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Implanting innovation into your workflow

Learning how the digital workflow opens up new possibilities in implantology—and better patient care.

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Taking implants digital

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Even though dental implants are some of the oldest dental restorations, it’s still amazing to see how far they’ve come in just a few short years. While basic modern implant technology has been around for decades, the ways imaging and CAD/CAM tools have changed implantology is incredible.

Consider digital X-rays and CBCT scans. Whereas previous generations of dentists and dental technicians—not to mention oral surgeons—had to rely on film X-rays to see where best to place implants, modern technologies allow the dental team to pull bone and jaw data right into their design software. Suddenly, there’s very little guesswork involved in creating the best implant possible—one of the experts we spoke with in this month’s cover story (see page 32) calls this a “virtual surgery,” and he’s right.

In addition to our cover story, we’re exploring all the latest technology in implants with this issue. Learn about amazing esthetic possibilities (page 18), new revenue options (page 14), how intraoral scanning leads to better implants (page 26) and much more. Digital Esthetics is committed to helping you unpack the many ways technology is changing dentistry, and if dental implants are any indication, there’s much more to come!

Ryan Hamm
ryan.hamm@ubm.com

Mission Statement
Digital Esthetics provides dental artists with cutting edge techniques, contextually meaningful product information and relevant insights into the newest products and trends. Intentionally created to be a primary resource for both dentists and dental technicians who seek to incorporate digital tools to pursue creativity, Digital Esthetics helps creative dental professionals improve their businesses and their patient care.
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Better scanning

3Shape’s latest version of Dental System is packed full of new features designed to make the digital workflow simpler and more powerful.

Compiled by Ryan Hamm | Information provided by 3Shape

Earlier this year, 3Shape released Dental System™ 2016, the latest version of its CAD software for dental professionals. Dental System™ 2016 introduces new and improved applications and workflows as well as a completely rewritten software for impression scanning to eliminate steps in the dental lab workflow. Dental System 2016 is also designed to save time for lab technicians by making designing faster and more intuitive for simpler to more advanced cases as well as increasing software reliability.

Dental System 2016 introduced features like impression scanning. The 2016 version of the impression scanning application eliminates a dental lab’s need for pouring gypsum models and other manual steps in the workflow.

All 3Shape dental lab scanners can now scan analog impressions and skip directly to CAD design: a workflow step-saver that can reduce crown turnaround time by nearly one day. The 3Shape D2000 and D1000 lab scanner models additionally feature multi-line scanning technology for a more detailed and optimal impression scanning.

3Shape includes LABcare™ with all Dental System subscriptions. LABcare ensures that 3Shape users can continuously receive the latest technology through annual software releases such as Dental System 2016. In addition to upgrades, LABcare includes access to the 3Shape support network, as well as training channels such as webinars, videos and more.

Other features include:

- Updated impression scanning software—scan each side of a triple tray in less than 30 seconds and single trays in 75 seconds
- New functionality accelerates 3Shape D500, D1000 and D2000 lab scanners’ performance and speed
- Increased stability for large cases such as implant bridges
- Integration with TRIOS® and third party IOS
- Robust crown design engine for fast and intuitive design
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Applying the CS 3600 in your business

A lightweight intraoral scanner with full HD.

Compiled by Ryan Hamm | Information provided by Carestream Dental

The CS 3600 intraoral scanner from Carestream Dental is designed to simplify the scanning process with high-speed, continuous scanning; an Intelligent Matching System; autoclavable tips; and stunning high-definition full HD 3D images.

The CS 3600’s continuous scanning capabilities reportedly significantly reduce the time it takes to acquire a scan. Users can scan in a smooth, uninterrupted manner without worrying about the impact of unsteady hands or fidgeting patients between successive views.

Intelligent matching system: To make scanning even more efficient, the CS 3600 also features an Intelligent Matching System that allows users to freely fill in missing information for any area in the data set. Simply jump to any position in the mouth; there’s no need to indicate an exact location to the system or to follow a specific direction, as the scanner will “auto-locate” for the user.

Additionally, the broad 13 mm scanning range is designed to allow users to capture scans in a way that feels most natural to them. The scanner does not need to be kept at a fixed distance to produce optimal scans; whether hovering or briefly resting the scanner on a tooth, users can use whichever method they prefer without disrupting the flow or the image capture process.

Two tip options: The CS 3600 also comes with two rounded, interchangeable tips in different orientations—normal and side-oriented—so users can capture scans in hard-to-reach areas while considering patient comfort. Both styles are autoclavable to support sterilization for infection control and can be used up to 20 times.

Full HD images: No matter which tip is used, the scans captured by the CS 3600 are available as both 2D and full HD 3D color images. The HD 3D color feature offers superb image quality with more vivid color and texture that better reflect in-vivo anatomy.

Returning features: The CS 3600 also includes many of the same features of Carestream Dental’s previous generation of scanner, the CS 3500. It’s lightweight, making it easy to carry from operatory to operatory; includes an onboard heater; and produces open .STL and .PLY files that reportedly are easy to export to any open third-party design software or lab that accepts digital impressions. Plus, the CS 3600 has no additional fees to scan or to send scans to a third party. ●

This article originally appeared in the August 2016 issue of Dental Products Report.
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The dental technician’s role in digital technology

New digital workflows mean a shift in the dental technician’s role in case planning and execution

The explosive growth of digital technology in all facets of the dental industry has made even closer communication and cooperation between clinician, technician and in some instances, specialist, the new reality.

At the same time, whole new realms of materials, techniques and technologies have opened up within what the dental laboratory can now provide to the practitioner. Trying to stay ahead of the trends and advancements is a daunting task for any individual. By including a lab that has integrated a digital workflow as just one part of the total solution, a dentist doesn’t have to worry about being left behind by new innovation.

Traditionally, the dentist would discuss and plan restorative options with the patient alone. Decisions were made on esthetic options, type of material, costs and even schedules. These decisions were all made chairside without input from the dental lab or a technician. Then, with these decisions in place, the dental technician and the lab team would make things work with quality restorations. While, more often than not, the final result was a success, today’s new technologies have made it possible for this time-honored system to be vastly improved with much better communication and technician involvement in an advisory capacity at the outset, for the positive benefit of clinician and patient alike.

Dentists can now take advantage of the knowledge and training of an experienced dental lab technician to plan and execute a complete restorative solution. Let’s look at just a couple of examples of technologies (virtual wax ups and digital surgical guides) where the technician can be involved in the planning stage of the restorative workflow.

Traditional diagnostic wax ups were provided to help the patient make a more informed decision on the planned restorative work. (Fig. 1) While these certainly help the patient to envision what their new teeth may look like on a model, they cannot show the patient what they will look like in their own mouth.

