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## FROM THE EDITOR

# What Do You See?

BY MARK FLEMING, D.D.S.

I have just returned from the CEREC 25<sup>th</sup> Anniversary Celebration. It was a fantastic time, a veritable who's who of CEREC speakers. If one wanted to know anything about CEREC technology, this was the meeting to attend. Congratulations to all involved in producing this event.

Dr. Frank Spear started the general session. One phrase he used was very apropos for the weekend and for me in particular. At the beginning of his presentation, he put up a slide that said, "You can only treat what you see. You only see what you know. What do you see?"

What do you see? Dr. Werner Mörmann saw something unique when he started thinking about how to restore teeth in a different way. What he saw has changed the way thousands of dentists – myself included – now treat their patients.

CEREC software manager Ingo Zimmer gave us a look at what Sirona "sees" for the constant improvement of the CEREC technology. Exciting times are definitely ahead.

What do you see? Do you see something more than a technology that fabricates single-unit ceramic restorations? I know, for myself it seems that many advancements have happened since CEREC's 20th Anniversary. There have been incredible improvements in both software and hardware. The integration of CEREC and GALILEOS technologies has shown amazing treatment possibilities, especially in the area of implant dentistry. Dental manufacturers have made innovations in materials that allow CEREC users to



think beyond single-unit restorations. These are definitely exciting times, and Sirona's R&D team is going to ensure we have exciting times with this technology in the future.

*You only see what you know.* What do you know? It's our intent with this magazine to further your knowledge about CEREC technology. With this knowledge, we hope you see more

treatment possibilities. Do you see possibilities of doing multiple anterior restorations? Do you see possibilities of provisionalizing situations using this technology?

Knowledge is key to seeing. The [cerectoctors.com](http://cerectoctors.com) Web site is an incredible resource to help expand your knowledge, and your ability to see different possibilities for this technology. And with the five different levels of advanced CEREC courses at Scottsdale Center for Dentistry, you have the opportunity to see even more.

What do you see? What are you doing to expand your knowledge to see more possibilities of using this technology to treat your patients? We at [cerectoctors.com](http://cerectoctors.com) magazine are honored to help you to know, to help you see what CEREC Technology can do. ❖

P.S. – If you enjoyed CEREC 25, **don't miss the 3rd Annual CEREC Doctors Symposium**, July 15-16, 2011, at Scottsdale Center for Dentistry. Visit [www.cerectoctors.com](http://www.cerectoctors.com) for more information.





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## CLINICAL

# CEREC 3-D v. 3.8 and Long-term Provisional Prostheses Using CAD-Temp

Broadening the Applications  
for CAD/CAM Technology in Dentistry

BY MARSHALL WHITE, D.M.D.

**A**s dental CAD/CAM technologies continue to mature and enjoy adoption in more dental practices, their usefulness also continues to grow in scope. As an example, one area that has reached a point where it can readily become a part of mainstream application is in the fabrication of long-term provisional fixed

prostheses. When a patient will be provisionalized for longer periods of time to accommodate occlusal refinements, surgical healing, etc., excellent materials in a variety of block sizes and shade schemes permit the doctor to create esthetic and durable custom temporaries using CEREC 3-D and the MC XL milling unit.

VITA has a line of CAD/CAM blocks made of an acrylate composite resin manufactured specifically for provisional prosthetic applications. This material, called VITA CAD-Temp, is easily finished for immediate placement. CAD-Temp's high molecular weight polymer matrix is combined with micro-fillers; as with conventional bis-GMA composites, fillers that not only add strength and high wear-resistance, but also cause the prosthesis to polish easily to a great sheen while retaining high strength and low-wear characteristics. It can be used with the CEREC system to make provisionals for most fixed

**"When one considers time savings and the degree of direct control afforded by creating provisional prostheses in-house, to a tech-savvy CEREC doctor, CAD-Temp can be almost irresistible."**

applications; we have used it for bridges and splinted crowns.

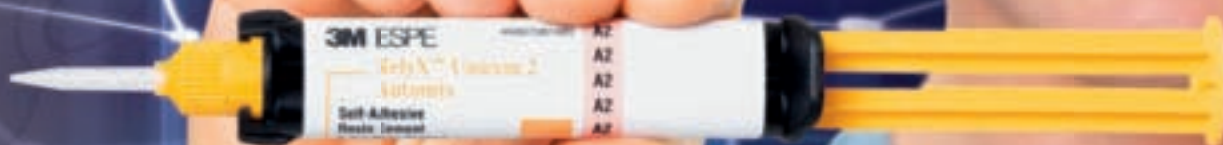
CAD-Temp is created to the same standard as acrylate composites used for premium denture/RPD teeth. So it will come as no surprise that whenever characterization, modification, revision or repair is required for CAD-Temp, this is handily performed using VITA's line of VMLC composites, a palette of light-activated resins that Vident specifically synthesized for use in custom characterization and repair of teeth that are part of

removable prostheses.

As is the case with the ceramic material composing the familiar blocks used with CEREC, the composite in CAD-Temp blocks is manufactured under ideal conditions of atmosphere, pressure and temperature. This means that CAD-Temp blocks are free of voids, and polymerization approaches 99 percent. The quality-control measures that can be imposed on a manufactured product assure CAD-Temp enjoys the same degree of homogeneity and shade consistency as its porcelain cousins. And just as VITA's TriLuxe and TriLuxe forte ceramic blocks broaden the doctor's aesthetic control, the special CAD-Temp multiColor CTM-40 line of CAD-Temp blocks broaden aesthetic applications for long-term provisionals. These factors alone make this modality a unique and attractive alternative to lab-fabricated custom temporary prostheses. When one considers time savings and the degree



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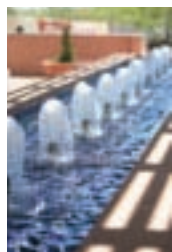


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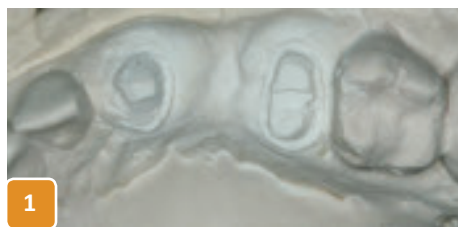


of direct control afforded by creating provisional prostheses in-house, to a tech-savvy CEREC doctor, CAD-Temp can be almost irresistible.

Following is a case wherein a patient desired two prostheses: a straightforward three-unit bridge to replace #12 over a fully healed extraction site, and a lower anterior prosthesis that will serve to splint three of the lower incisors and replace the fourth following non-surgical gum therapy with extraction of that hopeless tooth. Fabrication and placement of a definitive prosthesis in the upper arch is at five weeks; the lower anterior will be accomplished following a healing time of about 12 weeks. We'll detail the steps for design of the upper provisional and show some images of the lower provisional RPD after being in place for a few weeks.

### THREE-UNIT FPD (PROVISIONAL PROSTHESIS)

Following local anesthesia, pre-op impressions were taken. An Isolite was used for airway protection, auxiliary evacuation and illumination of the operative field. Then teeth #11 and #13 were initially prepared in typical fashion to receive an all-ceramic FPD. To the degree possible, all margins were placed supra- or equi-gingivally; initial reduction and preparation form was achieved, but preps were not necessarily finalized at this point. The entire surfaces of both abutments were cleaned with Ultradent Concepsis and sealed using Simplicity (APEX Dental Materials) according to manufacturer's instructions. Then the teeth were



swabbed with 70 percent isopropyl alcohol to remove O2-inhibited monomer, rinsed, dried, isolated and impressed using a generic VPS impression material.

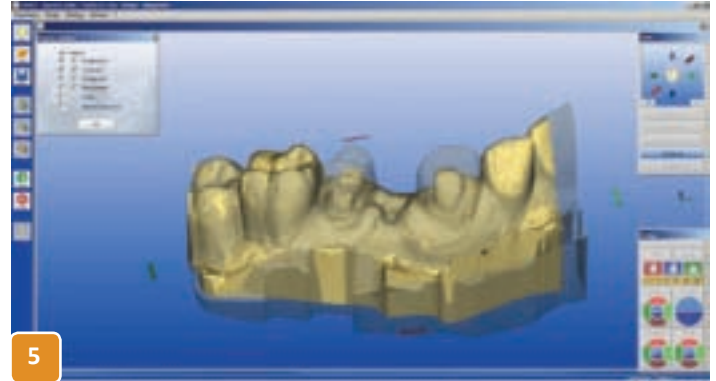
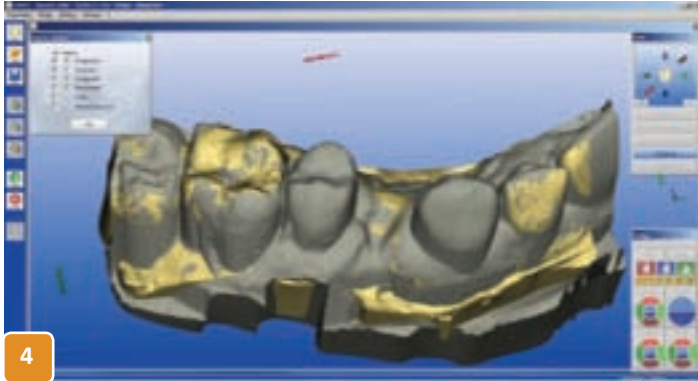
Both the pre-op and the preliminary final impressions were poured up by a dental assistant using Snap-Stone® (Whip Mix Corp), and allowed to set for a minimum of 10 minutes. Models were inspected, blown free of dust and then lightly powdered using Vident CEREC Powder (Figures 1, 2).

First, the model with prepared teeth was scanned into the CEREC 3-D unit. Then the model of the teeth in their preoperative state is scanned taking

into account any positional nuances of the camera that gave the best scans of the preps. For the purpose of making the CAD-Temp provisional, scans only extended one-and-a-half teeth beyond each of the abutments (Figure 3).

At this point, perusal of the virtual models on the CEREC 3-D can be quite useful, as it may aid in discernment of undercuts, less-than-ideal reduction or issues of parallelism (Figures 4, 5). These issues usually are of little or no consequence to the provisional FPD under consideration, but when finalization of the preparations is performed (during the milling of the CAD-Temp temporary bridge),





correction may be required or desired for the final bridge.

Now attention returns to the teeth. The mouth was again isolated with an Isolite; the teeth rinsed, dried and closely inspected under 6x loupes. If required, at this point finalization of the abutment preparations would be accomplished. Cord can be packed, buccal margins lowered or otherwise modified, insertion axis or undercuts addressed, corners rounded, etc.

On rare occasions, the CAD-Temp provisional prosthesis may need to be lined to close margins as a result of changes made during this phase of treatment, but any other modifications of abutments will be inconsequential to the CAD-Temp bridge. If any changes to the abutment preps were made, the abutments are again sealed with Simplicity, then swabbed with 70 percent isopropyl, rinsed, dried and final conventional or optical impressions made for fabrication of the definitive prosthesis.

## ON THE CEREC 3-D

Bridge design was accomplished in Master Mode, in this case using CEREC 3-D software v.3.8. Once the Preparation and Occlusion images had

been scanned in and virtual models correlated, good superimposition was confirmed using Window > Display Options > Occlusion (Figure 4).

The first margin requested was #11, then a request for our outline of an approximate footprint for the pontic #12 and finally a margin for #13 (Figures 6, 7). A proposal for all three units of the bridge is then generated by CEREC 3-D v.3.8 in a single step (Figures 8, 9).

Toggling on and off the Occlusion feature in Display Options permits positioning and manipulating of individual units into positions approaching the native or pre-op state. This toggling of the Occlusion feature can also be a guide indicating occlusal morphology that had successfully occluded with opposing teeth, thus permitting refinement of the abutment proposal teeth into a shape and position where, when milled, they will demonstrate pleasing aesthetics and a functional occlusion requiring very little adjustment (Figures 10, 11). After completing the abutment teeth, the pontic was completed last (Figure 12).

