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Déjà Vu All Over Again

Is it, is it the same thing all over again? End of one year, starting the next with the same old thing? Usually this From the Editor article begins the same way with a song lyric, and this one could be viewed the same way with credits to John Fogarty. But the first time I heard this saying was from the great philosopher, Yogi Berra. He also once quipped, "It ain't over 'til it's over." Since this article ain't over, let's move ahead.

I must admit I was unaware of the end of a decade until midway through December of 2019. And with some of the upcoming changes, I started perusing some back issues of the Magazine. At the beginning of the decade, we ran a story called We Are cerecdoctors.com. Well, that has now changed. Without stealing too much thunder from our cover story and Dr. Sameer Puri's Happenings article, we are now CDOCS.com. As I mentioned in an article in that same past issue, "It's over … and it's just beginning …" Really looking forward to what's next!

Along the same thought process of another Yogism, "When you come to a fork in the road, take it," I took a look at the Q3 2014 issue of the Magazine, which basically predicted the future of the organization. I talked about reflecting on a saying displayed on one of the walls in our offices. This really resonated with me then and certainly does now: *Evolve or risk irrelevance. Challenge the usual, embrace change, defy normalcy, exceed expectations.* I have had a great opportunity to watch this company grow, especially over the last half of the previous decade. It has been led by people who have had faith in the people they work with. And by having this faith, they had faith in the people's ideas that have helped with this growth. Also, with this faith, the company has evolved and will continue to work toward a new and better reality.

Yogi once said, "You can observe a lot by watching." We have observed a lot of change in dentistry over the last decade, especially in the areas affected by digital concepts. CDOCS.com has observed these changes and will continue to evolve. I'll leave you with what was said in the Q3 2014 issue: *I believe we at cerecdoctors.com (CDOCS) are evolving. Our intent, whether through the Magazine, the website, our hands-on courses, or memberships is not only to meet but exceed your expectations.* We will continue in that endeavor. Here's to the future of CDOCS.com. Thanks.

For questions and additional information, Dr. Fleming can be reached at mfleming@cdocs.com.

Mark Fleming, D.D.S.
Editor

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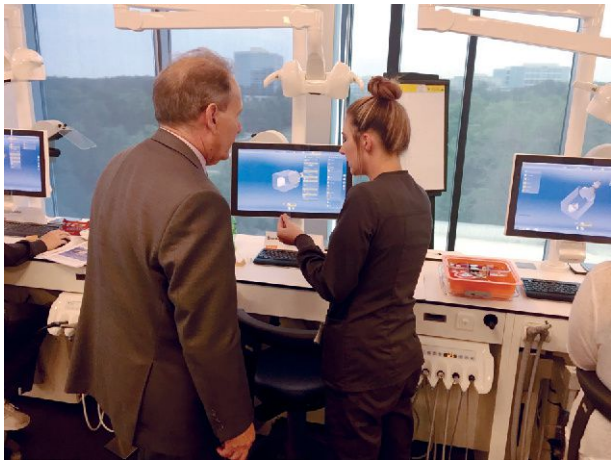
Let's Talk CDOCS.com Q&A with Sameer Puri, D.D.S.

By Mark Fleming, D.D.S.

What is the history of cerecdoctors.com?

We started doing CEREC® training in 2005 and founded the website cerecdoctors.com in 2006. Soon after, we had an agreement with Patterson, and what was known back then as Sirona, that a membership to the website would be included with each and every CEREC sale. In 2007, we started offering courses at the new Scottsdale Center for Dentistry, which is now known as Spear Education. In 2011, I left Los Angeles and moved to Scottsdale full time to focus more on teaching. Our CEREC curriculum has grown and, to this day, we have trained more CEREC users than anyone in the world. I'm very proud of our entire team in the dedication that we have to the doctors who participate on our website and attend our workshops. The agreement to include the cerecdoctors.com website with every CEREC purchase has continued to this day and has even expanded. As



of October 1, 2019, cerecdoctors.com, now known as CDOCS.com, has been tasked by Dentsply Sirona to deliver all of their cone beam education for new users. We are grateful for the opportunity and very proud to continue to educate doctors on the tremendous technology in which they have invested.

Why are you changing the name to CDOCS?

In early 2019, we started negotiating with Dentsply Sirona to provide their cone beam education. As that discussion became closer to reality, we realized that we were not exclusively teaching CEREC anymore. The name cerecdoctors.com might not make sense. But we didn't give it another thought because the brand cerecdoctors.com is very strong. Now, as of 2020, we have an additional agreement with Dentsply Sirona to do more than just CEREC and cone beam training, so it was time we thought that we should look more closely at our name. If, for example, we provide education in implant therapy, would it make sense to still call ourselves cerecdoctors.com? We decided that a new name would showcase to the world our new direction. CDOCS.com made perfect sense because in reality everyone has been calling us CDOCS for years. In lieu of the new agreements with Dentsply Sirona, we officially changed our name to CDOCS.com and our new website to www.cdocs.com

What does CDOCS stand for?

Great question! It could mean comprehensive doctors, complete doctors, computerized doctors. The reality is that it will mean different things to different people. We have called ourselves CDOCS for short for years, as have our attendees. By offering comprehensive training in five different verticals — implants, ortho, endo, CEREC, and cone beam — we are offering a complete and comprehensive training program for doctors to become the most proficient and productive they can be. We have been known as CDOCS for years, but because of the new training offerings, it was time to make it official.

Can you describe the direction of the company with this new agreement with Dentsply Sirona?

Yes, I alluded to it a bit in the previous question. Our new agreement with Dentsply Sirona dictates that CDOCS will now be the exclusive bundled educational provider for the main Dentsply Sirona verticals, CEREC and cone beam, which we were already doing but now also implant education, orthodontic education, and endodontic education. We are extremely excited to expand our reach at this time because doctors have been asking us to provide comprehensive implant education for years; however, for various reasons, we did not venture down that path. Now, with our new mission and our new infrastructure, we are able to offer our attendees a comprehensive implant curriculum that allows doctors to learn not only implant placement but the fundamentals of implant restorative protocols as well. The same with orthodontics and endodontics. All of our education will be focused on general practitioners but taught with a combination of general practitioners and specialists.

We have been known as CDOCS for years, but because of the new training offerings, it was time to make it official.

Where will the education take place?

The education will take place at our campus in Scottsdale and at the Dentsply Sirona Academy in Charlotte, North Carolina. We have been utilizing these two locations for almost two years now, so this is not new to us. However, we will be doing more workshops. Certainly, we are looking to enhance and renovate the spaces to accommodate the increase in the number of workshops we will provide, but the locations themselves will help to minimize travel for both east and west coast doctors. Both locations are easily accessible by direct flights as they serve as hubs for major airlines. And, for the most part, both locations are unaffected by weather and offer a variety of activities outside of the education, which make them such a great destination to visit.

Does this mean you will no longer be doing CEREC training?

On the contrary — we have no plans to stop CEREC training. Our goal is to continue to be the leaders in CEREC education. We will simply have more offerings on our menu for our doctors. We had so many doctors go through the CEREC curriculum with us and then ask, "What's next?" Well, simply put, we had nothing else to offer them. We now have multiple curriculum offerings for the doctors. They can choose to master implantology or become proficient in clear aligners or learn multiroot endodontics. All in the familiar settings of CDOCS.com east and west campuses.

Who will be teaching all the workshops?

We have added to our faculty with a combination of general practitioners as well as specialists. They will teach in the various workshops and will provide online content for our revised website. The team of educators is phenomenal and each one is committed to providing the very best educational experience for our attendees.

Are you expanding the CDOCS.com team?

Yes, the increased number of classes means that our team is expanding. We will have more than 40 employees for CDOCS.com when all is said and done. I am amazed at our growth in the past eight years. I am also amazed at what is possible when you remove the barriers and allow your team to thrive in a great environment. We will have team members located at both the Scottsdale and Charlotte campuses to serve our doctors ideally.

What changes are planned for the CDOCS.com website?

Obviously we will be adding content in all of the different verticals that we are teaching. We are currently working on a comprehensive endodontic curriculum that will be available online, as well as for the clear aligner program that will teach the fundamentals of orthodontics for general practitioners. In addition, a full-blown implant curriculum from start to finish. The website will continue to feature tremendous amounts of CEREC and cone beam content, but this allows us to offer a comprehensive and complete educational packet for our doctors.

What does the future hold for you, Sameer?

I'm so excited to be able to bring on new team members and help to continue to grow our company. While I'm not actively teaching workshops, I am still working hard behind the scenes to ensure that our courses, workshops, and website all are working optimally to deliver education to our attendees. If you are asking if I'm retiring — not a chance. The first 15 years with cerecdoctors.com have been amazing and have changed my life completely. I am excited as to what the next 15 years will bring with CDOCS.com. I'm humbled and filled with gratitude for the trust that the doctors have put in us and that they have entrusted us with their education. We take that obligation seriously and will continue to do so.

For questions and additional information, Dr. Fleming can be reached at mfleming@cdocs.com.

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Dentsply Sirona

CEREC® Primemill

Mike Skramstad, D.D.S.

Beautiful crowns in an hour…How would that change your workflow? How would that change your practice? This idea is no longer a concept, but a legitimate reality with the introduction of Dentsply Sirona's new milling unit, the CEREC® Primemill (Fig. 1), which brings industry-defining speed to the market. Every facet of the milling unit has been reworked, resulting in unparalleled convenience, versatility, speed, and quality. These four main concepts have not only improved upon the CEREC MC XL milling unit, but also the entire experience of chairside milling and patient experience. Just how fast is it? The CEREC Primemill has the ability to machine both zirconia and glass ceramic restorations in less than five minutes. Better yet, the optimized machining algorithms and tool geometries allow this speed with even better quality than before. This speed and quality, along with a new user interface and wide versatility, will undoubtedly change and improve the CEREC workflow. In this article, we will discuss all the new features of the CEREC Primemill and show several executed cases, as well as how the overall result and patient experience were improved.

Fig. 1: CEREC® Primemill

Fig. 2: Touch interface

Convenience

The CEREC Primemill has incorporated a new larger 7" touch interface that is incredibly intuitive and user friendly (Fig. 2). It guides the user through a step-by-step workflow directly on the screen and is independent of the Acquisition Unit. Some of the touch applications include choosing the manufacturer/block, choosing machining strategy, changing the tools, and all maintenance protocols. Along with the touchscreen interface there is a new LED light strip along the middle of the milling unit that informs users about job progress and unit status. These features will greatly accelerate the learning curve of new users and improve delegation for all offices.

The CEREC Primemill also incorporates an entirely new tool concept. Each diamond grinding tool and milling bur comes with color-coded caps for easy identification. The new computer-aided manufacturing (CAM) framework intelligently calculates tool wear, resulting in more robust tools and stable lifetimes. Furthermore, when it is time to change the bur, the CEREC Primemill has a new radio-frequency identification (RFID Tool Reader) on the front of the milling unit. Simply hold the color-coded cap to the RFID reader and the tool fitness status and correct bur will be recognized immediately (Fig. 3). Changing burs has never been easier because the milling unit touchscreen tells you exactly which tool to use and where to put it, and the RFID technology makes it almost impossible to ever make a mistake.

Fig. 3: RFID bur reader

Fig. 4: Block reader

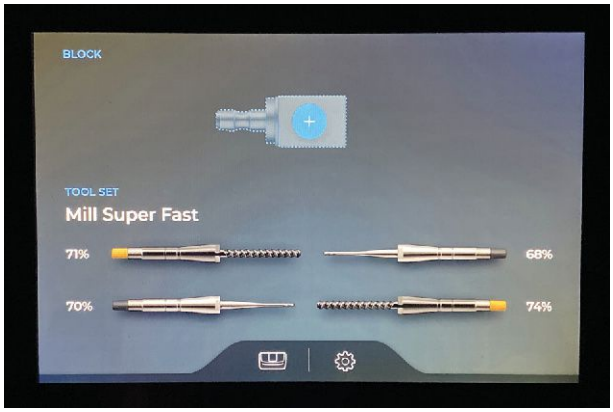

Fig. 5: Touch interface choosing block

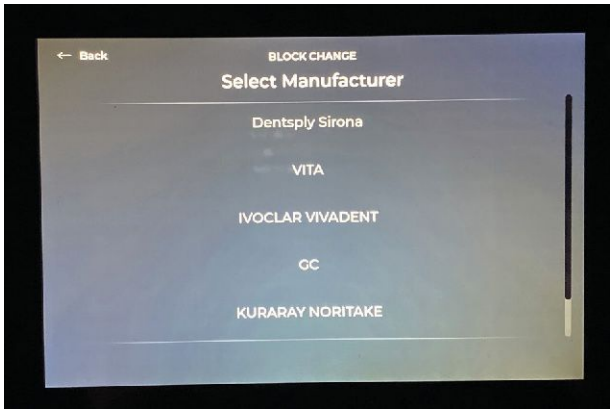

Fig. 6: Touch interface choosing manufacturer

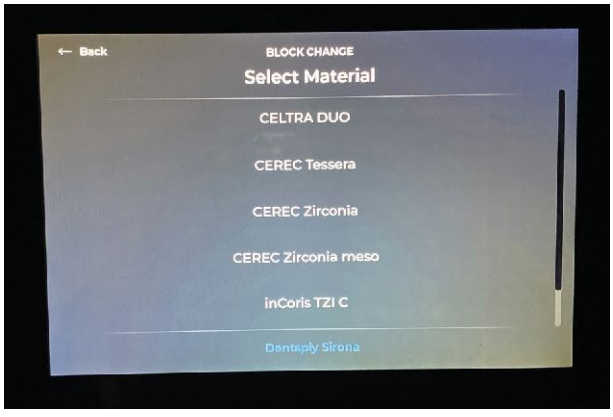

Fig. 7: Touch interface choosing material

Versatility

The CEREC Primemill offers wet and dry milling and wet grinding processes for a broad range of materials. These options include different machining modes and the ability to choose from different strategies based on each particular clinical situation. For example, if highly detailed fissures or embrasure areas on zirconia bridges are required, the new Bur 0.5CS can be used for an extra-fine milling strategy.

The CEREC Primemill also has nine validated material partners, including Dentsply Sirona, to cover a broad range of indications and materials. This gives the user the option to choose what material is best for each clinical case.

Speed

The CEREC Primemill feature that causes the most excitement is the unbelievable manufacturing speed. It is not "just" the speed that matters; it's the overall workflow efficiency improvements. It all starts with loading the block. No longer (especially when doing zirconia) do you have to wait until the manufacturing screen tells

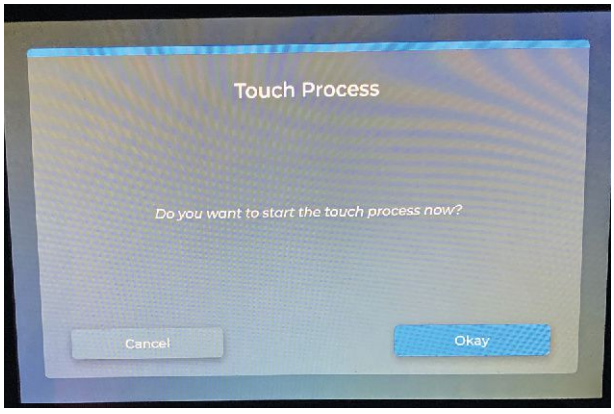

Fig. 8: Pretouch option

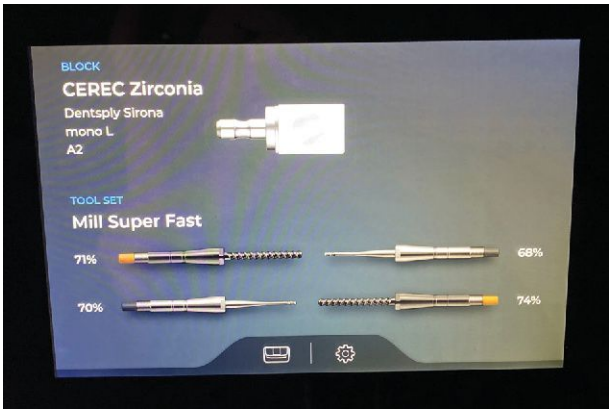

Fig. 9: Block ready for mill

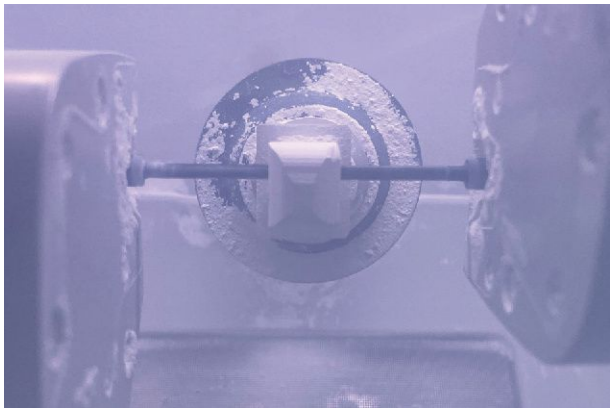

Fig. 10: Super-fast milling zirconia

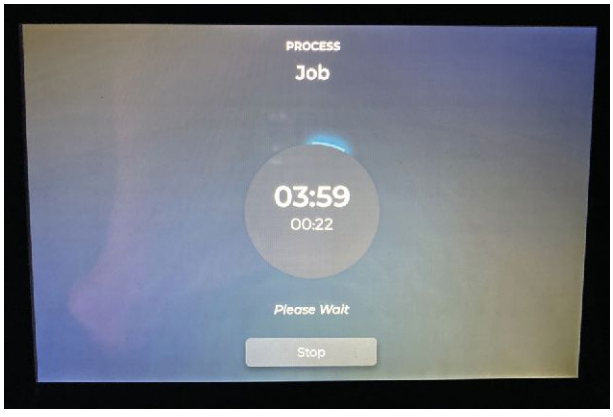

Fig. 11: Super-fast milling time

you to place the block in the milling unit. Before the appointment or during anesthetizing, you can simply scan the new data matrix code on the block with the all-new block scanner (Fig. 4). If no compatible data matrix code is on the block, you can manually enter the block information directly on the touchscreen by first tapping on the block icon (Fig. 5), selecting the manufacturer (Fig. 6), and choosing the material (Fig. 7). All of this should be completed prior to starting the preparation.

