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international magazine of digital dentistry

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interview
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Dr Scott D. Ganz

Editor-in-Chief

The awakening

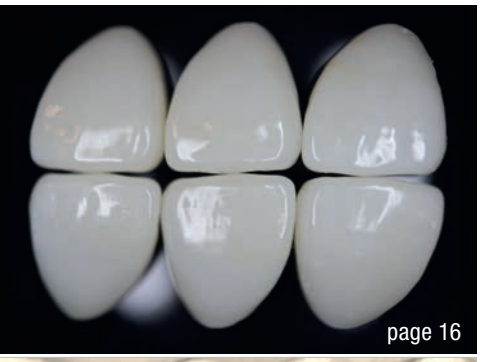
There are indications that the COVID-19 pandemic has started to retreat, allowing many countries around the globe to awaken from the restrictions that have bound us to our homes, forced us to social distance and hindered the normal human experience. Thanks to the administration of tens of millions of doses of vaccines, great numbers of people can enjoy some level of protection from this deadly virus. Many countries have either opened their borders or plan to soon while lifting many of the limitations that have prevented us from travel, separated families and curtailed live in-person educational meetings around the globe. Fortunately, continuing education programmes have restarted, and many courses and symposia have sold out owing to huge pent-up demand by clinicians, who need this especially important personal interaction to enhance their knowledge and skill set, a need that online Zoom sessions were not able to fulfil.

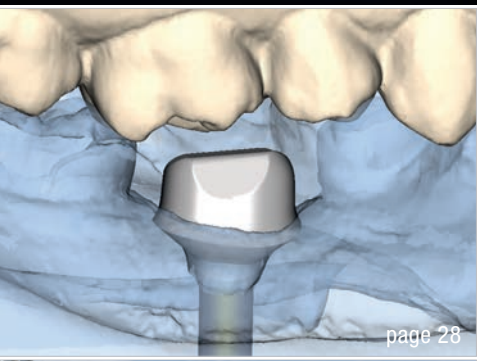
During the pandemic, social media became a major focus of our attention to keep track of friends, relatives and colleagues around the globe. Many lecturers, educators and authors were able to utilise the forced time constraints of everyday practice to continue to develop excellent content to eventually share in the form of webinars, articles, textbooks, videos, etc. So, despite the shutdowns of our clinical practices and constraints on our ability to lead normal lives, people have been productive and communicative throughout the past year and a half. Hopefully, clinicians have also had the time to sit in front of their computers, smartphones or tablets to learn about different concepts, techniques and treatment modalities that were presented online via a variety of platforms.

Currently, we are awakening from the depths of the pandemic and are anxious to get back to work, exploring all the opportunities to deliver improved care for our patients. Whether for a single-tooth restoration or a full-arch guided solution, a simple sinus bump procedure or a lateral sinus augmentation, a socket shield or a socket preservation, a particulate bone graft or harvesting cortical bone from the ramus, there are both analogue and digital solutions available for successful treatment outcomes. As in-person courses and larger symposia are becoming a reality once again, practitioners will have the opportunity to expand their knowledge base and interact with peers for meaningful discussion and debate. Education will always be the foundation for success.

This most recent edition of digital presents excellent content delivered from some of the finest practitioners and educators, who have documented clinical case presentations, research and important treatment modalities in our continued efforts to serve as a global platform and resource for our readership. Enjoy and be safe.

Dr Scott D. Ganz
Editor-in-Chief





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The COVID-19 practice manager 2021: Four steps to confidence—Part 2

Chris Barrow, UK

Introduction

I promised you a series of articles specifically for practice managers as we move into the post-pandemic environment, to cover:
- leadership;
- management;
- teamwork; and
- extreme self-care.

In the first part of this series, we looked at the characteristics of great leadership and how this applies to the role of the practice manager. We discussed the communities who look to you for guidance; answers to some common FAQs from practice managers; your personal manifesto; the Karpman Drama Triangle; the Courtesy System; and *The Chimp Paradox*—overall, what it takes to be a leader, even when you do not feel like one (most of the time—as great leaders will tell you).

Management

The economic pundits suggest that franchises are the most successful business model in history, measured by financial return on investment. Franchises make more money because they are designed to create simple and repeatable systems which, if followed, will ensure success.

Business author Michael Gerber expanded on this in his award-winning 1995 book, *The E-Myth Revisited*. By sharing with his readers a parable—the story of Sarah's pie shop—Gerber was able to demonstrate that every business employs five basic management systems (with my dentistry examples):

- marketing systems—the way you get new patients in the door;
- patient journey systems—the way you care for and sell treatment to your patients;
- financial systems—the way you measure and analyse the money that flows through your business;
- operational systems—the way you make sure that things work and are compliant; and
- team systems—the way you hire, train, appraise, pay, promote, discipline and remove your people.

The role of the practice manager as head of systems is to ensure that all of these systems are in place and are followed to the letter—because if you do that, success follows.

Would it not be great if I could say so off you go then and finish this article now? Sadly, it is rarely that simple. What gets in the way? If a system is the wrong system, you will soon find out. That is why it is essential to have your systems constantly under review.

