Passive fit—for the first time

CAD/CAM bar restoration

Author_Björn Roland & Dr Peter Gehrke, Germany

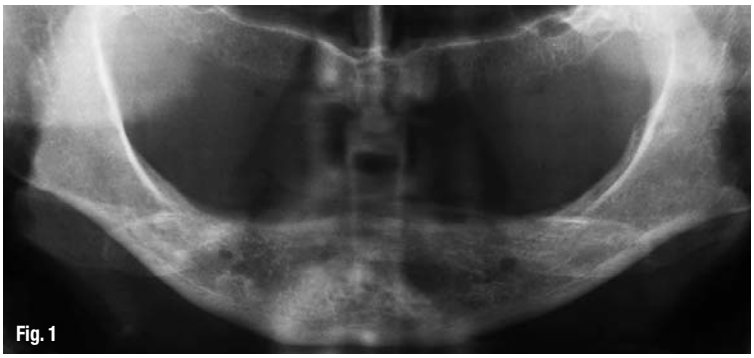
Fig. 1


Fig. 2

Fig. 1_The panorama image shows the situation prior to insertion of the XiVE S implants.
Fig. 2_Two weeks after being uncovered, an open pick-up impression is made at implant level with an individual tray.

_Conventional or CAD/CAM? Today, dental technicians and implantologists ponder this question more frequently than ever. More and more often, they tend towards CAD/CAM. Owing to their tension-free fit, CAD/CAM-fabricated solutions are particularly well suited for the restoration of larger jaw sections. Deciding in favour of or against a CAD/CAM restoration should thus always be a team decision. With his expertise and training, the dental technician is able to contribute considerably to an aesthetic and technically perfect result.

To ensure successful prosthetic restorations, all the steps of a procedure—from planning through impression to insertion—need to be performed with utmost care. This is equally true for both conventionally cast work and CAD/CAM-fabricated structures. With both methods, only a precise transfer of the oral situation to the model guarantees success. Precision is vital for both methods, particularly when restoring larger jaw sections. Outstanding results can also be obtained with conventional casting technology if the work is done accurately and with sufficient experience. However, the risk of an ill fit is substantially higher compared with modern CAD/CAM procedures. Furthermore, wide-spanning and solid frameworks in particular enable cavities to arise and the framework to warp. Also, (partial) overheating of the melt, another potential quality flaw, is often observed with large volumes. These problems do not occur with CAD/CAM technology.

_Therapy decision

Our patient wished to regain a firm bite and unimpaired speech. She had already been wearing mucosa-supported complete dentures for 20 years, but was comfortable only with the maxillary denture. The grip of the mandibular prosthesis was inadequate owing to the resorbed alveolar ridge (Fig. 1) and ob-

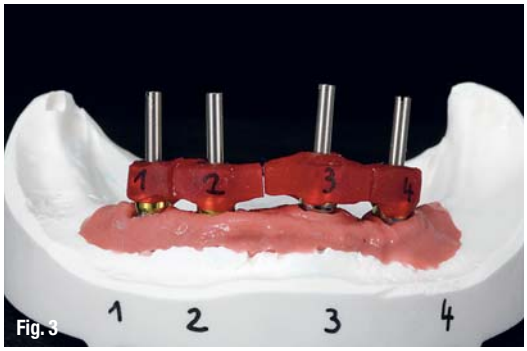

Fig. 3


Fig. 4

Fig. 3_In order to check the accuracy of transfer, a bar made from autopolymerisate is manufactured on a screwed-in Friadent MP abutment and split into segments.
Fig. 4_The individual tray for the pick-up impression with fixed pick-up screws.


