



Composite artistry using Premise - The new breed of nanofiller

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The emergence of a new breed of composite resins comprising very small-sized particle technology enables dentists to provide both strong and life-like aesthetic restorations. These new breeds of composite resins, termed “nanofilled composites”, promise better polish, longevity of lustre, better handling and high strength.

Premise (Kerr), is the third nanofilled composite resin to be launched in this new class of materials and exhibits very impressive qualities.

Much smaller filler particles (0.02 microns compared to 0.4-1 micron with the hybrid resins) result in a higher filler loading, approximately 84% by weight and 69% by volume. This higher filler loading enables a much lower rate of shrinkage which Kerr states as 1.6%. This higher loading also allows better polish, with the restoration being easier to attain and sustain polish and not lose significant gloss in the long term.

With the smaller particle size there is a more chameleon-like effect with a greater scattering of light. As visible light hits the 0.02 micron filler particle, the light is scattered much more than with a larger-particle composite. Natural teeth themselves allow for a great deal of scattering. More scattering brings about two major benefits. Firstly it allows excellent blending in of the restoration (the “chameleon effect”) and secondly, it gives life-like aesthetics.

The other advantages are that the strength is not compromised even with the improved aesthetics, with the flexural strength (128Mpa) being similar to many hybrid composites. This is very promising as we may now be at the stage where we have a truly universal composite that can be used for posterior and anterior restorations with none of the associated disadvantages that we have come to accept with micro-filled and hybrid composite resins.

In attaining a life-like, natural looking



Figure 1.

restoration, it is important to remember that teeth are polychromatic, having a three dimensional effect. Premise allows us to layer our composite resin restorations to simulate natural tooth structure. We can build successive layers of dentine, enamel and translucencies and effects with optical properties that reflect, refract, absorb and transmit like natural teeth. Layering our restoration reduces polymerisation shrinkage and enhances the aesthetics of the restoration.

The following example describes the use of direct composite resin (Premise - Kerr) to veneer the anterior teeth to improve the aesthetic concerns of the patient.

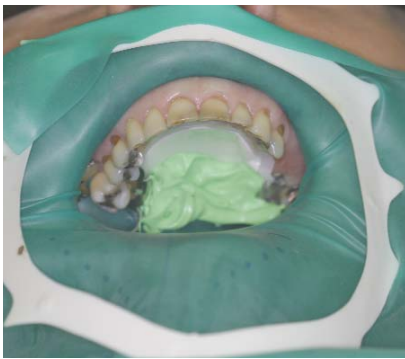
Restorative Sequence

1. Preoperative Assessment and Shade Selection: A complete history and comprehensive examination was carried out prior to the restoration of the teeth. Assessment of the factors that caused the deterioration of the teeth and occlusion

were assessed and the treatment plan had additional phases that were done after the anterior teeth were restored that is not within the scope of this article. Selection of shade should be made at the start of the appointment and before rubber dam placement to prevent incorrect matching due to dehydration and the subsequent increase in value. In this case a lighter shade was chosen to improve the aesthetic outcome.



2. Diagnostic Wax-up: A diagnostic wax-up of the case was performed as the patient wanted a more uniform symmetry of teeth along with an improved smile-line.



3. Rubber dam placement: The teeth were isolated with a rubber dam to achieve adequate isolation. A full arch dam was placed to allow access to all the anterior teeth with the palate sealed with a dry tip and bite registration material. This allows protection from contaminants like blood, saliva and crevicular fluid to ensure optimal adhesion for our bonding agents.



4. Putty key matrix: A putty key of the diagnostic wax-up was taken to transfer the new increased length and dimensions for the new direct veneers. This putty key is tried in for fit and may need the excess removed to fit accurately.



5. Removal of old restorations and/or caries is done with rotary instrumentation. All carious dentine is removed along with any residual composite resin and staining. The preparation only involves affected tooth structure and the adhesive preparation allows maximum preservation of tooth structure.



6. Each individual tooth was then etched using the "Total Etch" technique with 37% phosphoric acid on enamel and dentine for 15 seconds only. The adjacent teeth are separated by a cellulose acetate strip so that no etch is inadvertently allowed on adjacent teeth. The tooth was then washed thoroughly with water spray and left moist. Optibond Solo Plus (Kerr) was then applied with a disposable applicator for 20 seconds. This is done with a scrubbing motion and leaves the dentine glossy demonstrating good resin impregnation. The bond is light cured.



7. The first increment was placed onto the putty key and adapted to the tooth structure. This first increment was with a translucent layer of Premise to simulate the replacement of enamel. This first increment is to replace the enamel layer.



