

Length, Shape, Color, and Materials DO Matter (Part 2)



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Esthetic dentistry, when done correctly, can be a source of immense satisfaction for both the dentist and the patient. Converting dentistry to an attractive dentistry into an esthetic, functional work requires proper expertise and knowledge, attention to detail, and excellent communication skills. In the quest for superior esthetics, the dentist must have a thorough background in the principles of restorative dentistry including balance, form, and function. Success relies heavily on factors such as successful smile design, preparation design, choice of prosthetic techniques, and final restoration materials.¹

Bonded porcelain veneers offer a popular treatment modality for improving dentition in the anterior esthetic zone. The conservative preparation design combined with the ability to esthetically blend in the veneers with existing natural dentition and previous restorations make it an integral part of esthetic dentistry because depends on the crown-tooth, bio-compatibility, and indistinguishable appearance that follow the guidelines of basic form and function.² With the subjective nature of esthetic

dentistry, success also relies on determining and meeting the patient's expectations and desires with the final prosthesis. The dentist's gratification is governed by the patient's satisfaction.

When analyzing tooth shape, size, length, and color along with smile design, the dentist

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must consider his/her professional guidance with determining what is attractive for the patient. This greatly increases case acceptance and ultimate patient satisfaction. An aesthetic tool that allows for predictable, visual

communication is Computerized Esthetic Imaging used with the Lamin Library Smile Shape and Length Selection Guide (Developed by Lewis Richard and David L. Smith) discussed in *Figure 1*.

Communication from the beginning is essential for successful diagnosis, treatment planning, and case delivery.

Case Summary

In the quest to "practice what you preach," the patient (who is also a dentist) asked the authors to help give him the best smile

possible, and identify his previous personal habits.

The patient had previously undergone orthodontic treatment to straighten his teeth, and had composite resin bonding 7 years ago to enhance the shape and size of his maxillary incisors. The bonding work was an all-espouse improvement, but still really lacked optimal color, shape, size, and shape. The patient's dental history revealed chronic use of mouth cancer that contained an extremely high percentage of alcohol, so some over-the-counter mouth rinses do become alcohol is usually a solution, years of smoking with this had caused the teeth to lose its stain and luster. After further evaluation of the series of close-up digital photographic photos of the patient's smile (Figures 1 through 3), the authors determined that the veneers were not clean, and that improvement of the shape and color of just the four incisors would not create the smile he truly wanted.³ A final treatment plan was formed to include six, not four, porcelain veneers for teeth five, 6 through 11,



Figure 1—Preparation for all six teeth.



Figure 2—Preparation close up view.



Figure 3—Final bonded view.

Case Study (continued)



Figure 3—Evolution of smile design.



Figure 5—Laboratory work including preparative wax-block diagnosis using a smiling face image, preparation of wax, and finished provisional wax.



Figure 4—Composite waxing for smile design.



Figure 7—11.05 (11.05mm) Splint and metal splint for 11.05 (11.05) adding facial margin.



Figure 8—Splint finished for 11.05 (11.05) adding facial margin of splint for finished preparation.



Figure 9—High jaw for 11.05 (11.05) to add facial margin and facial structure around teeth.



Figure 10—Splint opened prepared and 11.05 (11.05) in patient preparation.



Figure 11—Preparation splint and 11.05 adding facial margin.

Preparation

Digital photographs can give a patient and surgical staff an esthetic visualization. The case of teeth "gone and silver" digital cameras combined with the high level of quality of the digital images provides a whole new arena in case presentation. In a matter of minutes, a diagnostic and visual means to evaluate the patient's smile can give the clinician a view of what the patient likes and dislikes about their smile. A dentist can immediately show a patient a professional presentation of the preparative design with the different angles printed on excellent photographic quality paper. By showing the patient enlarged images of teeth over dentures on a computer monitor, the accuracy in color and detail of digital photographs allows a dentist to focus on imperfections in color and on the surface of the teeth that the patient now wants to improve. In this way digital photographs can help case planning by raising awareness of areas that need esthetic and even restorative improvement.¹

Esthetic Imaging

Digital photography allows dentists to take the visualization

one step further. Through the use of esthetic imaging, the patient can be shown digitally refined images of their smile. After viewing his digital preparative images, the patient was shown the esthetic smile to choose from a library of smile designs. In this case, the authors used the Lette Library Smile Style Guide. The patient narrowed down his choice to two levels: digital smile designs, Nos. 11.05 and 11.05, with Length Code R. The next step was to image the patient using the authors' modified imaging software, Digital Dentist (Digitdent), used in conjunction

of the computer, and final smile—11.05 (11.05mm) composite—applied around "beauty-printed" template.²

The final staged smile the authors chose for the patient involved lengthening all six anterior teeth, especially the canines and lateral incisors. It is important to ensure that the preparative design allowing for lengthening of the abutment teeth will provide adequate resistance and retention.³ In cases that the increased length would also function in the patient's mouth, a composite mock build-up was done directly in the patient's

mouth was verified.⁴ A quick diagnosis impression of the mock build-up with increased length was taken and poured to create. This would send the laboratory to the fabrication of a diagnostic wax-up of correct length, shape, and position on properly attached diagnostic cast, from which provisional completion, preparation splint, and the final restoration would be made in.

