

Breathing Vivid Life into *Our Creations*

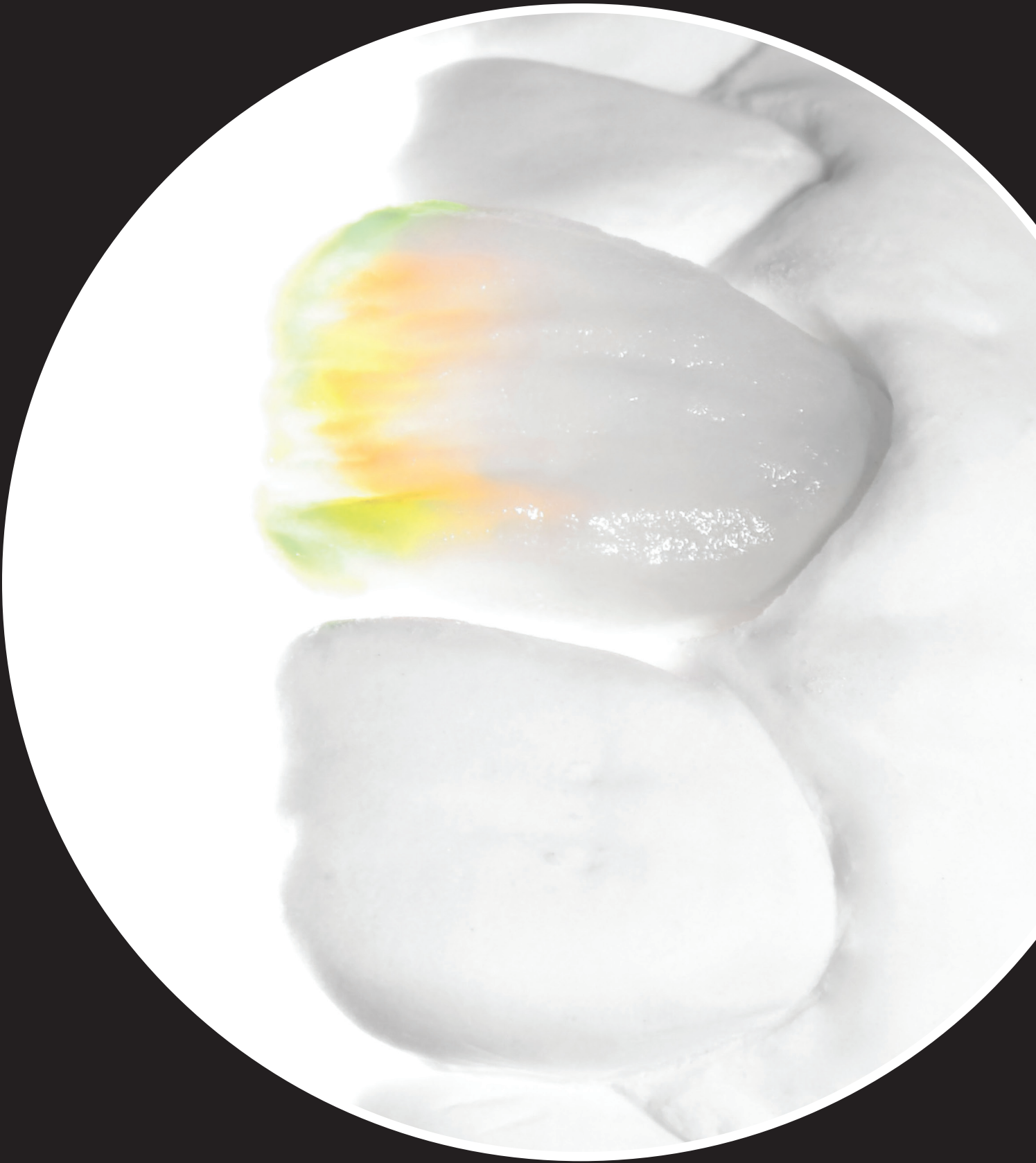
Combining Artistic Sensibility with Functional Essentials Achieves the Desired Outcome

