The Revolution of Implantology!

ICam4D
Benefits of the ICam4D

The ICam4D is revolutionizing the workflow for multi-implant restorations. This exciting new technology has tremendous benefits for the patient and all parties involved from dentist to production. The ICam4D technology reduces chair-time, the number of visits, and it eliminates significant hardware, personnel and production costs. It is the only technology that guarantees predictable and accurate results independent of the operator.

Chair-side

The complex task of taking an impression for a multi-implant structure is reduced to just a few minutes when including the insertion and removal of the ICamBodies.

This results in:

- Large savings in valuable chair time due to the easy placement of the ICamBodies and the rapid measurements with the ICam4D.
- Predictable outcome as the result is independent of the skill level of the user.
- Elimination of costs for materials for taking the impression for multi-implants.
- No re-tries as the first part will have a perfect fit.
**Patient**

The advantages for the patient include:

- No stress due to the taking of the impressions. The insertion of the ICamBodies and the capture of the gingiva are rapid and comfortable compared to taking an implant impression.
- The measurements can be performed with a lip extractor only. For the upper arch the mouth must be opened slightly and for the lower arch the mouth can be measured in the rest position. Thus there is no need to open the mouth to extreme positions as with intra-oral scanners.
- The technology eliminates try-ins as the part will fit perfectly.
- Improved comfort of the patient due to the quality of the fit of the final restoration.
- Possibility of much shorter treatment times as early load protocols are much more feasible with the ICam4D.

**Laboratory**

The work for the laboratory and/or dental technician is greatly reduced.

The advantages include:

- No need for a stressful rapid production of models with gingiva mask and implant analogs.
- No need to scan complex implant models.
Technology

The ICam4D is a hand held “camera unit” consisting of four cameras and one projector. It combines photogrammetric and structured light scanning techniques to capture 3D data. It uses the ICamBodies, high precision mechanical parts with a unique proprietary target arrangement, to determine the position and orientation of implants. The position and orientation computed for one implant is called an “ICamPosition”. The ICamBodies are replaced by Imetric at regular intervals to assure that they always meet the necessary precision requirements.

Another component of the ICam4D technology are the ICamRefs. These are similar to healing abutments and in fact it is possible to use healing abutments instead of the ICamRefs. The smaller size of the ICamRefs makes it much simpler to take an impression of the gingiva or to scan the ICamRefs and gingiva with an intra-oral scanner. The software of the ICam4D then allows the user to transform the ICamPositions into the coordinate system of the gingiva using the ICamRefs. This is done with a few simple clicks.

Key aspects in the development of the ICam4D system were:

- To make the ICamBodies very small, easy to handle, and easy to disinfect.
- To make the measurements completely independent of the operator.
- To make both the ICamBodies and the measurement as precise as technically necessary to assure a perfect fit.
- To make the capture of the gingiva as simple as possible.
Workflow

The unique technology of ICam4D reduces the complex and time consuming workflow of taking impressions on implants chair-side and creating models and scanning with laboratory scanners to three simple steps.

**Step 1: Measure the implant positions**

The ICamBodies are placed on the implants. The measurements with the ICam4D are done handheld by moving the ICam4D slowly from one side to the other in front of the open mouth of the patient. The operator starts the measurement process and the software will automatically detect the optimum positions where measurements are to be taken.

The user interface indicates both the distance at which the ICam4D is to be held as well as the successful measurement of the ICamPositions during use. This literally only takes seconds and the complete process from placing the ICamBodies, taking the measurements, and removing the ICamBodies can be done in a few minutes.
**Step 2: Digitize the gingiva**

Once the ICamPositions have been captured, the ICamBodies are removed from the implants and ICamRefs are placed on the implants. Now the gingiva with the ICamRefs can be scanned with an intra-oral scanner or a rapid impression can be taken. Such an impression can be scanned with an Imetric L2i lab scanner in less than 1 minute. Alternatively, standard healing abutments can be used instead of the ICamRefs.

**Step 3: Align implant positions and gingiva**

The STL data from the gingiva is then imported into the proprietary Imetric scanning software, IScan3D Dental, and the ICamPositions and the STL data from the gingiva are aligned. The aligned data is then exported in formats and coordinate systems compatible with different dental CAD software packages (XML and STL respectively).
Final result

ICam4D Hardware and Specifications

An ICam4D includes:

- The ICam4D which comes with a calibration plate and a power supply.
- A set of eight (8) ICamBodies compatible with the “Nobel Biocare Multi-Unit RP” platform. The ICamBodies remain the property of Imetric. They are exchanged at intervals defined by Imetric.
- Training on site.
- Optionally a set of ICamRefs can be purchased but healing abutments with an appropriate shape can also be used.
- We recommend the use of a laptop with an Intel i7 CPU, at least 8 GB of RAM, an SSD, 3 USB 3.0 ports and an NVIDIA GTX graphics card with HDMI video output port.

The performance specifications of the ICam4D over a full edentulous arch are:

- The ICamPositions of the ICamBodies are measured within 1 minute when following the protocol explained during the training by Imetric.
- The accuracy of the ICamPositions is better than 30 microns according to the Imetric testing procedure.