Preparatory Laboratory Work

After reviewing the mock build-up using a No. 12 Haly, maxillary and mandibular Imp-Print (IM IMP) heat-curing polyethylene wax impression, a bite registration, and a face bow with wax bite fork were taken. These were sent along with the mock-up model and esthetic image to the laboratory for the fabrication of mounted study casts and a diagnostic wax-up. The laboratory fabricates the wax-up of ideal proportions using the approved standard pattern with the chosen Lette Library Smile Design as a guideline for desired tooth shape and using the mock-up model to guide the length. After lengthening and reshaping Smile No. 6 through (1) to ivory was, the man-

Digital photographs can help case planning by raising awareness of areas that need esthetic and even restorative improvement.

with the Lette Library, the patient saw images with the two smile designs were made in minutes (Figure 4). Not only did the esthetic images give him the excitement to make the final commitment to do the work, it also enabled the authors to choose the basic shape and length

of the preparation, and final smile—11.05 (11.05mm) composite—applied around "beauty-printed" template.²



Figure 10—SuperSnap® disk used to round-shape the angle.



Figure 11—Final preparation.



Figure 12—Impregnum® Prime™ bulk-fill composite resin.



Figure 13—Receiving final smiles of bonded provisional matrix.

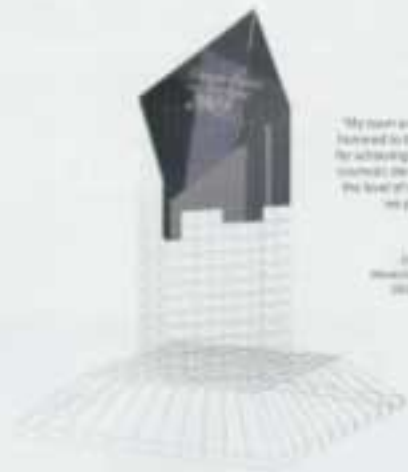
up was displaced and pushed up to serve to facilitate the construction of a preparation guide and a bulk-fill provisional matrix (Figure 10). By tracking the original posture and smile design along with the case, fabricators had a way to make sure that the construction of the matrix was always guaranteed to be worked with, and that is the first step to creating a successful esthetic and restorative outcome.¹

Preparation

Artistically non-adventurous local 0.154 EB (Ergo) handpieces (KaVo America Corporation) and diamond burs from the Contemporary-Cutting Kit (Ohrli® Dental Corporation) were used for the preparation of tooth line 8 through 11 for partial veneers (Figure 6). A steel diamond bur (0872-1) was first used to outline the margin of the preparation (Figures 7 and 8). The depth gauge (0893-1) was used to score the facial surfaces of the teeth to facilitate smooth removal of old composite trim and tooth structure (Figure 9). A coarse tapered diamond (0830C-1) performed grove initiation, and a superfine tapered point (0830F-1) polished the preparation (Figure 10). Adequate reduction was verified using the composite preparation guide made from the image-scanned wax-up (Figure 11). Finally, a SuperSnap® disk (Ohrli® Dental Corporation) was used to smooth any sharp line angles (Figure 12). When the reduction was sufficient and preparation complete (Figure 13), an Impregnum® Prime™ bulk fill (ESPE) polyfiller preparation was taken (Figure 14). An alginate impression was taken of the opposing arch and poured

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Figure 18—Removing lower replica of hardshell provisional wax.



Figure 21—Inserts polished to work with new surface of temporary upper on casting of printing.



Figure 20—Cure-It Curing Light, 90



Figure 19—Removing excess with fine facial gingival margin using the tapered diamond.

up in stone, and forwarded to the laboratory along with a lab registration.

Temporization

Attractive, easy temporization was made simple by using the hardshell provisional wax created from the image-scoped wax-up that follows the smile design chosen by the patient, as described earlier. The double-layer of hardshell construction gives bio-crylic provisional with desired shape and contours and polished surfaces in just minutes. The resulting provisional not only provides an attractive interim solution, it also allows the patient to evaluate their chosen tooth shape in their mouth before you proceed to make their final restorations. Because the temporary match the smile

design chosen by the dentist and the patient originally (later approved in the month), patient satisfaction is practically guaranteed.

The preparations were coated with Gluma® Odorless Primer, Inc.) a desensitizing, disinfectant, and gently air-dried, leaving the tooth surfaces slightly

the resin had fully set, the outer hard matrix was removed first (Figure 19). Then the inner soft matrix was peeled off to reveal a polished resin surface (Figures 20 and 21). The adaptability of the hardshell construction creates an esthetic provisional with ideal occlusion and optimal con-

ture was adjusted using a tapered, double diamond (Shade® Dental Corporation) (Figure 21), and the resin was finished with diamond polishing paste to lower a transitional tint that the patient approved of (Figures 22 and 23).

