

CAD/CAM

the international magazine of digital dentistry

3²⁰¹⁶

clinical case study

The single-visit
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Clint D. Stevens, DDS

When the "horseless carriage" was introduced to the general public in the 1800s, the view of the majority was that the horse and buggy would never be replaced. As the Industrial Revolution progressed, the modern automobile proved the "nay-sayers" wrong, as we're all aware! In today's Digital Revolution, we see similar resistance to digitization in dentistry:

"Dental educators and practicing dentists have, at times, been slow to respond to advances in dental materials and techniques. Operative dentistry, in particular, has often been influenced more by history and tradition than by science."

Many dentists continue to be hesitant regarding digital impression systems and the use of CAD/CAM technology, in spite of substantial research, literature and empirical clinical success supporting its efficacy, accuracy and cost-effectiveness. Meanwhile, our continued reliance on full-coverage restorations as the go-to treatment option for treating damaged and/or diseased teeth is antiquated, given the significant advances made in dental adhesion and restorative materials.

While it's understandable why we got stuck in these paradigms, it's high time we work on changing them. I think we can all agree that we want restorative treatment to be predictable, long lasting and able to meet patient expectations while avoiding creating bigger problems for patients in the future. To best achieve these goals, we should be doing adhesive dentistry, and we should be doing it digitally.

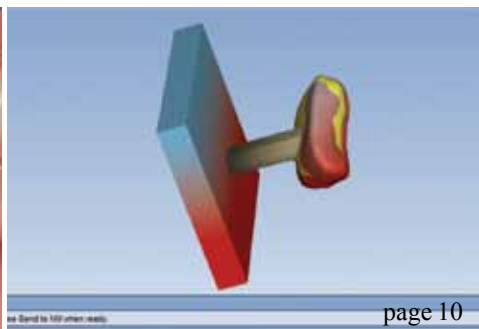
Digital impressioning gives clinicians accuracy and a much better view of their preparation than they would ever have otherwise, resulting in one of the most critical factors for long-term restorative success: a quality preparation. Utilizing digital workflows and chairside CAD/CAM significantly shortens treatment completion times, as well as minimizes and in many cases eliminates complications because of provisionalization.

As you'll see in this edition of *CAD/CAM*, digital workflows are ever expanding and constantly improving yet, at the same time, simplifying the delivery of the highest quality care for our patients. While implementing these changes in your practice can be a daunting proposition, you'll see that implementation has never been easier, and there has never been a better time to go digital in dentistry. I encourage you to embrace the change and help lead our profession into a new era!

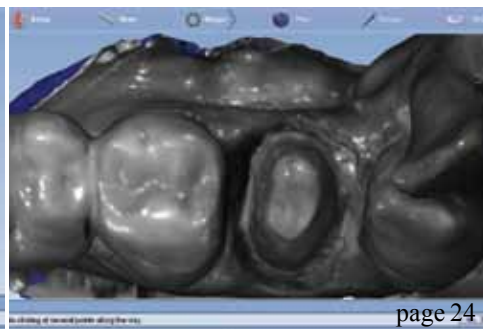
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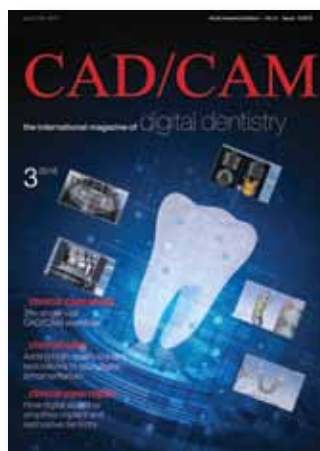
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The use of two digital impression STL files to simplify the **single-visit CAD/CAM workflow** for multiple ceramic restorations: A case study

Authors_James M. Stein, DMD and Brett E. Stein, DMD

_Introduction

The influence of digital dentistry reaches beyond clinical treatment to the patient as a consumer of our service. The "Age of the Internet" has brought an increased demand for instant results and an evolved element of impatience for the practitioner to manage.

Any patient's targeted online search will inform him or her that CAD/CAM dentistry may provide a single-visit solution to the traditional multiple visit process,¹ which is many times coupled with seductive digital proposals.

The multiple visit norm with provisional restorations may induce limitations of function, comfort and perhaps a less than optimal appearance for weeks. The single-visit solution can eliminate many of the steps that dissuade the patient from committing to treatment.

Furthermore, when elective treatment is sought primarily to make an appearance related change in the esthetic zone, traditionally the laboratory technician has no in-person contact with the patient. The following patient treatment example offers a rationale and method to provide anterior milled ceramic restorations in a single visit. The emphasis will be on using a dual STL file method for an efficient workflow and restoration accuracy.

_Patient selection for single-visit milled restorations in the anterior sextant

Patient selection may be the most critical element in providing four or more single-visit milled ceramic restorations in the esthetic zone. When selecting a patient, a match between the dentist's esthetic evaluation and the patient's expectations is the primary

Fig. 1_Pre-treatment full smile.

Fig. 2_Pre-treatment retracted, frontal view.

(Photos/Provided by
James M. Stein, DMD)



Fig. 1



Fig. 2



Fig. 3 Pre-treatment radiographs of maxillary anterior teeth. Note the large composite restorations, the root taper and the distance from the contact areas to the crest of bone as it relates to the loss of the gingival papilla.

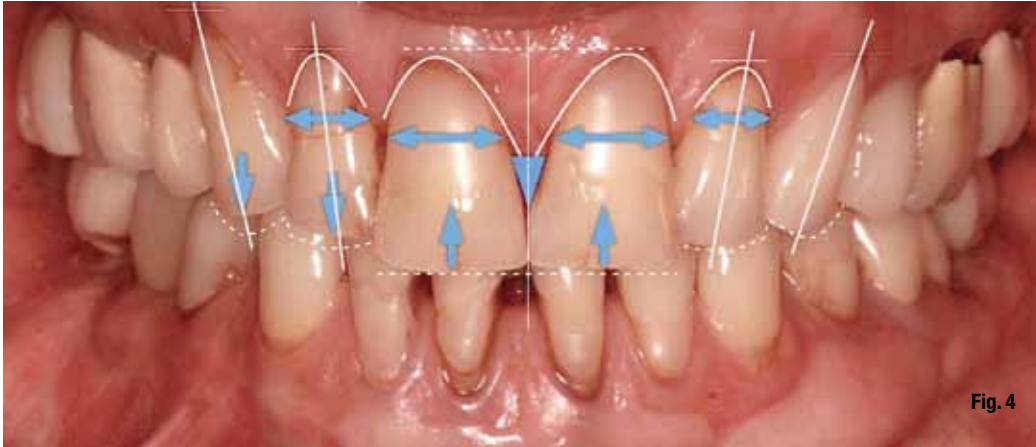


Fig. 4 A digital treatment plan analysis serves to identify and document all of the patient's concerns and document the specific goals of treatment.



Fig. 5 Pre-treatment intra-oral digital impression scan.

factor to consider (Fig. 1). Secondly, the patient must have the stamina to partner in what may become a five-hour creative process.

In this single case, the 70-year-old female patient presented with concerns about her maxillary anterior teeth #6-10. Specifically, she did not like the overall color, form and spaces between the teeth where the papillae had receded. Considering the health of the periodontium, there was no evidence of active disease and no patient awareness or concerns about the asymmetry in the position of the gingival margins.

However, in the esthetic zone there did exist generalized, mild loss of interdental papillae, multiple failing and/or unesthetic composite restorations, wear and stains (Fig. 2). The evaluation of the clinical and radiographic size of these restorations reinforced the plan for complete coverage restorations (Fig. 3). These observations were in line with the patient's concerns. Clinical findings and proposed treatment options were discussed and digitally il-

lustrated. The patient agreed to restore teeth #6-10 with full contour crowns (Fig. 4).

Treatment considerations and digital workflow

When beginning the single-visit CAD/CAM procedure for multiple restorations, an organized workflow will reduce treatment time and increase the patient's satisfaction with the experience. An intimate knowledge of the intraoral scanner, design software and mill capabilities is required.² A pre-treatment scan of the existing teeth and/or a diagnostic wax-up (analog or digital) will save time in the design phase (Fig. 5).

In this case, the large composite resin restorations on the facial cervical surface of #6-10 were supragingival, and there was no visible sign of recurrent caries extending beneath the gingival crest to necessitate the placement of preparation margins deep within the sulcus.

Fig. 6 Tooth preparations for teeth #6–10 full contour, single unit e.max FDPs using a single-visit CAD/CAM procedure. Care was exercised to avoid damaging the gingival tissues as bleeding may prevent an accurate digital impression scan.

Figs. 7a, 7b Dividing the digital impression of the five teeth into two scan files results in a more efficient use of treatment time.

Fig 7a: An occlusal view of #7–10 tooth preparations. Fig. 7b: The scan of #6 tooth preparation using #7–10 seated in lithium monosilicate phase as landmarks.

Figs. 8a, 8b Digital restoration design of tooth #7–10.

Fig. 8a: To achieve a balanced esthetic appearance, the restorations should have a similar facial thickness of ceramic material on each central and lateral tooth where possible.

Fig. 8b: Tooth preparation should be completed with restoration thickness in mind.



Fig. 6



Fig. 7a



Fig. 7b

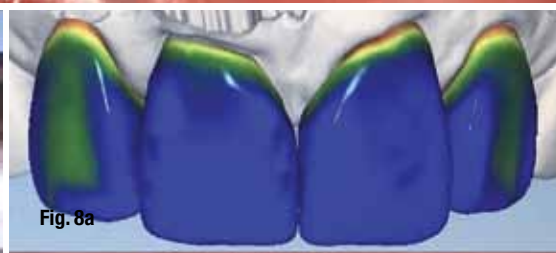


Fig. 8a



Fig. 8b

_about the author CAD/CAM



James M. Stein, DMD, left, maintains a private practice in Boston, Mass. He has been featured in TV, radio and print media for his work with single-visit CAD/CAM ceramic crowns and veneers. He has published and lectured internationally on prosthodontics, implantology, cosmetics and CAD/CAM technology and has completed extensive clinical, surgical and technical training. He has been serving the Boston community through his private dental practice for 30 years.

Brett E. Stein, DMD, completed his undergraduate education at Bowdoin College where he graduated with a BA in biology in 2012. In 2016, he received his DMD from the University of Pennsylvania School of Dental Medicine, graduating with honors in clinical dentistry. He is currently completing his post-doctoral specialty training in the prosthodontics residency program at the Harvard School of Dental Medicine.

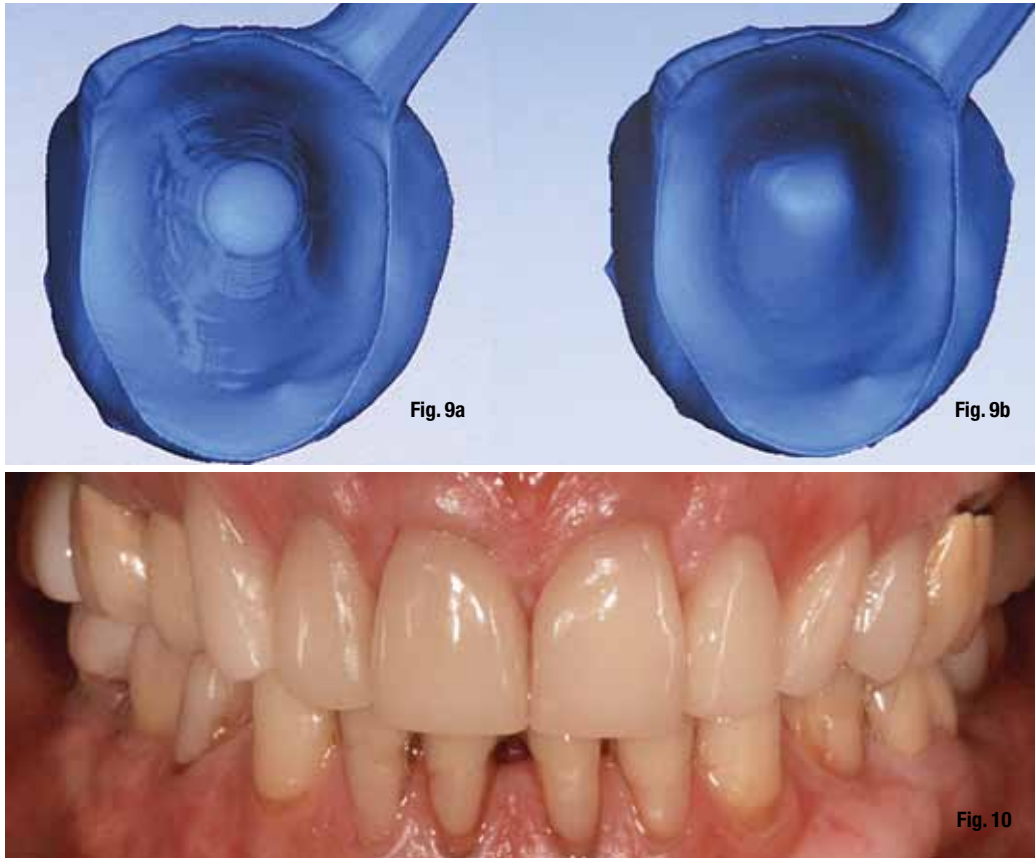
Margins placed deeply subgingival are not only an inflammatory irritant to the attachment apparatus³ but are difficult to scan due to both fluid and tissue deflection issues (Fig. 6). When the practitioner presents the option of expedience made possible by CAD/CAM technology, it is difficult to predict or acknowledge possible complications in tooth preparation due to factors such as tooth position and variation in normal dental anatomy.

