

Surface Texture

Matching the Single Central

The single maxillary central incisor is perhaps a dental technician's most demanding restoration. Color, translucency, internal characterization, surface texture and luster are all essential elements critical to its success. While recent innovations in ceramics have greatly improved our ability to match a tooth's natural color, translucency and characteristic, the accurate reproduction of surface texture and luster remains a mechanical task that requires keen observation, thoughtful planning and execution. Matching the adjacent teeth's surface texture and luster is as crucial to a restoration's successful integration as is matching color and characterization and should not be overlooked.



Figure 1 (above)
Shade mapping No. 9 with old porcelain-to-metal crown on No. 8.

Surface texture directly influences the value, color saturation and zones of light reflection and absorption. An anterior restoration that does not exhibit surface texture and luster comparable to the adjacent natural teeth will immediately appear out of place, particularly when the surface of the surrounding dentition is complex or heavily textured. The natural tooth's surface is composed of horizontal and vertical concavities and convexities that vary in complexity and intensity from tooth to tooth. Achieving the desired level of esthetics in restorations is rarely possible when these structures are not faithfully replicated.

Complex ceramic layering techniques may showcase the technician's skill level, but surface texture and luster showcase the restoration.



Figure 2 (above)
Preparation of No. 8.



Figure 3 (above)
Temporary on No. 8 exhibiting the desired contour.

Case Presentation

A 41-year-old female patient presented with a 20-year-old porcelain-to-metal crown. Beyond the poor esthetics of the crown, the tooth exhibited recurrent decay and the surrounding soft tissue was inflamed. After reviewing the available treatment options, the patient opted for an all-ceramic replacement.

Upon returning to the office, the patient was anesthetized and the existing crown and underlying decay was removed. The tooth was re-prepared and a temporary crown made from Luxatemp Fluorescence (Zenith DMG) acrylic was fabricated.

After surface characterization was applied using the composite color modifiers (Kerr), the provisional was layered with a thin coat of light-cured glaze (Luxaglaze) to fix the color and characterization.

The tooth was then scaled with an ultrasonic scaler prior to cementation of the provisional with a carboxylate cement (Durelon, 3M Espe).



Figure 4 (above)
Zirconia coping (Procera) designed with a porcelain labial margin.



Figure 5 (left)
Porcelain labial margin adapted to the Zirconia coping (Procera).



Figure 7 (left)
Application of the dentin shade.

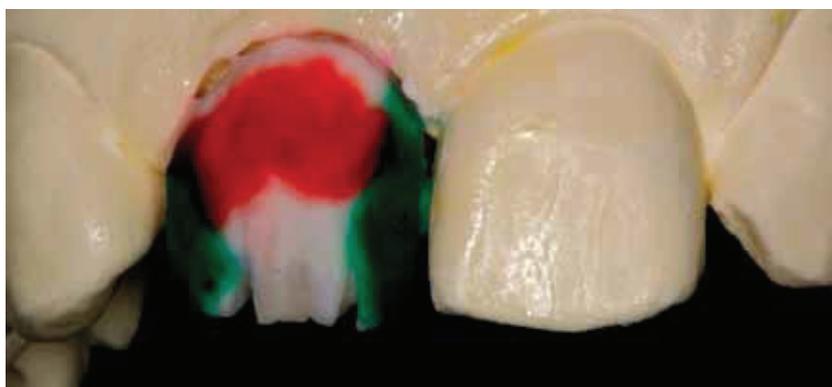


Figure 8 (below)
Colored enamels are placed on the mesial and distal. Cervical translucent orange color is applied to the cervical third.