Digital technology can take that imaging one step further and show the patient what those new teeth may look like by superimposing virtual restorations onto a photo of themselves. (Fig. 2) This technique is being called “emotional dentistry” but I suggest it is more than that. This new technology and technique really allow the patient to make a more informed and knowledgeable decision than was previously possible with traditional methods. For many patients who undergo complex restorative work, the journey can be a stressful one when you are unsure of the final destination. Those stresses are lessened when you have a clearer picture of your destination before you set out, making it easier for clinician and patient alike. Think about when you use a travel tool like Google Maps. When you reach your destination, and the outcome is indeed what you had envisioned, your reaction may well be a positive and emotional one.

Digital guided surgery is another area where the lab technician can be resource for the dentist. Using sophisticated software, a trained technician can merge a CBCT scan of the patient with either an intraoral digital scan of the mouth or a digital lab scan taken from a traditional impression. This merging creates a three-dimensional virtual model of the patient’s skull, including the interior of the mouth. The technician can then, with input from the doctor, plan the placement of the implants into the virtual model. As this planning is done in a virtual environment, there is no need for the doctor to learn how to use, or to purchase, the required
software. All the doctor needs is access to a computer to be fully involved in the process. They can choose to log in to a live online planning session with the software-trained technician, or they can use email to communicate.

The “digital team” can discuss the final restorative goals as well as the surgical requirements and plan accordingly. Once decisions are made, and implants have been placed digitally as agreed, the surgical guide (or stent) can be designed from the digital model that now includes the depth, size and angles of the planned implants. A surgical guide is then fabricated in an acrylic type material, typically in one of two ways: by using a Computer Numerically Controlled (CNC) milling machine or by using an additive manufacturing process commonly known as 3D printing.

**A case history**

A recent case that was planned with Dr. Vic Kooner of Bayview Dental in Qualicum Beach, British Columbia, Canada, was a great success using 3Shape Implant Studio. The patient was fully edentulous and had been using traditional dentures for over 20 years. Duplicates of his existing dentures were made and fitted. Radiopaque markers were imbedded into these duplicate dentures (Fig. 3) and two CBCT scans were conducted.

The first scan was done with the dentures in place in the patient’s mouth while biting down with moderate pressure to ensure they are in a ‘locked’ position. (Fig. 4) A second scan was made of the individual denture appliances themselves. (Fig. 5) The radiopaque markers are used as landmarks to merge the two scans together. Using the Implant Studio software, a 3D virtual model of the patient was created. (Fig. 6)

A live online planning session was conducted with Dr. Kooner. During this session, the fact the patient had experienced moderate bone loss due to being fully edentulous for many years was noted, and the appropriate size and length

**CAPTIONS**

Fig. 01 Traditional diagnostic wax up.

Fig. 02 Digital wax up.

Fig. 03 Radiographic template denture.

Fig. 04 Actual scan with dentures in place in patient’s mouth. Note how the radiopaque markers are the only thing visible of the denture.

Fig. 05 Second scan of individual denture appliances.

Fig. 06 Three dimensional virtual model of the patient.

Fig. 07 Model of the patient with implant locations.

Fig. 08 Finished surgical guides.
of implants were chosen and placed in the best possible locations for success. (Fig. 7) The surgical guides, one for the maxilla and one for the mandible, were designed and fabricated using 3D printing technology by Core3dcentres®. It is important to note that no physical models were ever produced. The guides themselves were a digitally accurate reproduction of the patient’s existing dentures with drilling sites added to facilitate surgery. (Fig. 8) The guides were then shipped to the doctor’s office with the required parts to perform the surgery. The surgery was an absolute success. In Doctor Kooner’s own words:

“Patient John S. underwent placement of eight implants in the maxilla and mandible with the aid of a fully guided surgical stent. The stent was planned in advance with Jason Atwood of Core3D in a digital platform. The implants were virtually placed with both surgical and restorative considerations taken. This process minimizes surgical complications and ensures a prosthetically-driven final restoration. It was the best kind of dental implant surgery—uneventful. The patient tolerated the procedure extremely well with only the use of local anesthetic and oral sedation. Moving forward, I would not consider full arch dental implant surgery without the assistance of fully guided stents.”

The patient is doing well with his implants. They are buried and integrating; and should be ready to restore on schedule. The plan is to do fixed full-arch prosthesis on four implants in each arch, based on the same dentures that the patient has been happily wearing for many years. The difference is that the lab technician was involved in the whole restorative process, and not just the fabrication of the final prosthesis. The implants were planned and placed with the location of the final restorations taken into consideration. Now, when the case comes to the lab, they already have a digital guide to use as a template.

This use of digital technology makes results consistently predictable. Involving the lab technician from the beginning is like handing a driver a map before they get into the driver’s seat—or using GPS while driving. For the technician, there is no longer a need for self-navigation or to ask for directions. For the dentist, a lab technician well trained in digital technology becomes a valuable resource.

When I see what the dentist and technician can accomplish working together in a digital environment, I am reminded of a quote:

“Computers are incredibly fast, accurate and stupid. Man is unbelievably slow, inaccurate and brilliant. The marriage of the two is a force beyond calculation.” —Leo Cherne
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The art of digital dentistry in implant work

How technology and artistry can combine on implant cases to produce stunning results

Our latest techniques in digital dentistry are getting faster and better. We have so many options available to us that we did not in years past and our esthetics and overall case design have been greatly improved as well because of these streamlined processes.

The purpose of this article is to explain digital workflow to create zirconia porcelain layering for a screw-retained unit to a full mouth case. There are considerations to look into when fabricating the final restorations securely, such as path of insertion for the implant crown. We also have to look at how deep the implant level is since this will have a major effect on the framework design.

Before we can have a basis for our frame design, we have to have a step-by-step plan from both the doctor’s and the lab’s side of the case.

From the lab’s perspective, for this case study, we needed a verification jig as our first step in making sure the six implants engaged together accurately. Secondly, we checked the bite registration and bite block for the denture teeth setting to accurately check the patient’s mid-line, smile line and occlusion.

The wax try-in indicates the final frame design if we are making a screw-

CAPTIONS

Fig. 01 Six implants with pink tissue indication.
Fig. 02 Dentist impression.
Fig. 03 Ceramill Map400 digital scanner.
Fig. 04 Nesting technique.
Fig. 05 Post-milling appearance.
Fig. 06 Amann Girrbach pre-shading color.
Fig. 07 Modify zirconia block.
Fig. 08 After sintering.
Fig. 09 GC Initial ZR second build-up stage.
CAPTIONS

Fig. 10 Finished restorations.
Fig. 11 Mirrored image final restoration.
Fig. 12 Occlusion view.
Fig. 13 Occlusion view left side.
Fig. 14 Occlusion view right side.
Fig. 15 Internal implant screws.
Fig. 16 After pre-shading.
Fig. 17 On model with soft tissue.

Fig. 18 Side view in the mouth.
Fig. 19 Restorations in the mouth.
Fig. 20 Maxillary view 6-11.
Fig. 21 Maxillary view 6-8.
Fig. 22 Maxillary view 9-11.
Fig. 23 Final restoration.
Fig. 24 Wax try-in.
Fig. 25 Six-unit implant final view.
Fig. 26 Try-in the mouth.
retained denture since occlusion will be linguinalized. If we are fabricating a screw-retained zirconia restoration, we will need centric contact—either tri-pod or cusp to fossa. These are all working areas of necessity for the laboratory as they begin work on a case such as the one we will be describing.