From experience, STL files can be a challenge to accurately acquire and may lose accuracy⁴ with increasing file size in some cases. Therefore, to increase acquisition of accurate scan data, prevent possible scan complications and shorten the treatment time, the five restorations would be divided and produced from two smaller files (Figs. 7a, 7b).

Specifically, teeth #7–10 will be scanned, and #7 will be designed and milled followed by teeth #8–10

(Figs. 8a, 8b). The normally idle milling time was used to prepare tooth #6 and then scan this preparation with the milled #7 in place for an accurate contact and design landmark. The possibility of achieving a good quality clinical outcome with a single scan and design of all five teeth simultaneously could certainly have produced clinically acceptable result, but it would be less productive in terms of time management and without the improved accuracy.

Tooth preparation design will influence whether the block is milled more quickly on a "standard" setting vs. on a "detailed" setting (Figs. 9a, 9b). Accordingly, teeth should be prepared with scanning in mind and design should be completed with milling in mind: We scan to provide data for an accurate design, and we design the proposals to maximize the parameters of the mill's abilities. Anterior tooth preparations with incisal area dimensions smaller than the mill's



Figs. 9a, 9b_Mill settings are critical with ceramic restorations to not produce over-milled restorations on anterior teeth. The reduced material thickness can not only be weak but less retentive. Compare the milling proposal of tooth #10 on the 'standard' setting (A) vs. 'detailed' setting (B).

Fig. 10_Post-treatment single-visit CAD/CAM restorations.

cutting instruments may become exoriated beyond the intended design parameters. The consequence is compromised internal adaption thereby decreasing prosthesis thickness, retention and esthetics due to preparation show-through.

As each restoration finished milling, the contact areas and occlusal function were adjusted and evaluated in the patient's mouth. The patient had communicated her desire for minimal tooth characterization. Therefore, a limited amount of cervical, body and incisal characterization with subtle surface texture was employed prior to the crystallization and glazing cycle. The insertion protocol called for treating the lithium disilicate restoration with combined acid etch and ceramic primer.⁵ The tooth preparations were conditioned with a one-step etch and prime formulation. The restorations were inserted one at a time with a dual-cure translucent resin cement (Fig.10).

Summary

There are many factors that can influence the patient's treatment, chair time and experience with single-visit CAD/CAM restorations. In this particular patient example, the workflow was made most efficient by preparing the four maxillary incisors and scanning them as a single file followed by the preparation and scanning of the single cuspid.

The patient's ultimate satisfaction was ensured through the copious pre-treatment gathering and analysis of clinical information.

An understanding and strict adherence to the protocols for acquiring scan data and mill performance eliminated interruptions in the digital workflow. Future case controlled studies might investigate the added accuracy and patient satisfaction using a two-file method.

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Leveraging modern technology and materials to provide better outcomes for our patients

Author _Clint D. Stevens, DDS

_In spite of significant advances in the ability to provide predictable, adhesively retained partial-coverage restorations, full-coverage restorations continue to be the mainstay of dental treatment. The vast majority of indirect restorations provided for patients, both anterior and posterior, are full-coverage crowns. This is perhaps not surprising, given that preparing teeth for partial-coverage restorations is more technically demanding and potentially more challenging to facilitate an esthetic outcome, not to mention the added challenges to a traditional workflow when a restoration is to be adhesively cemented.

While bonded partial-coverage restorations present different challenges when compared to conventionally cemented full-coverage restorations, many of these obstacles have been significantly reduced in recent years. The development of novel isolation devices and significant advances in hemostatic agents and dental lasers have made obtaining appropriate isolation for bonding much easier. Vast improvements in resin cement properties and adhe-

sives have made restoration delivery and subsequent clean up easier and less technique sensitive than ever before.

Even more importantly, there now exist highly esthetic ceramics, such as IPS Empress and IPS e.max (Ivoclar Vivadent, Schaan, Liechtenstein) that can mimic natural dentition, be quickly and predictably fabricated, and have a proven track record of clinical success.^{1,2}

There are a number of advantages to bonded partial-coverage restorations over full-coverage restorations. These largely center around the fact that partial-coverage restorations preserve significantly more tooth structure than full-coverage restorations. Multiple studies have shown partial-coverage all-ceramic restorations to be significantly more conservative of tooth structure, even when compared to a cast gold restoration.³⁻⁵

Full-coverage restorations have long been associated with an increased risk for pulpal complications⁴, which could be significantly avoided with partial-



Fig. 1

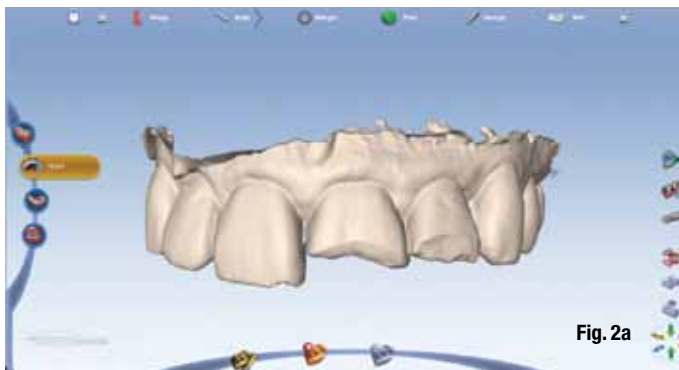


Fig. 2a

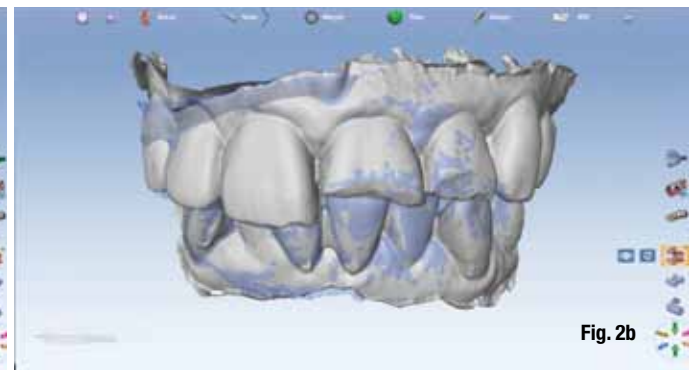


Fig. 2b

coverage restorations. Specific to anterior teeth, in vitro and in vivo data indicates that long-term prognosis of a tooth restored with a partial-coverage direct or indirect restoration when possible is equal to or better than using a full-coverage restoration.^{6,7}

Digital impressing and chairside CAD/CAM technologies further enhance patient outcomes for partial-coverage restorations and eliminate many of the barriers that exist in conventional workflows for partial-coverage dentistry. Perhaps the biggest concern dentists have with partial-coverage dentistry is provisionalization, because of the non-retentive nature of adhesive preparations.

Chairside CAD/CAM, in allowing for single-visit dentistry, eliminates this problem. It also eliminates concerns of persistent pulpal irritation during the days or weeks of provisionalization, thereby further reducing the patient's risk of subsequent pulpal complications.

Digital impressing and digital restoration design also give a practitioner much more control over ensuring a quality preparation and one that appropriately supports the proposed restoration, resulting in a more ideal restorative outcome for the patient.

Case report

A 70-year-old male presented with a chief complaint of broken teeth as a result of a fall. Clinical examination revealed a small chip in the incisal enamel of tooth #8, as well as significant fractures of

the incisal thirds of teeth #9 and #10, extending well into dentin but with no visible pulpal exposure (Fig. 1).

Periapical radiographs provided by the patient revealed no overt periapical pathology or root fractures. Periodontal examination found all probing depths to be 3 mm or less, with no bleeding on probing and no tooth mobility. The patient reported a positive, non-lingering response to cold for all anterior maxillary teeth. Based on clinical and radiographic findings, teeth #8–10 were diagnosed with incisal fractures limited to the incisal third of the tooth with a normal pulpal, periapical and periodontal status.

Findings and treatment options were discussed with the patient, including partial-veneer or full-veneer restorations with either composite resin or ceramic. Because of the small size of the incisal chip of tooth #8 limited to enamel, a composite resin restoration was chosen to repair that area.

For teeth #9 and #10, the patient expressed a desire to have the most durable restorative material possible but wished to limit the removal of further tooth structure as much as possible. For this reason, partial-coverage ceramic veneers were chosen to restore teeth #9 and #10.

Minimal modifications to teeth #9 and #10 were made, primarily to remove sharp points and line angles and to place a chamfer margin on the facial surface to help blend the transition of the proposed restorations with the natural tooth structure. Digital impressions were made using the PlanScan Scanner (Planmeca USA, Roselle, IL) (Figs. 2a, 2b).

(Photos/Provided by
Clint D. Stevens, DDS)



Fig. 3

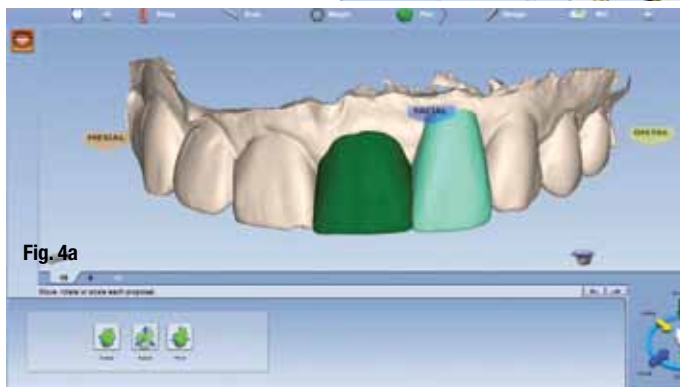


Fig. 4a

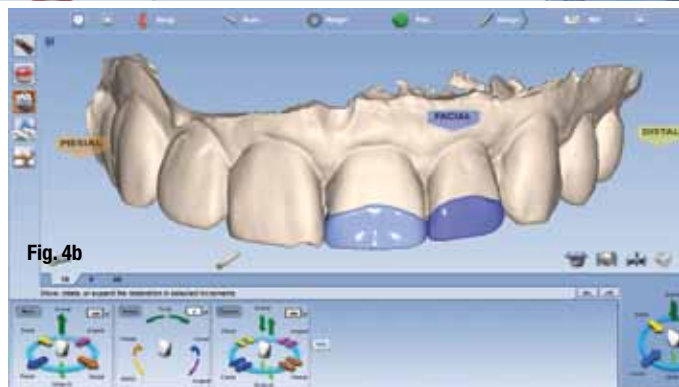


Fig. 4b

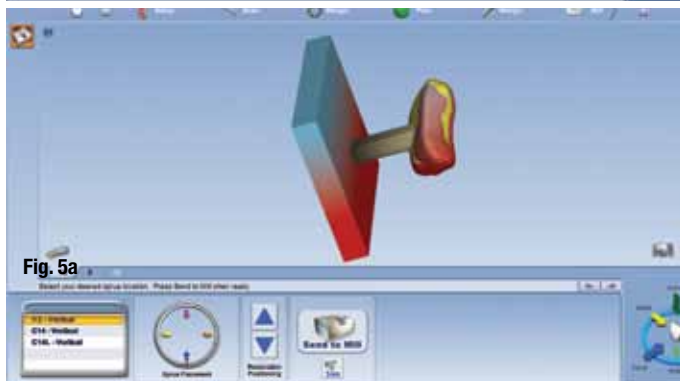


Fig. 5a

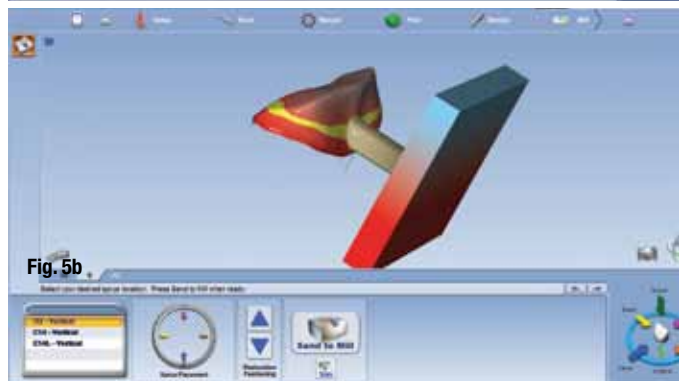


Fig. 5b

Following impressions, the partial-coverage veneer restorations were designed using Planmeca's PlanCAD software (Figs. 3a–4b). The restorations were milled with the Planmeca PlanMill 40 (Fig. 5a, 5b). IPS Empress CAD Multi blocks by Ivoclar Vivadent were chosen for the restorations, as they best matched the patient's natural dentition (Figs. 6, 7).

Following sprue removal, the restorations were polished with Dialite HP Extra-Oral Polishers (Brasseler USA, Savannah, Ga.) (Figs. 8, 9).

After verifying the fit of the restorations, the partial-coverage ceramics were tried in with Variolink Esthetic Try-In Paste (neutral shade) by Ivoclar Vivadent. This allowed the patient to view the resto-

rations and approve of the esthetics and contours prior to cementation. The restorations were then conditioned for 60 seconds with Monobond Etch & Prime (Ivoclar Vivadent).

An OptraGate (Ivoclar Vivadent) was used during bonding procedures to help ensure adequate isolation. After the teeth were rinsed and dried with water, teflon tape was placed on the mesial surfaces of teeth #8 and #11 to prevent bonding to those teeth during the placement of the restorations. 37 percent phosphoric acid (Total Etch, Ivoclar Vivadent) was selectively placed on the enamel margins of teeth #9 and #10 for 20 seconds, followed by rinsing with water and gently air drying.



