All-ceramic Crown Techniques

Fig. 76
The restoration fits the lip line, the oral environment and the patient’s appearance (photography by Dr. Irfan Ahmad, London).

Fig. 74 and 75
Exciting: Before-and-after comparison (photographs by Dr. Irfan Ahmad, London).
The two lateral incisors were prepared for a Procera restoration in a young woman (Fig. 77). In this instance as well, we felt that the 0.4-mm Procera alumina copings were a suitable basis for our layering technique. This is nearly the ideal case. The preparation was very good, and the dental technician was not challenged by the tooth shade either. There were no particular deviations from the standard tooth shade. The non saw-cut master cast provided us with all of the additional information we needed for our restoration (Fig. 78). The results of our work are revealed in Figure 79. When the tooth shade is neutralized, the shape of the tooth and surface texture are more easily visualized. This is accomplished with a bit of gold powder. The surface texture was adapted to match the adjacent teeth (Fig. 80).

Figures 81 and 82 show the teeth in situ. To evaluate the layering, we photographed the teeth against a black background. We can clearly see how well our crowns match the adjacent teeth. Of course, the natural antagonists are also adjacent (Fig. 83 and 84). This information needs to be incorporated into the layering of the crowns i.e. the color details of the mandible considerably influenced the reconstruction of our two lateral maxillary incisors. This is the only way we can achieve a picture of overall harmony like that shown in Figure 85. The two lateral crowns are completely unassuming, i.e. the layering is appropriate, the brightness is correct, and the shape also turned out well.

**Fig. 77** Patient case 3: The two lateral incisors were prepared for a Procera restoration with 0.4-mm copings.

**Fig. 78** The non saw-cut master cast provides us with all the information we need. Layering can begin!

**Patient Case 3**

The two lateral incisors were prepared for a Procera restoration in a young woman (Fig. 77). In this instance as well, we felt that the 0.4-mm Procera alumina copings were a suitable basis for our layering technique. This is nearly the ideal case. The preparation was very good, and the dental technician was not challenged by the tooth shade either. There were no particular deviations from the standard tooth shade. The non saw-cut master cast provided us with all of the additional information we needed for our restoration (Fig. 78). The results of our work are revealed in Figure 79. When the tooth shade is neutralized, the shape of the tooth and surface texture are more easily visualized. This is accomplished with a bit of gold powder. The surface texture was adapted to match the adjacent teeth (Fig. 80).

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**Fig. 79** The result of our endeavors.

**Fig. 80** More details can be seen without color. A little bit of gold powder is used to make the surface texture visible.
Fig. 81 and 82: Crowns in situ. They are adapted to the neighboring teeth.

Fig. 83 and 84: Information regarding the color details of the antagonists has also been incorporated in the layering of the crowns.

Fig. 85 a and b: Overall picture. The layering is correct, the brightness is appropriate and the shape is also successful.
Figures 86 to 88 show the restoration in the labial environment.

To perfectly adapt such single crown restorations, we need the patient to come to the lab. Without the dental technician directly communicating with the patient and getting a direct visual impression of the restoration in situ, perfect results are a matter of chance. We do not want the success of our efforts to depend on luck. The results of our work need to be predictable. If anybody feels lucky, it should be the patient who leaves our laboratory satisfied (Fig. 89).
Patient Case 4

Renovating old restorations is an increasing part of our regular work. In this case, the crown at tooth 21 had come off and needed to be replaced in connection with the adjacent crown at tooth 22 (Fig. 90). The substructure consisted of two metal posts and cores (Fig. 91). It was not worthwhile for the dentist to remove them. The risk of fracturing the root of the tooth would have been simply too great.

Figures 92 and 93 show the crowns before fine-tuning during try-in at the lab. The surface texture was course, and the luster was rather matte. The papilla between teeth 21 and 22 was slightly swollen; this was probably caused by the provisional acrylic coping. The situation six months later was completely different (Fig. 94 and 95). The gingiva lies perfectly against the Procera crowns and looks very vital.
Figure 96 reveals a few details about the layering technique. A relatively large amount of transparent material was used, and a whitish incisal margin was initially applied.

Figure 97 gives us an overall impression of the two crowns in situ. With single crowns, tooth shape and luster are much more important than basic shade. In this case, we had to give the crowns a certain matte luster. A matte luster is not the same as a glaze firing i.e. we needed to individually control our ceramic oven. A low firing temperature and short holding time generate a satiny, matte luster.

