Two approaches, one goal
Digital expertise versus manual skill in the fabrication of ceramic veneers
By Dr Eduardo Mahn, Chile

In the restoration of anterior teeth, clinicians have to select the most appropriate material for the case at hand on the basis of specific criteria. Recently developed restorative materials have opened up a myriad of exciting possibilities. In situations in which teeth show signs of erosion, abrasion, attrition or a combination of these phenomena, practitioners will tend towards using ceramics or composite resins, depending on how much intact tooth structure remains.

Traditionally, composites are used for Class III, IV and V defects, however, ceramic veneers are preferred in cases in which a large amount of tooth structure is missing or a major change is planned (e.g. a smile makeover). When two central incisors need aesthetic enhancement, the choice of approach is not as clear. Irrespective of the material used, a minimally invasive approach involving very little preparation of the tooth structure can be taken nowadays owing to the high strength of modern materials (e.g. lithium disilicate glass-ceramic). Nevertheless, it is important to remember that minimal preparation is an option only if the teeth are properly aligned. As long as the desired changes to the tooth shape and shade are small, the preparation can be limited to the enamel. In many cases, however, orthodontic treatment is needed before the tooth position and/or shape can be optimised by means of restorative procedures. This minimally invasive approach requires the dental practitioner to convince the patient of the necessity of undergoing preliminary orthodontic treatment.

It is our aim to remove as little of the tooth structure as possible in every case that we treat. With modern materials such as lithium disilicate and leucite-reinforced ceramics, we can press or mill veneers that are as thin as 0.6 mm and even 0.3 mm with confidence. Only a few years ago, treatment with indirect restorations still required at least two appointments. Ceramic materials such as IPS Empress-CAD (Vivadent) allow clinicians to produce polychromatic monolithic veneers and crowns in less than one hour and without having to glaze them. Nonetheless, many dentists still believe that dental technicians with their well-honed manual skills produce better aesthetic results than a machine does, and they do not see the need to embrace digital technology. As a result, some clinicians are reluctant to invest in this technology because of the high acquisition costs of the milling machines. Through the clinical case study presented here, we want to focus on aspects like the importance of having a suitable treatment plan, the possibilities currently available for the fabrication of veneers, the potential of the press and CAD/CAM techniques, as well as the latest improvements made in the field of cementation.

Clinical case
A 33-year-old female patient presented to our office because she was dissatisfied with her anterior teeth. She complained about the malalignment of the maxillary and mandibular central incisors (Fig. 1). A detailed clinical examination established that the composite restorations in these teeth were defective. As a result of erosion, a considerable amount of tooth structure had been lost. In addition, malalignment of teeth 21 and 41 was quite obvious.

The treatment plan we presented to the patient included initial orthodontic treatment followed by minimal preparation of the two central incisors for two ceramic veneers. The patient was referred to an orthodontist for treatment. Unfortunately, it took more than a year before she presented to the practice again and we were quite surprised to find that the two central incisors had been restored with poorly finished direct composite veneers (Fig. 2). In addition to preventing any contamination of the working field, the clinician must accomplish the arduous task of creating an appropriate emergence profile, proper contours and contact areas, and producing a suitable micro- and macro-texture, and all this within a single appointment. Many simply underestimate the challenging nature of this type of restoration, and this was a case in point.

Owing to the poor preparation, the composite veneers had to be removed and replaced with new ones. In this particular case, the advantages of using the indirect technique were obvious. The patient agreed to have two ceramic veneers made for her. For this purpose, impressions were taken and a master cast was produced. This working model provides the dental technician with the opportunity to evaluate the situation in detail. He or she has the time to think about possible ways of correcting the malalignment.

Dentists do not have this luxury of time when they are treating a patient in the dental chair, as they have to finish the restorations as quickly as possible in order to prevent contamination of the treatment area and keep chair time to a minimum for the comfort of the patient. In the present case, another hurdle had to be overcome: any composite material that might have remained on the tooth structure had to be clearly identified using transillumination with white light-emitting diode light (Fig. 3) and
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carefully removed without damaging the healthy tooth structure. Next, the teeth were prepared, retraction cords were placed and an impression (Virtual, Ivoclar Vivadent) was taken (Fig. 4). The patient was provided with a temporary crown and bridge material (Telio CS C&B, Shade A1; Ivoclar Vivadent) and cemented with a dual-curing luting composite (Telio CS Link, Ivoclar Vivadent; Fig. 5).

We followed two different routes in fabricating the veneers. We instructed our laboratory technician to make two ceramic veneers using the press technique with IPS e.max Press (Shade HT A1, stained; Ivoclar Vivadent), and we milled two ceramic veneers with our in-office CAD/CAM machine using an IPS Empress CAD Multi block (Shade A1; Ivoclar Vivadent) at the same time. The veneers made in the dental office were just polished and not glazed. Figures 6 & 7 allowed us to compare the results from a facial perspective.

This experiment illustrated the aesthetic potential of modern ceramics. Both types of restorations blended in beautifully with their surroundings. The appearance of the veneers produced using CAD/CAM technology came very close to that of the manually manufactured version. Nevertheless, in the end, we opted for the laboratory-fabricated veneers with the consent of the patient, since we were able to achieve a slightly better match to the neighbouring teeth by staining the restorations.

The paste was applied. Even though the darker shade (Warm+) was very close to that of the natural tooth structure and would have worked well with the veneers, we selected the lighter shade. This is very common, as in most cases we tend to prefer the lighter version because it provides a better contrast to the tooth structure and therefore renders the removal of excess cement easier and faster.

Before the veneers were seated, retraction cords were placed and the enamel was etched [not the dentine; Fig. 10]. Adhese Universal (Ivoclar Vivadent) was used as the bonding agent to place the veneers (Fig. 11). The excess luting composite was then carefully removed (Fig. 12) and a glycerine gel (Liquid Strip, Ivoclar Vivadent) was applied. This gel prevents the formation of an oxygen inhibition layer at the margins. The luting composite was cured with two curing lights (Bluephase Style, Ivoclar Vivadent) simultaneously and cooled with plenty of water (Fig. 13). Figure 14 shows the harmonious result produced by the lithium disilicate veneers.

Conclusion
State-of-the-art restorative materials have immense potential. Depending on the particular requirements of the patient and the indication, they allow a suitable treatment option to be determined quickly and easily. The case presented here shows that highly aesthetic ceramic veneers can be fabricated with minimal effort using in-office equipment (IPS Empress CAD Multi). Nevertheless, pressed ceramic veneers were chosen for this patient, since they offered the possibility of applying stains, through which a very close match to the neighbouring teeth could be attained. As a principle, however, highly aesthetic results can be achieved with both approaches if the appropriate treatment protocol is followed.

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