Chairside CAD/CAM immediate restorations

Anterior no-preparation ultrathin veneers

By Drs Feng Liu & Xing Liu, China

**Introduction**

No-preparation ultrathin veneer is one of the most minimally invasive restorations. Its thickness ranges from 0.3 to 0.5 mm. In the right circumstances (Figs. 1 & 2), it can show excellent aesthetic appearance, and provide long-term stability and health of soft- and hard-tissue.

The overall structure of ultrathin veneer is flexible, in that its neck can gradually change from thick to thin, and the border can be in knife-like or thin round-convex (Figs. 3 & 4).

Manufacturing inlays, onlays, crowns and veneers chairside with a CAD/CAM system has become established in most dental offices. This technique can produce immediate scans, design, milling and restoration quickly and conveniently. It is the same for the no-preparation ultrathin veneer. For chairside CAD/CAM systems, CEREC is the most developed system.

The bioscopy mode, which is widely used for restoration design, has target contours such as wax up. In this mode, the operator should scan the original tooth shape in the mouth or on the model first, then wax up and re-scan the wax-up shape into the CEREC system. Both optic impressions will transfer into the virtual model, and match to each other to obtain the restoration contour information. Depending on the 3-D data, chairside milling can be complete in few minutes. Post-milling processes usually contain shaping and polishing. In some conditions, it may be necessary for additional grinding and glazing.

**Case report**

A 72-year-old female patient presented, whose dentition had apparent coloration. The treatment plan had occurred gradually over time. These problems resulted in an unsatisfactory smile, and made her appear older than her age. She also made a request for a highly comfortable and minimally invasive treatment plan, and expected an improvement in the color and shape of her upper anterior teeth, which would rebuild her smile and self-confidence (Figs. 5 & 6).

It was found that due to the abrasion which had occurred over several decades, the labial surface was planed and flat, the incisors had been worn to a straight line and also had abrasion-associated defects (Figs. 7 & 8). The no-preparation veneer that would occupy the “outer space” of the teeth would avoid the slight wrinkles around the lips. These effects were part of the patient’s expectations and the treatment plan was accepted.

Taking the treatment requirement and oral condition into consideration, the patient was prepared for the ultrathin no-preparation veneer. Digital Smile Design (DSD) was done based on the pre-operation photos (Figs. 9 & 10), and the patient was satisfied with the aesthetic appearance of the design.

The patient wanted her teeth color to seem natural and to disguise the discolored tooth. The treatment plan was confirmed as CEREC designed and manufactured Mark II (VITA) veneer of 0.3 mm thickness, A1 shade, and the material was chosen for its excellent aesthetic performance and translucency.

**Conclusion**

To sum up, the “bulk-fill technique” using Tetric EvoFlow Bulk Fill and Tetric EvoCeram Bulk Fill allows us to be more efficient with almost no compromises compared to the conventional layering technique. The C-factor is no longer an issue due to the shrinkage stress relievers. As expected, marginal gaps do not occur more frequently and are not larger compared to the conventional layering technique. Application is clearly quicker and the aesthetic effect is in most cases similar to that of conventional laminated composites. The differences in the translucency of materials for conventional posterior composite restorations are no longer of relevance due to the Aescensio technology. This sets a new standard in this group of composites.

**Figures**

1. No preparation veneer is adapt to the teeth with flat surface.
2. When the teeth have apparent curvature, no preparation veneer may have weak contact area. Micro-preparation veneer is more appropriate.
3. Ideal gradual thinning no-preparation veneer.
5. Frontal view pre-operation.
6. Frontal smile view pre-operation.
7. Upper anterior dentition view pre-operation.
8. Upper pre operation.
9. DSD dentition view pre-operation.
10. DSD smile view pre-operation.
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Restoring function and aesthetics with monolithic zirconia restorations

By Dr Ara Nazarian, US

With greater public awareness about cosmetic dental reconstructions, the dentist is often challenged with greater demands from the patient. This increased demand for aesthetic restorative treatment challenges the dentist, laboratory technician and dental manufacturers to develop techniques and materials to satisfy the demands. The case presented in this article demonstrates the significance of a systematic approach to planning, preparation and material selection in full-mouth reconstruction of a patient’s dentition.

Case presentation
A woman in her early forties was referred to my practice by her dental provider because she was dissatisfied with the appearance of her smile. The patient explained that she felt her existing teeth and restorations were unattractive because of recurrent caries, wear and colour (Fig. 1). Most importantly, she mentioned that she was suffering from tension headaches, grinding and a limited range of function.

Initial diagnostic evaluation at the first appointment consisted of a series of digital images with study casts, a centric relation bite record, a facebow transfer and a full-mouth set of radiographs. In the maxillary arch, the patient had several teeth with worn composite and veneer restorations, as well as abstractions with cervical caries. In the lower arch, several existing composite restorations had worn and exhibited caries on the facial cervical areas. Although there were no restorations present in the mandibular anterior teeth, there was severe wear of the incisal edges, possibly due to grinding and other parafunction.