**Fig. 96**
A relatively large amount of transparent materials were used, and a fine, whitish incisal margin was initially applied.

**Fig. 97**
The crowns in situ. The shape of the tooth and luster are more important than the basic shade.
Patient Case 5

It is usually single crowns that make our life particularly difficult. In this patient, the crown was positioned extremely far to the labial (Fig. 98 and 99), the brightness of the neighboring tooth was very high, and the tooth stump in the cervical area exhibited major discoloration (Fig. 100).

We wanted to mask the discoloration of the stump with a semi-translucent Procera coping. In addition, it was advisable to make the basic dentin slightly brighter in this area. As mentioned, brightness is much more important than basic shade.

Particularly with single anterior crowns, the basic shade is difficult to define since our eyes are frequently subject to the phenomenon of metamerism. At this juncture, we do not want to delve too deeply into the science of color; nevertheless we would like to briefly explain the phenomenon of metamerism.

Metamerism or conditional isochromism is a phenomenon of the apparent color change of an object as a function of light source. This phenomenon is characterized by the fact that objects appear have the same color under one light source, but to have a different color under another light source. The reason for this is that our eyes do not individually analyze the spectral distribution of light when viewing objects. That is why we will always be subject to an unavoidable amount of metamerism when we view ceramic crowns and natural teeth. Metamerism also occurs between natural teeth and shade samples. The shade sample, ceramic veneers and natural teeth are all made of different materials. If possible, shade-taking should always be done under white light.

The patient wants to correct the position, i.e. align the crown within the dental arch. Not an
Figure 105 shows the crown on the master cast. The cervical area perfectly matches the gingival contour.

Some patient wishes are difficult to fulfill: Align the crown in the dentition.

Fig. 101 and 102

Fig. 103 and 104

Minimum: The thickness of the Procera alumina coping is 0.3 mm. The coping and veneer are 0.6 mm thick.

Fig. 105 (left)
The crown on the master cast. The cervical area perfectly matches the gingival contour.

Fig. 106 (right)
A pencil was used to mark the contours of neighboring tooth which were copied to our crown.

Figure 105 shows the crown on the master cast. The cervical area is perfectly adapted to the gingival contour. The refinement of the proximal heights of contour also proceeded in a systematic fashion. We used pencil to mark the contours of the adjacent tooth, then we copied this template applying it step by step to our crown (Fig. 106).

easy task, given the master cast as shown in Figures 101 and 102. Even after preparation, the labial portion of the stump contacts the tangent on the adjacent teeth. Since saving space is paramount, we therefore reduced the 0.4-mm Procera alumina coping down to 0.3 mm. The space created was for the benefit of our veneer. The calipers reveal the thickness of the coping and veneer. The thickest portion was 0.6 mm (Fig. 103 and 104).
The ability to make perfect copies is one of the talents that a dental technician needs to be born with. However, you can only copy what you can see, and you have to learn how to see. That which sometimes appears as razzle-dazzle and prosthodontic overindulgence in publications and lectures is actually the result of hard training. We repeatedly photograph nature and analyze it (Fig. 107 to 110). Teeth in direct light, teeth in transmitted light and teeth coated with silver or gold powder is instructive.
Figure 111 shows us the emergence profile of the crown. Despite the minimum amount of space, we were able to integrate the crown into the dental arch. The model coated with gold powder makes it clear that the crown has almost no texture (Fig. 112). We used very fine diamond burs, and subsequently polished the restoration with a rubber wheel.

Despite its thinness, the layering turned out well (Fig. 113). The brightness was increased slightly at the margin. The cervical discolouration was no longer an issue.

With the crown in situ, we immediately noticed that it did not extend much farther in a labial direction than the neighboring teeth (Fig. 114). The incisal edge also appeared just as vital as the natural central incisors. We conclude this patient case by showing the lip line (Fig. 115 and 116) and a very satisfied patient.

Fig. 111
The emergence profile of the crown. We successfully integrated the crown into the dentition.

Fig. 112
The crown has virtually no surface texture.

Fig. 113
Successful layering: The brightness was increased slightly in the marginal area.

Fig. 111
The emergence profile of the crown. We successfully integrated the crown into the dentition.
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Fig. 114 a and b The crown projects just slightly more labially than the neighboring teeth.

Fig. 115 and 116 Incisal edge and lips are in harmony.