Fig. 5

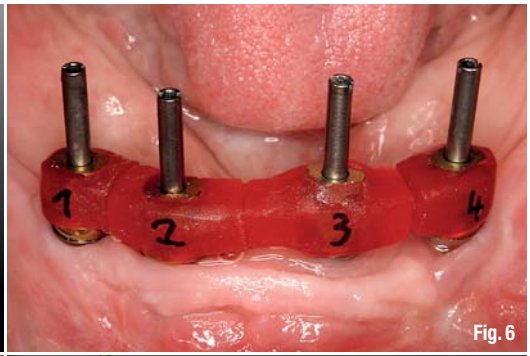

Fig. 6

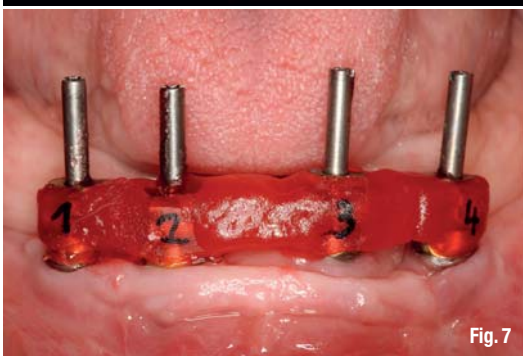

Fig. 7


Fig. 8

Fig. 5_The bite template is fixed in the mouth on two implants.
Fig. 6_Preparation for pick-up impression: The four separate parts of the bar are screwed-in in the mouth.
Fig. 7_The segments are splinted with a small amount of autopolymerisate. The Friadent MP abutments are not removed afterwards.
Fig. 8_Double-mix impression.

structed eating and speaking. There were no general medical findings ruling out an implantation. After detailed consultation, we opted for a bar denture on four implants placed inter-foraminally in the mandible. A fixed restoration was not possible owing to cost considerations. A prosthesis on two implants, which would be more economical, was not an alternative from a medical perspective. The patient desired as stable a restoration as possible and we had to avoid degradation of the implant site through tilting motions in each case.

In the current case, the precision, which can only be achieved with this procedure, turned the balance in favour of a CAD/CAM-produced bar construction. This is also the reason that our dental laboratory, whenever possible, uses wide-span superstructures that are fabricated industrially. The result becomes ultra-predictable in conjunction with the two-stage impression process that we have been implementing with a conventionally cast framework for years. We frequently use the two-stage method whenever there are high demands on accuracy of the impression.

_Transfer of implant positions

Four months after insertion, the osseointegrated implants (XiVE S, length: 13 mm; diameter: distal 4.5 mm, mesial 3.8 mm) were restored with gingiva formers. The situation was impressed and an individual tray created. The impression at implant level was made two weeks after uncovering (Fig. 2). The DENTSPLY Friadent pick-up transfer copings were then screwed onto the analogues in the dental laboratory. Precisely transferring the oral situation with the abutments onto the model requires a second impression with an appropriate control key. A bar made from autopolymerisate was used for this. In order to reconcile any tensions, which develop during polymerisation, the bar is divided into four parts (Fig. 3). We went on to make a second individual tray (Fig. 4) and a plastic-based template to determine the relation. We designed the template in such a way that it can be secured with two impression copings onto the Friadent MP abutments (DENTSPLY Friadent) fixed in the mouth (Fig. 5). This is the only way to test the bite reliably, as well as the aesthetics, function

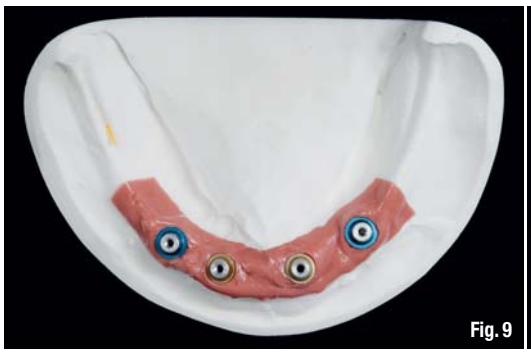
Fig. 9


Fig. 10

Fig. 9_The master cast with removable gingiva mask.
Fig. 10_The wax-up.