Where else has efficiency been improved? How about when you hit "Start" to begin the manufacturing process? The restoration begins to mill immediately! Currently, this is slowed down by the 2- to 3-minute touch process at the beginning of manufacturing. This will no longer happen because of the biggest efficiency change, the new block pre-touch process plus improvements with the path calculations, which are sent faster from the CEREC Primescan AC.

This feature has long been wished for and finally is a reality. It works in the following way: After the block is set up and inserted in the CEREC Primemill, the following message will display on the unit's screen: "Do you want to start the touch process now?" (Fig. 8). By clicking "Okay," the entire touch process will complete and the CEREC Primemill will be ready to receive the restoration from the Acquisition Unit (Fig. 9). As soon as you hit the start button, the process begins immediately (Fig. 10). And please do not walk too far away… because the super-fast milling in most cases will take approximately four minutes, and sometimes faster (Fig. 11). The CEREC Primemill can now deliver super-fast milling mode for zirconia due to a very unique parallel milling strategy to maximize speed for shorter workflows.

Quality

The speed outlined above is a major advantage because it completely changes the workflow. It allows us

Fig. 12: Preoperative tooth #15

Fig. 13: Preparation tooth #15

Fig. 14: Initial proposal tooth #15

to predictably complete both zirconia and glass ceramic crowns in an hour. This changes how we schedule patients and their overall experience. However, the quality must still be there. The CEREC Primemill not only uses optimized machining algorithms and tool geometries, but all new electronic and mechanical components. These improvements result in fewer post-mill adjustments, better margin edge stability, and overall better clinical restoration results and longevity.

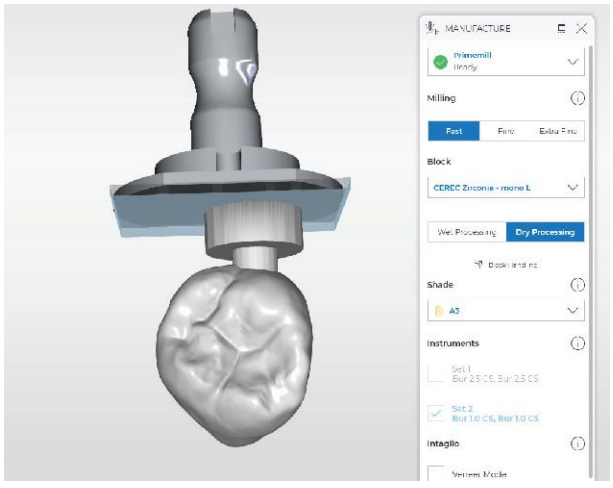

Fig. 15: Manufacturing stage tooth #15

Fig. 16: Milled restoration #15 super fast

Case Presentation 1: Super-Fast Milling Zirconia

A 62-year-old male presents with an old ceramic restoration with an endo access, open distal margin, and recurrent decay (Fig. 12). Since this restoration was going to be in a high-stress, nonesthetic location, it was determined the best course of treatment was to replace the tooth with a high-strength zirconia restoration (CEREC Zirconia, Dentsply Sirona) in a single appointment with the CEREC Software (SW) 5.1 and the CEREC Primemill to create a stronger restoration and close the distal contact.

After anesthetizing the patient, the shade was taken for the restoration. It was determined that an A3 CEREC Zirconia block would be used. Then the block information was entered into the CEREC Primemill and the touch process was initiated. Patient information and the

Fig. 17: Final polished and glazed tooth #15

Fig. 18: Final restoration tooth #15 CZ

Administration Phase was then completed (designating CEREC Zirconia for the restoration). The full-coverage restoration was prepared appropriately for retention and resistance form (Fig. 13). No retraction cord was necessary due to excellent tissue management and because CEREC Primescan's amazing depth of scan can capture margins quite accurately.

After prepping the tooth, the upper jaw, lower jaw, and buccal bite were recorded with the CEREC Primescan in Acquisition Phase. The models were processed and the auto-margination was evaluated. The CEREC SW 5.1 did an excellent job with the margination and only minor modifications were necessary. The CEREC software gave an excellent initial proposal and no adjustments were necessary to the contours, contact, or occlusion (Fig. 14). After evaluation, the restoration was brought to the Manufacture Phase and sent to the CEREC Primemill (Fig. 15). Since the touch process was completed earlier, the milling began immediately. For this case, we used the new super-fast milling mode to complete the process quickly. The total mill time for the CEREC Zirconia restoration was 4:43.

When milling was completed (Fig. 16), the restoration was removed from the sprue, anatomy defined, and pre-polished. This process removes bur paths from manufacturing and minimizes the finishing you need to do postsintering. The restoration was automatically transferred to the CEREC SpeedFire furnace and sintering was completed in 17 minutes. After sintering, the functional surfaces were polished and the restoration glazed with CEREC SpeedGlaze (Fig. 17). The CEREC Zirconia was cemented conventionally using resin-modified glass ionomer and a final X-ray was taken to confirm adequate cleanup (Fig. 18). The final restoration fit was excellent and needed no postcementation adjustments. The CEREC Primemill allowed us to go more than 20 minutes faster than traditional manufacturing with the CEREC MC XL while maintaining excellent quality.

Total treatment time: 1 hour 9 minutes.

Case Presentation 2: Fast Grinding IPS e.max CAD

A 59-year-old female presented to my office with a large composite on #12 that was breaking down and previous root canal treatment (RCT) (Fig. 19). Due to the extent of the previous composite and RCT, we decided to do a full-coverage restoration and bonded IPS e.max CAD crown (Ivoclar Vivadent). The IPS e.max CAD was chosen because of a moderately high esthetic need and its long-term success as a high-strength glass ceramic

The full-coverage restoration was prepared appropriately for a glass ceramic restoration by creating a 1.0-mm modified shoulder and reducing the occlusal by

Fig. 19: Preoperative tooth #12

Short, sweet and to-the-point

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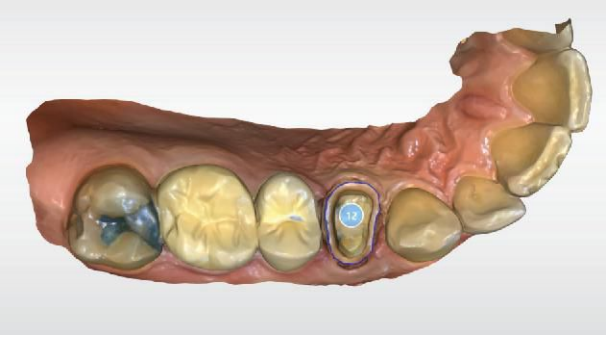

Fig. 20: Automargination tooth #12

Fig. 21: Final design tooth #12

Fig. 22: Final IPS e.max CAD tooth #12 fast grind

2.0 mm to ensure proper anatomy and at least 1.0-mm ceramic thickness.

After preparing the tooth, the case was scanned with the CEREC Primescan in Acquisition Phase. The models were processed and the auto-margination was evaluated (Fig. 20). The CEREC SW 5.1 did an excellent job with the margination and no modifications were necessary.

The CEREC software gave an excellent initial proposal and only minor adjustments were necessary to the contours, contact, and occlusion (Fig. 21). After evaluating the proposal, the restoration was brought to the Manufacture Phase and sent to the CEREC Primemill. Since the touch process was completed earlier, the milling began immediately. For this case, we used the fast grinding mode to complete the process quickly. The total mill time for the IPS e.max CAD restoration was 3:53. Due to the NEW CAM framework and motors of the CEREC Primemill, fast grinding of glass ceramics can be reevaluated. With proper marginal support, glass ceramics can now be fast milled with a similar quality of fine milling in one-third the time.

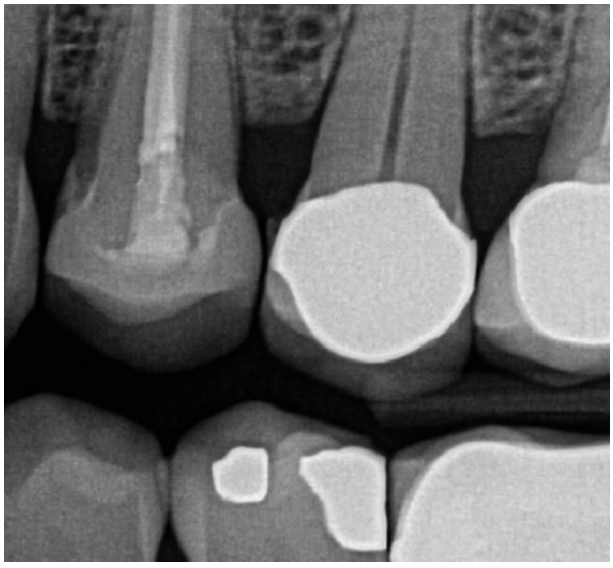

Fig. 23: Final radiograph tooth #12 fast grind

After crystallizing and staining/glazing the restoration, the IPS e.max CAD was bonded to the tooth with resin cement (Fig. 22). After final cleanup, a radiograph was taken to confirm the result and resin removal (Fig. 23).

Total treatment time: 1 hour 9 minutes.

Case Presentation 3: Extra-Fine Milling KATANA STML

This patient presented with an RCT on tooth #14 that had a previous porcelain-fused-to-metal (PFM) crown fracture removed the previous week. There was no decay present, excellent oral hygiene, and sufficient tooth structure to make a new buildup and crown for this patient (Fig. 24).

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Fig. 24: Preoperative tooth #14

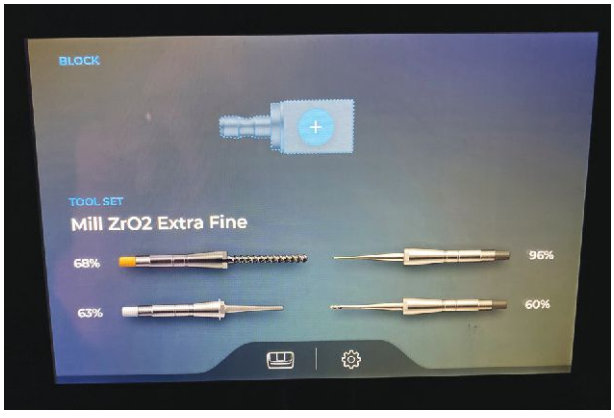


Fig. 25: Extra-fine bur set

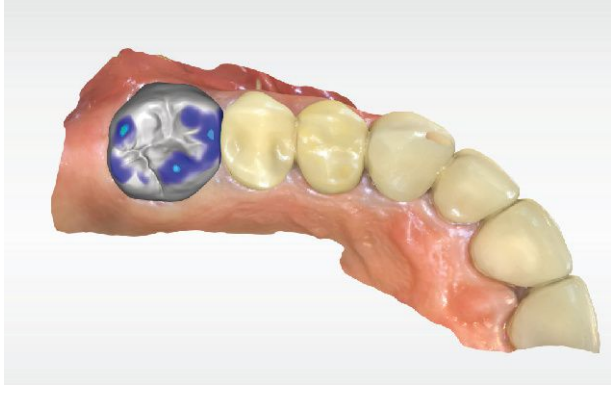


Fig. 26: Final design tooth #14

Because no enamel was present, the tooth was already prepared for a conventional crown, and it was necessary to maximize resistance and retention form, a full-coverage zirconia crown was chosen. KATANA Zirconia STML (Kuraray Noritake) was planned because the rest of the arch was restored with IPS

Fig. 27: Extra-fine milled restoration #14

e.max CAD and we wanted to match the translucency as close as possible.

Additional time was allocated for this patient (1 hour and 40 minutes), so we decided to use the extra-fine zirconia milling for this case. In addition to the Bur 2.5 ZrO2 CS shaper and Bur 1.0 CS finisher, there is a smaller Bur 0.5 CS finisher used to create extra-detailed anatomy and minimize finishing after the Manufacture Phase (Fig. 25).

After anesthetizing the patient, the shade was taken for the restoration. It was determined that we would use an A2 KATANA Zirconia STML block. The block information was entered into the CEREC Primemill and the touch process was initiated.

After a bonded buildup was accomplished, a full-coverage preparation was completed on tooth #14. The case was scanned with the CEREC Primescan and designed with the CEREC SW 5.1. The proposal was excellent and only minor adjustments were necessary to the contours, contact, and occlusion (Fig. 26). The restoration was brought to the Manufacture Phase and sent to the CEREC Primemill. Since the touch process was completed earlier, the milling began immediately. The extra-fine milling takes a little longer than the fine or fast milling, but the detail is improved. The total mill time for the KATANA Zirconia STML restoration was 26:59. In most cases, the extra-fine milling takes closer to 19 minutes, but this larger restoration took longer.

Once extra-fine milling was completed, the restoration was removed from the sprue. Because the anatomy was

Fig. 28: Final stained and glazed tooth #14

Fig. 29: Final restoration extra-fine KATANA Zirconia STML #14

excellent with the extra-fine milling, no extra detail was required, reducing the amount of time necessary on pre-sinter finishing (Fig. 27). The restoration was automatically transferred to the CEREC SpeedFire furnace and sintering was completed in 18 minutes.

After sintering, the functional surfaces were polished and the restoration was stained and glazed in the CEREC SpeedFire furnace (Fig. 28).

After glazing and cleaning the restoration, the KATANA Zirconia STML was cemented conventionally using a resin-modified glass ionomer (Fig. 29). The final restoration fit was excellent and needed no postcementation adjustments. The extra-fine milling certainly extended the time compared to the super-fast milling, but even with the extra milling time, the total appointment time fell into an acceptable range. The great thing about extra-fine milling is that the option exists to create additional detail if required.

Conclusion

The main benefit the CEREC Primemill brings to the appointment is speed with no sacrifice of quality. It is truly astonishing how fast the restoration is manufactured and it completely changes the entire CEREC workflow and appointment for the patient. There have been many hardware and software innovations that have increased ease of use and applications, but this is different…the combination of the user interface directly on the mill, the pre-touch process, and the manufacturing speed saves the dentist 15 to 20 minutes per appointment. This is real time! When you hit "Start," the restoration will immediately start milling. If one did even 10 indirect restorations with CEREC Primemill per week, this would mean a time savings of up to 10 hours per month or 120 hours per year! This is clearly a benefit for the dentist, but also for the patient. The biggest benefit of single-visit chairside dentistry has always been the patient experience. Making the process more efficient, faster, and more predictable (while not sacrificing quality) is a definite win for all involved.

For questions and additional information, Dr. Skramstad can be reached at mskramstad@cdocs.com.

It is truly astonishing how fast the restoration is manufactured and it completely changes the entire CEREC workflow and appointment for the patient.

Introducing CEREC® Tessera (Advanced Lithium Disilicate): A New Material That Truly Puts the "Single-Visit" in CEREC® Single-Visit Dentistry

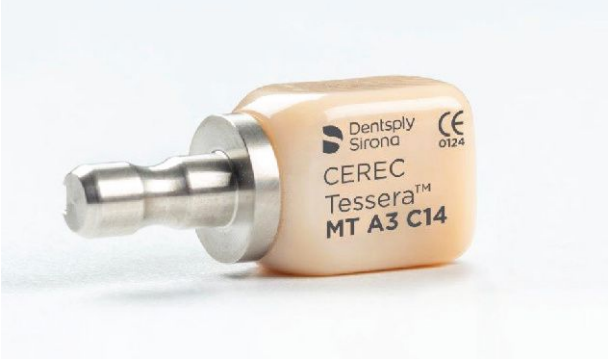
By Mark Fleming, D.D.S., Interviewing Dr. Markus Vollmann

Dentsply Sirona is committed to technology and innovation in the service of helping customers build healthy practices through improvements in efficiencies, and as result, healthy smiles for patients. Back in 2016, there was an opportunity to engage with the CDOCS.com community and Dr. Vollmann during a speaker meeting that allowed feedback on new product concepts. Through a lively and engaging discussion, it became clear that focusing on shortening the workflow to help improve efficiency would have the most impact. It was agreed that the opportunity existed to focus on not just a material, but one that could simplify the workflow and decrease processing time. That began the journey over the last three years that led to the new CEREC® Tessera Advanced Lithium Disilicate (ALD), a block built from the ground up with direct feedback from the CDOCS.com community to maximize strength, speed, and esthetics. CEREC Tessera (ALD) will be launched at the Chicago Midwinter Meeting in February 2020.

Dr. Markus Vollmann, the Director of Research and Development at Dentsply Sirona, spoke about the advantages of CEREC Tessera (ALD) and how it fits into the CEREC single-visit restorative workflow.

What can you tell me about the development of CEREC Tessera (ALD)?

Since the introduction of CEREC, we have had an ongoing mission to improve and innovate. Thirty years ago, the first CEREC system produced only inlays. Today, it can produce virtually any type of restoration: full-contour crowns, inlays, onlays, veneers, multiunit bridges and frameworks, implant abutments, diagnostic wax-ups, and even guides for implant surgery. The CEREC restoration design software and camera have undergone continuous improvements year to year, having started with a simple black-and-white camera and 2D wireframes to where we are today with a video-based, full-color scanner that captures fully anatomical true-to-life 3D digital impressions in real-time.