The joints where units connect should be given close attention. To start, it's suggested using the Scale tool

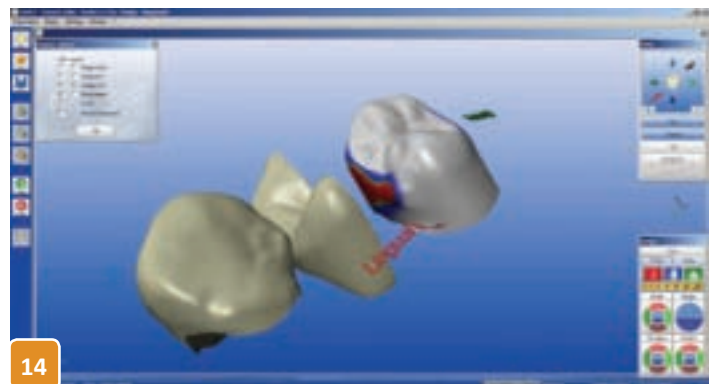
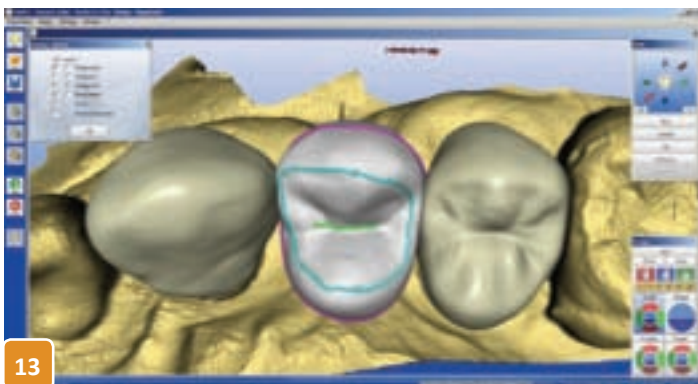
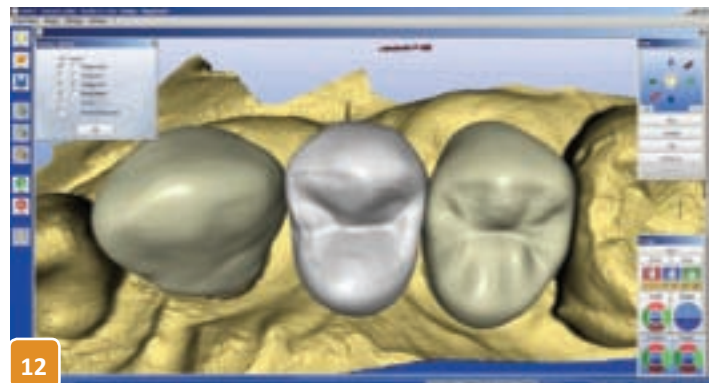
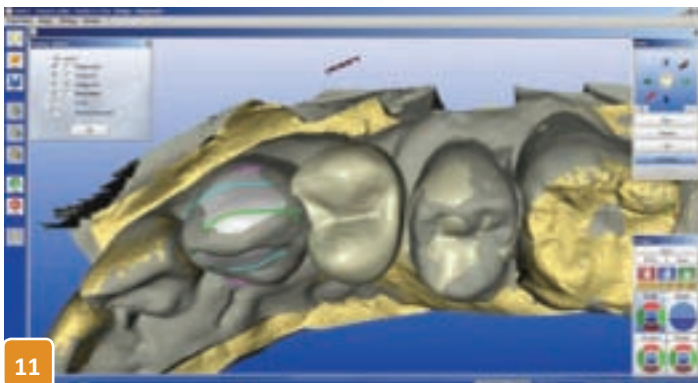
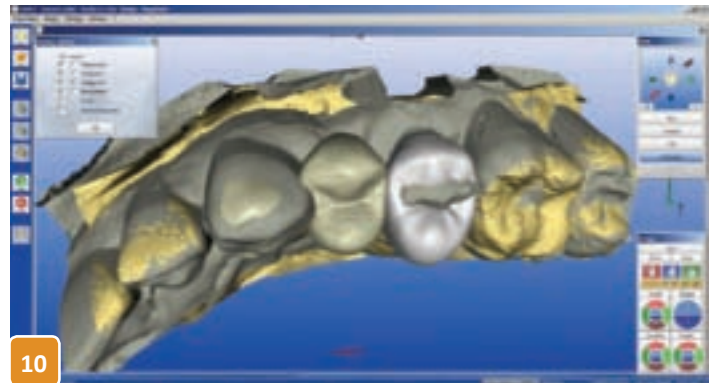
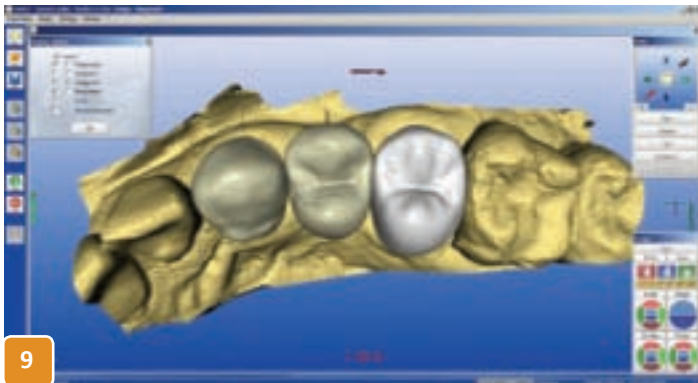
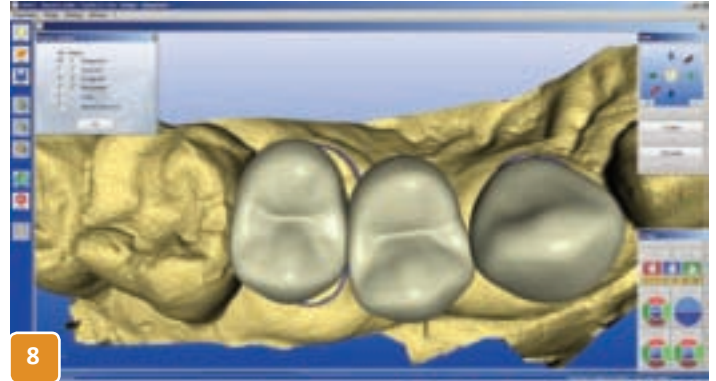
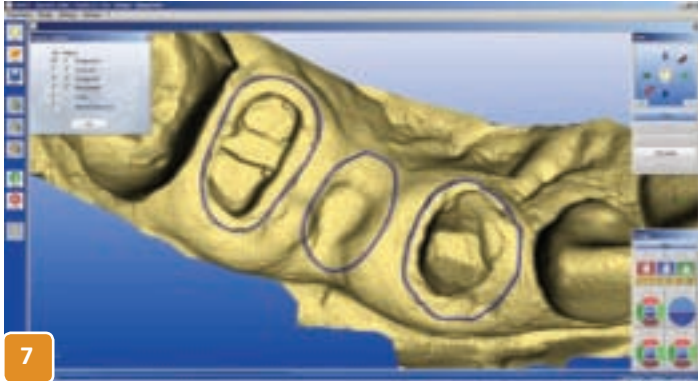


to widen the pontic in the mesio-distal dimension (Figure 13). Experience has shown it prudent to use the Trim and Contact features to access embrasure areas of each unit, and use the Form tool to ensure not just sufficient axial thickness but also a large enough surface area of overlap between bridge units that strength is maximized (Figure 14).

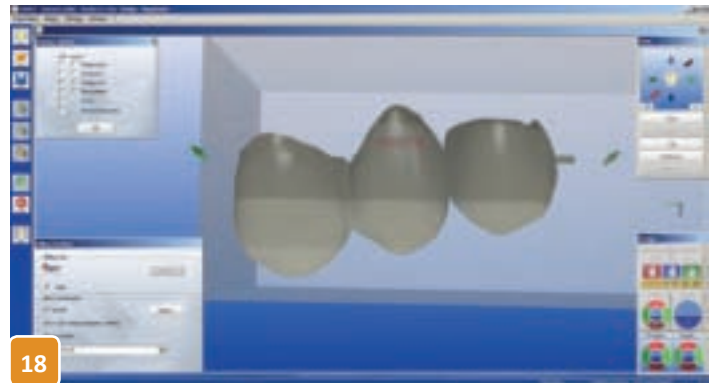
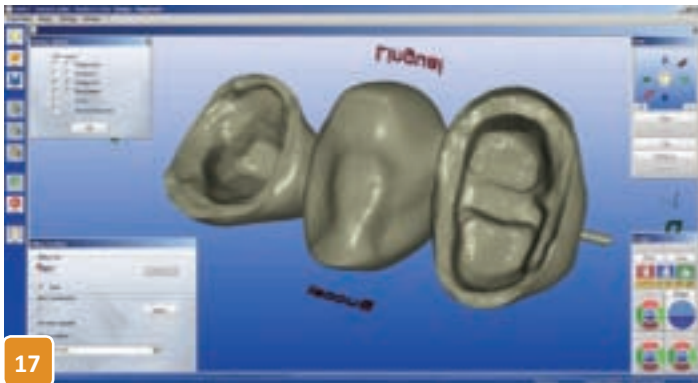
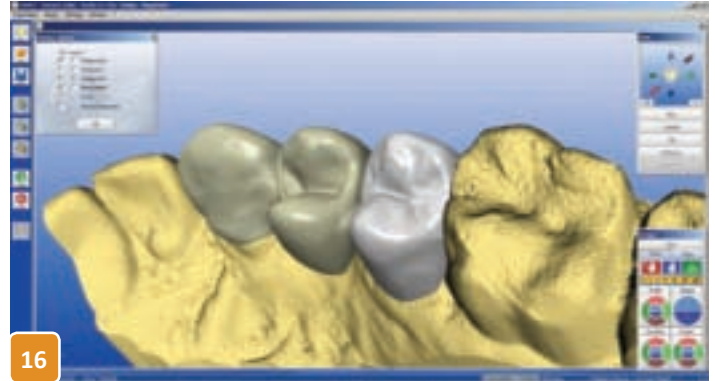
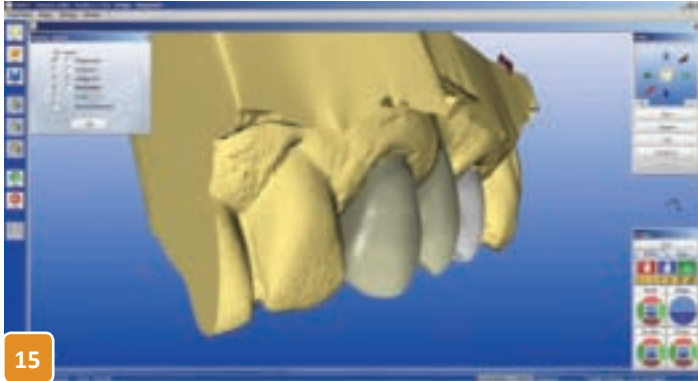
This is the time for thinning or thickening of margins, smoothing, confirming contacts, checking for harmonious alignment and making any finishing touches. All sides were checked before moving on (Figures 15, 16).

Milling preview showed a good virtual result, and for this bridge we chose a VITA CAD-Temp multiColor CTM-40 block (Figures 17, 18). While uniformly single-shaded blocks are available as well, this block has slight gradations of shade and translucency









that help reduce monochromism. At 40 mm in length, these blocks can accommodate bridge or splinted-crown prostheses of four to six units. The single-shaded VITA CAD-Temp blocks are also available in a 55 mm length that can be milled into an entire quadrant, but our experience has shown it is limited only by the degree of curvature present in the required span.

Milling took about 30 minutes; time spent refining preps and getting a final master impression for the lab. Once

milled, the bridge was given an initial polish and fitted to the model of the preliminary preparations, a model where the teeth immediately adjacent to the new prosthesis had been adjusted so as not to interfere with its mesial and distal contacts (Figures 19, 20).

## BACK TO THE MOUTH

The intaglio (Figure 21) of the provisional bridge was inspected, cleaned, and the prosthesis fitted to the abutments. Contacts and occlusion

were adjusted and it was placed with temporary cement (Figures 22, 23) following a final shine. Oral hygiene instructions were reinforced, and just prior to discharge photos were taken showing the new bridge in place as well as a second lower anterior temporary bridge that had been placed a few weeks earlier (Figures 24, 25). Biocompatibility is extremely high for VITA CAD-Temp as demonstrated by the photos of the lower anterior prosthesis in place for some time. Similarly, several weeks later the soft tissues remain very healthy in an image taken upon removal of the #11-13 VITA CAD-Temp provisional bridge to try in the final prosthesis (Figure 26).



*For questions or additional information, reach Dr. White at [m@mwdmd.com](mailto:m@mwdmd.com).*





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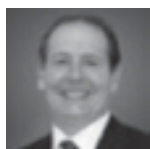
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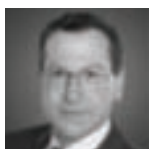
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# q&a with DR. BOB WINTER

BY SAMEER PURI, D.D.S.

IT WAS MY PLEASURE for this issue to interview an individual unique in the field of dentistry. Not only is Bob Winter an incredible clinician and prosthodontist, he is also a master dental technician. He was instrumental in helping to design one of the most-used porcelains in dentistry. He now helms The Winter Laboratory and teaches with the Spear Education group in Scottsdale. I hope you enjoy his insight into the connection between the laboratory and CEREC.

**Q:** *For those that do not know Dr. Bob Winter, can you tell the readers about your experience in dentistry and a bit about your history?*

**A:** I graduated from Marquette University School of Dentistry in 1981, and then specialized in prosthodontics at the Veterans Administration Medical Center in Milwaukee. I had a full-time practice limited to prosthodontics from 1983 to

2009. I have been fortunate in that I have taught more than 500 didactic, clinical, and technical courses in more than 35 countries over the course of my career, and have served on faculty at several universities. Probably the highest honor that I have received is the Dental Alumni of the Year Award from Marquette University in 2005. In addition, I was the second recipient of the Gordon







Christensen Lecturer Recognition Award for Excellence in Restorative Education in 1991. I have published numerous articles for peer-reviewed journals, and am currently serving on the board of directors of the American Academy of Esthetic Dentistry.

