

Bringing Composite Resins to an Art Form in the Anterior Segment

By Dr Newton Fahl DDS, MS

AESTHETIC DENTISTRY HAS EVOLVED TREMENDOUSLY OVER THE PAST 20 YEARS AND HAS GAINED UNPRECEDENTED ACCEPTANCE BY BOTH DENTISTS AND PATIENTS ALIKE. CURRENTLY, THE USE OF HIGH-END TECHNOLOGY AND STATE-OF-THE-ART MATERIALS ENABLES SPECIALISTS AND GENERAL PRACTITIONERS TO PERFORM AESTHETIC PROCEDURES AT THE UTMOST LEVEL OF SCIENTIFIC SOUNDNESS WHILE EFFECTING LIKE-LIFE RESULTS.



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Esthetic dentistry has evolved tremendously over the past twenty years and has gained unprecedented acceptance by both dentists and patients alike. Currently, the use of high-end technology and state-of-the-art materials enables specialists and general practitioners to perform esthetic procedures at the utmost level of scientific soundness while effecting like-life results.

Composite resins lie among the many materials that have been contemplated with an exponential growth in terms of improvements on their composition and their manner of application. Presently, knowledgeable and skilled clinicians can perform adhesive direct procedures so as to mimic the physical and optical characteristics of the natural dentition. Current composite systems provide better strength and polish than early formulations while offering a wider shade range that closely reproduces the color properties of natural dentin and enamel. Many manufacturers have become aware of the need to meet the esthetic demands of professionals and their patients, and have endeavored to launch products that provide unrivaled esthetics and long lasting results.

Inasmuch as having state-of-the-art restorative composite resins available sets the ground for the realization of excellent restorations, that in itself is

insufficient should the operator not be familiar with the scientific and artistic realm that surrounds every anterior direct challenge. Optical concepts such as the four-dimensional color system (i.e. hue, chroma, value, translucency/opacity), fluorescence and opalescence are paramount and should be thoroughly understood when correlating the varying perceived colorimetric nuances of a tooth to be restored with the actual restorative resins. Other important parameters are the physical properties of current formulations and include sculptability, wear resistance, fracture resistance, and polishability. Most often these parameters are conceived only theoretically but lack a realistic application in a clinical setting. Only when the clinician thoroughly and practically comprehends the importance of mastering the fundamentals of the science and art involved in direct composite procedures, there can composite resin restorations be realized effectively and predictably.

Simple restorations such as a Class IV require as much treatment planning as some more extensive cases (figure 1). Treatment is initiated by reproducing the original tooth contour either through a wax-up or shape mock-up from which a silicone matrix is fabricated (figure 2). This matrix will determine the three-dimensional anatomic perception and proper incre-

Figure 1 – Even simple tooth fractures demand a thorough esthetic scrutiny and precise treatment planning to ensure successful clinical results.

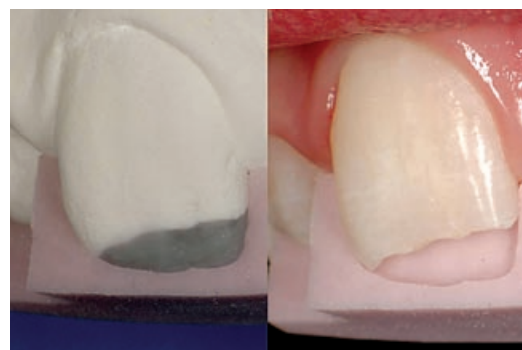


Figure 2 – Wax-up or mock-up procedures determine the three-dimensional morphologic envisionment necessary for polychromatic composite layering.



Figure 3 – The utilization of customized shade tabs minimize problems related to color mismatch.



Figure 4 – A color mock-up is used to confirm if the selected composite shades are correct.



Figure 5 – A color mock-up is used to confirm if the selected composite shades are correct.



Figure 6 – Precise layering of artificial enamel and dentin shades determine life-like polychromatic results.



Figure 7 – Accurate finishing and polishing techniques ensure the attainment of seamless restorations.



Figure 8 – Veneering a discolored single anterior tooth is one of the biggest restorative challenges.

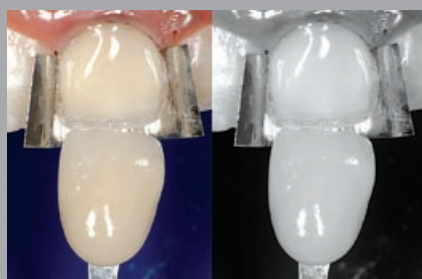


Figure 9 – Black and White photography is a practical adjunct in the determination of correct color value during the restorative stages.



Figure 10 – Subtle characterization can be emulated to impart a true artistic and life-like flare to the restoration.



Figure 11

mental application of the composite shades. Creating customized shade tabs made out of the actual composite will help minimize shade mismatches resulting from an existing difference between the VITA Lumin shade guide and most esthetic restorative systems (figure 3). This step allows for an ulterior assessment of color via an intra oral color mock-up, which is the actual layering of the composite increments according to their histological boundaries and optical/physical characteristics (figures 4 and 5). Only then can the definite restoration be carried out to completion with success for color and form will have been thoroughly scrutinized. Reproducing the outer primary, secondary and tertiary anatomies also poses a challenge that should not be disregarded. Finishing and polishing are performed meticulously attempting to emulate the surrounding natural enamel in all of its morphological variances (figures 6 and 7).