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Introduction

Patients ultimately judge the restorative treatment of their anterior teeth based on our ability to realize two requisites for esthetics: natural beauty and ideal beauty. However, our restorative decisions must be guided by a number of functional and clinical considerations, including patient age, gender, number of compromised teeth, and current oral health status. By combining our artistic sensibility with knowledge of functional essentials, we can maximize the use of various esthetic materials to resolve the challenges we face when creating restorations that mimic multiple facets of natural teeth.



Natural Beauty

Reproducing natural beauty requires satisfying an insatiable curiosity about the unique characteristics of natural teeth through observation. This leads to the important realization that asymmetry is sometimes the hallmark of natural beauty that balances esthetics and function. For example, the angulation of a tooth, its incisal form, or the location of tooth surface characterizations can be reproduced to create an inherent beauty that patients feel comfortable with. Therefore, it becomes imperative for us to mimic in our restorative endeavors the interplay of color and form in a tooth based on the natural asymmetries that are present.



Natural *Beauty* in the Asymmetrical



A cut-back and layering technique was used with an esthetic pressable lithium disilicate (IPS e.max Press, Ivoclar Vivadent; Amherst, NY) to create a crown for tooth #9.

(Clinical work by Dr. Yusuke Yamaguchi)

Ideal Beauty

Achieving ideal beauty depends upon translating the patient's esthetic requests into final restorations that reflect their restorative desires. Close communication and collaboration between the laboratory technician and the dentist is of paramount importance to this process. Communication begins on the clinical side of treatment, where discussions with the patient identify their hopes, what kind of esthetic outcome is visualized, and how much can be improved restoratively.

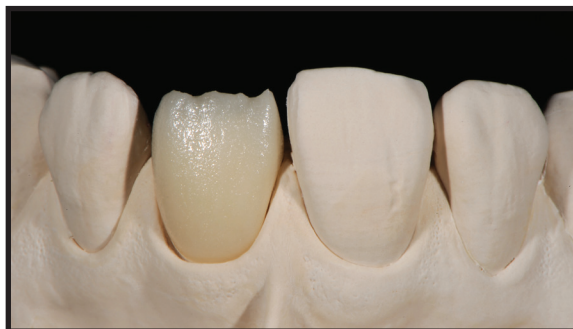


Ideal *Beauty* in the Symmetrical



Teeth #7, #8, and #10 were functionally and esthetically restored to reflect natural beauty using porcelain laminate veneers, and #9 was restored with a crown created with a cut-back and layering technique and a pressable lithium disilicate material (IPS e.max Press).

(Clinical work by Dr. Tatsunori Nagao)