Shade Selection

Accurate and harmonious shade selection presents another essential component demanding a successful outcome and patient satisfaction. Although shade selection has been very subjective in the past, advances in technology have made color matching foolproof with electronic shade taking devices such as the Shade Eye-NCC™ (Shade® Dental Corporation).

The Shade Eye-NCC™ is designed to interact with the operator to identify the most precise, esthetic shade patch possible, and communicate this information accurately to the laboratory for duplication in porcelain. In this case, the authors looked at the assumed inevitable procedure and lower incisors. The Shade Eye-NCC™ eye was placed flush against the facial surface of each No. 5, and with the probe of a burs, the base shade and porcelain recipe was printed out on a descriptive shade slip. When the authors substituted the base shade, they chose to go half a shade lighter for the final restorer. Again, digital photography comes into play by offering a tool to provide instantaneous and accurate communication between the dentist and the laboratory. A digital photograph of the shade tab indicated by the Shade Eye-NCC™ next to the prepared abutment teeth and supported adjacent work allows the laboratory

Advances in technology have made color matching foolproof with electronic shade-taking devices

dent. The hardshell matrix was filed with Finemop™ 1 (3M EMP) wax case bio-crylic temporary crown and bridge material in shade A1, and sealed over the teeth with fine grained Allen

stone. The finishing diamonds (Shade® Dental Corporation) were used to easily fine-tune several excess resin to have this superb gingival margin (Figures 18 through 20). The matrix

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Figure 20—Forming a shade guide on a tooth.



Figure 21—Aligning a shade guide on a preparation.



Figure 22—A showing view of the preparations.



Figure 23—A restored view of the veneers.

To see the present shade of the teeth, the corresponding shade tab for reference, and any translucency or characteristics to be increased for maximum realism, included in the prescription with the shade slip and photograph was instructed to go half a shade lighter for the final provision.

Laboratory Work

At the laboratory, lithium disilicate porcelain veneers were prepared. During the provision build-up process on the articulated models, coping use and aesthetic provision guidance were carefully assessed and maintained. Axial interfaces were chamfered, and the facial preparation was addressed. After the build-up was completed and the veneers were baked, the contour and surface texture were refined. The veneers were then glazed and the platforms left unsmoothed. The final restorations were fitted to a wetted model, checked, and internally finished.

Bonding Appointments

At the bonding appointments, the temporaries were activated using a few chamfers and popped off using a composite removal instrument. Exposed[®] (Duxis Corporation) was expressed into the gingival margin to protect the gingiva and control bleeding as residual resin was removed with glycol air abrasion (BUNDOLUX[®], Kurli America Corporation). Because the strong cement can further stain shade variations in parts of the Baby's[™] CDM ESPE[®] water system were used before choosing A-1. The preparations were etched with 35% phosphoric acid for less than 15 seconds before being thoroughly rinsed and dried. Glue[®] was applied as a writing



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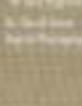
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Figure 19—Initial close-up view



Figure 20—Initial close-up view

agent for its increased bond strength and desiccating properties.¹¹ Multiple layers of Adper[®] Single Bond (3M ESPE) adhesive were applied and the excess blown off, leaving a mirror-gloss surface. The preparations were light-cured using the Bredent[®] Supplite[®] Plasma Arc Light (Bredent[®] Corporation) curing light. BodyC[®] resin cement in shade A1 was trimmed into the teeth and into the porcelain. The restorations were cured on the abutments with gentle pressure, scoring both veneers free, then the laterals, and finally both (single or premolar restorations). Excess resin was removed



Figure 21—Initial close-up view



Figure 22—Dr. Richard J. Lippert, D.D.S.

with a subtle break and the contours were finished before curing to allow for easy clean-up.

The restorations were then completely light-cured using the Bredent[®] Supplite[®]. The sensitive Enamel[®] C-Fluoride (Bredent[®] Corporation) opened the microprismatic ceramic, which was then finished with fine. The margins were finished and polished in a gingival-occlusal dimension using fine and superfine 1 and 2 Bredent[®] ceramic polishing cups and pumice from the Contemporary Finishing Kit

(Shofu[®] Dental Corporation). The patient was instructed on the use of his complementary HomeCare[®] (Pro-Dentist[®], Inc.) electric toothbrush, an alcohol-free tooth and tonguepaste, and gel tooth.

Conclusion

Advances in digital technology, communication tools and techniques, and esthetic materials allow the creation of natural-looking attractive smiles that follow the desired shape and contours suggested through esthetic imaging and communication, as illustrated here (Figures 24 through 27). Control and communication every step of the way from beginning to end were the keys to success. Gathering and transferring information of shape and color is crucial. Advances in digital technology through the use of esthetic imaging in conjunction with a Case Library, Guide Shape and Length Design Guide allowed improved diagnosis, case presentation, and communication/labatory communication—and finally, another quality completed esthetic case. ☺

Disclosure

Dr. Richard J. Lippert is a consultant for Digital Imaging Communications and Shofu[®] Dental Corporation.

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Product References

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| Manufacturer | 3M ESPE |
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