

## APPENDIX 2:

### Supporting information for CT/DVT scans

This appendix provides additional information for radiologists and MTAs to help them produce appropriate CT/DVT scans for the subsequent dental implant planning with coDiagnostiX software. It outlines the specific requirements imposed on such scans by the coDiagnostiX software.

#### 1. CT SCANS

Scans made in line with the recommendations below constitute a low radiation exposure for the patient and form a good basis for diagnostic analysis.

To improve image quality, it is – apart from the procedure described in this chapter – always necessary for the radiologist to optimize deduction parameters. In addition to this, parameters must be adapted individually to the patient.

##### 1.1 Preparation

- Have the patient wear the scan template with the reference pins for position and angle measurement.

##### Note

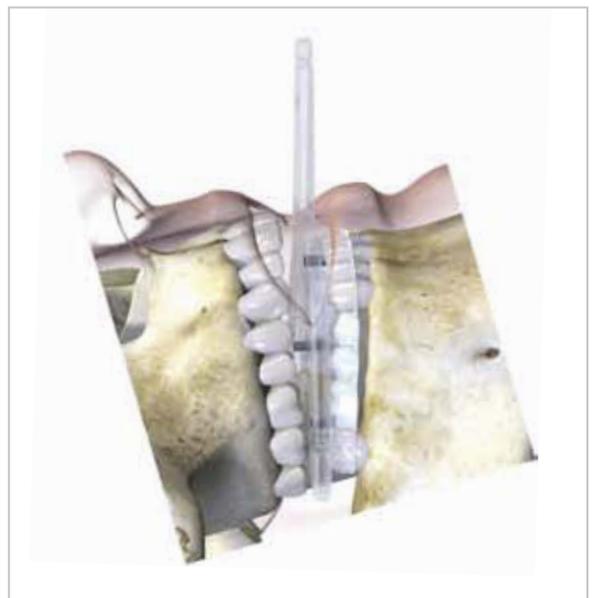
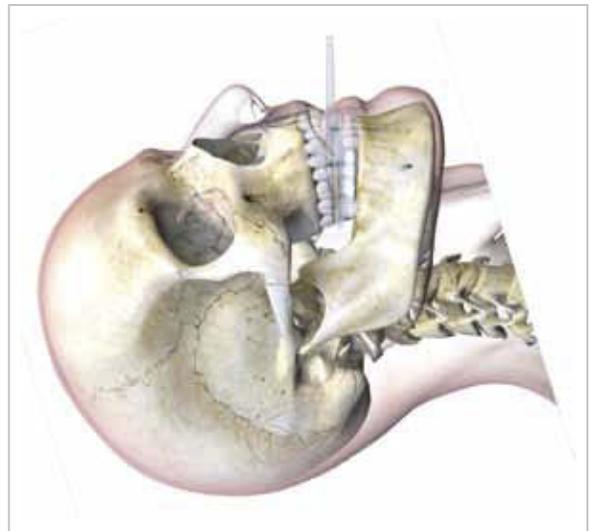
These reference pins have to be **completely** visible in the CT scan. Please make sure to clean or disinfect the scan template before using in the patients mouth.

- The patient wears **only** the scan template in his mouth. All metal parts which are not fixed have to be removed.
- Bite: Let the patient bite on something.

## 1.2 Patient positioning

The positioning instructions given below are applicable for scanning an upper or lower jaw as well as for scanning both jaws simultaneously. In the latter case, the patient must wear both scan templates.

- Position the patient as shown in the figure and ensure that the patient does not move during the scanning procedure.
- A gantry angle of  $0^\circ$  is recommended. However, the software is able to process image data produced with a gantry angle  $\neq 0^\circ$ , if absolutely necessary.
- Align the occlusal plane to the scan plane in the best way possible.