This commitment to improvement applies to every step in the workflow, including, of course, the block. We realized that if we could create a material strong enough to withstand a very rapid, high temperature firing, such as the CEREC SpeedFire can achieve, while maintaining beautiful esthetics, it would be a breakthrough. It required a great deal of material science, and many, many tests and improvements, but we believe we got there with CEREC Tessera (ALD).

Can you talk about the material science that makes CEREC Tessera (ALD) possible?

The formulation of CEREC Tessera (ALD) is comprised of two strength-enhancing crystals: lithium disilicate and new crystals called virgilite. The dense interwoven crystal composition is key to its high strength and serves to virtually eliminate the presence of microcracks and subsequent crack propagation. In addition, the crystal combination that is responsible for high strength and fracture toughness also contributes to its highly esthetic and dynamic light refraction, transmission, and absorptive properties that mimic visual vitality of the natural teeth. Also, the strength is greater than 700 MPa, which allows a prep design of 1.0 mm with adhesive cementation. It is quite a remarkable material.

Fig. 1 shows an SEM image of the microstructure. The rod-like bars are lithium disilicate and the round platelets are the virgilite; these two crystals combine to

create the dense, interlinked, crystal microstructure of CEREC Tessera (ALD).

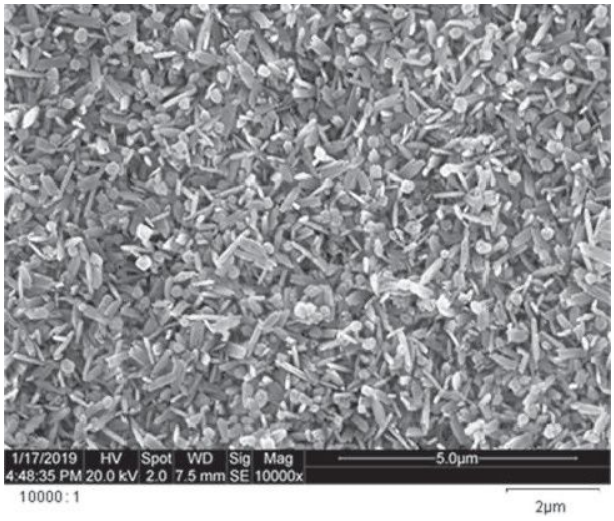


Fig. 1: SEM image of the microstructure

How does CEREC Tessera fit into the CEREC workflow?

Everything we develop is in the context of improving the CEREC workflow. We agreed in the development stage that, in addition to everything else, any new block would have to dramatically decrease the firing time, which is one part to optimizing the workflow. Because of its microstructure, CEREC Tessera (ALD) is able to fire in 4 minutes 30 seconds in the SpeedFire furnace, thereby improving overall workflow efficiency. We believe the introduction of CEREC Tessera (ALD) will be exciting for doctors and patients, and it's going to move single-visit dentistry forward.

What are doctors who have tried CEREC Tessera (ALD) saying?

Material science is interesting, but of more importance, how does the product perform and what is the impact to the workflow? We've been conducting an early evaluation with a small group of clinicians and the feedback has been very positive of the fast firing, which complements the speed and simplicity of the CEREC single-visit workflow process.

For questions and additional information, Dr. Fleming can be reached at mfleming@cdocs.com.

Single-Visit Zirconia Gets Delivered in Primetime with the New CEREC® Primemill

Karyn M. Halpern, D.M.D., M.S.

Introduction

One of the most popular restorative options available today for patients is the use of full-contour milled zirconia. Over the past several years, full-zirconia restorations have certainly evolved from mostly unesthetic and opaque-looking crowns and bridges to now significantly improved esthetics without compromised strength. Milled monolithic zirconia restorations have become the author's material of choice for single-unit crowns on second molars, posterior three-unit bridges, and both single and multiple posterior implant restorations due to its preferred high strength. However, the amount of time that was required to both mill and sinter zirconia restorations chairside was excessive and did not fit into the author's single-visit workflow. It was simply too inefficient. For these cases, digital impressions with the CEREC® Primescan (Dentsply Sirona) were taken and sent via CEREC Connect to the dental lab technician for fabrication. Returning for a second visit for delivery of these restorations and leaving with provisionals was inconvenient for both doctor and patient alike.

Fortunately, these problems now have been completely resolved with the development and release of the new CEREC Primemill. Advances in new multilayered zirconia blocks and sintering technology, combined with the ability to efficiently super-fast mill chairside zirconia restorations with CEREC Primemill affords the opportunity to provide single-visit zirconia restorations in a fast and efficient manner for our patients. Dentsply Sirona has revolutionized the practice of dentistry once again and did not disappoint.

Zirconia restorations can now be predictably and efficiently milled, sintered, and delivered with the use of Dentsply Sirona's new Primemill and SpeedFire oven in under an hour. It has been a game changer in this author's practice. The super-fast mill setting creates a full-contour zirconia molar crown in under four minutes. Zirconia blocks, such as KATANA Zirconia STML, can then be sintered in the SpeedFire in as little as 18 minutes. No more provisionals, no more second visits. This process is fast, precise, and efficient.

Fig. 1: Leaking defective large failing amalgam restoration with mesial occlusal fracture, palatal cuspal cupping attrition with erosions and cracks present on distal marginal ridge

Case Report

A healthy 42-year-old female presented for a hygiene visit and exam with a large failing occlusal amalgam on tooth #15, mesial marginal ridge fracture, mesial recurrent decay, and palatal cuspal wear with cupping erosion (Fig. 1). Also noted were multiple cracks on the distal marginal ridge with shadowing at the marginal ridge and distal of the palatal cusp. An intraoral image (DEXIS DEXcam, KaVo Kerr) illustrating the condition of the tooth was taken for both patient education and submission for preauthorization from the patient's insurance company. The patient was advised of the findings and agreed to proceed with restoring her tooth with a CEREC full cuspal coverage crown restoration.

The morning of the scheduled procedure, the chosen KATANA STML A2 block was placed in the CEREC Primemill and the super-fast mill option selected using the convenient touch screen. The CEREC Primemill then guided the dental assistant on the proper removal of the tools and replacement with those needed the for

Fig. 2: Finished preparation with mesial and distal retention grooves

super-fast mill setting. The dental assistant accomplished this task quickly and correctly using the RF technology provided that allows the user to scan by each tool to be certain the correct size and shape are installed. Once the tools were placed, the touch process was accomplished. The ability to have this process completed in advance of the procedure saved time and is very efficient.

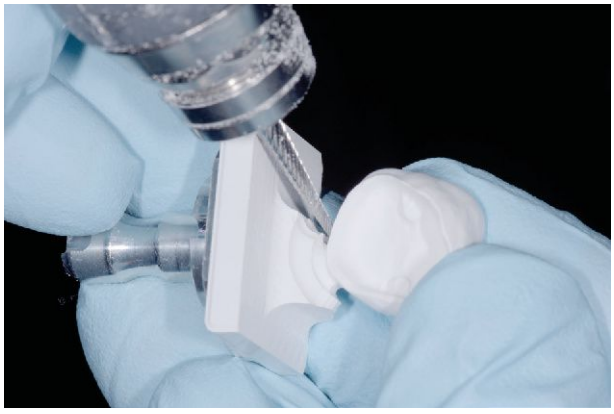
The patient was seated upon arrival and a local anesthetic (Septocaine, Septodont) was administered via The Wand (Milestone Scientific) to locally infiltrate buccal to tooth #15. An Isolite mouthpiece (Zyris) was placed to achieve isolation for the preparation. The failing amalgam was removed using a pear-shaped coarse diamond bur (Henry Schein) in a high-speed handpiece (KaVo Kerr). The cracks were removed and recurrent mesial decay was excavated. Caries indicator (Sable Seek, Ultradent) was used to confirm all recurrent caries were removed.

Fig. 3: Milled KATANA STML restoration on super-fast mill setting in CEREC® Primemill without chipping

The cusps were reduced using a 2-mm diamond occlusal reduction bur (Meisinger USA). A chamfer margin was prepared using a coarse diamond bur (6856.31.018, Brasseler USA). The preparation was then scrubbed with 4% pure chlorohexidine (Fairview Pharmacy). A composite core build up was completed using composite resin (G-ænial Universal Flo, GC America). The preparation was then refined with a finishing diamond chamfer bur (8856.31.018 Brasseler USA) (Fig. 2). Because the abutment height was relatively short, mesial and distal retentive grooves were prepared for added mechanical retention. The preparation was rinsed and dried with an air/water syringe. The preparation quadrant past the midline, opposing, and buccal bite catalogs were scanned with the CEREC Primescan.

The CEREC Primescan created a virtual image of the quadrant in the CEREC software from the digital information captured. Margins on the virtual preparation were initially created using auto margin finder and then corrected as needed using the manual mode. The design proposal was reviewed, and the local parameters set to have a minimal occlusal thickness of 1000 µm and margin thickness of 110 µm. The design was then reviewed for proper fissure thickness, occlusion, contacts, and contours. The fast mill option was then selected in the mill phase.

The restoration was milled with a KATANA STML A2 block using the new super-fast setting in the new CEREC Primemill. The restoration was quickly and precisely milled in only four minutes. The margins milled beautifully without any chipping. The intaglio milled out incredibly smooth with accurate milling of the retentive



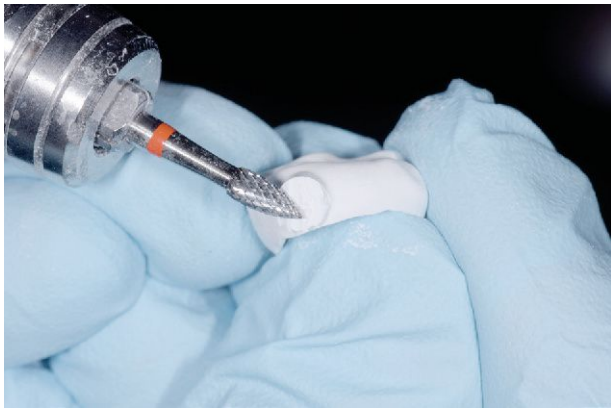


Fig. 4: Sprue removal using carbide burs at 10,0000 rpm in a lab handpiece

grooves (Fig. 3). Once milled, a carbide bur (HM498 FX023) followed by another carbide (HM78MF 023) (Meisinger Lab Kit JK04, Meisinger USA) was used at 10,0000 rpm on a lab handpiece to remove the sprue in the green state (Fig. 4).

The occlusal anatomy of the restoration was further enhanced using a sintered diamond bur on a lab handpiece at 10,000 rpm (S862 031, Lab Kit JK04, Meisinger USA) (Fig. 5).

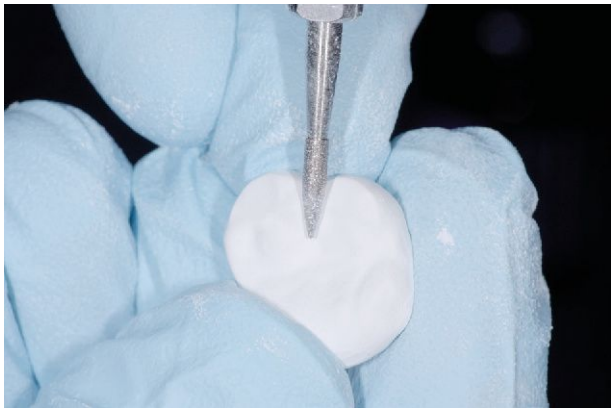


Fig. 5: Enhancement of occlusal anatomy with sintered diamond bur

The end result was a strong, durable restoration that blends well with the adjacent teeth.

Next, the restoration was pre-polished using pink and beige twist polishers and very light pressure (9769M 170 & 976p F170, Lab Kit JK04, Meisinger USA). Care was taken to polish in a direction away from the margins and avoid the mesial contact area. Prepolishing only took a few minutes and allowed for the final restoration, once sintered, to need very little additional polish (Figs. 6–8). The restoration was then sintered in the Dentsply Sirona SpeedFire according to the manufacturer's program for 18 minutes and 30 seconds with the intaglio surface facing upward (Fig. 7).

After the restoration was sintered, it was tried in the mouth to verify proper contact, margins, and occlusion were achieved. Final polishing was then quickly accomplished using green and blue Meisinger twist polishers (Meisinger USA). Last, DiaShine fine soft paste was used on a Robinson wheel to achieve the final gloss (Figs. 8–9).

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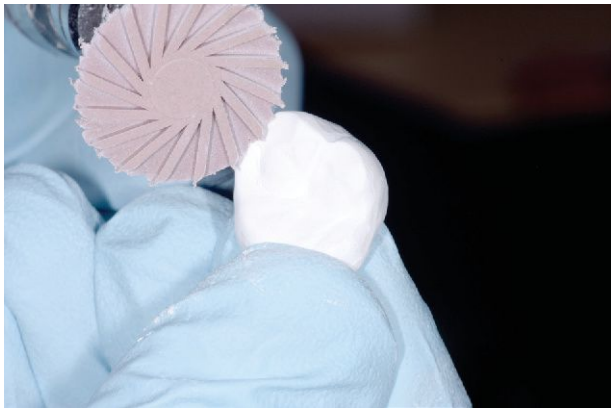

Fig. 6: Prepolishing prior to sintering with pink and beige Meisinger twist polishers.

Once the polishing process was complete, the restoration was prepared for cementation. The restoration's intaglio surface was mircoetched with aluminum oxide, 50 µm, white (MicroEtcher, Danville). Next, it was steam cleaned and air-dried with an air syringe.

Fig. 7: The final restoration after sintering completed in the Dentsply Sirona SpeedFire

The Isolite mouthpiece (Zyris) was reinserted and tooth #15 was prepared for cementation. The prep was rinsed and air-dried. The enamel was selectively etched with 35% phosphoric acid gel for 10 seconds (Ultra-Etch, Ultradent). The bonding agent (Clearfil Universal Bond Quick, Kuraray Noritake) was applied to the preparation with a microbrush (Microapplicators, Ultradent) using a rubbing motion and then air-dried by blowing mild air until the bonding agent did not move. The cement (Panavia SA Cement Universal, Kuraray Noritake) was then loaded into the intaglio of the crown. The crown was then seated and isolated while the resin cement was chemically cured in 2–4 minutes. The excess bulk cement was easily removed with an explorer. The contacts were then flossed using a piece of floss with a small knot tied into it to aid in cement clean up. The occlusion was checked with articulating paper in both centric and excursions. No further occlusal adjustment was needed.

The end result was a strong, durable restoration that blends well with the adjacent teeth (Fig. 9).

Conclusion

This clinical case demonstrates how quickly and efficiently a full-coverage zirconia crown can now be fabricated and delivered in a single visit with the new CEREC Primemill. It is the author's opinion that the new speed, precision, and ease of use for the CEREC Primemill will once again revolutionize how single-visit dentistry is performed by both new and existing CEREC users alike. In the time this author has had the luxury of using the CEREC Primemill, it has allowed for single-visit

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Fig. 8: Final polishing achieved with green and blue twist polishers followed by Robinson wheel with DiaShine paste

Fig. 9: Kuraray .stl file A2 crown tooth #15 after cementation

chairside zirconia restorations to be delivered in as little as an hour and improved the overall patient experience. Being able to incorporate zirconia restorations into the list of options that can be delivered in a single visit allows for many more cases that no longer warrant a second visit, a provisional, nor a lab bill. The author could not imagine practicing without the CEREC Primemill and is confident all new users will share the same sentiment.

For questions and additional information, Dr. Halpern can be reached at kmhalpern@mac.com.

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Pete Gardell, D.D.S.

The word is out about a new restorative system that can have a beneficial effect on your practice. The 3s PowerCure system from Ivoclar Vivadent is bringing immediate benefits to your efficiency in the operatory. There is no other system presently available that can deliver and cure direct restorations as quickly and easily; and all while reducing the inventory burden to your office. It is a synergy of chemistry, materials, and technology, which affords you time and cost benefits. Being a CEREC® dentist, you may ask yourself how it can benefit me in my computer-aided design/computer-aided manufacturing (CAD/CAM) practice.

The answer is that the 3s PowerCure system is more than just an efficient direct resin delivery system, it has benefits for any of the restorative procedures done by a dentist (Fig. 1).

The elements that make up the 3s PowerCure System are Adhese Universal, Tetric PowerFlow and Tetric PowerFill, and the Bluephase PowerCure light. All of these elements have been designed to work together to enable the fastest restoration workflow possible. Adhese Universal is a product familiar to many. It is an eighth generation bonding agent that can be used in any one of three workflows – self etch, total etch, or selective etch. Great initial bond strengths are attained while keeping sensitivity low for your direct and indirect restorations.

Tetric PowerFlow and Tetric PowerFill have been designed to create durable long-lasting esthetic direct restorations. The material has been engineered to be placed in 4-mm increments. Ivocerin is a new photoinitiator used since the release of Tetric BulkCure for its "polymerization booster" properties. This allows for an increase depth of cure of these bulk cure materials while maintaining an enamel-like translucency. The enamel-like translucency is a feature that has benefits for a dental office and is a mechanism for inventory control. PowerFlow and PowerFill materials are available in three shades that satisfy the spectrum of colors our patients present with: IVA, IVB, and IVW.

Fig. 1: The 3s PowerCure system consists of Adhese Universal, Tetric PowerFill, Tetric PowerFlow, and the BluePhase PowerCure light.

For direct restorations, it has been working wonderfully, especially when using the warm composite and stamp technique. There is no quicker way to produce a highly detailed posterior resin restoration for your patient.