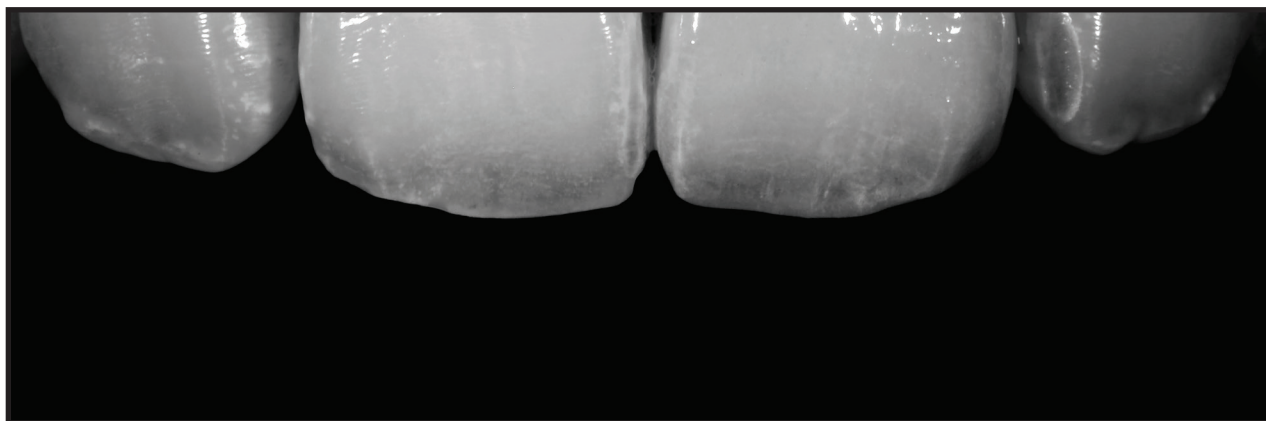


Mimicking Nature Through Understanding

A combination of external influences and the optical properties of internal tooth structure determine the color of natural teeth. Color characteristics such as brightness, chroma, shade, and opalescence result from the interaction of light with enamel and dentin layers and are perceived by the eye based on how external elements (e.g., lifestyle, lighting, oral health) affect them, and each of these can change over time. When we attempt to reproduce tooth color, we must consider—and replicate the effects of—these influences in our restorations. Therefore, excessive reproduction to capture "a moment in time" should be avoided. However, both internal and external characteristics comprise the totality of balanced tooth color, so reproducing them to suit the individual patient is essential. This requires magnification to visualize the various individual nuances of natural teeth so as to replicate these details in the final restorations.

(Clinical work by Dr. Tsutomu Kubota)

Observe *Nature's* Individual Nuances



Tooth #9 would be restored with a cut-back and layered crown using a pressable lithium disilicate material (IPS e.max Press).

Artistic Sensibility

Esthetics encompasses many aspects of the smile (e.g., gingival symmetry, incisal edge position in relation to the lips, tooth proportion within the face) that must be artistically reflected when creating anterior restorations. Laboratory technicians develop their inherent intuitive skills in, and artistic sensibilities about, recreating the feelings experienced when observing a patient's smile in the context of all of their features through repetition. In order to replicate the essence of the individual—something that is intangible and not easily explained—detailed communication between the dentist and the laboratory technician is very important, along with a respectful partnership.

(Clinical work by Dr. Tsutomu Kubota)



Tooth #8 also would be restored with a cut-back and layered crown using a pressable lithium disilicate material (IPS e.max Press).

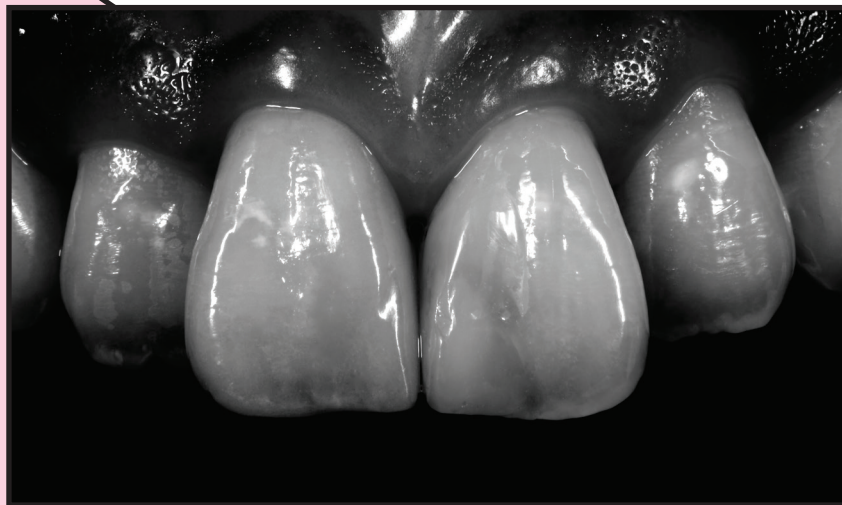
VISUAL COVER ESSAY

Light and Shade

There are many nuances of natural teeth that are invisible to the naked eye, yet which must be replicated in anterior esthetic restorations. A high level of esthetic treatment is therefore predicated on the laboratory technician's ability to demonstrate their expressiveness, creativity, technique, and skills in recreating these inherent subtleties in the restorations they produce. Today, the widespread availability of high-resolution and high-specification digital single-lens reflex cameras not only facilitates documentation of cases, but also enables confirmation and visualization of esthetic details. This raises our level of artistic skill and motivates us to achieve the best possible outcomes.



