Since bulk-fill composites have been on the market for a number of years, the time has come to take a look back at the introduction, development, current trends and future options of these materials.

By Dr Eduardo Mahn, Chile

When bulk-fill composites first hit the market, they were considered a true innovation. We had been layering posterior composites for more than 40 years, yet many of us were not quite sure for what reasons the layering technique was mandatory. Understanding the reasons why a certain technique is applied is crucial for the correct assessment of the pros and cons of any technique.

Basically, the reasons were four:

1. Aesthetics: It is obvious that a layering technique involving dentin, enamel and effect shades leads to a better final outcome than a technique that uses only a single layer in a standard translucency. As regards the bulk-fill technique, this reason can easily be rejected because, objectively, most posterior restorations are almost always placed using one shade only and most patients are satisfied with the result.

2. Reduction of volumetric shrinkage: The less composite we place, the smaller the volumetric shrinkage.

3. Reduction of shrinkage stress: This reason makes sense and is based on the configuration factor. It is said that the shrinkage stress is reduced if the unbounded surface area of a layer is larger than the bonded surface area. Although there is enough in-vitro evidence on the relevance of the C-factor, a clinical correlation has not yet been shown. This point can be easily illustrated by the fact that Class-I restorations have an unfavorable C-factor but a high survival rate while Class-V restorations have a favorable C-factor but a low survival rate. This example shows that the C-factor is only one of many factors that determine the success of a direct restoration - and frequently not the most important one.

4. Depth of cure: This is probably the most important factor because increments of only 2 mm could be applied before the advent of bulk-fill composites. Some studies suggest that the depth of cure of certain composites is even lower than 2 mm. This was the reason why all layers were restricted to a maximum thickness of 2 mm. If not, the composite material placed in the deeper areas of the cavity would never receive enough light to cure adequately. Having discussed all these factors, we may realize that we are not so far from the bulk-fill technique. If a composite is capable of reducing the stress when applied in thick layers and, at the same time, offers an increased level of translucency and a more effective light-curing process, the bulk-fill technique is feasible. In most cases, shrinkage stress relievers are responsible for the reduction of shrinkage stress. Shrinkage stress relievers are fillers with a lower modulus of elasticity. Their function is to release the stress as the composite polymerizes.

Nowadays, all major dental manufacturers offer bulk-fill composites. Bulk-fill composites can basically be categorized into two main groups: first, flowable bulk-fill composites requiring a final capping layer and, second, sculptable bulk-fill composites. Generally, these materials increase the efficiency of the restorative workflow as they allow the fillings to be placed with either a single-increment technique (sculptable composite or a two-increment technique (dentin replacement with flowable composite and capping layer with sculptable composite). These methods are obviously faster and easier to perform than conventional layering procedures. However, this advantage is undermined by the fact that bulk-fill materials are generally too translucent and allow discolorations to shine through the restorations, especially if they are used to replace an amalgam filling. Nevertheless, clinical evidence has shown that the results achieved with the new bulk-fill methods are comparable to the results achieved with conventional multi-layer techniques.

Fortunately, new developments often pave the way for new technologies. By this I mean the Aessencio technology developed by Ivoclar Vivadent. By this I mean the Aessencio technology developed by Ivoclar Vivadent. The clinical case below demonstrates the importance of predictable clinical performance is poor. Furthermore, there is growing evidence in clinical trials and elsewhere that self-etch protocols show a favourable performance. The clinical case below demonstrates how three materials are used.

**Fig. 1:** Pre-op situation

**Fig. 2:** Enamel etching with Total Etch

**Fig. 3:** Application of Adhese Universal with the VivaPen

**Fig. 4:** Tetric EvoFlow Bulk Fill was applied.

**Fig. 5:** Tetric EvoFlow Bulk Fill before light-curing. The high translucency facilitates the penetration of light.

**Fig. 6:** Once cured, Tetric EvoFlow Bulk Fill exhibits a dentin-like translucency, masking discolorations.

**Fig. 7:** Tetric EvoCeram Bulk Fill was applied as a final layer. All excess was removed before curing.

**Fig. 8:** Completed restoration after 1 week. Occlusal view

**Fig. 9a-b:** X-ray images before and after the restoration. Both the flowable and sculptable variants offer adequate radiopaque properties.
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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 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 scan, 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 biocomposite, 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 optical impressions will transfer into the virtual model, and match to each other to obtain the restoration contour information. Depending on the 3D data, chairside milling can be complete in a few minutes. Post-milling processes usually contain shaping and polishing. In some conditions, it may be necessary for additional staining and glazing.

Case report
A 72 year-old female patient presented, whose dentition had apparent curvature. No-preparation treatment plan, and expected an improvement in the colour 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 occupied several decades, the labial surface was plane 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 leave the spaces and gaps around the lip. 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 colour to seem natural and to disguise the discolouration. The treatment plan was confirmed as CEREC designed and manufactured Mark II (VITA) veneer of 0.3 mm thickness, A3 shade, and the material was chosen for its excellent aesthetic performance and translucency. The manufacture of no-preparation veneer could depend on the precise wax-up of pre-operation. This step...

Figure 6 shows how the translucency altered in the course of the curing process and the material started to mask the discolorations underneath. Then, a final composite layer of Tetric EvoCeram Bulk Fill was applied. Excess composite was carefully removed and the filling contour to an adequate anatomical shape prior to undergoing final polymerization (Fig. 7). This was all accomplished in a single step, as most of the cavity had already been filled before with Tetric EvoFlow Bulk Fill. After final curing, the restoration was polished with OptraPen. Then, Fluor Protector S was applied. The completed restoration rather closely resembles the natural tooth structure. It is virtually impossible to detect the margins from the occlusal and frontal view (Fig. 8). The X-rays show the excellent radiopaque properties of both materials, i.e. the flowable and translucent variant (Figs 9a and b).

Conclusions
To sum up, the “bulk-fill technique” using Tetric EvoFlow Bulk Fill and Tetric EvoCeram Bulk Fill allows us to more efficiently 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 composite restorations. The differences in the translucency of materials for conventional posterior composite restorations are no longer of relevance due to the Aessencio technology. This sets a new standard in this group of composite.

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