### 1.3 Scanning process

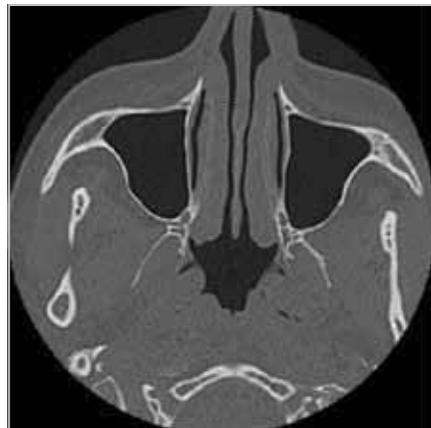
#### Maxilla

When scanning an upper jaw, choose the image section so that the upper jaw bone is completely visible. The scan should comprise the area from the occlusal plane to the middle of the maxillary sinus.

The ideal field of view (FOV) is 8 to 12 cm.

#### Exception

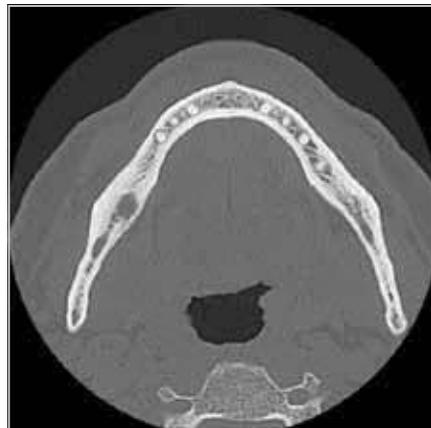
If a sinus lift is planned or planning shall be made with Zygoma implants, the scan should comprise the area from the occlusal plane to the orbital floor to meet the modified planning situation. Additionally, it is recommended to choose a field of view which also includes the zygomatic arches.



#### Mandible

When scanning a lower jaw, choose the image section so that the lower jaw bone is completely visible. The scan should comprise the area from the occlusal plane to the basis of the mandible. It is recommended to scan an additional slice below the bone in the soft tissue to make sure that the corpus mandibulae has been captured completely.

The ideal field of view (FOV) is 9 to 14 cm.



### Important scanning parameters:

- A gantry angle of 0° is recommended to achieve the best quality for image reconstruction.
- Block the opposite jaw bone using plastic material or cotton wool pads to avoid artifacts around the reference pins.
- Do NOT vary reconstruction parameters within a series (constant value for X and Y axis).
- Set a high-resolution bone algorithm:
  - "Inner Ear"
  - "Bone"
  - "High"
  - No "EDGE"!
  - Siemens e.g. "AK 97"
  - Elscint e.g. "Ultra High"
  - etc.
- Parameters for a complete data set when using dynamic mode:
  - Slices: 0.5 mm to 1.0 mm
- When using spiral mode, reconstruction to 1 mm slices or less is recommended.
- KV: approx. 110 to 130
- mA: approx. 20 to 120

## 1.4 Storage of CT scans

For dental implant planning with coDiagnostiX, only axial slices are required.

Store the image data set in DICOM III format on CD-ROM or on any other portable storage device. Do not save raw data. Only axial image data are required for planning with coDiagnostiX.

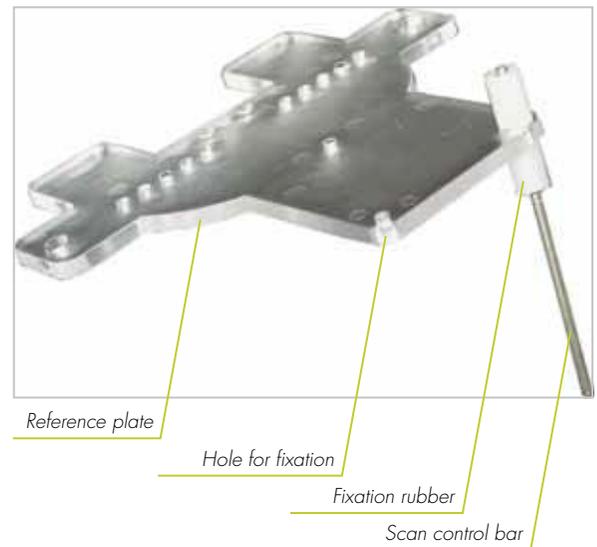
## 1.5 Visualization of motion artifacts

As motion artifacts in CT scans may affect 3D planning with coDiagnostiX, you can use a reference plate with a scan control bar to visualize these motion artifacts better and directly after the scan. The scan control bar has a length of 6 cm and a diameter of 2 mm and should be visible in all slices of the CT scan.

