Mill In or Send Out?

by Paul Caselle, DDS

Dr. Paul Caselle completed his undergraduate studies in biology at Boston University College of Arts & Sciences, then went on to New York University College of Dentistry to attain his DDS degree. After graduation, Dr. Caselle completed a residency program in family dentistry at the Forsyth Institute in Boston. He opened his dental practice in Wilmington, Massachusetts, and has been providing the community with exceptional, family-oriented dental care ever since.

Short course description

This course details how digital impressions can be used for more than just the in-office milling of crowns. It will explore other uses for digital impressions that are most appropriate for lab fabrication.

Abstract

The challenges of obtaining traditional impressions that can affect the quality of the lab fabrication prosthesis include tooth position, patient tolerance for the material, and distortion of impression material because of technique or environmental factors.

Digital imaging can eliminate these factors, resulting in a more accurate prosthesis, which reduces chair time and increases efficiency since remakes are reduced. The ability to create a digital image with a capture device that can later be coupled with a milling unit allows the dentist the ultimate in versatility—the ability to provide "now" dentistry for routine one or two units. This provides a valuable service to patients while maintaining the flexibility of using a lab for more extensive restorative procedures.

This course will give the dentist a better perspective on how this technology can be a good fit for his or her office.

Learning objectives

After reading this article, the participant should understand the following:

1. Why digital impressions can be a viable alternative to traditional impression techniques and materials.
2. What is required for obtaining an accurate digital impression.
3. When digital impressions can be used to assist in lab-fabricated prosthesis vs. an in-office restoration.
4. The different types of isolation that aid in efficient digital impression taking.
5. How the digital workflow simplifies lab communication.

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Introduction

As a business owner, my constant objective is to make dentistry easier, more predictable and more profitable. As a result, I invested in CEREC technology in 2001, because it gave me the ability to control the entire restorative process to ensure a great patient experience and while feeling confident that I will consistently achieve a great result.

Performing "now" dentistry was just as important then and is even more important now because of our highly mobile society. More dentists are starting to realize the benefits of digital impressions: no messy impressions to gag patients; the ability to evaluate a scan and correct deficiencies in real time, saving the dreaded second or third impression; and getting well-fitting restorations.[1]

The issue of investing in a CAD/CAM system that allows chairside fabrication of crowns, veneers, bridges, onlays and inlays is debatable—however, chairside milling does offer increased profitability, because of no second visits and reduced lab costs.[2] It is one of the most cost-effective technologies that a dentist can incorporate into the office, resulting in a tremendous return on investment.

The issue for the dentist is the level of commitment required to learn the technology and use it whenever appropriate.

Case study No. 1

As a longtime user of CAD/CAM dentistry who does all single units chairside, I've learned that there are times when using a lab is necessary and desirable.

Consider a 59-year-old patient who presents with an old five-unit porcelain-to-metal bridge from tooth #32 to #28, with decay at the margins of the crowns. Although it is possible to fabricate the bridge on-site, it would require additional equipment and considerable time and work to fabricate a zirconium framework and/or an overlay porcelain layer.[3] It would not be cost-effective or a good use of time for most dental offices to do this amount of work unless a laboratory technician is on-site.

The patient's medical history was unremarkable except for high blood pressure. The patient takes lorazepam before dental visits for anxiety. Before starting the case, a detailed consent form outlining the risks of treatment was given to—and reviewed with—the patient. She was informed of the possibility of root-canal therapy because of leakage and extensive decay, because the bridge had been cemented with only temporary cement by a previous dentist.

During the first visit, local anesthesia was administered, an Isodry was inserted and the old bridge was removed, followed by excavation of decay, resulting in carious exposure of teeth #31 and #28. A sedative dressing was placed and a temporary bridge fabricated and cemented with NexTemp temporary cement. The patient was referred to an endodontist for treatment because of canal morphology.

The patient returned once root-canal therapy was completed, and posts and cores were placed on teeth #31 and #28 using Unicore posts. The posts were cemented and core buildups were placed using 38 percent phosphoric acid, Prime & Bond self-activating bonding agent and DC core dual cure resin.

