

# LIFELIKE AESTHETICS WHEN REPLACING EXISTING RESTORATIONS

**Dr Frank Milnar shares his step-by-step guidelines to replace existing restorations with only two composite shades to achieve lifelike aesthetics**

**R**ecognising the unique biological architecture of the natural tooth, dentists today practice conservative procedures and minimally-invasive techniques in order to preserve the maximum amount of healthy structure when restoring dentition to proper form and function<sup>1</sup>. This can prove challenging when combined with patient expectations for an aesthetically pleasing smile and the predilection toward biomodification

and biomimetics in modern dentistry<sup>2-4</sup>. Additionally, visual ergonomics is of optimal importance when restoring the anterior segment of patients presenting with Class IV fractures that have been previously restored<sup>5</sup>.

In the past, recreating the unique characteristics of natural dentition could be difficult and confusing. Manufacturers released multiple composite shades, opacities, and translucencies, all of which were required to reconstruct individualised teeth. Therefore, the direct composite placement technique became overwhelming and time consuming.

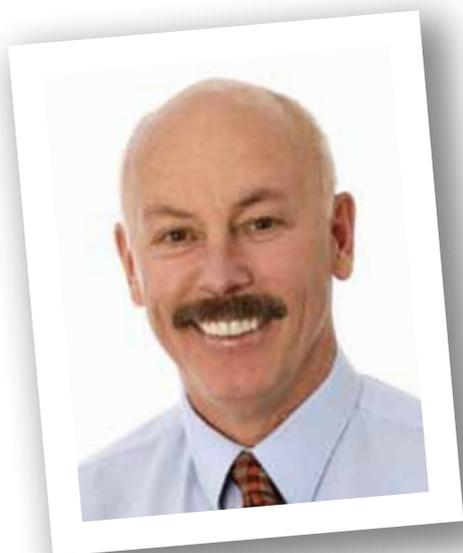
Fortunately, dental material manufacturers have helped to improve and enhance dental treatments by developing direct composites that simplify the layering process. Today's biomimetic direct composite materials reduce the amount of composite colours required to recreate aesthetic restorations and simplify and enhance predictability. These new composites address demands for minimally-invasive treatments while providing increased strength and optical characteristics, universal application, improved adhesion, and optimal handling and sculptability when reconstructing the biological, aesthetic and physical architecture of natural teeth<sup>6</sup>.

Among the new alternatives available is a nano hybrid indicated for Class I – Class V restorations. GrandioSO (VOCO) is a newly developed universal nano hybrid restorative that displays greater wear resistance, enhanced colour stability, long-lasting polish retention, natural dentition-like flexural strength, and low shrinkage. GrandioSO is unique due to its construction that includes 30–50% less resin compared to other micro hybrid resin-based restoratives<sup>7</sup>. GrandioSO contains very small designer nano-particles made from silica-dioxide filler particles grown to 20–40 nanometers, then covered with a special

coating<sup>7</sup>. Glass ceramic fillers with an average particle size of 1µm, combined with the designer nano-particles, create a nano hybrid composite that outperforms conventional composites that have limited use<sup>8</sup>.

The rate of polymerisation shrinkage in the newest, modern generation composites reaches 2–2.5% when curing<sup>9</sup>. However, the low-resin content construction of GrandioSO decreases shrinkage to 1.6%, reducing stress and, as a result, eliminating the undesirable 'white line' that often appears with resin-based composites during the finishing process<sup>8</sup>.

The unusually high surface hardness found with GrandioSO results from the increase in filler load. Conventional composite filler weights range from 70–77% to GrandioSO's 89%<sup>7</sup>. Due to its unusually high surface hardness (210.9 Vickers microhardness, MHV), GrandioSO is the closest composite to natural enamel (350–450 MHV)<sup>8</sup>. It maintains its strength, is highly polishable,



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Figure 1: Preoperative view of the patient's natural smile



Figure 2: Close-up preoperative view of teeth 11 and 21



Figure 3: Two shades of composite were previewed



Figure 4: Shades A1 and A2 would be used



Figure 5: An enhanced wax-up model demonstrated anticipated treatment outcomes



Figure 6: The stent would be used to help maintain facial/lingual line angles



Figure 7: View of the final bevel preparation



Figure 8: The teeth were etched using 35% orthophosphoric acid etch (Vococid, VOCCO)



Figure 9: A dual-curing self-etch dentine/enamel bond (Futurabond DC, VOCCO) was applied to the preparations using a brush



Figure 10: GrandioSO shade A2 was placed to create the lingual enamel layer of tooth 21

and demonstrates long-term abrasion and wear resistance<sup>10</sup>. In addition, the composite retains surface smoothness and a permanently polished sheen.

While careful composite selection and artful procedures during placement protocol are still required when emulating natural tooth structure, shape and shade while blending with surrounding dentition, the availability of new nanohybrid composites such as GrandioSO enable simplified techniques. This article describes how GrandioSO was used to re-restore the maxillary anterior teeth of a 48-year-old woman. Old and discoloured Class IV composite restorations on teeth 11 and 21 were removed, and the patient's smile rejuvenated using the GrandioSO composite and a predictable two composite layering technique.

