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COMPANY™



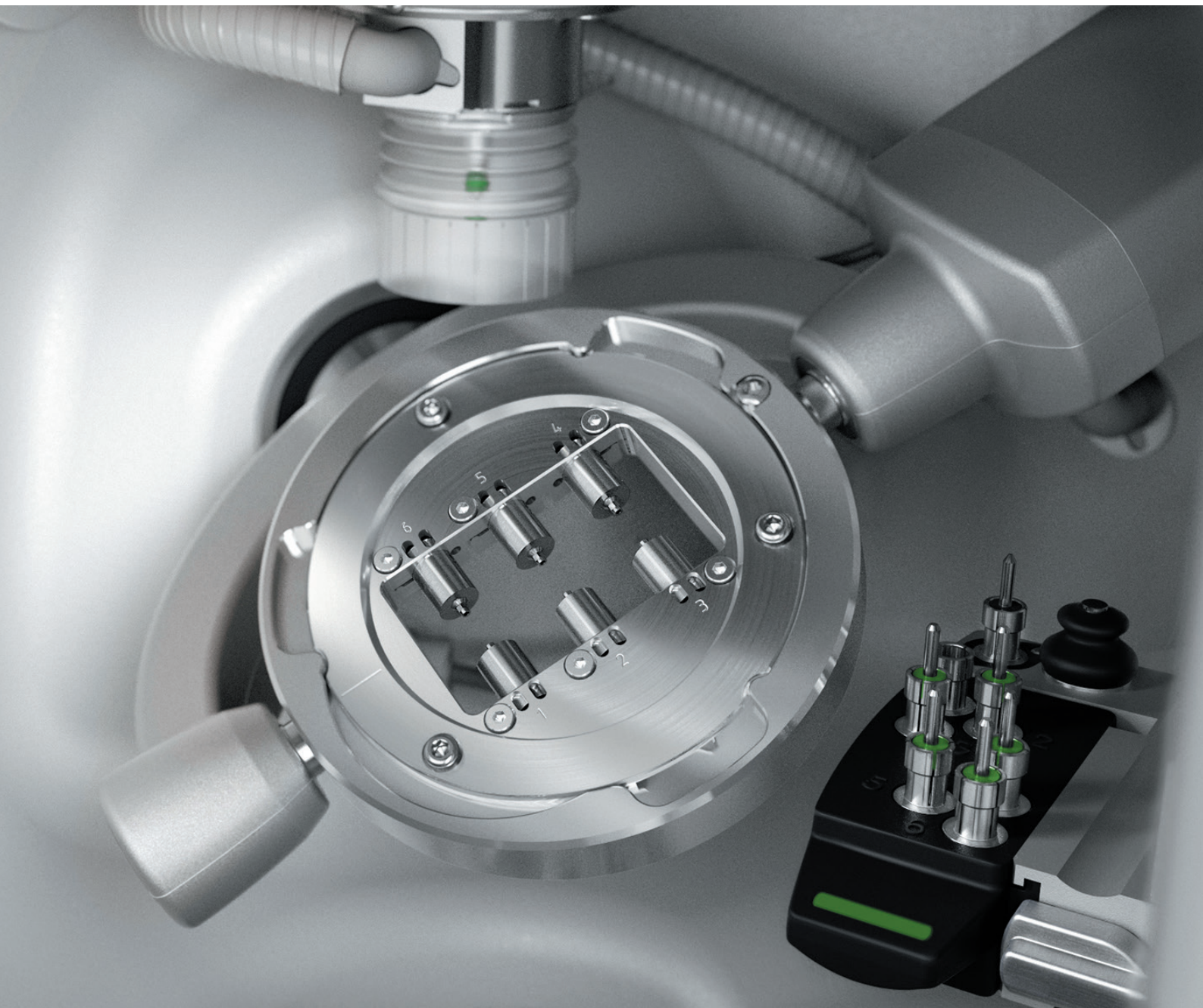
User Case

Production of titanium abutments with inLab MC X5

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Custom titanium abutments made in your own laboratory

As links between implants and superstructures, abutments are indispensable components in implant prosthodontics.

They can be sourced from the implant manufacturer as prefabricated units or custom-made for a specific patient case. However, when producing custom one-piece titanium abutments, inLab users until recently had to work with an external milling center. The most recent version of the CAD and CAM software, inLab SW 16.0, now terminates this dependence by allowing these abutments to be fabricated on the laboratory's own 5-axis milling unit. Just how that works in detail is exemplified by the following patient case.

