Analysed, pressed and layered: Excellent aesthetics owing to skilfully combined materials

Gerald I. Uhasy
France

For the creation of a bright smile, a precise evaluation of aesthetic and functional aspects of treatment is required. A well-planned working protocol is essential in the fabrication of dental restorations. We have developed a special approach in our dental laboratory that is presented here with the help of a case report.

The restorative work involved the fabrication of six veneers for the anterior teeth. In challenging cases, the dental laboratory technician begins the restorative procedure by carefully analysing all of the available data. This includes photographs of the initial situation, study models and a face-bow registration.

The facial photograph of the patient alone provides important diagnostic information. Based on this image, we can carefully analyse the tooth shape and the facial parameters (morphology) and gain significant insight into how to approach the creation of an “esthetic smile” (Fig. 1). In our case, the intra-oral images showed that the anterior and posterior teeth had been severely abraded (Fig. 2). The patient asked for these flares to be remade and for the natural shape of his teeth to be restored. After in-depth consultation with his dentist, it was decided to restore the affected teeth with all-ceramic veneers according to minimally invasive principles.

As a preliminary step, orthodontic treatment was performed to move teeth #11, #12, #13, #21, #22 and #23 towards the vestibular aspect and to achieve a less traumaizing function. Then the vestibular surfaces of the maxillary anterior teeth were then prepared (Fig. 3).

We chose to produce the veneers with pressed ceramic, which has then proceeded to build up according to the individual requirements. I first fabricated restorations (IPS Empress, Ivoclar Vivadent) in this way in 1992 and have been using this technique for many years.

IPS Empress 2 was my ceramic of choice but I now use IPS e.max Press (lithium disilicate-glass ceramic) exclusively for this purpose. In my opinion, this solution is ideal for fabricating restorations of this kind.

Although the conventional layering technique using refractory models produces highly aesthetic results, it is very time-consuming and demanding. The restoration has to be fired several times without the possibility of monitoring its colour in the process. With the technique I use, however, a framework is pressed and then the incisal third is cut back. Thereafter, the dental technician “moozery” has to apply the veneering ceramic. This procedure takes less time and the outcome is easier to control.

The layering scheme
In anterior restorations, the most important is to match the tooth saturation and the brightness carefully. In most cases, however, several ceramic layers are required to achieve the appropriate blend. In the present minimally prepared case, very little space was available for the veneer. I guess that every dental technician is familiar with this scenario. In order to achieve a true-to-nature result nonetheless, a detailed layering scheme is indispensable (Fig. 4).

In this case, I used two different IPS e.max Ceram Dentin materials (Ivoclar Vivadent): A5 and A2, as well as a lighter Dentin B1 mixed with 1/2 Opal Effect 4 (OE 4) to increase the value. As we all know, the incisal third of natural teeth is translucent. Therefore, in this part of the restoration, the Dentin material has to be desaturated with a translucent neutral material. Opal Effect 1 (OE 1) material is indispensable owing to its opalescent properties. It has a translucent blue appearance in reflected light and an amber tint in transmitted light. Consequently, we placed some OE 1 in the proximal corners and along the incisal edges.

Natural teeth often have small areas on the edges that absorb light. In the present case, these areas were imitated with a violet material (Opal Effect violet) and 1/2 OE 1. I have given this case the descriptive name of “absorption material”. As only limited space was available for the enamel material, I decided to use the bright OE 4. The layering technique is time-consuming, but my method for ensuring the correct shade, as well as many other useful properties described in detail in my book Tricks and Hints.2

Pressed and...
The IPS e.max Press ingots are ideal for fabricating the frameworks of layered veneers. In the present case, my associate Florence Ouli pressed such a framework using a medium-opacity (MO) 1 ingot (framework thickness of 0.4/0.5 mm; Fig. 5). The colour and opacity of these ingots is optimal. The material masks the colour of the prepared tooth satisfactorily, but it is not excessively opaque.

The broad range of IPS e.max ingots provides a suitable solution for almost any clinical situation and owing to the choice of various levels of opacity, translucency, brightness and fluorescence, even difficult cases can be treated successively.

