

# Treatment Planning & Surgical Guide Records

Pre-surgical digital records required for CBCT-based treatment planning and guide fabrication

## SECTION 1

### How to Use This Guide

This guide defines the digital records DTS requires before beginning CBCT-based treatment planning and surgical guide fabrication. Submitting complete records at the outset eliminates delays and ensures the plan we deliver matches your clinical intent.

This guide covers pre-surgical records only. Records requirements for restorations, custom abutments, and final prosthetic work are covered in a separate DTS document.

**Note:** *When in doubt, submit all available records. Incomplete records are the most common cause of planning delays. If you are unsure what a specific case requires, contact DTS before submitting.*

## SECTION 2

### CBCT Requirements

A cone beam CT scan is required for all guided surgery cases. CBCT is used to plan implant position, assess bone volume, and register the surgical guide. No surgical guide can be fabricated without a qualifying CBCT.

#### Scan parameters

<b>Voxel size</b>	0.2–0.4 mm (0.3 mm preferred for implant planning)
<b>Field of view</b>	Full arch: inferior orbital rim to chin (maxilla); full mandible including inferior border. Capture both arches in one FOV when planning bilateral cases.
<b>Gantry tilt</b>	0°; axial slice plane parallel to maxillary occlusal plane
<b>Arch separation</b>	Cotton rolls bilaterally in the posterior - arches must be separated during all patient scans
<b>File format</b>	Single-file DICOM (recommended) or uncompressed DICOM multi-file volume. Do not export iCAT Vision files, DICOMDIR, or compressed formats.
<b>Quality review</b>	Review scan before dismissing patient. Confirm no stitching errors, double imaging (patient movement), or cut-off anatomy.

**Note:** Single-file DICOM export is preferred where your CBCT unit supports it. It prevents missing files and data corruption during upload, and opens faster in RealGUIDE planning software. A standard uncompressed multi-file DICOM volume is acceptable if single-file export is unavailable. It is always safer to export the DICOM output in a \*.zip format.

## Positioning and patient preparation

- Center the patient within the FOV – cutting off posterior anatomy is the most common scanning error and will require a repeat scan
- Full arch coverage is required – quadrant scans cannot be used for treatment planning
- Instruct the patient to close their eyes before initiating the scan – this significantly reduces involuntary head movement and motion artifact
- Patient must remain completely still throughout the scan – motion artifact invalidates the CBCT for planning
- Confirm all vital structures are visible before dismissing: inferior alveolar nerve, sinuses, and ramus of mandible

## DICOM export and submission

- Export the DICOM volume to a clearly labelled folder on your computer (patient name + date of scan)
- Preferred: export as a single-file DICOM if your unit supports it
- If multi-file: uncompressed DICOM 3 multi-file volume only. Do not include viewers, iCAT Vision files, or DICOMDIR
- For dual-scan cases: create separate sub-folders labelled 'patient' and 'appliance'
- Zip the folder and upload via the DTS secure upload link provided at case setup

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## SECTION 2 – DUAL-SCAN PROTOCOL

### Dual-Scan Protocol for Fully Edentulous Cases

For fully edentulous cases requiring a tissue-supported guide, the dual-scan protocol is mandatory. It uses two records to register the intended prosthetic tooth position against the patient's bone anatomy: an extraoral scan of the denture (or scan appliance), and a CBCT of the patient wearing it.

A well-fitting existing denture or a clear acrylic duplicate scan appliance is required. A loose or poorly-adapted prosthesis will produce an inaccurate guide and must be relined before scanning.

#### Step 1: Denture reline (if needed)

Perform a hard acrylic chairside reline if the existing denture is not firmly adapted to the tissue.

1. Inject hard acrylic reline material onto the intaglio (tissue) surface of the denture.
2. Guide the patient into proper occlusion. Hold while the material sets.
3. Remove the denture and trim excess material from the exterior surface only.

## Step 2: Apply radiopaque fiducial markers

Fiducial markers allow the two scans to be co-registered in the planning software. Markers must remain fixed between both scans. Apply them before the extraoral scan and do not handle the denture in a way that could dislodge them.

