

Case selection criteria and a simplified technique for placing and finishing direct composite veneers

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Abstract

This article will attempt to address the key obstacles modern clinicians face when considering direct composite veneers as a treatment option for the cosmetic correction of anterior teeth. These obstacles are case selection, material selection, the best technique to permit the expeditious placement of the veneers, and ultimately, the final esthetics. These obstacles will be addressed by attempting to define the best clinical situations for choosing direct composite veneers, and will introduce a new microhybrid composite resin system (Esthet-X, Dentsply/Caulk) that offers a simplified solution to shade matching and polishing. The case shown highlights a simplified technique for the placement of stratified, polychromatic direct veneers, and demonstrates a novel new polishing system that generates a microfill-type shine with modern microhybrids.

Introduction

In this age of rapidly advancing indirect materials and techniques, some practitioners are abandoning the use of direct composite veneers as a viable alternative to satisfying the cosmetic desires of their patients. Though it is certainly appropriate to use porcelain veneers and crowns in many circumstances, these procedures should be limited

to applications that demonstrate careful consideration of variables such as the age of the patient, tooth conservation, opposing wear, longevity expectations, difficulties in communicating shade to a remote laboratory, and the financial resources of the patient.¹

The primary barriers preventing practitioners from incorporating direct composite veneers in their practices are the time involved in placement, and the esthetic result of their efforts. Since few universities offer advanced training to undergraduates in creating polychromatic, stratified, direct composites, post-graduate training is often mandatory to achieve proficiency. And with the introduction of several new “mini-filled” hybrid systems offering multiple shades and opacities, proper utilization of these materials may seem daunting to those not familiar with them.

Choosing Direct Composite Veneers:

When considering direct composite veneers as a treatment choice, clinicians are advised to consider several key variables before recommending this procedure.

First, the occlusal scheme must be carefully evaluated. Those patients that present with deep overbites with steep maxillary inclines; or shallow cuspid rise or group function cases that offer minimal clearance of the lateral and central incisors during excursions; or Class III cases that present end-to-end function of the incisors in centric occlusion; may dictate forces that exceed the physical properties of the composite material during function. Additionally, the presence of parafunctional habits such as nocturnal bruxism, daytime clenching or grinding, and more overt habits such as fingernail biting and ice chewing, have the potential to levy catastrophic forces that may

contraindicate direct composite veneers unless they are controlled or eliminated.

Common sense dictates that direct composite veneers would be best suited for stable Class I or even Class II molar relationships where adequate clearance of the weaker incisal edges of these restorations are protected from shear forces in excursions. Even in these occlusal schemes, it will be imperative for the clinician to assess whether the lingual inclines and incisal edge contacts can be arranged to adequately distribute the stresses created during protrusive function such that single point contacts are avoided. It may be necessary to equilibrate the teeth, including the lower incisors to permit a more favorable occlusion in some cases.²

Second, since direct composite veneers are placed on the teeth without vacuum firing, some degree of surface porosity can be expected. This, combined with the inherent surface roughness present with even the most meticulous polishing regimens, direct composite veneers are more likely to accumulate stain compared to laboratory processed materials. Therefore, patients that admit to heavy smoking or other tobacco habits, or the frequent use of staining beverages such as cola, tea, coffee, and red wine, should be informed of the potential for reduced longevity due to staining with sorption of these materials into the resin matrix.³ Clearly, if the patient is unable or unwilling to cease, or at least limit, the use of these chromagenic compounds, indirect porcelain may prove to be the better material choice.

Third, the age of the patient plays a significant role in selecting direct composite as the restorative material. Volchansky, Cleaton-Jones, and others have reported studies suggesting that the maxillary and mandibular anterior teeth continue to undergo passive eruption beyond 20 years of age, suggesting that the gingival architecture and papilla

height is not stable in late teens and young adults.^{4,7} This of course is of particular concern when utilizing indirect restorations, particularly those that require subgingival margin placement to be esthetic. Not only would porcelain fused to metal margins become unsightly as the gingival crest moved to a more mature, apical position, papilla height and thickness changes may expose conservative interproximal porcelain veneer margins. Such exposure may not compromise the appearance of the restoration unless the new restorations were made at a differing shade than the underlying tooth (which is a common reason for placing porcelain veneers), or staining at the margin occurred over time and ceased to be hidden beneath the original gingival architecture. Regardless, indirect restorations do not lend themselves to simple modification if these changes do occur, and full replacement may be necessary. The expense and morbidity associated with this procedure, particularly if this occurred only a few years after placement, would be less than desirable for the patient or doctor.