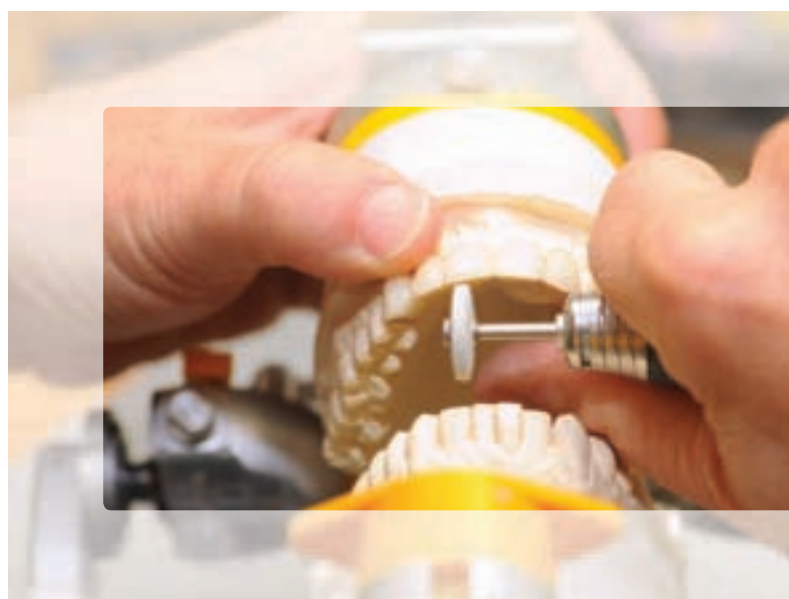
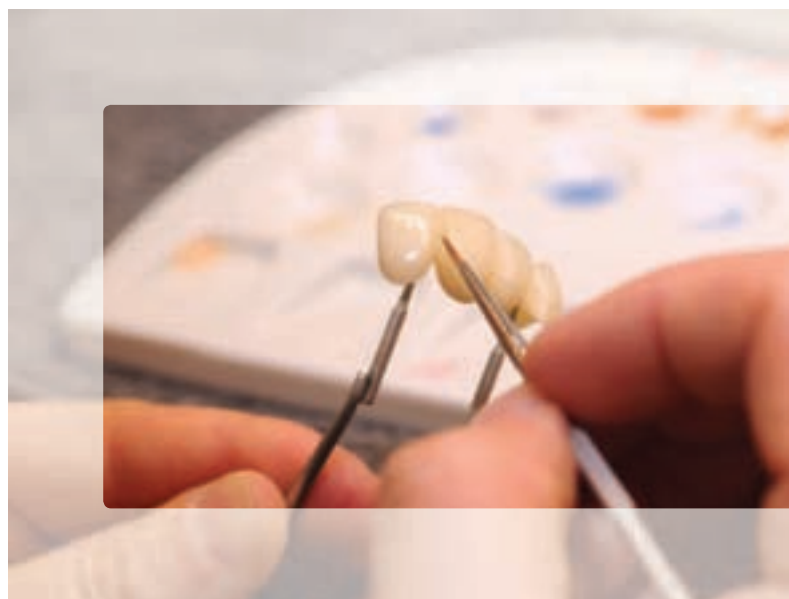
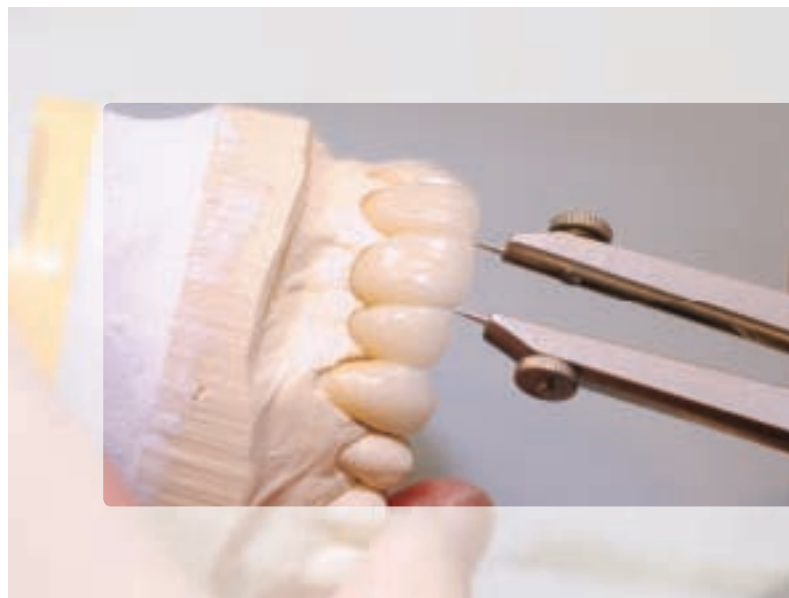
**Q:** *How did you end up as one of the faculty members for Spear Education?*

**A:** I have known Frank Spear for 21 years. He is one of the most talented clinicians I know, in addition to being one of the most exceptional teachers in the world. I practiced with Frank for six years in Seattle, and enjoyed teaching with him during that time. A year and a half ago he asked if I would join him in Scottsdale at the education center to help supplement the dental continuing education efforts occurring there.


**Q:** *What led to the creation of The Winter Lab?*

**A:** I have personally been involved in dental technology since dental school. I have performed all phases of technology, in particular ceramics, taught dental technicians in all phases of their profession, and owned and operated a dental laboratory for 27 years. In addition, I developed Ivoclar's d. SIGN ceramic. When Frank asked me to become involved with Spear Education, we saw a great opportunity to not only coach clinicians on their clinical skills and knowledge, but also to support them in dental laboratory procedures. Our goal is to more closely integrate the technician into the restorative team and provide services that enhance their educational experience.

**Q:** *The Winter Laboratory has clients from all over the country. What kind of work does the lab perform, and what kind of a doctor does it attract?*








**A:** The Winter Laboratory performs fixed prosthodontic services ranging from single units to full-mouth rehabilitations, smile design and cosmetic cases, and implant restorations. The clients are general dentists and prosthodontists who are seeking out quality services for their patients.

**Q:** *What is the future for The Winter Lab?*

**A:** The plan is for The Winter Laboratory is to have controlled growth in order to satisfy the needs of our current clients. When I say 'controlled growth,' I am referring to increasing the number of qualified technicians to stay ahead of the demand for services. We do not want to compromise the quality of our product nor extend turnaround times. The Winter Training Program is an integral part of our efforts. It is designed to elevate the skill and knowledge of our technicians by following the philosophies of Spear Education.

**Q:** *As a clinician, what is your personal impression of CEREC technology?*



**A:** I have been exposed to CEREC technology since I arrived at Spear Education. I have been fortunate to be able to attend CEREC courses here with leaders in the field, Dr. Sameer Puri and Dr. Armen Mizayan. We have since incorporated the technology into some of the posterior live patient courses at the center. I've been extremely impressed with the occlusal morphology and the fit of the milled posterior restorations, especially when there is an appropriate preparation design for the milling process. This is a rounded, flowing design that accounts for the size of the milling bur. I cover all of the preparation design requirements and the burs that are used, in the restorative design courses I teach at Spear

Education. In addition, I have my technicians assist in teaching the CEREC course information pertaining to contouring, surface texturing, staining and glazing, on both anterior and posterior restorations. They work hands-on with the doctors and assistants that are attending the courses to improve their skills in these procedures.

**Q:** *Has your impression regarding CEREC changed as CAD/CAM technology has evolved?*

**A:** Certainly my impression has changed over the years. Twenty-five years ago, I thought it was a brilliant idea, the future of dentistry, but the outcomes produced were not very impressive as they related to fit, morphology, and esthetics. With the advancements in technology, scanning methods, milling procedures, equipment, and materials, the improvements in the restorations that are milled is truly amazing. It seems there is a new or updated software program every few months, rather than years.

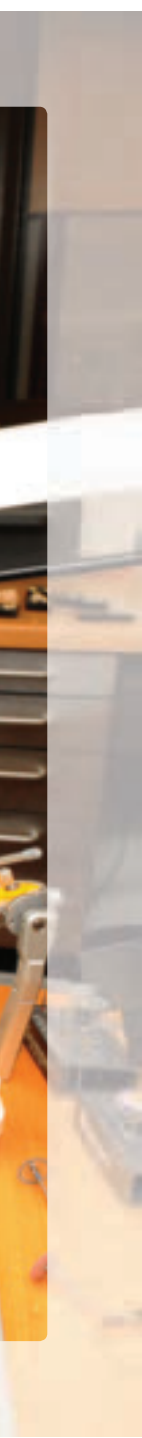
**Q:** *As you see it, what role does CAD/CAM technology play in the dentist/lab relationship?*

**A:** The role CAD/CAM technology plays in the dentist/technician relationship will continue to evolve. The transfer of information compared to conventional methods is quicker – almost instantaneous – easier, and possibly more accurate. It is possible for the dentist to transmit an image of the tooth preparations to get input from the technician concerning space requirements for the restorative material. It is possible for the dentist to design the restoration or have the technician design it and have the dentist check it if he or she desires. How the relationship evolves will depend on the degree of collaboration desired by both parties.









**Q:** *In what ways has CAD/CAM technology redefined the dentist/lab relationship?*

**A:** CAD/CAM technology can positively or negatively impact the relationship between the dentist and technician. It is possible that the dentist produces all posterior restorations chairside, eliminating the need for a laboratory. The dentist may choose to do single posterior restorations and send the more extensive or complex restorations to the laboratory by conventional means or using CEREC Connect. In addition, the dentist can choose not to have a milling unit in the office, and instead work exclusively thorough CEREC Connect for all posterior and anterior restorations. This obviously enhances the relationship and opens the door to better communication and interaction.

**Q:** *From the lab perspective, what has been the most significant effect of CAD/CAM dentistry?*

**A:** Not only is CAD/CAM technology important in the clinical setting, but its effects are progressively impacting the dental laboratory. Every day there are increasing numbers of designed and milled components for restorative dentistry. They include but are not limited to implant abutments, surgical stents, implant frameworks, copings, bridges, and provisional and final restorations of all types. Many clinicians may not know that part or all of the restorations they receive from the laboratory involve the use of some type of CAD/CAM technology.

**Q:** *Do you feel it is important for clinicians to incorporate digital impressions into their practice?*

**A:** I would strongly encourage all dentists to investigate the technology, and consider integrating digital impressions into their day-to-day practice. This technology has evolved

tremendously in recent years, and there is no question that it will overtake conventional impression-taking in a few years. The detail in the milled or printed models produced relating to tooth preparation, is quite impressive. The weak link at the moment is in capturing the surface detail of the anterior teeth that are not prepared. A conventional impression is needed to depict this detail in order for the technician to incorporate it into the final restoration.

**Q:** *What impresses you most about CAD/CAM dentistry?*

**A:** The most impressive aspect of CAD/CAM technology is the advancement in software programs that has allowed for greater accuracy, detail, and natural morphology. The design capabilities are faster, easier, and more efficient at producing the desired outcome.

**Q:** *Do you think it would be an advantage for lab technicians to be digitally trained?*

**A:** There is no question that laboratory technicians need to be digitally trained. In some laboratories, there may be a CAD/CAM department, and in others, virtually everything may be done using this technology. If technicians choose not to become involved, they will be left behind as dentistry's use of this technology continues to evolve. They may be left only producing highly customized restorations for demanding or highly discriminating patients.

**Q:** *How can a lab justify the cost of a CAD/CAM system such as CEREC inLab?*

**A:** The better question may be, how can a laboratory justify *not* investing in CAD/CAM technology? It would be very short-sighted not to get involved, not only to be able to improve the



**"The most impressive aspect of CAD/CAM technology is the advancement in software programs that has allowed for greater accuracy, detail, and natural morphology. The design capabilities are faster, easier, and more efficient at producing the desired outcome."**

efficiency and decrease the costs associated with production, but to be able to communicate and interact with clinicians as this technology becomes more extensively integrated into dental practices.

**Q:** *What advantages are there for clinicians to use a chairside milling system versus sending the case to a lab?*

**A:** If the clinician uses a chairside milling system, digital images are taken of the opposing teeth, prepared teeth and occlusion, eliminating the need for conventional impressions and bite registrations. These procedures save time, in addition to eliminating the expense of the materials. The ability to immediately evaluate the results may minimize potential adjustments or remakes because of errors that may not be recognized until conventional processes are completed in the laboratory. There is no provisional restoration required, nor is a second appointment needed to insert the restoration if the dentist decides to design and mill immediately. The patient receives anesthetic only once, and if the restoration is cemented/bonded at the same appointment, there can be a significant savings in time and costs for both the patient and the dentist.

