

# FABRICATING CUSTOM ABUTMENTS

LUC AND PATRICK RUTTEN

How much should a Dental Technician know about the clinical aspects of implantology? The answer is clear: as much as possible. This is the distinction between a good dental technician and one who is an integral member of the dental team. Dental technicians who do not get involved in the field of implantology will neither understand the requirements of the clinician nor be able to give appropriate technical advice.

**Key words:** Aesthetic, individual abutments, implants, soft tissue management

According to clinicians, the most critical criteria in dental implantology today include:

- prosthodontics (including backward planning),
- gingival tissue structure
- bone preparation

It can also be noted that there is a shift in priority from gingival tissue augmentation to gingival tissue preservation. In the aesthetic anterior arch, many clinicians prefer immediate implantation after extraction to maintain soft tissue and support the bone. From the clinician's point of view, long-term success rates are determined by making the correct choice of treatment based on soft tissue type (thick and thin biotypes). Confronted with all these aspects, the technician can greatly influence the long-term results of implant-based reconstructions.

*Luc and Patrick Rutten  
Tessenderlo, Belgium*

*Contact Address*

*Dental Team BVBA • Luc and Patrick Rutten  
167 Neer street • B-3980 Tessenderlo  
Tel +32 (0) 13. 67 04 80  
Fax +32 (0) 13. 67 04 88  
www.dentalteam.be • dental.team@scarlet.be*

The dentist or periodontist's goal is to achieve perfect gingival tissue management, with the periodontal situation creating the pre-condition to achieving a high end restoration. The technician can then support the efforts of the clinician by giving the restoration an optimal emergence profile and gingival supported contour. This can only be realised if the abutment fulfils these requirements from the outset. The objective of



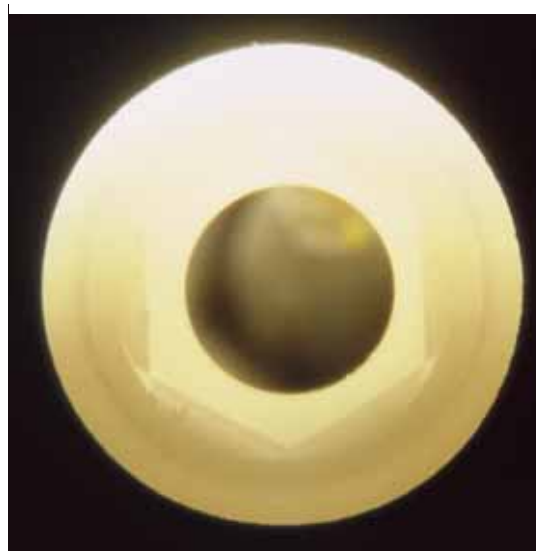
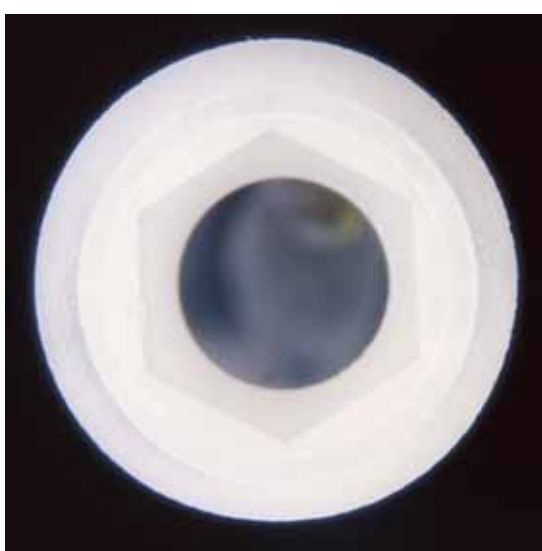
**Figure 1:** Patient case number 1: The provisional chairside crown on a classic hexagonal Brånemark implant."



Figure 2: The shape of the abutments was generated with software. Delivery was by courier.



Figure 3: The translucent properties of Zirconia abutments are similar to those of Alumina abutments.



Figures 4 and 5: Precision: The abutment cavity as depicted from the base corresponds in accurate detail to the shape of the hexagonal Brånemark implant.

correct abutment selection is to achieve a definitive restoration which supports the gingival contours so meticulously prepared by the dentist.

#### Patient case 1

Figure 1 shows a provisional crown fabricated by the clinician for this specific implant case. A classic hexagonal Brånemark implant was placed. Using 3D CADD software, the abutment was almost entirely manufactured automatically, and delivered a few days

later via courier (Figure 2). As usual, the screw cylinder was over-sized and had to be trimmed.

The translucent quality of zirconia abutments is similar to that of alumina abutments as illustrated in Figure 3. Furthermore, the fit of the abutments is excellent (Figures 4 and 5).

