Using in-office CAD/CAM technology and lithium disilicate to fabricate efficient and predictable restorations

mCME articles in Dental Tribune have been approved by HAAD as having educational content for CME credit hours. This article has been approved for 2 CME credit hours.

By Author John C. Schwartz, DDS

In today’s fast-paced world, instant gratification is expected to be synonymous with worthwhile results. This applies also to dental treatments. While there have been many recent technological innovations specifically for chairside restorations, dentists have faced complications when mastering complex and time-consuming protocols.

The E4D Dentist System™ (D4D Technologies) eliminates those obstacles by providing outstanding clinical results in a single visit using intuitive, efficient and state-of-the-art technologies. The E4D Dentist System’s three-dimensional software simplifies designing and milling multiple restorations. This provides dentists with more control over the esthetic process.

The E4D in-office CAD/CAM system is equipped with a high-speed intraoral laser scanner for capturing digital impressions, which provides restorations with better-quality fit and function because it incorporates intraoral digital impressions, traditional impressions and models.

The E4D Dentist System streamlines work for dentists who gain the enhanced confidence of producing reliable restorations for every patient case. Meanwhile, patients receive faster treatment times.

Contributing to efficiency and accuracy is the E4D design software, which facilitates required modifications to finalize restorative designs in record time.

Restorative designs are then sent to the E4D pre-cision milling unit, which incorporates dual spindles and diamond burs to efficiently form CAD materials into restorations that exhibit exceptional fit, maximal strength and lifelike esthetics. In fact, restorations fabricated using CAD/CAM processing have demonstrated less chipping or fracturing, which enhances the predictability of the restoration.

Among the materials that can be processed chair-side with the E4D Dentist System is lithium disilicate (IPS e max CAD, Ivoclar Vivadent), which is available for processing CAD/CAM restorations indicated for placement in the anterior and posterior.

The material is also indicated for an assortment of dental procedures, including partial and full coverage inlays and onlays, thin veneers (0.3 mm) and implant superstructures. Lithium-disilicate glass ceramic trumps traditional ceramic materials because of its durability and high flexural strength values.

Case presentation

A 55-year-old woman presented requesting re-moval of the maxillary left bicuspid and molar crowns. Their unsightly margins and gold crowns were visible in her smile (Figs. 1, 2), and the patient had grown weary of their unsettling and lackluster appearance. Her goal was to whiten her dull-looking teeth in order to reflect the brighter color of her natural anterior dentition. In-office CAD/CAM restorations (IPS e max CAD) were discussed with and agreed to by the patient. The optical qualities of IPS e max CAD, which include a fairly low refractive index, optimal light transmission and lifelike translucency, would provide natural-appearing and highly esthetic restorations.

Fig. 1 A preoperative, buccal view of the patient’s unsatisfactory gold restorations. (Photos/Provided by Dr. John C. Schwartz)

Fig. 2 Preoperative occlusal view of the patient’s unsatisfactory restorations.

Fig. 3 Line of the patient’s prepared tooth with margins identified.

Fig. 4 View of the CAD proposal created utilizing Autogenesis.

Fig. 5 Buccal view of the CAD proposals.

Fig. 6 Optimization of CAD proposal to account for occlusion and contact pressures.

Fig. 7 Optimization of CAD proposal with model and occlusion in place.

Fig. 8 The preparations are cleaned and three drops each of Multilink A&B solution are mixed in a well.

Fig. 9 The Monobond Plus Primer was applied with a microbrush for 60 seconds.

Fig. 10 Ceramic Etching Gel is applied for 20 seconds, rinsed with water and dried. In preparation for salinating using Monobond Plus primer.

Fig. 11 A preoperative, buccal view of the patient’s unsatisfactory restorations.

Fig. 12 The preparations are cleaned and three drops each of Multilink A&B solution are mixed in a well.

Fig. 13 Setting time varied on the basis of the bonding system used, using the E4D Dentist System’s three-dimensional software to simplify the design and milling of multiple restorations.

Case presentation

A 55-year-old woman presented requesting re-moval of the maxillary left bicuspid and molar crowns. Their unsightly margins and gold crowns were visible in her smile (Figs. 1, 2), and the patient had grown weary of their unsettling and lackluster appearance. Her goal was to whiten her dull-looking teeth in order to reflect the brighter color of her natural anterior dentition. In-office CAD/CAM restorations (IPS e max CAD) were discussed with and agreed to by the patient. The optical qualities of IPS e max CAD, which include a fairly low refractive index, optimal light transmission and lifelike translucency, would provide natural-appearing and highly esthetic restorations.
When milled from highly aesthetic lithium-disilicate blocks (IPS e.max CAD), the restorations enable dentists to provide exceptional treatments tailored to the patient’s authentic aesthetic characteristics.

**References**


**Preparation and digital impression-taking**

The existing crown restorations were removed and the teeth were prepared for IPS e.max CAD crowns. Preparations included a 2 mm occlusal re-duction and a 1–1.2 mm shallowed margin. A scan was performed of the patient’s arch and prepared teeth, and the margins were identified (Fig. 3).

**Digital restoration creation**

The autogenesis feature in the E4D DentacLogiQue intuitive software was used in conjunction with E4D CAD proposals (Fig. 4), which incorporated images of the buccal and occlusal aspects (Figs. 5, 6) and contact intensity (Fig. 7).

The restorations were designed and then sent to the E4D milling unit where lithium-disilicate high-translucent (HT) blocks (IPS e.max) were milled. After completion, the monophasic crowns were first tried in the patient’s mouth to appraise fit, contour and anatomical harmony, then crystallized.

**Customization**

The restorations were removed from the furnace, then cleaned and dried. To fulfill the patient’s desired goal of having a more natural colored smile, the restorations were appropriately stained and glazed. The ideal shade stain was placed on the tip of a hygienic brush and applied to the restorations.

Once staining was complete, the crowns were fully crystallized and fired. The case was ready for seating using universal cement (Multilink, Ivoclar Vivadent).

**Cementation**

Lithium-disilicate glass ceramic restorations (IPS e.max CAD) can be traditionally cemented or bonded adhesively. As a result, any restrictions that may be presented due to placement or location within the mouth are eliminated. The internal aspects of the crowns were cleaned with Ivoclean and etched with Ceramic Etching Gel. The Ceramic Etching Gel was applied for 20 seconds, rinsed with water, dried in preparation for silica-nating using the Monobond Plus Primer (Fig. 9). The Monobond Plus Primer was applied with a microbrush for 60 seconds to the internal surfaces of the restorations to ensure a sound bond between the restorations and cement, as well as increase bond strength (Fig. 10). Excess primer was air dried.

The solution was then applied to the prepared teeth and allowed to sit for 40 seconds. The Multilink A&B solution (Fig. 11) was air blown gently to remove excess cement. The ideal shade stain was placed on the patient’s desired goal of having a more natural colored smile, the restorations enable dentists to provide excellent treatments tailored to the patient’s authentic aesthetic characteristics. The restorations were sent to the E4D milling unit, where lithium-disilicate high-translucent (HT) blocks (IPS e.max) were milled. After completion, the monophasic crowns were first tried in the patient’s mouth to appraise fit, contour and anatomical harmony, then crystallized.

Once staining was complete, the crowns were fully crystallized and fired. The case was ready for seating using universal cement (Multilink, Ivoclar Vivadent).