The advantages of the system also have benefits for your indirect restorations. When I am restoring a tooth with CEREC, I have been frustrated with the following situations: You are removing the decay present in the patient's tooth and you quickly realize that a significant defect will be created. As I start to think about how the CEREC system works, I visualize what movements the mill has to go through to generate the intaglio. I think about not only the extended time needed to produce this intaglio, but then also think about how many sharp transitions are to be sculpted into the ceramic. Studies have indicated that cracks initiate and propagate in the tertiary anatomy we like to carve into the ceramic. Although we don't see it in the final bonded product, our mill can produce these in the intaglio of the restoration.

The next part of the decision-making process is determining how much time is needed to produce the build up. Is the defect small and the cement can be allowed to fill it to create a pseudocore, or is it more significant and prepping must be stopped to build up the tooth,

then refine the prep? Too many steps can be a significant investment of time. Even if the time to mill the restoration is less, when you figure the time to produce a core with a dual cure material, you will be running late. You're adding stress to you and your staff. I started to think about the way warmed Tetric PowerFill has benefitted my direct resin restorations and determined that these benefits could transfer to your core placements seamlessly.

Studies have shown that you have a higher monomer conversion rate with warm composite. The conversion rate was found to be 31.6% at room temperature. When the composite is heated to 60 degrees Celsius, the conversion rate jumps to 67.3%.[1] This significant increase means a clinically harder final composite material.

With all light-cured composite materials, we need to be aware of the stresses that may develop as the material is cured. A core presents a situation that is no different. Research on the effect of warming composite shows that these shrinkage forces are decreased, even for a bulk-filled material like Tetric PowerFill, which has stress relievers built into its chemistry.[2]

If we rethink our core procedure, we now can expand the use of products already in use in our offices for direct-resin restorations but add this role of core material. Inventory control is vital to a healthy practice; whenever you can take an existing technology product and expand its use in the practice, it only improves the bottom line and reduces inventory stress. Utilizing warm Tetric PowerFill allows for harder and more stable cores in a shorter amount of time.

Clinical Case

Irene presented with recurrent decay on a tooth that has had endodontic therapy in the past (Fig. 2). The patient was asymptomatic and reported endodontic treatment was completed 20 years ago. She declined to have the tooth re-treated prior to the crown being done. It is a case where I knew a core had to be done, but it also was a great case to do a speed core (Fig. 3). A speed core for me might be a different approach but has proven successful over the years. However, now I can be more efficient. I evaluate the remaining tooth structure and make a judgement call on whether the tooth has enough structure to forgo a post. To be honest, I have gotten to the point that if a tooth needs a post and core, I discuss an implant with the patient.

Fig. 2: Preoperative radiograph of the failing restorations

Fig. 3: Preoperative intraoral photo of the tooth to be treated

In Irene's case, it appeared clinically and radiographically that only a core would suffice. The approach at this point is not to deconstruct from the exterior, but from the inside out. Concrete is not poured without a

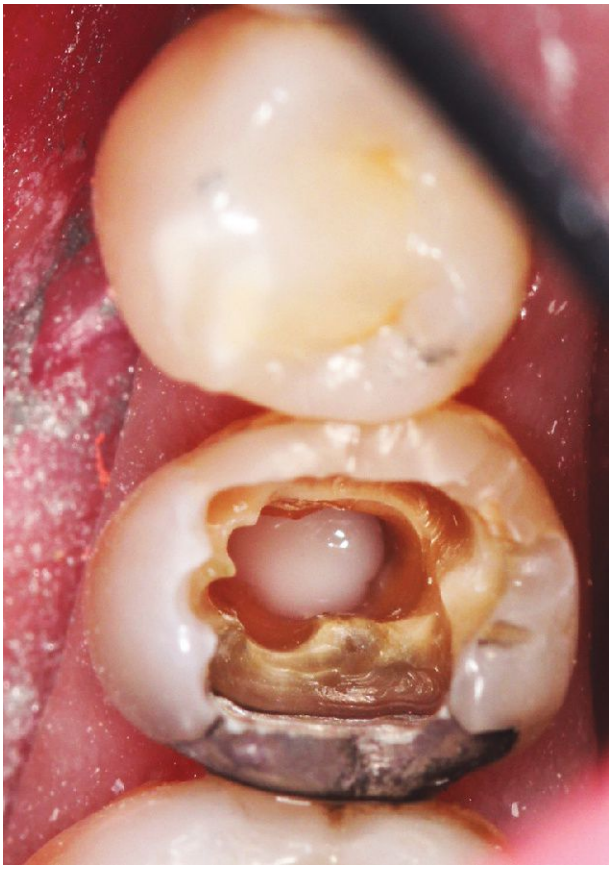

Fig. 4: Close-up of the tooth after it has been prepared to receive the warm Tetric PowerFill for the core

Fig. 5: Close-up of the tooth after two layers of Tetric PowerFill have been used to create a core

form — that would result in a mess and take time to clean up. Core placement is no different, you can always place a core freehand, but would you say that is an efficient approach? I see a different approach if you can create a "form" out of the remaining restorative material. This is done by removing the decay and restorative material in a way to leave a uniform wall of about 1 mm (Fig. 4). Not that this will be incorporated into the final crown, as the tooth is prepared for the restoration in the remaining area that the existing restoration will be removed. Areas of leaking or recurrent decay, if any, will be removed when the preparation is completed. In Irene's case, you can see that the chamber has been cleaned and the area is very deep. A dual cure core material could be used. This process can take some time; it requires stocking an additional material in your stockroom. Flowable composite could be used, but the depth of the area would require a large number of

Inventory control is vital to a healthy practice; whenever you can take an existing technology product and expand its use in the practice, it only improves the bottom line and reduces inventory stress.

Fig. 6: Close-up of the tooth after it has been prepared for a full coverage restoration

Fig. 7: The virtual mode for the case

applications and cures. Both are potential spots that add time to your appointment.

An alternative method I have adopted is using warm Tetric PowerFill to construct these cores. There are a number of advantages brought to the process when it is approached in this manner. As mentioned, the material has a higher conversion rate when cured; the warm composite also has a lower viscosity, improving its adaptation to the prep. The system's ability to cure in 4-mm increments makes fast work of filling in these large defects. The result is a strong and durable core material that takes much less time than is required for a core with a dual cure material.

In Irene's situation, I used a glass ionomer liner over the canal orifice, and then I could build up the defect in two increments. Curing time was three seconds for Adhese Universal, and three seconds for each layer afterward. After nine seconds of curing time, the tooth is ready for final prepping (Fig. 5). A conservative prep is still possible, as you can see; you don't have to overprepare the tooth to attain better efficiency with your core process (Fig. 6). An image of the area was taken, and the restoration designed (Fig. 7).

An IPS e.max restoration was delivered using both Adhese Universal and Variolink Esthetic, which provided strength and beauty (Fig. 8).

With all this talk of fast curing, I don't want to give an impression that the Bluephase PowerCure light is only for doing one thing really well. It is a fully functional light that can take care of all your curing needs in your office.

There are four different settings to cover the span of procedures you perform and the variety of materials you use (Fig. 9).

PreCure: PreCure is a 2-second low-intensity cure designed to bring your resin cement, such as Variolink

Fig. 8: IPS e.max crown after delivery

Fig. 9: Bluephase PowerCure curing light

Esthetic, to a gel stage that delivers easy cleanup for your indirect restorations. The light intensity is 950 mW/cm^2.

High: The high cure cycle is a high intensity output with 5-, 10-, and 20-second options. The light intensity is 1,200 mW/cm^2.

Turbo: Turbo Cure is a cycle where even the light output is a higher light intensity. The cycle is set as a 5-second cure. The light intensity is 2,100 mW/cm^2.

3s: This cycle is only approved with the components of the 3s PowerCure System. The cycle is set as a 3-second cure and the mode produces a light intensity of 3,050 mW/cm^2.

In this case we can see the range of the 3s PowerCure System. A core was formed in a simple and straightforward manner with significant time savings. A strong and esthetic indirect restoration was fabricated and delivered, and the same light was able to switch from the strongest on the market to a delicate one for tack curing with the press of a button. It adapts to the wide range of applications that exist in the general dentist's office.

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Innovation for High-Strength Ceramic Restorations: CEREC® Tessera

Dennis J. Fasbinder, D.D.S.

A single restorative material that provides optimum esthetics combined with maximum strength has proved to be an elusive goal. To increase the challenge, CEREC® chairside restorations also require the added feature of an efficient fabrication process. In the quest for this combination of properties in a single material, there tends to be two main paths. One path recognizes the high strength of full-contour zirconia as well as the relative opacity and brightness of the material that compromises the esthetic result. New developments attempt to improve the esthetic qualities, especially translucency, while maintaining the high strength. The other path recognizes the esthetics that glass ceramic materials offer and attempts to improve the physical properties. As these two paths progress, it may be expected that their intersection will result in a single material with optimized esthetics and strength.

Dentsply Sirona is introducing a new glass ceramic material called CEREC Tessera. It is characterized as a tooth-colored, high-strength, advanced lithium disilicate ceramic material. It has 40% to 45% glass content with a submicron particle size of approximately 0.5 µm. It is composed of approximately 90% lithium disilicate crystals, 5% lithium phosphate, and 5% virgilite crystals, which are small (< 100 nanometers) lithium aluminum silicate platelet-shaped crystals. The high strength of the material is created by applying a spray glaze and subjecting the milled restoration to a 4.5-minute matrix firing cycle in the SpeedFire oven (Dentsply Sirona). Matrix firing optimizes the crystal structure by forming new virgilite crystals, surface healing the glass content, as well as increasing the density to achieve a flexural strength of greater than 700 MPa.

CEREC Tessera will be available in 10 Vita shades in high (HT), medium (MT), and low (LT) translucencies. The glass-containing material allows it to be etched with hydrofluoric acid for adhesive bonding with resin cements, and the high strength of CEREC Tessera may allow it to be conventionally cemented as well.

As with any new material, both laboratory and clinical testing is important to identify the expected performance of the material clinically. This report describes some early laboratory pilot testing of CEREC Tessera performed at the University of Michigan.

Margin Milling Integrity

CEREC Tessera is a significantly harder material to be milled compared to other marketed millable ceramics. There may be concerns about the margin milling integrity due to the high hardness and high glass content of the block as it is subjected to the grinding process by the milling diamonds. A series of crowns using different materials were manufactured in an MC X milling unit (Dentsply Sirona) using wet grinding from a master crown preparation with four different margin designs. The facial margin was a standard 1.5-mm axial chamfer and the lingual margin was a 1.0-mm axial chamfer. The mesial margin was a

Fig. 1: Master crown preparation for measuring margin milling integrity with four different crown margin designs

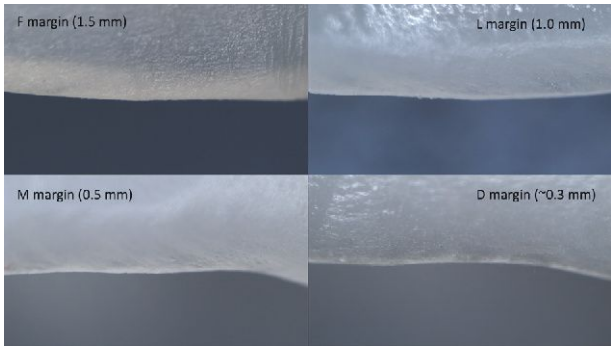


Fig. 2: Lava Ultimate, fine grinding, CEREC® SW 4.6

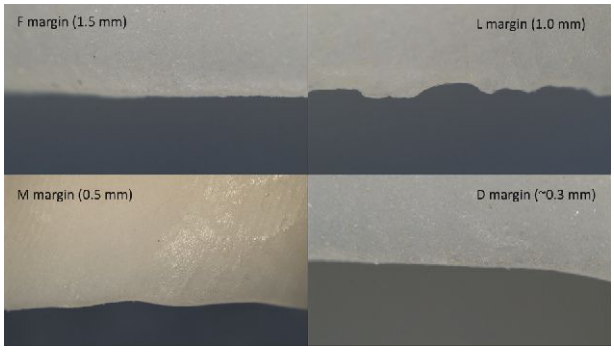


Fig. 3: IPS Empress CAD, fine grinding, CEREC® SW 4.6

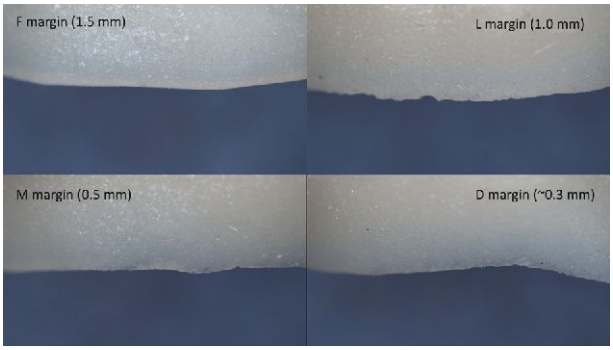


Fig. 4: CEREC® Tessera, fine grinding, CEREC® SW 4.6

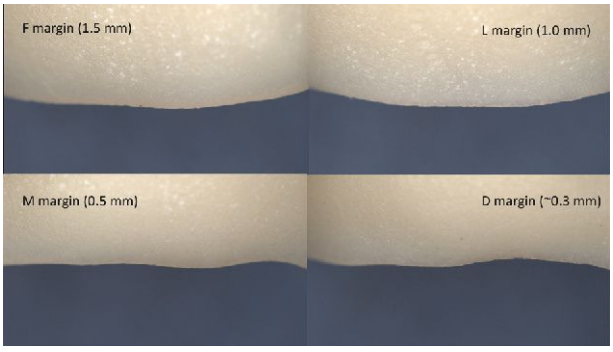


Fig. 5: CEREC® Tessera, fine grinding, CEREC® SW 5.1

0.5-mm axial light chamfer and the distal margin was a knife edge 0.3-mm axial margin design (Fig. 1).

A resin-based resilient ceramic crown (Lava Ultimate, 3M) was manufactured using the CEREC Software (SW) 4.6 with fine grinding (Fig. 2). There was inconsequential margin chipping for all four margin designs. This is a consistent finding with resin-based materials due to their lack of glass content. A leucite-reinforced glass ceramic crown (IPS Empress CAD, Ivoclar Vivadent) also was manufactured using the CEREC SW 4.6 with fine grinding (Fig. 3). The 1.0-mm margin demonstrated more margin chipping, which is generally consistent with glass-containing materials. One interesting note is how well the thinner 0.5-mm and 0.3-mm margins milled with results similar to the resin-based material. This may be a result of the improved margin milling algorithm in the CEREC SW 4.6. A high-strength, advanced lithium disilicate crown (CEREC Tessera, Dentsply Sirona) also was manufactured using the CEREC SW 4.6 with fine grinding (Fig. 4). There was inconsequential margin chipping for all four margin designs, similar to the resin-based material. This also was true after fine grinding using the CEREC SW 5.1. (Fig. 5). The high strength of the material and fine particle size may contribute to the very good margin integrity after wet grinding.

CEREC Tessera is limited to the fine grinding option due to the higher hardness of the material. This results in milling times generally between 10 and 15 minutes for most restorations. Ongoing laboratory testing is evaluating fast grinding as a future option in the software for clinical use.

Surface Characterization — Polishing

An essential property of any restorative material is how the surface needs to be handled to ensure the desired esthetic appearance and wear compatibility with the opposing dentition. A general concern is that wear of opposing tooth structure is a function of material hardness. However, it is more a function of material surface smoothness and fracture toughness (resistance to fracture). Zirconia is a very strong material with a

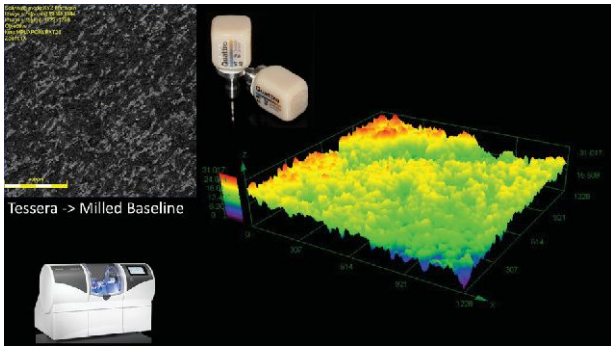


Fig. 6: CEREC® Tessera fine grinding

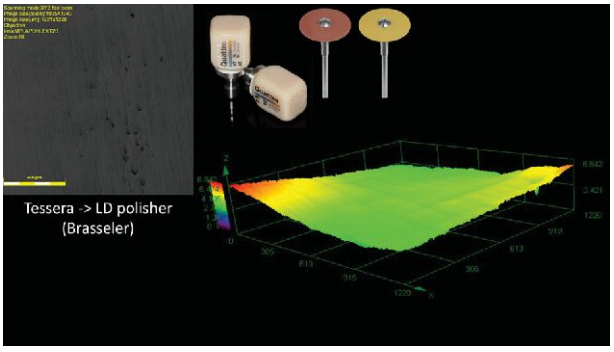


Fig. 8: CEREC® Tessera polished with LD

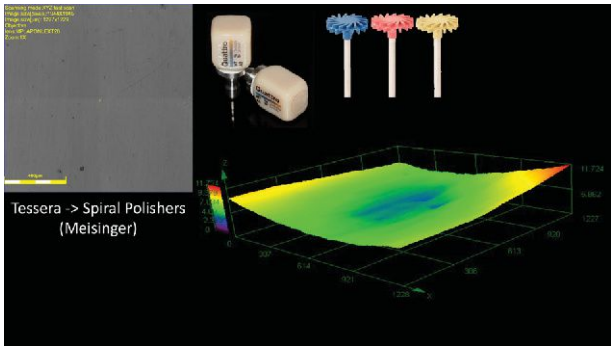


Fig. 7: CEREC® Tessera polished with spiral polishers

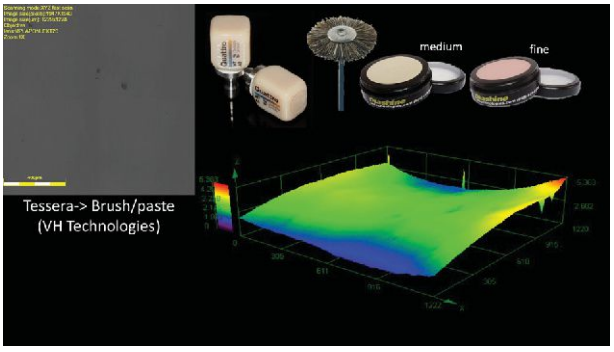


Fig. 9: CEREC® Tessera polished with brush/paste technique

high fracture toughness. The reason a rough zirconia surface can be very abrasive to the opposing dentition is due to the high fracture toughness of zirconia, the rough peaks on the surface of the zirconia do not fracture during functional abrasion (wear), and instead abrade the opposing surface. By polishing the zirconia surface and removing the sharp peaks, the material is still hard and strong, but the surface is no longer abrasive to the opposing dentition.