The hollow space of the abutment, photographed from the basal side, depicts how the shape of the hexagonal implant has been reproduced in exact detail. Nor is any weakening of the abutment evident on the



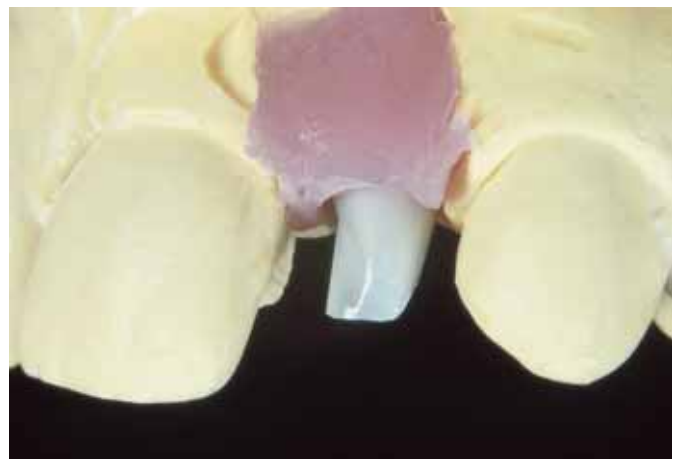
Figure 6: The fit is perfect on the replica model.



Figure 7: The fit highly magnified.



Figures 8 and 9: The alignment of the implant is just within tolerance.



Figures 10 and 11: The screw sleeve is detached. The abutment is an exact copy of the 3D-CADD design.

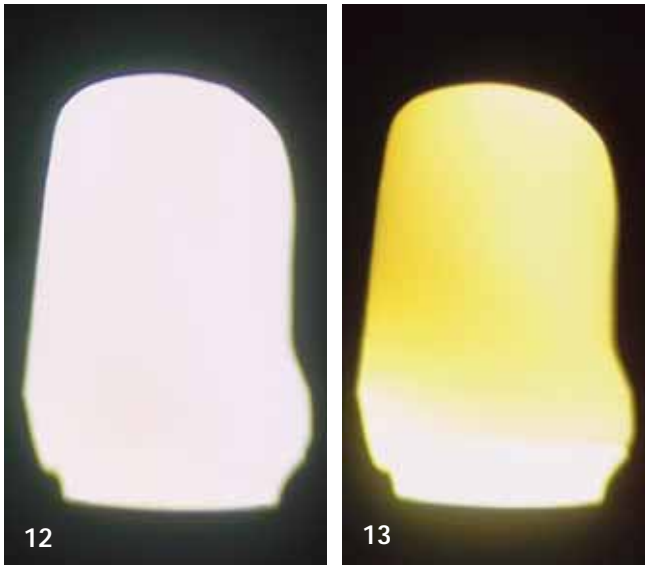


Figure 12: The finished coping on the abutment in direct light.

Figure 13: Even with the combination of alumina (coping) and zirconia (abutment) the customary semi-translucency is observed.



Figure 14: The crown margin should be located between 0.4 - 0.5mm subgingivally.



Figure 15: A case for zirconia: the labial wall thickness of the abutment is minimal.



Figure 16: The emergence profile and contact points with the adjacent teeth are checked.

replica model: it is a perfect fit (Figure 6), even under high magnification (Figure 7).

The delivered abutment was then screwed on to the master cast. While the extreme labial axial alignment of the implant is noticeable, the implant alignment was still within tolerance as compensation was made for the position of the axis in the restoration (Figures 8 and 9).

With minimal effort, the screw sleeve was detached leaving little still to be done. The abutment is an exact copy of the 3D-CADD design (Figures 10 and 11).

The articulator was used to check whether there was sufficient space for the Procera coping and veneer. The abutment was rescanned once more and the Procera coping, (in this case alumina), was fabricated using the 3D-CADD software.

Figure 12 shows the finished coping on the abutment in direct light. Even with the combination of alumina (coping) and zirconia (abutment) the customary semi-translucency designed to illuminate the gingiva when exposed to transmitted light was evident.

## CLINICAL



*Figures 17 and 18: If the emergence profile is correct, and the contour of the crown supports the gingiva, the gingiva and papilla will heal.*

The custom abutment was tried in and the crown margin checked. This should be located between 0.4 - 0.5 mm sub gingivally. Should the crown margin be lower, the clinician will have difficulty removing excess cement or composite. A qualified dental technician should consider this when designing abutments.

As shown in Figure 15, the labial wall thickness of the abutment is minimal. This is a typical indication of zirconium oxide whose outstanding material strength permits the design of extremely delicate abutments.

The emergence profile and contact points with the adjacent teeth were checked once more on the master

model.

The emergence profile - the natural, physiological profile of a crown as it emerges through the gingiva - has a great influence on the regeneration of the soft tissue. If it is correct, and the contour of the crown supports the gingiva, then optimum conditions exist for the gingiva and the papilla to heal completely. Examples are illustrated in Figures 17 and 18.

Figure 19 shows the patient a few weeks after a full ceramic restoration was placed. The restoration is imperceptible at speaking distance, and is virtually perfectly integrated into the oral environment. The



*Figure 19: A few weeks later: the restoration is imperceptible at speaking distance.*



*Figure 20: The black/white photograph depicts the luminosity.*



Figure 21: Patient case 2: Tooth 21 was restored with an implant and a custom zirconia abutment.

black-and-white photograph illustrates the luminosity.