**Q:** *CAD/CAM was once thought by some to endanger the clinical/laboratory relationship. How do you see CAD/CAM and digital dentistry bringing dentists and labs closer together?*

**A:** There is no question in my mind that CAD/CAM and digital dentistry will bring dentists and technicians closer from a collaboration perspective. Yes, some restorations, mainly posterior in my opinion, will be done chairside in the dentist's office, decreasing the need for a working relationship if this is the main focus of a dentist's practice. However, I strongly believe this technology will force a more intimate working relationship and communication, because of the interactive nature and efficiency with which it can be accomplished. I believe that many dentists will realize that producing all of the ceramic restorations in their office would require hiring a ceramist to be able to efficiently complete the desired anterior esthetic outcomes expected by their patients. The more cost-effective and practical approach would be to use CEREC Connect. This improved collaboration between the dental practice and laboratory will be the key to the success of both entities.

**Q:** *What does the future hold for Dr. Bob Winter?*

**A:** I will be focusing 100 percent of my energy on teaching at Spear Education and The Winter Laboratory. When I retire, I will pursue my hobbies of skiing, golf, photography, and courses in painting and sculpture. I can't imagine totally stepping back from dentistry, and so will hopefully continue to teach on a limited basis. ❖



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## ESTHETICS, PART 2

# Achieving Natural Esthetics: Physiologic Contours and Surface Topography

BY ROBERT WINTER, D.D.S.

**T**he first in this series of articles explained the scientific principles related to color, optical effects, and surface attributes, as they affect light reflection or absorption into the tooth. This article will focus on the aspects of a tooth or restoration that relate to contour and surface topography.

Restorations can be designed on the computer and then either milled to full anatomic form and stained, or milled to full form, cut-back, and layered with an incremental build-up of ceramic enamel overlay. With either technique, the resulting restoration form and surface detail will need refinement by contouring with a diamond bur before glazing, in order to achieve the desired final outcome. Putting more detail into the initial design will minimize the amount of grinding and contouring that is required. However, unique surface attributes will need to be added.

## GENERAL GUIDELINES

Facially generated treatment planning principles as taught at Spear Education must be followed to produce the appropriate smile design for the patient, and to create a functionally enduring restoration. The maxillary anterior teeth should display an age-appropriate amount of tooth structure in repose, and be in harmony with the



» Fig. 1: This smile represents the beauty of nature. There are subtle differences in apparent tooth size because of their position, incisal edge form, incisal embrasure appearance, and surface light reflectance. None of these factors distracts from the harmony of the smile.

to the imbalance. This does not imply that there must be total symmetry or a mirror image, but rather balance must be maintained so that the focus of attention is not on an irregularity or flaw in the smile.

## TOOTH SHAPE DETERMINANTS

Shape refers to an object's outline form or its two-dimensional aspect. The four aspects of a tooth that need to be considered are the incisal edge, incisal proximal corners, interproximal contact length, and the influence of the gingival tissue on the anatomic tooth exposure.

## INCISAL EDGE

smile line formed by the lower lip. The general morphology and arrangement of the anterior teeth must be in balance with their adjacent teeth, and more importantly, to their corresponding contralateral tooth (Figure 1). If there is an imbalance from one side of the smile to the other at a social distance, this will attract the viewer's attention

The incisal edge shape can be flat or convex, but never concave. If it is flat, it typically denotes an aged or worn tooth. The shape may be dictated by the parafunctional habits of the patient. A convex incisal edge denotes a more youthful appearance. If the edge has irregularities, it will simulate a natural tooth (Figure 2). It can be specifically





» Fig. 2: The natural teeth have convex incisal edge form with subtle irregularities. They will not be apparent at a social distance. The incisal embrasures are generally open, except between the right lateral and central incisors, which is closed because of the mesial-palatal rotation of the lateral incisor.

requested by a patient to give the appearance of a more “perfect” tooth.

## INCISAL PROXIMAL CORNERS

The shape of the proximal corners in combination with the tooth position, rotation, and arrangement with the adjacent tooth, will determine the incisal embrasure. The open or closed appearance of the incisal embrasure is critical to the overall appearance of the final case. The silhouette of the incisal edges in contrast to the dark background of the oral cavity gives the teeth their individuality, and the smile design its natural uniqueness or its artificial, more “perfect” appearance. The incisal corners can be round or square. Typically, the more round the corner, the more open the incisal embrasure, giving the tooth or teeth more individuality. The more square the corner, typically the more closed the incisal embrasure becomes. This,

in combination with a flat incisal edge, leads the observer to perceive a worn dentition. The possible combinations of incisal edges and proximal corners determine the general shape of the tooth in the incisal third.

## INTERPROXIMAL CONTACT LENGTH

The interproximal contact length is determined by the most incisal interdental contact point to the papilla tip. This assures that the gingival embrasure is closed. The length is predetermined by the existing papilla height and the incisal embrasure that has been established. The physical tooth width will be determined or dictated by the adjacent natural teeth, or if multiple tooth restorations are being fabricated, it is possible to shift



» Fig. 3: The tooth shape in the gingival third is determined by the gingival tissue drape over the tooth. Adjacent central incisors appear to be significantly different because of their tooth position in the arch and the underlying bone, which results in the tissue being 1.5 mm higher on the right central. In order to establish the same tooth length and elliptical shape to the soft tissue, the tooth position, contour, and probably the underlying bone, would have to be altered.

interdental contacts to slightly alter tooth widths. The average length-to-width proportion of maxillary anterior teeth ranges between 75 percent and 85 percent.

## GINGIVAL TISSUE CONTOUR

The shape of the tooth in the gingival third is determined by the soft tissue. The gingival architecture can be flat, scalloped, or highly scalloped. These are determined by the tooth morphology, and height and contour of the underlying bone (Figure 3). The shape of the tissue can be altered slightly by subtly changing the subgingival contour of the restoration, causing it to be repositioned. If more significant changes are desired, osseous re-contouring may be necessary.

The resulting combination of the above determinants establishes the shape of the tooth as being square, rectangular, triangular, ovoid, or tapered. By altering the contour, subtle changes in the overall appearance of the restoration can be made.

## TOOTH CONTOUR DETERMINANTS

Contour refers to an object's three-dimensional aspects. The five aspects of a tooth that need to be considered are transitional line angles, gingival height of contour, facial planes, surface topography, and tooth arrangement.

## TRANSITIONAL LINE ANGLES

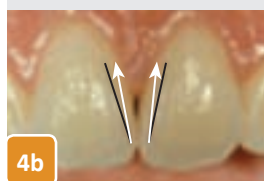
The transitional line angles are where the light reflects off the mesial and



distal heights of the tooth's contour, and establishes the heights of contour proximally. These areas are convex in nature, and because of its prominence, the surface is smoother than other areas of the tooth. The heights of contour can be moved toward the center of the tooth, making it appear narrower, or moved toward the proximal aspect, making it appear wider. This is only a perceived change, achieved without altering the physical dimensions. The

**Understanding shape, contour, and surface topography will assist the clinician in creating an outcome that more closely mimics nature.** The more detail you incorporate into the design of the restoration, the less contouring will be needed to create the desired outcome.

direction of the transitional line angles can influence the perceived shape of the tooth. If the transitional line angles are more vertical, the tooth can appear to be more square or rectangular (Figures 4a, 4b). If the angles are converging from the incisal to gingival third of the tooth, it will appear more tapered or ovoid. In addition, the heights of contour can be straight or curved, resulting in the tooth being more square or rectangular, rather than more ovoid. The prominence of



» Figs. 4a, 4b: Adjacent central incisors have a triangular tooth form and a small interdental contact in the incisal third.

The black line is adjacent to the light reflective line that is on the height of contour. The tooth shape can be changed to appear more rectangular by making a longer interdental contact and moving the transition line angles to the location of the white lines.

the height of contour will greatly affect the three-dimensionality of the tooth.

### GINGIVAL THIRD HEIGHT OF CONTOUR

The tooth's gingival third height of contour is sometimes referred to the "cervical bulge." The most important aspect of the contour in the gingival third is to support the gingival tissue facially, and the papilla. The contour prominence can vary slightly; however, it should always be convex to replicate natural morphology. The contour created emerging from the tissue should never be straight or concave. This will not adequately support the gingival tissue, and may open gingival embrasures leaving space between the interdental contact and the papilla tip. The gingival height of contour can be moved slightly incisally, making the



» Fig. 5a: The lateral incisors have a relatively smooth surface

topography. The typical developmental concavities are apparent on the central incisors.

» Fig. 5b: These natural teeth have a very stippled surface, which can be replicated in ceramic by bouncing the tip of a diamond bur on its surface. When the restoration is subsequently glazed, the small divots left by the diamond round slightly, simulating the pattern of light reflection.

tooth appear shorter and more round. If it is moved more gingivally, the tooth will appear longer and flatter.

### FACIAL PLANES

The facial planes are best evaluated in profile. The facial aspect of the tooth can be flat or in one plane, from the gingival tissue to the incisal edge. The gingival third height of contour will be located at the gingival tissue crest. This flat contour will lengthen the appearance of the tooth.

The facial aspect of the tooth will be more curved if the gingival height of contour is positioned toward the transition from the gingival third to





6a



6b

» Figs. 6a, 6b: Pre-operative views of a patient who has a significant tooth size discrepancy between the maxillary lateral incisors. In addition, there is a diastema between the maxillary right lateral and central incisors. The patient requests that the space be closed, an improvement in tooth size discrepancy be made, that the teeth are straightened, and a uniform tooth color is created.



6c



6d

» Figs. 6c, 6d: Post-operative views restoring the maxillary six anterior teeth with ceramic veneer restorations, accomplishing the goals of the case.

more spherical. Generally on the labial aspect, there are anatomical features that will cause light to reflect off in a more irregular pattern (Figures 5a, 5b). Developmental concavities on the facial aspect of incisors are wider incisally than gingivally, run vertically following the long axis of the tooth tapering toward the gingival third, and vary in depth. The greater the depth or concavity created, the more three-dimensional the surface will appear. There can be subtle vertical or horizontal grooves or waves, which will alter light reflection. Additional surface attributes include a stippled surface or horizontal striations. This differs from surface luster, which can range from matte to glossy.

the midline third of the tooth. This will create two planes.

It is possible to have three facial planes, each at the approximate transition from gingival, midline, and incisal third of the tooth. This will enhance the convex nature or roundness of the tooth.

## SURFACE TOPOGRAPHY

The topography refers to the undulating nature of the tooth's surface. If the surface lacks detail, it will appear

## TOOTH ARRANGEMENT

The arrangement of natural teeth or restorations can change their perceived appearance – not only because of their physical position, but also because of how light reflects off their surface (Figures 6 a-d). The straighter the tooth alignment, the more uniformly the light will reflect off the heights of contour. With tooth rotation, not only will the size of the tooth appear to change, but also the surface topography. This is because of the variation of light reflected. Tooth arrangement will affect the incisal embrasures, opening them if the teeth are vertically aligned, or closing them if the teeth overlap or are crowded.

## CONCLUSION

Understanding shape, contour, and surface topography will assist the clinician in creating an outcome that more closely mimics nature. The more detail you incorporate into the design of the restoration, the less contouring will be needed to create the desired outcome. Finessing the topography of the restoration's surface in order to replicate the light reflection of a natural tooth may be the only final detail required before glazing.

The next article in this series will compare the differences between surface staining and glazing, and ceramic layering of the facial aspect of the restoration in order to incorporate internal details such as mammalons or variations in translucency. ❖



## CASE STUDY

# Central Incisor Replacement Using Biogeneric Reference

BY SAMEER PURI, D.D.S.

Replacing a single central incisor is one of the most difficult – if not the most difficult – things we do in dentistry. Matching the size, shape, color and contours can be a daunting task for even the most experienced clinicians.

The fact that you have to keep your preparations ideal to accommodate enough reduction to mask out any underlying defects, coupled with accommodating your choice of restorative material, you also have to be conservative to avoid any unnecessary weakening of the tooth itself.

On top of the clinical challenges are the communication challenges we have with our laboratory in conveying size, shape and contours of the adjacent tooth. Often photos and models are sent so that our technician can match the adjacent central incisor perfectly.

In reality, if we could simply have a mirror image of the adjacent tooth in the right color, many of the esthetic challenges would be easily overcome. The good news is that by utilizing CEREC, we can.

Biogeneric Reference is a design mode in our CEREC 3.8 software that allows us to do exactly that. By taking an image of the contralateral tooth, we are able to have the software mirror image and “flip” the tooth to make an exact copy.

This can be used when you are

treating a single central and want to copy the adjacent central. It can also be used when you are treating a lateral incisor or canine and want to mirror image the contra lateral canine or lateral incisor. It is, in fact, a tool that makes restoring a single central incisor much less of a challenge than in the past.

