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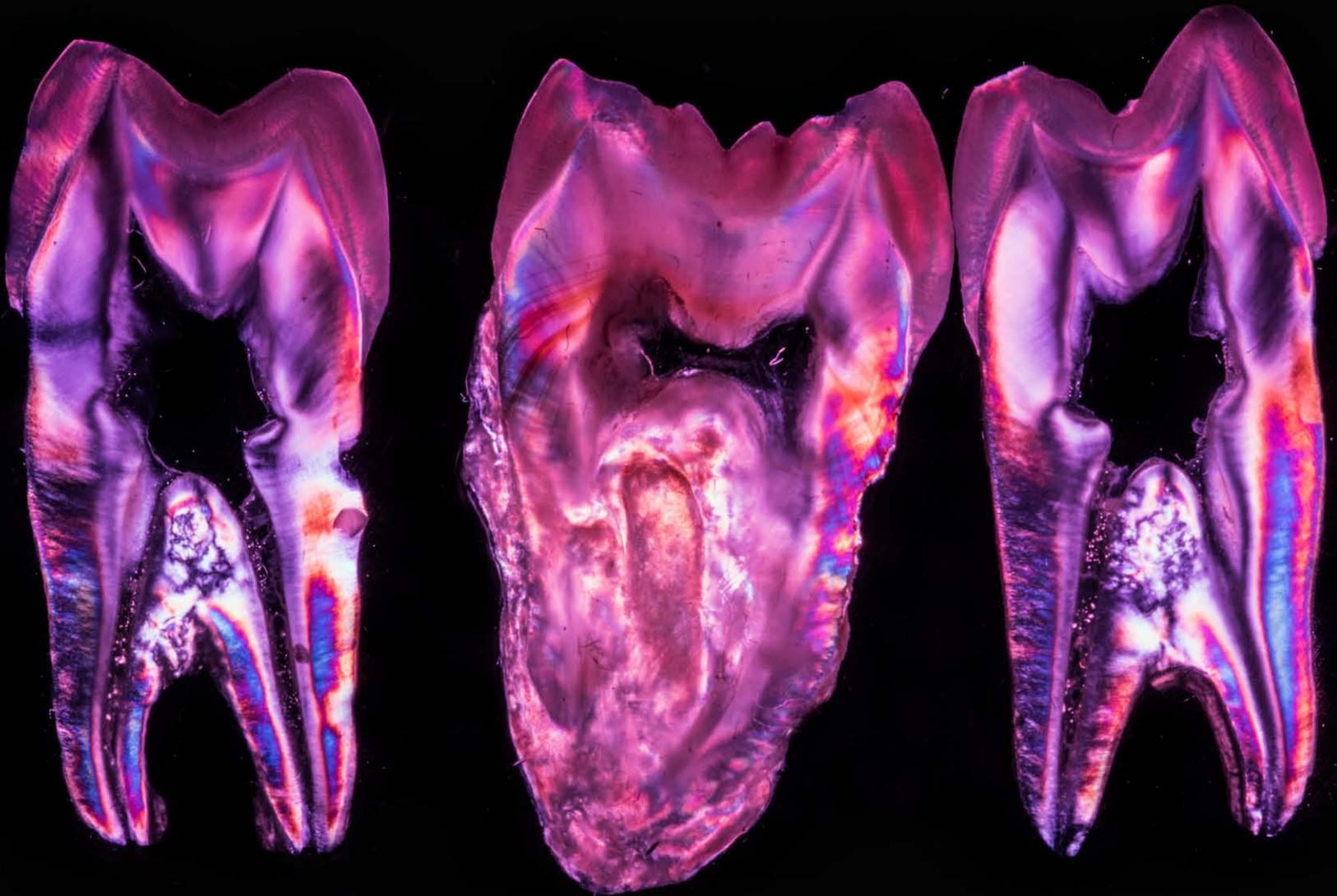


Photo credit: Aydee Almaraz, Dental Surgeon
An intimate look into a microscopic world

Innocence, Maturity, and Wisdom:

Custom-Characterizations According to a Person's Age — with HC Block/Disk and Lite Art Stain System

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Introduction

Nature is the essence of what makes us different. In its uniqueness, the natural dentition is not perfect. Yet, in its imperfection, natural teeth exhibit distinct beauty in bespoke colors, shapes, texture, and individual accents.