8. The next layer was an increment of opaque composite to replace the dentine layer. This layer is to block the show-through or translucency that can happen if not enough opacity is provided within the restoration. This opaque layer is especially important in large Class III or IV restorations or when there is an increase in the height of the restoration as in this case.

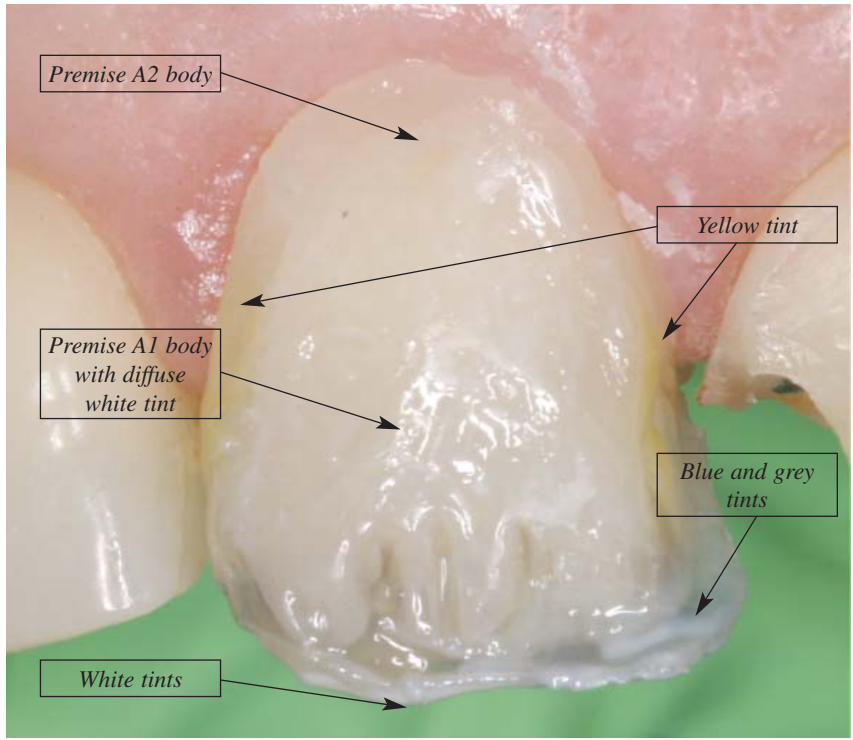


9. The next layer is the body shade of composite. In this case a layer of A2 composite was placed in the cervical third followed by the blending in of A1 towards the incisal edge. Adaptation of the composite is done with artist brushes and a thin flat plastic instrument. The composite was indented to form dentinal lobes as seen in the picture and this adds to the three dimensionality of the restoration adding more depth. Different tints (Kolor Plus - Kerr) were then applied to the restoration to give the tooth natural looking optical effects. Yellow tint is applied to the interproximal regions, blue and grey translucencies to the incisal edges and white tints to the incisal edge to simulate a "halo effect". A very diffuse layer of white tint was also applied to the surface of the body composite to increase the value of the restoration.