Think about how many systems became defunct after lockdown 1.0 and had to be adapted to our new working environment. The ability to change course quickly when external factors change is called "pivoting", and it is a sign of an agile business when it can pivot quickly. Many of us have learned all about pivoting and agility in the last 15 months. Those who have not are in trouble. As a manager, you have to equally be aware of internal changes in your business, whether systemic or the people you hire, and exercise the same degree of agility in changing course (or crew) should it be necessary.

For many years now I have shared a monthly management meeting agenda with my clients as a template for the questions they should be able to answer on a regular basis. Imagine this as a sea vessel taking a positional reading in order to determine whether it is on course. As you work through this agenda, ask yourself whether you have this information to hand and/or how quickly

you could lay your hands on it and whether you review this information with the practice owners at least monthly.

Marketing
1. Overall progress of annual marketing plan
2. Website review and analytics
3. Online reviews
4. Social media connection and engagement
5. Word-of-mouth patient referrals
6. Testimonials collected
7. Review of any advertising
8. General dental practitioner referral development (where relevant)
9. Return on investment from marketing spend
10. Treatment Co-ordinator (TCO) conversion statistics

The patient journey
1. Efficiency of online booking systems
2. Front of House (FOH) and telephony review of FAQs
3. Treatment Co-ordinator (TCO) analysis:
    1. Treatment delivered
    2. Pipeline management
    3. Patient referrals
4. End-of-treatment reviews
5. Membership plan sign-ups

Financial
1. Review of profit and loss statement for previous month and year to date
2. Twelve-month cash flow—comparison of budget versus actual
3. Analysis of key performance indicators against industry benchmarks
4. Average daily production of all fee earners
5. Profitability of fee earners

Operational
1. Clinical issues
2. Non-clinical issues
3. Operational issues
4. Governance and compliance
5. Clinical mentoring

Team
1. Review of overall team performance
2. Review of individual team members
3. Review of compensation systems
4. Review of daily huddles
5. Schedule of team meetings ahead
6. Training issues
7. Personal progress interviews

Strategy

For the sake of completeness (although not directly rated to this article), I would also add that practice managers should be invited to share their opinions on the overall strategic direction of the business—matters such as tactics for growth and market positioning moving forward.

As Gerber suggests in *The E-Myth Revisited*, even if you only ever trade from one location, you should build systems that are so robust and automated that you could safely open other practices, drop the systems into place and be rest assured that things would get done effectively and efficiently. Over the years, I have invested many hours in helping clients to build these systems and then train the team to operate them. Once my initial work is done, it becomes the remit of the practice manager to ensure their continuity.

The post-pandemic landscape

I am the first to admit that adherence to systems during the pandemic has been an order of magnitude more difficult than at any time previous. COVID-19 threw all of our systems in the shredder for a good while; we became the ultimate Zen businesses, living in the now and reacting on a daily basis to whatever was thrown at us.

My admiration for those who have survived this period knows no bounds. I have had many a conversation with long-suffering practice managers who have burned their candle at both ends and in the middle. But as I write this article at the very end of April 2021, I have a real sense that the world is slowly coming back to life and that, as lockdown eases, we shall see a return to that much quoted "new normal". It will never be the same as the world we left behind in 2019, but I do believe that we have learned many valuable lessons, both personally and professionally, along the way. Perhaps personally, we have learned to appreciate family, friends and fresh air. Perhaps professionally, we have learned that we are capable of much more than we imagine.

We must take the opportunity now to return to a systematic approach to business delivery, leaving little to chance and making sure that we are on course. The practice manager is the principle navigator in this.

In Part 3, I would like to visit the subject of teamwork: what makes an ideal team player and an ideal team, and how does the practice manager find and keep the right people?

about

Chris Barrow has been active as a consultant, trainer and coach to the UK dental profession for over 24 years. His main professional focus now is through his Extreme Business company, providing coaching and mentorship to independent dentistry around the world via face-to-face meetings, a workshop programme and an online learning platform.

"You cannot push people into digital dentistry"

An interview with Prof. Markus Blatz, chair of the Department of Preventive and Restorative Sciences

By Iveta Ramonaite, Dental Tribune International

Prof. Markus Blatz has always been excited about technological advancements in dentistry. However, he only uses dental technology when it is evidence-based and provides a true benefit for the patient.

It is safe to say that Prof. Markus Blatz has dedicated his life to the furthering of clinical and theoretical knowledge in order to advance dentistry. His passion for the dental profession is unmistakable and can be seen in his numerous degrees, professional awards and academic publications, among other achievements. In his current role, Blatz serves as chair of the Department of Preventive and Restorative Sciences and assistant dean for digital innovation and professional development at the University of Pennsylvania School of Dental Medicine in Philadelphia, US, where he founded the Penn Dental Medicine CAD/CAM Ceramic Center and is leading the Digital Innovation Initiative. In this interview, he discusses all things digital dentistry, including the CAD/CAM workflow, 3D printing and the use of artificial intelligence (AI).

Prof. Blatz, you've dedicated a large part of your life to dentistry and have received numerous teaching and research awards. What inspired you to start using digital technology in your clinics, and how happy are you with the results?

Innovative clinical protocols, new technologies and advanced treatment concepts that have a positive impact on patient care have always been at the center of my work, going back to my time at the University of Freiburg in Germany. A strong quest for clinical excellence and an excitement about new technological developments and materials, paired with a deep passion for teaching and research, motivated me to engage in digital dentistry and material research early on. However, I am not someone who always has to have the "latest and greatest" tools out there. For me, these tools need to provide

Dental students at the university are required to gain an in-depth experience with CAD/CAM technologies, and they happily embrace digital tools.

a true benefit for our patients and have at least some scientific support.