Direct composite veneers offer several attractive features that address the dilemma of esthetic smile reconstruction at a young age. Since, in some cases, they may require little to no preparation of teeth, they can represent the most conservative option for young patients. Since the ultimate dental esthetic desires of young patients may not be manifested until adulthood, it is extremely practical to do the least invasive procedure when they are young. This allows options such as reversal of the procedure, adult orthodontics, or more definitive porcelain restorations if they are desired later in life. But more importantly, direct composite veneers may be the most amenable to “renewal” or repair, if and when the gingival architecture changes post placement. Since the margins can easily be extended by adding more composite to the newly exposed area, direct

composite veneers may be the cosmetic restoration of choice during the early childhood to young adult years.

Lastly, direct composite veneers often represent the least expensive treatment alternative for cosmetic reconstruction. Obviously, this is highly dependent on the practitioner's ability to deliver the service in an expeditious way. This requires a technique and material that are simplified to consistently produce vital-appearing restorations in the least amount of time.⁸

This article will present a case that, in the author's opinion, represents an ideal indication for the use of direct composite material for cosmetic enhancement, and offers a technique that utilizes a simplified cosmetic composite system and its companion-polishing system that permits consistent results.

Introducing Esthet-X (Dentsply/Caulk)

The demand for a composite resin system that offers the physical properties of a universal hybrid, the optical properties and finish of a microfill, and a full range of shades and opacities that achieve the objective of building a stratified, layered restoration has been longstanding. These objectives were met with the production of Esthet-X (Dentsply/Caulk, Milford, DE). Esthet-X is a "mini-filled" hybrid composite consisting of a urethane modified Bis-GMA resin combined with a Bis-GMA adduct with a high molecular weight and fewer carbon double bonds. The reduction of the contractible carbon sites permits less polymerization shrinkage, according to the manufacturer. The fillers in this product are a unique blend of proprietary bariumalumino fluoroborsilicate

glasses (BAFG) with an average particle size of 0.6 – 0.8 microns. **(Note: no, I don't think readers will know this... but they will now. This comes directly off the product specs as referenced at the end of the paragraph... #9)** The particle distribution is extremely narrow, with the range falling between .002 – 2.5 microns. Nanoscale **(yes, they should know, since I liken them to something they should already know... microfills)** silicon dioxide particles similar to most microfills are added to increase filler loading between the submicron particles, bringing the filler weight to 77% (60% by volume). The optical properties of the BAFG fillers offer a vital range of opacity and translucency; while the small particle size permits a more than satisfactory polish similar to microfills.⁹ **(To the best of my knowledge, this is in fact what makes this product unique compared to others. Many are optically good, but don't polish well or vice versa).**

Case Presentation:

A young female patient presented for esthetic consultation seeking to correct the rotation and crowding of teeth 8 and 9, as well as cosmetic correction of the large white pigment present in the incisal 1/3 of tooth #8 and the mesial fracture of tooth #9.

(Figures 1-3). A thorough clinical and occlusal exam was conducted, and all findings were negative. She demonstrated excellent homecare, no active caries or previous restorations, stable class I **(Class I in this case is an orthodontic classification, meaning her bite relationship. Should be common knowledge)** molar and canine relationships, and appropriate canine guidance. She was a non-smoker, and did not admit

to frequent consumption of highly chromagenic substances that may lead to increased staining over time

In the author's opinion, this case would be best treated by the use of two direct composite veneers on teeth #8 and #9. This option represented the least invasive treatment compared to full crowns or orthodontics, and could be accomplished in one appointment and for the least expense. If over time, passive eruption continued and the gingival height and architecture were to change, the restorations could easily be modified to accommodate these changes.

Treatment:

Prior to anesthetizing the patient, shade selection was performed while the teeth were still hydrated and an accurate color assessment could be made. The Esthet-X (Dentsply/Caulk, Milford De) shade guide is unique in that the shade tab not only communicates the normal hue, value and chroma required, but also gives a "prescription" for the 3 levels of opacity typically found in the natural human dentition required to create the vitality and characterization found in the shade tab.¹⁰ Since this case will involve preparations that will require opaque, body and enamel shades to restore, the shade tab simplifies what could be a difficult shade selection process. The process is as simple as choosing the best shade tab match (**Figure 4**), and following the "recipe" found on stem of the tab itself. In this case, the "XL" tab was selected, dictating the use of the A2-O opaque shade, the XL body shade, and the CE enamel shade to create the polychromatic restoration. Once the shades were selected, local anesthesia was administered.

Prior to preparing the teeth, the gingival zenith of tooth #8 was improved by recontouring the margin apically to a height equal to the cemento-enamel junction, with the apex of the gingival height being slightly distal to the new long anticipated long axis of the new restoration.