1. MO 1 ingots mask the colour of the prepared tooth, but do not look opaque. We use these ingots for almost 70 per cent of the crowns we fabricate.
2. MO 0 ingots are a good alternative for fabricating lighter crowns, or in this mixture in which the patients want brilliant white teeth.

5. Low-translucency (LT) press ingots are suitable for clinical situations in which the prepared tooth has a light colour. Owing to their translucent properties, these materials allow the preparation shade to shine through, which imparts a certain depth to the appearance of the restoration. It is not to use LT ingots in the fabrication of individual teeth, as their shade after seating is difficult to anticipate.

The IPS e.max Press ingots are ideal for fabricating the frameworks of layered veneers. In the present case, my associate Florence Ouli pressed such a framework using a medium-opacity (MO) 1 ingot (framework thickness of 0.4/0.5 mm; Fig. 5). The colour and opacity of these ingots is optimal. The material masks the colour of the prepared tooth satisfactorily, but it is not excessively opaque.

The broad range of IPS e.max ingots provides a suitable solution for almost any clinical situation and owing to the choice of various levels of opacity, translucency, brightness and fluorescence, even difficult cases can be treated successively.

1. MO 1 ingots mask the colour of the prepared tooth, but do not look opaque. We use these ingots for almost 70 per cent of the crowns we fabricate.
2. MO 0 ingots are a good alternative for fabricating lighter crowns, or in this mixture in which the patients want brilliant white teeth.

5. Low-translucency (LT) press ingots are suitable for clinical situations in which the prepared tooth has a light colour. Owing to their translucent properties, these materials allow the preparation shade to shine through, which imparts a certain depth to the appearance of the restoration. It is not to use LT ingots in the fabrication of individual teeth, as their shade after seating is difficult to anticipate.
In addition, several more fluorescent press ingots are available today, including IPS e.max Press Impulse Opal 1 and 2, as well as Impulse Value 1, 2, and 5. We use these materials according to the case.

...then layered
After the pressing procedure, the frameworks were reduced to 0.3 mm and coated with translucent layers (

(Fig. 7). Foundation fusing at 750 °C preceded the layering procedure. After firing, the IPS e.max Ceramic Essence materials were applied (Fig. 6).

These working steps demand considerable expertise from the dental technician. As the framework (MO 1 ingot) in the present case masked strong colours, we had to ensure adequate saturation of the cervical third. However, the space for the layering materials was limited.

The Essence materials provide a good alternative in such cases. These materials are fired at 725 °C. In the case described, the subsequent layers were completed in one firing cycle (Fig. 7). This economical procedure considerably reduces the workload and heightens the efficiency of the laboratory. The thickness of the veneers was 0.5 mm in the middle third and 0.3 mm in the cervical third. The clinician deliberately prepared the incisal third of the teeth to allow sufficient space for building up the ceramic layers and for creating all of the fine details required for a natural-looking restoration.

Morphological design
In order to recreate the morphology of the teeth faithfully, we marked the contours and angle characteristics on the veneers with a bicoloured wax crayon (Fig. 8–10). This guided us in reproducing the tooth shapes efficiently and precisely. The use of this method, which I have taught for 18 years, allows one to achieve high-quality results.

We have a collection of several thousand natural teeth at our disposal. On the basis of these samples, we can adapt the shape and surface texture of the teeth. The completed restorations were 0.75 mm thick in the cervical third. However, the space for building up the ceramic layers was limited.

We carefully polished the lifelike surface. The layering material was remarkably thin. Nevertheless, we managed to produce highly aesthetic anterior restorations (Figs. 11 & 16). Undoubtedly, this successful outcome is also due to the close collaboration of Dr Stefan Kouki from Marseille, who was the clinician who treated this case. Together we were able to restore the patient's smile with tooth shapes corresponding to the patient's personality and tooth morphology (Fig. 17).

Conclusion
In cases such as the one described, veneers represent an excellent treatment option. We were able to achieve outstanding results with restorations involving pressed frameworks, which were subsequently built up with ceramic layers. This method is much easier than the conventional layering technique but provides optimum quality.

Acknowledgement
Special thanks go to Dr Stefan Kouki for his great personal and professional qualities.

References
1. G. Ubassy, Shape and Color: The Key to Successful Ceramic Restorations (Chicago: Quintessence, 1995).