An artistic crown restoration was cut back and layered from pressable lithium disilicate (IPS e.max Press) for tooth #8.



(Clinical work by Dr. Tsutomu Kubota)



Teeth ##8-10 were expressively restored with cut-back and layered pressable lithium disilicate crowns (IPS e.max Press).

Detailed *Structure*



A pressable lithium disilicate material (IPS e.max Press) was used as a superstructure solution for the restoration on tooth #10.

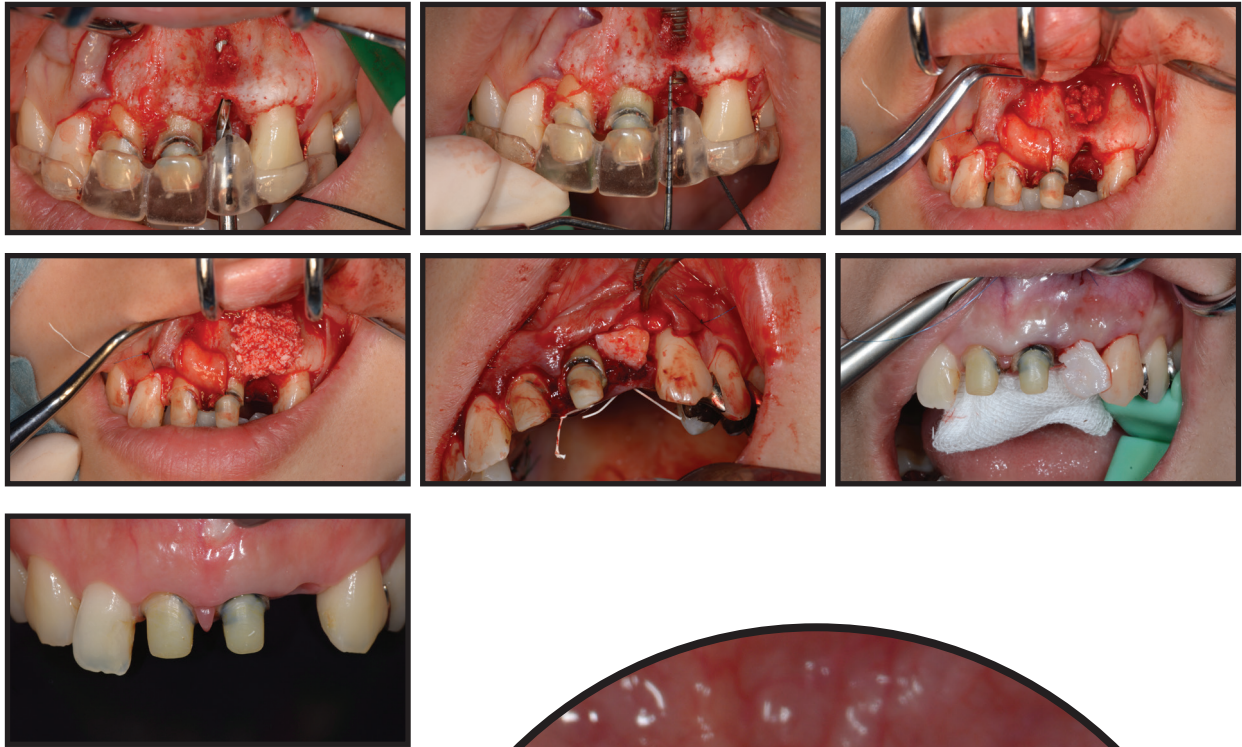


Vivid *Portrayal*

Realizing an Individual's *Essence*

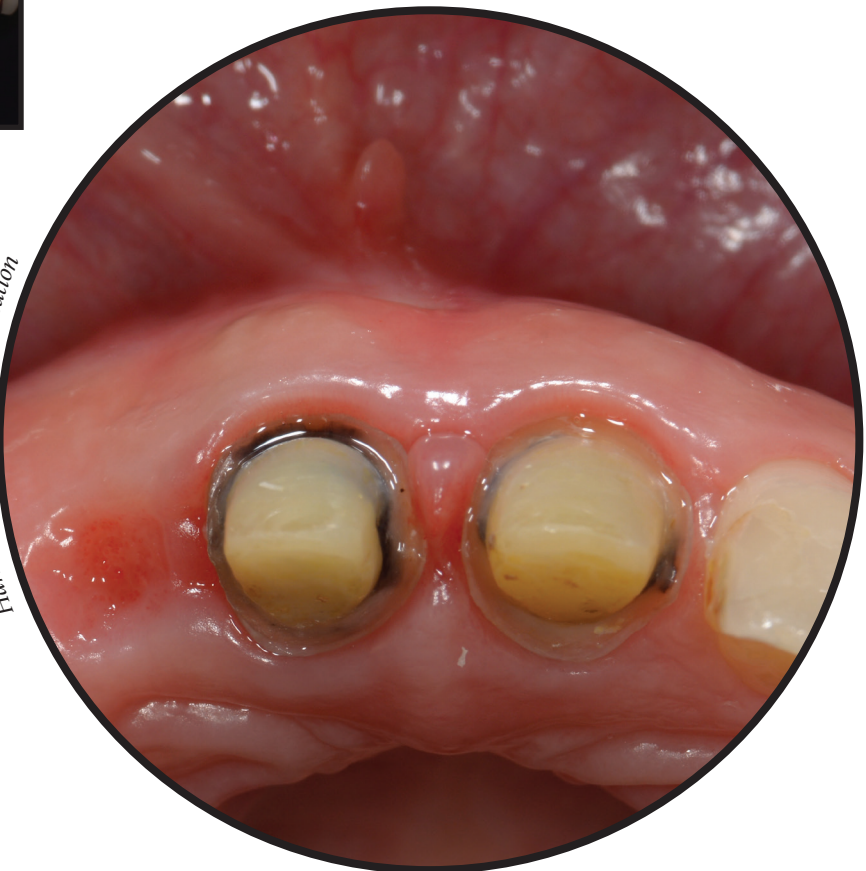


The Foundation of *Brilliance*

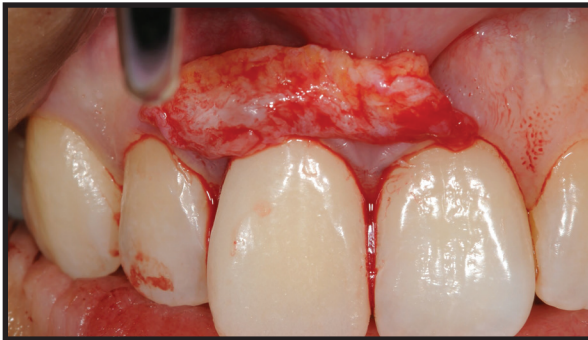


(Clinical work by Dr. Norimi Oda)