Fig. 6

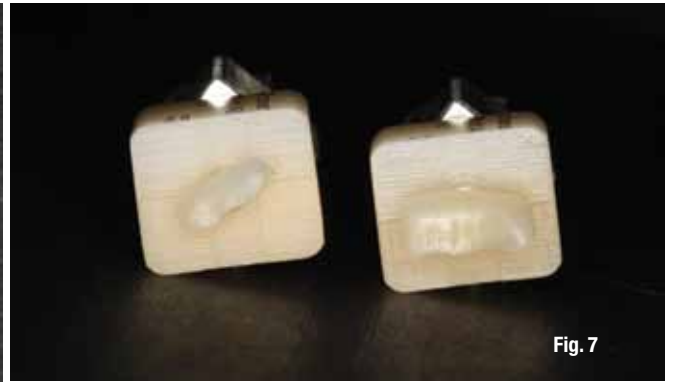


Fig. 7



Fig. 8



Fig. 9



Fig. 10

Next, the preparations were vigorously scrubbed with Adhese Universal (Ivoclar Vivadent) for 20 seconds, then air dried until no more movement of the layer of adhesive was visible and light cured for 10 seconds with a Bluephase G2 curing light (Ivoclar Vivadent). The intaglio surface of the partial-coverage veneers were covered with Variolink Esthetic LC Neutral (Ivoclar Vivadent) and carefully placed onto the preparations.

After fully seating the restorations, initial cleanup was performed prior to curing with a rubber-tipped

gum stimulator. All restorative margins were then covered with Liquid Strip (Ivoclar Vivadent) to prevent an oxygen-inhibited layer and to ensure full curing of the resin cement. Final curing was done for 20 seconds on each surface of each restoration.

After removing excess cured cement with a #12 scalpel and interproximal finishing strips, occlusion was adjusted with a fine grit diamond. Final polishing of the tooth/restorative interface was done with fine grit diamonds and Dialite HP Intra-Oral polishers (Brasseler USA) (Fig. 10).

about the author CAD/CAM



Dr. Clint Stevens graduated from the University of Texas Health Sciences Center San Antonio and completed a one-year advanced education in general dentistry residency at the University of Michigan. He is engaged in ongoing laboratory and clinical research dealing with adhesive restorative materials, digital dentistry workflows, endodontics and dental implants. He serves as a key opinion leader and consultant for product development and evaluation to several dental manufacturers. He has utilized chairside CAD/CAM for 10 years and has extensive experience with Planmeca FIT. Stevens maintains a full-time private practice in Tulsa, Okla., that emphasizes the use of modern, evidence-based materials in providing the highest level of comprehensive dental care.



Fig. 11

The small chip in the incisal edge of #8 was then etched with 37 percent phosphoric acid for 30 seconds, rinsed and gently dried, scrubbed with Adhese Universal for 20 seconds, dried and light cured for 10 seconds, followed by the placement of Tetric EvoCeram composite (Ivoclar Vivadent), which was light cured for 20 seconds.

Occlusion was verified and the restoration was polished with Astropol polishers (Ivoclar Vivadent). The patient was seen for a two-week post-operative visit. He reported no issues with his treatment and was very pleased with his final result (Fig. 11).

Conclusion

This case illustrates the potential for modern adhesive dentistry and digital workflows to improve outcomes for patients. Partial-coverage ceramics maximized the preservation of natural tooth structure while still meeting the patient's esthetic expectations, providing him with the most conservative treatment possible and giving the involved teeth the best long-term prognosis for success.

Digital impressioning and restoration design combined with chairside CAD/CAM allowed for these restorations to be performed immediately in a single visit. This greatly streamlined the workflow process and, at the same time, significantly enhanced patient satisfaction.

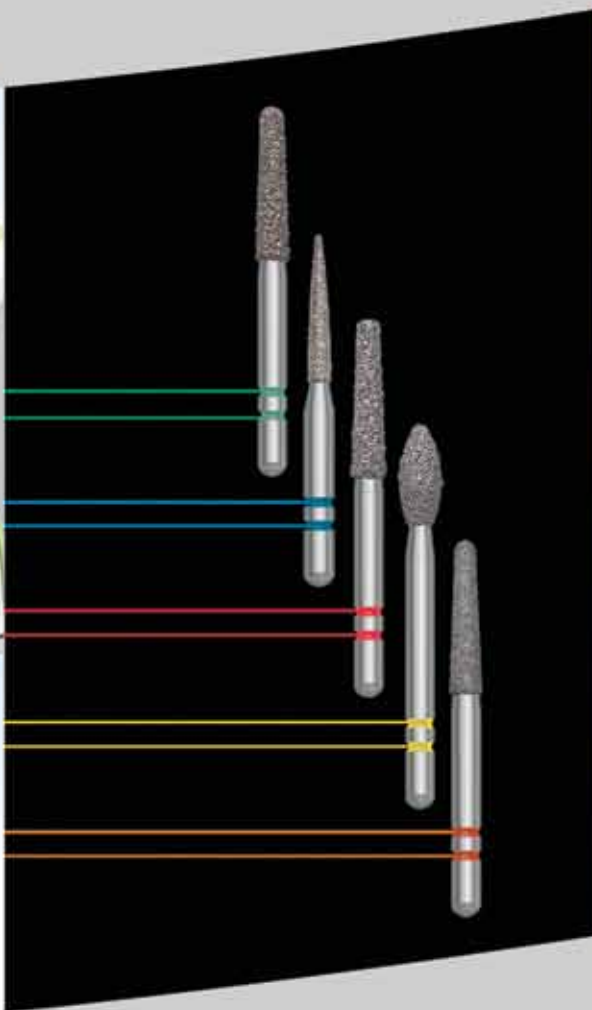
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Adding high-quality implant restorations to your digital armamentarium

Author _Dr. Michael Kelliher

One of the significant advantages of the Planmeca FIT system is the ability to easily export your scans. This allows users to work with the dental laboratory to fabricate restorations that you aren't able to create in the office. A restoration that lends itself to laboratory collaboration is an implant-supported full-coverage crown seated on a custom-milled titanium abutment.

There are many advantages to fabricating a milled custom abutment vs. working with a stock abutment. By fabricating a custom abutment, one is able to create a proper emergence profile on the abutment and place the restorative margin ideally to aid in

cement cleanup. A milled titanium abutment is also extremely strong and can be designed to provide ideal thickness of the final restoration.

Historically, custom abutment-supported implant restorations were fabricated by taking a fixture level impression and shipping the impression to the dental laboratory for fabrication of the abutment and crown. While this yielded excellent results, each restoration was quite costly and took a fair bit of time for the lab to fabricate.

Utilizing the Planmeca FIT (Planmeca/E4D Technologies) system and the DDX laboratory portal (Henry Schein Inc.), dentists who utilize CAD/CAM technology are able to reduce lab turnaround time and fabricate the final crown in office, drastically reducing the costs.

This is accomplished by utilizing a scan body to digitally capture the implant position using the Plan-scan (Planmeca/E4D Technologies) (Fig. 1).

Scan bodies are available from many labs and implant manufacturers. The scan bodies used for this case were obtained from 5 Axis Dental Laboratory (5 Axis Dental Laboratory, Whitby, Ontario).

.STL files are exported to the laboratory via the secure, HIPAA-compliant DDX network, which allows the case to be in the laboratories' hands almost instantly. The final restoration is fabricated on a printed model provided by the laboratory in the of-



Fig. 1 _A scan body.

(Photos/Provided by Dr. Kelliher)

Fig. 1

fice. The workflow is very straightforward and will allow the office to easily fabricate the final crown using familiar techniques with a few changes vs. a tooth-borne crown.

Case presentation

A patient presented to our office for fabrication of a definitive restoration in the #30 area. A Straumann RC bone level implant (Straumann USA) had been placed and integration confirmed by the surgeon.

In order to make scanning the proximal surfaces easier, a pre-op scan was taken with the healing abutment in place (Fig. 2).

The healing abutment was removed, and the matching scan body was screwed into place, taking care to orient the flat portion of the scan body as facially as possible. This flat portion of the scan body is critical for the software to locate the implant position.

There will be times that you are unable to fully record the proximal portions of the scan body. These areas aren't as critical so a bit of missing data here is acceptable. Also, the scan body can be slightly adjusted proximally if needed to allow the scan body to seat properly.

Time saver was then used, erasing the healing abutment, and then scanning in the scan body, taking care to ensure the flat portion was accurately recorded (Fig. 3). Opposing and a buccal bite were then acquired.

In some instances you will need to remove the scan body prior to capturing the bite. Depending on the depth of placement, the scan body may impact the opposing dentition, so take care to evaluate the position before having the patient close.

Either way, the software will have plenty of data to align the bite.

Close the case and once the file has saved, click the plus button next to your case to expand the list of files. Click the DDX export button (Fig. 4), which will take you online to the DDX portal. From the lab list, select the laboratory you wish to use and you will bring up its lab prescription form (Fig. 5).

Fill out the details for the digital prescription; the patient name will transfer over to the online form. From there, indicate the implant type, desired material for the abutment and any applicable surface finish.

Dentists will also be able to indicate how they prefer the restorative margin be placed relative to the tissue. Typically, settings would be to have the facial margin 1.5 mm subgingival, the proximal margins equigingival and the lingual slightly supra gingival.

The laboratory returns the abutment and screw along with a printed model with an aluminum analog (Fig. 6).

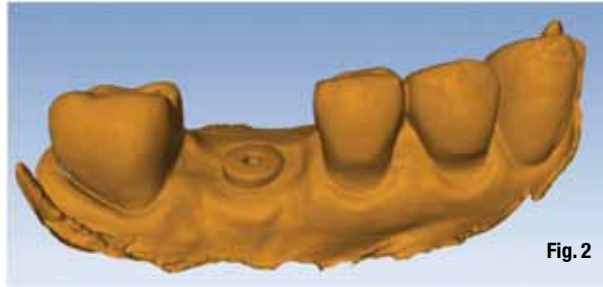


Fig. 2

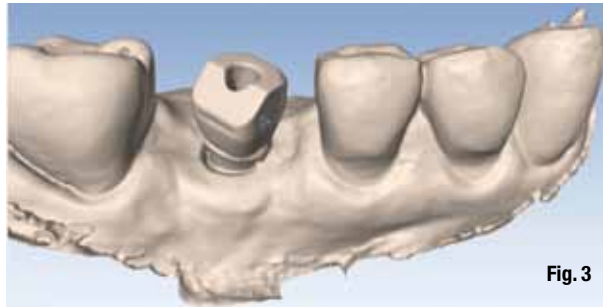


Fig. 3



Fig. 4



Fig. 5



Fig. 6

Fig. 2_ Pre-op scan.

Fig. 3_ Scan body scan.

Fig. 4_ DDX export.

Fig. 5_ DDX online prescription form.

Fig. 6_ Printed model with aluminum abutment analog.

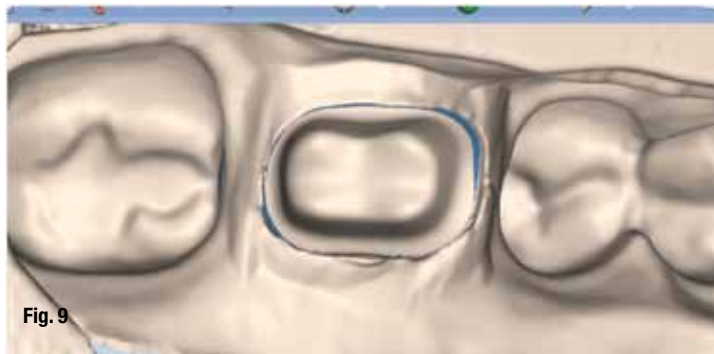
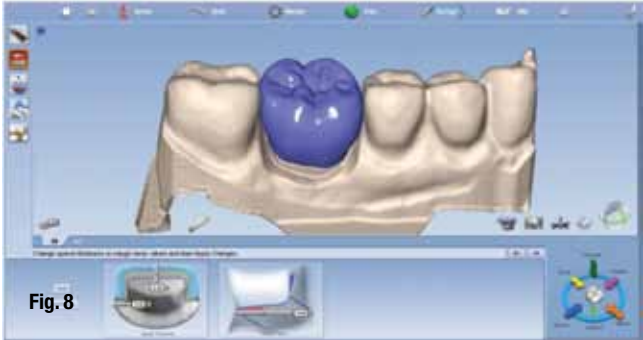
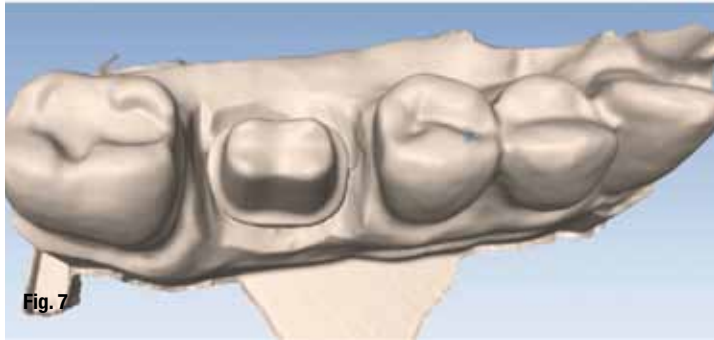


Fig. 7_ Printed model and analog scanned using the Planscan.