Case report: Titanium abutments

The patient presented at the dental practitioner's office with a strong inflammation in the posterior region of the lower left quadrant, which mandated extraction of all posterior teeth up to the canine and removal of some bone at site 34. The dentist and patient agreed that the newly edentulous region was to be rehabilitated using an implant-supported restoration (with implants to be placed at sites 34, 36, and 37). Since the removal of bone tissue had resulted in greatly divergent vertical dimensions, the dental laboratory was tasked to provide custom abutments.



Fig. 1

The starting point for the laboratory procedures was a classic analog impression of the oral situation, based on which the master cast was poured and a gingival mask produced in the usual manner (Fig. 1).



Fig. 2

In the software inLab CAD SW 16.0, a new case for the "Implant" restoration type was opened and the corresponding implant positions specified (Fig. 2).

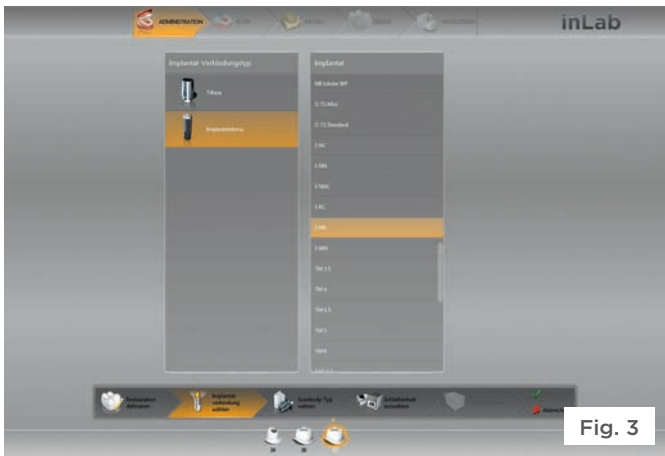


Fig. 3

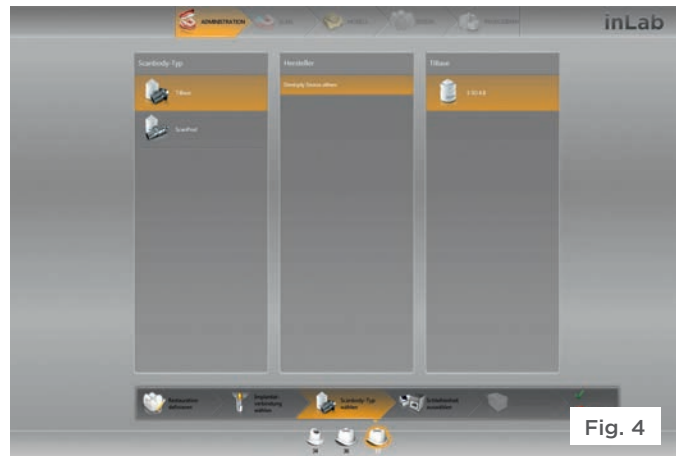


Fig. 4

This was followed by selecting "Implant Level" as implant connection type (Fig. 3) and "TiBase" as scanbody type (Fig. 4).