The preparations involved heavy reduction of the mesio-incisal line angle of tooth #9 to return the tooth to the same bucco-lingual plane as the rest of the arch. In this case, it was necessary to carry this preparation through the entire bucco-lingual thickness of the mesial-incisal edge of tooth #9, leaving a Class IV-type defect. A conservative chamfer margin was placed on both teeth, and they were shortened approximately 1.5 mm to permit the free-hand creation of a new incisal edge out of composite in the desired plane (**Figure 5**). An interproximal saw (Cerisaw, Den Mat), and diamond impregnated sanding strips (Visionflex, Brasseler) were used to further reduce the interproximal overlap of the teeth, and to align the midline with the long axis of the patients face.

Tooth #9 was then isolated from the adjacent teeth by placing a dead-soft foil material (Dead Soft Foil, Den Mat) between the interproximal contacts, and the tooth was etched with 37% phosphoric acid for 20 seconds. The etchant was then thoroughly rinsed, and the tooth was left moist to permit proper hydration of the exposed collagen filigree in the exposed dentin of the preparation. Multiple coats of a single bottled adhesive (Prime & Bond NT, Dentsply/Caulk) were applied for 20 seconds, lightly air-thinned to volatilize the acetone solvent and eliminate pooling, and light cured for 40 seconds with a conventional halogen light (Spectrum 800, Dentsply/Caulk).

Since the Class IV-type defect would permit the darker oral cavity to show through this portion of the final restoration, the A2-O opaque shade chosen from the

shade tab recipe was applied in this area to serve as a lingual wall, or scaffold on which the subsequent body and enamel shades would be applied (**Figures 7 and 8**). Note that this opaque layer was limited only to the defect, and did not extend beyond the prepared labial plane or the prepared incisal edge of the tooth. This layer was then cured for 40 seconds.

The dentin body shade XL, also selected from the original “recipe,” was placed in a thin layer across the entire preparation. An occlusal mirror was used to confirm the appropriate facial thickness as the material was placed. The simple technique of intentionally thinning this semi-translucent material at the gingival 1/3, and allowing it to become thicker in the middle 1/3, and tapering back to the lingual in the incisal 1/3 allows for subtle variation in the saturation of color of the restoration. An occlusal mirror was used to view the facial plane of this layer from the incisal to assure that it was in line with the corrected arch form (**Figure 9**). Prior to curing, the XL body shade was extended 1.5 – 2 mm beyond the incisal preparation and sculpted with a thin IPC composite instrument to create dentinal lobes or projections that mimic the basic morphology of naturally occurring dentin (**Figure 10**). Once confirmed from all angles, it was cured for 40 seconds.

In order to mimic the translucent edge characteristics of the neighboring teeth, a small amount of the CE enamel shade of Esthet-X was removed from the syringe, and pressed into the dentinal lobes created in the XL body shade, and blended onto the middle 1/3 of the body material (**Figure 11**). This relatively transparent shade permits the **darkness of the** oral cavity to show through, imparting a grayish-blue band of

translucency commonly found in natural teeth. This layer is then smoothed with a sable brush (Cosmedent), and cured for 40 seconds.

The final step in creating a lifelike, polychromatic restoration is the addition of a “halo” on the incisal edge. This is easily achieved by utilizing a high value material such as the XL dentin body shade as a “frame” around the incisal edge of the tooth. A small amount of this shade is dispensed from the syringe and gently rolled **with an instrument on a clean paper pad** into a thin ribbon shape. It is then applied directly to the incisal edge, blended along the entire length of the edge and into the mesial and distal interproximal areas, and cured (**Figure 12**).

Finishing and Polishing:

The primary advantage of choosing a microhybrid composite material like Esthet-X over a traditional microfill is its superior physical properties. Since microfills have roughly 50-60% less fracture toughness, flexural strength, and tensile strength, they are far more likely to chip and fracture under stress than their microhybrid counterparts.¹¹ But traditionally, this increase in physical properties has been exchanged for a poorer polish or shine. Microfills polish well by their very nature. They are typically filled with a nanoscaled, fumed silica which lends itself well to polishing to a high luster. Since microhybrids like Esthet-X deliberately incorporate a narrow size range of glass fillers for strength and optical properties, finishing and polishing is far more challenging than that of typical microfills. Numerous polishing systems have been introduced, some of which have been effective in creating a reasonable polish. However all currently available microhybrid finishing systems require multiple steps, up to 3 – 10 in some cases, with a variety of grits, shapes, and mediums. The time involved utilizing some of

the modern systems can range from 4 – 10 minutes per tooth.¹² With the introduction of PoGo (Dentsply/Caulk), a new micro-diamond polishing disc, clinicians can now achieve a microfill-type shine on anterior restorations with most microhybrid composite resin systems in one simple step in approximately 20 seconds. The disc is uniquely sized to be utilized in all aspects of veneer polishing, as well as typical Class III, IV, and V situations. **(Not sure what to say here. I just spent a full paragraph talking about the “other” products without naming them and telling why THIS product is unique. Would fair play dictate I bash other products by name for being multistep time wasters rendering the same or inferior shine? Not being crass, but it is the point of demonstrating THIS product. You may edit as needed).**