A person's smile provides hints about that person's life. When matching a single central restoration to the surrounding dentition, a stage, or a season of the teeth is an important factor to consider. Using a universal analogy, the different stages in the life of a tooth could be dubbed as "Innocence", "Maturity," and "Wisdom."

Innocent central incisors are very prominent in shape and size, when compared to the other teeth. As natural dentition metamorphoses with age, the dentin and enamel continue to evolve. For instance, when factoring in the stress and masticatory forces,

dentin tends to gradually attrit, becoming more susceptible to external factors such as food staining. Maturing enamel, on the other hand, progressively transitions into a more transparent and less translucent form.

Astute dental laboratory technicians will seek out materials and techniques to hone their technical prowess and to improve their laboratory's efficiency and profitability.

Laboratory Procedure

In the following process, three restorations concomitant with three stages in the life of a tooth, "Innocence," "Maturity," and "Wisdom," were fabricated from HC Block (Shofu Dental) and naturalized using LiteArt Stain System and Ceramage (both Shofu Dental).

HC Block was selected based on its unique physio-mechanical characteristics and the ability to quickly create restorations that are functional and highly aesthetic in a long term.

Composed of 61-percent zirconium silicate embedded in a high-temperature/high pressure polymer matrix, a densely packed nano filler of HC Block forms a skeleton which uniformly absorbs masticatory forces and promotes resistance to breakdown phenomena. The high flexural strength of 191 MPa and Vickers hardness of 66 Hv0.2 make HC Block a good candidate for a variety of indications, including permanent anterior/posterior restorations for inlays/onlays, full-contour crowns, and implant-supported cases and long-term transitional restorations.

All blocks were milled in a Cerec inLab MC XL (Dentsply Sirona), under wet conditions, in a

total milling time of 11 minutes and 30 seconds (Figure 1).

The selected shades of an HC Block exhibited all the criteria to allow for an effective customization of restorations according to the age, or the season of a tooth. For a restoration representing the "Innocence" of a tooth, a small one-layer HC Block in a shade A1-HT was selected. For a restoration concurrent with the "Maturity" stage of a tooth, a medium two-layer HC Block in a shade A2 was chosen. For a final restoration, corresponding with the "Wisdom" season of a tooth, a medium two-layer HC Block in a shade A3 was decided to be the best option (Figure 2).

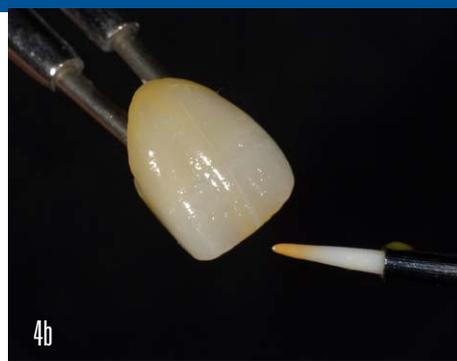
After milling, all sprues were easily removed, and the contacts and occlusion were minimally adjusted, with the facial surface of crowns slightly reduced to make room for internal staining with the LiteArt.

With the purpose to provide a reliable mechanical retention, the units were roughened by sandblasting with aluminum oxide at the granulation of 50 microns and the pressure of 2 bars, for 10 seconds. Consequently, all restorations were neatened with a clean brush without the presence of water. Alternatively, the cleaning process could have been conducted using oil-free compressed air.

CeraResin Bond (Shofu Dental) was incorporated to facilitate a strong and durable chemical bond. Initially, CeraResin Bond 1 was applied to prime the surface (Figure 3). After 10 seconds CeraResin Bond 2 was added, left undisturbed for 10 seconds, and subsequently light-cured for 20 seconds.

All restorations were internally characterized with LiteArt Stain System which ideally bonds to resins, composites, acrylic, and PMMA structures. Novel multifunctional micro-monomers and photo-initiators incorporated into the LiteArt together with a broad shade selection allow the technicians to emulate the natural dentition's optical properties of light diffusion and anisotropy by adjusting the chroma, value, and hue. A low viscosity of the LiteArt enables for a precise application of the stains which can also be diluted with LiteArt





Clear Liquid to soften the colors and to create a myriad of other optical illusions (Figure 4 a & b).