Fig. 8_ Crown is designed.

Fig. 9_ Flipped Mill Sim model. Note the lack of axial interference.

Fig. 10_ Precision fit of the milled emax to the titanium abutment.

The printed model is scanned using the Planscan (Fig. 7). To ensure the abutment color is properly blocked out, an emax LT block (Ivoclar/Vivadent) should be used to fabricate the final restoration. emax has the strength to be conventionally cemented provided the occlusal thickness is 2 mm or more.

Because the milled custom is shaped essentially like a natural tooth, preparation fabrication of the final restoration is completed in much the same fashion as any natural tooth. The only exception is margin ramp and axial spacer settings. As the abutment generally has ideal taper and contours, I will set the margin ramp at .5 and the axial spacer at .05 (Fig. 8).

Also for implant crowns, it is important to mill in detail mode to get the most precise fit to the abutment as possible. The abutment has ideal taper and is perfectly smooth, which allows the mill to create a very intimate fit when the conical bur is used to mill the internal aspect of the crown.

Also always perform a mill simulation in detailed mode to ensure there is no internal binding of the restoration.

The easiest way to check for interference is to simply flip the simulation screen over and check to see if any blue bleeds through in the axial areas (Fig. 9).

If any blue bleeds through the tan model, go back to the design screen and open the axial setting by .01 and simulate again. Keep nudging the spacer out until you get the tightest fit without interference.

An excellent-fitting crown is produced by the mill with extremely accurate margins (Fig. 10).

Proximal and occlusal contacts are evaluated on the printed model/analog and adjusted as needed while the emax is in the purple phase.

The restoration is stained and glazed in the same manner as a tooth-retained crown (Fig. 11).

One of the big advantages of using emax for an implant restoration vs a layered restoration is the reduction in fracture potential. Traditional layered ceramics are more prone to chipping in implant ap-

‘The open source nature of the Planmeca FIT system allows users the flexibility to utilize their systems in a variety of workflows to provide care for our patients.’



Fig. 11



Fig. 12

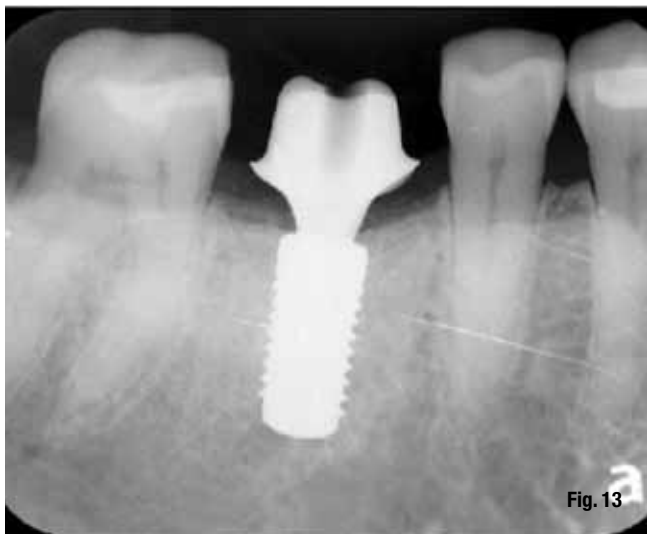


Fig. 13



Fig. 14

plications as they are rigid structures, not cushioned by a periodontal ligament as natural teeth are.

The abutment is inserted and torqued to 35 Ncm (Fig. 12).

Teflon tape is placed into the screw hole access prior to cementing the final crown to prevent cement from entering the top of the screw. A radiograph is taken to ensure the abutment is properly seated (Fig. 13).

The emax crown is cemented with Fuji 2 RMGI cement (GC America), and clean up of excess is performed with a rubber tip and floss. The final restoration will provide the patient years of service (Fig. 14).

Conclusion

The open source nature of the Planmeca FIT system allows users the flexibility to utilize their

_about the author

CAD/CAM



Dr. Michael Kelliher is a 1993 graduate of Tufts University School of Dental Medicine. He operates a general dental practice in Longmeadow, Mass., with an emphasis on CAD/CAM restorative dentistry.

Fig. 11_ Glazed crown.

Fig. 12_ Milled abutment follows the tissue contour.

Fig. 13_ Radiographically you can see the emergence profile ideally created on the milled abutment.

Fig. 14_ Final restoration in place.

systems in a variety of workflows to provide care for our patients.

This case provides an easy-to-follow workflow that will allow offices to add high-quality implant restorations to their digital armamentarium._

How digital workflow simplifies implant and restorative dentistry: A case report

Author_Dr. Eugene Antenucci

_Implant dentistry in the United States is growing exponentially for several reasons. The convergence of large numbers of mature patients with a high degree of dental awareness and sufficient disposable income has contributed to high levels of growth in implant dentistry.

In 2014, it was estimated that U.S. general dentists surgically placed about 25 percent of the 2.5 million dental implants. This number is poised to swell much higher with the availability of quality dental education in implant dentistry, a marketplace that presents many affordable choices for implant systems and instrumentation and digital technologies that streamline the entire implant process — from diagnosis to treatment planning, surgical implant placement and prosthesis completion.

The term “digital dentistry” refers to the use of computer-acquired and computer-driven information. Furthermore, it describes electronic technology used in dental care that generates, stores and processes data in strings or bytes of information that a computer, tablet or even a cellular device can assemble, store, access and convert to physical processes that facilitate patient care. In implant dental care, digital dentistry refers to technologies that assist in the process of dental implant placement and restoration.

The most commonly understood and used forms of digital dentistry are intra-oral camera images and

sensor-based radiographic images. These technologies are used by a high percentage of dentists. More advanced digital technologies are 3-D cone-beam CBCT images, CAD/CAM (computer-aided design) and milling processes for restorations. Imaging software such as Planmeca Romexis® allows for processing, manipulating, storing and sharing digital imagery and information.

Digital dentistry elevates the standard of care through:

- Superior diagnostic ability
- Improved patient comfort and convenience
- Enhanced patient compliance
- Time savings
- Cost savings
- Consistent quality and esthetics of restorations
- Inherent educational benefits for patients
- Elevation of the practice's perceived value
- Complete control over the entire process

Digital dentistry is not the future. Digital dentistry is today's reality for the benefit of the patients treated, for the benefit of the dentists who treat them and for the manufacturers and distributors who make these technologies available.

That reality allows for a seamless workflow for the dental practitioner to deliver implant dentistry in a consistent and economic fashion that allows patients a higher degree of comfort and results that are of high quality.

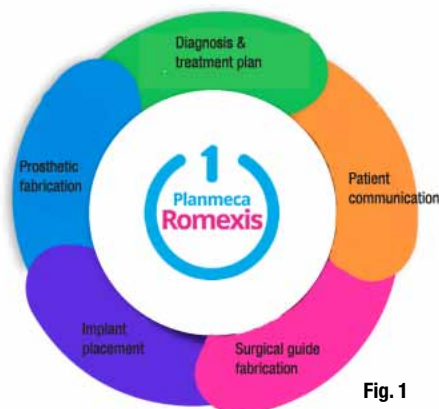


Fig. 1

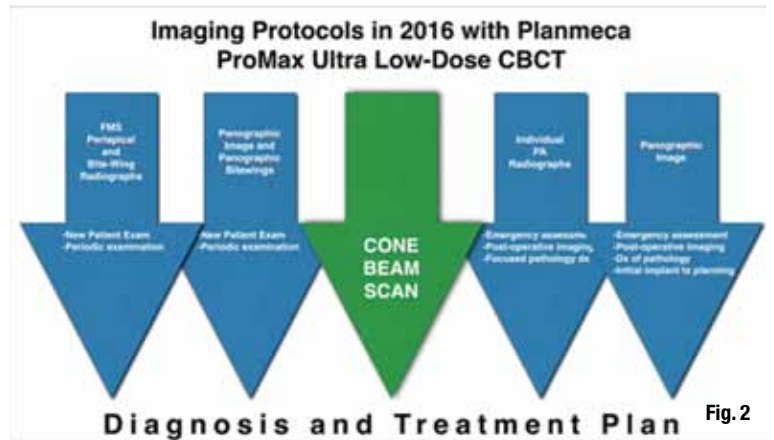


Fig. 2



Fig. 3



Fig. 4

Sensor-based digital X-rays and digital panorex radiographs are often the first digital diagnostic instruments used for a patient during a routine, emergency or need-based examination. The resulting images give the provider a sense of the area of concern, showing surrounding hard-tissue structures and anatomy and an overview of the areas in question.

When combined with a physical visual examination, much information is revealed. Up until approximately a decade ago, two-dimensional images such as these were the only imagery available to achieve a diagnosis. The diagnostic and treatment workflow could be described as in figure 1.

With the introduction, and now routine use, of cone-beam imaging in dentistry, the workflow has dramatically changed.

In addition to traditional two-dimensional PA, bitewing and panoramic images, three-dimensional cone-beam images can safely and effectively be used to yield exponentially higher amounts of diagnostic information. Planmeca's ProMax® 3D technology can deliver highly accurate and diagnostic images using proprietary Planmeca Ultra-Low Dose™ Imaging protocols (Fig. 2) with comparable radiation yields to conventional digital PA, BW and panoramic studies.

The impact of Planmeca's Ultra-Low Dose 3-D

imaging is that practitioners can choose to utilize 3-D cone-beam studies without concern for excessive radiation exposure to the patient. The 3-D images allow for visualization of structures in all dimensions, showing height and width of hard tissue structures as well as a clear 1:1 view of all pertinent anatomy. These images can be used for the virtual placement of implants, planning the prosthetic end result with a library of abutments and correlating images derived from CAD/CAM designs to overlay implant prosthesis that are in proper occlusal form.

An example of the superior diagnostic ability of 3-D over 2-D is shown in Fig. 3.

The workflow for the diagnosis and treatment planning of implants today begins with digital 3-D CBCT imaging (Fig. 4).

Once imaged, implants may be placed virtually in the exact position desired, with full awareness of anatomical structures such as the mandibular nerve, the mental foramina, maxillary sinuses and lingual mandibular concavities, to name a few.

With the implant placed virtually, the study can be emailed in a secure and compliant fashion to a laboratory for the production of a surgical guide, if desired. This same 3-D image can be correlated or matched to a CAD/CAM scan of the same area, allowing the dentist to properly plan the restoration while

(Photos/Provided by
Dr. Eugene Antenucci)



Fig. 5



Fig. 6



Fig. 7

The guide was seated and an intimate fit was verified



Fig. 8



Fig. 9



Fig. 10

taking into account considerations such as occlusal factors and vectors of force.

The CAD/CAM scans are easily acquired with Planmeca FIT technology, which allows for accurate digital models and streamlined planning of restorations. The digital models, acquired as .stl files, are easily imported into Romexis' cone-beam.dicom files to facilitate planning.

The digital workflow is exemplified in the following case involving a 45-year-old patient who was distraught over losing tooth #12. She presented to my office after an oral surgeon extracted the tooth in an emergency. She requested a temporary replacement that was not removable.

A composite bonded provisional was fabricated, and the provisional stayed in place for three months prior to implant placement.

A cone-beam study is made, and the case is planned virtually (Fig. 5). The intended implant is positioned in the available bone in a desired axis, taking

into account occlusal forces, using, in this case, the outline of the provisional tooth as a guide.

The file was emailed to a laboratory to fabricate a tooth-borne surgical guide. In this case, a Nobel Replace-Select 4.3 x 11.5 mm implant was selected, and a guide was made to allow for guided placement of the implant (Fig. 6).

On the date of surgery, the guide was tried-in to assure an accurate, stable and intimate fit. The windows provided by the guide allow for visualization of the proper fit (Fig. 7).

With the guide in place, the tissue is marked, and a tissue punch is used to gain flawless access to the osteotomy site, with full confidence of the intended position (Fig. 8).

Surgery is performed using the guide and associated instrumentation (Fig. 9). The process is simple and straightforward.

The implant is fully seated, with the entire process completed in a relatively atraumatic fashion with



Fig. 11



Fig. 12

minimal bleeding and no need for sutures (Fig. 10).

A transmucosal healing abutment was used, and the patient was temporized with a composite provisional bonded to the adjacent teeth. After four months, the patient returned for a digital impression. The provisional was removed, and removal of the transmucosal abutment showed excellent tissue healing and contour (Fig. 11).

A stock implant abutment was prepared extraorally and seated to 20 ncm torque. Teflon tape and Firmit™ were used and cured to seal the screw access of the abutment (Fig. 12).

The abutment was then scanned intramurally with the Planmeca Fit™ Scanner to obtain a digital impression of the abutment, the opposing arch and the occlusion. From these scans, an IPS e.max crown was milled in the PlanMill 40, shade A1.

Within 12 minutes time, the mill was completed. The IPS e.max restoration was tried in the mouth on the abutment, contacts and occlusion were adjusted, stain and glaze were nuccapplied, and the restoration was placed in the Ivoclar Programat™ oven for crystallization and glazing. The entire restorative visit was less than 1.5 hours.

Digital workflow in implant dentistry facilitates care by allowing for a concise and accurate diagnosis in a simple manner. Planmeca Romexis® software allows for implant planning, fully taking into account anatomical constraints and considerations while also allowing for prosthetic planning. The images are easily transmitted to a laboratory for guide fabrication.

With this workflow, patient acceptance is increased. The patient is fully involved in the planning process while watching the initial plan and can more easily understand the three-dimensional images presented to them. Patients also appreciate being able to see a virtual representation of the final restoration, which is the reason for an implant in the first place.