The timing to begin use of PoGo is essential. It is best used after finishing with a 12 – 16 fluted carbide composite finishing bur where a smooth start surface has been achieved. In the case presented, **Figure 13** depicts the final finishing with a 16 fluted carbide bur (TF 7214 / Midwest), with the additional use of a Enhance silicone finishing cup (Dentsply/Caulk) to accentuate the developmental concavities. When this level of finishing has been completed, PoGo can be used to bring the restoration to a high luster. The best technique is to use the front side of the disc (not the back edge as many clinicians often do with other finishing discs) in a manner depicted in **Figure 14**. Heavy pressure is used briefly to initiate polish, then backing off to a light “feather-like” brush motion to achieve the final gloss. When used in this fashion, the luster seen in Figure 15 can be generated in approximately 20 seconds with this one disc. This represents a significant paradigm shift from most polishing systems that require the use of coarse, medium and fine grits, often followed by some sort of paste system. The time savings

associated with PoGo are realized quickly as no mandrel changes are necessary, and only one disc can complete the final shine.

Tooth #8 was completed using the same technique and shades, and finished and polished in the same fashion as #9 (**Figure 15**). Note that the thin, flexible edge of the PoGo finisher is well suited to adapt to tough interproximal margins and embrasure areas.

Figures 17 and 18 demonstrate the final result. Note the polychromatic edge characterization, integration with the surrounding teeth, correction of the rotations and undesirable white pigment, and the final enamel-like luster.

Conclusion:

The case presented highlights a classic example of an indication for direct composite veneers, and demonstrated a technique and material that offer a simplified method of producing durable, esthetic results. By utilizing the simple recipe formula, and the 3 levels of opacity found in the Esthet-X microhybrid, and the novel polishing system, PoGo (Dentsply/Caulk), naturally appearing, vital restorations can be created expeditiously, saving time and expense for the doctor and patient. By utilizing proper case and material selection, and the techniques presented, direct composite veneers may become a predictable adjunct to the armamentarium of those dentists offering cosmetic services to their patients.

Bibliography

1. Denehy G. The importance of direct resins in dental practice. *Pract Perio Aesthet Dent.* 1999; 11: 579-584.
2. Davidson C, Davidson-Kaban S. Handling of mechanical stresses in composite restorations. *Dent Update.* 1998; 25: 274-279.
3. Belli S, Tanriverdi F, Belli E. Colour stability of three esthetic laminate materials against different staining agents. *J Am Dent Assoc;* 93: 790-792.

(Authors note: you may drop references 4 and 5 and renumber accordingly. The reference appears in the text as “4 – 7.” Just make it read “4,5” and re-number the remaining references accordingly)

4. Gottlieb B, Orban B. Active and passive continuous eruptions of teeth. *J Dent Res.* 1933; 13: 214 – 221.
5. Løe H. Periodontium, In: Goldman HM and Cohen HW (ed) *Periodontal Therapy*, 4th ed, St Louis, Mosby, p. 1.
6. Volchansky A, Cleaton-Jones P. The position of the gingival margin as expressed by clinical crown height in children aged 6-16 years. *J Dent.* 1976; 4:116-122.
7. Volchansky A, Cleaton-Jones P. A 3-year longitudinal study of the position of the gingival margin in man. *J Clin Perio.* 1979; 6:231-237.
8. Meijering A, Creugers N, Mulder J, et al. Treatment times for three types of veneer restorations. *J Dent.* 1995; 23:21-26.
9. Esthet-X product manual. Dentsply/Caulk.
10. Dietschi, D. Free-hand bonding in the esthetic treatment of anterior teeth: creating the illusion. *Journ Esthet Dent.* 1997; 9: 156-164.
11. Data from comparison of the physical properties found in the product manuals of Durafill Microfill (Kulzer), Renamel Microfill (Cosmedent), Silux Plus Microfill (3M), Herculite XRV Hybrid (Kerr/Sybron), Esthet-X Hybrid (Dentsply/Caulk) and Vitalescence Hybrid (Ultradent).
12. Unpublished survey data of current systems used by dentists to finish and polish composite restorations – Dentsply/Caulk

Legend for Photographs

Figures 1 – 3: Preoperative views of teeth # 8, 9. Note ectopic labial position of tooth #9 and subsequent overlap over tooth #8, the slight linguo-version of tooth #8, and the undesirable white pigment found on the incisal edge of tooth #8.

