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Capturing Digital Impressions for a Large-Scale Veneer Case

The ability to use the digital scanner for large cases is a significant help in the operatory.

By John F. Weston, DDS, FAACD

Since the introduction of digital impression systems, the dental community has waited to observe the initial success of existing systems and the advances in this exciting technology. This “wait and see” approach is understandable, given the radical change these systems introduce to the impression-taking process. Today, the expanded indications and utility of these devices make them valuable tools in the dental office and worth a new evaluation.

The two main devices currently on the market are the 3M™ ESPE™ Lava™ Chairside Oral Scanner C.O.S. (3M ESPE, www.3mespe.com) and the iTero™ (Cadent, www.cadentinc.com). The author has worked with the 3M ESPE system for approximately 2 years, and has found it to be a powerful technology. The Lava C.O.S. works by capturing a digital video image of the patient’s mouth via an intraoral wand. As the image is being scanned, it is displayed in real time on a chairside monitor, allowing the clinician to immediately assess whether the necessary data has been captured. The full-arch scanning capabilities of the device make it particularly helpful. To capture a full-arch scan, the clinician simply scans one sextant at a time, overlapping a common tooth for the system to merge the scans together.

Data on the system has shown positive results. Compared with restorations created with traditional impression materials, those made with the Lava C.O.S. have exhibited a better overall fit,1 so much so that the rate of remakes due to marginal fit for these restorations is 80% below the industry average.2 Crowns made with a digital scan have also been found to show a greater number of accurate interproximal contacts, better fit and stability, better margins, and more precise occlusion than those created from traditional methods.1 The excellent fit established using the Lava C.O.S. has resulted in seating times for single-unit crowns that average 41% faster than those made with traditional methods.[3]

The models created with this digital scanning system are fabricated via an automated stereolithography (SLA) process. Research on these models has found that their accuracy is as good as models constructed from a traditional VPS material.[4,5] Resin models are also much more durable than stone models, and less susceptible to breakage or degradation.

While the device was not initially indicated for veneers, the technology has grown to encompass this procedure, as is demonstrated by the following case.

Case Presentations

The patient, a 50-year-old man, presented with minor crowding in both arches as well as incisal wear and disharmony in the smile line (Figure 1 and Figure 2). The patient was initially referred to an orthodontist to discuss treatment options, but declined traditional orthodontics, as he wanted his smile repaired as soon as possible. It was determined that 16 veneers could be placed to meet the goals of the patient: 10 on the upper arch (teeth Nos. 4 through 13), and six on the lower arch (teeth Nos. 22 through 27).

X-rays and preoperative photos were captured, as well as preoperative models, bite records, and a facebow transfer (Figure 3). At the same visit, a smile design and mockup were performed. 3M™ ESPE™ Filtek™ Supreme Plus Flowable Restorative was applied and cured first to teeth Nos. 8 and 9 to establish ideal incisal edge position. Once this had been established, the rest of the smile could be extrapolated. A photograph was taken and shown to the patient to gain approval of the design (Figure 4).

The mockup was recorded with impression material in order to create a provisional matrix, and reduction guides were made using bite registration material. The composite was then removed and the patient was dismissed, scheduled to return a week later for preparation and final impressions.


Figure 1


Figure 2


Figure 3


Figure 4


Figure 5


Figure 6


Figure 7


Figure 8

On preparation day, the preparation guides were used to carefully reduce each tooth by the proper amount. A soft-tissue putty retraction material was applied to the tissue interface, and the teeth were washed and air-dried. A light dusting of contrast powder was applied to all teeth, and a light stream of air was again blown to remove any powder from within the sulcus (Figure 5).

The Lava C.O.S. was then used to capture impressions of the teeth in overlapping sections of six at a time. The patient was instructed to bite into centric occlusion, and the bite record was digitally recorded. The scan was then reviewed to confirm that the margins had been captured adequately. Direct lock-on provisionals were then built using the impression of the mockup that was taken previously (Figure 6). Gluma® desensitizer (Heraeus, www.heraeus-dental-us.com) and 3M™ ESPE™ Adper™ Single Bond Plus Adhesive were applied to the preparations, and the impression was filled with 3M™ ESPE™ Protemp™ Plus Temporization Material. The impression was seated tightly over the preparations for 4 minutes, removed, and the excess material was trimmed away (Figure 7). The Protemp Plus was polished in place with an impregnated medium rubber polishing cup.

A laboratory prescription for the veneers was completed on the touch screen monitor and e-mailed to the laboratory, and the patient was dismissed with written instructions. After the laboratory work was complete, the case was delivered to the dental office with the restorations etched internally and ready to be delivered (Figure 8). At the delivery appointment, the provisionals were removed and the teeth were thoroughly disinfected. A rubber dam was placed to isolate the teeth and the veneers were tried in “dry” to verify fit, which proved to be excellent. After the teeth were etched with 35% phosphoric acid, Gluma was again placed as a desensitizer, followed by 3M™ ESPE™ Adper™ Scotchbond™ Multi-Purpose primer and the light-cure adhesive. A ceramic primer was applied to the intaglio surface of the veneers followed by a layer of light-cured resin. The veneers were luted to the teeth using 3M™ ESPE™ RelyX™ Veneer Cement, in the translucent shade. Teeth Nos. 8 and 9 were seated first, followed by teeth Nos. 7 and 10, continuing outward in the same fashion until all 10 maxillary veneers were seated. The same technique was used for delivery of the lower restorations.

The majority of the excess cement was removed and the veneers were then spot-tacked for 1 second at the margin with a 2-mm light-curing tip. Additional interproximal cleanup was performed, and the final cure was done by holding one 3M™ ESPE™ Elipar™ S10 LED Curing Light simultaneously on each side of the teeth for 20 seconds using glycerin gel as an oxygen barrier along the margins.

Excess cement was cleaned away with a blade, and Brasseler diamond finishing strips (www.brasselerusa.com) were used to finish the interproximal surfaces. Very minor occlusal adjustments were performed and the lingual surfaces were polished with fine diamonds and rubber polishing tips. An impression was taken for a bite guard and the patient was asked to return in 1 week. At the follow-up appointment, the bite guard was delivered and postoperative photographs were taken (Figure 9 and Figure 10).

The patient was very satisfied with the final result and stated that he had never imagined his teeth could look so straight without undergoing orthodontic treatment. He was also pleased that the treatment did not require significant removal of tooth structure.

Figure 8

Figure 9

Figure 10

Discussion

The ability to use the digital scanner for large cases such as this is a significant help in the operatory. In addition to many smile design veneer cases, the author has used the system for cases in which all of the teeth in the arch were prepared, and has completed more than 300 scans while seating more than 500 restorations made via Lava C.O.S. digital impression technology.

The efficiency and accuracy enabled by the digital scanner brings benefits to both the dentist and the patient. The typical time needed to capture a scan of a preparation, the opposing dentition, and the bite registration averages less than 3 minutes when using a digital scanner. Additionally, the assurance the clinician receives from being able to confirm the scan has captured all of the necessary data is quite valuable. At the delivery appointment, the consistently accurate fit of restorations created with the scanner has reduced the author’s average delivery time by approximately 40%, allowing for reduced stress and greater efficiency in the office flow.

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