CEREC Tessera has a significantly higher strength than other glass ceramics (equal to 5 mol% zirconia). However, the fracture toughness is not at the same level of zirconia. A 3D measuring laser microscope (LEXT OLS 4000, Olympus) was used to measure the surface roughness of CEREC Tessera after milling, polishing, and glazing. The laser microscope records the average surface roughness (Sa) in three dimensions over a surface area of the sample. A Sa of > 1.00 µm is common for the milled surface of glass ceramics and approximately 0.50–0.70 µm for milled resin-based materials. A surface roughness of ≤ 0.40 µm should be achieved for polished ceramic surfaces to ensure clinically insignificant wear of the opposing dentition.

CEREC Tessera had an Sa of 1.092 ± 0.038 µm following fine grinding in an MC X milling unit (Fig. 6). This surface roughness is common for most milled glass ceramic materials. Three different polishing techniques were used on the milled sample to evaluate the effectiveness of creating a smooth surface. Spiral polishers (LUSTER Twist [blue-red-yellow], Meisinger) were able to create an Sa of 0.031 ± 0.008 µm (Fig. 7). Wheel polishers (Dialite LD Polishers [red-yellow], Brasseler) were able to create an Sa of 0.032 ± 0.005 µm (Fig. 8). A brush/paste system (DiaShine [medium-fine paste/brush], VH Technologies) was able to create an Sa of 0.032 ± 0.006 µm (Fig. 9). All three polishing techniques were able to create the desired smooth surface on CEREC Tessera to prevent abrasive wear of the opposing dentition. CEREC Tessera's fine particle size (approximately 0.5 µm) is a significant factor in creating a smooth finish.

A surface spray glaze must be applied for the matrix

firing process to create the high strength of CEREC Tessera. This brings up the question, should CEREC Tessera be contoured and polished before applying the spray glaze and matrix firing when the surface is not as hard to polish? The polishing sequence is not an optional alternative to spray glazing and matrix firing, but does polishing Tessera prior to spray glazing and matrix firing result in an equally smooth surface compared to polishing after spray glazing and matrix firing?

CEREC Tessera samples were manufactured and then subjected to three different sequences for contouring, polishing, and matrix firing. One group was milled and polished without spray glaze and matrix firing, a second group was milled and polished before spray glazing and matrix firing, and a third group was milled, spray glazed and matrix fired, and then polished. There was no significant difference in the average surface roughness of the three groups. The matrix firing process does not affect the surface smoothness of the material. Spray glazing and matrix firing is a requirement to create the high strength of the material. There was no impact on the final surface smoothness whether the samples were polished before or after matrix firing. The choice to contour and polish CEREC Tessera before or after matrix firing would be one of clinical preference.

Surface Characterization — Glazing

The second surface finishing process evaluated was oven glazing. A surface glaze must be applied to the CEREC Tessera material as part of the matrix firing process. The glaze acts as a wicking or concentration agent to focus the oven heating energy on the surface of the material, ensuring maximum strength. It is also very important to center the restoration in the SpeedFire oven to ensure consistent heating. The honeycomb firing tray elevates the restoration to the correct heating space, and the firing pad over the tray ensures the restoration does not bond to the tray through the glaze. This is also the reason why only one CEREC Tessera restoration at a time can be matrix fired. The only available glaze with the correct coefficient of thermal expansion for CEREC Tessera is the Indenco Spray Glaze. A paint-on glaze with the correct coefficient of thermal expansion has not been developed for use with CEREC Tessera in the SpeedFire oven and existing paint-on glazes pose a combustion risk within the oven.

The surface roughness of polished CEREC Tessera samples were compared to the surface roughness of spray glazed samples. The spray glazed samples were initially contoured to simulate removal of the milling sprue before they were spray glazed. The spray glazed surface had an Sa of 0.038 ± 0.006 µm. This is not quite as smooth as the polished surfaces, but probably not clinically significant. The glazing process is required to achieve maximum strength of CEREC Tessera, but if post-glazing adjustment is required, it can be consistently polished to a smooth surface with a variety of polishing instruments.

It is also possible to custom shade the surface of CEREC Tessera using the Dentsply Sirona Universal Stain & Glaze kit. A small amount of the Stain & Glaze liquid (NOT the glaze paste) can be added to the stains to make them amenable to paint-on application. The stains can be applied to the contoured surface of the restoration to create the desired shade modifications. The spray glaze is then applied over the stains prior to matrix firing. Alternatively, the restoration can be matrix fired using just the spray glaze and then the shade can be modified in a second glazing process with the Dentsply Sirona Stain & Glaze kit, as used for other ceramic materials.

Conclusion

The quest for a high-strength restorative material with optimum esthetics has resulted in the introduction of CEREC Tessera. Initial laboratory pilot testing of several features of the material have found it to be manufactured with good margin integrity without significant margin chipping, which is characteristic of other glass ceramic materials. The fine particle size allows it to be well polished to a smooth surface using a variety of contouring and polishing instruments to ensure it is not abrasive to opposing dentition. Clinical studies are beginning at the University of Michigan to evaluate the clinical performance of the promising laboratory properties of the material.

For questions and additional information, Dr. Fasbinder can be reached at djfas@umich.edu.

Expanding Treatment Options: The Digital Lab Collaboration

Anthony Ramirez, D.D.S.

This article will describe a case that employed the use of the digital dental laboratory to manage both a smile makeover and maxillary rehabilitation. Even though I am a huge advocate for single-visit dentistry, I rely on capable digital labs to facilitate cases where my in-office technologies limit my production or where my time is better spent providing direct patient care. It's about being more efficient and more productive with better time management. Just as the clinician can effectively and efficiently communicate with our patients during a complete dental examination using computer-aided design/computer-aided manufacturing (CAD/CAM) and cone beam computed tomography (CBCT) imaging, so too can the lab collaborate with the clinician to prepare and develop complex or advanced treatment plans and options with their expanded capabilities. Sometimes a second pair of eyes can enlighten a treatment plan and give additional vision to the correct path of treatment. I have utilized these labs for their expertise with restorative materials when additional third-party planning services were needed and to:

- fabricate long span bridges
- create digital smile designs
- perform smile makeovers
- restore vertical dimension
- improve occlusion
- make significant changes to morphology
- create All-on-4 prosthetics
- perform complex dentistry.

"I Want to Have Teeth that Stay in My Mouth"

A 42-year-old female in good health presented for a consultation considering implants for tooth #2 and #4, which had been missing for many years. Clinical and periodontal examination revealed healthy gingival tissue and bone levels for the natural dentition. A full set of 2D periapical X-rays and intraoral photographs were obtained and reviewed. She presented with generalized worn dentition and a reverse smile curve with early signs of gingival recession. She had been treated with a moderate amount of restorative dentistry. Periodontal sulcular depths were all within normal limits of 3 mm or less. No mobility was found, temporomandibular joints (TMJs) were asymptomatic and without any muscle tenderness. Tooth #2 was mesially rotated and many teeth exhibited short gingival-occlusal crown heights. We discussed orthodontic therapy to improve the occlusion, but she declined during this consultation visit and was only interested in replacing the missing teeth in the areas of #2 and #4. I recommended an enhanced 3D CBCT scan to fully evaluate these areas, which she agreed to.

Fig. 1: Preoperative image of upper right quadrant. Note buccal concavity.

Fig. 2: Preoperative dentition in occlusion

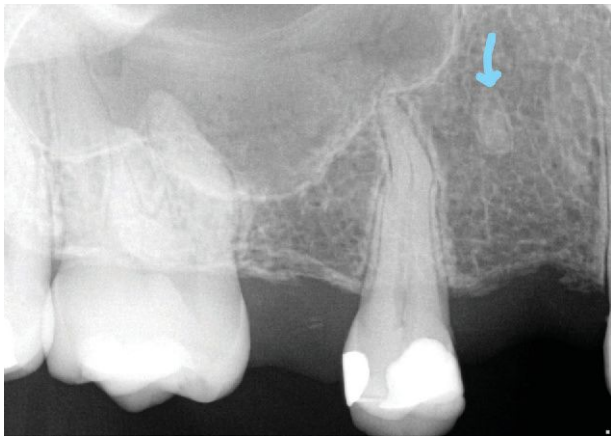


Fig. 3: Residual root fragment in implant site

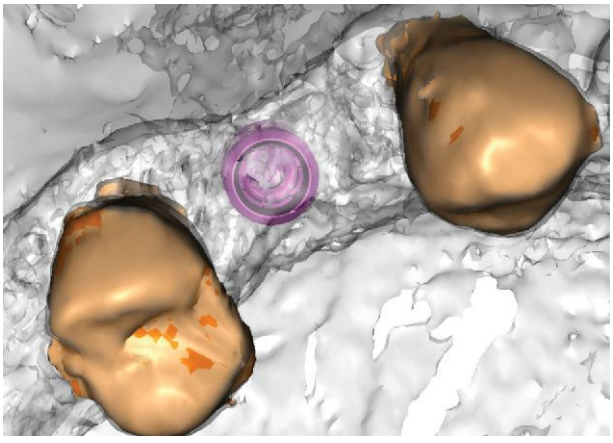


Fig. 5: Deficient buccal alveolar bone housing virtual implant in axial view, contoured bone graft required

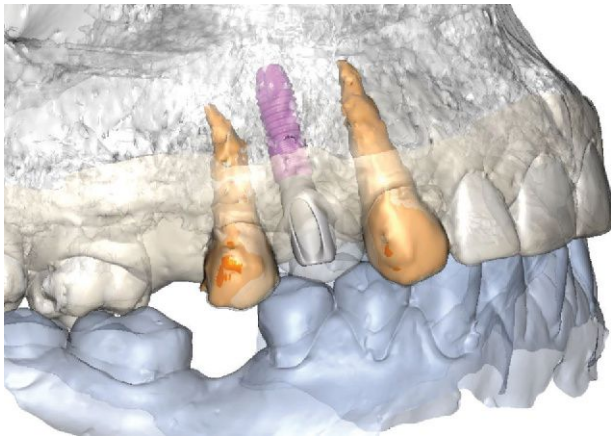


Fig. 4: Simplant implant plan for Azento case

Fig. 6: Timing orientation of guided driver

The CBCT scan captured the entire volume of maxillofacial anatomy and was ready within a few minutes, enabling me to make the proper diagnosis and treatment plan to satisfy this patient's desires. During our discussion, it was apparent that a sinus augmentation would be necessary if an implant could be considered for tooth #2. The patient declined and was given the alternative treatment plan for a three-unit bridge. The site for tooth #4 was carefully evaluated, and a virtual implant was inserted. I determined that an implant was possible with a concomitant buccal bone graft to gain at least 2 mm of bone surrounding the implant. The patient was fully informed and agreed to a single implant and a three-unit bridge, which would result in a full complement of maxillary teeth. This plan addressed her immediate concern, but options were discussed for a complete rehabilitation and long-term solution to the malocclusion and worn dentition (Figs. 1–3).

An existing acrylic unilateral upper-right partial was being used as her definitive prosthesis and I decided to commence with implant therapy and utilize this partial until I could transition to a four-unit fixed VITA CAD-Temp (VITA North America) provisional bridge. I transferred a DICOM file and CAD/CAM data to a Dentsply Sirona implant lab for treatment planning and guide fabrication. This case followed the Azento protocol (Dentsply Sirona) and was worked up in Simplant and Atlantis for a 3.6 x 11-mm Astra Tech Implant System EV (Dentplsy Sirona) plan. Of note, a small residual root fragment was present in the edentulous site and would have to be obliterated during the osteotomy when placing this implant. After receiving the Azento plan, I was able

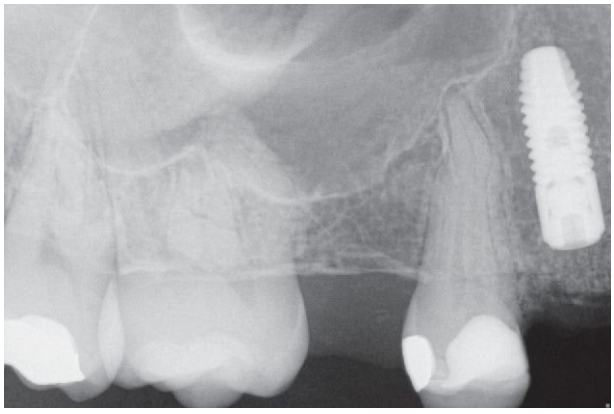


Fig. 7: Tooth #5 implant installed

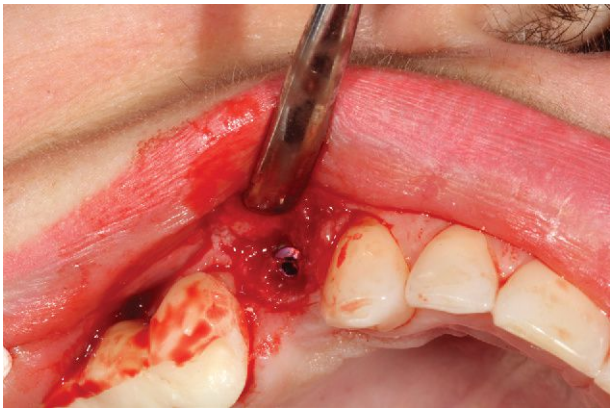


Fig. 9: Uncovering Astra Tech Implant System EV implant #4 and newly regenerated buccal bone volume

Fig. 8: Two-stage implant surgery completed. Note thickness of buccal wall after bone graft.

Fig. 10: Azento protocol validating the timing of the one-position only internal connection and how well the prefabricated definitive Atlantis abutment and the PMMA fit.

to edit the implant's position to achieve my desired location for an optimal outcome. The case was approved and the Azento box was delivered with all the necessary supplies and products to complete the guided implant surgery for tooth #4. During the surgical visit, a flapped guided implant fixture was placed without incident. The osteotomy obliterated the residual root fragment as expected and a mineralized corticocancellous bone allograft in a 50/50 mixture was applied to the buccal bone to provide the necessary bone volume to protect this implant and improve its long-term viability.

I modified the partial to be worn as an interim prosthesis for two weeks until I could prepare and fabricate a four-unit fixed VITA CAD-Temp that would take us through the three-month osseointegration period. The Azento protocol pairs perfectly with the Astra Tech Implant System EV and the fully guided placement was precise and had zero postoperative complications. Although I did not expect to immediately restore this fixture, I documented that the timing of this placement was exactly as the virtual image proposal. You can see how the guided implant driver lined up in the guide sleeve and, subsequently, how the abutment and temporary crown fit into this site. I placed a cover screw and completed the two-stage surgery.

Two weeks later, tooth #2 and #4 were prepared so that a four-unit VITA CAD-Temp restoration could be fabricated to replace the unilateral acrylic denture. The patient was thrilled to have this fixed provisional and it was during the healing phase that she became motivated to move forward with a full-mouth smile makeover.

Upon returning for uncovering, the patient expressed her desire to rehabilitate her dentition and enhance her smile.

Fig. 11: Stage 2 completed

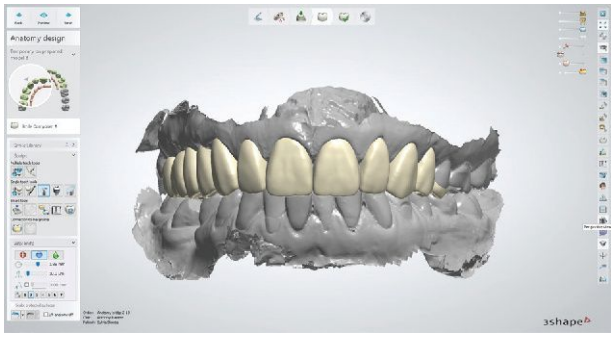


Fig. 12: 3Shape digital design of restorations

Fig. 13: Digital wax-up

We exposed the implant platform and examined the bone level, which was determined to be excellent. I utilized the definitive Atlantis abutment (Dentsply Sirona) and the prefabricated polymethyl methacrylate (PMMA) provisional included as part of the original Azento case (Figs. 4–11).