Hard and Soft Tissue Augmentation



Surgical Approach for a Single Central



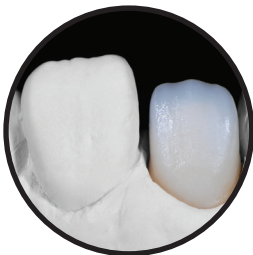
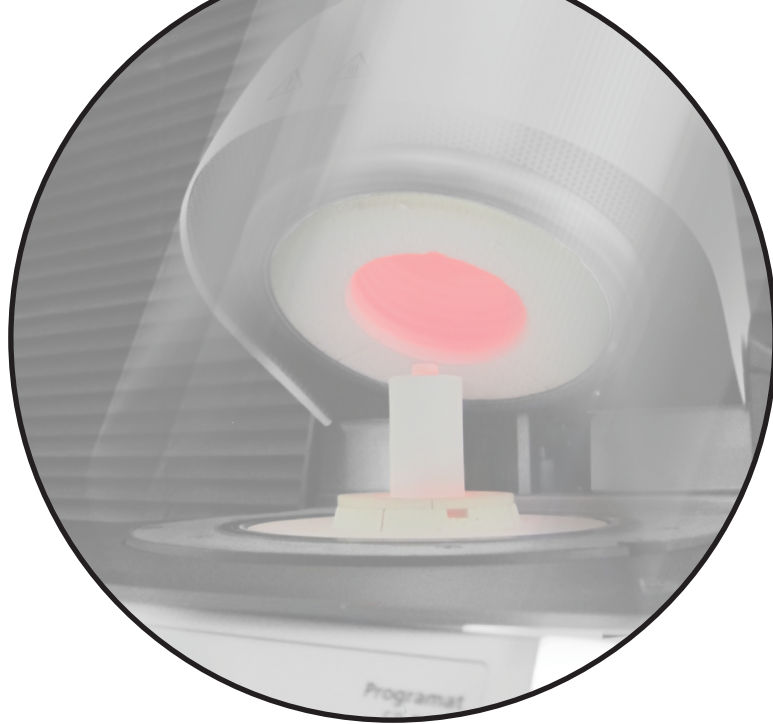
*Soft tissue augmentation using a connective tissue graft.
By changing the tissue biotype, underlying tooth discoloration can be masked.*

(Clinical work by Dr. Kotaro Nakata)

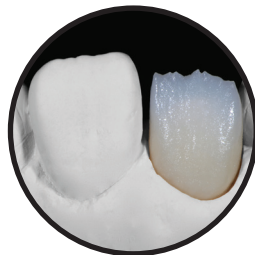


Ideal Materials and Multilayered Structure

Proper color development within each restoration is important for imparting a vital and lifelike appearance. Achieving this is dependent upon ingot selection, material and restoration thickness, and artistic application of deep dentin and enamel ceramics. Expertly incorporating ideal materials (e.g., IPS e.max Press and IPS e.max Ceram) can facilitate brightness and opacity control, which is key to achieving the best results.