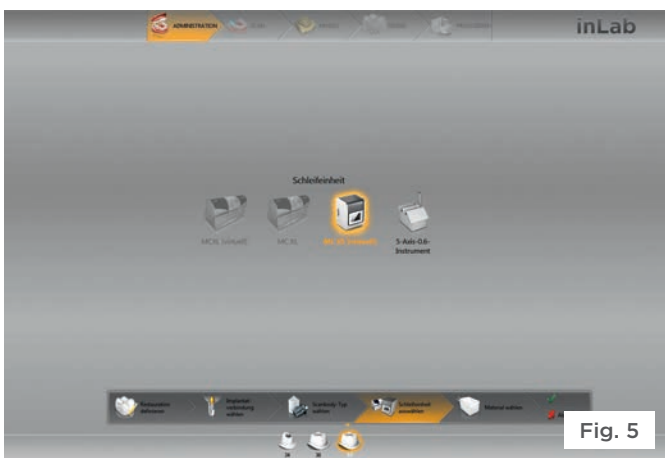


Fig. 5

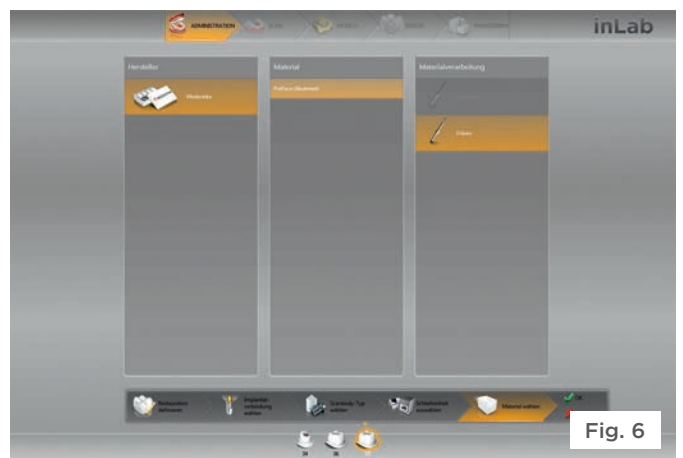


Fig. 6

Next, "inLab MC X5" (Dentsply Sirona CAD/CAM) (Fig. 5) was selected as milling device and "Medentika Preface® Abutment" (Fig. 6) as the material. The administrative set-up phase was thus completed with just a few clicks.



Fig. 7



Fig. 8

To prepare the model for the scanning process, the gingiva mask is temporarily removed and the titanium bases (TiBase) with scanbodies (both Dentsply Sirona) are connected to the laboratory implants analogs (Figs. 7 and 8).



Fig. 9

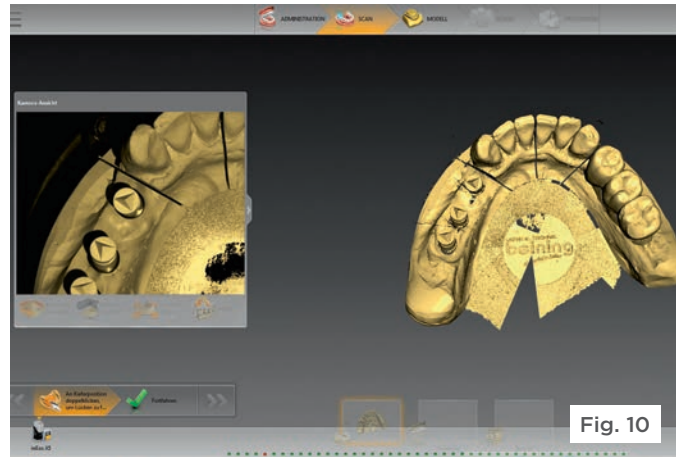


Fig. 10

This assures a precise detection of the implant positions during scanning. The prepared cast is then scanned in the inEos X5 laboratory scanner and, once the model has been calculated, the data is sent to the inLab CAD 16.0 software (Figs. 9 and 10).

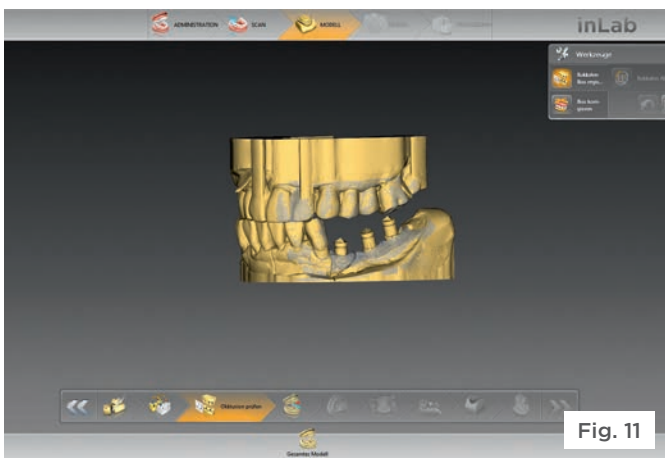


Fig. 11

This is followed up by checking the occlusion (Fig. 11).