### How to use the scan control bar:

- There is a hole on the left and right side in the front area of the reference plate to fix the scan control bar. One scan control bar will be sufficient.

During the CT scan, the scan control bar remains outside the oral area.



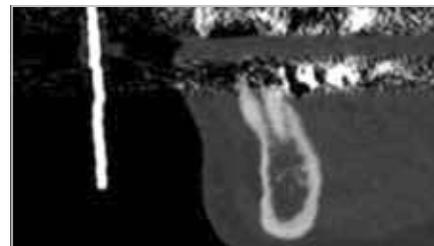
- Position the scan control bar in a way that it will be visible in the axial planes at upper or lower jaw level.
- Make sure the scan control bar is not bent.
- After CT scanning, scroll through the axial slices to evaluate the appearance of the scan control bar in these slices and identify possible motion during the scan. 3D reconstruction will facilitate evaluation.



- If you detect significant offset between the single slices, it might be recommended to repeat the CT scan.

#### Note

It is not mandatory to use the scan control bar when working with coDiagnostiX. However, it is recommended to better visualize motion artifacts. The scan control bar is not needed for devices which do not scan by slices (e.g. DVTs).



## 1.6 Checklist for CT scans

Work Step		Done
1.	Patient interview/indication by remittor: <ul style="list-style-type: none"> <li>■ Patient wears a template</li> </ul>	YES <input type="checkbox"/> NO <input type="checkbox"/>
2.	Scan template check: <ul style="list-style-type: none"> <li>■ Template correctly fitted</li> <li>■ Opposite jaw blocked with cotton wool pads or plastic material, if necessary</li> <li>■ Scan control bar fitted to the scan template to visualize motion artifacts</li> </ul>	<input type="checkbox"/>
3.	Gantry angle adjustment: <ul style="list-style-type: none"> <li>■ Gantry angle: 0°</li> <li>■ ATTENTION: Set a gantry angle of 0° even if the patient cannot move the occlusal plane to the scan plane. This will be calculated by coDiagnostiX afterwards.</li> </ul>	<input type="checkbox"/>
4.	Slice distance setting: <ul style="list-style-type: none"> <li>■ 1 mm or less</li> </ul>	<input type="checkbox"/>
5.	Advices when patient is wearing a scan template with reference pins: <ul style="list-style-type: none"> <li>■ ALL 3 reference pins have to be scanned completely</li> <li>■ Scanning one slice above the pins will be sufficient</li> </ul>	<input type="checkbox"/>
6.	Standard instructions for patients: <ul style="list-style-type: none"> <li>■ Do not move, do not swallow, do not breathe</li> </ul>	<input type="checkbox"/>
7.	Adjustment of the image section according to the advices given in the preceding sections of this Appendix 2	<input type="checkbox"/>
8.	Data export to CD: <ul style="list-style-type: none"> <li>■ DICOM III Format, no raw data</li> <li>■ No separate viewer required</li> </ul>	<input type="checkbox"/>

## 2. DVT SCANS

For the production of DVT scans follow the instructions of your device manufacturer.

### 2.1 Preparation

- Have the patient wear the scan template with the reference pins for position and angle measurement.