4. Use Suremark DentalMark VisionLine 2.0 mm ball markers (denture-sized adhesive labels). The 2.0 mm diameter is the correct size for subgingival placement in dental acrylic: visible on CBCT without excessive artifact, and small enough to position precisely within the pink acrylic. Substitute with other sizes is not recommended.
5. Apply 5 to 6 markers total.  
Distribute them asymmetrically across the denture – asymmetric placement gives the planning software stronger geometric control during co-registration and prevents ambiguous orientation. (Example for a maxillary denture: buccal surface at tooth positions #3, #6, #10, and #14; palatal surface at #12, and one more positioned past the rugae into the flat palatal zone.
6. Place all markers within the pink acrylic only, on the buccal and palatal or lingual surfaces, subgingivally. Do not place markers on denture teeth or on the occlusal surface.
7. Press each marker firmly until fully adhered. Confirm all markers are secure before proceeding.

**Important:** Do not move, reposition, or replace markers between scans under any circumstances. Marker movement invalidates the dual-scan registration and requires both scans to be repeated from the beginning.

## Step 3: Scan the denture extraorally (Scan 1)

The extraoral scan is performed first, before the denture is placed in the patient's mouth. This sequence confirms marker adhesion under controlled conditions before any intraoral handling.

### Option A: Extraoral CBCT of the denture

8. Place the denture on a foam or Styrofoam block in the center of the CBCT field of view. Orient in occlusal position: maxillary teeth facing down; mandibular teeth facing up.
9. Do not place the denture directly on the CBCT unit's plastic stand – the stand creates artifact that obscures the markers.
10. Ensure the entire denture is within the FOV. Scan using the dedicated denture protocol of your CBCT unit.
11. Export and label this dataset as 'appliance'.

### Option B: Extraoral IOS scan of the denture

12. Scan both the intaglio surface (tissue side) and the cameo surface (external side) with a high-resolution intraoral scanner.
13. Ensure full 360° coverage to capture the complete denture geometry including all marker positions.
14. Export as open STL/PLY and label as 'appliance'.

## Step 4: CBCT scan of patient with denture seated (Scan 2)

15. Seat the denture or scan appliance fully in the patient's mouth. Confirm full tissue contact with no rock before scanning.
16. Instruct the patient to bite lightly on cotton rolls or gauze bilaterally in the posterior to hold the denture fully seated.
17. Instruct the patient to close their eyes before initiating the scan.
18. Confirm that all radiopaque markers are visible in the scanner FOV.
19. Initiate the scan. Instruct the patient to remain completely still until scanning is complete.
20. Recommended FOV: inferior orbital rim to chin. Before dismissing the patient, review the scan: no stitching errors, no double imaging, complete anatomical coverage of the inferior alveolar nerve, sinuses, and ramus of mandible.
21. Export and label this dataset as 'patient'.

## Bite registration: dual-scan cases

A radiolucent bite registration is required for edentulous dual-scan cases. It stabilizes the denture during the patient scan and serves as a seating index at the surgical appointment.

22. With the denture fully seated, apply a thin layer of radiolucent clear VPS bite registration material to the occlusal surface of the denture.
23. Guide the patient into centric occlusion. Hold while the material sets.
24. Remove and trim any flash. Retain this bite index – it is used at surgery to confirm the guide is fully seated before anchor pin placement.

**Note:** *The bite registration is a physical item used at the surgical appointment. Document it in the case notes and retain it at the referring practice until the day of surgery.*

## Submitting dual-scan data

- Create a master folder named with the patient name and date
- Sub-folder 'patient': CBCT DICOM of patient with denture seated
- Sub-folder 'appliance': CBCT DICOM or open STL of the denture alone
- Zip the master folder and upload via the DTS portal.

## SECTION 3

# Intraoral Scans

DTS accepts digital intraoral scans only. Physical impressions and analog bite registrations are not accepted. All records must be submitted as digital files in open STL format/via your IOS portal.

## Dentate arches

Capture a full-arch scan of both the operative arch and the opposing arch. Partial-arch scans are not accepted for treatment planning cases.