Current digital workflows, including intra- and extra-oral scanners and chairside and laboratory-based CAD/CAM systems, have reached a level of quality as good as or even better than conventional ones. Quality, accuracy and precision of fit achieved with digital tools are excellent and undergo constant improvements. Another key argument is the enhanced patient experience, for example, through intra-oral scanning, digital smile design or in-office restoration fabrication. Just ask patients which impression technique they prefer: digital or conventional rubber impressions. Also, using a scanner allows the rescanning of irregularities without having to remake the entire impression.

You are leading the Digital Innovation Initiative at the University of Pennsylvania's School of Dental Medicine. Could you tell us a bit about the initiative and your role in it?

As chair of the Department of Preventive and Restorative Sciences, I am responsible for the entire preclinical, clinical and postgraduate education in operative dentistry and prosthodontics. We are teaching a comprehensive care model that embraces all aspects of modern restorative dentistry, from caries control to complete dentures and implant-supported reconstructions. In my role as assistant dean for digital innovation, I developed and implemented a school-wide strategic plan for integrating new technologies in clinics, preclinical education, dental laboratory technology and research.

I believe that having experts in some central leadership positions is key to success. Soon after I had joined Penn Dental Medicine (PDM) in 2006, we hired a master dental technician from Germany who had extensive experience in CAD/CAM technologies. Together, we founded the Penn Dental Medicine CAD/CAM Ceramic Center, which is a unique industry-supported venture that focuses on digital planning, workflows and materials in dental laboratory technology. The appointment of a clinical CAD/CAM director to lead the training of students, residents and faculty with chairside CAD/CAM technologies has ensued more recently.

> "The COVID-19 pandemic has given digital dentistry, especially chairside restoration fabrication, a great boost."

In late 2019, we opened the Digital Design and Milling Center, a state-of-the-art facility featuring chairside digital technologies including scanners, design computers, milling machines and ceramic furnaces. In this center, there is a designated dental technician who assists dental students with the design and fabrication of restorations.

Novel learning technologies and pedagogies that recognise students' learning styles and preferences are also part of the digital innovation initiative. The PDM learning technology team, which I founded and supervise, includes curriculum designers and learning technology experts. The team is responsible for the development of blended e-learning/online curricula and continuing education courses, digital course manuals (iBooks), videos and modules for blended learning, examination software, MOOCs (massive open online courses) and "gamification" tools and for the integration of AI, virtual reality and haptic technologies. Virtual reality dental training simulators have been part of our educational programmes for many years.

"AI will soon become critical in aesthetic and functional planning and design and material selection, customised for each patient."

You've been actively involved in the initiative since Day One and have contributed greatly to its success. What are you most proud of, and did it live up to your expectations?
Definitely, I am most proud of our great team, staff, faculty and students. Despite initial hesitations about digitalising our workflows, undergoing intense training helped us realise that these tools make our work easier and more predictable. You cannot push people into digital dentistry, but you can show them why and how to use it and what the real benefits are.

It appears that the COVID-19 pandemic has given digital dentistry, especially chairside restoration fabrication, a great boost. In order to limit the number of times one has to change protective gear and clean the treatment area, dental professionals now carry out more procedures in one longer appointment. This means that it is now possible to fabricate indirect restorations in one such appointment. Additionally, the reduction of laboratory expenses is significant. However, the clinician can still choose to send the intra-oral scan files to an outside laboratory, so all previous options are still available.

The use of our Digital Design and Milling Center has been tremendous and exceeded even my wildest expectations. In fact, we are now fabricating between 70 and 80% of single-unit restorations from our student clinics with chairside CAD/CAM technology!

What are some of the state-of-the-art tools, techniques or software that you're using in the School of Dental Medicine, and how do they facilitate your work and that of your students?
The laboratory-based CAD/CAM Ceramic Center features multiple face and model scanners, three industrial five-axis milling machines that can mill a full spectrum of materials and types of restorations, and multiple sinter furnaces. There are several computer stations with professional 3D designing software that can design and fabricate pretty much any type of restoration, from single-units to tooth- and implant-supported full-mouth reconstructions. The centerpiece is newly developed virtual treatment planning software that produces digital wax-ups in a timely and predictable manner.

The Digital Design and Milling Center for in-office CAD/CAM technologies features 12 design computers and various software programs for planning, designing and milling restorations. There are ten high-speed milling machines and eight ceramic furnaces for firing and finishing restorations. Students learn to select, mill and finish the materials for their patients' restorations. Currently, we have 17 intra-oral optical scanners throughout the school's clinics, and we are expecting to receive more equipment soon, some of it updated.

Our goal is to scan every patient who comes to our clinics and to eliminate preliminary alginate impressions for the diagnostic cast. To that end, both centers are equipped with new 3D printers. We also incorporate digital files into electronic health records. This has various advantages, including the space-saving storage of diagnostic models and the fabrication of an identical restoration in the event of failure.