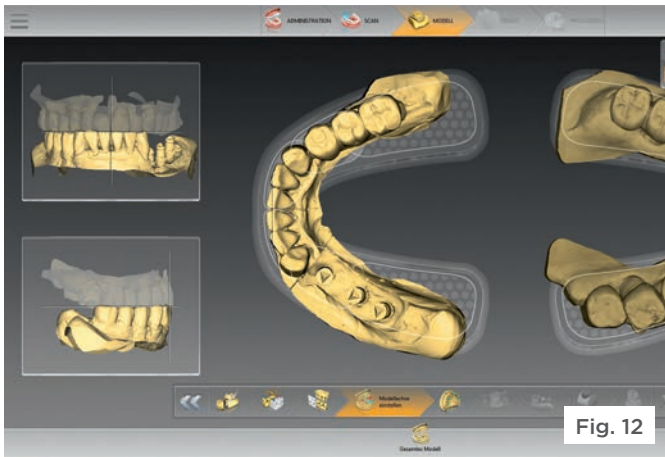


Fig. 12

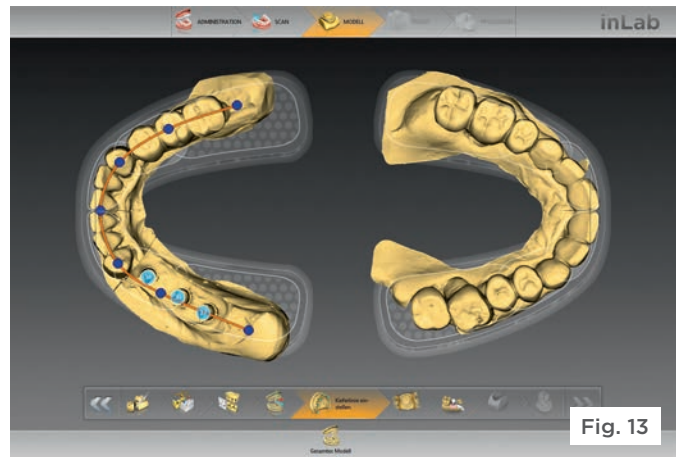


Fig. 13

The next step includes the aligning of the model axis (Fig. 12), and drawing the jaw line (Fig. 13).

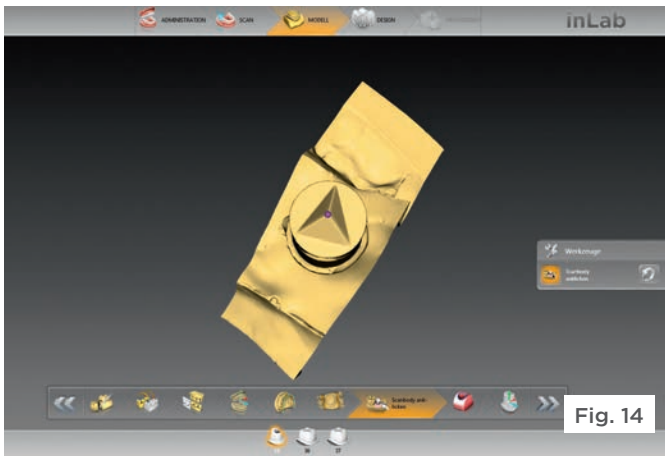


Fig. 14

Finally, the individual model segments are trimmed for the areas to be restored and the scanbodies are marked (Fig. 14).