Veneering a discolored single anterior tooth is perhaps one of the greatest restorative challenges with composites (figure 8).

Within a minute preparation, which varies from .8 to 1.2 mm, value, hue and chroma have to be judiciously juggled in order to imitate the correct polychromaticity of the natural adjacent tooth. Achieving an initial correct color value with the application of opaquest agents will determine a predictable polychromatic result. Thus, it becomes mandatory that value changes be gauged precisely before, during and after the restorative procedure. As the human eye cannot accurately pinpoint value levels, photography comes into play as an adjunct. As the layers of composite are applied, B&W digital photography helps the visualization of value and the due alterations in opacity and chroma are ensued during the restorative stage (figure 9). Other layers are subsequently applied according to the polychromatic effect that is intended. The true artist should even attempt to mimic subtle characterizations, such as white spots and high chroma mamelons, which impart true life-likeness to the restoration (figures 10 and 11).

In more severe case scenarios, smile design concepts play a major role in the determination of proper function and a harmonious esthetic arrangement for the anterior segment. The keen operator must ascertain the discrepant smile under the scope of principles such as smile line, midline, tooth proportions, tooth alignment, incisal edge position, gingival architecture, to name a few (figure 12). Decisions ought to be made as to how the choreography of the lip, gingiva and teeth will perfectly blend with the facial biotype of the patient, so as to create a synergistic flow between facial and dental esthetics. In such cases, a correct communication between dentist and patient is the key to achieving a successful esthetic result. After gathering the subjective esthetic expectations from the patient, the dentist must cross reference them with objective smile design criteria and issue an initial treatment plan. This plan most often involves the realization of an intra oral mock-up and subsequently of a wax-up (figure 13). The former will

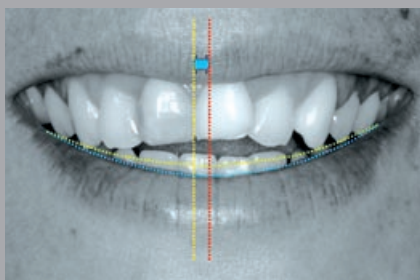


Figure 12 – Smile design principles must be taken into account when architecting the esthetic and functional changes of a compromised smile.



Figure 13 – An intra-oral mock-up is the ultimate means for assessing function, phonetics, and esthetics prior to the realization of the final restoration.



Figure 14 – A harmonious smile results from proper treatment planning.



Figure 15 – Extremely challenging cases require the interplay of several specialties to maximize results.



Figure 16 – Surgical stints collaborate in the precise determination of the gingival margin.



Figure 17 – The change in the gingival architecture and tooth proportions are evident after periodontal surgery.



Figure 18 – Waxing-up the final morphology helps predict correct intra-oral contours.



Figure 19 – A silicone matrix is created from the wax-up to serve as a guide for the application of the composite layers intra-orally.



Figure 20 – The interdisciplinary collaboration culminates in the realization of precise results yet maintaining a personal artistic touch to the composite artistry.

enable the patient to visualize subtle and marked changes in the smile and relay the level of satisfaction or dissatisfaction to the dentist, who, in turn, should effect the due alterations until the patient is fully pleased with the result. The latter, i.e. the wax-up, is carried out based upon the mock-up and is meant to give the operator precise occlusion and anatomic guidelines to be used in the manufacturing of a silicone index for the intra oral application of the composite resin materials. The final esthetic and functional outcome is usually excellent and there is minimal risk of the patient's not accepting or becoming frustrated with the final work (figure 14).

Interdisciplinary tactics is necessary to solve extremely challenging cases regardless of whether the elected restorative material be porcelain bonded restorations or composite resins (figure 15). In architecting the treatment plan, the leading restorative dentist must discuss treatment options and sequencing with a team of specialists in order to establish an ideal clinical

situation prior to the actual restorative phase. Multiple diastemata are a common scenario where orthodontics is paramount for the establishment of correct tooth position and alignment in order for improved anatomic tooth proportions to be achieved. Once teeth have been moved to position, periodontal cosmetic surgery can come into play determining an ideal gingival architecture that harmonizes with the lip line while adequate tooth width-length ratios are obtained (figures 16 and 17). Mock-up and wax-up protocols are utilized to ensure esthetic resonance when the final composite restorations are delivered (figures 18 and 19). Beginning with an end in mind allows the artist-dentist to visualize final results and to predictably and consistently achieve superior function and esthetics (figure 20).

Although composite resins have been a commonplace material for decades, they can be successfully employed as a conservative restorative modality that elicits extraordinary esthetic and functional results. Science sets the foundation for the

artist-dentists to unleash a creativity that is only limited by their knowledge and skills. It is this author's opinion that any restorative dentist who wishes to attain a higher level of excellence with direct composite restorations should endeavor to understand the fundamental concepts cited herein, and many more, and strive to incorporate new skills and knowledge through intensive reading and participation in hands-on courses on the subject. Initially, the learning curve might pose a bit steep for those unfamiliar with the new paradigms, but the reward will come naturally, once a comfort zone is reached.

Dr. Fahl will be lecturing & giving hands-on courses in Australia this August. Perth: Wednesday, August 16, Sydney: Friday, August 18, Melbourne: Saturday, August 19 and Brisbane: Wednesday, August 23. For more information or to register ring Dental Educators Australia on (03) 9523-9261.

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