Base control



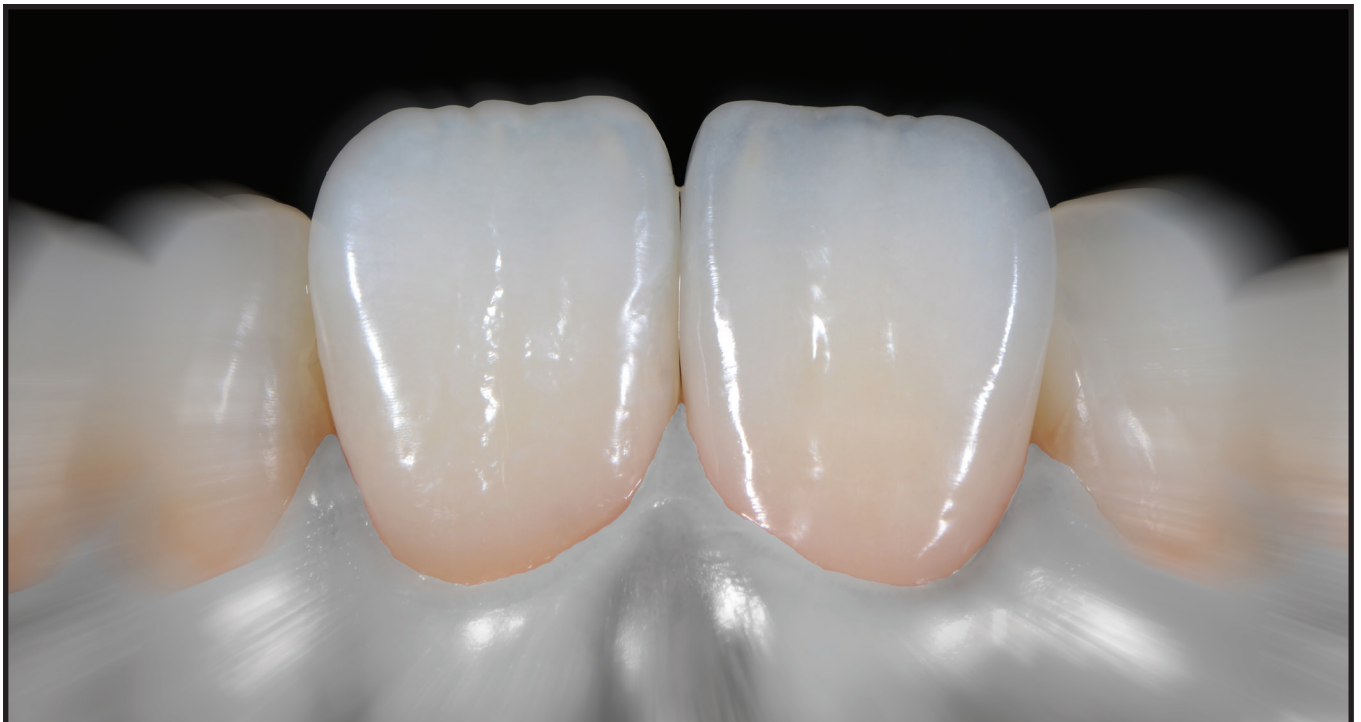
Opacity control



Internal characterization



Completion



Proper *Reproduction* of Natural Tooth Composition



A cut-back and layered lithium disilicate crown (IPS e.max Press) provided a natural-looking treatment for tooth #8.



Multilayered structures can be achieved using a lithium disilicate layering ceramic (IPS e.max Ceram).

Multilayered Structure



Ingot selection
 Opacity control
 Base dentin
 Mamelon structure
 Opal effect
 Enamel layer

LT A1
 DD A2
 DA A2
 MM salmon
 OE1
 Tl2+OE2 (1:1)



Ingot selection
 Opacity control
 Base dentin
 Mamelon structure
 Opal effect
 Enamel layer

LT A1
 DD A2
 DA2
 MM yellow-orange
 OE1
 Tl2+OE2 (1:1)



Ingot selection
 Opacity control
 Base dentin
 Mamelon structure
 Opal effect
 Enamel layer

LT A2
 DD A2
 DA3
 MM salmon+CT orange-pink (2:1)
 OE1
 Tl2



Ingot selection
 Opacity control
 Base dentin
 Mamelon structure
 Opal effect
 Enamel layer

LT A1
 DD A2
 DA2
 MM light+yellow-orange (2:1)
 OE2
 Tl2+OE2 (1:1)



Ingot selection
 Opacity control
 Base dentin
 Mamelon structure
 Opal effect
 Enamel layer

LT BL2
 DD A1
 DA2
 MM light+salmon+yellow-orange (1:1)
 OE2+T blue (1:1)
 TIBL+OE4 (1:1)

Multilayered Concept



Step 1 – Base Control

Controlling the base color of a restoration depends upon ingot selection, which itself is based on several criteria, including opacity of the natural tooth structure to be emulated (the “target” tooth), opacity of the underlying tooth, discoloration of the underlying tooth, and preparation clearance. When a cut-back and layering technique is used, a low-translucency ingot (e.g., IPS e.max Press LT) can be selected. For the framework material, it is best to choose an ingot that is one to two shades lighter than the target tooth to compensate for a reduction in brightness, minimize show-through of underlying discoloration, and enable better light reflection from the inside. This will create a more natural-looking color for the restoration once in the oral cavity, particularly along the gingival margins.