Case Study
In Figure 1, our image is of the six implant units indicating the pink tissue color. The patient’s natural color has variety with five or six different colors and indicates a reason to utilize as many as possible. The life-like pink esthetics would prove to be essential to create natural looking restorations.

An impression was taken by the dentist and sent in to the lab after which the technicians fabricated the soft tissue for the model (Fig. 2). After that was completed, the CAD/CAM technicians completed a scan and design of the model using the Ceramill Map400 digital scanning machine from Amann Girrbach (Fig. 3). The next image demonstrates the nesting technique in which the technicians try to increase or decrease the fit of the restorations as they are placed in the zirconia block for correct milling (Fig. 4). The next step was the milling process, and the technicians milled the restoration in the Motion Mill 2 machine from Amann Girrbach (Fig. 5), which we see in the finished product, pictured here. The technicians utilized the pre-shading color, liquid shade in an A1 base with pink color for tissue and facial layering porcelain application (Fig. 6).

The zirconia block was modified by hand, using a diamond burr. The goal was to create irregular tissue shaping (Fig. 7) for a more natural restoration. After sintering and applying porcelain over the zirconia blocks, we can see the appearance of the restoration (Fig. 8). The author used zirconia porcelain from GC America (GC Initial ZR) for the second build-up stage (Fig. 9), illustrated here. The final restoration was then seated on the model after the titanium base was cemented to the zirconia framework (Fig. 10). In a mirrored image, the final restoration is shown for the reader in order to note the tissue area indentation and color, whitish-pink with texture. The author utilized and applied an A1 base color for the incisal area, with translucency (Fig. 11).

In an occlusion view image, the author gives the reader a view of appearance after Lustre Paste application with maximum strength and no porcelain layering involved (Fig. 12). An occlusion of the left side (Fig. 13) follows, with right side image (Fig. 14) pictured here. We can see the internal implant screws in the next mirrored image (Fig. 15), not previously visible. Before the frame design, and after pre-shading, this is the case appearance (Fig. 16) on the model and then again once that was completed (Fig. 17). The finished restoration was photographed in the mouth after immediate try-in (Fig. 18). Next, note a right-side view on the model (Fig. 19) which is followed by a maxillary view of numbers 6-11 (Fig. 20). The author next gives a maxillary view of 6-8 (Fig. 21), then 9-11 (Fig. 22). The final restoration with verification jig and temporary cylinder, is shown here, but not previously (Fig. 23). A wax try-in model is compared to the final restoration, after duplication (Fig. 24) to verify fit and appearance based on the beginning stages. A final, upside-down view of the six implant units (Fig. 25) follows.

Conclusion
As we indicated, the traditional method for fabricating a case such as this one is with a verification jig and wax try-in. We are now able to efficiently utilize the digital system method for our cases, but in order to do so, we still have to make certain the preliminary work has been properly completed. And as with the traditional method, it is still essential to check the implants on the model with a verification jig and to allow the patient a wax try-in stage in the dentist’s office in order to make sure the case fits before the final restorations are completed.

As technicians, we also must still utilize our porcelain layering skills for the facial area of the restoration, as with traditional restorations. Life-like restorations can be created with zirconia screw-retained implants if we are aware of and practice our porcelain layering skills in the facial area.
Providing immediate esthetics for implant cases

A technique for immediate implant placement after extraction followed by immediate temporarization

by Mr. Chris Halke, CAD/CAM Supervisor, and Dr. Michael Pikus, Director of Clinical Education
both of Albensi Laboratories

Today, immediate implant placement after extraction and immediate temporization is becoming an increasingly popular option for many clinicians.

Implants have revolutionized dentistry and are allowing patients whose only hope 40 years ago would have been to get complete dentures to now be able to have an esthetic and functional fixed prosthetic. Initially, dental implants were placed by oral surgeons, and their restorations were almost entirely undertaken by a prosthodontist. As implant science improved with different surface treatments and an increased scientific body of knowledge about the process of osseointegration, more clinicians started to delve into implant placement and prosthetics.

Immediate placement of dental implants after extraction and the patient’s need to have an immediate fixed restoration of dental implants have pushed many clinicians into providing this service to their patients. One way dentists are able to offer patients quick, accurate, esthetic, long-lasting and functional restorations is for the clinician to utilize a dental laboratory with a digital workflow.

As technology has improved in clinical dentistry, it has also made significant strides on the manufacturing and laboratory side. Clinically, we have technological innovations in radiography with digital X-rays and cone beam computerized tomography (CBCT). On the laboratory side, we have seen a vast improvement in scanning and computer-assisted design and computer-assisted manufacturing (CAD/CAM). Advances in 3D printing and milling—with mills that are able to operate in five axes—have allowed the lab to improve its manufacturing practices. At Albensi Laboratories, we have achieved an almost complete digital workflow.

The process for the design of a fully guided surgical appliance begins with the clinician taking both a CBCT scan and impression or intraoral scan of the patient. This information is then sent via the internet to Albensi Dental Lab where the treatment planning phase of the restorative procedure begins using the Blue Sky Bio software. If a traditional impression is sent with the case, it is poured up in stone and then scanned using a 3Shape D-series cabinet scanner. For those practitioners

CAPTIONS

Fig. 01 Implant alignment in the CBCT scan.
Fig. 02 Implant position to allow for screw-retained temporary and eventual final restoration.
Fig. 03 The assembled guide on the model.
Fig. 04 The finished immediate temp on the model.
Fig. 05 Seating jig for correct tooth alignment.
Fig. 06 A detailed report is provided for the surgeon to review.
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using intraoral scanners, the scan data can be merged directly with the CBCT upon receipt, eliminating two production days from the case (in the form of shipping and stone model creation). Once the intraoral scan of the patient’s mouth or scanned models have been imported and aligned in the surgical guide fabrication software, a rough implant placement is done using the information on the Rx and industry-standard guidelines. Vital structures are able to be visualized on the scan, and are then accurately marked by an Albensi technician. The treatment plan is then reviewed by resident periodontist Dr. Michael Pikus and is approved or adjusted accordingly.

Dr. Pikus always evaluates implant angulation and the esthetic goals of the case. Bone density and vital structures are evaluated and implants placed in the most ideal position given the patient’s oral anatomy and pathology (if any is noted). Implant size and restorative options are considered so that spacing of implants is proper to achieve proper balance and cross arch stabilization to maximize implant and immediate load stability. Upon completion of the internal review, a remote session is scheduled between the dentist and an Albensi Laboratory specialist where the plan is reviewed and final adjustments requested by the treating dentist can be made.