## CLINICAL CASE

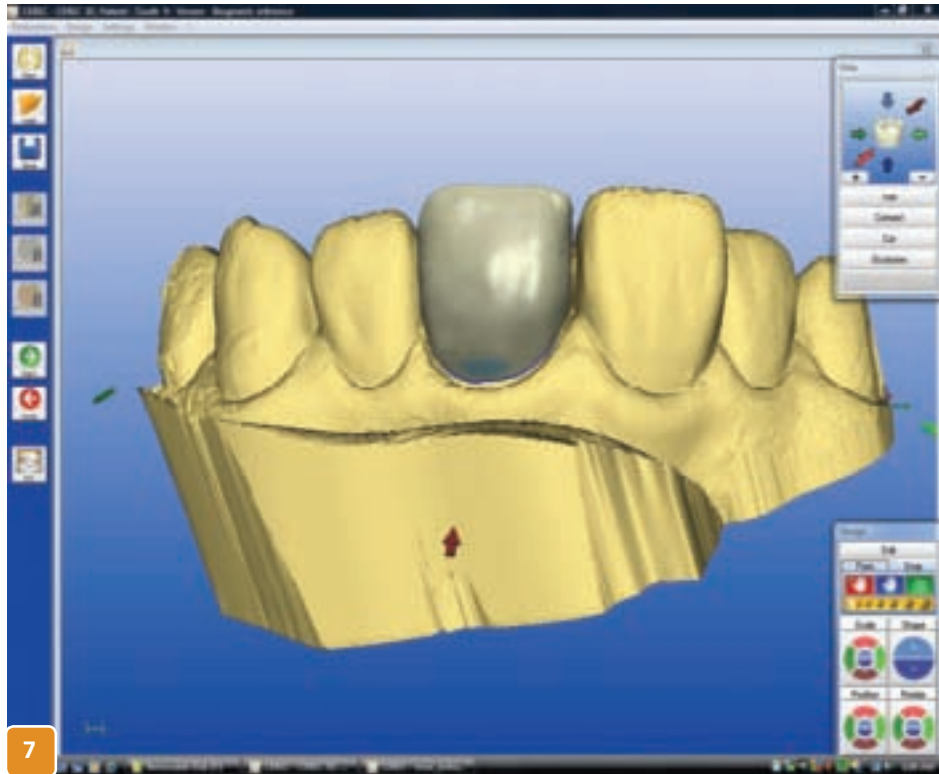
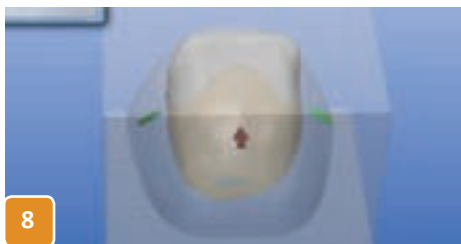
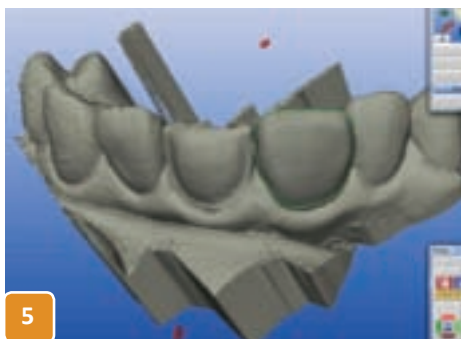
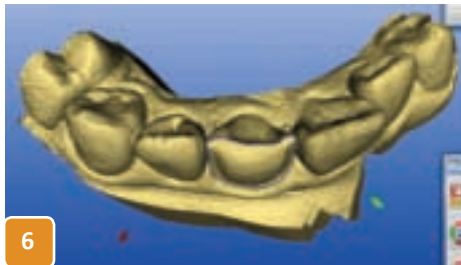
A 26-year-old patient presented to the office as a new patient on an emergency basis with the chief complaint of a fractured veneer (Figure 1). An examination revealed that the patient had fractured an existing veneer on tooth 9 while playing basketball and suffering a blow to the mouth with an elbow. All other teeth were natural teeth (Figure 2).

Radiographs were taken, and there appeared to be no other trauma or fractures other than the broken veneer. Treatment options were discussed with the patient, and it was decided that the ideal treatment would be to replace the veneer with a CEREC single-visit veneer.

The tooth was conservatively







prepared, and the remaining restoration was removed from the tooth.

A 000 cord was soaked in Hemodent and placed in the sulcus to retract the tissue (Figure 3). An optical impression using the CEREC BlueCam was made of the anterior teeth (Figure 4).

The virtual model rendered by the software was marginated by the automatic margin finder (Figure 5). Utilizing the Biogeneric Reference design mode, the outline of the contralateral tooth was outlined to give the software information as to which part of the tooth to precisely copy (Figure 6).

The 3.8 software utilized the information to give a proposal that mimicked the adjacent tooth (Figure 7). Any necessary modifications were made using the Scale and Form tools of the software.

In the mill preview, the restoration was placed in the Vita Real Life block and positioned to get an optimal amount of enamel and dentin (Figure 8).

The final restoration was milled and contoured and characterized chairside to mimic the adjacent natural tooth. The restoration was cemented using Variolink veneer cement from Ivoclar. Since the patient had an existing open bite, there were no occlusal adjustments necessary in the mouth (Figures 9, 10).

The patient was dismissed and scheduled for recall care.

By utilizing the CEREC and Biogeneric Reference, we were able to take a difficult esthetic situation and treat it predictably and satisfy the patient's esthetic needs. ❖



## CASE STUDY

# A Smile in One Day: 3.8 Software Approach

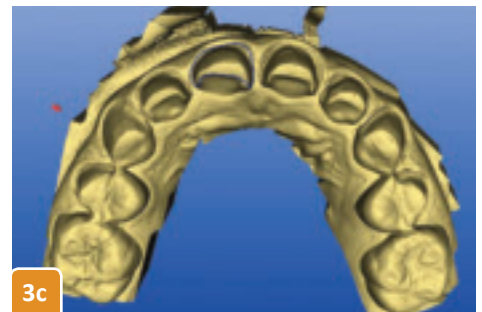
BY DANIEL VASQUEZ, D.D.S.

**T**his patient had completed orthodontic treatment three months prior to our appointment. Her chief complaint was that she was unhappy with the color and shape of her teeth (Figure 1).

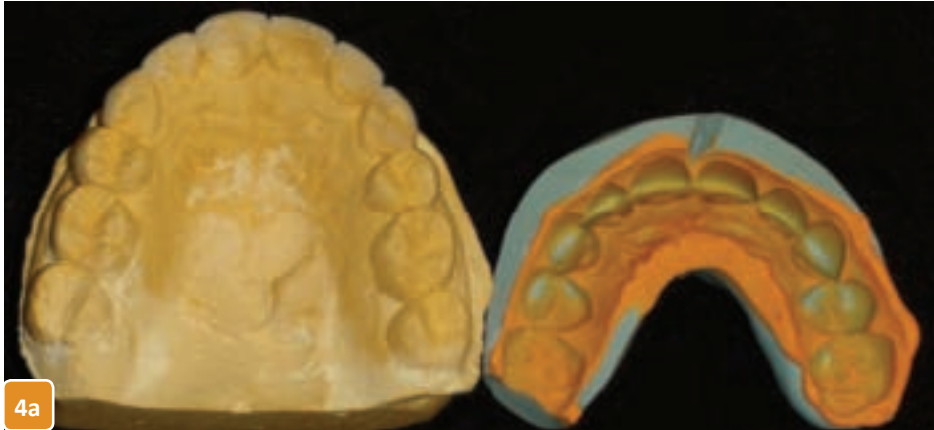
We reviewed all of the different treatment options, ranging from tooth whitening, veneers completed by the laboratory or a 'Smile in One Day' with CEREC restorations. Due to time constraints, she chose to proceed with 'Smile in One Day' CEREC restorations.

Initial impressions were taken one day before the treatment was to commence (Figure 2a). A wax-up was ordered and shown to the patient for approval of the size and shape of the anticipated teeth (Figure 2b).

On the day of treatment, anesthesia was administered, and all preparations were finished (Figure 3a). A number 0 cord was placed to help with gingival retraction and to allow for improved visualization of the margins (Figure 3b). Once the tissue was retracted, full arch optical impressions were made using the CEREC system (Figure 3c).

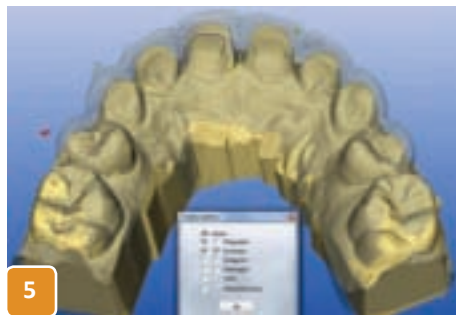






The wax-up was transferred to the prepared teeth using a temporary stent and Luxatemp bisacryl material. Final modifications were made to the provisional mock-up to get the final size, shape, contour and length of the teeth (Figure 4a). Optical images of the temporaries were taken with an intra-oral full arch scan (Figure 4b).

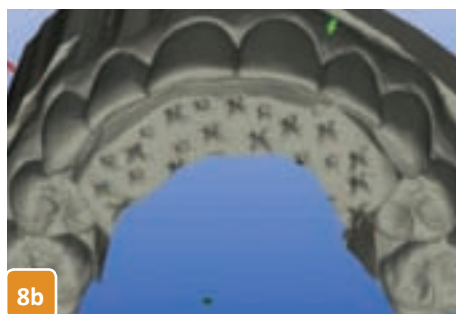
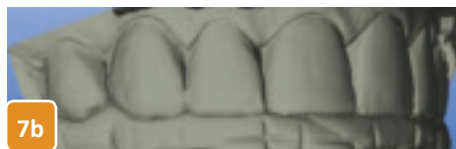
Figure 5 shows ideal stitching of the models utilizing only the distal molars.



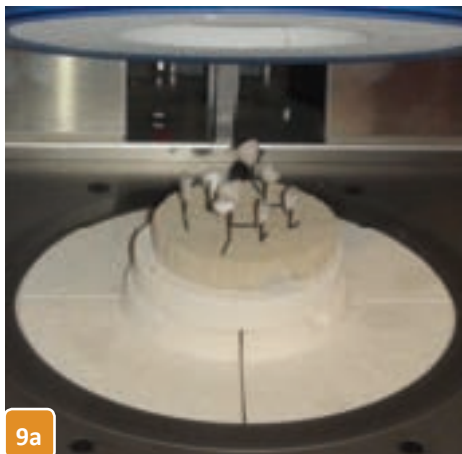
Once the optical impression of the preparations and the mock-up are taken, the clinician has the option of using the 'virtual seat' technique to fabricate the final restorations (Figures 6a, 6b, 6c).

A stitching jig (Assaviour Jig, Figures 7a, 7b, 7c) was used to aid in stitching of the models. The jig allows for ease of stitching between the preparation and provisional models. Numerous jigs are available, and when utilized properly, they can greatly aid in the stitching of the models. As you can see in this case, the use of a jig allowed for ideal stitching. (Occlusal jig, Figures 8a, 8b, 8c).

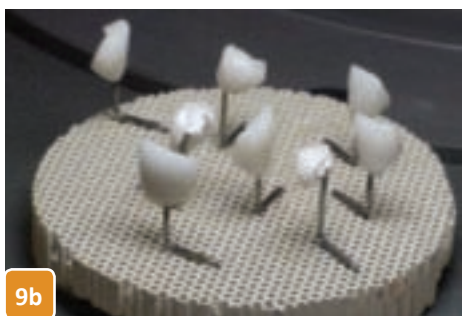
One of the patient's chief complaints had been that her teeth were too dark, and she would love to have WHITE teeth. We selected IPS Empress Multi BL3. No stain or cut-back was







9a



9b

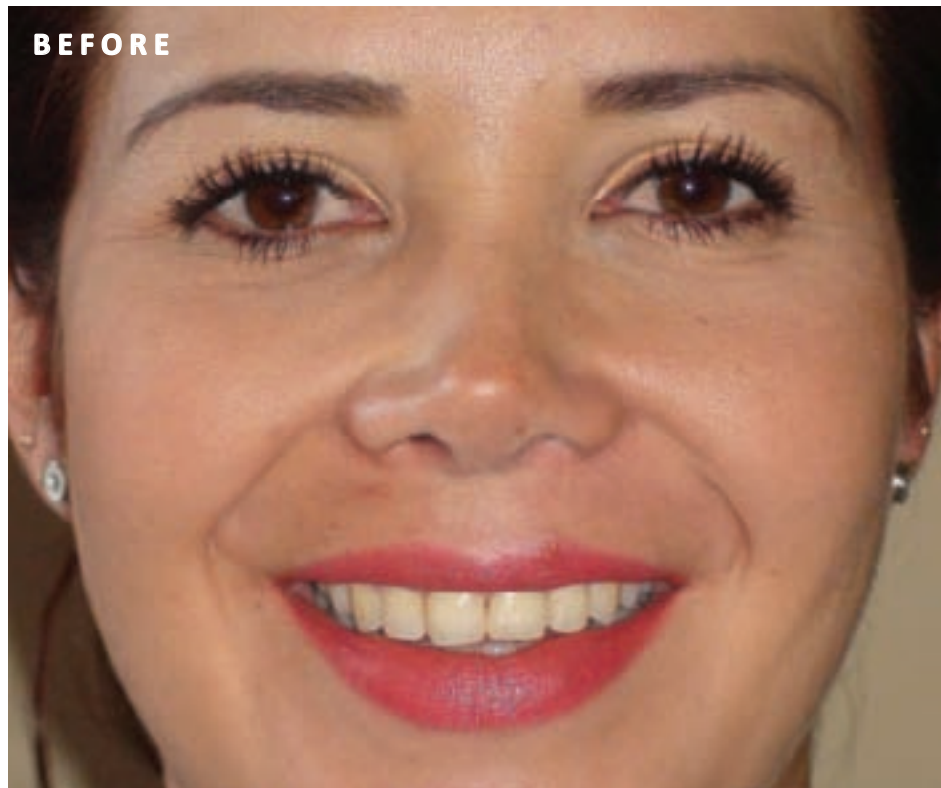
performed in this case; glaze was only applied to the facial surfaces of the teeth (Figures 9a, 9b).