- Operative arch: full arch including all present teeth and marginal tissue
- Opposing arch: full arch
- Digital bite scan in centric occlusion (see Section 4)

## Partially edentulous arches

Same requirements as dentate. Ensure that edentulous spans are fully captured including the alveolar ridge tissue within and adjacent to the span. Remove any removable partial before scanning. Perform a second scan including the partial denture fully seated and saved as a “pre-op” scan.

## Fully edentulous arches

For guided surgery cases on edentulous arches, the intraoral scanner is used to capture the denture or scan appliance as part of the dual-scan protocol (see Section 2).

A direct IOS of the edentulous ridge alone is not sufficient for surgical guide fabrication.

If no prosthesis exists and a new denture is required as part of the treatment plan, contact DTS before scanning. A planning consultation will determine the appropriate workflow.

## Extended scan coverage: immediate denture cases

When an immediate complete or partial denture is planned as part of the surgical case, the IOS scan must extend beyond standard arch coverage to capture all landmarks required for denture fabrication.

### The following landmarks must be fully captured:

- Vestibular depth: full depth of the buccal and labial vestibule. The scan must not terminate at the ridge crest.
- Frenum attachments: labial and buccal frenums, including position and width
- Palatal vault: full depth from alveolar crest to midline (maxilla)
- Maxillary tuberosities: distal extent of the ridge bilaterally
- Mandibular retromolar pads: full posterior extent of the ridge bilaterally
- Full alveolar ridge including undercuts and lingual and buccal borders

**Important:** Incomplete vestibular coverage is the most common reason an immediate denture scan is rejected for fabrication. The scan must capture the full tissue depth – not only the ridge crest.

<b>Format</b>	Open STL (.stl) – scanner-native formats not accepted
<b>Coverage</b>	Full arch – partial arch scans not accepted
<b>Opposing arch</b>	Required for all cases
<b>Bite record</b>	Digital bite scan required (see Section 4)
<b>Scan quality</b>	No voids, compression artifacts, or tears in the area of interest
<b>Immediate denture</b>	Extended coverage required – see landmark list above
<b>Submission</b>	Upload via DTS secure file transfer link provided at case setup

**SECTION 4**

## Digital Bite Scan

A digital bite scan in centric occlusion or centric relation is required for all guided surgery cases. DTS does not accept analog bite registrations. All bite records must be submitted as STL files.

### Dentate and partially edentulous arches

- Capture the digital bite scan within the same scanning session as the arch scans
- Centric occlusion for most cases; centric relation for full-arch cases without reliable maximum intercuspation
- Both arches must be represented – unilateral bite scans are not accepted
- If the opposing arch carries a removable prosthesis, seat it fully before capturing the bite scan

### Fully edentulous arches

For edentulous cases using the dual-scan protocol, the bite registration is the physical radiolucent VPS index described in Section 2. A digital bite scan of an edentulous arch is not required for surgical guide fabrication.

<b>Format</b>	STL – captured as part of the arch scan session
<b>Dentate / partial</b>	Digital bite scan, full arch, centric occlusion or centric relation
<b>Fully edentulous</b>	Radiolucent VPS bite index (physical – see Section 2, dual-scan protocol)
<b>With prosthesis</b>	Seat any removable prosthesis before capturing the bite scan
<b>Submission</b>	Upload as STL alongside arch scan files

SECTION 5

# Clinical Photography

Clinical photographs are required for all guided surgery cases where an immediate-load provisional or immediate denture is planned. For cases without a provisional, photography is strongly recommended but not required for guide fabrication.

Capture all images with the patient seated upright, camera level with the occlusal plane. Photograph before intraoral scanning to keep soft tissue and teeth undistorted.

## Required views: immediate provisional and smile design

These four views provide the reference needed for provisional smile design, midline alignment, and prosthetic clearance:

- Full face, frontal – natural smile, both eyes and ears fully visible. Used for smile width, midline, and facial proportion reference.
- Smile at rest – lips relaxed, teeth lightly together. Used for lip line and resting tooth display.
- Exaggerated smile – full smile. Used to evaluate transition line, prosthetic clearance, and upper lip dynamics.
- Retracted, frontal – with cheek retractors. Used for tooth proportions, arch form, and midline confirmation.