As a university that distinctly focuses on the sciences, all of the above facilities, tools, workflows and materials are being heavily used for research. Our studies cover the entire spectrum of modern restorative dentistry and CAD/CAM technology, with a special focus on the physical, optical and biological properties as well as the manufacturing of new materials. Students and residents engage greatly in our research activities, as evidence-based dentistry plays an integral role in our education, training, treatment planning and clinical care.

When entering our programmes, every student receives an iPad already equipped with the necessary documents, applications, software and files. One of these applications is dedicated to digital smile design in order to allow students to learn about dental and facial aesthetic parameters and, ultimately, include these in the treatment planning process, so that they are able to share planned smile designs and

Prof. Markus Blatz believes that digital dental technology is the way of the future and that the use of artificial intelligence will help further advance the field. *(All images: © Prof. Markus Blatz)*

prospective outcomes with the patient even before the treatment commences.

You would probably agree that it is crucial to educate dental students on the latest advancements in dentistry. What possibilities does digital dentistry open up for training dental students, and how ready and willing are your students to embrace digital technology?
Although many private practices may not have yet embraced digital dentistry, it is the way of the future. The predoctoral and postdoctoral curricula have been adjusted to require students to gain in-depth experience with CAD/CAM technologies. Digital tools are second nature to them, and they adapt to a virtual and digital environment with ease. Even first- and second-year students are already learning how to use intra-oral scanners and digital design in the preclinical simulation laboratories. Not only are they willing to engage but also, they are excited about these technologies and embrace them with enthusiasm.

You specialise in materials science, prosthodontics and aesthetic dentistry. How did the application of CAD/CAM-milled materials and 3D-printed materials redefine your own workflow?
I believe that 3D printing is the future of restoration fabrication in dental laboratory technology. One of our goals is to print a crown in various layers with different ceramics, translucencies and colours in order to truly replicate a natural tooth. At this time, however, subtractive manufacturing, such as milling, is the predominant fabrication technology in the digital CAD/CAM workflow. Despite current limitations, especially related to the accuracy, print quality and material options, 3D printing certainly has its place in the digital workflow, namely for the fabrication of occlusal splints, surgical guides, denture bases, provisional restorations and study models. In the future, 3D printing will likely be used for all types of materials and restorations, but we still have a way to go.

Would you like to add anything else?
Besides digital impression making and restoration fabrication, CAD/CAM technologies are increasingly used in the diagnostic and treatment planning stages. This includes technologies that detect caries, automatically read radiographs and collect patient information from CBCT, intra- and extra-oral scans and photographs in order to develop an individual treatment plan.

Also, AI is becoming more prevalent in automating many of these steps while removing subjective operator-related bias. AI will soon become critical in aesthetic and functional planning and design and material selection, customised for each patient. We will also use information technology to track and compare general and oral health data to better understand the pathology and prevalence of certain diseases. Merging these data sets and applying AI will enable us to understand disease like never before. It will also help us improve preventive measures and be more targeted in our efforts to better treat our patients.

Slow(er) dentistry in times of extra-fast digital technologies

Dr Gertrud Fabel, Germany

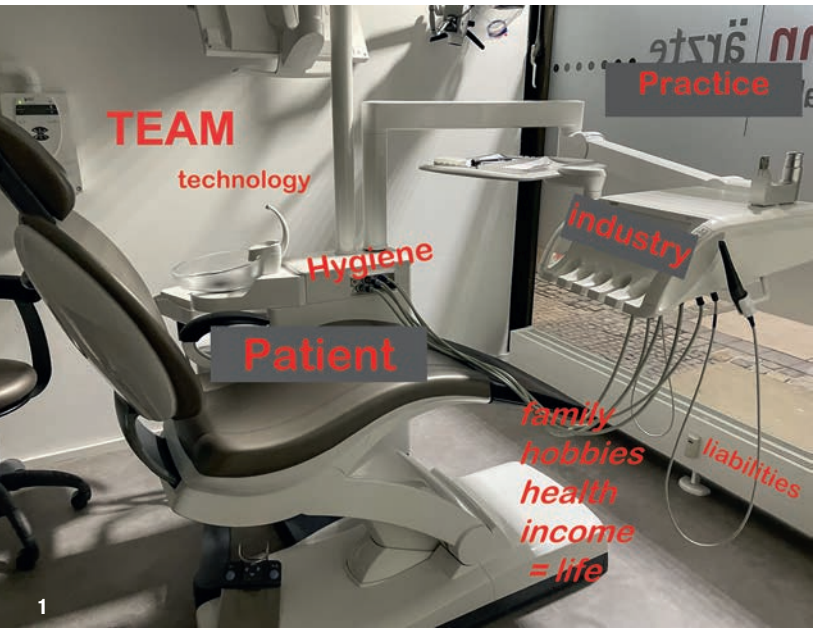

Fig. 1: An intense workflow in the dental office might be overwhelming.

The last few years have been characterised by enormous technical progress in dentistry, especially with regard to digitisation. However, the vast majority of processes in dentistry are just the translation of analogue processes into digital ones. The main goal behind all efforts it seems is making treatment more comfortable for the patient and faster for the dentist.

Depending on the different practice structures, dentists reach this goal with more or less investment in new technologies, followed by a high expenditure of time in the effort to integrate the new processes into the teams' routines. Many of us are somewhere between learning new techniques, integrating these into workflows, being successful and offering the highest possible benefit for the patient (Fig. 1).