The “Innocence” Restoration

The “Innocence” restoration was individualized with the LiteArt stains in orange, pink*, ivory*, white, and cyan. Orange was applied to the cervical, lingual cingulum, and interproximal areas to accentuate the chroma. Pink was utilized on the center of the mamelons to bring out the internal colors and to create the opal effect as first described by a world-renowned master technician, Makoto Yamamoto in his book “Principals of Metal Ceramics,” in a chapter referring to “Light and Opalescence.” Ivory and white were painted on the mesial and distal of the mamelons. Cyan was added to the mamelons’ walls to create the effect of translucency. Solidilite V light-curing unit (Shofu Dental) was employed to polymerize the restoration for 1 minute.

Indicated for a wide array of applications, including highly aesthetic anterior and posterior restorations that require long-term durability, an indirect flowable composite, Ceramage, was applied with a small, flat brush to enhance the translucency, to create the depth and space, and to shield the restoration from damages. For the mamelons and difficult-to-reach areas, Ceramage F-T-Glass was applied and overlaid with Ceramage 57 Incisal (Figure 5). The unit was light-cured for 3 minutes.



The “Mature” Restoration

The “Mature” restoration was characterized with the LiteArt stains in orange and orange brown, khaki, ivory*, white, and cyan. To color-adjust the cervical area and to enhance the dentin shade, diluted orange brown and khaki were painted to the surface of the crown. Ivory with a mix of white was applied on the mesial and distal of the mamelons to create an illusion of the depth. Orange was painted on the center of the mamelons. Cyan was added to enforce the effect of translucency. Orange and orange brown were painted on the lingual and interproximal areas. The final process was similar to the steps undertaken to achieve the “Innocence” crown but, this time, the unit was overlaid with Ceramage 58 Incisal (Figure 6).

The “Wisdom” Restoration

The “Wisdom” restoration was characterized with the LiteArt stains in orange brown, khaki, white, ivory*, violet, cyan, blue*, and blue gray.

Orange brown and khaki were applied on the cervical area and thru the 1/2 part of the crown, on the lingual surface and interproximal areas to emulate the attrition wear. White was added to mimic the crack lines, decalcified horizontal bands, and white spots. Ivory was painted to the mesial and distal of the mamelons along with violet to give an illusion of the depth and also to lower the chroma. Orange brown



was layered onto the center of the mamelons. Cyan, blue, and blue gray were added to the areas where the translucency effect needed to be intensified. The final process was similar to the steps undertaken to achieve the “Innocence” and “Mature” crowns but, this time, the unit was overlaid with Ceramage 59 Incisal (Figure 7).

Minimal contouring to finesse the anatomy and surface texture of all restorations was performed using a Dura-Green Stone (Shofu Dental) and a diamond bur. CompoMaster (Shofu Dental), a two-step abrasive system, was implemented to finish and pre-polish the restorations. Final polishing was conducted with a bristle brush impregnated with a Dura-Polish Polishing Paste (Shofu Dental). The artistic glossy look was achieved with a felt wheel and a Dura-Polish Dia Polishing Paste (Shofu Dental) (Figure 8).

Conclusion

Based on the performed work, it can be inferred that HC Block, LiteArt Stain System, and Ceramage can complement each other for a broad variety of indirect uses, including long-term transitional restorations and permanent anterior/posterior restorations for inlays/onlays, full-contour crowns, and implant-supported cases (Figure 9). By incorporating these materials, the entire laboratory process inclusive of milling, staining, glazing, finishing and polishing of the restorations was successfully accomplished in an efficient manner, resulting in final restorations that are both functional and highly aesthetic.

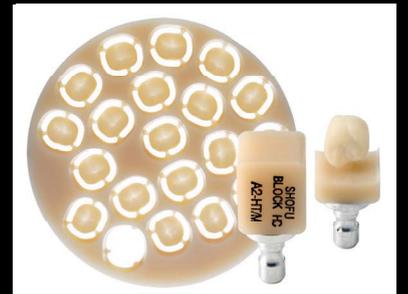
Conclusively, the selected tools also provided the dental laboratory technician with a stage to showcase his creativity and artistry. With a novel CAD/CAM hybrid-ceramic indirect restorative (HC Block) and an assortment of stains (LiteArt) and translucencies (Ceramage), the technician was able to transform the artificial canvas to reproduce the beauty of natural dentition at different seasons of life, including the “Innocence,” “Maturity,” and “Wisdom.” ■

* Custom-made stain, based on the LiteArt shade chart provided by the manufacturer



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