Fig. 11


Fig. 12


Fig. 13


Fig. 14

Fig. 11_The basis of the wax-up with the sunken impression copings.
Fig. 12_Screw-retaining the wax-up with the two distal implants ensures the correct position when fitting.
Fig. 13_The construction proposal supplied by Compartis.
Fig. 14_The bar milled according to the dental laboratory's specifications fits perfectly on the laboratory analogue. The bolt eyes for the planned MK1 locking bolts are clearly recognisable in the distal extensions.

and phonetics during the later wax-up. During the session to determine the relation, an impression was also made at gingiva level using the plastic bar. The individual parts were screwed on the Friadent MP abutment (Fig. 6) and splinted together using as little autopolymerisate as possible (Fig. 7). The final abutments always remain in the mouth from this point in time onwards. This has the benefit that peri-implant bone resorption is limited and the soft tissues can heal undisturbed. The impression was made with two-phase silicon (Aquasil Ultra, DENTSPLY DeTrey; Fig. 8). The master cast was made of class IV dental stone. Making a gingival mask is part of the standard procedure (Fig. 9). Fabricating two precision impressions allows maximum accuracy to be achieved with wide-span superstructures. If any inaccuracies are perceived during the impression and model manufacturing process, the corresponding step has to be repeated in each case.

_Manufacture and try-in of the bar

In order to fabricate the XiVE CAD/CAM bar, only the result of the wax try-in was still necessary. This was performed in a separate session using a plastic-based template (Figs. 10 & 11). The wax try-in is fixed onto two implants to facilitate better and definite positioning (Fig. 12). Together with the master cast, the set-up was then sent to the Compartis, where both were scanned in with a customised system. The data records resulting from the scan served as a basis for constructing the bar. At the latest, the construction proposal leaves the Compartis one day after receipt of the model by e-mail. The construction is checked with the viewer software provided by Compartis at no cost (Fig. 13). The jaws, bar and set-up can easily be shown, hidden and viewed from all angles with the software providing optimal control. At this point, the Compartis still accepts corrections.

After the design has been approved, the data record is e-mailed back to the Compartis. The CAD/CAM structure is delivered within seven days after the approval has arrived. In our experience, any conceivable bar solution in any size and type can be realised with the Compartis offer, for example Dolder bars, round bars or even bars with different retaining elements. At delivery, the bar already exhibited a quality of finish equal to a highly polished state (Fig. 14).

We first checked the accurate fit on the master cast before we sent the bar for a try-in at the dental practice. In order to detect any gap formations on the opposite side, the bar was first screwed in (Sheffield test) on one side. The fit also proved to be very accurate, even intra-orally (Fig. 15). X-ray control of the completely screw-retained bar provided additional security (Fig. 16).

_Completion

After the bar was slightly revised and given a final polish, the Galvano intermediate layer could be made (Fig. 17). After making the model casting scaffold for the denture, the bolts were fitted (Fig. 18). Before completing the bar denture, a second wax try-in was carried out for functional fine adjustment. In order to ensure optimal stability, we always make the basal portions of dentures from cold polymerisate. During the finishing process, the soft tissues were replaced with individually fashioned

Fig. 15_The bar fits accurately onto the implants and has tissue-friendly adaptation to the alveolar ridge.
Fig. 16_The X-ray control after screwing the bar in.


Fig. 15

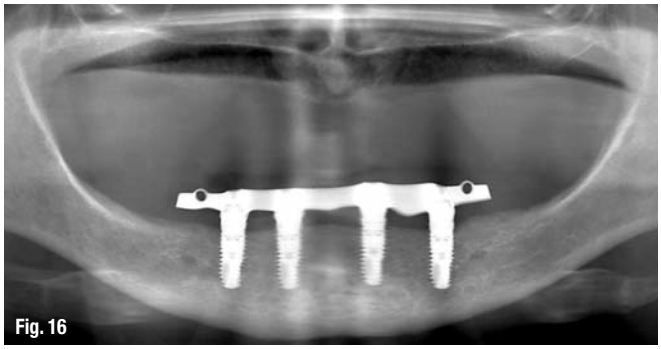
Fig. 16

2011-04 A0008

ADVANCED TISSUE-MANAGEMENT

The easy way to aesthetics.