For many years, digitisation in dentistry progressed with chairside dentistry, which is still connected to the CEREC system (Dentsply Sirona). Today, digitisation in dentistry means being perfectly in time in terms of workflows, (wo)manpower and use of machines. Only the best possible balance of all the technical components allows the dentist to deliver a restoration within the planned time. And it is not only the dentist's time which counts; demanding patients have the highest expectations regarding how little time they will spend in the practice. Acceleration of software, "saving clicks", was one of the issues which seemed to be a guarantee of greater speed, while production time was a constant. It meant for the dentist and the dental assistant in many cases hurrying between treatment rooms and the in-office laboratory. In order to bridge the time between processing and post-processing, patients have to wait in the practice (or go out for a short walk), while the dentist takes care of another patient, is attending to an emergency case, is in the hygiene room or is finishing the crown herself or himself.

In 2018, the Slow Dentistry movement arose in Switzerland and demanded, for example, longer appointments to allow for sufficient hygienic measures, treatment and patient care.

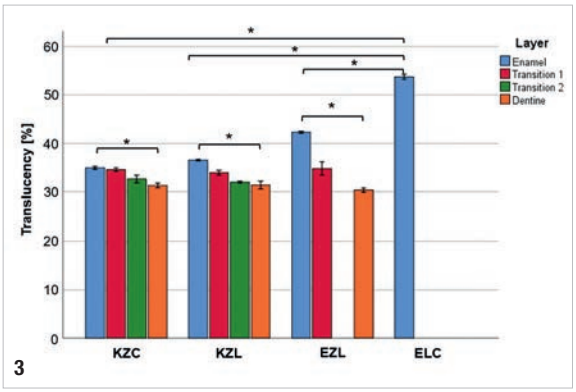

Fig. 2: The milling results (left: extra-fine; right: superfast). **Fig. 3:** This research showed that lithium disilicate was more translucent than the zirconia material used.[1] KZC = KATANA Zirconia Block STML; KZL = KATANA Zirconia STML; EZL = IPS e.max ZirCAD Prime; ELC = IPS e.max CAD. **Fig. 4:** Milled restoration.

The industry offered some workflows in chairside dentistry, which promised to save minutes with quicker software and shortening of milling time and firing processes. Using the best possible tools can save time, but involves investment to a greater or lesser extent. Would a new ceramic material and a new milling unit together translate to a quieter workflow in patient treatment and not lead to a loss of mechanical quality and/or optical results of the restoration? Moreover, is there a way to be mindful of ourselves?

This article tries to find an answer to both of these questions after using monolithic zirconia and a new lithium disilicate in a fast milling process, followed by speed sintering or speed firing post-processing in our practice.

In autumn 2019, Dentsply Sirona brought the new CEREC Primemill milling unit into our technical laboratory, and at about the same time, we joined a research project with the prosthodontics department of the Ludwig-Maximilians-Universität München in Germany on the process of speed sintering of zirconia in the CEREC SpeedFire furnace (Dentsply Sirona). This coincidence gave us the opportunity to test the idea of a more concentrated, shorter chairside workflow concerning the following questions:

– Is superfast milling an option for us in terms of fissure details and precision of the crown margins?
– Are the optical and mechanical properties of zirconia comparable with those of lithium disilicate?

To these questions was added: is the new lithium disilicate CEREC Tessera (Dentsply Sirona) an option for us concerning the shortest firing time of all ceramics (about 4 minutes)?

Properties of superfast-milled zirconia

The quality of a crown has to be considered in terms of dental health, such as margin quality, occlusion and internal fit, as well as in terms of personal taste, such as fissure details and colour. The last two points could be parameters of different pricing, play a role in the general economic framework of a practice or be decided from case to case. CEREC

Table 1: Comparison of the fracture load of crystalised lithium disilicate ceramic and zirconia.

Material		MW ± SD (N)	95% CI (N)	Weibull modulus (95% CI)
KATANA Zirconia Block STML	Initial	4,638 ± 655	(4,222; 5,054)	7.8 (4.3; 14.1)
	Aged	3,949 ± 1,283	(3,134; 4,764)	3.2 (1.8; 5.8)
KATANA Zirconia STML	Initial	4,574 ± 776	(4,081; 5,067)	6.2 (3.4; 11.3)
	Aged	3,535 ± 740	(3,065; 4,006)	5.5 (3.1; 10.0)
IPS e.max ZirCAD Prime	Initial	5,038 ± 910	(4,460; 5,616)	6.6 (3.6; 11.9)
	Aged	5,040 ± 911	(4,462; 5,619)	7.8 (4.3; 14.0)
IPS e.max CAD	Initial	2,522 ± 745	(2,049; 2,996)	3.5 (1.9; 6.2)
	Aged	1,999 ± 394	(1,735; 2,264)	5.2 (2.8; 9.6)

Primemill's superfast milling mode works only for the smallest block size, and it needs a thickness of the crown margin of 100 µ. It has to be planned in advance, since it requires special instruments. The dental assistant changes the burs and allows the mill to perform the pre-touch of the zirconia block to calibrate the milling process. Only with these steps done can the crown be milled in 4–5 minutes. Compared with the extra-fine mode, the time-saving is about 13–14 minutes. Speed sintering takes about 15 minutes, more or less the same time saved in using the quick milling mode. The milling results are shown in Figure 2. The margins and a very good circular fit of the crowns show promising accuracy on models as well as in clinical situations.