Step 2 – Opacity Control

In addition, the cut-back and layering technique requires opacity and brightness control, particularly in the cervical area, where brightness is typically lacking. This can be accomplished with an LT ingot by applying Deep Dentin porcelain, but the technique may not be appropriate for all cases. Based on the brightness of the natural tooth to be emulated, an opaque layer is applied on the cervical area according to the range of brightness change from within the natural tooth structure using the following porcelain mixture ratios: 1) Deep Dentin 100%; 2) Deep Dentin 50% with Dentin 50%; 3) Dentin 100%; etc. Then, the build up of the cervical areas over the 0.6-mm LT framework is completed with an approximately 0.6-mm dentin layer, followed by an approximately 0.3-mm enamel layer.



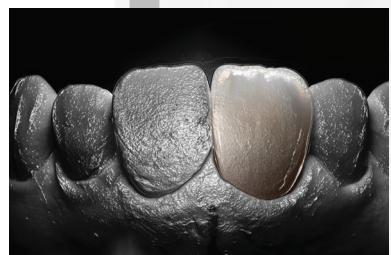
Step 3 – Internal Characterization

To enhance the subtle nuances of the restoration, the enamel porcelain layer is built up by arranging opaque porcelains and internal stains (e.g., Mamelon, Deep Dentin, Opal Effect) in an artistic and appropriate manner, in addition to adding internal characterizations to the incisal area. Contrast is also controlled along the incisal edge. Cutting back from the lingual is very important when adjusting transparency at the incisal edge, and typically the mamelons are built up from the labial and lingual to demonstrate three-dimensional depth in thin incisal areas. This process is very important for imparting vitality to esthetic anterior restorations.



Step 4 – Luster Control

The restoration form is complete following enamel porcelain build up and modification, after which adjustments to texture and surface effects are made manually, partially to control glossiness and luster. Variations in a restoration's gloss affect the appearance of surface texture, how restoration surfaces reflect light, and how its color will be perceived. Therefore, final gloss is adjusted after glazing and polishing to replicate the intensity of the natural tooth to be emulated. Because glazing procedures (i.e., burning temperatures) alter the surface properties and gloss of restorations, over glazing should be avoided. Areas requiring emphasis of surface characteristics, however, may require the use of glazing paste.



Step 5 – Optical Effects

After completion, it is important to confirm under various lighting conditions that the optical effects and properties of the restoration reflect those of the tooth to be mimicked. When considering the optical effects of the restoration in the context of the individual patient, keep in mind that natural tooth fluorescence and opalescence tend to decrease with age. However, if additional optical effects are required, Transpa Incisal porcelain and Opal Effect porcelain can be mixed in a 1:1 ratio and applied for additional customization.

Summary

Laboratory technicians and dentists alike strive to achieve ideal esthetic anterior restorations based upon their experience, knowledge and skill sets, and on individual patient desires. Communication and mutual respect between dentist and laboratory technician are critical to these endeavors so that each party can do their best as professionals, as well as integrate their thoughts and concepts for achieving esthetic goals. This visual essay has showcased seven collaborative cases to present the requisites for achieving success in creating highly esthetic anterior restorations. **jCD**

Acknowledgment

The author and the dentists whose cases are featured in this article—Drs. Yusuke Yamaguchi, Tatsunori Nagao, Tsutomu Kubota, Norimi Oda, and Kotaro Nakata—express their respect for Mr. Naoki Hayaishi, RDT (Irvine, California), and their gratitude to him for inspiring them.

“Communication and mutual respect between dentist and laboratory technician are critical to these endeavors so that each party can do their best as professionals, as well as integrate their thoughts and concepts for achieving esthetic goals.”



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