_about the author

CAD/CAM



Dr. Eugene Antenucci's expertise in the clinical integration and utilization of advanced dental technologies will directly help you make sound decisions in working with and profiting from technology in practice. As an international lecturer, his programs have provided

hundreds of attendees with concrete and usable information on the practical applications of technologies such as digital impressioning and PlanScan Chairside CAD/CAM by E4D, intra- and extraoral imaging, digital radiography, dental lasers, cone-beam CBCT imaging, office automation, as well as the incorporation of social media and the internet in dental marketing in order to increase your practice's visibility and flow of new patients

Antenucci maintains a full-time restorative, implant and cosmetic private practice in Huntington N.Y. His state-of-the-art facility and practice was distinguished as "Dental Practice of the Month" by Dental Economics, and "Business of the Year" by the Huntington Chamber of Commerce.

Antenucci serves as a clinical assistant professor at NYU College of Dentistry teaching implant surgical and prosthetic dentistry. He is a diplomate of the International Congress of Oral Implantologists and a fellow of the Academy of General Dentistry. He has served in numerous leadership roles with the Academy of General Dentistry at both the state and national levels. His many years of experience with chairside CAD/CAM and cone-beam imaging, along with his implant teaching experience and years of training dentists in seminars and workshops, will assure that each attendee achieves the highest levels of practical learning from his programs.

The visit following surgery is the final one — with digital scanning and restorative fabrication using the Planmeca Fit CAD/CAM system. The entire process is streamlined and implied using a digital workflow. _

The versatility of Traxodent improving digital dentistry

Author_William Davidson, DMD

Traxodent is proving critical to my practice for improving clinical outcomes and easing chairside problems. The more I use Traxodent (Fig. 1), the more uses I find for it. This is how Premier describes Traxodent and its use.

"Traxodent is a paste retraction and hemostatic system for use prior to impression making, cementation, bonding procedures or wherever hemostasis and retraction is required. Traxodent paste contains 15 percent aluminum chloride — a proven, effective hemostatic agent.

"Traxodent can be dispensed directly from the sleek syringe into the sulcus and be adapted to a variety of techniques. The absorbent paste displaces soft tissue and works synergistically with the astringent properties of aluminum chloride to create retraction.

"Fluid is absorbed while Traxodent occupies the sulcus. After two minutes, Traxodent is rinsed away, leaving an open, retracted sulcus.

"The Traxodent hemostatic retraction system provides predictable tissue management for accurately detailed impressions with less retakes."

(Photos/Provided by William Davidson, DMD)



Fig. 1

Premier also supplies retraction caps to enhance the effect of Traxodent. Anatomic-formed cotton caps work synergistically with Traxodent to quicken and assist retraction and hemostasis. These retraction caps offer the following features:

- Provide predictable hemostasis and soft-tissue management in minutes.
- Easily guide Traxodent into the sulcus.
- Compression assists and quickens hemostasis.
- Cotton absorbs fluids.
- Anatomic form allows easy placement.

Here are some examples of how Traxodent and digital dentistry go together.

Case No. 1: Tissue Preparation: Prior to cementing final restorations

Fig. 2.

These are the preparations after removing the temporaries. There is temporary cement remaining on the preps and fluid weeping onto the margin from the tissue. Cleaning the preps at this point would also induce bleeding from the tissue.

To resolve these issues I start with Traxodent.



Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8

Fig. 3

Traxodent syringed around all the preps.

Fig. 4

I will have the patient bite on split cotton rolls to apply pressure on the Traxodent and to keep the Traxodent in the sulcus.

Fig. 5

After washing off the Traxodent and removing any remaining temporary cement, the preps are ready for bonding.

Fig. 6

This case was done with Romexis and the Planmeca FIT system being used to take digital impressions for submission to my dental laboratory.

Only minor contact adjustment on teeth #7 and

#10 were needed along with slight occlusal adjustment on #20-22. The image shows the e.max crowns inserted.

Case No. 2: Tissue Preparation: Single-unit crown

Fig. 7

Here is a case where I wanted to do a single-visit crown. Unfortunately, the patient's gums were not healthy, leading to bleeding while preparing the tooth.

Fig. 8

I used Traxodent twice. Once prior to packing the Knit-Pak, which is a braided easy-to-place cord. And again after placing the Knit-Pak as an alternative to a second cord layer.



Fig. 9



Fig. 10

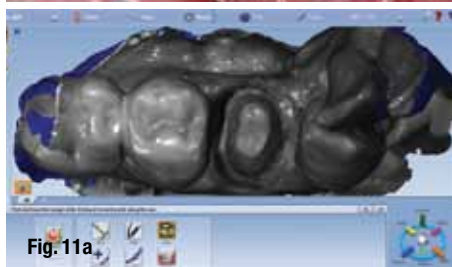


Fig. 11a



Fig. 11b



Fig. 11c



Fig. 12a



Fig. 12b



Fig. 12c

Fig. 9
The Traxodent was syringed in place.

Fig. 10
I had the patient bite on a retraction cap.

Figs. 11a-11c
The clean dry tooth is ready for my digital impression. Fig. 11a shows the digital impression in ICE mode (I C Everything). Fig. 11b has the digital model showing the margins. Fig. 11c shows the margin drawn with the area on the buccal that needs editing.

Figs. 12a-12c
The Empress Multi block polished with diamond twist SCL (lab) and SCO (intra-oral) kits allow me to achieve a fast glaze-like finish on ceramic. This photo is immediately after removing the cord, which I left in

until after the crown was bonded in place, ensuring a clean dry field throughout the procedure.

Case No. 3: Hemostasis prior to using a laser

Fig. 13
Lasers have been a big part of my practice for more than 20 years. I started with an argon dual-beam laser for curing composite and cutting tissue. I have had several diode lasers and currently have the precise diode from CAO and Henry Schein.

It is quick and easy to use any time I want to do a single-tooth gingivectomy or for troughing around a crown prep. However, many times I still use Traxodent.

In this case, I started with a bridge with decay around the margin visible.



Fig. 13



Fig. 14



Fig. 15



Fig. 16



Fig. 17

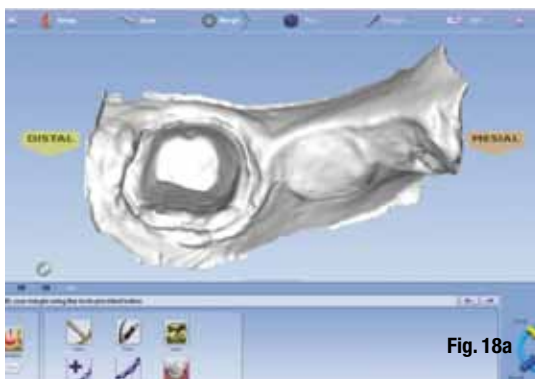


Fig. 18a

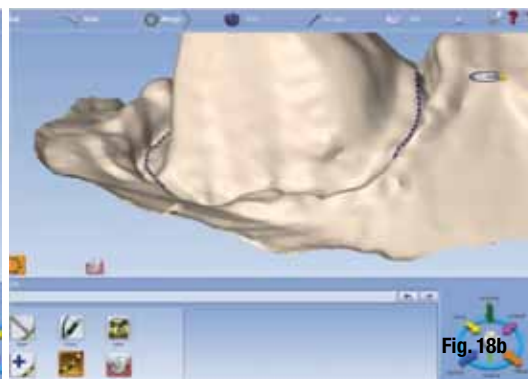


Fig. 18b

On removal of the bridge – Surprise! – I found more decay than expected and very deep subgingival decay. Decay removal causes tissue bleeding.

Fig. 14

Lasering the tissue in a pool of blood does not work well. I use Traxodent for hemostasis prior to using the laser.

Fig. 15

I am now ready to use the laser.

Fig. 16

Tissue has been troughed for optical impression.

Fig. 17

I will use Traxodent again at this time to insure a clean visible margin.

Figs. 18a-b

I use the Planmeca FIT system to take a scan. Alternating between the stone model and the photo (ICE view) using magnification allows for accurate margin finding.

about the author CAD/CAM



Dr. William Davidson has been in private practice since 1981. He received his doctor of medicine in dentistry degree from Case Western Reserve University. Davidson is well-known for practicing state-of-the-art dentistry and using 3-D technology to create natural and durable ceramic teeth restorations. He is sought after by both national and international groups to train dentists in the art and science of using these technologies. He is frequently called upon as a technical advisor for various dental manufacturers and assists in evaluating new precision instruments. In his private practice, Davidson owns four different digital impression systems and has been a digital dentist since acquiring his first system in 1997. He is a member of the Cleveland Dental Society, the Chicago Dental Society, the Ohio Dental Society, the American Dental Society and the Academy of General Dentistry.

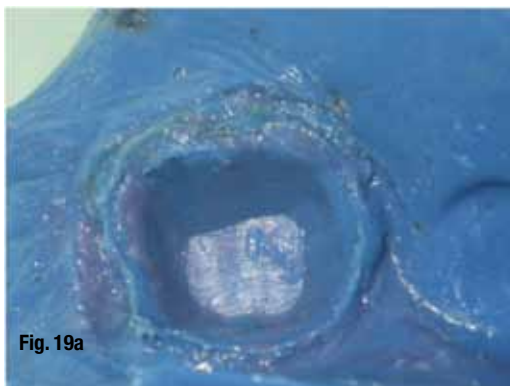


Fig. 19a

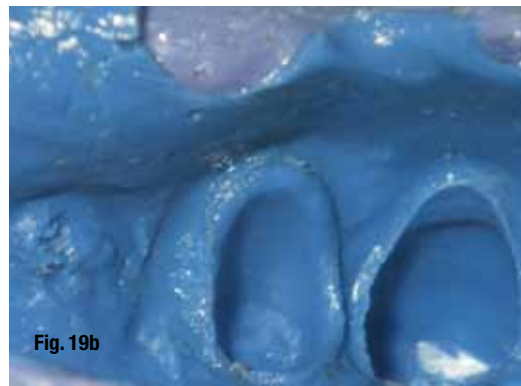


Fig. 19b



Fig. 20



Fig. 21



Fig. 22



Fig. 23



Fig. 24a



Fig. 24b

Figs. 19a-b

I will use the LAVA material from 3M for long-term temporary crowns for both abutments. For this bridge, I am working with a small lab that won't accept my digital scans yet. They are the last hold-out lab I work with. All others are digital.

I took a physical impression with impregum. Look at the excellent detail capture of the margin with the laser and Traxodent combination.

Case No. 4 Tissue Preparation: After using a laser

Fig. 20

Carbon dioxide CO2 lasers are considered the gold standard for soft-tissue treatment in dentistry. I have a SOLEA hard-/soft-tissue laser. Nothing removes tissue faster and cleaner. I still use my Traxodent though. In this case, a crown came in with decay around the margin.

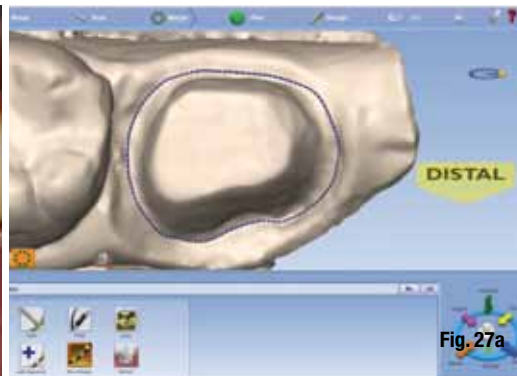


Fig. 21

On removal of the crown, the decay is extensive.

Fig. 22

I start by using the CO2 laser to remove tissue and decay.

Fig. 23

After that, it is time to clean up the field with Traxodent. The Traxodent is put in place and the patient bites on a retraction cap for two minutes.

Figs. 24a-b

The tooth is then ready for final decay removal (Fig. 24a) and build up (Fig. 24b).

Figs. 25a-b

After shaping the build up, Traxodent is syringed into place (Fig. 25a), and the patient bites on a retraction cap (Fig. 25b).

Fig. 26

The tooth is then ready for optical impression taking.

Figs. 27a-b

For the optical impression, I used the Planmeca FIT system with the color tip. The stone model and the color picture make it easy to draw the margin (Fig. 27a). The final picture is the finished crown (Fig. 27b).

Even with lasers Traxodent makes digital impressing easier, faster and better. Bonding and finishing are performed more efficiently and predictably, and even physical impressing is easier. Traxodent is one of those products that you just have to have in your toolbox!_

On target with onlays: Boost chairside milling ROI with more profitable restorations

Author _Laurie Lauletta-Boshart

_With price pressure growing in the marketplace, doctors are continually seeking new and innovative ways to create profitable restorations leveraging chairside milling systems. A simple yet dynamic opportunity for practice growth exists for doctors to perform more onlays instead of direct restorations (aka composite fillings).

Consider this startling statistic: On average, doctors perform nearly 1,000 direct restorations annually while their chairside milling system sits idle. You've made a significant investment in a chairside milling system; now it's time to capitalize on that technology and maximize your ROI.

How? Consider converting a portion of your direct restoration cases to onlays. Your patients benefit from a high-quality, long-lasting restoration while you benefit from greater practice revenue.

Despite the benefits for patient and doctor alike, all too often the challenge of material quality and insurance reimbursement considerations act as a barrier, discouraging the treatment plan that might be best for your patients. The esthetic efficacy and best interest of the patient are paramount in choosing a course of treatment, and material considerations and insurance reimbursement should not create a hindrance or prevent you from pursuing the optimum outcome.