The teeth were re-prepped with a rounded-shoulder preparation, and excessive gingival tissue was removed using the Epic Diode Laser 1.4 watts CP2 mode to expose gingival margins. GingiPak retraction cord was used to keep all prepped areas clean and free of debris while scanning.[4]

The entire arch, opposing arch and a bite registration were scanned using CEREC Connect software and the OmniCam by Sirona (Figs. 1-3). Trying to obtain an accurate full-arch impression in this case using traditional impression material would have been a challenge because of the position


Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5

Disclosure:
The author declares that neither he nor any member of his family has a financial arrangement or affiliation with any corporate organization offering financial support or grant monies for this continuing dental education program.

of the teeth and patient's anxiety of having the mouth full of impression material.

The ability to digitally capture the tooth preparations made the process considerably easier for both patient and dentist. In a case of this size, it was important to digitally capture teeth to at least the left canine on both the upper and lower jaws to ensure accuracy. The margins were drawn on all the abutment teeth (Fig. 4, pg. 107), the prescription was completed (Fig. 5, pg. 107), and the case was sent to the lab electronically.

When the case returned from the lab, the patient was given local anesthetic and the bridge was tried in and bite adjusted. The patient signed a case satisfaction form and the bridge was bonded to the teeth. The intaglio surfaces were cleaned with Ivoclean and treated with MonoBond Plus.[5] The abutment teeth were cleaned with Conspesis and etched with 38 percent phosphoric acid followed by Multilink bonding agent and Multilink resin cement. Post-cementation X-rays (Figs. 6 and 7) confirm no excess cement and the excellent fit of the restorations.


Fig. 6

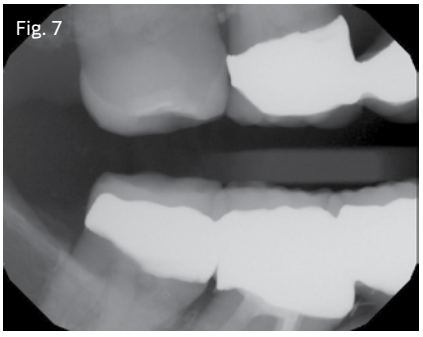
Fig. 7

The digital workflow in both cases were streamlined in that all digital information—including scans of the prepared teeth, opposing arch and bite, as well as all supporting information—was submitted in the same prescription.

Case study No. 2

In another case, a 50-year-old male presented with four anterior teeth with porcelain-to-metal crowns and very long teeth as a result of full-mouth periodontal surgery.

The patient was not interested in an extensive reconstruction, and wanted to replace the old crowns that had exposed metal margins and dark roots because of root-canal therapy and cast metal posts. The challenges for in-office milling in this case were the number of units and the dark shade of the teeth. Would it be possible to mask out the dark shade with the material available in the office?

It was decided to do a diagnostic wax-up and fabricate temporary crowns based on the wax-up. The patient could see the proposed result before final crown fabrication. The shade of the lower incisor teeth was taken with the Vita EasyShade. A photograph was taken with the corresponding shade guides (Fig. 8).

At the start of treatment, the patient reviewed and signed a crown and bridge consent form. He was administered local anesthetic and OptraGate was placed to allow for easy access. The old crowns were removed and any resulting voids were filled in using an opaque multilink. A GingiPak retraction cord was placed into the sulcus to provide a clear image for scanning. CEREC Connect software and the OmniCam were used to scan the prepared teeth, the opposing arch, and bite (Fig. 9). The crown margins were drawn on the model (Fig. 10) and the lab prescription was filled out. The temporary crowns were relined with acrylic and cemented with Vaseline and NexTemp temporary cement to allow for easy removal.

Since the patient was happy with the esthetics of the temporary crowns (Fig. 11), a scan of the temporary crowns was made and a photograph was taken using a Rebel XS Canon camera with ring flash.