Once the implant position and size and angulation are finalized, the laboratory can start the fabrication process. The guide itself is designed using the manufacturer-established protocol for the doctor’s surgical-guided drilling kit. Once exported as an STL file, it is 3D printed using either an EnvisionTEC Vida or Stratasys Objet 350v. Simultaneously, a separate file is exported with digital versions of the same scan flags used in scanning physical models for implant design. This file is imported into 3Shape as a digital impression and designed as a screw-retained or cement-retained restoration depending on the doctor’s request. The design is based around a non-engaging Ti base abutment to prevent any concerns with correct timing during implant placement. Once finished, the crown design is milled on a Roland DWX51D using PMMA, and a model with the implant interface is printed on an EnvisionTEC 3Dent.

The accuracy of the surgical guide is such that after implant placement, the treating dentist will be able to place a full-arch prosthetic that is not only highly esthetic, but it will be functional and will allow proper contouring of the soft tissue to prepare for the final completed prosthesis once all the implants have demonstrated successful osseointegration.

After fabrication, all parts are tested for fit and assembled. The appropriate guide tubes are cemented into the surgical guide, and it is tested against the model for retention. The PMMA crown is assembled and tested on the printed model for correct contact, fit and seating. As the returned temporary restoration is non-engaging, a seating jig is provided to ensure proper alignment during insertion. A final report is included, detailing specifics such as bone thicknesses and density around the implant site, what drilling protocol was used, and any special considerations.

Barring any unexpected concerns, the final osteotomy is step by step. The guide is seated in the patient’s mouth and the site is drilled based on the indicated protocol. Once the proper torque has been achieved with the implant, the temporary restoration is placed using the jig. If necessary, minor alterations can be made to the restoration using light cure composite and a handpiece.

Dentists focusing on improving their aptitude in implant dentistry will find this is another tool to help them as they seek to provide patients solid, esthetic and predictable implant restorations. Clinicians who successfully adopt a partnership with a digitally-advanced and skilled laboratory should not fear or avoid large implant-supported restorations or treatments. Bringing together expertise and various skills can help your patients walk out of your office with a smile.
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Using digital impressions for better implants

How using digital implant impressions streamlines the restorative workflow

By Paresh B. Patel, DDS

A female patient in her early 20s presented for initial consultation with a congenitally missing maxillary lateral incisor. She had been wearing a flipper appliance for much of her life and desired an implant restoration for her missing tooth now that her dental development was complete.

The patient had been saving money for treatment but was told by another doctor that, as a result of bone loss that had occurred over the years, her ridge was too thin to receive an implant without extensive grafting.

CAPTIONS

Fig. 01 The patient presented for treatment with a flipper appliance in the area of her maxillary right lateral incisor.

Fig. 02 Initial condition of edentulous space.

Fig. 03 Occlusal view of edentulous area shows facial-palatal resorption of the ridge.

Fig. 04 Caliper measurements indicated ridge width of approximately 5.5 mm, which was sufficient for the placement of a 3.0-mm-diameter Hahn™ Tapered Implant.

Fig. 05 A surgical flap was reflected to visualize the bone crest.

Fig. 06 Proper positioning of the initial osteotomy was confirmed radiographically with a parallel pin in place.

Fig. 07 The 3.0 mm x 16 mm Hahn Tapered Implant was initially inserted with a handpiece and threaded into final position with a torque wrench.

Fig. 08 Treatment area after full seating of the implant.

Fig. 09 Post-operative radiograph verified that the implant was fully seated and didn’t impinge upon the periodontal ligament spaces of the adjacent teeth.
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CAPTIONS

Fig. 10 Condition of patient after 17 weeks of healing.

Fig. 11 A tissue punch was used to expose the implant.

Fig. 12 A scanning abutment was attached so a digital impression could be taken.

Fig. 13 Radiography verified complete seating of the scanning abutment.

Fig. 14 The iTero intraoral scanner was used to create the final digital impression and submit the case to the lab for restoration.

Fig. 15 The lab digitally designed the Inclusive Custom Abutment without having to wait for a physical impression or pour a stone model.

Fig. 16 The final crown was designed in concert with the custom abutment to optimize the gingival margins and emergence profile.

Fig. 17 To maximize esthetics in the smile zone, the final restoration consisted of a BruxZir® Anterior crown over an Inclusive Custom Zirconia Abutment with titanium base.

Fig. 18 Complete seating of the custom abutment was confirmed with a periapical X-ray.

Fig. 19 The custom abutment fit perfectly, establishing margins just below the soft tissue. Teflon tape was placed over the fixation screw.

Fig. 20 The final crown was cemented over the custom abutment.

Fig. 21 The patient was very happy with the final restoration, which exhibited a lifelike appearance among the patient’s natural teeth.
The initial patient examination, including measurements of bone volume with ridge calipers, determined that, although the ridge was thin, there was sufficient facial-palatal bone volume and mesial-distal space to accommodate a 3.0 mm Hahn™ Tapered Implant, which excels at fitting within tight anatomical spaces. This implant would also prove advantageous because it could be restored using a custom zirconia hybrid abutment, which was important because of the restoration’s location in the esthetic zone.

The patient agreed to the treatment plan and returned for the implant placement appointment. After anesthetizing the area of treatment, an envelope flap was reflected just palatal to the crestal ridge so the bone volume and osteotomy trajectory could be visualized. The osteotomy was created following a simplified drilling protocol, with periodic X-rays taken to verify proper positioning and alignment with the long axis of the adjacent roots. After placing the Hahn Tapered Implant to depth, a cover screw was inserted and the implant site sutured.

After healing for 17 weeks, the patient returned for final impressions. An intraoral scanner was used in order to provide the patient with a highly accurate implant crown in as little time as possible. The final digital impression was taken with the iTero® intraoral scanner (Align Technology, Inc., San Jose, California) and submitted to the lab along with the parameters for the restoration, without the need for physical paperwork or shipping.

Using the virtual model generated by the digital impression, an Inclusive® Custom Abutment was designed with CAD software to optimize the emergence profile and esthetics of the BruxZir® Anterior restoration. At the final restoration appointment, the custom abutment and implant crown were seated and established the desired form, function and esthetics without the need for any chairside adjustments.

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Implanting innovation into your workflow

New implant technologies, workflows and systems mean new opportunities—and revenue  

By Robert Elsenpeter, Contributing Writer
There’s no doubt: Implant dentistry is booming. Thanks to advancements in technologies, materials and procedures, the restorations are more popular than ever. According to the American Association of Implant Dentistry (AAID), three million people have dental implants, and that number grows by 500,000 every year. Further, the AAID estimates the dental implant and prosthetic market in the U.S will reach $6.4 billion by 2018.

Labs are able to deliver more for their doctors. Doctors are able to perform the surgeries quickly, more easily and less expensively than ever. And, as a result, more patients want the restorations, leading to more work for the entire dental workflow.

Advances are happening on many fronts: from the doctor to the manufacturers, but nowhere more so than what the lab is able to deliver.

How CAD/CAM shapes the implant workflow

Any discussion of improved workflows would be incomplete without recognizing the role of CAD/CAM. Like so many other restorations, implant creation has benefitted from a digital workflow.