Upon completion, the patient was extremely happy with the result of her newer, whiter teeth. Even more pleasing to the patient was the ability to finish her new 'Smile in One Day.'

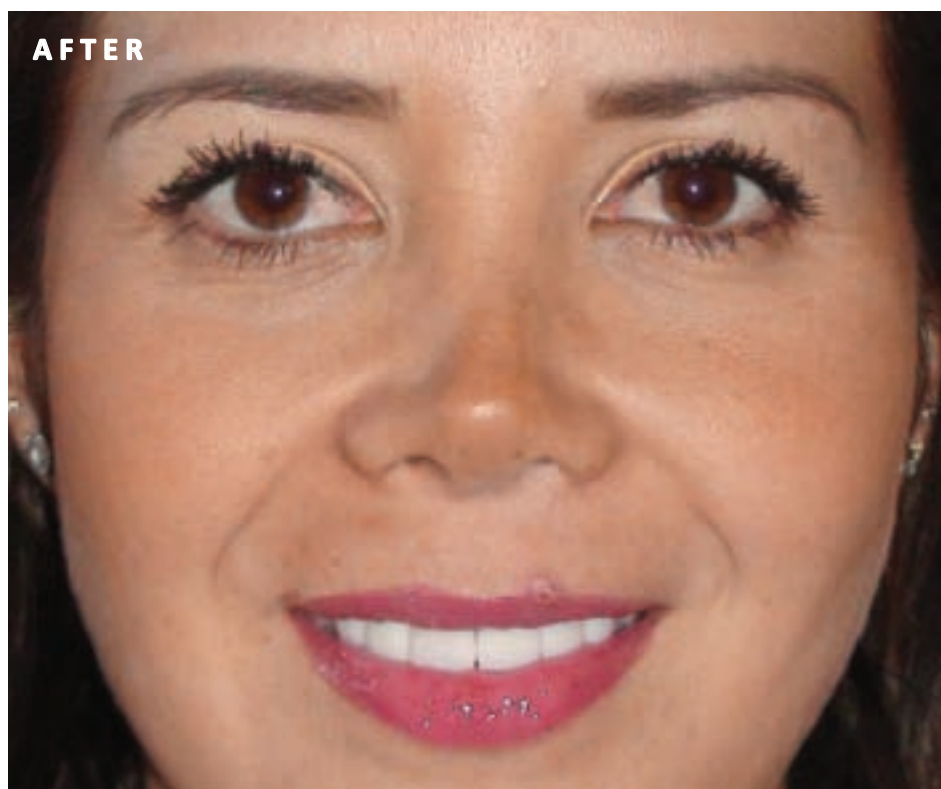


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## CASE STUDY

# Anteriors Made Easy

BY TORY R. LINDH, D.M.D.

In the years that I have been a CEREC basic/advanced trainer, there has been one thing that I have been a little confused about. Most CEREC users are well aware of the benefits of the CEREC technique in restoring posterior restorations with relative ease, but when it comes to anterior restorations, even the experienced user has been

known to shy away from employing the CEREC technique to the anterior segment. I have been of the mind that it would have been a natural progression from posterior to anterior as one's experience and technique increased, not to mention that we should all strive to get the most out of our investments in this technology. The purpose for this article is to demonstrate that with the proper diagnosis, treatment planning and the judicious use of the available technology (CEREC, soft tissue laser, automated shade devices, etc.) that anterior restorations are not to be feared, but to be excited about.

## CASE STUDY

The case presented will be a 49-year-old female with a chief complaint of, "I broke my upper tooth." Further examination revealed a number of esthetic abnormalities, which included a shade discrepancy, uneven gingival margin heights, purplish/gray color at the gingival margin, and a lengthy incisal edge position in addition to the fracture of the cingulum area of tooth #9 (Figures 1a, 1b, 1c). After discussing the above discrepancies with the patient, a set of treatment goals was agreed upon, which included shortening the length of the central



incisors, changing the shape of the line angles from square-square to round-square, evening the gingival heights with a soft-tissue laser, matching shade with an automated shade device and texture of the centrals to the rest of the upper teeth.

Due to the pre-operative morphological state of the upper incisors being very close to the intended outcome and treatment goals discussed with the patient, Correlation was chosen as the design technique that we would use in this particular case. A pre-operative wax-up was not necessary

because the existing morphology was close to the planned outcome, but could definitely have been used in this case. Pre-operative images were taken and saved in the occlusion catalog (Figure 2). Pre-operative shade of the existing dentition was taken with an automated shade-taking device (Easyshade Compact, Figure 3). A base shade of 1M2C was chosen. Although both VITA classical and VITA 3-D master shades are available via the Easyshade, it has been my experience that the 3-D master shades provide a much better predictability when shade



matching. Since the 3-D shades are a mathematically based shade guide, it is very easy to adjust the nuances of the final shade.

After initial shade taking, profound anesthesia was achieved with a buccal infiltration with Articaine. Gingival recontouring was next in the list.

Many types of soft-tissue lasers are available on the market including 810nm, 940nm and 980nm lasers. A 980nm diode laser was used in this case to recontour tooth #9 so that it closely matched the gingival contour of tooth #8. It is important that enough gingival tissue is present apical to the existing margin to ensure that biologic width is not violated. After recontouring was complete, the existing crowns were removed and the preparations were reprepared at the new gingival margin (Figure 4). Although the soft-tissue laser can be used to trough the sulcus prior to imaging and/or final impression, gingival retraction cord was used in this case. In the presence of healthy gingival tissue, it has been my experience that using gingival retraction cord in conjunction with proper powdering/priming technique can produce an excellent optical image and/or final impression (Figure 5).

Although not necessary, in this case, we also took both final optical images and a final analog impression using the irreversible hydrocolloid impression material (Dry Processor II by Dux Dental) and poured up with polyvinyl die material (Mach-2 by Parkell). It has been my experience that having a physical model for anterior cases





is very helpful in producing the best perspective in relation to the existing unprepared teeth. The entire process of making a physical model only takes approximately eight to 10 minutes, due to the setting time of the individual materials used in this technique.

While the dental assistant is fabricating the final physical model, the design is completed in Correlation mode. If proper planning has preceded this point, either by imaging the preexisting condition ("if it's pretty and it fits," to steal a phrase from our friends in Texas), or to do a functional and diagnostic wax-up, the design of the restorations should go very quickly. Especially with the new 3.8 software, the design steps are almost automatic. Most of the subtle changes of the restorations can be achieved after the milling process. Since the base shade was taken in the VITA 3D Master Shades, we chose VITA Trilux Forte as our restorative block, in shade 1M2C. The Trilux Forte blocks provide almost all the characterization that is needed in most cases. The blending of the multiple layers in one block has really been a leap forward in the art of anterior restorations.

After the milling process has been completed, we make any adjustments to gain our treatment goals on the fabricated polyvinyl model before we do a try-in in the mouth (Figure 7). Once satisfied with the general outcome of the restoration morphology, we move to the customization phase. Customizing can be achieved a number of ways. One could have made an appointment with the lab technician to come to the office to finish customizing their restorations (as seen in the case of 10 anterior units



in the sample case, Figure 6) or just customize the units themselves (stain and glaze). In this case, these units were completed in-house. A mixture of white, blue and vanilla stains was used to complete the final look. Prior to the stains, a judicious amount of texturing was given to the restorations to impart the light refraction to the crowns.

The crowns were cemented with a light-cured resin cement shade B1 (Figures 8a, 8b). Notice that the existing dentition has been dehydrated from the entire process that preceded it; the gingival may look raw and uncomfortable, but if the patient were asked about the post-op discomfort from laser gingivoplasty, they typically have little to no discomfort to speak of. After 10 days of healing, note the final restorations, almost complete

healing of the gingiva, including the marginal gingiva, color, shape and how well the gums have adapted to the crowns (Figures 9a, 9b, 9c, 9d). I expect the small black triangle between #7 and #8 to fill within the next few weeks. The crowns themselves have met the original treatment goals, and have given the patient a more esthetic appearance as well as a durable, long-lasting restoration.

Hopefully this example has given all of us a glimpse into what is possible if we use the technology that is available to us today to achieve great results for our patients in just one visit. Remember ... CEREC CAN do anteriors ... in fact, quite well. ❖

*For additional information or questions, reach Dr. Lindh at [www.drindh.com](http://www.drindh.com).*





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## CLINICAL POSSIBILITIES

# CEREC Implant Temporaries

BY TARUN AGARWAL, D.D.S., P.A.

**Y**ou're a CEREC owner. What does that mean to your practice and your patients? Over the past several issues, I have introduced a variety of procedures that can be effectively accomplished utilizing CEREC, from simple chairside restorations to complex anterior restorations using CEREC Connect. My

hope is that each case will encourage you to increase your knowledge and utilization of one of the most advanced technologies in dentistry. In this issue, I would like to share a technique to provide your patients with a prefabricated, immediate implant provisional using the combined technologies of CEREC and GALILEOS.

Whether you're surgically placing implants or not, the time will arrive in your practice that you will need to make an implant provisional – why not choose CEREC? Implant provisionals are especially helpful for anterior implants. Whether done at time of surgery or after integration (prior to final restoration), provisionals serve the critical role of soft-tissue development. We have all seen anterior implants that have lost papillae or with abnormal tissue contours. The use of a provisional can prevent this from happening.

## CASE INTRODUCTION & TREATMENT PLAN

Michael, a 45-year-old male, presented to our office with a chief complaint that he was unhappy about his missing front tooth (Figures 1-3). After thorough clinical and GALILEOS radiographic evaluation and a review of



his medical history, it was determined that Michael was an excellent candidate for a single-tooth implant.

Michael's only concern with implant treatment was the time necessary to achieve his goal of having a tooth. My clinical concern of any treatment was development of soft tissue contours to allow a natural emergence profile. Luckily, we could kill two birds with one stone by fabricating an immediate placement provisional. Our final plan in this case was for guided implant placement site #9 with an immediate provisional restoration.

## PRE-SURGICAL PLANNING

To pull off a case where you prefabricate a provisional and place an implant and have everything fit requires lots of luck, OR the precision and predictability that comes from 3-D technologies. Instead of relying on luck, we are going to rely on technology.