The lab prescription was submitted electronically with the case. The technician was told to copy the design of the temporary crowns, to use the photograph of the teeth with shade guides, and to use the EasyShade mapping to arrive at an acceptable shade. It was decided it was best to use a layered zirconium crown to restore the teeth, because it could best mask out the dark shade of the teeth while providing acceptable esthetic results.

The case was returned, tried in and approved by the patient, who signed a patient satisfaction form authorizing final cementation. OptraGate was placed and the crowns were bonded in using the same process outlined in the above-mentioned case.

The digital workflow in both cases were streamlined in that all digital information—including scans of the prepared teeth, opposing arch and bite, as well as all supporting information—was submitted in the same prescription.[6] The entire digital file is sent to the laboratory, which can begin work on the restoration immediately because these cases are produced without models.[7]

If you are using CEREC, some labs may request a model from Infinident, a Sirona company—however, these models should be used only to check contacts and assist in stacking porcelain. Before sending a case to the lab, it's important to have a conversation with the lab tech about the digital workflow and how it relates to the scanner you are using.

Digital use in orthodontics

Digital impressions are moving beyond traditional crown and bridge scans and are

utilized in the orthodontic world. Invisalign has been accepting digital impressions from Itero and 3M True Definition scanners and now has the ability to accept scans from CEREC.

I recently had a 55-year-old female patient interested in Invisalign. I was able to scan the entire mouth in approximately the same amount of time it would have taken me to do a putty-wash impression.

In this case, I used the Premier ComfortView Lip and Cheek Retractor to fully retract the lips and cheeks. The scan (Figs. 12-14) was completed using the new Ortho Connect software and OmniCam. The scan was uploaded to CEREC connect portal, and Invisalign was selected as the recipient of the scan. The necessary photographs were taken; however, photographs were uploaded to the Align Technology website directly along with the prescription.

The days of traditional impressions are on the decline, along with all the inherent problems of impression materials.[8] There are several companies making scanners, and there are others that have the capability of not only scanning, but also allowing for chairside milling of restorations.[9] The challenge for the practice owner will be deciding which manufacturer can offer the best solution to meet current and future needs. Consider the flexibility of a machine that can not only digitally scan, but also allow the flexibility to do chairside milling. Advances in materials, processing, and milling capabilities will continue to expand to all types of prosthetics.[10]


Fig. 8


Fig. 9


Fig. 10


Fig. 11


Fig. 12


Fig. 13


Fig. 14

Conclusion

The Digital Age has arrived in the dental industry, and as CAD/CAM technology continues to evolve, it will give dentists the tools to provide efficient and exceptional care to their patients while giving the business an excellent return on investment.[11]

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1. The advantages of CAD/CAM dentistry are the following:
- A) Single visit
- B) No gagging on impressions
- C) Ability to use various materials for fabrication of prosthetics
- D) A and B only
- E) All of the above

2. Digital imaging is useful in cases when:
- A) Teeth are tilted or rotated
- B) Patient is anxious
- C) A or B
- D) None of the above

3. Digital imaging can be used only to aid in the fabrication of crowns.
- A) True
- B) False

4. Dental imaging requires the following:
- A) Isolation to avoid capture of extraneous data
- B) A dry or slightly moist field
- C) Capture of adequate number of unprepared teeth
- D) A and C
- E) All of the above

5. When using CAD/CAM technology to fabricate restorations, the following is required:
- A) A physical model
- B) Bite registration
- C) Lab fabrication
- D) A and B

6. Effective isolation can best be achieved by one of the following:
- A) Isodry
- B) OptraGate
- C) Premier Comfortview Lip and Cheek retractor
- D) All of the above

7. The primary reason to use digital impressions is to save money.
- A) True
- B) False

8. Digital capture allows the following:
- A) Ability to correct deficiencies in tooth preparation
- B) Save time
- C) More accuracy
- D) A and B
- E) All of the above

9. Digital imaging can be used to:
- A) Fabricate orthodontic aligners
- B) Fixed bridges
- C) Models
- D) All of the above
- E) A and B

10. The decision to mill a restoration in-office or to send the case to a lab is based on the following:
- A) Number of units involved
- B) Type of material to be used
- C) A and B
- D) None of the above

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