CEREC® Primescan Facilitates this Smile Makeover

My usual protocol for creating an esthetic smile makeover involves obtaining diagnostic study models and

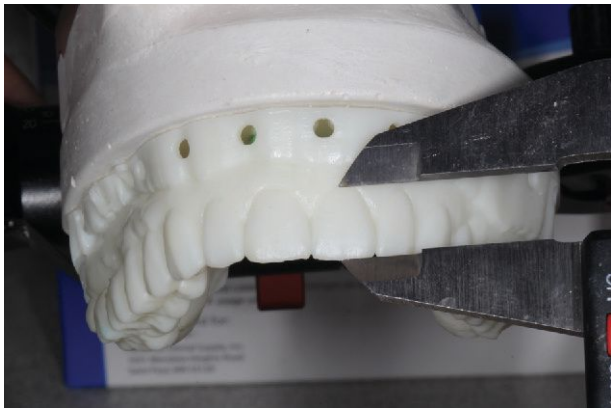


Fig. 14: Occlusal-gingival length of 10.25 mm confirmed with calipers

Fig. 15: Preparations completed

intraoral photographs, assessing the desires of the patient, and determining how the goals of this treatment can be accomplished. I have transitioned these treatments into the digital world and rely on CEREC Primescan (Dentsply Sirona) to take the place of analog impression techniques. This process improves communication between the dentist and lab, which enhances the outcome. The lab will produce a digital wax-up, print a model, and create a matrix to transfer the newly designed morphology to the patient's existing dentition, which will become the blueprint for the final restorations. I performed a composite mock-up to determine the proper incisal lengths for this patient. Initial incisal lengths were 8.8 and 8.9 mm for the respective central incisors. This mock-up was evaluated for speech, esthetics, and guidance. I determined that a good length for each central should be 10.25 mm.

Full-mouth CEREC Primescan optical impressions were obtained, which would be used to digitally design

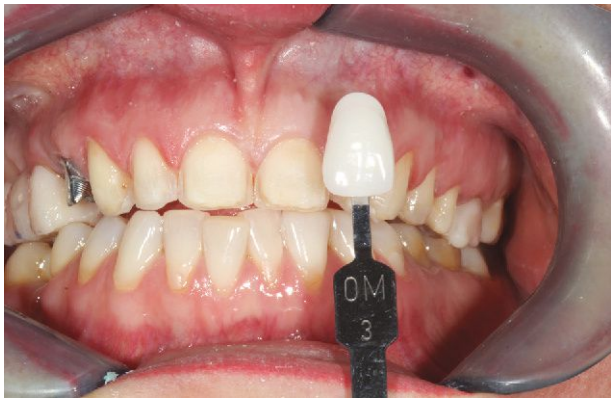


Fig. 16: Shade OM3 selected, bite opened for restorative material, and anterior space to straighten lower incisors with clear aligner therapy

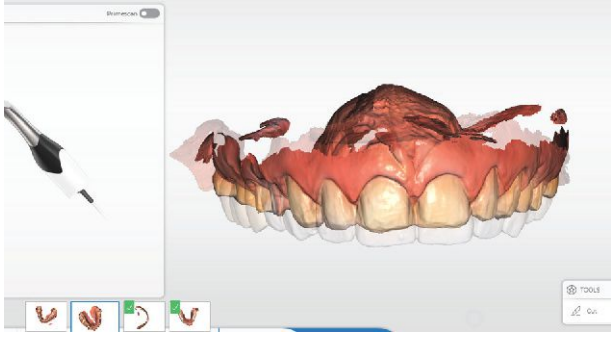


Fig. 17: CEREC® Primescan impression of preparations #2–#14

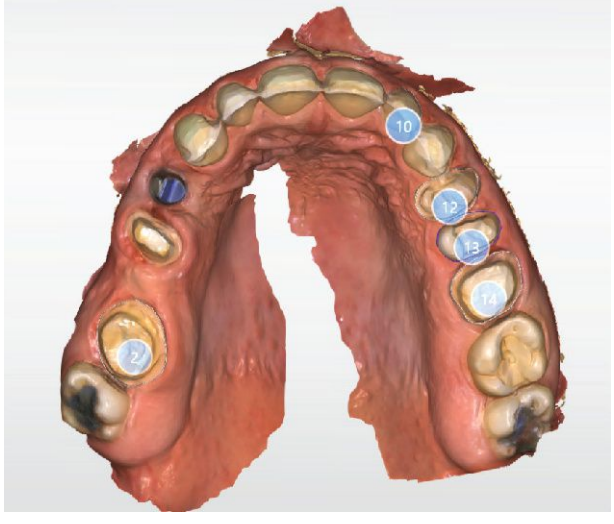


Fig. 18: Occlusal view of CEREC® Primescan impression

the maxillary dentition. All of the preoperative records, photographs, and impressions were captured and transferred in a digital format. A digital wax-up was produced in 3Shape software and I received screenshots and a short video of the design proposals. The lengths were critical to keeping within the patient's desires, so the measurements were once again checked to be no more than 10.25 mm. The digitally developed blueprint for this case met all my preoperative specifications for tooth morphology, shape, size, and length before any anterior preparations were started. CEREC Primescan optical impressions took the place of analog impressions and printed resin models replaced stone casts (Figs. 12–14).

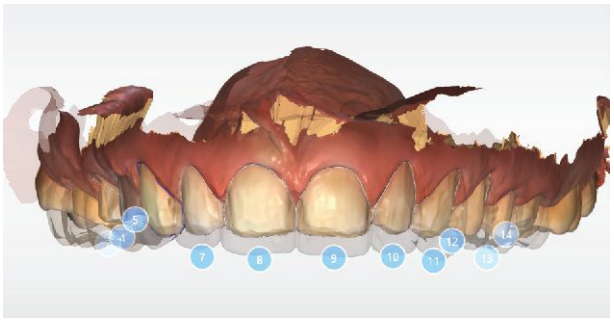


Fig. 19: Marginated preparations to improve communication with the lab

From Preparation to Delivery in Two Visits

The preparation visit went well with tooth #6–#11 prepped for veneers, #12 and #13 prepped for partial coverage, and #2–#4, #5 (from the original treatment plan), and #14 for crowns. The CEREC Primescan impressions quickly captured these preparations, along with the lower dentition, and a bite catalog. I did use an Artex facebow registration and bite stick for the lab to articulate working printed models. Shade tab photos of A2 were forwarded to the lab. Provisional restorations were created out of Luxatemp bisacryl material (DMG America) in a bleached shade using a putty matrix and bonded to each tooth with a no-etch bond (ExciTE, Ivoclar Vivadent). I have used this technique for years with success because these trial restorations remain securely attached to the underlying tooth structure for weeks.

An additional scan was taken of the provisional restorations, which acted as a guide for the technician to follow for morphology, length, and occlusion. These provisional restorations resulted in a dramatic enhancement and a pleased patient. Digital transfer of

Fig. 20: Putty matrix used to transfer provisional restorations onto preparations

Fig. 21: Luxatemp provisionals bonded with ExciTE

Fig. 22: Biocopy of provisional restorations

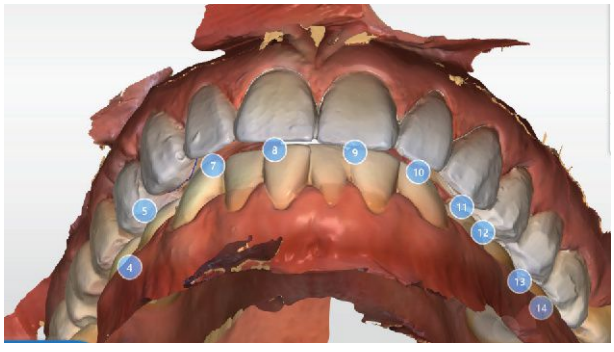


Fig. 23: Biocopy in correct occlusion, which the lab was requested to maintain

Fig. 24: Milled IPS e.max to be layered by ceramist

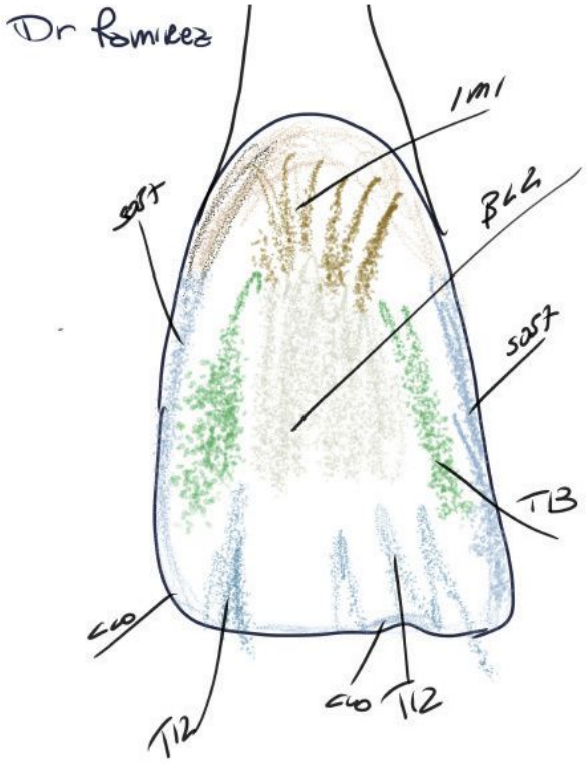


Fig. 25: Detailed shade mapping customized by Roberto Rossi

this data through the Sirona Connect portal completed this visit. The patient was dismissed and asked to return in a few days for feedback and photographs prior to the manufacture of the definitive case.

Photographs were obtained the following week and the patient remarked that she was thrilled with the esthetics and had no postoperative issues to report. I evaluated her new smile and made additional notes for the lab to follow when producing the restorations. Provisional photographs

Fig. 26: Completed restorations on articulated printed prep model

Fig. 27: Postoperative smile makeover exceeding patient expectations

Fig. 28: Close-up view of anterior restorations. Note the marginal adaptation and gingival tissue response.

were sent to the lab to be used as reference (Figs. 15–23).

Communicating the desires and expectations for these cases is paramount for success. I was able to see the various stages of production as the lab crafted our patient's restorations. A printed model of the provisional restorations was poured and became the basis for morphology, length, and occlusion. The lab created a shade map, which they referenced to customize the shade and

Fig. 29: Emergence profiles, facial planes, and tissue health

Fig. 30: Left side postoperative

Fig. 31: Completed smile makeover

create distinctly polychromatic, unique, and natural-looking restorations for our case. The porcelain buildup was performed with painstaking detail to produce the

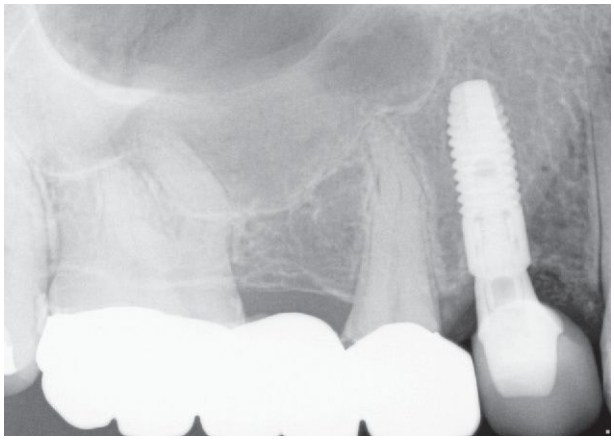


Fig. 32: Postoperative bone level at nine months

exceptional esthetic result that was obtained (Figs. 24–25). The provisionals remained intact for more than two weeks as the restorations were being produced. It was necessary to remove these by sectioning through the material and separating each in pieces.

The completed case was returned and placed on the printed model. I transferred all 13 of the restorations to the mouth. Each restoration fit perfectly, covering all prepared tooth structure. The marginal coverage using a digital printed model was as good, if not better, than cases I have completed on stone models. I began the process of silanating the porcelain and preparing all tooth surfaces for the bonding procedure. The lab was a little concerned with the insertion as no contacts were broken for the six veneers and thought I might have to adjust interproximally to fit. This was not an issue and I bonded all six at once by tack curing, removing the excess, and then completely curing. The bridge and crown for #2–#4 and #5 followed and finally the two onlay veneers for #12 and #13, and the crown for #14. I spent some time cleaning up the veneer cement and maintained excellent contact throughout the maxilla. The smile reveal was spectacular, and our patient was ecstatic with her new smile even while anesthetized.

Patient expectations were exceeded with this 13-unit rehabilitation. Crown proportions and symmetry were developed, and a final attractive H/W ratio was achieved with a well interdigitated occlusion. The midline was maintained, and the incisal edges of the newly created maxillary teeth followed the contours of the lower lip. These smile design principles contributed to the esthetically pleasing appearance and directly impacted the ultimate success of this case (Figs. 26–33).

Fig. 33: Exceeding expectations

Concluding Thoughts

This case illustrates how connecting the clinician, lab technician, and digital technologies can improve treatment outcomes by relying upon a team approach to plan and execute treatment for multifaceted dental problems. Communication and the ability to work closely with the lab while keeping control and approval in the dentist's hands ensures that nothing is left to chance. I believe collaborating with an experienced and well-equipped digital lab can mitigate risks and maximize the rewards that digital dentistry provides to both the patient and the clinician.

The incredible lab work in this case was performed by Master Ceramist Roberto Rossi of Synergy Dental Ceramics, New Hyde Park, Long Island, NY.

For questions and additional information, Dr. Ramirez can be reached at info@dranthonyramirez.com.

SiroLaser Supports CEREC® Chairside Treatment

Andreas Bindl, PD, Dr. med. dent.

A finished restoration in one session — this is a key reason why Dr. Andreas Bindl from Zurich has been working with the CEREC® computer-aided design/computer-aided manufacturing (CAD/CAM) system from Dentsply Sirona for the last 24 years. In some cases, however, this procedure is made more difficult, for example, when the tooth to be treated has to be prepared subgingivally. In the following case study, Dr. Bindl describes how, with the help of his new diode laser, he was able to quickly and safely treat a patient in a single session.

Modern technical equipment helps the practitioner, as well as the patient. That's why I've been using CAD/CAM-based CEREC (Dentsply Sirona) for a long time, in addition to digital X-ray units. The system is scientifically very well documented, the material blocks are of high quality, and there is a great variety of materials for a large variety of clinical indications. In fact, I use almost all of the materials available: glass ceramics, feldspathic ceramics, hybrid ceramics, zirconia, composite, and polymethyl methacrylate (PMMA) polymers. My patients also appreciate modern technology — especially because high-quality restorations are possible in just one session.

Two years ago, I expanded the equipment of my general dental and implantology practice to include the SiroLaser Blue laser. The key factor here was the desire to use it in reconstructive dentistry as well, especially in CEREC treatments. The diode laser has three different wavelengths, one blue, one infrared, and one red diode, thus opening up a broad range of treatments to me. In addition, it is very easy to use and has an excellent, easily adjustable cutting performance. I always use the laser whenever a targeted, relatively less-invasive procedure is indicated, such as fibroma removal, gingivectomy, or decontamination of implant surfaces in the treatment of peri-implantitis.

Recently, the SiroLaser Blue supported me during a restorative treatment. The absence of bleeding is essential for the adhesive bonding of a crown. This can be

Fig. 1: Prepared tooth #6 after laser treatment

Fig. 2: Prepared tooth #11 after laser treatment

achieved very well with the use of a laser in a subgingival preparation. I found other procedures to be somewhat awkward. With this in mind, I was sure that I no longer wanted to do it without a soft-tissue laser.

The Case

A 67-year-old patient was to be treated with one crown each on teeth #6 and #11, which I wanted to manufacture with CEREC. This treatment was necessary due to carious lesions and insufficient fillings. After the initial preparation of the tooth, it was revealed that the preparation margin was clearly subgingival at several points. Sulcus widening was necessary. In the past, I used retraction threads to expose the preparation margins — a complicated and difficult procedure. Today, I can perform the gingival adjustment and sulcus widening quickly and easily with the SiroLaser Blue (Figs. 1–2). Of course, in

Fig. 3: Situation during the optical impression with CEREC® Primescan

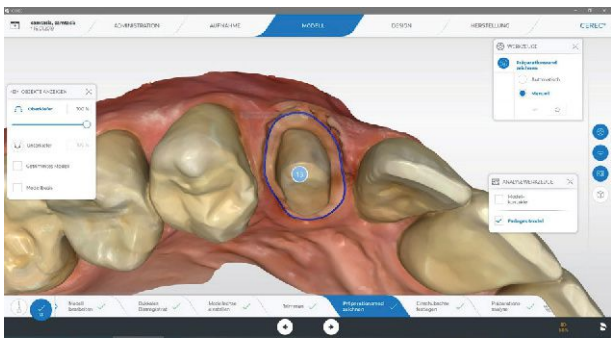


Fig. 4: Automatic marking of the preparation margin with nearly blood-free preparation of tooth #6

Fig. 5: Automatic marking of the preparation margin with nearly blood-free preparation of tooth #11

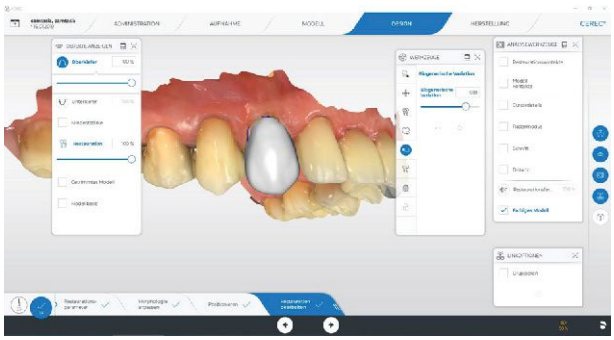


Fig. 6: Adjustment of the fine morphology with the help of Biogeneric Variation

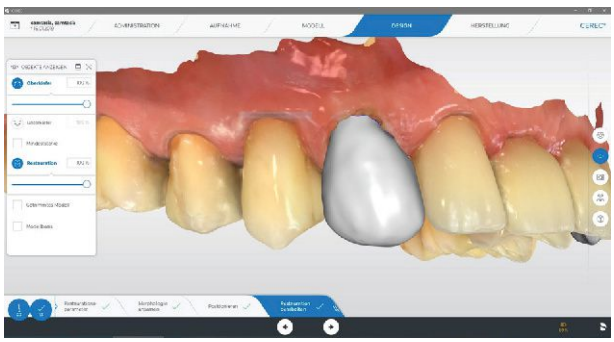


Fig. 7A: Using the virtual articulator, the morphology can be checked during function, canine guidance was achieved on both sides.