Figure 4: Shade selection with the Esthet-X shade guide. Note the “recipe” on the shade tab handle, which indicates the opaque, body and enamel shades necessary to create the shade and characterization of the selected tab.

Figure 5: The selected shades taken from the shade tab recipe.

Figure 6: The finished preparations.

Figure 7: Application of the A2-O opaque shade to block out the darker oral cavity in the Class IV – type defect created by the preparations.

Figure 8: The final contour of the lingual shelf created by the A2-O layer.

Figure 9: Occlusal view of the tapered XL body shade. Note the 3 facial planes created in the new labial position.

Figure 10: Final sculpting of the dentin lobes in the incisal 1/3 of the tooth.

Figure 11: Application of the CE enamel shade into the dentin lobes.

Figure 12: Placement of the high value XL body material on the incisal edge to create an incisal “halo.”

Figure 13: Immediate appearance of the polychromatic restoration prior to finishing.

Figure 14: Immediate appearance of the restoration after contouring and finishing with a 16 fluted carbide finishing bur, and the accentuation of the facial concavities with a silicone cup.

Figure 15: The proper orientation and working surface of the PoGo (Dentsply/Caulk) microdiamond polisher. Note the immediate gloss produced.

Figure 16: The final luster achieved with PoGo (Dentsply/Caulk) after approximately 20 seconds of polishing.

Figure 17: Final polishing of the veneer on tooth #8. Note the immediate luster.

Figures 18 – 19: 1 week post operative photographs demonstrating the achieved objectives of treatment.

Learning Objectives:

After reading this article, the reader should be able to:

- ? Have greater insight into proper case selection for offering direct composite veneers.
- ? Be able to properly prepare rotated and crowded teeth to receive direct composite veneers to bring the teeth back into alignment in the arch.
- ? Understand the concept of rapidly developing a stratified, polychromatic direct composite veneer.
- ? Recognize when to use opaque, body, and enamel shades of a microhybrid composite system.
- ? Learn a fast, simple technique for generating a microfill-type luster with a microhybrid composite.

Review Quiz

1. When evaluating the occlusal patterns of a potential direct composite veneer patient, which of the following may be a contraindication?
 - a. Deep overbite with steep maxillary inclines.
 - b. Poor anterior disclusion in anterior excursive movements.
 - c. Class III end-to-end occlusal schemes.
 - d. All of the above. Answer: D
2. Patients seeking conservative cosmetic changes for their teeth in the late teens or early adult years may be better suited for direct composite veneers rather than porcelain restorations because...
 - a. Composite resin adheres better to newly developed enamel than porcelain.
 - b. Composite veneers have refractive indices more comparable to developing enamel.
 - c. The gingival architecture during this age period may not be mature, and exposure of porcelain margins may occur as passive eruption continues.
 - d. The compressive strength of direct composite is stronger than porcelain. Answer: C
3. When re-creating the incisal edge of a direct composite, how much incisal reduction is often necessary?
 - a. 3 – 4 mm
 - b. 1 – 2 mm
 - c. Less than 1 mm
 - d. Greater than 4mm Answer: B
4. The incisal “halo” should be created out of which material?
 - a. The translucent enamel material
 - b. A low value opaque material
 - c. A high value body material
 - d. A universal shade Answer: C
5. Prior to using the PoGo (Dentsply/Caulk) polishing disc, the restoration should be finished with...
 - a. A 16 fluted carbide finishing bur
 - b. All 3 grits in a sandpaper finishing system
 - c. A coarse diamond finishing bur
 - d. Diamond discs. Answer: A
6. PoGo (Dentsply/Caulk) polishing disc is beneficial to the practitioner because it...
 - a. Gives a microfill-type luster to microhybrid composites
 - b. Is uniquely shaped to reach all aspects of a direct composite veneers
 - c. Can achieve a high shine in less than 30 seconds
 - d. All of the above Answer: D
7. The Esthet-X shade guide is unique in that it...
 - a. Does not use the Vita guide system
 - b. Provides the “recipe” for the polychromatic stratification of color
 - c. Only demonstrates the opaque and enamel layers
 - d. Only communicates hue and value. Answer: B