Properties of speed-sintered multilayer zirconia

In order to determine whether we could integrate zirconia into our chairside workflows, we had the opportunity

Figs. 5a & b: Example of milled restoration covering discoloured tooth. Before **(a)** and after **(b)**.

Table 2: Comparison of the overall production time of KATANA Zirconia STML, IPS e.max CAD and CEREC Tessera.

Material	Milling mode	Milling time	Sintering/firing time	Post-processing time: Glazing	Post-processing time: Polishing	Total time
KATANA Zirconia STML	Superfast	4.5 min	18 min	18 min	3 min	25.5–40.5 min
	Extra-fine	17.5 min	18 min	18 min	–	53.5 min
IPS e.max CAD	Superfast	4.5 min	18 min	18 min	–	40.5 min
	Extra-fine	17.5 min	18 min	18 min	–	53.5 min
CEREC Tessera	Extra-fine	17.0 min	–	(Spray) 4.5 min	–	21.5 min

to investigate and compare the mechanical and optical properties of a novel strength- and colour-gradient multilayered zirconia and the impact of conventional and high-speed sintering.[1] In comparison with the crystalised lithium disilicate ceramic IPS e.max CAD (Ivoclar Vivadent), the following zirconia materials were analysed concerning fracture load with and without chewing simulation and concerning two body abrasive wear and translucency: the high-speed-sintered KATANA Zirconia Block STML (4Y-TZP; Kuraray Noritake Dental), the conventionally sintered KATANA Zirconia STML (4Y-TZP, disc; Kuraray Noritake Dental) and the conventionally sintered IPS e.max ZirCAD Prime (5Y-TZP/3Y-TZP, disc; Ivoclar Vivadent).

A master crown was scanned (CEREC Primescan, Dentsply Sirona) and reconstructed in BioCopy mode in CEREC Software 5.1 (Dentsply Sirona) to copy the master crown design, and KATANA Zirconia Block STML was milled in the CEREC MC XL milling unit (Dentsply Sirona). The 24 crowns were high-speed-sintered at 1,560 °C for 19 minutes (CEREC SpeedFire); the sintering parameters were generated automatically during milling. Translucency was measured in geometric specimens of 1 mm in thickness made out of the different layers of zirconia materials and lithium disilicate within the polychromatic zirconia as well as in comparison with IPS e.max CAD LT.

We found that all the zirconia groups showed a higher fracture load than lithium disilicate initially and after ageing simulation and that the high-speed-sintered KATANA Zirconia STML showed a higher fracture load after chewing simulation than initially but a lower Weibull modulus (Table 1).[1] We also found that lithium disilicate was more translucent than the zirconia material in this research (Fig. 3).[1]

Properties of the advanced lithium disilicate CEREC Tessera

Since March 2021, another lithium disilicate material has been available for CEREC users: CEREC Tessera is a strong glass-ceramic with 700 MPa biaxial tensile strength. The block is made of a new material that includes virgilite, a lithium aluminium disilicate that makes up about 10% of the volume. New virgilite crystals form during firing and are embedded in a zirconia-enriched glass matrix.[2] The post-milling processing requires glazing and in the preheated CEREC SpeedFire furnace (400°) takes only 4.5 minutes.

To the author's knowledge, there is no publication comparing optical or mechanical properties of other lithium disilicate products (IPS e.max CAD) or lithium silicate (Celtra Duo, Dentsply Sirona). The first results in the author's practice showed nicely milled margins and translucent optics

Figs. 6a & b: Example of milled restoration used in geriatric dentistry. Before **(a)** and after **(b)**.

Figs. 7a & b: Example of milled restoration when a faster milling time allows chairside delivery of crowns with demanding optical requirements. Before **(a)** and after **(b)**.

(Fig. 4). More experience, as well as *in vitro* and *in vivo* research, is required.

In a comparison of the overall production time of three different materials (KATANA Zirconia STML, IPS e.max CAD and CEREC Tessera) milled and fired in CEREC Primemill and CEREC SpeedFire, CEREC Tessera was the fastest, followed by zirconia sintered and polished (the time needed for staining and glazing was not considered; Table 2).

Assuming the fact that it is not economical to change the treatment room and/or patient for 20 minutes or less, CEREC Tessera and polished zirconia are materials which can be used for true chairside dentistry. Disinfection and a complete hygiene protocol for the room take at least 15 minutes. In other words, it not only is more courteous, but also makes economic sense to just stay and talk to your patient than to hurry into the next treatment. Having your patient leave the treatment room during processing of the crown also means having more instruments to clean. It could be a nice idea for the dentist to grab a cup of coffee while the patient remains in the treatment room, giving the patient the opportunity to relax.

Is it possible to have sufficient time for your patient, for yourself, to slow down and yet be as productive as before only by choosing different materials and another milling unit? It is not that simple, but requires some preparation in advance, such the exact choice of material, preparation of the milling unit and insertion of the correct burs, and preheating of the oven (CEREC Tessera). This system is closed; firing parameters are automatically generated beginning when the mill button is pushed after construction of the restoration in the CEREC software so that mistakes can be avoided. Despite all the possibilities and deliberation, we did not succeed in fulfilling our expectations concerning the time in every case, but we ended up integrating a broader spectrum of material into our chairside offering—zirconia is no longer *only* a laboratory product.