#### **Note**

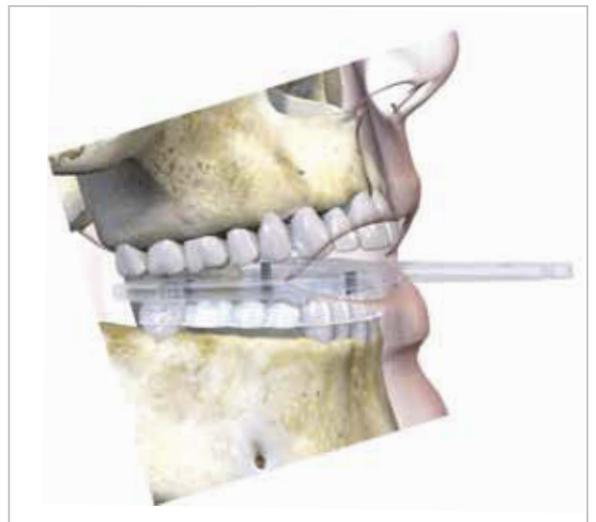
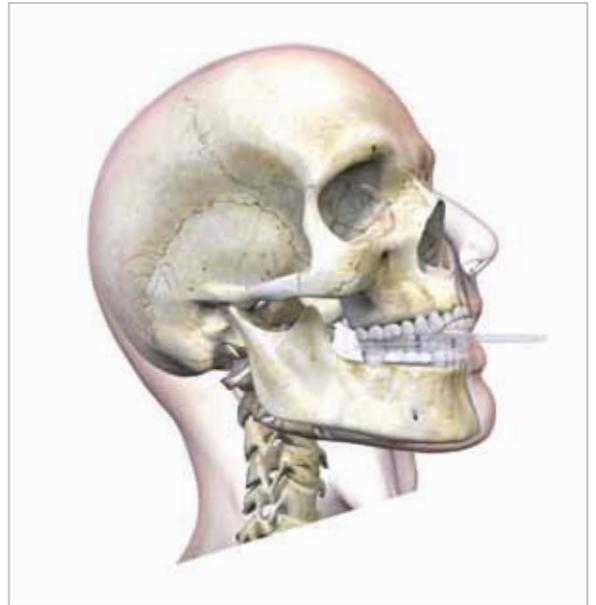
These reference pins have to be completely visible in the DVT scan.

- The patient wears in his mouth only the scan template. All metal parts which are not fixed have to be removed.
- Bite: Let the patient bite on something.

## 2.2 Patient positioning

The positioning instructions given below are applicable for scanning an upper or lower jaw as well as for scanning both jaws simultaneously. In the latter case, the patient must wear both scan templates.

- Position the patient as shown in the figure and ensure that the patient does not move during the scanning procedure.
- Align the occlusal plane to the scan plane in the best way possible.



## 2.3 Scanning process

Follow the instructions and recommendations given by the manufacturer of your DVT device.

## 2.4 Storage of DVT scans

For dental implant planning with coDiagnostiX, only axial slices are required.

Store the image data set in DICOM III format on CD-ROM or on any other portable storage device. Do not save raw data. Only axial image data are required for planning with coDiagnostiX.

## 2.5 Checklist for DVT scans

Work Step		Done
1.	Patient interview/indication by remittor: <ul style="list-style-type: none"> <li>■ Patient wears a template</li> </ul>	YES <input type="checkbox"/> NO <input type="checkbox"/>
2.	Scan template check: <ul style="list-style-type: none"> <li>■ Template correctly fitted</li> <li>■ Opposite jaw blocked with cotton wool pads or plastic material, if necessary</li> </ul>	<input type="checkbox"/>
3.	Slice distance setting: <ul style="list-style-type: none"> <li>■ 1 mm or less</li> <li>■ ATTENTION: Set a gantry angle of 0° even if the patient cannot move the occlusal plane to the scan plane. This will be calculated by coDiagnostiX afterwards.</li> </ul>	<input type="checkbox"/>
4.	Advices when patient is wearing a scan template with reference pins: <ul style="list-style-type: none"> <li>■ ALL 3 reference pins have to be scanned completely</li> </ul>	<input type="checkbox"/>
5.	Standard instructions for patients: <ul style="list-style-type: none"> <li>■ Do not move, do not swallow, do not breathe</li> </ul>	<input type="checkbox"/>
6.	Adjustment of the image section according to the recommendations given for your DVT device	<input type="checkbox"/>
7.	Data export to CD: <ul style="list-style-type: none"> <li>■ DICOM III Format, no raw data</li> <li>■ No separate viewer required</li> </ul>	<input type="checkbox"/>