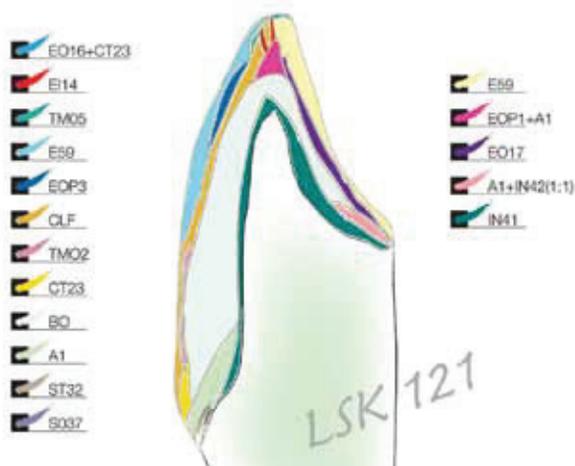


Figure 6.
Initial ZR (GC) porcelain color mapping for crown.

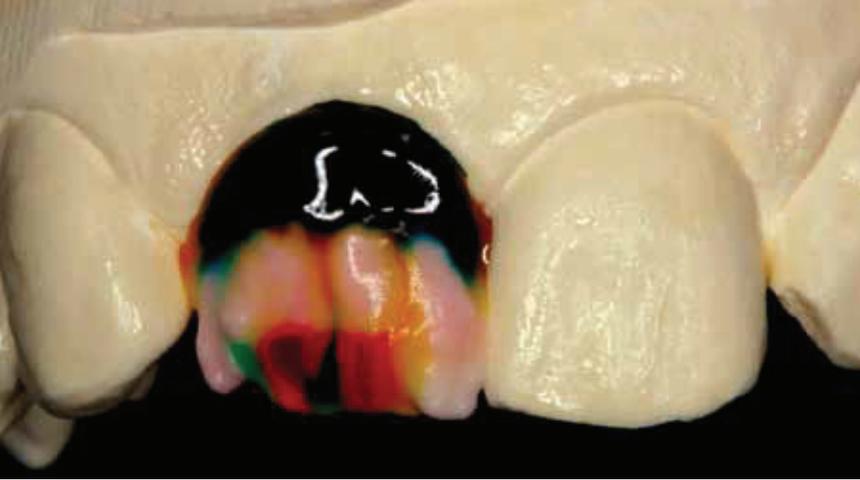


Figure 9 (above)
Various enamel colors are placed

Figure 10 (right)
Enamel filter is applied over entire labial surface.

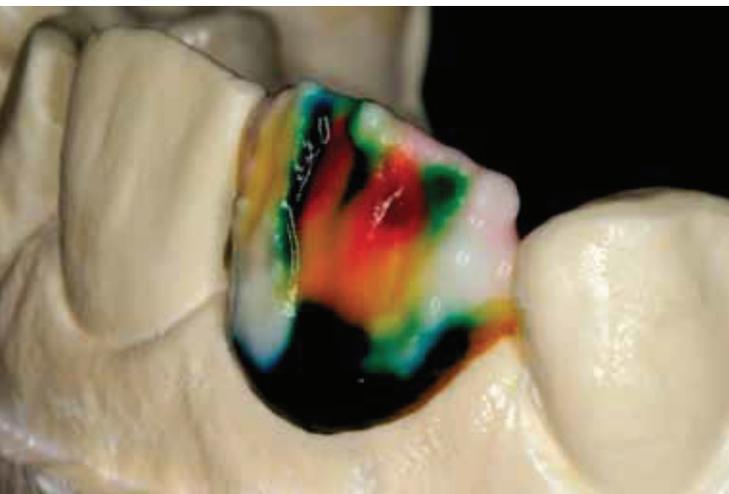
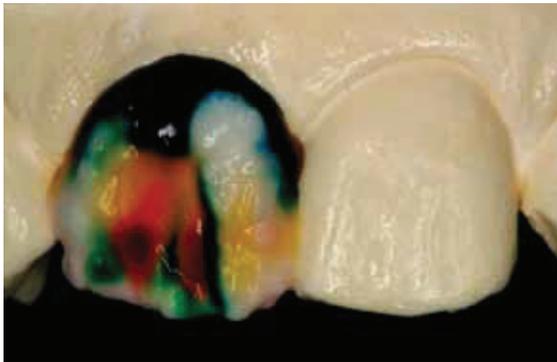


Figure 11 (above)
The enamel filter is 0.2mm thin.