New materials with promising properties are worth trying, for example polychromatic zirconia for veneers. The new ceramics which fall under the zirconia family have very different material properties and can be used in very different ways, although their translucency is not as high as that of lithium disilicate restorations. Hence, in some cases, this is exactly what is needed to cover a discoloured tooth (Fig. 5) or in geriatric dentistry (Fig. 6). A faster milling time allows chairside delivery of crowns with demanding optical requirements (Fig. 7), when complex staining and glazing procedures need more than one firing process. If future studies confirm our results on optical and mechanical behaviour, the 4.5-minute firing time of CEREC Tessera will lead to the fastest chairside process—almost too good to be true. Both translucent polychromatic zirconia and CEREC Tessera can be milled or ground with reduced wall thickness (1 mm) and need to be bonded with an adhesive technique.

The first two decades of digital dentistry were synonymous with CEREC and chairside treatment, but now besides the many scanners available, there are many possibilities in manufacturing of restorations. Exact timing and increasingly demanding patients, not to mention the highest standards of hygiene, make chairside treatment sometimes a great challenge and stressful if one of the variables fails. All of this demands durable, hygienically impeccable technical components and equipment. If this cannot all work chairside, then we have to export the case and make a provisional restoration.

Conclusion

Beginners might be overwhelmed and need support when they first start practising digital dentistry if analogue pathways remain the norm in university education. Finding the right solution concerning equipment but also workflows and material is crucial for the clinician's personal success, confidence and mental health, as well as for the clinical result and the patient's needs.

Conflict of interest

I confirm that there is no actual or potential conflict of interest in relation to this article.

Editorial note: A list of references is available from the publisher.

contact

Dr Gertrud Fabel MSc (clinical dental CAD/CAM), is a CEREC mentor and certified Institute of Specialist and Cosmetic Dentistry trainer.
She regularly collaborates on research and publications with universities in Munich and Greifswald in Germany and lectures and offers training nationally and internationally.
Dr Fabel has been in private practice in Munich since 1998.
She can be contacted at dr.gertrudfabel@gmail.com.

Digital workflow for colour verification of indirect anterior restorations

Dr Les Kalman, Canada

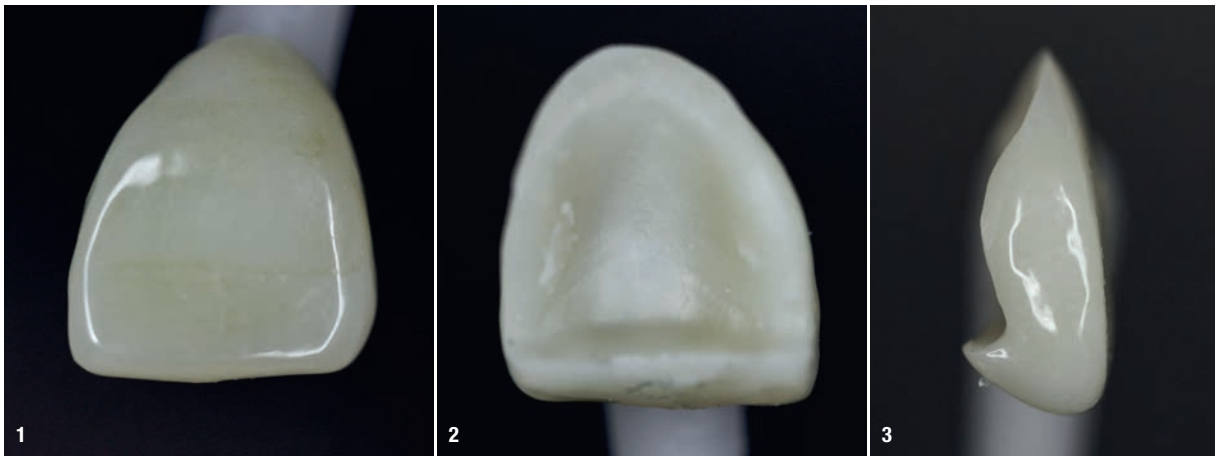

Fig. 1: Zirconia veneer facial surface. **Fig. 2:** Zirconia veneer internal surface. **Fig. 3:** Zirconia veneer proximal surface.

Introduction

Dentistry is experiencing a continuous and rapid evolution into a digital platform,[1] as an increasing number of clinic procedures can be completed with the aid of technology.[1] Digital dentistry provides many benefits to the clinical workflow, including increased efficiency,[2] reduced environmental impact,[3] and a more acceptable approach for the clinician and patient,[2] especially in light of specific restrictions related to COVID-19.[4]

Combining the digital dentistry platform with recent advances in dental materials provides improved predictability of procedures,[5] especially in challenging anterior aesthetic cases. Zirconia has traditionally been used in posterior regions[6] owing to its very high strength.[6] However, zirconia may also be used in the anterior regions for veneers (Figs. 1–3)[7] and crowns (Figs. 4–6), as it exhibits high strength and translucency and requires minimal preparation.[7]

Although many aspects of dentistry have benefited from a transition to digital methods, others remain grounded in dated and historic approaches.[8] One specific clinical procedure is that of colour verification of indirect restorations. Digital dentistry can facilitate virtual impressions, digital design and output, but the verification of colour is

