral workflows, such as:

6. Reverse Polo Scan Body (Nobel Biocare®).
7. RevEx (Straumann®).
8. Similar extraoral scanning systems.

In this protocol, the prosthesis itself becomes the common reference object used to relate the various datasets.

Clinical Protocol.

Workflow Using Sticker Markers or PEEK Spheres.

Step 1

Place the CT-SPOT® markers or the PEEK spheres secured with Gingival Barrier onto stable areas of soft tissue, ideally in a tripod configuration. Place one on the posterior left, one on the posterior right, and one in the anterior region.

Step 2

Perform an intraoral scan of the prosthesis in occlusion, ensuring that all markers are fully captured.

Step 3

Scan the opposing arch.

Step 4

Capture the occlusal record (Bite Scan).

Step 5

Remove the provisional prosthesis.

Step 6

Connect the scan bodies to the Multi-Unit Abutments, taking care not to displace or detach the reference markers.

Step 7

Perform the soft-tissue and scan-body scan.

Step 8.

Complete the photogrammetry protocol according to the system being used.

Clinical Protocol Using Extraoral Scan Bodies.

Step 1

Perform an intraoral scan of the provisional prosthesis in occlusion.

Step 2

Scan the opposing arch.

Step 3

Capture the occlusal record (Bite Scan).

Step 4

Remove the prosthesis from the patient's mouth.

Step 5

Attach the Reverse Scan Bodies or corresponding extraoral scan bodies to the prosthesis.

Step 6

Perform a complete 360-degree extraoral scan of the prosthesis, capturing all surfaces.

Alignment Workflow in Exocad.

Technique Using Scan Markers.

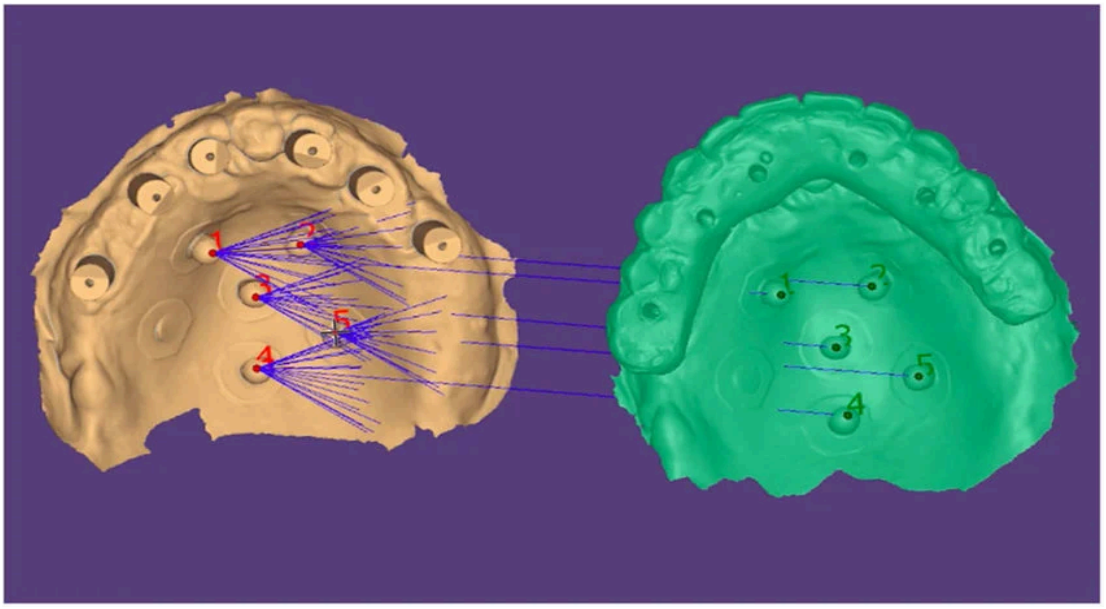
Scan markers, whether adhesive markers or PEEK spheres, serve as common reference points between:

- The prosthesis scan obtained in occlusion.
- The soft tissue and scan body scan.

Alignment is performed by matching these markers across both datasets.

Once the scans are aligned, the following information is preserved from the provisional prosthesis:

- Vertical dimension.
- Occlusal relationship.
- Tooth position.
- Approved esthetics.



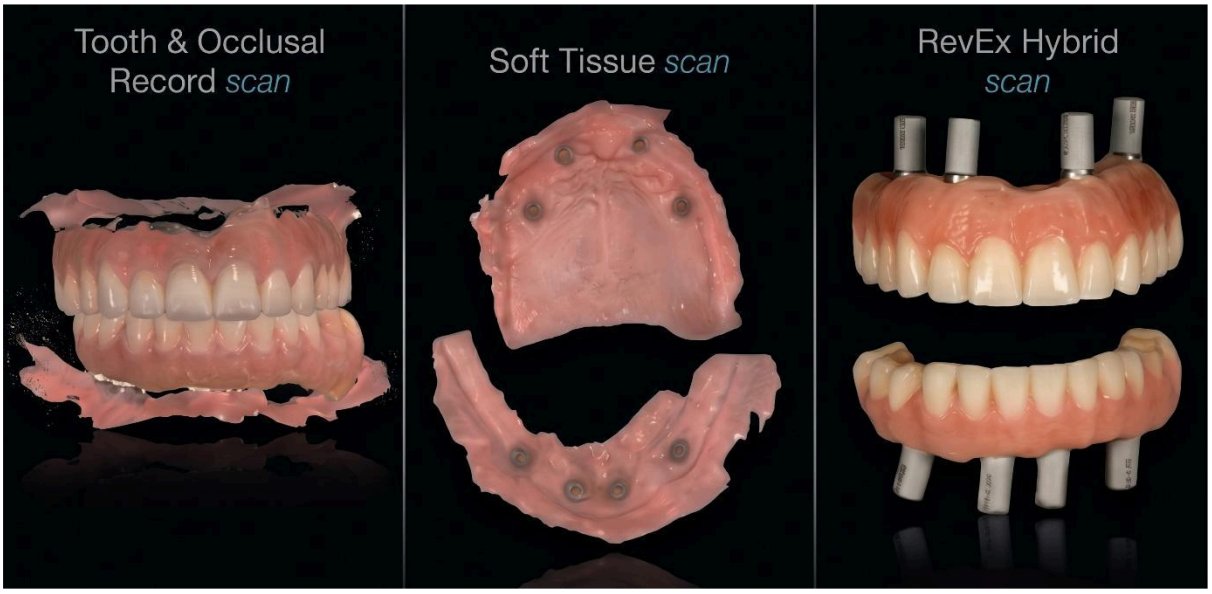
Technique Using Extraoral Scan Bodies.

In this workflow, the provisional prosthesis remains the primary record containing the patient's vertical dimension, intermaxillary relationship, and approved esthetics.

The extraoral scan captures the prosthesis with the Reverse Scan Bodies, while the prosthetic teeth provide the common geometry for alignment.

As a result, the prosthetic teeth become the fiduciary references used to relate:

- The intraoral prosthesis scan.
- The extraoral scan with Reverse Scan Bodies.
- The soft tissue records.
- The photogrammetry data.



DENTAL DIGITAL DESIGNS