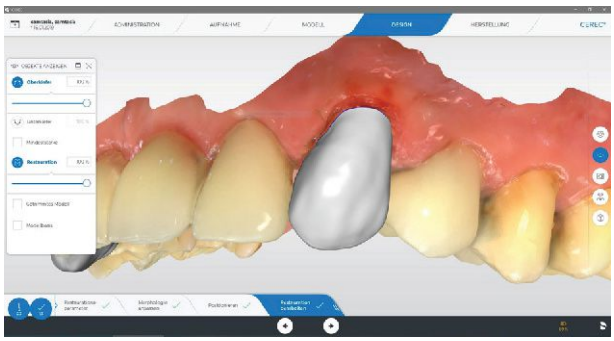


Fig. 7B: Using the Virtual Articulator, the morphology can be checked during function, canine guidance was achieved on both sides.

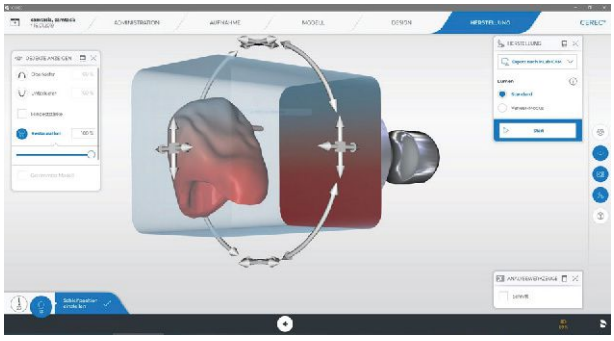


Fig. 8: The crown construction is positioned in the preview.

Fig. 9: Fitting CEREC® crown on tooth #6

this case too, I set myself the goal of completing the restoration in one session. Our patients are accustomed this and, therefore, already expect it.

The gingiva had to be absolutely free of bleeding for the digital impression and later for placing the adhesive restoration. I used the SiroLaser Blue for careful and targeted removal of gingival areas. Nevertheless, the widening was successful, and I was able to carry out the digital impression in the course of testing with CEREC Primescan immediately thereafter (Figs. 3–4). The new intraoral scanner impresses with its accuracy, the speed of the scan, and very easy handling. This process has become even easier since the introduction of the new CEREC Software 4.6, and now with the current CEREC Software 5,

Fig. 10: Testing CEREC® crown on tooth #11

Fig. 11: Inspection after six weeks, crown on tooth #6

which saves additional time and is very convenient. During the planning of the restoration, I used the "Biogeneric Variation" function, with which I found the crown morphology suitable for the clinical situation (Figs. 5–8). I finally made the restoration from leucite-reinforced glass ceramic IPS Empress CAD Multi-Chromatic Blocks

Fig. 12: Inspection of crown on tooth #11 after six weeks

with color gradient (Ivoclar Vivadent) (Figs. 9–10). The patient was very satisfied with the esthetically appealing result. The patient returned to my practice six weeks after the treatment to check the healing process (Figs. 11–12).

Conclusion

Although I have only been working with the SiroLaser Blue for two years now, it is almost impossible to imagine my daily treatment work without it. Interventions on the soft tissue are minimally invasive and gentle, healing is usually free of scars. Moreover, my patients respond very positively to modern technology and have less postoperative pain. The fact that the laser and CEREC complement each other so well is still a fairly new but good experience. I almost have to ask myself why I did not use laser technology before?

For questions and additional information, Dr. Bindl can be reached at info@praxiszürichberg.ch.

Performing an Esthetic, Full-Mouth Rehabilitation with VITA SUPRINITY PC

Jeff Sumner, D.D.S.

Abstract

An existing 52-year-old male patient whom I've known for more than 20 years presented with a severe history of bruxism that had worn his teeth down over time. I had previously performed some repair work, but this time the patient was ready for something more permanent. He was unsatisfied with the esthetics and function and elected a full-mouth rehabilitation as his final treatment. The clinical challenge was to stay true to my business model of same-day dentistry and the digital workflow and find a ceramic block that would offer strength and quality esthetics. In this case, a zirconia-reinforced silicate ceramic (VITA SUPRINITY PC, VITA Zahnfabrik) was selected as the restorative material. The goal was to provide a highly functional restoration with a natural appearance and pleasing esthetics.

Introduction

As a CEREC® dentist, my primary goal and business model with patients is to execute same-day dentistry using a digital workflow. CEREC computer-aided design/computer-aided manufacturing (CAD/CAM) dentistry has allowed me to stay true to this process where I am fully accountable for the final results. While attending the American Academy of Cosmetic Dentistry in San Diego, CA, in April 2019, I met Eddie Corrales, CDT, owner of Downtown Dental Designs. We mutually admired each other's work and talked about potentially working on a future case together. When an ideal case presented itself a few weeks later, it was the perfect scenario to collaborate with Eddie. We made arrangements and Eddie flew to Ontario, Canada, to work on the two-day case with me.

Case Report

An existing 52-year-old male patient presented with a severe history of bruxism that had worn down his teeth (Fig. 1). The patient's chief complaint was the overall esthetics and function of his teeth. I had previously performed some patch and repair work, but this time the

Fig. 1: A 52-year-old male patient presented with severe bruxism.

Fig. 2: 3D printout of the esthetic wax-up of the maxilla

Fig. 3: 3D printout of the esthetic wax-up of the mandible

Fig. 4: Vacuform Essix to show patient increase in tooth length

Fig. 5: Temporaries worn for two months (Luxatemp)

Fig. 6: Initial preps of maxilla teeth

Fig. 7: Preps of maxilla teeth after gingivectomy of tooth #9

patient was ready for something more permanent and comprehensive. A treatment plan that included a full-mouth rehabilitation using VITA SUPRINITY PC as the restorative material was proposed and accepted. The goal was to create full-mouth, highly functional restorations with a natural appearance and pleasing esthetics.

Preparation

To start, I used my CEREC Primescan (Dentsply Sirona) to scan the patient's entire mouth and bite registration. The case file was sent digitally to the laboratory, Downtown Dental Designs in San Diego, CA, via a portal (Sirona Connect, Dentsply Sirona). I communicated with lab owner Eddie Corrales that I wanted to open the patient's vertical dimension of occlusion (VDO) by about 3 mm. Eddie created a digital wax-up of the patient, which included a full-mouth reconstruction of his upper and lower teeth (28 in all), and sent back a high-resolution .stl file. I printed the wax-

Fig. 8: CEREC® Primescan of prepped maxilla teeth

Fig. 9: VITA SUPRINITY PC and VITA SMART.FIRE

With its simplified processing and high-edge stability, the material also offers a precision fit and can be crystallized without auxiliary firing paste.

up using my Formlabs 3D digital printer (Formlabs, Inc.) and presented a model of the predicted final outcome to my patient (Figs. 2–3).

Material

VITA SUPRINITY PC, which is a zirconia-reinforced lithium silicate ceramic (ZLS), was selected for the full-mouth reconstruction. The material is incredibly strong and provides amazing esthetics. The material offers excellent polishing capabilities and easy manual finishing after milling, providing natural translucency, fluorescence, and opalescence. With its simplified processing and high-edge stability, the material also offers a precision fit and can be crystallized without auxiliary firing paste.

Treatment

The patient returned to the office and was shown the digital wax-up (Figs. 2–3). He was very pleased, approved it, and was excited to move forward. From the 3D printout of the digital wax-up, I created a vacuform clear Essix-type retainer. The patient tried in the Essix so we could visualize the increase in the length of the proposed teeth (Fig. 4). At this stage, we removed three existing posterior gold crowns and made temporaries for the 14 teeth on the top and the 14 teeth on the bottom. The temporaries were essentially additive, so I did not need to prep any of the teeth, with the exception of where the gold crowns were removed, to achieve added retention. I used Luxatemp Ultra (DMG America, LLC) and a polyvinyl putty to make the temporaries, which peeled off nicely, leaving beautiful margins. No bonding of the temporaries

Fig. 10: Patient watching milling of teeth on CEREC® MC XL and MC X mills

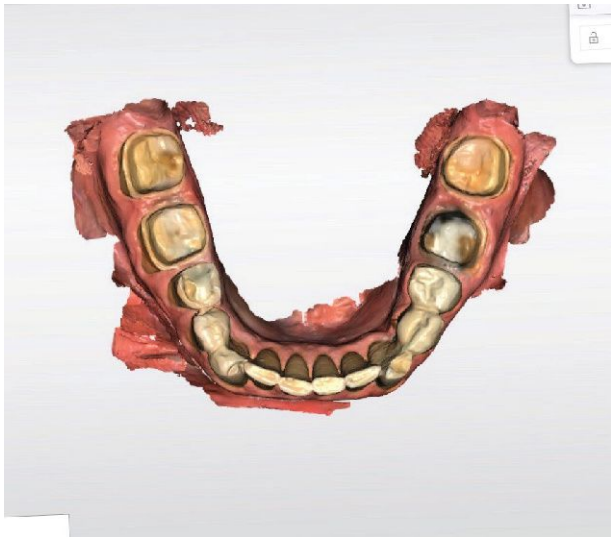


Fig. 11: CEREC® Primescan of prepped mandible molars (Day 1)

was needed (Fig. 5). The goal for the temporaries was to increase the patient's vertical dimension so he would become comfortable with the change, which included more length for a youthful appearance, and a different rest and bite position. The patient wore the temporaries for two months, allowing ample time for him to determine if the restoration was a good fit. I also adjusted his occlusion at this stage so we had a very balanced bite that the patient was comfortable with. The adjusted bite was then scanned with the CEREC Primescan and sent to

Fig. 12: Try-in of 14 precrystalized VITA SUPRINITY PC crowns

Fig. 13: Cutbacks on precrystallized crowns

Eddie so he could use the new bite as the template for the final bite design.

Two months later, Eddie visited my clinic in Ontario to help me complete the case. Our plan was to complete

Fig. 14: Cutbacks on same crowns postcrystallization

Fig. 15: VITA AKZENT Plus stain and glaze

Fig. 16: CEREC® Primescan of 10 mandible teeth (Day 2)

Fig. 17: Maxilla crowns bonded with PANAVIA V5 clear

Fig. 18: Mandible crowns bonded with PANAVIA V5 clear

Fig. 19: Full-mouth rehabilitation with VITA SUPRINITY PC

the 14 maxillary crowns on Day 1 and the 14 mandibular crowns on Day 2. On the first day, I completed the 14 preps on the maxillary crowns. I decided that tooth #9 needed some crown lengthening (Fig. 6), so I performed a gingivectomy on that tooth (Fig. 7) and then scanned them. Scanning 14 teeth took approximately 30 seconds using the CEREC Primescan (Fig. 8). I used VITA SUPRINITY

Fig. 20: Eddie Corrales, Jeff Sumner, and pleased patient

Fig. 21: Full-mouth rehabilitation before and after

PC for the restorative material in the 3D-Master Shade Guide, shade 2M2 HT for the posterior and 1M1 HT for the anterior (Fig. 9).

Eddie began work on the design and milling of the restorations, which were milled using a CEREC MC XL and MC X milling unit (Dentsply Sirona) (Fig. 10). We were so far ahead of schedule that we decided to work on more of the restorations and proceeded to complete four of the mandibular crowns (Fig. 11). In total, we completed 18 crowns on Day 1. Once we had the teeth milled, we tried them in to check the fit, margins, and contact (Fig. 12). As a master ceramist, Eddie elected to do some cutbacks to obtain even greater esthetics for the patient (Figs. 13–14). His preferred method was to put the crowns on a model to work on them. My Formlabs 3D printer is not fast enough to print a model for Eddie to work on, so we did a polyvinyl impression and immediately poured it. He used the model to seat the crowns and do his cutbacks and build-up of the incisal characterization of the teeth. VITA AKZENT Plus stain and glaze was used for the characterization (Fig. 15).

On the second day, the patient returned in the morning to complete the rehabilitation. We had only 10 teeth left to do, so I prepped the 10 mandibular teeth/crowns and scanned them (Fig. 16). Eddie completed the design, milling, cutback, and characterization of the remaining teeth.

Bonding

We tried in all the teeth and bonded them using a translucent shade resin cement (PANAVIA V5, Kuraray Noritake). Adhesive cementation helps strengthen ceramic restorations (Figs. 17–18). Following the bonding, I did some equilibration of the patient's bite and then rescanned the teeth again in order to make a night guard. The night guard is important to protect the patient's newly restored teeth, especially considering his history of wear and abrasion. The restorations were delivered after two days without any major modifications.

Conclusion

This was an amazingly rewarding case for the patient, the lab, and me. It confirmed the evolution of CEREC dentistry, in that I could be more efficient and achieve better results collaborating with the right lab, and still continue with same-day dentistry. The patient was extremely impressed — he loved the entire experience and now feels confident and proud of his new smile (Figs. 19–20). VITA SUPRINITY PC's excellent marginal adaptation and shade match, as well as its high-quality strength and esthetics, made it the ideal choice for this rehabilitation (Fig. 21).

For questions and additional information, Dr. Sumner can be reached at drjeffsumner@rogers.com.

Primed and Ready to Mill: Single-Visit Implant Restorations are "Super Fast" with CEREC® Primemill

Daniel Butterman, D.D.S.

Restoring implants with CEREC® is one of the most rewarding and profitable procedures in our dental arsenal. For the majority of cases, the TiBase workflow is an excellent treatment option. The TiBase workflow starts with a titanium base and ScanBody for the specific brand of implant and platform size that is being restored. The second step is to image the implant and design the restoration in the software. Then, the restoration is milled out of a meso block with a premanufactured hole that fits precisely to the TiBase.

Although it's possible to mill the restoration in a single appointment with the inLab MC XL unit, it takes a considerable amount of time. Because the MC XL is not able to fast mill meso blocks (meso blocks are must be fine milled), it takes approximately 30 to 40 minutes to mill a screw-retained meso block. Due to the long milling time for a hybrid abutment screw-retained restoration, or an abutment with a cemented crown, many doctors have resorted to restoring implants in two visits.

Two visits are counterintuitive for most CEREC users because we purchased this technology to eliminate the second appointment for our patients and ourselves. For most of us, completing a single crown on a tooth in a 90-minute appointment brings both an increase in productivity and an increase in profit. And for our patients, doing the procedure in a 90-minute appointment means convenience and time savings. If we had the ability to complete an implant restoration in approximately the same time as a single crown, it would mean a significant increase in our hourly production because we charge a higher fee for an implant restoration than we do for a crown.

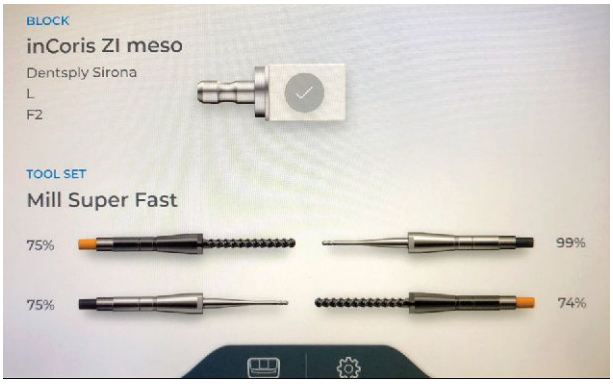


Fig. 1: CEREC® Primemill home screen

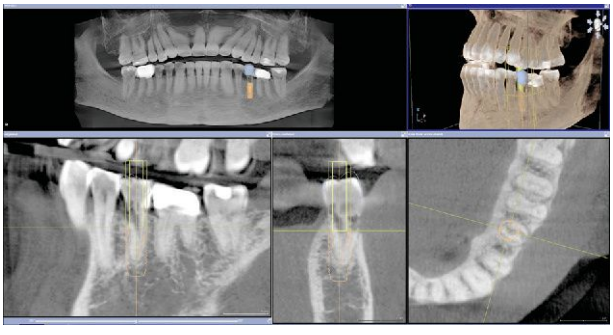


Fig. 2: GALILEOS implant #20 plan

The CEREC Primemill has made single-visit implant restorations much more feasible. With "Super

In conjunction with the quick and accurate scanning of the CEREC Primescan, the CEREC Primemill's fast and precise milling has made restoring implants in a single visit a reality.

Fig. 3: (a) Osstell ISQ reading. **(b)** Implant #20 with healing abutment removed. **(c)** Implant #20 with ScanPost and ScanBody. **(d)** Image catalogs.

Fast" milling mode for zirconia crowns and "Fast" milling for zirconia abutments and lithium disilicate meso blocks, the CEREC Primemill enables us to mill implant restorations in a fraction of the time (Fig. 1). In conjunction with the quick and accurate scanning of the CEREC Primescan, the CEREC Primemill's fast and precise milling has made restoring implants in a single visit a reality.