Here we give you the business case in favor of onlays over direct restorations, as well as some practical tips on how to accurately document a case to

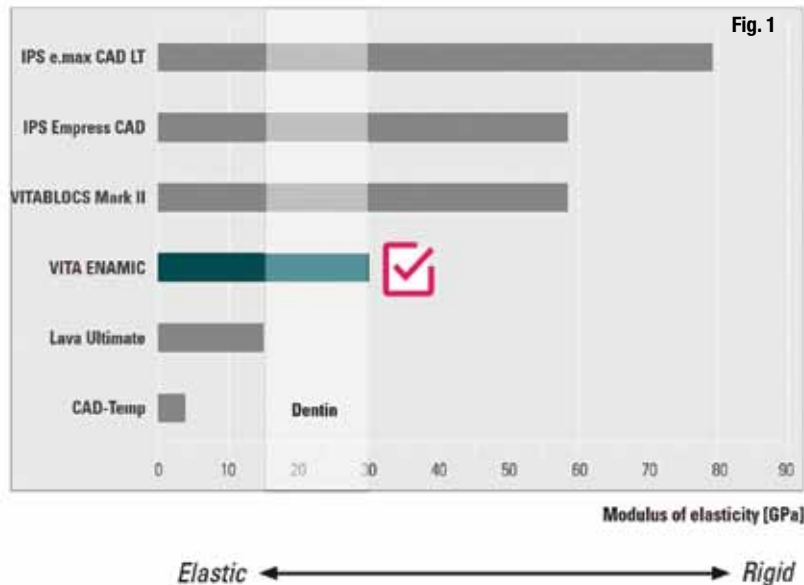
maximize your reimbursement success and identify which material is the most ideal.

_Expand clinical indications to increase ROI

While many doctors have bridged the gap and successfully leveraged chairside milling to its fullest potential, others struggle to get the most out of their investment. Those 1,000 direct restorations currently in your practice offer significant potential to expand your system beyond just crown processing and increase your ROI.

For example, if you used your chairside milling system only for crown processing — say, an average of 250 crowns per year at a treatment fee of \$1,500 each — your annual practice revenue for those crowns would be \$375,000. Meanwhile, if you're doing another 1,000 direct restorations at \$350 each, you're generating another \$350,000 in practice revenue. Just those two procedures alone total \$725,000 in practice revenue.

But consider the practice revenue implications if you were to convert just 10 percent of those direct restorations to onlays at \$1,000 each. While the revenue from direct restorations would decrease from \$350,000 to \$315,000 — about \$35,000 less — you just generated \$100,000 from 100 new onlay procedures. With your 250 crown procedures, 900 direct restorations and 100 onlays, you have now increased



practice revenue to \$752,500 — an increase of 9 percent. You've also just increased the ROI associated with your chairside milling system by 27 percent!

Meanwhile, you've delivered a long-lasting, high quality result to your patient thanks to a more minimally invasive treatment plan. This should be emphasized when discussing the benefits of the procedure to your patients.

The right choice of materials is key

Leveraging a minimally invasive treatment plan that allows you to successfully expand your clinical indications, generate higher ROI and deliver the perfect blend of tooth-like characteristics are important considerations in choosing a material for onlays.

When it comes to selecting the right material, clinicians should consider a CAD/CAM block that most closely resembles natural tooth characteristics in function, rigidity and elasticity.

Available on Planmeca PlanMill® and other chairside milling systems, VITA ENAMIC is the only dual-network CAD/CAM material in the world. It boasts a dominant ceramic structure infused with polymer to deliver the same material properties of natural dentition, making it an ideal biomimetic restorative material. In fact, ENAMIC features characteristics that most closely resemble the patient's original tooth. It features an elasticity of 30 GPa, a value that falls into the same range as human dentin.

VITA ENAMIC can be milled as thin as 1 mm occlusally, saving up to a third of natural tooth structure and allowing an easy blend of the margins. It provides precision milling with no chipping, while other materials often experience chipping and don't have the option to be milled as thin, presenting you with

significant challenges when performing an onlay.

VITA ENAMIC is also fast and easy to process. With no furnace required, it decreases chairtime by up to 50 percent for greater practice profitability. This is also significant to your patient by reducing appointment time that can lead to higher referrals. After all, time is money for both you AND your patient.

Code correctly for maximum reimbursement

At some point in his or her practice, every doctor has experienced it — a denial from the insurance company for a partial-coverage restoration. Despite your best efforts to facilitate communication and documentation that warrants full reimbursement, you still receive a denial. Because of this, many doctors shy away from performing onlays and default to the simpler and lower-fee direct restorations, even though they may not be ideal for the patient and despite a significant investment in chairside milling.

Insurance reimbursement can be unpredictable without proper documentation, as is using the proper insurance codes. Standard insurance codes for onlays are D2643 (porcelain/ceramic, three surfaces) or D2644 (porcelain/ceramic, four or more surfaces).

Typically, an onlay is defined as a restoration made outside the mouth that replaces the cusp or cusps of a tooth. It is also cemented or light-cured onto the tooth. An onlay incorporates portions of a tooth (within the cusps of a tooth) that might correspond to areas also commonly restored using amalgam or composites or by using an inlay, with the addition of a cusp or cusps. It is not considered correct to report an inlay code along with an onlay code.

The onlay code is inclusive of the inlay. Inlays are

Fig. 1 An ideal material for onlays, VITA ENAMIC features characteristics that most closely resemble the patient's original tooth, including an elasticity of 30 GPa, a value that falls into the same range as human dentin.

Fig. 2 VITA ENAMIC can be milled as thin as 1 mm occlusally for an easy blend of margins with no chipping.

(Photos/Provided by VITA)



Fig. 3

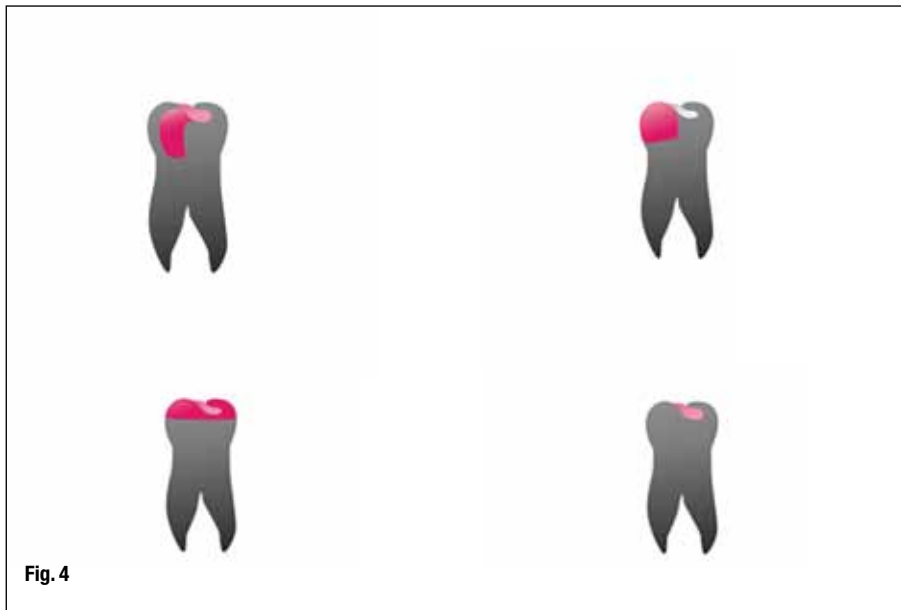


Fig. 4

Fig. 3 With no furnace required, VITA ENAMIC has been shown to decrease chairtime by up to 50 percent for greater practice profitability.

Fig. 4 Onlays vs. direct restorations represent a significant opportunity for doctors with chairside milling and require practices to be savvy in material selection, patient conversion and insurance documentation.

usually paid by carriers at the least expensive alternative treatment fee, frequently comparable to the fee for an amalgam.

Depending on the cusp involvement, onlays may be a paid benefit with no alternative clause, typically at 50 percent of the insurance carrier's fee schedule or maximum allowable benefit. Many carriers require that two or more cusps of a tooth be involved in the onlay and may specify how much of the cusp incline must be involved (usually 80 percent or more) in order to qualify for a benefit. When the decay or fracture involvement of a tooth would be sufficient to generate a benefit for a crown, then an onlay may also qualify.

To maximize your reimbursement potential, start by using the appropriate insurance codes.

—Prove the pathology with pictures

In order to increase the potential for full insurance reimbursement for onlays, the pathology of a case must be appropriately documented. A standard X-ray and clinical notes are no longer enough; detailed pictorial and written explanations are required. Begin by taking a pre-op periapical X-ray. Even if you think you won't need one, it's a good practice to get in the habit of ordering one.

Next, follow with clear pre-operative photos that show the entire quadrant of the tooth. Insurance will typically approve reimbursement if adequate documentation demonstrates that the restoration incorporates three-quarters of the tooth.

Photographs taken during the procedure should highlight anything that is of clinical concern, like leakage, fractures or decay. Removing caries while preparing a tooth may be expedient, but the practice may also keep you from being fully reimbursed. Be

sure to take photos during the preparation process to prove the pathology before moving on to the final restorative steps. Keeping a digital camera and notebook handy will aid in documenting each case and should become part of your standard operating procedure.

—Be persistent — you're the expert

If after accurately documenting a case with photos and case notes, you are denied or down-coded to a different procedure, make a point to challenge the decision. Be aggressive in your pursuit, especially when you are able to clearly show the procedure was in the best interest and well-being of the patient. Re-state your case and your professional assessment in a formal letter. Do not allow a third party or clinician advisor who was not part of the case to dictate what you believe is in the best interest and well-being of your patient.

—Conclusion

Expanding clinical indications on chairside milling systems beyond crowns provides dentists with a market opportunity that can significantly increase practice revenue and ROI. Many of the direct restoration cases currently being performed would benefit from onlays. Understanding how to appropriately document an onlay case to increase the potential for insurance reimbursement, as well as the availability of VITA ENAMIC, an ideal material for onlays, provides dentists with the optimal tools to successfully include an expanded indications strategy in their practice and provide better patient care with long-lasting, high quality results. —

Digital gateway

Author Mark Morin, DDS, FWCM

We all know that the landscape of our profession has changed drastically during the past decade. PPO insurance plans dominate the market, and most of them continue to cut reimbursements.

Corporate dentistry has come in with huge marketing budgets aimed at attracting patients based on convenience and lower fees that a single practitioner just cannot compete well with. Dental schools are pumping out large numbers of new dentists, which is increasing competition in the marketplace. More and more offices are seeing their overheads creeping up close to 75 percent. Doctors are burning out as they struggle with a lack of profitability. What is the solution?

I have spent the last 20 years traveling across the world, teaching dentists about CAD/CAM. I have found that I have learned quite a bit from those kind enough to share their stories with me.

Anecdotally, I have heard stories from doctors who were going to sell their practices and find another career because they just didn't enjoy running the office anymore. They add a CAD/CAM system, and they become reenergized to do more dentistry.

Henry Schein has also confirmed that it sees a 30 percent increase in dental supplies sold to doctors who add CAD/CAM systems, which increases to 57 percent if you add the blocks as well. With a scan-only system, the company sees a 9 percent increase. This increase is due to more dentistry being sold and done because doctors and staff are excited about what they now have to offer. It becomes fun again.

Many doctors out there hear what CAD/CAM has done for other practices and think, "That's good for you, but that won't work in my practice."

I challenge you to start by analyzing your practice. Enlist Henry Schein to do a Dental Practice Analysis (DPAT) for you. It will show you how to tap into the potential that is already there. It will show you what the return on investment would be for CAD/CAM in terms of the number of crowns or other indirect restorations your office has provided.

Many DPATs reveal a lab bill that is disproportionate to the gross revenue. Often times it shows that new patient flow is lagging. Once armed with

this information, you can address the needs of your practice. Many doctors have no idea that starting the digital cascade with a CAD/CAM system solves issues with profitability almost immediately.

This technology will reduce your lab bill by 4 percent minimum. It will help differentiate your practice. One survey done by a technology company indicated that patients who see a CAD/CAM dentist are more likely to refer their friends and family by 91 percent.

Adding CAD/CAM to your practice is just the tip of the iceberg to becoming more efficient and profitable. With this technology, PPO participation becomes feasible because now the cost to make the crown is only \$30, which is the cost of the block.

Offering single-visit dentistry becomes another arena to leverage. By getting the patient to stay for treatment in one visit, it cuts down on the likelihood of no-shows or cancellations, you lose the expense of turning over the room, and you regain 30 minutes of unproductive chair time that would be lost because of the cementation appointment.

Not to mention, patients today want things now. They don't want to wait two to three weeks to come back.

Often doctors find that CAD/CAM is the springboard into the rest of the digital arena. They often add CBCT technology, which then allows them to couple it with their CAD system to provide implants and Invisalign, as well as provide a platform for sleep dentistry.

These fully digital practices are very successful and usually have the lowest overhead. They are successful because they are focused on their patients' needs and giving the best and most predictable outcomes.

These practices are able to attract the best staff as they have the ability to expand their professional skill set.