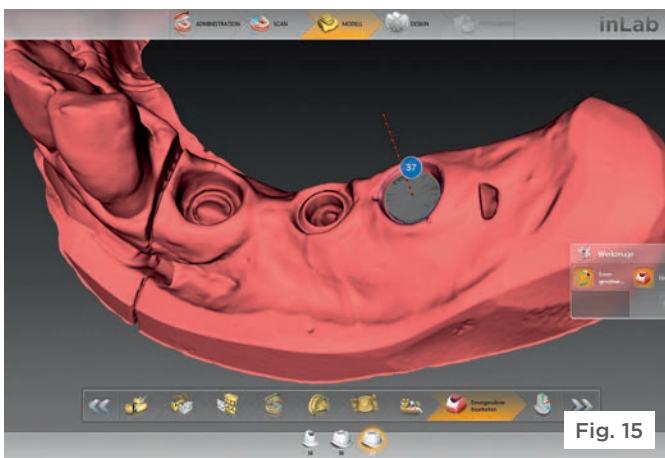


Fig. 15

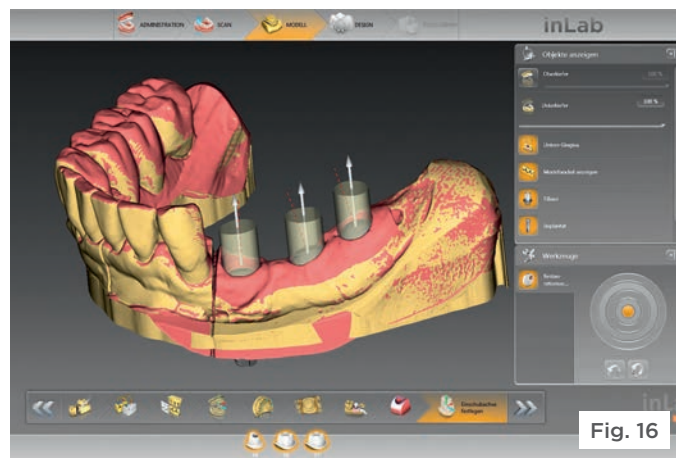


Fig. 16

The position and orientation of the implant shoulders are adjusted in the "Edit Base Line" (Fig. 15) and finally the insertion axis is determined (Fig. 16).

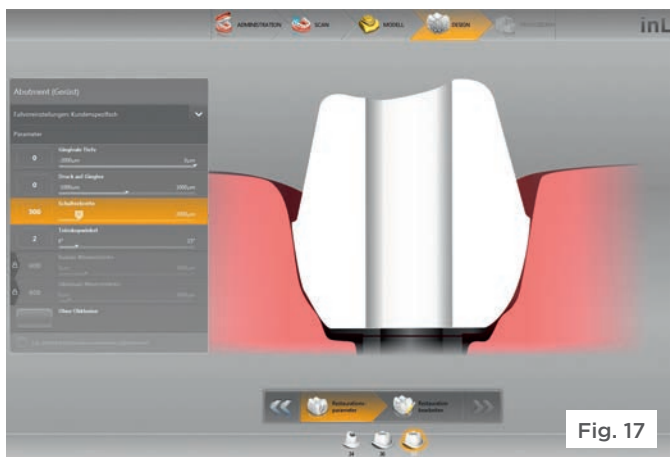


Fig. 17

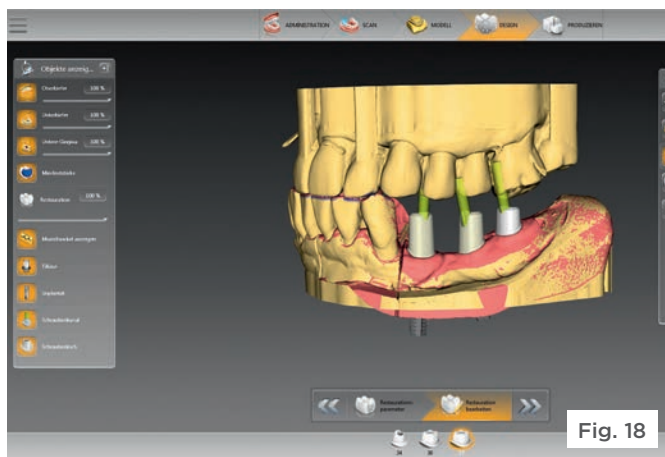


Fig. 18

After parameter setting selection (Fig. 17) such as the occlusal shoulder width, the telescope angle, the gingival placement pressure and the implant length, the software presents a good first proposal for the abutment design (Fig. 18). If necessary, this proposal can be individually adjusted (for example by providing more space on the occlusal surface or increasing or decreasing its diameter), but as in most of these cases, the proposal could be confirmed without further modifications.