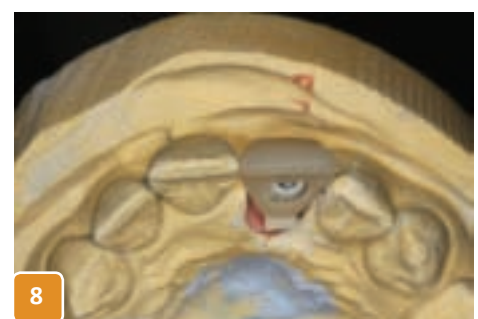
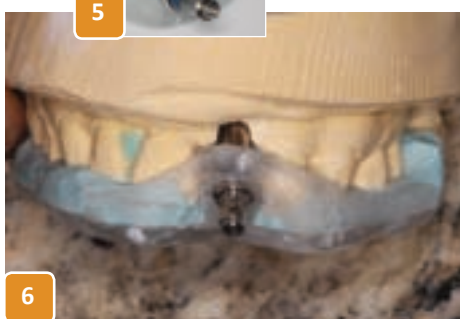
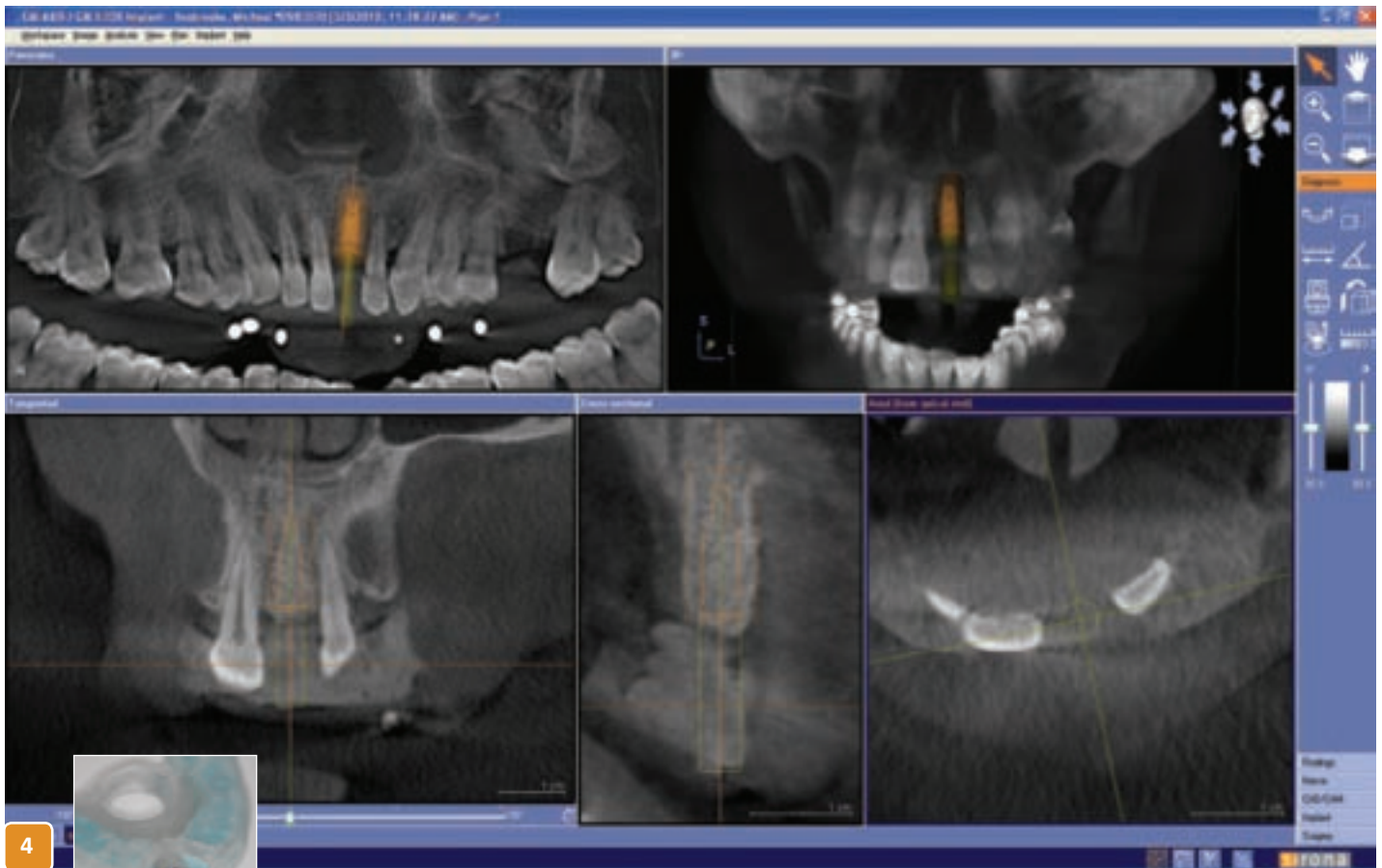
GALILEOS technology provides us with a precision surgical guide for implant placement and CEREC technology provides us with precision fabrication of the

provisional.

The surgical planning is completed based on final restorative position and available bone. In this case, we are able to plan the implant in ideal mesio-distal and bucco-lingual position with the implant long axis through the cingulum (Figure 4). From this planning a SICAT surgical guide was ordered for guided implant placement (Figure 5).

Once the surgical guide is completed, the next step is to fabricate the provisional restoration using CEREC. The surgical guide is fitted with a





laboratory analog mount that allows the creation of a master working model (Figure 6). Then, a plastic temporary cylinder is fitted, adjusted and scanned with CEREC (Figure 7). The restoration is then designed using your favorite technique – Biogeneric, Replication or Correlation (Figure 8). For esthetics, the restoration was milled from VITA TriLux, and polished (Figure 9). The

completed restoration was then luted to the temporary cylinder extra-orally to create a screw-retained provisional (Figure 10).

With the prefabricated CEREC provisional completed, the case is ready to proceed to surgical placement of implant and delivery of provisional restoration.



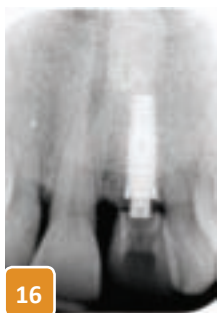


I continue to encourage you to **invest in technologies that advance your clinical outcomes, grow your practice, and stay committed to participating in the education** that will take your skills to higher levels.

## CLINICAL PLACEMENT & DELIVERY

With all the heavy lifting done in the planning stage utilizing the most advanced 3-D technologies, the final step is relatively straightforward.

After careful evaluation of attached tissue, the guided surgery is commenced with a tissue punch, versus traditional flap surgery (Figure 11). After the tissue punch, the osteotomy is completed using



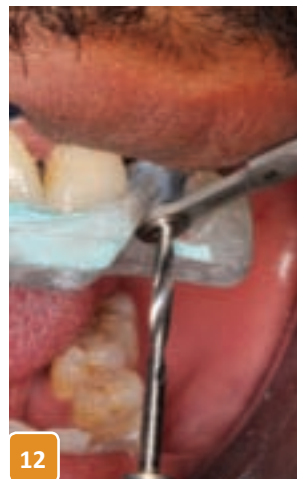
16

the supplied surgical recipe with the sleeve-in-sleeve osteotomy drills (Figure 12). The implant is then placed through the surgical guide (Figure 13), and the hex timing is verified by lining the slot on the implant mount with the slot on the master cylinder (Figure 14).

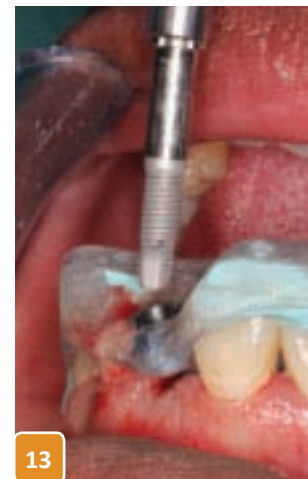
With the implant placement complete (Figure 15), the provisional restoration is placed and hand-tightened to the implant, seating is verified with



11



12



13



14



15



17



18

a radiograph (Figure 16) and the screw access is filled with cotton and composite.

The final result (Figure 17) is a provisional restoration that will give the patient immediate satisfaction, and help develop ideal soft tissue esthetics.

By utilizing the latest technologies and staying abreast of novel clinical techniques, you are able to provide treatment outcomes that fulfill your patient's desires (Figure 1 and Figure

18). I continue to encourage you to invest in technologies that advance your clinical outcomes, grow your practice, and stay committed to participating in the education that will take your skills to higher levels. ❖

*For additional information or questions, reach Dr. Agarwal at [DrA@raleighdentalarts.com](mailto:DrA@raleighdentalarts.com).*



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## TOOLS YOU CAN USE

# The Virtual Fit Checker

## Another Great Tool in the Arsenal of the CEREC Software

BY RICHARD ROSENBLATT, D.D.S.

**W**e've all been there. A patient comes into the office for a crown. We prep, temp and impress the tooth and send it off to the lab for fabrication. Approximately two weeks later, the patient comes back into the office to permanently seat the crown. We all know the thoughts that go through

our heads just before the seat: "Please margins be closed, please margins be closed." We then try in that crown and it does not fully seat.

We check and adjust the contacts as needed, but that crown still does not fully go down. We check the impression and the model and start talking to ourselves wondering what it could be. Now what? We get out sprays or pastes to place on the internal of the crown to see if and where it is binding. We look for a smudge where the high spot should be. Sometimes we see it and other times we don't. Hopefully you adjust the correct spot. Sometimes, the crown even seats ... Whew! Then we have to work on getting that stuff out of the internal of the crown and make it look pretty again before we cement it down. Worst though, was that it did not seat, and you needed to send the case back for two more weeks and try all over again.

This was a typical situation for me prior to having my CEREC machine. There were no more two-visit appointments, impressions, temps or second injections, but from time to time I still had to deal with internal binding and how to find it ... until now.

CEREC now has the ability to virtually check the fit of the intaglio of the restoration to the preparation. If the restoration does not seat all the way, the software can help us determine where it is binding. We can also lower or raise the spacer or adhesive gap settings before we mill, to either allow more room when the prep has some irregularities, or dial in the spacer to create the most intimate fit without getting held up. How do we do this, you ask? Let's discuss and show an example of what to look for.

### THE VIRTUAL FIT CHECKER

It is important to give the milling machine a preparation that the burs can easily mill out. When prepping a tooth, avoid sharp corners or irregular surfaces that that bur will struggle to mill. If this happens, the restoration will have the potential to bind in areas where the size of the bur can not accurately mill out the troublesome areas described. Now we have the ability to find these trouble spots using the "virtual fit checker."

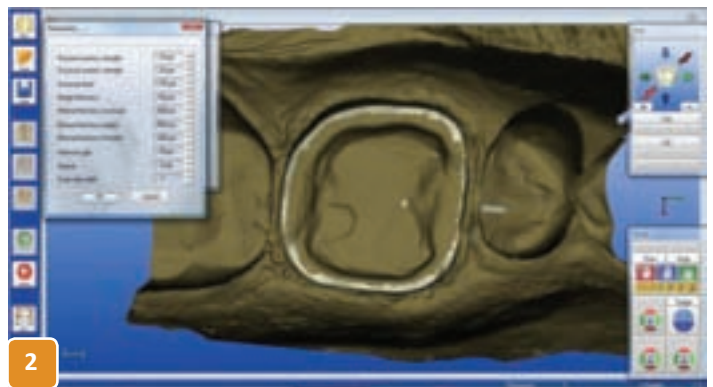
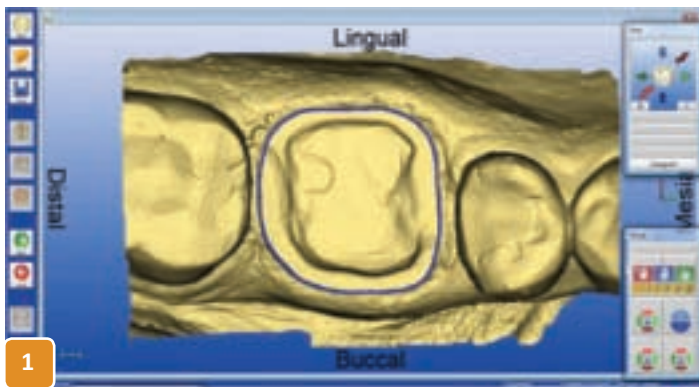
The virtual fit checker is activated at the mill preview step. When the

crown is shown in the mill preview, click Trim>Trim>Ctrl B. By doing these steps, it will bring up the virtual model, and then hollow out the bottom of the model. You can now look at the underside of the restoration. What you will see on that restoration is a white perimeter on the margin, and then the rest of the underside of the restoration will be gray. The margins are white because they are milled with no spacer, so there is no visible gap when seated. The rest of the crown is gray, and that represents the spacer to allow for easier seating. If you notice a white spot peeking through the gray internal of the crown, that is likely an irregular spot that cannot be milled, and it will be the place where your crown is binding. At this point, adjust the internal of the porcelain exactly where you see the spot, or adjust the prep just at the spot. This should allow the crown to fully seat. All this with no messy sprays or pastes!

### CASE STUDY

Let's look at an example. Here is a crown that was prepped and was binding (Figure 1). The first problem was the fact that it was milled on





ENDO mode. I will not go into a deep discussion on ENDO mode, as that is an article in itself, but ENDO mode will try to mill out exactly what the prep looks like without sacrificing porcelain to insure fit. This will lead to binding, and unless the spacer is increased, restorations run a higher risk of not seating fully.

In this case, ENDO mode was chosen, and the crown did not seat. The prep is relatively flat, but has some minor undulations. If this was not milled in ENDO mode, it would likely have seated at the chosen spacer. In this case, the spacer was set at zero, milled on ENDO mode, and was binding on the prep (Figure 2). When we went back to look at the restoration, I wanted to correct it without having to re-prepare or remill. At the mill preview step, I clicked Trim>Trim>Ctrl B. We can see the underside of the restoration, and we notice the white perimeter at the margin. In the next photo, notice the two white dots (noted by black arrows) that represent where we are binding (Figure 3).