“I’ve been around the implant business and digital for a long, long time,” says Dr. Robert Gottlander, VP, Global Prosthetic Solutions at Henry Schein. “The whole thing started out with machined titanium abutments, and what CAD/CAM really has done is that it has made it possible to use ceramic materials. When we talk about digital and CAD/CAM, we are usually focused on the technology and the equipment. But in some ways, what is really driving the technology is that you can use ceramic materials. You can use zirconia, you can use lithium disilicate, and you can actually design these materials in a way so they can be used for abutments, for crowns and for bridges. And that means that you will get a much better esthetic outcome.”

Dr. Gottlander compares crafting implants to building cars.

“If you have a really good person that’s doing it handcrafted, you get a phenomenal product,” Dr. Gottlander says. “It’s like [an] automobile. It’s not bad if the person who’s [building] it knows what they’re doing. But if you want to have a really good, predictable quality for a larger number of people, then it’s good if you have robots doing it. It’s a little bit the same with abutment production. I would never say that digital is better than handcrafted, but since we all know that handcrafted restorations have] more fluctuations in quality than something you design in 3D and produce on a milling machine, I think the design of the abutments in the production of the implants is very good and that will also lead to better esthetics.”

Ultimately, CAD/CAM is a tool—a revolutionary tool, but a tool nonetheless—and lab technicians and dentists can use it to produce quality restorations.

“CAD/CAM just improves all the little details,” says Marina Caponigro, MDT, EFDA and in-house lab technician for Dr. Neal Patel, DDS at Infinite Smiles in Powell, Ohio. “They’re little details but they’re very important. It cannot be done sloppily. It should be scientifically driven and you should think about the end result. You don’t have to spend time on routine steps that are a waste of time. CAD/CAM makes it very easy on the doctor and the technician.”

How software helps

Innovation has occurred in every part of implantology, especially where CAD/CAM is involved. The software used to design implants has not only made the restorations better, but has also made the work easier.

“It’s more intuitive,” observes Dr. Gary Severance, DDS, Planmeca University. “In the early generations, the software may have given you a good proposal or it gave you something the computer thought was a tooth in the right location, but the more information that we, as dental professionals, can provide the system, whether scanning more, detailing some areas, marking the margins of the tissue, then the computer has information and can present an ‘educated’ proposal. We see the computer becoming more intuitive and learning from past patterns—learning the clinician/technician’s preferences. There’s going to be artificial intelligence in the design process [to] give you a better proposal, saving time, and that’s a big thing when you’re in the mouth or you have a patient waiting. If that computer can have an educated/learned proposal for what you really want, then the whole design process of the CAD becomes much easier for everybody and less time-consuming.”

As a result of the technology’s precision and intelligence, implants are improved and prices lowered.

“Certainly the accuracy has improved dramatically, and it’s getting even better every day,” says Mark Ferguson, General Manager, Vulcan Custom Dental in Birmingham, Alabama. “Here at Vulcan, when we’re printing models, we’re no longer using a metal lab analog. We’re...
actually printing the implant interface and screw threading in the printed model, which is keeping prices down as well. It’s more accurate, because there are fewer things to rotate. Fewer parts always makes things more accurate.”

CAD is also able to help labs objectively quantify formerly subjective information.

“One big thing is the ability to measure things,” Ferguson says. “We’re not guessing anymore. We know precisely where a margin’s being placed. We know precisely how much tissue displacement there is. If a doctor has trained the tissue, we can digitally set the implant right on that trained tissue, so there’s some really amazing features, digitally.

“None of it is actually new, it’s just being used in a different way now,” Ferguson adds. “One of things that got me excited about digital 10 years ago was the fact that I can make my model translucent and then measure exactly how far something is from something else. It’s the ability to quantify what we’re doing, instead of saying, ‘Yeah, that’s about the tissue compression that we want,’ based off of a feel.”

While these innovations make implant creation easier, more accurate, and less expensive, in the end, patients see the benefit.

“All of this technology can speed up treatment times while also resulting in higher-quality outcomes,” Dr. Gottlander says. “You can take digital impressions with an intraoral scanner, design the position of the teeth, and then take that design file from the cone beam and to do the implant planning. There are so many things that you can do today that you could not do five or 10 years ago.”

Breakthroughs in esthetics

Patients want durable, quality implants. But when they smile—and see their investment reflected back in the mirror—they aren’t seeing durability. They want to see something that looks like a real tooth. Happily, esthetics continue to improve and evolve.

“The potential for ideal esthetics has always been there; it’s more a question of how skilled does someone have to be to achieve the ultimate results,” Dr. Severance notes. “In previous years and decades, a technician would layer many layers of ceramic and fire it and layer it again and fire it to get those layered looks. And now blocks are coming out with that layered translucency and are multi-chromatic, so it’s just made it easier for the masses to achieve and predictable. Techniques have been simplified so there’s less chance of errors, and so whenever anybody has fewer choices to make, they have a better chance of success.

“It’s like when you do MapQuest and you get 11 different turns. You have a pretty good chance of getting lost,” he compares. “But if we reduce that to one or two, and the computer or the intelli-

INTEGRATING CBCT IMAGES WITH CAD SOFTWARE

Making the design process even more innovative is the ability to integrate cone beam computed tomography (CBCT) data with CAD. This allows labs and clinicians a new level of design capability, since CBCT scans allow them to see the patient’s jaw, bone structure and tooth structure. Combining that data with CAD software allows users to see exactly what the final restoration will look like in the patient’s mouth.

“We usually rely on cone beam CT imaging for 3D scanning of our patients so that we can see the exact anatomy,” Dr. Patel says. “Within that, we can plan an implant, we take one of those CBCT scans, and we can actually merge it with the CAD/CAM data and plan implants knowing exactly what the final restoration should look like. We can make clinical decisions in the software to improve the placement of the implants to benefit the patients and to precisely plan things before we even start surgery. Once the clinician positions the implant directly underneath the virtual teeth that the lab technician and/or the dentist have designed in the software, we can confirm its final location, and then that data actually gets sent back to lab.”

CBCT provides an unprecedented, accurate view of the patient’s head and mouth, which, when used in conjunction with planning software, allows for precise, accurate design and final placement.

“Once we have the CT, it’s pretty easy planning the case,” Dr. Ghaboussi says. “We use CLINIVIEW in Anatomage. There’s a lot of software out there, but they’re so user-friendly and easy-to-use. The CTs are super accurate, so we can plan a case by doing what I call a virtual surgery, which is where we can look in 3D at the bone structure and tissue and place the implant on the computer before we do anything to the patient. So that way it’s super accurate. We know exactly what we have to do, exactly where we have to put an implant.”

As with so many other aspects of digital dentistry, this ability to integrate cone beam data with CAD tools is revolutionary for labs and clinicians.