Figure 12 (above)
The enamel filter will match the contour of the labial. translucent is applied.

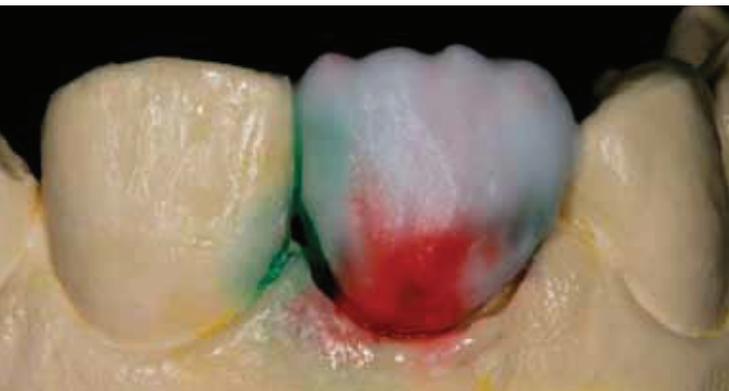


Figure 13 (above)
The enamel filter is completed and a modest amount of cervical



Figure 14 (above)
The bisque-bake firing.

In order to achieve optimal gingival health for final impressions, the patient was sent home with a chlorohexidine solution (Oris Rx, Dentsply) and instructed to brush the affected area.

After three months, the tissue health was restored and impressions were taken (Xpasyll by Gunz for retraction, Clinician's Choice triple tray and Aquasil Decca with LV wash by Dentsply). Before releasing the patient, Polaroid images of the teeth were taken with various shade tabs in view and she was instructed to contact the lab for a custom shade appointment. After a bisque-bake of the crown was complete, the patient returned to the lab for shade verification and further characterization.

During the cementation appointment, the patient was anesthetized and the tooth was lightly air abraded. Simplicity was used to prepare the tooth while an etching gel (Ceretch, Vident), silane and Dentastic Uno adhesive (Pulpdent) were used to prepare the crown. After the excess composite cement was removed (P4 Flowable, Dentsply), the restoration was light cured,

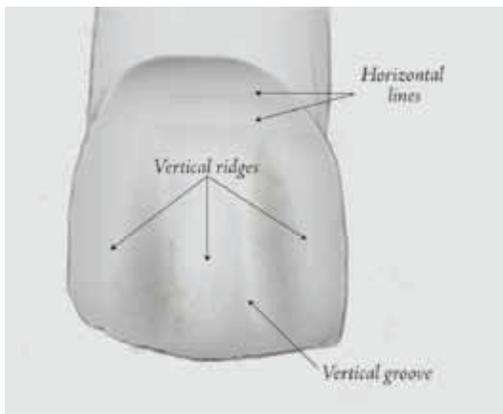


Figure 15 (left)
Mapping the surface texture of No. 9.

Figure 16 (right)
Surface-texture mapping transferred to No. 8.

