KLS martin
GROUP

IPS Implants®

Scan protocol

Orthognathics

IPS® — Individual Patient Solutions

IPS Implants® scan protocol

Orthognathics

Basic information

This scan record describes how patient data has to be prepared for the
virtual planning of orthognathic surgery so that a product of the IPS Implants®
product family can be made.

The following data sets are required for the virtual planning of orthognathic
interventions:

- Scan of the patient skull
- Dental scans of the maxilla and mandible in STL or DICOM format
- Optionally: scan of the planned final occlusion in STL or DICOM format,
  Alternatively: simulation of a virtually planned occlusion by IPS® Design Team

Should you have any queries, please do not hesitate to contact our
hotline +**49 7463 838-222.**

Important:

Planning results are only ever as up to date as the clinical data records!
If the anatomical situation should change after scanning, the precision fit
of the products can no longer be guaranteed.

Scan of the patient skull

- Patient scans have to be up-to-date and precise.
- The spatial resolution (size of the voxels) should be a maximum of **1.00 mm** for DVT scanners.
- The slice thickness of CT scans should be between **0.5 - 1.0 mm.**
- Movements of the patient during the actual scanning have to be avoided coercively.
- Digital volume tomography (DVT scans) is sufficient for orthognathic case planning with splints.
- Classic computed tomography (CT) scans are preferred for implant planning.
- In the case of medical CT scans **no gantry tilt is allowed (gantry tilt 0°).**
- Make sure that there is no (foreign) radiopaque material in the patient's mouth during the scanning.
- The complete dento-maxillofacial complex including all areas of interest in the anterior cranio-maxillofacial volume has to be scanned.
- The use of bandages, chin rests or similar to constrain the patient should be avoided, otherwise the soft tissue will be deformed.
- Save the entire scan (incl. all sub-files) as a DICOM file.

(CB)CT-based workflow for dental casts

When taking the bite impression make sure that

- the patient bites down deep enough into the impression material
- the material covers all the desired areas for the impression.

When the patient is wearing braces, make sure the impression material also covers the brackets at least up until the archwire. Please avoid covering the braces or brackets with wax.

Scan of the planned final occlusion

- Fixate the lower and upper cast into the correct occlusion.
  Tip: Sticking wax to the sides of both casts will fixate the occlusion without causing artifacts in the scan result.
- Place a firm sponge in the scanner (approx. 10 mm thick).
- Place the fixated casts on the sponge in the scanner. Make sure that the occlusal plane is as horizontal as possible.

- Performing the scan:
  - Voxel size: **0.20 mm**
  - Position the casts in the scanner in a similar orientation as in the patient scan.
  - In the case of a medical CT the casts might have to be positioned vertically.
    Ensure that the impression does not touch the CT table (e.g. by a sponge or similar).

Remove the casts, but **leave the lower sponge in place in the scanner.** This is important to make sure the dental cast scan and the occlusion scan are registered at the same position within the scanner.

Important:

Please make sure that the number of the **scan of the planned final occlusion** and the **scan of the dental casts is the same.** Make sure to perform the occlusion scan and the scan of the dental cast with the same scanner and the same scan protocol. Otherwise, case planning cannot be performed.

Make sure to scan the same upper and lower cast to create both the surgery model and the occlusion model.

Dental casts of the planned final occlusion   Dental casts separated

Scan of the dental casts

- Place the lower cast on the sponge that was left in the scanner after making the occlusion scan, the teeth facing upwards. Make sure the orientation of the dental cast scan is identical to the orientation of the occlusion scan.
- Place another firm sponge (between 2 mm and 10 mm, preferably 5 mm thick) on top of the lower cast. This will ensure a clear distinction between the two casts in the scanned files, without the gap being too big.
- Put the upper cast on top of the sponge, teeth facing downwards.
- Make sure that upper and lower casts are positioned as if they were in a correct occlusion, but separated by the sponge.

- Performing the scan:
  - Voxel size: **0.20 mm**
  - Position the casts in the scanner in a similar orientation as in the patient scan.
  - In the case of a medical CT the casts might have to be positioned vertically. Ensure that the impression does not touch the CT table (e.g. by a sponge or similar).

Virtual segmental surgery

If orthognathic surgery is virtually planned with a **split maxilla**, identical duplicates of the casts will be required. One of the two duplicates is then used for scanning the casts in the planned final occlusion and the other is used for scanning the casts at a distance apart.

STL-based workflow for dental casts

As an alternative to (CB)CT-scanning the dental cast models,
the virtual planning software supports to a limited extent a workflow
based on surface-scanned dental cast models (STL files).

Procedure

These STL files can be obtained by an intraoral scanner or
by a dental lab scanner. However, in this STL-based workflow,
you need to take into account the following:

- For the dental cast scan, separate STL files for the upper and
  lower dental models need to be provided. It has to be ensured
  up front, however, that these models are virtually positioned as
  they would need to be placed in the case of a CBCT scan.
- The planned final occlusion has to be scanned as one surface
  model.
- When working with STL files, make sure to preprocess the files
  in order to close the surface model and turn it into a 'watertight'
  model before using them in the virtual planning software.
- KLS Martin advises you never to combine STL files and DICOM
  files in a single patient case.
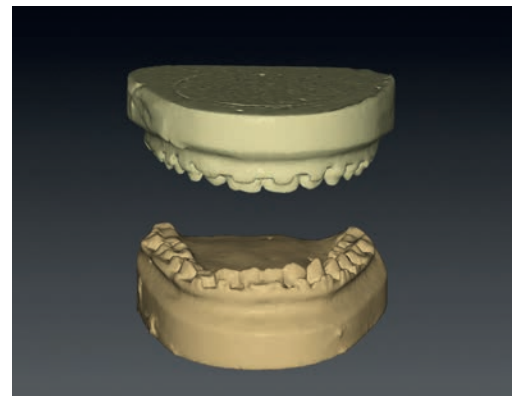
Scans of the surface models from the dental casts
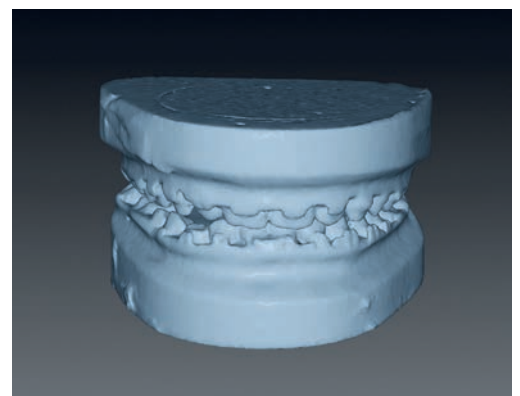
Scan of the surface model from the planned final occlusion

The IPS® product range
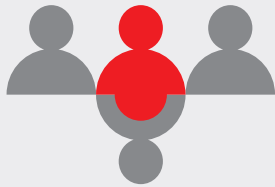
IPS CaseDesigner®

The IPS CaseDesigner® makes virtual 3D surgical planning easier and faster than ever before. With this flexible software tool, orthognathic procedures can be efficiently and reliably planned and simulated, and then applied to treatment in the operation in a customized manner.

IPS Gate®

The web-based platform and app guide surgeons and users reliably and efficiently through the process of inquiring about, planning and completing custom-made devices. With the HTTPS standard IPS Gate® guarantees encrypted data transmission, which is additionally certified by the TÜV Süd seal.

IPS Implants®

Custom-made devices, planning aids, and anatomical models are made from various materials using state-of-the-art fabrication technologies. Thanks to computer-based planning and functionalized custom-made devices, preoperative planning can be implemented in surgery with unprecedented precision.

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