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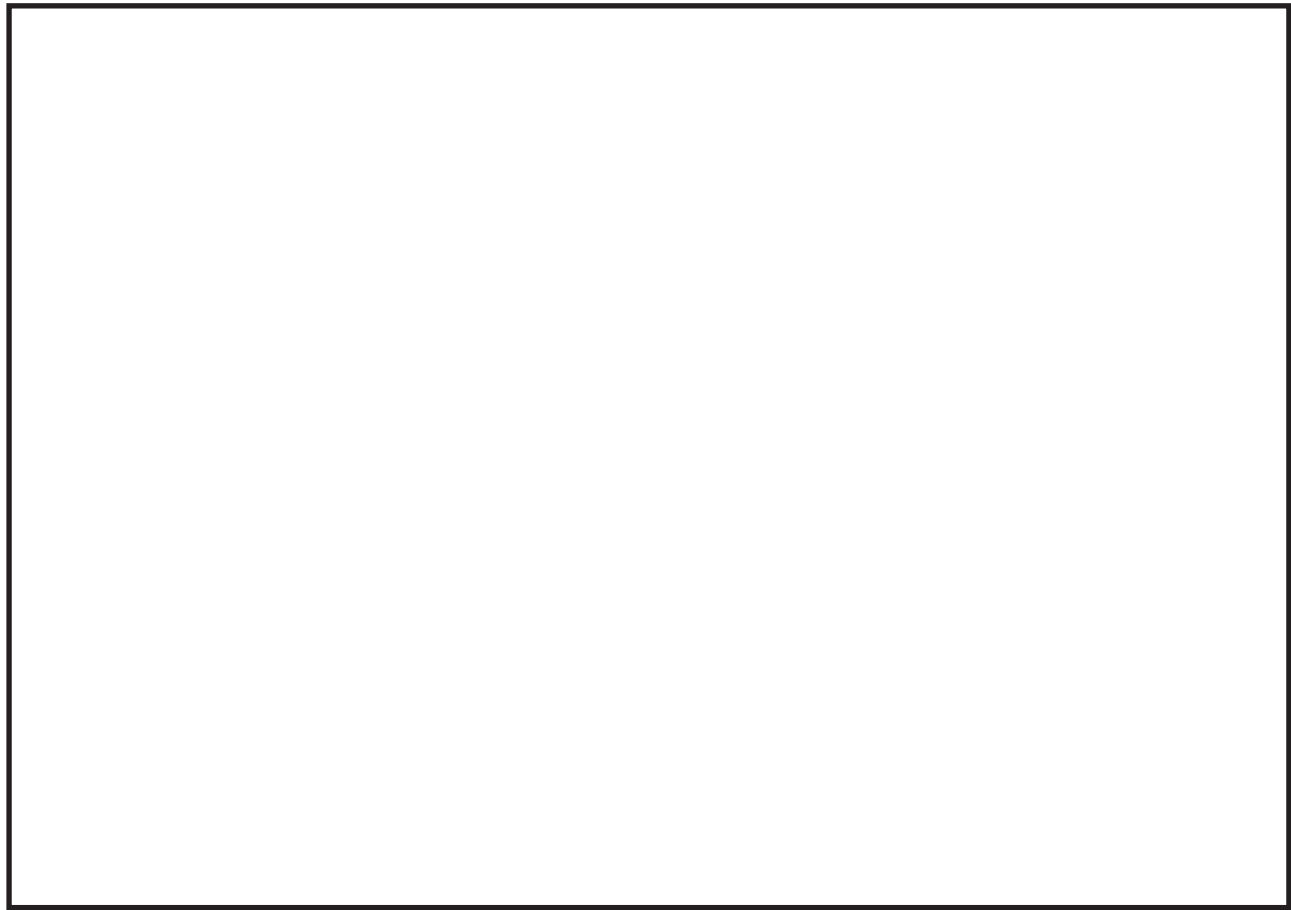


10. Building the artificial enamel layer: It has been stated that the colour from a tooth comes from the dentine with the enamel acting like a

fiberoptic rod transmitting the light. Therefore the final enamel layer is a translucent layer. A final layer of translucent Premise was then

overlaid over the body shade of composite and the tints that were placed. Because of the translucency it allows the colour of the underlying restorative material and tints to show through and gives the tooth a realistic depth and colour with all the optical characteristics inherent in a natural tooth.

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11. The other teeth (#14-24) were built up the same way and the restorations were finished and polished to reproduce the shape, contour and lustre of the natural dentition.

Initial contouring is done with multi-fluted finishing burs and finishing discs for the proximal contours. All areas of the restoration are polished and the restoration checked for occlusal interferences. All margins are then etched with 37% phosphoric acid and a surface sealant (Optiguard) is placed and cured to seal any micro-fractures from finishing procedures.

Polishing is carried out with rubber silicone points and the Occlubrush (Hawe-Neos), which is able to maintain the surface texture and anatomy. With these finishing procedures, it has enabled an exceptional polish and lustre seen only before in untouched teeth or porcelain restorations.

Conclusion

This article describes the use of a nano-filled composite resin and demonstrates the adhesive layering technique that can recreate the morphology and aesthetics of natural teeth.

Premise has excellent physical properties with ultra-low shrinkage and strength similar to hybrid composites. It has the ability to attain a very high polish and has excellent handling properties being sculptable and non-sticky.

Initial clinical trials show excellent results, however the long term durability of these restorations will need to be evaluated in future clinical trials.

The new breed of nanofilled composites with smaller particle sizes, shapes and formulations provide a very high level of polishability similar to enamel and with the advancement of the physical and optical properties allows the clinician to recreate natural aesthetics in their anterior and posterior restorations.

Dr Christopher Ho received his Bachelor in Dental Surgery with First Class Honours from the University of Sydney in 1994 and completed a Graduate Diploma in Clinical Dentistry in oral implants in 2001. He is an active member of the teaching faculty, involved in the teaching of restorative dentistry courses and is now a Clinical Associate with the Faculty of Dentistry at Sydney University. In addition to teaching at undergraduate level, he has lectured and given continuing education presentations in Australia and overseas on a wide range of topics related to cosmetic and implant dentistry. He maintains a successful private practice centered on comprehensive aesthetic and implant dentistry in Sydney, Australia.