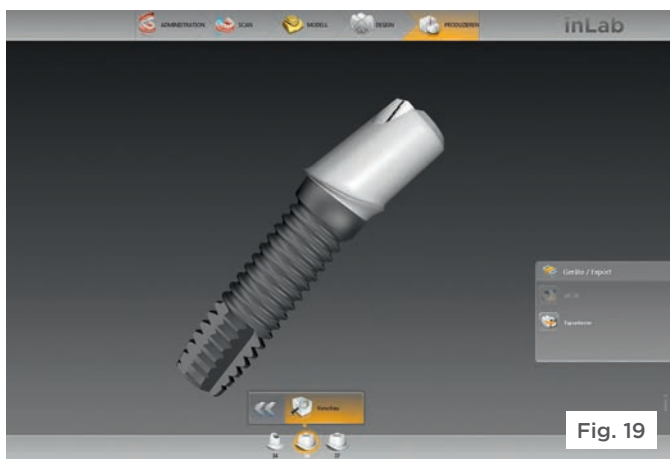


Fig. 19

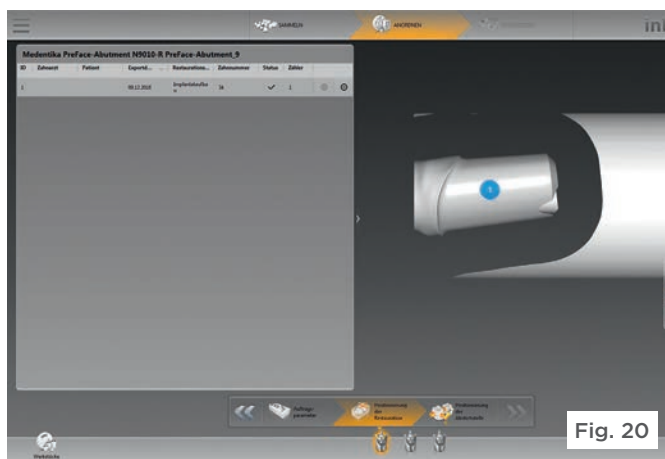


Fig. 20

Following a final review of the design in the preview (Fig. 19), the data (Fig. 20) is transferred to the inLab CAM Software 16.0.

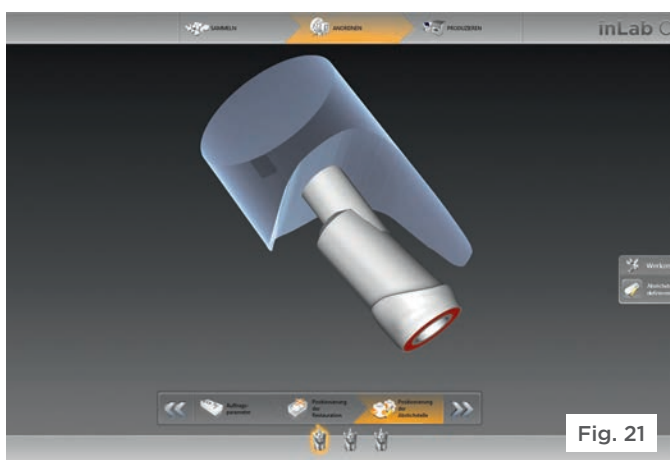


Fig. 21

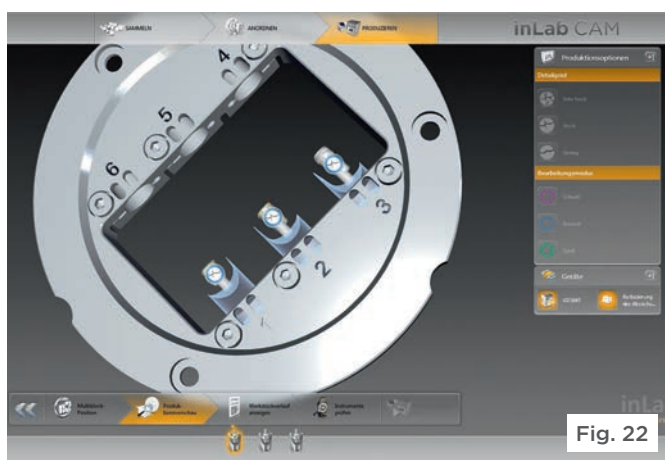


Fig. 22

Here it was possible to adjust the sprue locations (Fig. 21) and to place the virtual material on its holder (Fig. 22).