**Patient case 2**

Tooth 21 was restored with an implant that had a custom zirconia abutment (Fig. 21). The Procera crown on the abutment was successfully integrated with the oral environment (Fig. 22 and 23) when the patient smiled normally. The patient came to the laboratory for a try in and was very satisfied with the work (Fig. 24 and 25), theoretically giving a sense of job satisfaction. However, the result was unfortunately not perfect from a clinical point of view. As depicted in Figure 26, taken after the bisque bake and during the try in, the gingival



Figures 22 and 23: The Procera crown on the abutment integrates well with the oral environment.



Figures 24 and 25: The patient was very satisfied..



Figure 26: The gingival contour is not harmonious.



Figure 27: The papilla has not grown back completely.



Figure 28: The crown length was manipulated optically using a ceramic material with high colour saturation.

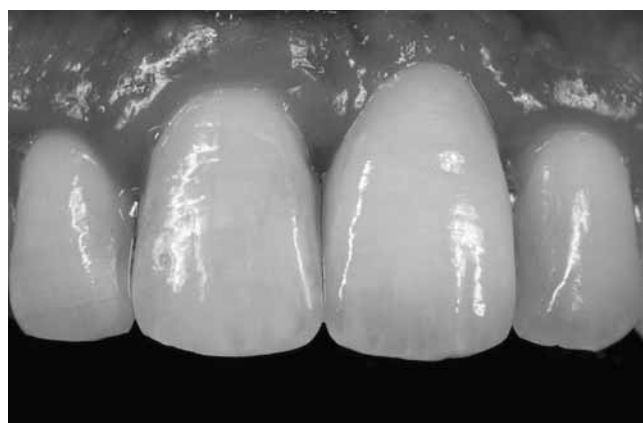


Figure 29: the black/white image shows the luminosity is correct.

contour is not in harmony with the two central incisors (11/21), nor was the interdental situation satisfactory, (Figure 27) despite the apparent harmony and crown integration. Using a ceramic material with a high degree of colour saturation, we tried to divert attention away from the clinical problem by optically (not actually) manipulating the length of the crown. This was successful as shown in Figure 28.

Simple layering, an appropriate surface texture and a successful shape completed the task. The black/white image (Figure 29) confirms that the luminosity was also correct.

### Patient case 3

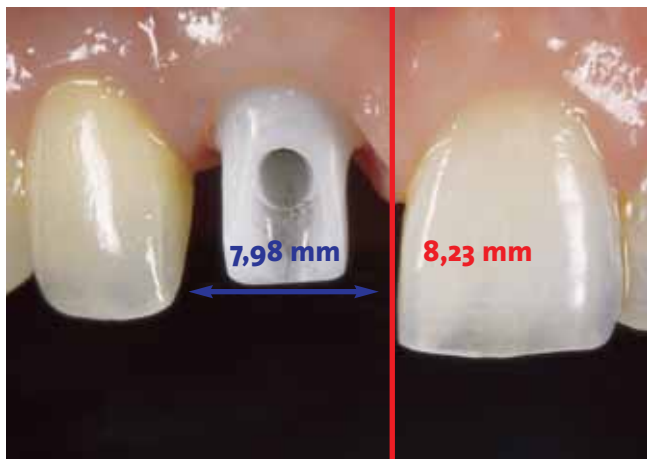
In this case, an all-ceramic crown was placed on a custom zirconium oxide abutment for tooth 11 (Figure 30). Whilst not a spectacular case, it was fairly typical as the dentist's prescription stipulated: "Please ensure the crown is aligned with the other teeth." Although the dentist's request should have been fulfilled, the lack of space was a limitation.

When tooth 21 was measured and compared with the space available at tooth 11, it became clear that an anterior crown that was "aligned" could not be created as it would be too narrow. The solution was simply to



Figure 30: Patient case 3: Tooth 11 will receive an all-ceramic crown fabricated on a custom Zirconium dioxide abutment.

## CLINICAL



*Figure 31: An impossible situation: The crown should align with adjacent teeth.*



*Figure 32: the space is too narrow. The solution: Simply overlap the mesial edge slightly.*



*Figure 33: Even the patient's natural dentition addressed the crowding by overlapping.*



*Figure 34: Shape and luminosity correspond.*

overlap the mesial edge slightly (Figure 32).

The mandible provided the indication or even justification for such a procedure (Figure 33). Even the patient's own dentition had naturally counter-balanced the crowding overlapping. Figure 34 shows the final

result in a black/white photograph, clearly illustrating that the shape and luminosity were correctly matched.

The patient came to the laboratory and was critical of the intended solution. She subsequently realised that the result was harmonious and matched her character.



*Figure 35: Critical evaluation by the patient.*



*Figure 36: Convinced: The result is harmonious and suits her character.*