### CASE PRESENTATION

A 48-year-old woman presented with 15-year-old composite restorations on her anterior maxillary teeth (Figures 1 and 2). The patient was not interested in porcelain veneers or unnecessary removal of tooth structure. She requested only reversible and repairable restorations.

### TREATMENT PLANNING

Before the pre-existing composite restorations were removed, the patient's occlusion was analysed. A comprehensive intraoral examination was performed that included an oral history, radiographs, and photographs. The patient was in good health, and nothing contraindicated direct composite re-restoration of teeth 11 and 21.

Morphologic, histologic and optical characteristics of the teeth were examined. To select the appropriate composite shade

for replacing the old restorations, composite materials (GrandioSO, VOCCO) in shades A1 and A2 were previewed side by side on teeth 11 and 21. This enabled the dentist to select the appropriate shades for the case (Figures 3 and 4), with shade A2 being the lingual enamel layer and shade A1 as the final composite layer.

### PREPARATION PROTOCOL

Before the original composite restorations were removed, a diagnostically-enhanced model was created from preoperative impressions (Figure 5). This model would also be used for fabricating a high-viscosity putty stent (Registrado X-tra, VOCCO) that, when placed intraorally, would provide a spatial reference and volumetric guide for composite placement (Figure 6). This stent would also help maintain the facial/lingual line angles<sup>11</sup>.

The old restorations were removed, and teeth 11 and 21 were prepared using diamond burs. In addition, a 2.5mm infinite facial

### PRODUCTS USED

GrandioSO	VOCCO
Registrado X-tra	VOCCO
Vococid	VOCCO
Futurabond DC	VOCCO
Tooth polishing discs	3M
Dimanto	VOCCO



Figure 11: To re-restore tooth 11, GrandioSO shade A2 composite was placed, sculpted and cured for 10 seconds



Figure 12: View of teeth 11 and 21 immediately following final placement of the composite material



Figure 13: The putty stent was again placed intraorally to verify the length and width of the restorations

bevel was created (Figure 7). Combined, this preparation design supported the fracture resistance and durability needed for the restorations and facilitated imperceptible restorative margins<sup>12</sup>.

The Class IV preparations were then verified incisally, after which the teeth were pumiced, rinsed and dried. Although manufacturers have developed newer generations of self-etching adhesives that demonstrate predictable long-term bonding and marginal integrity, selective enamel etching is still advocated in the literature to ensure excellent clinical results<sup>13-16</sup>. Thus, the preparations were etched with 35% orthophosphoric acid (Vocid, VOCO) for 15 seconds, rinsed, and dried (Figure 8). Then, a single-dose bonding agent (Futurabond DC, VOCO) was applied onto the preparations using a brush for 20 seconds (Figure 9). The selected bonding agent eliminated evaporation, would not spill, and required

fewer steps, thereby helping to reduce technique sensitivity. The bonding agent was air-thinned with high pressure and light-cured for 10 seconds per tooth.

The putty stent was placed intraorally and GrandioSO composite in shade A2 was applied in a 1.5mm-thick increment to form the lingual enamel layer and block any show-through on tooth 21 (Figure 10). This layer was cured for 10 seconds (note that darker shades require 20 seconds). In order to assess this lingual enamel layer, the putty stent was removed. To simulate higher value and lower chroma in the middle and incisal thirds of the maxillary central incisor, the putty stent was placed intraorally again, and the A1 composite shade was placed, sculpted, and cured for 10 seconds. The re-restoration of tooth 11 happened analogously (Figure 11 to 13).

The restorations were then finished using a series of discs (Figure 14) and contour, shape,

and shine cups and points<sup>17</sup>. These helped to ensure that the restorations demonstrated a similar harmony and balance with the adjacent teeth, as well as with each other. These finishing steps also imparted realism by better defining line angles (eg mesial transitional line angle). In order to create a natural-looking final luster, a one-step polishing system (Dimanto, VOCO) was used, which suited particularly well to the high surface hardness of new composite materials (Figure 15).

## CONCLUSION

The case presented here has demonstrated the manner in which only two shades of a direct composite resin were used to produce imperceptible anterior Class IV restorations (Figures 16 and 17). With the development of new generation composites, the ability to recreate restorations with two composite colours, as opposed to three or more, while reproducing durable and aesthetically-pleasing characteristics contributes to our goal to provide less technique-sensitive treatment in biomimetic, conservative and effective ways.



Figure 14: A 3M disc was used to impart the mesial transitional line angle



Figure 15: A Dimanto polishing cup (VOCO) was used



Figure 16: Postoperative view of the nanohybrid restorations on teeth 11 and 21; note the life-like aesthetics, translucency and shade characteristics created with only two composite shades



Figure 17: Postoperative close-up view of the completed two shade composite restorations on teeth 11 and 21

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