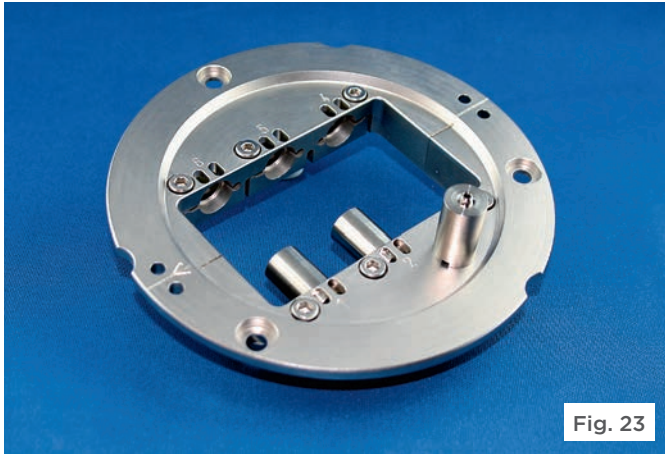


Fig. 23



Fig. 24

Meanwhile, the titanium PreFace® abutment blanks matching the implant system were clamped in place in the special inLab MC X5 abutment holder (Fig. 23). The blanks already contains the prefabricated implant connection geometry. The new holder is part of the Medentika PreFace® Abutments starter kit of Dentsply Sirona CAD/CAM (Fig. 24). This starter kit includes a torque wrench, special titanium burs (Bur 2.0 Metal and Bur 1.0 Metal), a separate tool magazine, tanks with filters for the inLab MC X5, along with a special cooling lubricant additive (DentaLub).



Fig. 25



Fig. 26

The holder is inserted into the milling unit (Fig. 25), and the milling process is launched by the CAM software (Fig. 26).



Fig. 27

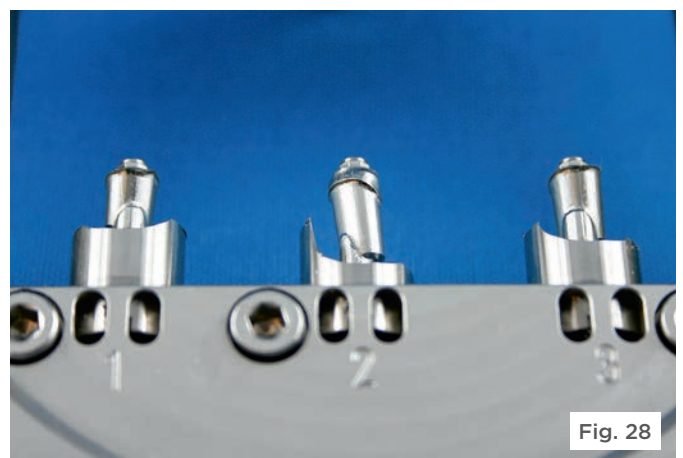


Fig. 28

After a processing time of about 2.5 hours (an abutment requires approximately 50 minutes of milling time, depending on its size), the abutment holder with the finished milled abutments are taken out of the machine (Figs 27-28).



In a final processing step, the abutments were now separated from the rest of the blanks at the previously defined sprue interfaces by means of cutting disks. The subgingival portions were polished to a high gloss. It is recommended to sandblast the superstructures with alumina (110 microns) once the restoration is completed (Fig. 32).



The finished titanium abutments, where the connection geometry precisely matched the implant system used, is then directly connected to the implant analogs on the cast and are immediately ready for further processing (Figs. 31 and 32).

Advantages for the laboratory

Individual abutments have a number of advantages over their pre-fabricated counterparts. Their individual design that matches the specific patient case gives the dental technician a much better foundation on which to produce an outstanding restoration in terms of function and esthetics. When using standard abutments, by contrast, the laboratory will have to make compromises in many situations. In the present case, for example, standard abutments would have meant that the abutments at site 34 would have disappeared almost completely below the gingival line, while the other two would have had an artificially high emergence profile. The compensation of vertical differences, the feasibility of restorations that require a special abutment angle, as well as the possibility to provide individual emergence profiles all favor the use of custom abutments. Moreover, the diameter of a standard abutment is often too small, especially in the posterior region. Custom abutments design can achieve diameters similar to those of prepared natural teeth. In the case presented here, they helped avoid an unnecessarily large prosthetic superstructure.

With the inLab MC X5 5-axis milling unit and the new inLab CAD and CAM 16.0 software, it is now possible to design and mill custom titanium abutments directly in the dental laboratory. This new method is of interest to the dental laboratory for several reasons. Production directly at the laboratory is much faster than having to go through a central production facility, where, given the shipping delay and possible adjustments, it may well be a few days until the abutments are ready. In addition, the workflow is not disrupted during the milling process with this procedure. Rather, the inLab software gives the dental technician the option to use the virtually designed abutments as they are being physically milled and continue working with them. An additional benefit is that a greater part of added value stays in-house thanks to the new process.



The Author

ZTM Andreas Beining

Dentaltechnik Beining
Baugenossenschaftsstraße 2
D-95145 Oberkotzau, Germany
E-Mail: beining-connect@t-online.de
Telephon: +49 (0) 92 86/63 24