At this point, we can adjust either the crown or the preparation at those exact locations, and the restoration should seat perfectly. If this is noticed

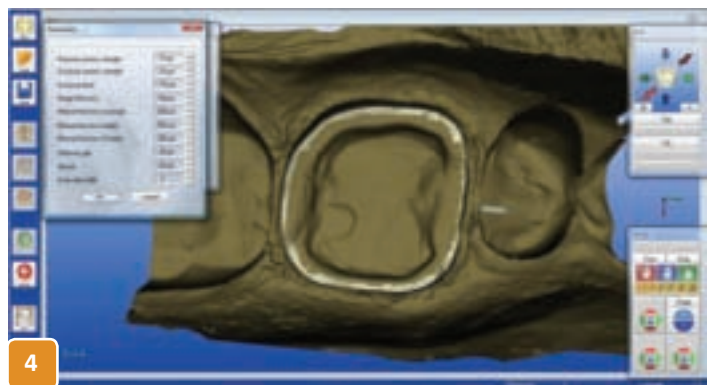


before the milling procedure, and you do not want to re-prepare, then

you can add to the spacer until you no longer see any white spots. In this case, the spacer needed to allow this restoration to seat fully would be 40, as noted in the photo. In this photo, with the increased spacer, we no longer have the white of the restoration showing through the underside (Figure 4).

### OBTAINING THE BEST FIT

Another very nice application the virtual fit checker can be used for is to dial in the spacer when we want to reduce the amount of rotation that can occur when restorations are fabricated. A prime example is when creating a crown on an implant abutment. Because of the precision of the abutment, if we set the spacer setting too high, we will find that the crown will have some



### The virtual fit checker is a wonderful addition to the CEREC program.

It allows us to check for areas where our inlay, onlay, crown or veneer may bind on the preparation and prevent complete seating of the restoration.



movement on that fixture. By using the virtual fit checker, we can now lower the spacer setting until we just begin to see a white spot on the internal, which would suggest an area of binding. When we see that first view of the interference, we just add 10 microns of spacer and it should fit nice and snug, and yet fully seat. Many times, this will leave the spacer at a negative number. That is not a problem. The software has built in an automatic 100 microns of spacer into this parameter. Therefore when we choose 20 microns of spacer, it is actually 120 microns of

spacer. This can be done on any prep to obtain the most intimate fit possible.

The virtual fit checker is a wonderful addition to the CEREC program. It allows us to check for areas where our inlay, onlay, crown or veneer may bind on the preparation and prevent complete seating of the restoration. This can be utilized either before or after we mill. If we forget to check it before we mill, we can accurately locate where to adjust the internal of the crown or the preparation. If we check it before we mill, we can either add spacer to allow it to seat, or we can lower the spacer to

allow an even more intimate fit. Worst case scenario is we can't adjust it to fit. Then we can easily improve the prep in the proper areas and remill. We can also use it to lower the spacer to create a more intimate fit on restorations such as implant abutments. This is just another great tool in the arsenal of the CEREC software. ❖

*For questions or more information, reach Dr. Rosenblatt at [richrosenblatt@gmail.com](mailto:richrosenblatt@gmail.com).*

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## PROFILE

# Kenneth Hill, D.D.S.

BY DARREN GREENHALGH, D.D.S.

**W**hat happens when you put a knowledgeable, friendly dentist, an energized staff, a master ceramist and CEREC inLab under one roof? You get unbeatable, exciting dentistry! At Parkridge Dental in Las Vegas, Kenneth Hill, D.D.S. has done just that.

Dr. Kenneth Hill has seen many changes in dentistry since he began practicing in 1986. When he began incorporating implants and cosmetic dentistry into his practice, he was challenged in getting the quality he wanted from a lab. Many factors were an issue – communication, shade and consistency of the restorations; even when he went into great detail on the lab slip and included photos for color, somehow the vision of the case was not properly communicated.

With the advent of CEREC technology, Dr. Hill had great interest, but also great concerns. Like many dentists, he was not sure if he could fit the CEREC into his practice. Would he have to make the CEREC crowns? Would it take him away from his patients? What about large cases, multi-unit, anterior, large bridges made from Zirconia or metal-based? The challenges of using a local or outside lab were still an issue.

Then it dawned on him – what if he incorporated CEREC inLab, had full sintering capabilities and a complete in-house dental lab? He would need an experienced lab tech, and he had someone in mind with 30 years of experience in implants, veneers and custom shade selection: Joel Waldman, M.D.T.

In January 2009, Hill made the big



Kenneth Hill, D.D.S. (right) and Joel Waldman, M.D.T., at Parkridge Dental in Las Vegas.

leap and purchased the CEREC inLab, CEREC AC and the VITA ZYrcomat T sintering oven. Waldman assembled the in-house lab, with all the porcelain needed to do full milled and layered ceramic bridges and crowns. Both Hill and Waldman attended continuing education CEREC courses at Scottsdale Center for Dentistry to perfect their skills for their patients.

As Hill and Waldman discussed every case in detail, the prior communication challenge disappeared.

“With Joel using the custom shade and with his mastery of custom staining, the full, milled contour crowns look so lifelike, it’s hard to tell what is natural and what is a CEREC crown,” says Hill.

The CEREC inLab allows Hill to



do large-span bridges of Zirconia, sintered right at the office, or InfiniDent substructures sent through CEREC Connect. Try-ins can be done as soon as digital scanning is completed with the CEREC AC unit. Checking fit with VITA CAD-Waxx® blocks makes it fast and easy.

With CEREC inLab in the office and a great team of dental professionals on hand, Parkridge Dental is able to do one-hour single CEREC crowns with confidence, says Hill. And that's not all. They are also adept at same-day multi-CEREC veneers or crowns and inlays – all the way up to nine-unit Zirconia milled frames, dipped in any desired shade and sintered, ready for porcelain to be beautifully layered by Waldman.

Hill now feels he is getting and delivering truly beautiful restorations and predictable results for his patients.



He plans to incorporate Sirona GALILEOS into his practice, bringing his implant cases to the next level of CEREC excellence.

There's another benefit of using CEREC: a 90-percent reduction in waste.

"We've had huge decreases in impression material, plastic trays, dental instruments for metal casting,"

he says. "Plus, not as many model and die stones are going into plaster traps and landfills. And no burn-out wax or burnout ovens to pollute the air."

"At Parkridge Dental, we can truly say that we can make your smile healthy – and we're helping to make the planet's smile healthy too!"

## MEET DR. HILL

**Q:** How long have you been in practice?

**A:** It has been a very fast 25 years, and I'm enjoying it more now than ever.

**Q:** What is the size of your practice?

**A:** My Las Vegas practice, Parkridge Dental, is 2,500 sq. ft.

**Q:** How many operatories does it have?

**A:** We work out of six operatories.

**Q:** What type of dentistry do you do?

**A:** I enjoy all aspects of dentistry. It has been great to experience so many facets of dentistry as a general practitioner.

**Q:** Why did you select CEREC as your CAD/CAM choice?

**A:** When I was looking into purchasing and implementing a CAD/CAM system, I had many factors that I needed to mentally check off. A few of the big ones that stood out

that eventually helped in the decision were Sirona's years of experience in business, and the many recommendations from friends.

**Q:** How does this technology fit into your office philosophy?

**A:** That is an easy answer! All I have ever experienced thus far has been that the fit of CEREC crowns, inlays and onlays are consistently better than from

an outside laboratory. Who doesn't like great marginal fits? The technology is a bolster to the practice, but I like the predictability.

**Q:** How does CEREC impact your practice?

**A:** A couple of the huge advantages presented when we purchased the CEREC system. First, it provided the ability to work smarter, and secondly, the thing that I didn't expect is how much it opened up the schedule to provide more dentistry to my other patients.

**Q:** What is your favorite CEREC procedure?

**A:** It might sound silly, but I would have to say crowns. They are predictable, and I don't have to worry about temporaries! I would have to say than I really enjoy having a great outcome on an anterior restoration. It really makes my day, and the patients love to be done in just one visit.

**Q:** What is your most unique CEREC procedure?

**A:** I had a couple of challenging cases present themselves at the office, and I was able splint two lower premolars and two crowns splinted with one IPS e.max block.

**Q:** If someone was to take your CEREC away today, you would...?

**A:** Easy. I would reschedule the day and buy another one A.S.A.P.!

**Q:** Anything else you would like to add?

**A:** I was very apprehensive at first, implementing a new technology with such a sizable investment. I was determined to make it work. One thing that might be unique to my practice – I decided to have a master ceramist work along with me. It has been great thus far! ♦



## HAPPENINGS IN THE CAD/CAM WORLD

# Are You Part of the Electronic Revolution?

BY SAMEER PURI, D.D.S.

**A**s the year rolls along and our world becomes more and more dependent on the World Wide Web, I feel it's important to review where our practices fit into this vast entity. No doubt you will agree that technology can play a huge role in growing our practices. From Cone Beam, to CAD/CAM, from digital

X-rays to the modern office, all of these things will have a huge impact on the growth of your practice and on your patients' perceptions of how technologically advanced your practice is. I hope you will also agree that you have to find a way to let your patients and the community know about your office. Traditional methods of marketing included postcard mailers, perhaps running an ad in the Yellow Pages; some of you more technologically advanced doctors may have even ventured to have a Web site built.

Today, if you are not online in some form or another, taking advantage of the Web and all its resources, you have completely missed the boat. Let's review some of the important online marketing resources that can be helpful in gaining a more robust online presence.

- **Web site** – There is no doubt that if you don't at the very least have a simple Web site that has your phone number and address, you may as well still be using a belt-driven handpiece and mixing your own amalgam. That is how out of touch you are. A Web site is an absolute must, and without one, you basically don't exist to anyone other than your existing patients. You can opt to build a Web site yourself and keep it simple, or you can contract a company to build one and make it more creative and complicated. In our office, we hired a company to build our site, but we maintain it ourselves. I invested in sending one of my team members to a basic Web design class at a local community college so that she knows how to update the site herself. This way, we don't pay a monthly support fee to anyone since we do everything ourselves. Our office has not had a Yellow Pages ad for more than 10 years – our Web site is the bread and butter for how we announce ourselves to the world.



- **YouTube** – All of you have gone to YouTube at one time or another and seen millions of videos. You probably searched for a particular topic, whether it was dental-related or not. YouTube has become a place where millions visit and millions of members upload their video creations in any number of categories. I think it's important for any office to have a YouTube presence. Creating an account for your office is easy and free. We bought an inexpensive Flipcam (about \$100 at your local Best Buy store), and take videos in our office. Whether it's patient

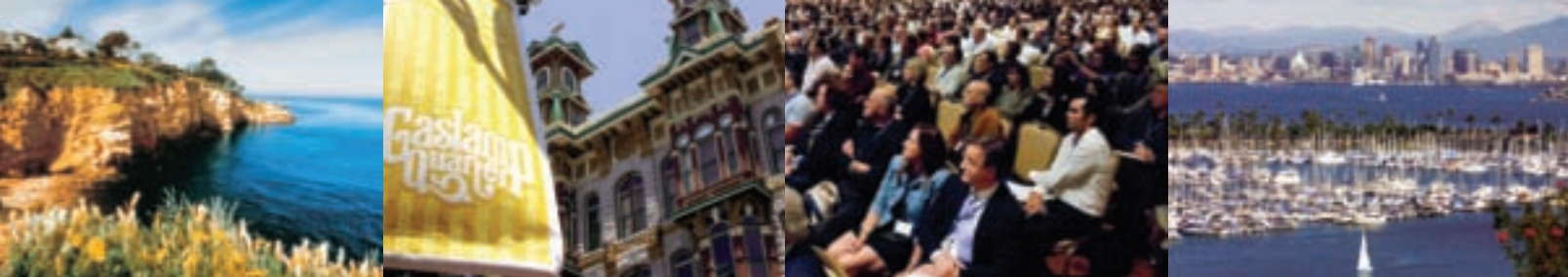
Today, if you are not online in some form or another, taking advantage of the Web and all its resources, **you have completely missed the boat.**

testimonials or procedures that we performed, we film short videos and upload them to YouTube. Now if someone searches for a particular procedure and we have a video created, those videos show up in the search. Of course, we include a link to our office Web site so visitors can take a virtual tour and perhaps become patients.

- **Facebook** – Another online community where your office should have a presence. Invite your patients to become friends. It's an easy way to keep your patients and friends up to date. The best part is that research shows that the majority of visitors to Facebook are female, and their average time online is about 50 minutes – the perfect target audience. We worked with [www.doctorbase.com](http://www.doctorbase.com) to increase our online presence on Facebook.

- **Electronic Communications** – Our office has been





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to view the Advance Program and to register for the symposium.



completely paperless for a while, but as of Sept. 1, we have gone even greener. We no longer send out postcards for hygiene appointments or birthday cards. We now use Patient Activator from 1-800-Dentist, which recently added a new feature that automatically sends email and text message confirmations for all of our appointments. Patient reaction to this has been extremely

positive. The majority prefer an email or text to a phone call reminding them of their next appointment. If anyone objects to the emails and texts from our office, our explanation is that we are going green in the office and minimizing paper communication. This not only helps save the environment, but also an incredible amount of money every month on postage.

I hope that this has been a helpful review for you to realize all of the electronic opportunities we can take advantage of to help keep our patient base aware of our practices. Most of these can be done for free or very little cost and are just a fraction of the things we can do to take advantage of the World Wide Web and our practices.

Happy CERECing. ❖







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