So as you can see, starting with one piece of equipment leads to an avalanche of great things. You owe it to your patients; your staff and yourself to take a closer look at what adding this technology can do for your practice.

about the author CAD/CAM



Mark R. Morin, DDS, FWCM, lectures globally on the subject of CAD/CAM and various aspects of practice management, productivity and digital dentistry. With his energetic and engaging style, Dr. Morin teaches dentists how to utilize technology to differentiate and elevate their practices to the next level of success. Because of his passion for this area of dentistry and his dynamic delivery, he has earned a place amongst Dentistry Today's "Leaders in Continuing Education" every year since 2002. Morin maintains a private practice that remains in the top 1 percent of dental practices in the United States.

Digital dentistry made easy

Author_Brent Parr



Dr. Alex Touchstone

Mississippi dentist Alex Touchstone revolutionizes Planmeca FIT training

“As one of the world’s leading experts on advanced computer-enabled digital dental technology, Dr. Alex Touchstone knew there had to be a way to make it easier for dental professionals to integrate the technology into their offices.

“The Planmeca FIT system is fantastic, but there wasn’t an accessible source of online learning to train new users on the clinical side of the system,” explains Dr. Touchstone, who runs Touchstone Dentistry in Hattiesburg, Miss. “I thought ‘There needs to be one central location where dentists can discuss common issues, watch video tutorials and complete courses to gain confidence and improve their skills.’”

Touchstone launched *LearnDigitalDentistry.com* in 2015, and the online resource has changed digital dentistry for thousands of practices worldwide.

A premium membership to *LearnDigitalDentistry.com* allows dental professionals to watch hours of online video tutorials on everything from isolation and bonding to practice scheduling and marketing.

They can complete online C.E. courses for credit, watch live patient demonstrations and step-by-step procedures, and chat with other professionals in the forum to see how dentists around the world are handling different challenges.

Touchstone says beginners love the new “100 days to Clinical FITness” course because it breaks down everything in a way that makes it manageable — even for dental professionals who aren’t very comfortable with technology. He’s worked closely with Planmeca to ensure the course picks up where SOS leaves off. And it supplements Planmeca’s already top-level high-touch 100 Day Fitness Plan.

“It takes a dentist and their team through every-

thing they need to know to integrate the Planmeca FIT system into their practice,” Touchstone said. “You learn best practices for scanning, prepping, milling and bonding your restorations while maintaining clinical excellence.”

Each video lesson includes downloadable resources, links to related videos, a dedicated forum and a practice crown restoration file that allows you to apply the skills you’re learning. Plus, the dashboard crown counter helps you to record and improve your timing as you work toward offering one-visit dentistry.

Premium *LearnDigitalDentistry.com* memberships also include an educational video library from Optio Publishing (valued at \$49/month) that you can share with patients — chairside, in the waiting area or on your website. The engaging videos allow you to explain different procedures and promote good oral health, and the library includes titles on Planmeca CAD/CAM procedures, general dentistry, orthodontics, cosmetic dentistry and more.

Touchstone is offering 30 days free to anyone who signs up with the coupon code “LDD-NEWUSER-30D,” so he’s hoping to see lots of new faces over on *LearnDigitalDentistry.com*.

“No matter what level you’re on — or what level your team members are on — there’s a customized solution for you,” Touchstone promises. “We go beyond installation and show you exactly how to use your Planmeca FIT system to take your practice to new heights.”

To learn more about Touchstone’s online resource for mastering digital dentistry, visit learndigitaldentistry.com/register_

about the author CAD/CAM

Brent Parr is the founder of Optio Publishing Inc. Optio provides innovative marketing for dental practices and dental training websites such as *LearnDigitalDentistry.com*. He can be reached at brent@optiopublishing.com.

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'FITNESS' isn't just a personal choice: Creating the 'FIT' practice

Author_Angela Severance

'Learn Digital Dentistry has been a great resource in our learning experience. However, having a FIT coach has been most helpful. She has given me great confidence!'

—Tonia, Dental Assistant

_Making the commitment to become FIT is a challenge. It is a lifestyle change. One can't continue old habits and expect new results.

The onboarding of CAD/CAM technology requires a new routine. How would you get ready to start a diet and become FIT? Would you go to the grocery store and fill your house with bread, cookies and ice cream, or would you rid your home of those things? Would you have a plan? Would you educate yourself on the steps you are going to take in a certain timeline to achieve your goals? Would you have the support of friends and family members for continued encouragement when you're having a hard day?

Is getting FIT easy? NO — if it was everyone would do it. It takes commitment, the willingness to accept habitual change. If you're ready to get FIT, then read on!

_A way of life

Implementing a lifestyle change means surrounding yourself with supportive people. People who already have adapted to the new lifestyle and those onboard with accepting the challenge to change and grow.

Team buy-in is imperative to the success of onboarding this new technology. This means every single office member must be ready to accept the

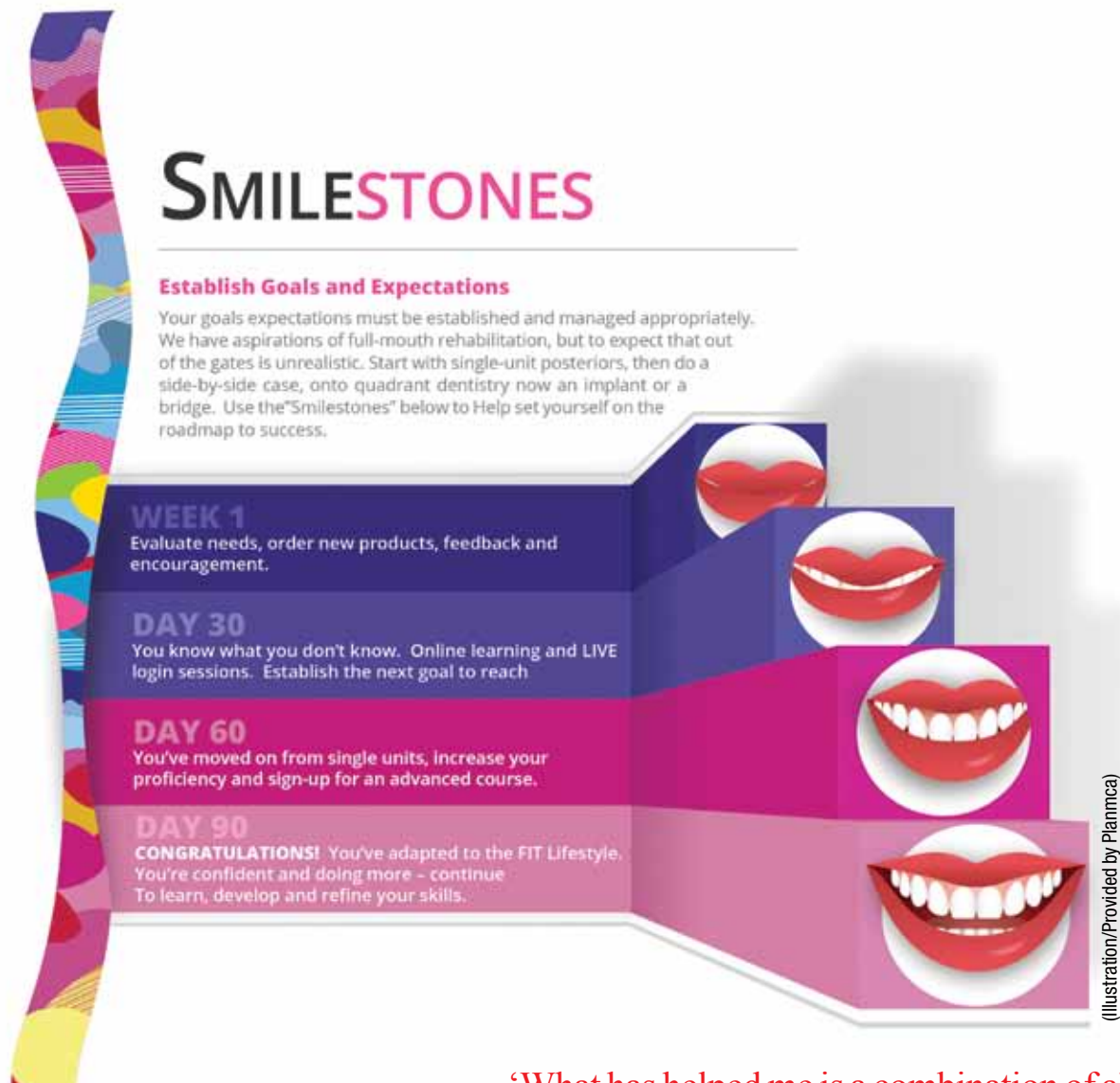
challenge to change. From the front-desk scheduling to the doctor's preps to the assistant's duties, all must become educated on all aspects of the process and work together.

It all starts with setting the scene for success. Before we begin a new FITness plan, we educate ourselves on the process. We need to know what we are getting ourselves into to set us up for success. We buy new tennis shoes, workout gear, get a gym membership, hire a personal trainer. We read the internet feverishly or buy a book or watch videos to ensure we will succeed.

When incorporating this technology, we too need to prepare the office for the new plan. We watch pre-training videos, purchase new burs and lingual retraction devices.

_Commitment

Commitment is key to making the lifestyle change stick. There will be days at the office those dozen donuts will be staring at you while you get yourself a cup of coffee, but it will take you and your support system to avoid temptation. Now, will you have a donut here or there? Probably. Everyone falls down. You don't quit the lifestyle change because you missed a workout or had the extra glass of wine. You wake up the next day and start fresh.



When incorporating this technology, there are hurdles that will be presented. Although it can be frustrating, this is how we learn. Instead of becoming upset, stay positive and look at the hurdle as another step closer to clinching your confidence curve.

Establish goals and expectations

Your goal expectations must be established and managed appropriately. If your goal is to lose 5 pounds in one week, you are going to have to be very dedicated and driven. If your goal is to lose 5 pounds in 5 weeks, you have a lot more leniency on your side.

People often ask me, "How long is this going to take me to learn?" My response to them is how frequently do you plan on using the technology? If you are doing two crowns a week vs four crowns a week, it will take you two times longer to become efficient. If you are doing two crowns a week vs eight crowns

'What has helped me is a combination of all the offered resources. Starting from the training in Dallas, which was definitely a good introduction to scanning and design. Followed by the in-office coaching, which gave us the confidence to start cases. Watching videos on Learn Digital Dentistry helped me a lot with my prep design. Lastly, the guidance and phone calls from our coach helped us proceed forward with more cases knowing that there is somebody there to help us if we struggle.'

— Kamelia Mallak, DDS

a week, it will take you four times longer to become efficient.

Think over a month how many crowns you have planned to do and set your expectations accordingly as to not let yourself down. Have a plan in place.

_about the author CAD/CAM



Angela Severance is a registered dental assistant and has practiced clinically for more than 20 years. While practicing clinically, her passion was directed toward integrating CAD/CAM technology into the dental practice. Severance concurrently worked with 3M EPSE, E4D Technologies and Henry Schein to assist with clinical evaluation, sales and customer support. She aided in the development of the Chair-side Dental Designer (CDD) program and is a CDD herself. She was a clinical educator at Planmeca University and speaks nationally on the evolution of the digital dental team, empowering and teaching others to adopt and integrate CAD/CAM technology successfully.

‘Our coach has been one of the most valuable assets to my practice using this new technology. My assistant and I are very grateful to Angela for her knowledge and understanding in coaching us.’

— Dr. Derek Wall

‘What has made me most successful with the integration is the encouragement from my coach. She has been the No. 1 resource and makes me feel much more comfortable and confident knowing she is always a phone call away if I need her! I have also gained knowledge by using the videos on the Planmeca Digital Academy and YouTube channel. I feel like because I am given all the resources and encouragement from everyone as a team I have been able to excel quicker and learn to be faster and more productive. The Planmeca sales team and Henry Schein rep all work together to make sure I feel comfortable with the learning process!’

— Jennie, RDA

Your plan needs to align with your goals. How quickly do you want to become FIT? If you work out twice a week, you will certainly start to see results but not nearly as fast as someone who is working out six days a week.

It works the very same way with CAD/CAM crowns. If your goal is to be doing restorations in two hours or less within 30 days, then you better be doing crowns every single day, utilizing the technology and refining your routine. The expectation that a crown here and a crown there will get you efficient in 30 days is unrealistic, so align your plan with your goals. Be proactive instead of reactive. Don't let yourself down because you didn't establish the patients ahead of time.

Just like you plan out your meals and your workout routines for the week and for the month, you too must plan out your patients and the number of restorations that need to be completed to attain your efficiency goals.

Managing expectations is the crawl, walk, run method. We all want to be FIT today. Going through the process of losing weight, changing our diet and toning our muscles is a painful laborious process. Wouldn't it be great to decide today that tomorrow we want to be lean and FIT and we wake up and it happens? Wake up! This is not possible.

I want to run a marathon. I wake up the next day and run 26.2 miles? Nope. I start off with a mile, then two, then a 5K, next a 10K. I run my first half marathon. I sign up for my first marathon, read the book, train, eat right, sleep right. It's no different then incorporating what you want to achieve within the FIT system.

We have aspirations of full-mouth rehabilitation, but to expect that out of the gates is unrealistic. Start with single-unit posteriors, then do a side-by-side case, onto quadrant dentistry, now an implant or a bridge but first get the resource — watch a video,

prepare yourself and set yourself up for success.

_Continuous learning

There are so many resources available to you when you are a part of the Planmeca family. Watching videos, joining a support group, requesting feedback from patients and LDD.com (Learn Digital Dentistry) to enhance further learning, retention and ability.