Planning
After reviewing the clinical findings and the mounted models, the patient was diagnosed with a restricted envelope of function and decreased vertical dimension from continuous wear. In order to develop a treatment plan and determine whether the vertical dimension could be increased, a diagnostic 3D White Wax-Up (Ar- rowhead Dental Laboratory) was fabricated (Fig. 4).

In the wax-up, the vertical dimension was increased by 1.5 mm. Also, based on information gathered from the initial consultation and digital images, it was determined that the maxillary central incisors could be lengthened by 1.5 mm to improve the aesthetics. The canines would also be lengthened to restore canine guidance in lateral excursions. Regarding the mandibular anter ior teeth, the goal was to correct the length-to-width ratio and create a less worn appearance.

As a result of the information gathered from the diagnostic wax-up, it was determined that aesthetics and function could be enhanced by restoring the entire dentition. The final treatment plan would consist of crown restorations, placing composites cores where needed from teeth #7-27 in the upper arch and teeth #7-26 in the lower arch.

The material of choice for these crown restorations would be Zenostar (Wieland/Ivoclar Vivadent). According to the manufacturer, this translucent zirconia material combines excellent flexural strength with the aesthetics of natural tooth shades.

With full-contour Zenostar restorations, there are two methods of achieving the desired shade: the Zenostar breath infiltration technique or the Zenostar staining technique. Six pre-shaded zirconia blanks—pale, light, medium, intense, sun and sun chroma—form the basis for reproducing the patient’s natural dentition. Owing to their warm, red-dish nuance, Zenostar Zr Translucents and sun chroma are suitable for restorations with individual colour characterisation and can therefore be used for patients whose own natural dentition deviates from the classical tooth shades.

Preparation
Once informed consent had been obtained from the patient, treatment was initiated.

After anaesthetic had been administered, the existing veneer and crown restorations were removed and the teeth cored with composite if there was any indication of recurrent caries remaining in the respective tooth.

Adhesive Universal bonding agent (Vivoclar Vivadent) was applied following the manufacturer’s protocol and cured using the Variolux LED curing light (Vivoclar Vivadent). Using MultiKore Flow Light (Vivoclar Vivadent), build-ups were accomplished on the teeth that required cores. A Clear Reduction Guide (Arrowhead Dental Laboratory) pro-

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RESTORATIVE

By Dr Ara Nazarian, US

Could save the patient’s chairside waiting time, the biocopy technique can simplify the design process, milling the restoration with a 0.5 mm original thickness and polishing after milling will decrease the risk of milling defect.

The exact process can be concluded as:
1. Obtain a precise pre-operation impression, and make the model. Use a CEREC scan to obtain information about the abutment teeth (Figs. 1 & 2).
2. Depending on the DSD result, make a wax-up on the pre-op model. The thickness of wax-up should be from 0.3 mm to 0.5 mm. Get the biocopy scan of the wax-up model, and match accurately with the pre-op model (Figs. 13-15).
3. Setting the margin of the abutment teeth, the marginal line is not fixed because of the no prepartion technique. The direction of the inserted should be defined first, which can cover most areas of the labial surface, incisor edge and adjacent surfaces. The border of the covered area should be the margin of the restoration (Fig. 16).
4. Shape formation of the restoration. Copy the target shape of the biocopy model, the restoration should be calculated automatically. If there is any defect, it can be adjusted and corrected by the tools. If there are any areas not thick enough for 0.3 mm, it should be added to 0.3 mm to avoid fractures during the milling process (Figs. 17 & 18).
5. Modulation and polishing of the initial restoration to 0.3 mm thick after milling. And fine polishing of the final restoration (Figs. 19 & 20).
6. Intracor try-in, fine adjustment and cementation (Figs. 21-24).
7. Four-year follow-up and recheck. The restorations are as excellent as before and the margins are tightly sealed, the colour is stable, there is no margin colored or whole colour changing. The patient is very satisfied with the aesthetic performance and function. A charming smile appearance has given her more confidence and vigour (Figs. 25-29).

Conclusions
The no preparation veneer is a kind of restoration with high precision requirement and manufactured difficulty. It is usually finished in laboratory. Getting benefit from chairside CAD/CAM techniques, immediate restorations in one appointment can be achieved, dentists can invite the patients to observe the process of restoration design and manufacture, and even get involved into the design. Patients may feel that they are participating in the treatment, establishing an emotional connection with the restoration, which may also make them more easily accept and love their restoration. The value of increasing the satisfaction should not be ignored.

Biocopy design is the combination of traditional aesthetic design and digital virtual design. It is also the most convenient and fast technique nowadays. Nowadays, 3D virtual technique is becoming more and more established. Using 3D technique directly to make a virtual design may also get wonderful restoration performance, it can be predicted that this pattern will become the mainstream of digital aesthetic design in future.