PARASORB Sombrero®
RESODONT®
PARASORB® HD Cone
GENTA-COLL® HD Cone

RESODONT®

- naturally cross-linked, with no chemical additives
- quick and easy to cut to size and apply, both sides can be used
- rapid integration in the surrounding tissue
- highest degree of product safety and excellent biocompatibility

PARASORB Sombrero®

- to cover and simultaneously fill the alveolus (socket preservation)
- offers a defined regeneration matrix
- formation of a stable bony implant bed after a relatively short time
- improved long-term aesthetic and functional results particularly in the anterior region

PARASORB® HD Cone GENTA-COLL® HD Cone

- rapid and safe haemostasis
- reduction of alveolar ridge atrophy
- optionally comes with antibiotic protection for high-risk patients (e.g. diabetics, smokers, immune-suppressed patients)

RESORBA
Wundversorgung GmbH & Co. KG
Am Flachmoor 16
90475 Nürnberg, Germany
Tel. +49 9128 / 91 15 0
Fax +49 9128 / 91 15 91
www.resorba.com
www.diedentalbox.com

RESORBA®
REPAIR AND REGENERATE

Fig. 17_The Galvano intermediate layer.
Fig. 18_The scaffold with the MK1 locking bars.
Fig. 19_The finished bar denture from basal direction.
Fig. 20_The finished dentures.


Fig. 17


Fig. 18


Fig. 19


Fig. 20

plastic. As patients recognise the clear aesthetic difference to their previous dentures, individual creation increases their satisfaction quite considerably. This also helps them to better accept the, as yet, relatively high costs of implant restoration. Figure 19 shows a basal view of the finished denture; and Figure 20, the inserted work.

_Process control

The introduction of CAD/CAM-fabricated structures (bars, bridge framework) does not change the cooperation between dentists or oral surgeons and dental technicians. However, producing the superstructure industrially necessitates rethinking the dental laboratory in one respect. The framework is no longer waxed up, but conceived on screen or, as in our case, processed on the dental laboratory PC according to a proposal from the Compartis and, if required, modified to fit individual wishes. External production requires appropriate scheduling.

Steps determining aesthetics and function, such as approving framework design and producing the superstructure, remain in the dental laboratory as it used to be with the conventional procedure. As before, the treatment team controls the entire process. Compartis is merely an external supplier and has no influence on the therapy. The manufacturer's warranty on CAD/CAM structures is also of interest since it is for up to ten years. This is possible because industrial standardisation ensures the high quality of the blanks' material and industrial milling guarantees maximum precision. Thus, the risk of material failure or faulty manufacturing, and hence economically difficult re-manufacture, is minimised.

_Conclusion

The patient was enthusiastic about her new denture. Her wishes for improved function and phonetics were fully met. The procedure described here, developed in "conventional times" according to our experience, has a permanent place in our team. Furthermore, with DENTSPLY CAD/CAM solutions we have a reliable system at our disposal. It substantially simplifies work procedures, increases precision and ensures full control over all working steps._

Editorial note: This article was first published in IDENTITY 2/10. *A list of references is available from the authors.*

_contact implants

Björn Roland, MDT
Dental Design Schnellbächer & Roland GmbH & Co. KG
Raiffeisenstraße 7
55270 Klein-Winternheim
Germany

b.roland@gmx.de

Dr Peter Gehrke
Professor Dr Dhom & Partner
Dental Practice
Bismarckstraße 27
67059 Ludwigshafen
Germany

dr-gehrke@prof-dhom.de

straumann

PERFECT FIT BY DESIGN

In combining Soft Tissue and Bone Level implants with a comprehensive prosthetic portfolio, Straumann has devised one system for all indications. The **Straumann® Dental Implant System** – excellent product quality designed for convincing, naturally esthetic outcomes.

More information on **www.straumann.com**

COMMITTED TO
SIMPLY DOING MORE
FOR DENTAL PROFESSIONALS