_The 100-Day Fitness Plan

The 100-Day Fitness Plan takes new doctors or team members through everything they need to know to integrate the Planmeca FIT system into the dental practice. They'll learn best practices for scanning, prepping, milling and bonding restorations while maintaining clinical excellence with a practice support team that will ensure a smooth and successful implementation.

There are five steps to "PRACTICE FITNESS SUCCESS"

- *Have a plan.* Execute the plan and stick to it. If there is a setback, then re-evaluate plan, establish new goal and execute.

- *Manage expectations.* This is a wand, not a magic wand. Crawl, walk, run.

- *Frequency of use.* If you don't use it you lose it. Two crowns a week vs four — takes one twice as long to gain efficiency. Two crowns a week vs eight — takes one four times as long to gain efficiency and clinch confidence curve.

- *Team buy-in.* Train, invest, encourage and most importantly believe in them. Have a supportive environment and make sure everyone is educated on all aspects of the process.

- *Commit.* Follow through. Stay positive. Continue education — videos, courses, utilizing the coach.

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How visibility, technology and efficiency led to rapid success

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Meet the men behind Corson Dentistry in Denver:
Michael Corson, DDS, and Kyle Miller, DMD



Dr. Michael Corson.
(Photos reprinted with permission
of Sidekick Magazine)



Dr. Corson's office in Denver, Colo.

From an Army hospital to a state-of-the-art cosmetic dentistry practice and, finally, to his own private practice in his hometown of Denver, Dr. Mike Corson Jr. has practiced dentistry in very different environments. Through those experiences, he has honed his skills in a wide range of dental specialties, which helped him envision how his own practice would be. Today, anyone who drives down I-25 in downtown Denver cannot help but see the oversized sign that advertises Corson Dentistry. It sits atop his building and is seen by 420,000 cars driving by every day.

The location that almost wasn't

Dr. Corson made the decision to move back to Colorado after practicing dentistry in the Army and in Scottsdale, Ariz. He had nearly settled on a location in a Denver suburb that his research confirmed would be profitable. Meanwhile, Henry Schein Field Sales Consultant Jason Whitlow met the doctor by chance at the office of another Denver dentist while making a sales call. Whitlow later reached out to Corson to suggest the downtown location. What the doctor saw convinced him it was an even better site than the suburban one.

"I saw the location and the density around the office," Corson said. "It was dense — I knew I could market to the area for years! The location also had great visibility and parking. Other offices nearby either didn't have the same visibility or wouldn't accept insurance, so I knew I could attract and retain a lot of patients there."

The doctor believed a combination of personality, efficient systems and a well-trained staff would lead to enough referrals that he could offset the money that would be written off from the insurance plans.

Today, Corson treats 3,500 active patients and adds 120 new patients each month. The 9 by 12-foot sign on top of his building that practically jumps onto the freeway is his main form of marketing; he also relies on Google and Yelp reviews he receives online from satisfied patients.

"We dominate now, with hundreds of positive reviews! When prospective patients look us up, that's what they see."

Interestingly enough, even though the location was outstanding, the space inside the building — retail space on the main floor with senior living apartments above — was nontraditional and therefore quite challenging to work with. The square footage was tight, so fitting all of the equipment required some changes to the usual specifications.

"When someone asks, I typically recommend 400 square feet for each operator, but that wasn't possible in Dr. Corson's space, so the design had to be adjusted," said Henry Schein Equipment & Technology Specialist Mike Stanislawski, who worked alongside Whitlow to help the doctor make selections for the office.

"We had to maximize our capacity in exchange for the great location," explained Corson, who noted the operatories are about eight feet across instead of the more common 10 feet. "We don't have side cabinets in any of the treatment rooms. Removing them gave us more space. We store supplies in 12 o'clock units,

Same-day restorations are a growing request from Dr. Corson's patients – made possible with the convenience of Planmeca's Planmill 40.



and we reorder supplies from Henry Schein by scanning bar codes, which are filed in a three-ring binder."

Spa-like ambiance and amenities

The practice is truly spa-like, with rich chocolate brown walls, comfortable upholstered furniture in the waiting area and a generous use of stained wood accents in wall niches and shelving and for framing the glass walls that keep the office open and bright. These homey touches are further emphasized with vertical wall tiles and carpeting, all in the same neutral tones, that lead patients through the office.

Other luxurious amenities include heated massage chairs and paraffin-wax hand treatments. To the delight of the hometown sports fans, framed jerseys from local professional athletes, who happen to be current and former patients, line the hallways. And as patients help themselves to gourmet coffee from the beverage station, they can look up and see Corson's framed army uniform, which is proudly displayed in the office.

"I personally wouldn't be where I am today," Corson said, "without my time in the military and the mentorship I received from both Dr. Mark Peck, a renowned cosmetic dentist, and my dad [Dr. Mike Corson Sr.], who is a well-known, retired dentist in the area."

To maintain an open feeling, Corson chose glass walls with rich wood beamed accents to showcase the consultation room. Neutral browns and tans cre-

ate a calming color palette and complement items such the check-out desk and waiting area.

High-quality care facilitated by cutting-edge technology

The 3,000-square-foot office, with its sophisticated yet comfortable feel, is equipped with the latest technology and equipment, and Corson essentially went "all in," purchasing everything he would need from day one instead of gradually adopting technology as his patient load grew. The office is paperless, and every piece of equipment is integrated with Dentrrix practice-management software. He brought an existing CAD/CAM system with him when he moved to Colorado, and he purchased a panoramic X-ray machine and digital sensors. After a year of running Corson Dentistry, he upgraded the panoramic X-ray to the Planmeca 3D Cone Beam unit.

"Before I had a cone beam, I sent my implant patients out for a CBCT scan," remembered Corson. "They would have to get in the car and see someone they didn't know. They didn't want to do that. They would either wait on the procedure or ask for a bridge instead. Now, we do the scan right in my office, and we have an acceptance rate of about 90 percent."

Around the same time, he also purchased a new Planmeca FIT™ restorative system to replace the CAD/CAM system he had. It made a large impact because he fabricates about 90 percent of all restorations in-house.



Dr. Corson invested in the Planmeca ProMax to provide precision 3-D imaging to his patients. The powerful Planmeca Romexis Software offers patients a comprehensive view of their diagnosis.

"The Planmeca FIT system allowed me to connect two laptops to the PlanMill," said Corson, who found the one room/one laptop setup with his previous CAD/CAM system was limiting his patient care and workflow. "I was going between rooms, so being able to add a second laptop was huge. Plus, the Planmeca FIT is a great product. The break-even point is so low, and I make money every month having that unit. It's had such a big impact on our practice that we are close to buying a second PlanMill 40."

Restorations placed on implants are still sent out to a lab, but the doctor utilizes Planmeca Romexis® and DDX software, which shortens the process by at least a week and, in his opinion, creates better-fitting, more precise restorations.

Rapid growth in staff, space and hours

When Corson opened the practice in November 2011, he employed just one assistant and one front-desk employee. He performed all procedures, from simple cleanings to complex procedures.

During the next few years, he added several hygienists, completed the other two operatories and welcomed Dr. Kyle Miller into the practice. Henry Schein helped Corson with the valuation of the practice and in drafting the associate agreement with Miller.

In 2013, Corson broke through a wall to expand into adjacent space and added three more operatories, bringing the total to eight.

"One of my favorite things about the practice is looking down the hallway into the new treatment

area," Corson said. "Now that we've maximized the space, we are offering extended hours."

Corson and Miller work on a split-shift schedule, with Corson working 7 a.m. to 1 p.m. and Miller working 1 p.m. to 7 p.m. These expanded hours are convenient for patients and allow the doctors to fully utilize all of the treatment rooms.

Ultimate goal to expand to multiple locations

With no further expansions possible in the current space, Corson's next goal is to expand his business through the acquisition of additional offices, and he would like to eventually have six locations under the Corson Dentistry banner.

In addition to operating a successful dental business, he also finds himself sharing his expertise in technology, lecturing about the Planmeca FIT restorative system at dental events and sharing his approach to integrated technology in his practice. "Many young dentists who have started or want to start their own practices want to meet with him and pick his brain," confirms Stanislawski. "They constantly seek him out, and he has a very open-door policy."

Corson maintains his mission is simple: offer comfortable, compassionate and convenient care to all patients. It must be working, because many patients drive a long way to see him. His successful formula — personality, good systems and staff, and a great location — has proven itself, beyond a doubt. —



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All images must be submitted separately, and details about how to do this appear below.

If you are interested in submitting a C.E. article, please contact us for additional instructions before you make your submission.

_Text length

Article lengths can vary greatly — from a mere 1,500 to 5,500 words — depending on the subject matter. Our approach is that if you need more or less words to do the topic justice, then please make the article as long or as short as necessary.

We can run an extra long article in multiple parts, but this is usually discussing a subject matter where each part can stand alone because it contains so much information. In addition, we do run multipart series on various topics. In short, we do not want to limit you in terms of article length, so please use the word count above as a general guideline and if you have specific questions, please do not hesitate to contact us.

_Text formatting

Please use single spacing and do not put extra space between paragraphs. We also ask that you forego any special formatting beyond the use of italics and boldface, and make sure that all text is left justified.

If you would like to emphasize certain words within the text, please only use italics

(do not use underlining or a larger font size). Boldface should be reserved for article headlines, headers and subheads please.

Please do not "center" text on the page, add special tab stops or use underlines in your text as all of this must be removed manually before layout. If you require a special layout, please let the word processing program you are using help you to do this formatting automatically rather than doing it manually.

If you need to make a list or add footnotes or endnotes, please let the word processing program do it for you automatically.

There are menus in every program that will help you apply all sorts of special formatting.

_Image requirements

Please number images consecutively by using a new number for each image. If it is imperative that certain images are grouped together, then use lowercase letters to designate the images in a group (i.e., Fig. 2a, Fig. 2b, Fig. 2c).

Insert figure references in your article wherever they are appropriate, whether that is in the middle or end of a sentence, but before the period rather than after. Our preference is to have figure references noted in the appropriate place within the text as it helps the readers to orient themselves when moving through the article. In addition, please note:

- We require images in TIF or JPEG format
- These images must be no smaller than 4 x 4 inches in size at 300 DPI
- Images should be 1 MB in size each

If you have an image that is greater than 1 MB, please do not bother "sizing it down" to meet our requirements, but send us the largest file size available. The larger the starting image is in terms of bytes, the more leeway the designer has in terms of resizing the image to fill up more space should there be room available).

Also, please remember that you should

not embed the images into the body of the text document you submit. Images must be submitted separately from the textual submission.

You may submit images through a zipped file via e-mail, unzipped individual files via e-mail or post a CD containing your images directly to us (please contact us for the mailing address as this will depend upon where you will be mailing them from).

Please do not forget to send us a head shot photo of yourself that also fits the image requirements noted above so that it can be printed along with your article.

_Abstracts

An abstract of your article is not required. However, if you choose to provide us with one, we will print it in a separate box.

_Contact info

At the end of every article is a contact info box with contact information along with a head shot of the author.

Please note at the end of your article the exact information you would like to appear in this box and format it according to the previously mentioned standards.

A short bio (50 words or less) may precede the contact info if you provide us with the necessary text.

_Questions? Comments?

Please do not hesitate to contact us for our International C.E. Magazine Author Kit or if you have other questions/comments about the article submission process:

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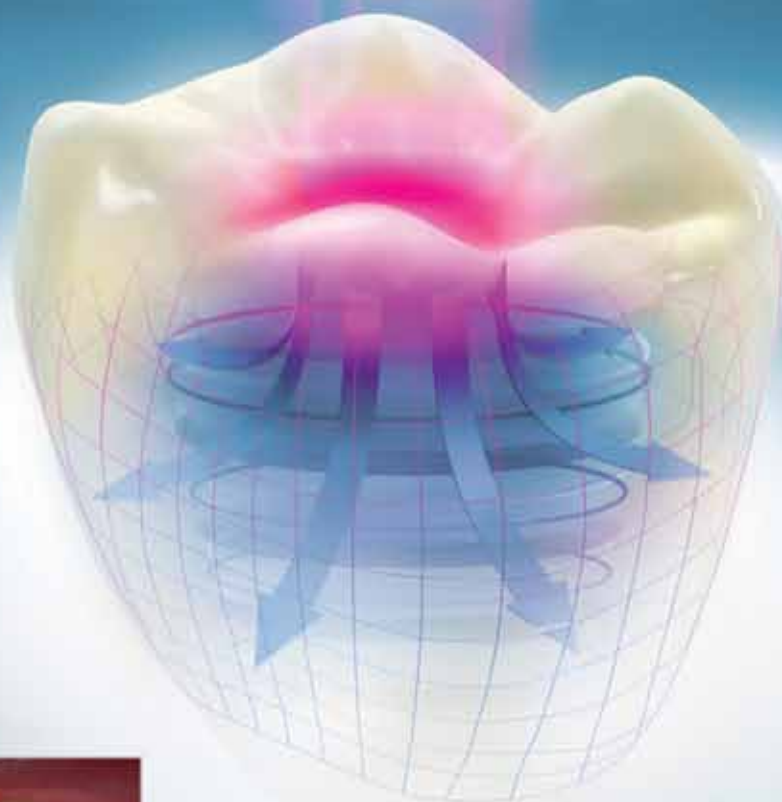
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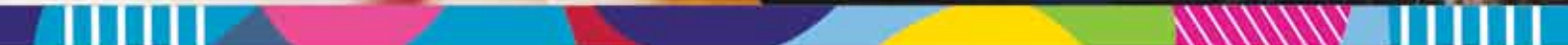
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