“The technology gives the possibility that now you can have an intraoral scanner, you can do a scan, we can then design the position of the teeth, and then you can use that design when you are taking the file from the cone beam and you’re doing implant planning,” Dr. Gottlander says. “From a technology point of view, there are so many things that you can do today that you could not do five or 10 years ago.”
The open architecture of the CS 3600 intraoral scanner makes sharing files even more straightforward. Choose the file type that works best for you and continue to use the dental CAD software of your choice with the manufacturing settings that you prefer. For more information, call 800.944.6365 or visit www.carestreamdental.com.
gence takes care of the rest, you have less chance of an error. One of the misnomers of CAD/CAM or digital dentistry is that it makes a bad dentist/technician/assistant good. No; it just makes a good team better. Because there are still fundamentals you can’t compromise on, but it makes it easier to get up to that better dentistry level consistently by eliminating variables.”

Great esthetics are the lab’s responsibility. Not only must they make the restoration as natural looking as possible, but they also must be skilled enough so that implants can be accurately placed and properly fitted.

“Esthetics really come from the lab, but the quickest way to kill esthetics is by having the doctor grind them all away,” Ferguson observes.

Manufacturers continue to improve their designs, resulting in better quality esthetics. For example, Dr. Patel looks to TiBases, from Dentsply Sirona.

“We’re getting phenomenal results because there are newer concepts in the restorative process for implants,” Dr. Patel says. “The TiBase is very low in profile and sub-gingival, so we can really customize the emergence of the restoration from the gum tissue. There is a lot of ceramic material, as opposed to titanium, which allows us to then have a more predictable esthetic result near the gum line and certainly the top of the tooth itself. The ceramics are now at the point where we can mimic existing teeth, regardless of their characteristics and color. They’ve come so far, I would say we are close to the edge of where we’re getting perfect results, esthetically where they’re not detectable by the untrained eye.”

New materials make implants better—but there’s room to grow
The components used to create implants continue to advance, providing better esthetics, greater precision and overall superior quality.

“We went from the cast frameworks, which we all know could be really good, but they were often not optimal,” Dr. Gottlander says. “Digital technology means that you can actually mill something that is absolutely precise and fits well, but what we’ve also seen is that you can do that and go from metal to ceramic.”

Though materials for digital workflows are improving, there are not as many options for digital dentistry as there are for traditional workflows.

“There are fewer materials to use than with the analog workflow,” Ferguson notes. “Traditionally, if you look at the UCLA abutments, labs had a wide variety of materials to choose from to then create porcelain-fused-to-metal, screw-retained. Right now, you’re kind of limited to either non-precious or titanium, titanium being harder to stack porcelain to, non-precious not necessarily being the ideal material for the implant-to-abutment connection. There’s still a little bit of work to do in terms of materials, but what we have is great.”

And while materials are improving, Ferguson notes that nothing is—yet—poised to take the implant world by storm.

“They’re not game-changing,” Ferguson says. “Hopefully they are stop-gaps to some really improved materials in the future. If we look at these materials, hopefully they are going to turn into kind of what zirconia has turned into, where, in the beginning, you’re given this one flavor, but through use, more shades come out and different processing methods come out, with the zirconia and painted on coloring and things like that hopefully something like that can happen with these high-strength ceramics.”

A new revenue source for labs that can improve patient outcomes
In some cases, doctors are able to drill holes into patients’ mouths—freehand—to place the implant. However, in more complex cases, surgical guides aid doctors. These plastic pieces fit over the patient’s gums and show the doctor precisely where, at what angle, and how deep to drill.

“If the case is ideal and just seems super easy, I will freehand it,” says Dr. Kaveh Ghaboussi, DDS, of Madison Smile Solutions in Madison, Wisconsin. “But if there is any kind of tricky part to it or angulation or the access is difficult, we just go ahead and have a surgical guide made.
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COVER STORY

IMPLANT MANUFACTURERS’ INNOVATION

Manufacturers have their own takes on implant workflows. We talked to representatives from Straumann, DENTSPLY Implants and Nobel Biocare to find out some of the highlights of their latest offerings.

Collaboration at Straumann
It should come as no surprise that the ability to work together on a case yields optimal results. To help facilitate collaboration, Straumann offers its DWOS Synergy, which links the restorative doctor and the lab.

“The lab is able to design a proposal for the tooth or teeth that are going to be replaced, and then that proposal is transmitted to coDiagnostiX treatment planning software, which can be owned by the surgeon,” says Jorge Pages, Marketing Manager, Digital Solutions at Straumann in Andover, Massachusetts. “Now they try to plan the implants with respect to the proposal that the lab has sent over, and they’re looking at the treatment plan in the software where they are looking at the available bone. They do their best to place the implant underneath the restoration that the lab proposed, but as we know, that may not always work out.

Synergy allows the lab, that has the CAD software, and the doctor, who has the coDiagnostiX software, to then go back and forth in real time and change the placement of the implant or the design of the proposal so that the patient gets the best result.”

Design and innovation at Nobel Biocare
Advancements in materials and technology are not just novel developments; they happen often enough that doctors should hold implants to a high standard.

“The science behind dental implants has progressed to the point that doctors should not only expect more out of the latest generation of implants—they should demand more,” says Hans Geiselhöringer, President of Nobel Biocare & Dental Imaging. “If you choose a clinically proven and evidence-based implant, you can expect high predictability, proven clinical performance, specific micro- and macro-design features that respect both biological and mechanical functionality, material solutions for restoring implants with unrivaled quality and precision. [This supports] value creation in the laboratory and a portfolio of products and solutions covering all clinical situations and indications. We believe all new innovation should be targeted to improve workflow efficiency for the clinician and most importantly, it must be a benefit for the patient.”

Tissue management at DENTSPLY Implants
In order to get the best results, proper tissue management is important, and implants must be designed with that outcome in mind.

“With the increased demand for better long-term results, both implant and abutment design need to be optimized,” says Matt Gassel, Director of Marketing for DENTSPLY Implants, North America. “The focus is on maintaining hard and soft tissue and working to create the most natural results with the tissue that’s there. For instance, ATLANTIS abutments can now be produced with concave emergence profiles to provide proper crown support with minimal tissue pressure. Long term, the abutments also need to be engineered to stand the test of time.

“We’ll continue to see a focus on maintaining hard and soft tissue with new technologies and designs to treat segments of the market more effectively. Restoratively, we believe there will be an increase in edentulous solutions to provide better options.”

The key to every implant case
It is incumbent on doctors and their laboratories to communicate and collaborate on their cases. Happily, digital dentistry has made that collaboration much easier and more effective.

“Successful laboratories have very often been successful because they have a close collaboration with the dentist,” Dr.

The cost of a surgical guide has come down significantly, so it just makes the workflow so much easier and cuts down on wasted time. The surgical guides can really simplify the case.”

In the past, creating surgical guides was a time-consuming process and were only made for the most difficult cases. Now, CAD/CAM and 3D printing has streamlined the process, making guide creation faster and easier than ever.