## Shade capture: immediate provisional cases

If an immediate-load provisional is planned, capture the tooth shade of the adjacent natural dentition before any scanning or injections. Include a shade tab in the frame where available. Document the shade in the case submission notes.

## Edentulous and partially edentulous patients

The patient must wear their existing prosthesis in all photographs. If no prosthesis exists, note this in the case submission. A retracted view of the edentulous ridge without the prosthesis is additionally helpful for planning.

## Additional views: full-arch and All-on-X cases

The following views are not required for single-unit or short-span cases but are recommended for full-arch and All-on-X planning where a new prosthetic contour is being designed from the ground up:

- Left and right profile – facial depth and lip support reference
- 12 o'clock overhead – arch form, midline alignment, and tooth position relative to the facial midline
- Retracted lateral, left and right in occlusion – posterior occlusion reference

<b>Camera position</b>	Level with occlusal plane; patient upright and seated
<b>Required – provisional cases</b>	Full face frontal, smile at rest, exaggerated smile, retracted frontal
<b>Shade capture</b>	Before scanning; shade tab in frame if available
<b>Full-arch add</b>	Profile, 12 o'clock overhead, retracted laterals (recommended)
<b>With prosthesis</b>	Worn in all photos for edentulous and partially edentulous patients
<b>File format</b>	JPEG or TIFF; minimum 2 MP per image

SECTION 6

## Pre-Surgical Submission Checklist

Use this checklist before submitting any guided surgery case to DTS. A checkmark indicates required for that arch type. A dash indicates not required (submission is always accepted if available).

CBCT SCAN			
Record	Dentate	Partial	Edentulous
Full-arch CBCT – single-file DICOM (preferred) or multi-file DICOM	✓	✓	✓
Arches separated with cotton rolls during CBCT	✓	✓	✓
Patient instructed to close eyes during scan	✓	✓	✓
Patient CBCT with denture fully seated (dual-scan, edentulous)	–	–	✓
Appliance CBCT or IOS STL – extraoral on foam block (dual-scan)	–	–	✓
INTRAORAL SCANS (DIGITAL ONLY – OPEN STL)			
Record	Dentate	Partial	Edentulous
Operative arch – full-arch STL	✓	✓	✓
Opposing arch – full-arch STL	✓	✓	✓
Extended scan with all denture fabrication landmarks (immediate denture)	✓	✓	✓
Extraoral IOS scan of denture / scan appliance (dual-scan, edentulous)	–	–	✓
DIGITAL BITE SCAN			
Record	Dentate	Partial	Edentulous
Digital bite scan – STL, centric occlusion or centric relation	✓	✓	–
Radiolucent VPS bite index with denture seated (dual-scan, edentulous)	–	–	✓
CLINICAL PHOTOGRAPHY			
Record	Dentate	Partial	Edentulous
Full face frontal – natural smile, both eyes and ears visible	✓	✓	✓
Smile at rest	✓	✓	✓
Exaggerated smile	✓	✓	✓
Retracted frontal	✓	✓	✓
Shade capture (immediate provisional or denture planned)	✓	✓	✓
Photos with existing prosthesis in place	–	✓	✓

Profile views + 12 o'clock overhead (full-arch / All-on-X)	—	—	✓
CASE SUBMISSION INFORMATION			
Record	Dentate	Partial	Edentulous
Patient name and date of birth	✓	✓	✓
Implant system and model (if already selected)	✓	✓	✓
Guided surgery kit and sleeve system (if already selected)	✓	✓	✓
Arch to be treated: maxillary, mandibular, or both	✓	✓	✓
Immediate provisional or immediate denture: yes or no	✓	✓	✓
Clinical notes or special instructions	✓	✓	✓

### DTS – Dental Technology Solutions

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Questions before submitting? Schedule a case discussion at [calendly.com/ilan-sapir-dts-lab/30min](https://calendly.com/ilan-sapir-dts-lab/30min)