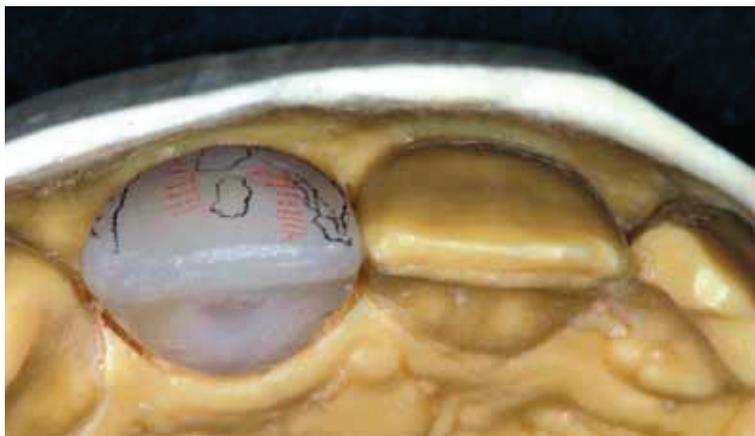
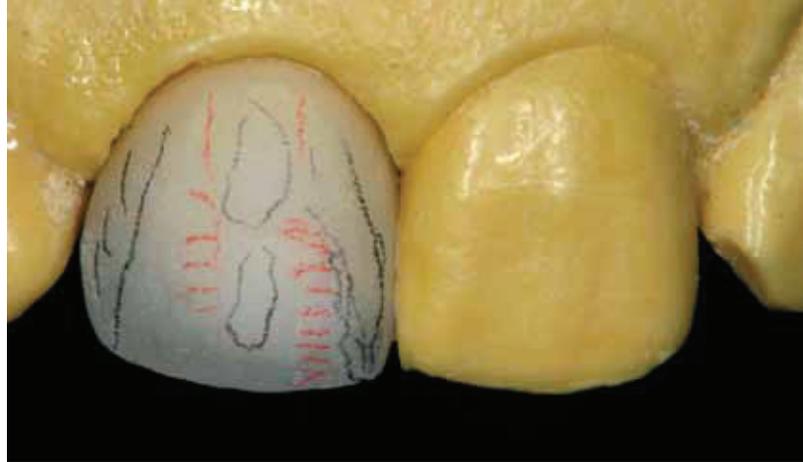


Figure 17 (above)
Incisal view of contour and surface topography.



Figure 18 (above)
The crown is naturally glazed then mechanically polished.



Figure 19 (above)
The texture of the incisal third after polishing.



Figure 20 (above)
The texture of the cervical third after polishing.



Figure 21 (above)
Incisal view of contour and surface topography.



Figure 22 (above)
Silver powder makes surface texture evaluation easier.



Figure 23 (above)
Finished restoration.



Figure 24 (above)
View after insertion. Note matching surface textures.

utilizing an Ultralume 5 (Ultradent). Any remaining cement remnants were removed using a sharp scaler and a trimming bur

(S.S. White #7901). The occlusion was then adjusted and the effected area was repolished with Axis polishing cups and points. A two-week post-operative visit revealed healthy tissue response, no sensitivity and a happy patient. 



Figure 25 (above)
Lateral view illustrates segmentation of the color saturation.



Figure 26 (above)
The color, form and texture of the restoration are in harmony with the adjacent natural tooth.

Acknowledgement

The author thanks Dr. David Carlson and Russell DeVreugd, CDT, for sharing their knowledge and time.

References

1. DeVreugd, Russell. Anterior and Posterior Function and Esthetics, 1991, Vol. 1, p. 30.
2. Kapp, FR. "Esthetic Principles for Full Crown Restoration." J Esthet Dent, 1993, Vol. 5, pp. 25-28.
3. Kataoka, S. "Nature's Morphology." Chicago Quintessence, 1993.
4. McLaren, Edward A. "All-Ceramic Alternatives to Conventional Metal-Ceramic Restorations." Compend Contin Educ Dent, 1998, Vol. 19, pp. 307-325.
5. Sulikowski, Alan V. and Yoshida, Aki. QDT, 2003, pp. 10-16.
6. Yamamoto, M. "Metal Ceramics." Chicago Quintessence, 1982, pp. 416-423.

About the Author:

Luke S. Kahng, CDT, specializes in high-end ceramic restorations. He has served on several major dental journal boards as a contributing member. He invented the Chairside Shade Guide – Volumes 1 and 2 and then expanded the offering to a unique ceramic shade guide system named the Seasons of Life Selection. These valuable tools are used daily on a world-wide basis. He is owner and president of his own lab, LSK121 Oral Prosthetics, one of the largest dental laboratories in the country, located in Naperville, Ill.



Earn continuing education credits for this article and quiz!

Receive .5 hours CDT/RG Scientific credit and .5 hours of General credit towards your state of Florida dental laboratory renewal by reading this article and passing the quiz. To get your credit, complete the quiz located on the FDLA website at www.fdma.net using the *focus* Magazine link. Once you have completed the quiz, fax it to FDLA at 850-222-3019. This quiz is provided to test the technician's comprehension of the article's content and does not necessarily serve as an endorsement of the content by FDLA.