“It used to take me about three hours to go through all the steps, plus I’d have to wait for the gypsum to set up and acrylics to set up, so it was a long process,” Caponigro says. “Now, with CAD/CAM, it’s so much easier. The doctor does his work, then I get my file, open it in the software, make it look nice, and it gets sent to a milling unit where it mills out while I’m drinking coffee and eating cookies.”

Creating surgical guides takes a lot of stress off of everyone involved in the case. “[Dentists] don’t need to sweat,” Caponigro says. “They don’t need to not sleep during the night thinking about how difficult the implant is going to be, because the implant is very predictable. The doctor has everything he needs to have with CAD/CAM technology and surgical guidance. There are no doubts. All he needs to do is pick up his drill, drill the hole, screw in the implant and he is done. It takes 10 minutes. It’s not bleeding. The patient has no pain and swelling. The lab technician’s life is easy, the doctor’s life is easy, the patient’s life is easy.”
Gottlander says, “In many situations, laboratories have supported the dentist with knowledge, and I think that will continue. What the technology is doing is that you can actually communicate much faster and more directly between the dentist and laboratory. Let’s say if I do a scan and I send it to my lab and the lab has designed an abutment, the lab can send that design back to me so I can check it on the screen in my office. I can approve it or ask for changes. I also think that communication between the dentist and the laboratories, when it comes to implants, is OK, but it can be taken one step further with new technology, that’s for sure.”

Digital tools, while great, are not perfect. The idiosyncrasies between the doctor’s and the lab’s systems necessitates communication.

“Hopefully there’s more back and forth now, and there certainly needs to be,” Ferguson notes. “Dentists have—if you’re going all-digital—maybe five-to-seven different scanners that they can use in the mouth. Not all labs can accept files from all those scanners. They’re all going to be slightly different, and depending on the technology in the lab, they may or may not be able to work with certain files. So a doctor can take a scan with the intraoral scanner and then all of a sudden have nowhere to send it—at least nowhere he’s been working with. And then the other side of that is on the clinical side; what scan body the doctor uses becomes very important as to the workflow that would follow as well, unlike traditional impressions, where the doctor can buy his impression coping, send it to the lab, and then the lab has free reign. The doctor’s making choices for the lab before the lab ever gets the case. My biggest advice I can give anybody is, don’t just do your first case. Communicate with your clinicians. For clinicians, communicate with your lab. Hopefully they’re communicating with their labs before they even purchase a scanner.”

**It’s time to embrace tech**

Dental professionals that may not embrace CAD/CAM implant creation should consider adding it to their repertoire. The proposition may seem like a prohibitively expensive addition, but it can be added in smaller, easier, more affordable phases.

“I like to advise [labs] to kind of dip their toe in the water before they jump into the deep end, the same way I tell doctors to reach out to their labs before they buy an intraoral scanner,” Ferguson says. “If you’re a lab technician and you’re going to start doing these bigger and more complex cases, or even if it’s the smaller cases and you’re not fully comfortable exactly with how the workflow is, get some information ahead of time. The information’s there. Any company that’s doing this type of work is absolutely there to help you, and they would find it much easier to help you before the case is under way than when it’s midstream.”

Caponigro advises accepting that CAD/CAM is the future and jumping on board. “Labs that are trying to avoid CAD/CAM technology and sticking to the old ways, they really need to get exposed to CAD/CAM, because it is our future,” she advises. “It does take some investment to make, but you have to invest money before you make money. People who are resistant shouldn’t be afraid. I see a lot of people who say, ‘Fixed bridges on implants, it’s such a complicated thing,’ but before you start doing it, you don’t...
know how to do it. Just don’t be afraid. Accept that you can make mistakes and things can break. But we learn from our mistakes and our experiences. There’s no point to be afraid and resist. Get your educational level up on the implantology and CAD/CAM technology, and just strive for better results. I see a lot of people who are very skeptical about it, and they shouldn’t be. Of course they’re going to sweat a little bit, but they’re going to get great results with less effort.”

Dr. Gottlander notes that labs must understand how CAD/CAM will fit in with their implant services and existing clients.

“I think everyone can benefit from it, but they have to figure out how much they’re going to use it,” he says. “They have to figure out, should they get involved with the dentist. If my dentist is using an intraoral scanner, I also have to learn about the scan technology, because I, as a laboratory, should provide support services to my customer. If the laboratory does not know about the procedure the dentist is doing, there will be a disconnect. Then, based upon how much volume the laboratory does, they can decide if they want a scanner only. If you go to the big implant labs today, they have machine after machine after machine working 24/7. If you go to a small laboratory, they might have a scanner only and outsource to someone else for production. There’s a solution for everyone, but they have to assess it and base it on where they fit in.”

And while CAD/CAM is changing how some restorations can be delivered—even allowing crowns to be created chairside in the dentist’s office—it affords new opportunities to the entire workflow.

“Dentistry has to embrace digital in all areas,” Dr. Severance says. “Don’t treat it like competition to conventional methods. The times are changing. We know that some dentists can do a lot of the work in their office, which used to go to a laboratory, but that just opens up other avenues for the laboratory to pursue. There’s nobody better at designing a smile or looking at the overall [complexity] of designing teeth than dental technicians, but if the profession rejects the opportunity or if they say, ‘I’m not going to get into digital,’ that’s not going to last very long. It’s really the opportunity for the dental profession to embrace technologies that make you a better dental professional, whether it’s dentists or technicians, so it’s just having an open mind. It’s the same thing when we were taking conventional film for cameras or X-rays and now nearly everything is digital. There are always some that will hesitate, but the ease of use, the advantages to the patient and the dentist and the dental technician are so numerous, you just have to be open to the new opportunities.”

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Digital Dental Solutions
The beauty of digital milling

How using a milling machine and e.max have helped create beautiful smiles.

By Ryan Hamm

For the past decade, IPS e.max from Ivoclar Vivadent has been one of the most-prescribed materials for restorative dentistry. And for a long time, the ability to mill it was mostly restricted to chairside options. But Ivoclar Vivadent announced the Zenotec select hybrid mill in 2014, a mill specifically designed for the dental laboratory that would mill IPS e.max CAD. Since then, Ivoclar Vivadent has released several updates to the e.max line, providing additional esthetics and strength.

To find out how the addition of the Zenotec select and updated materials has changed the digital workflow, we spoke to Chris Roman, a dental technician who works with a Zenotec select hybrid and with e.max CAD. We also spoke with Trey Wilcox, DDS, a dentist who works closely with Roman’s lab on a variety of restorations, including restorations made with a digital workflow using the Zenotec select and e.max materials. Here’s what they had to say about how the digital workflow really works in the context of a busy lab, and how patients are responding to digital restorations.

What are your roles on the dental team? Tell us about your laboratory and practice, respectively.

CHRIS ROMAN: I am a partner in Oak View Dental Laboratory located in Washington, Pennsylvania and the head technician of the lab along with two other technicians. Our lab has taken a role of working with around 25 doctors, who value the collaborative team approach and enjoy the ability to have a consistent quality product. Currently our lab specializes in crown and bridge and implant restorations with an emphasis on treatment planning to help our clinicians build confidence though education.