Clinical Cases

Mary is a healthy 68-year-old female who presented with pain in tooth #20 due to internal resorption. She agreed to an extraction and implant treatment. The implant was planned in GALILEOS implant software (Fig. 2), and the tooth was extracted without complication. A 4.8 C Astra Tech Implant System EV was placed immediately and allowed to integrate for three

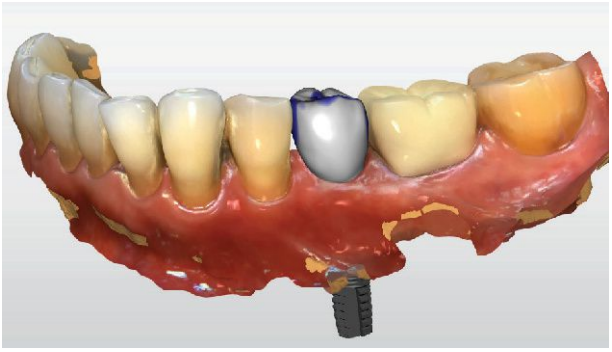


Fig. 4: Designed hybrid abutment restoration

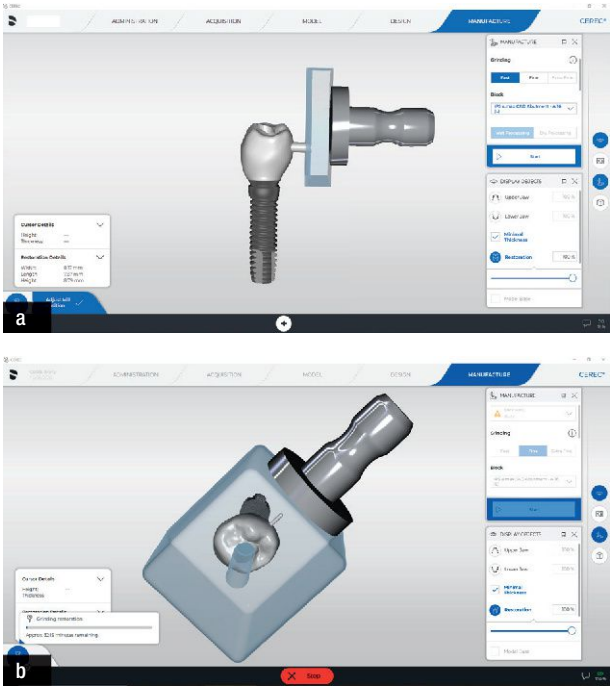


Fig. 5: (a) CEREC® Primemill manufacture phase. **(b)** MC XL manufacture phase.

Fig. 6: Milled IPS e.max hybrid abutment crown

Fig. 7: Restoration in SpeedFire oven

months. Integration was confirmed with an implant stability quotient (ISQ) reading of 83 (Fig. 3a), and Mary was scheduled for a single-visit implant restoration. The total time for the restorative appointment was approximately 75 minutes. During the appointment, the healing abutment was removed (Fig. 3b) and a ScanPost with a ScanBody was placed on the implant (Fig. 3c). Then, the image catalogs were scanned using the Primescan (Fig. 3d). The restoration was calculated, and minor adjustments were made to the design (Fig. 4). This process took approximately 20 minutes.

Using the Primemill on fast grinding mode, the total milling time for an IPS e.max A16L block in an A2 shade was just over eight minutes (Fig. 5a). This same restoration would have taken more than 30 minutes to mill on the MC XL (Fig. 5b). The screw-retained crown was then stained, glazed, and crystalized in the SpeedFire oven (Figs. 6 and 7). This program took about 30 minutes. The restoration was bonded to a TiBase

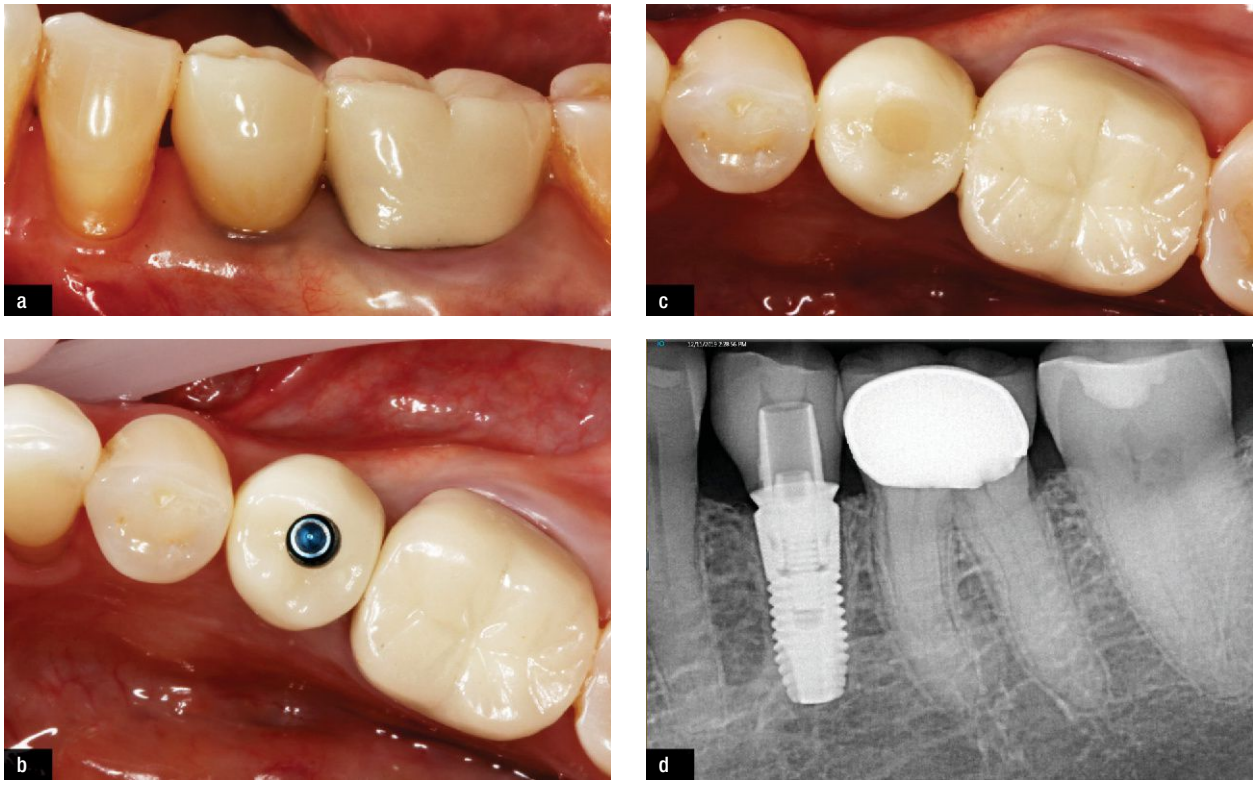


Fig. 8: (a) Buccal shot of implant restoration #20. **(b)** Screw access implant crown #20. **(c)** Completed restoration #20. **(d)** X-ray of completed restoration #20.

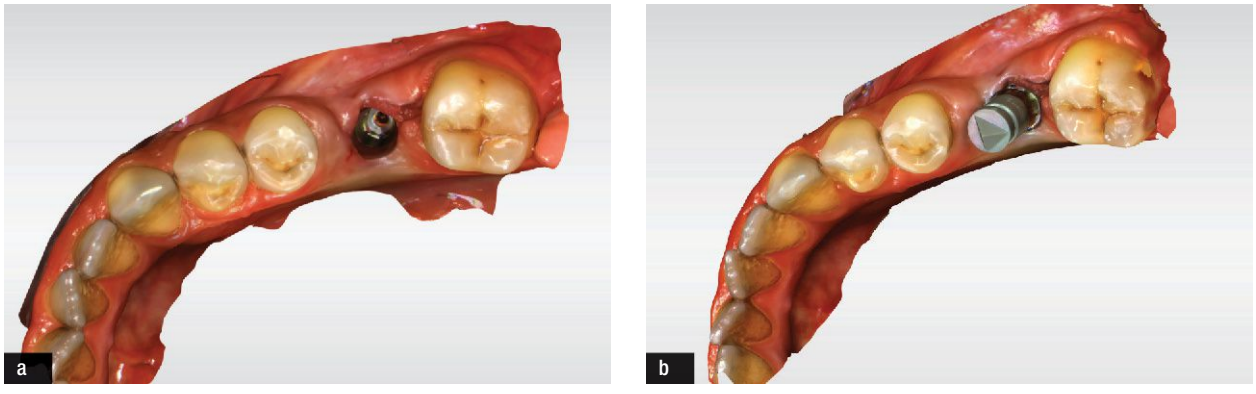


Fig. 9: (a) Uncovered implant #30. **(b)** ScanPost implant #30.

using Ivoclar Vivadent's Multilink Hybrid Abutment cement. Finally, the restoration was delivered, and the screw access hole was closed (Fig. 8a–8d). This process took about fifteen minutes. The CEREC Primemill enabled me to deliver Mary's implant restoration in less time than it typically takes to deliver a single crown.

Lori is a healthy 48-year-old female who presented with an integrated Astra Tech EV System implant at site #30. Due to the implant angulation not being parallel with the contacts of the adjacent teeth, the decision was made to fabricate a custom zirconia abutment bonded to a TiBase and a separate zirconia crown. An optical scan was obtained using a Primescan and the restoration was designed in CEREC Software 5.1 (Fig. 9a–9b). An inCoris ZI meso block (Fig. 10) was used for the abutment and a KATANA block was used for the

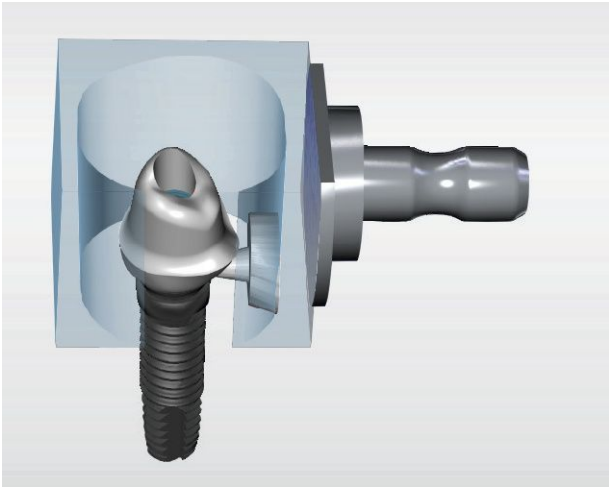


Fig. 10: inCoris abutment block in CEREC® Primemill manufacture phase

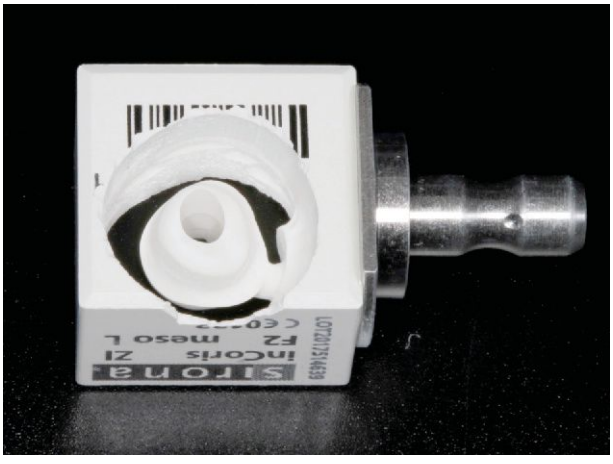
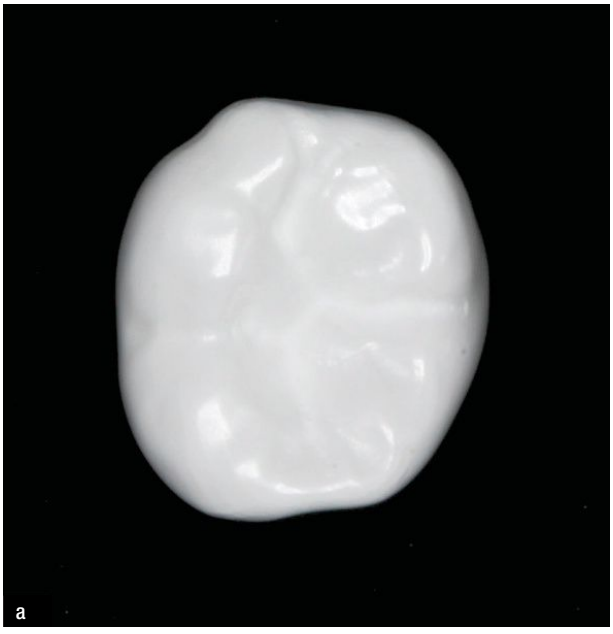


Fig. 11: Milled inCoris abutment block



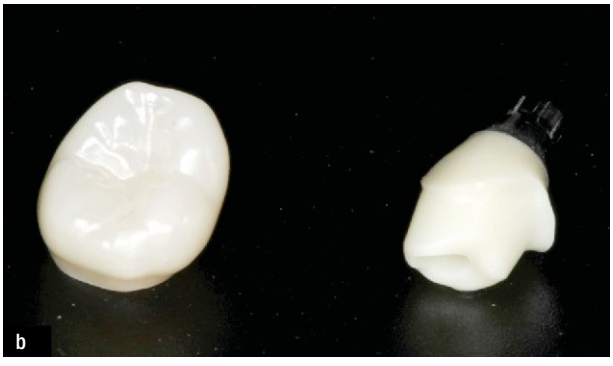


Fig. 12: (a) Milled and polished Katana crown #30. **(b)** Sintered abutment and crown with TiBase.

crown. The abutment was milled on fast mode and took approximately 10 minutes (Fig. 11). The KATANA block was then inserted and milled on Super Fast mode in about four minutes. Both the abutment and crown were sintered in the SpeedFire oven using their respective programs (Fig. 12a–12b). The final restoration was delivered to the patient in approximately 90 minutes (Fig. 13a–13b), and the fit of the crown to the abutment was perfect (Fig. 14).

Using the CEREC Primemill for the fabrication of an IPS e.max hybrid abutment crown shaved approximately 20 minutes off the MC XL milling time. Milling time savings are even more dramatic when making zirconia abutments and zirconia crowns because the "Fast" and

The CEREC Primemill enabled me to deliver Mary's implant restoration in less time than it typically takes to deliver a single crown.

Fig. 13: (a) Seated abutment. **(b)** Final abutment and crown.

Fig. 14: Fit of crown to abutment

The final restoration was delivered to the patient in approximately 90 minutes, and the fit of the crown to the abutment was perfect.

"Super Fast" milling modes can be utilized for zirconia. The accuracy and fit of these restorations, along with the reduction in manufacturing time, enabled me to deliver single-visit implant restorations in about the same time as a crown. When it comes to implant restorations, the CEREC Primemill has increased my speed, efficiency, and hourly production.

For questions and additional information, Dr. Butterman can be reached at drbutterman@buttermandental.com

CDOCS.COM

Sameer Puri, D.D.S.

CDOCS. Kind of rolls off your tongue, doesn't it? Well, after years of people calling us CDOCS for short instead of cerecdoctors.com, we officially decided to change our name. I mean, CDOCS has been the custom license plate on my wife's Tesla for about 6 years. It is fitting because she was the first official employee of the company way back when… but I digress.

I have to say that we have been planning the name change for a while, but really saw no compelling reason to do so because we've been so focused on providing the most comprehensive CEREC® education possible. Calling ourselves cerecdoctors.com just made sense because we trained doctors who owned CEREC systems.

But then, in 2019, Dentsply Sirona approached us and asked for our help to create and teach a comprehensive cone beam curriculum. We worked with our team to completely revamp the introductory and advanced cone-beam training workshops so users could gain a comprehensive understanding of how to interpret and integrate cone beam technology into their practices. We worked with Drs. Doug Smail and Darin O'Bryan to ensure that the introductory training given with the purchase of the Dentsply Sirona cone beam system is relevant to today's users. We worked with oral and maxillofacial radiologists Drs. Don Tyndall and Heidi Kohltfarber to develop an advanced cone beam interpretation workshop for those who want to geek out on reading oral radiology scans.

At this point, the conversations regarding the name change to CDOCS.com was heating up. Was it a good idea? Should we do it? Would people still know who we were because for close to 15 years we had worked to build up our community? We already had a following, we already had a brand. And now to change it to CDOCS.com? Hmmm…. maybe we need to think this through further?

The straw that broke the camel's back was when discussions about offering more educational tracks took hold in our company. Why not offer endodontic workshops? What about workshops on clear aligners — a relevant topic today? Why not a comprehensive implant curriculum? For years we had been teaching the integration between cone beam and CEREC. Our recent grafting workshops and full-arch digital workshops received rave reviews.

And so it was. In fall 2019, our team made a collective decision — we are no longer cerecdoctors.com, but instead we are now CDOCS.com. The name change reflects our commitment to not just CEREC training, but also training in other disciplines such as endodontics, implant placement and restoration, and clear aligner therapy — these are the current and relevant topics in our space.

Over the coming months, I hope to introduce you to our team of general dentists and specialists who will be leading the lectures and workshops. They are all nothing short of spectacular, and I am so proud and honored to be working with them to help deliver some of the finest education available. Changing our name to CDOCS.com, in addition to other tangible benefits, allows us to accurately represent the offerings of our company.

Say it with me, we are CDOCS.com! We have always been CDOCS!

For questions and additional information, Dr. Puri can be reached at spuri@cdocs.com.

The straw that broke the camel's back was when discussions about offering more educational tracks took hold in our company.

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*Study conducted in 2014. Grünheid, T.; Patel, N.; De FelippeN.; Wey, A; Gaillard, P.; Larson, B: Accuracy, reproducibility, and time efficiency of dental measurements using different technologies. Am. J. Orthod., 157-164 **Some geographical restrictions may apply.

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