DR. TREY WILCOX: I am a general practitioner with a patient pool estimate of around 1,400 patients. I run a five-operatory practice, with two hygiene chairs and three restorative chairs. During a typical week, I switch between two restorative operatories, and leave the third open for emergency appointments. I usually see between 100-120 patients a month on the operative side of dentistry.

Chris, what’s the workflow been like with IPS e.max?

ROMAN: We started doing e.max shortly after our lab was founded in 2006. As we all know by now, lithium disilicate has changed our industry dramatically over the last several years. The versatility of this material had given us an arsenal of products that best suit our clients’ needs. We can create everything from single unit anteriors for the most esthetically demanding patients, to our daily “production” single unit posterior. Currently, we are also utilizing CAD-ON bridges, bonded bridges and implant retained units.

You also have the Zenotec select hybrid mill. How does that fit into your workflow?

ROMAN: The mill not only fit seamlessly into the workflow of our laboratory, but almost completely changed our production setup, while making us more
efficient and keeping to our standards of a quality product. We have our CAD/CAM system setup with a 3Shape D800 and 3Shape 2015 design software as our server system. We have the ability to work as a client on the server when our case load reaches a certain level. Our designs are then sent to the Wieland software for nesting and CAM simulations before being sent to the Zenotec select hybrid mill.

**Dr. Wilcox, what’s the workflow look like when working with a digital lab like Oak View?**

**DR. WILCOX:** Since I began sending my cases to Oak View, workflow has much improved on my side of the practice. Crown seat appointments take less time, with minimal adjustments at most—crowns usually drop into place with invisible margins. I am seriously considering shortening my crown seat appointment times now.

**Chris, what features made the Zenotec select hybrid the right mill for your needs? What was it like incorporating it into your CAD/CAM workflow?**

**ROMAN:** Our lab has transitioned to only offering all-ceramic restorations this year, giving us the ability to optimally take advantage of all of the available features of the system. We chose this system for not just its current versatility but also for the future of the next generation of materials and processes.

I originally purchased 3Shape by itself in 2011 and sent all of the designed units to different outsourcing labs depending on what restorations were being produced. When we decided to purchase the Zenotec select, one of our concerns was, how will this system integrate into our workflow? It turns out that after we had the system setup and running (it takes some time to tweak your fits to meet your standards) we realized that we needed to change our workflow to keep up with what this piece of equipment can do daily.

**How does the combination of e.max and the Zenotec select hybrid mill work for your lab?**

**ROMAN:** IPS e.max has become our first choice for restorative units due to the versatility of esthetic options. Add to that the excellent margin adaptation and the fact that it can be bonded, it has been a workhorse for us. Since our work load is approximately 60 percent e.max, it was a no-brainer for us to utilize the Zenotec select. The combination of this mill and the material developed from the same company gives us the peace of mind we need to make sure that we can confidently produce a consistent quality restoration every day.

**How is the fit for e.max restorations made with the Zenotec select?**

**ROMAN:** We have found that our best fit for e.max has been all anterior restorations up to three-unit bridges, full contour posteriors and in the esthetically demanding cases, micro layering of the buccal of posteriors for strength and beauty.

**DR. WILCOX:** The results of the digital workflow have been outstanding. I have used multiple labs in my seven years of private practice, and the crowns I receive from Oak View are the best fitting crowns I have come across. Patients leave impressed, usually with the response of “it was that easy?!” Patients are happy when they can be in and out in under 30 minutes with a high-quality crown.

**Anything else either of you would like to add?**

**ROMAN:** While we have only talked about the machine and the materials used with it, I also think a major influence for us was the quality of support we received from Ivoclar Vivadent. They have been there for us for the simple “duh” questions and have really exceeded expectations with the most complex problems!

**DR. WILCOX:** I am thoroughly impressed with the quality and fit of the work from Oak View Dental Lab. Results are consistent, of the highest quality, and Chris and his staff are a treat to deal with!
What the digital transition means
One lab owner talks about the transition from analog to digital.

Shaun Keating
Mr. Keating is the CDT President and CEO of Keating Dental Arts, located in Irvine, California.

The industry is changing really quickly from analog to digital. How did you make the change?
KEATING: At Keating, we saw the writing on the wall early on as more and more of our doctors began requesting for us to accept digital files. From our start with Sirona/CEREC up to today, our manufacture partnerships and industry thought leaders have provided us with great information on current trends.

As more and more dental offices buy into digital technology, the need for the laboratory to transition into these systems is paramount. It is interesting that everyone has been talking about the digital solutions for several years, and only recently, with the price points of some of these systems coming down, have dentists become increasingly interested in getting into the game.

Basically, we work with all the systems at Keating. Open-architecture STL file formats are allowing us to work with 3Shape, Dental Wings and several other in-lab software’s to fulfill these digital work orders coming in from the scanners in the dental office.

How can labs keep their commitment to esthetics even as they go more digital?
KEATING: I see labs trying to go the cheapest route on labor and getting it out so they can sell it for a cheap price, where we totally do the opposite. We’ve kept all our technicians, many of which are Certified Dental Technicians. We really take pride in that. We’re cross-training them from ceramists that have been stacking from the ground up, to ceramists that provide contour and final stain/glaze to the product. They have the training and eye for detail; we just changed the material and process. All my PFM techs have now converted over to our Bruxer-type restorations. So it’s not about letting go your commitment to esthetics—it’s how to incorporate the materials effectively into the lab by training the team on the new process and procedures.

How can these new tools be used more effectively to maintain desired esthetics?
KEATING: No one likes change. There are still people in my laboratory that are fighting it a little bit, but they’re kind of dinosaurs and they like their ways—but they’re seeing the writing on the wall. As more and more crowns go into this digital format and less is being done by hand, they have to adapt and change or retire. A lot of my people don’t want to retire. It’s a happy place to work here. They like working here but we have to give them all the tools we can to help teach them and not just throw them in blindly. We want to get the best educators here, to help us with the change.

Every other week we have someone in here trying to help us improve on our technology. You’re always going to have to be on that cutting edge of learning and accepting that change is good. That’s the way it’s going in digital dentistry.

We have dentists working with us digitally. Digital doesn’t lie. We can get parameters on a crown, how it fits. We can add cement spacer for the dentist. We can wax things a little differently. I can go from 60 microns to 100 microns of gap space for cement. I can build connectors, the right 3x3 or 4x4 depending on where it’s at. I can build marginal ridges up to support within 2 mm. If I’m doing a stack-on type like a KDZ Ultra, I can build my ZR substrates exactly where I want support in the software.

It’s much more consistent and accurate by going digital. Yet with all of us here at Keating, we’ve got that aspect that we love but we also keep improving on how we interact with the doctors personally. We still have all the people on the phones. We still have every case that a doctor can call on and go over it hand-by-hand with us and we can program or we can do it by hand.
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