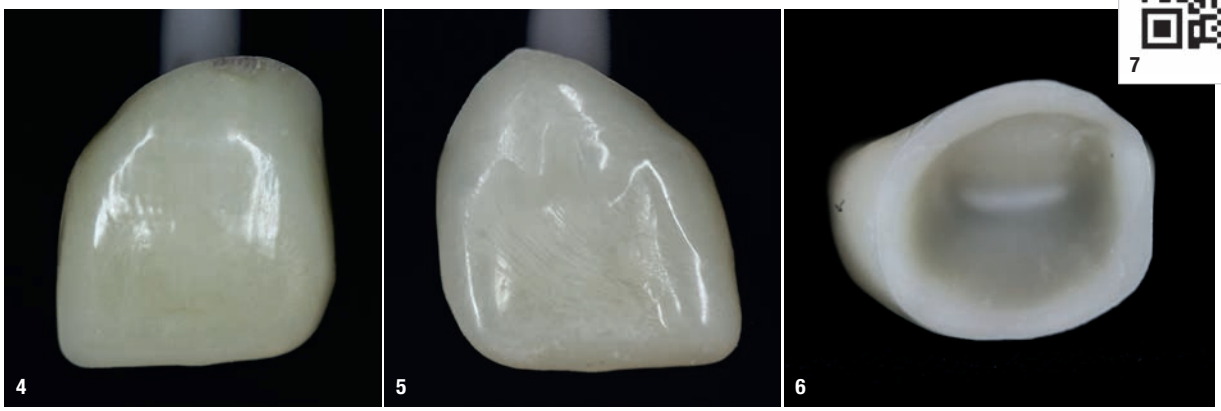

Fig. 4: Zirconia crown facial surface. **Fig. 5:** Zirconia crown lingual surface. **Fig. 6:** Zirconia crown internal surface. **Fig. 7:** Novel workflow demonstration video.

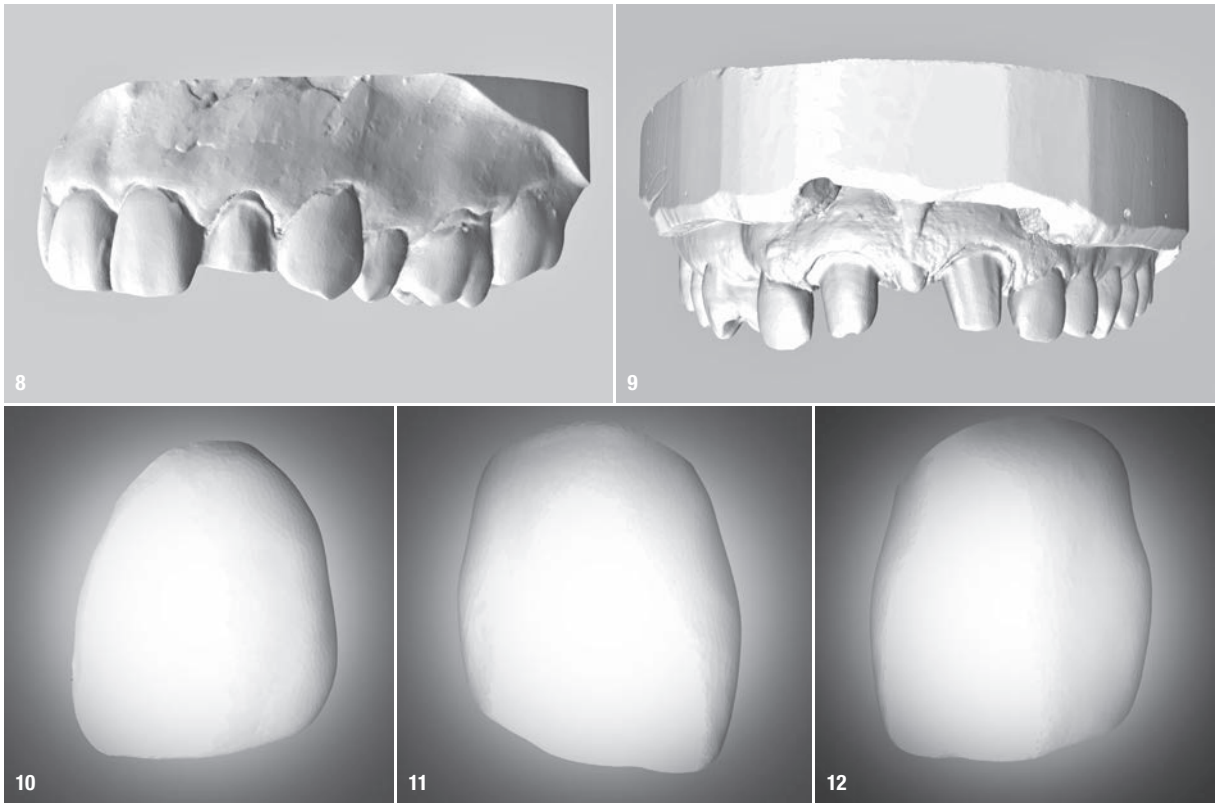

Fig. 8: Digital model for veneer. **Fig. 9:** Digital model for crown. **Fig. 10:** Veneer STL file. **Fig. 11:** Crown for tooth #11 STL file. **Fig. 12:** Crown for tooth #21 STL file.

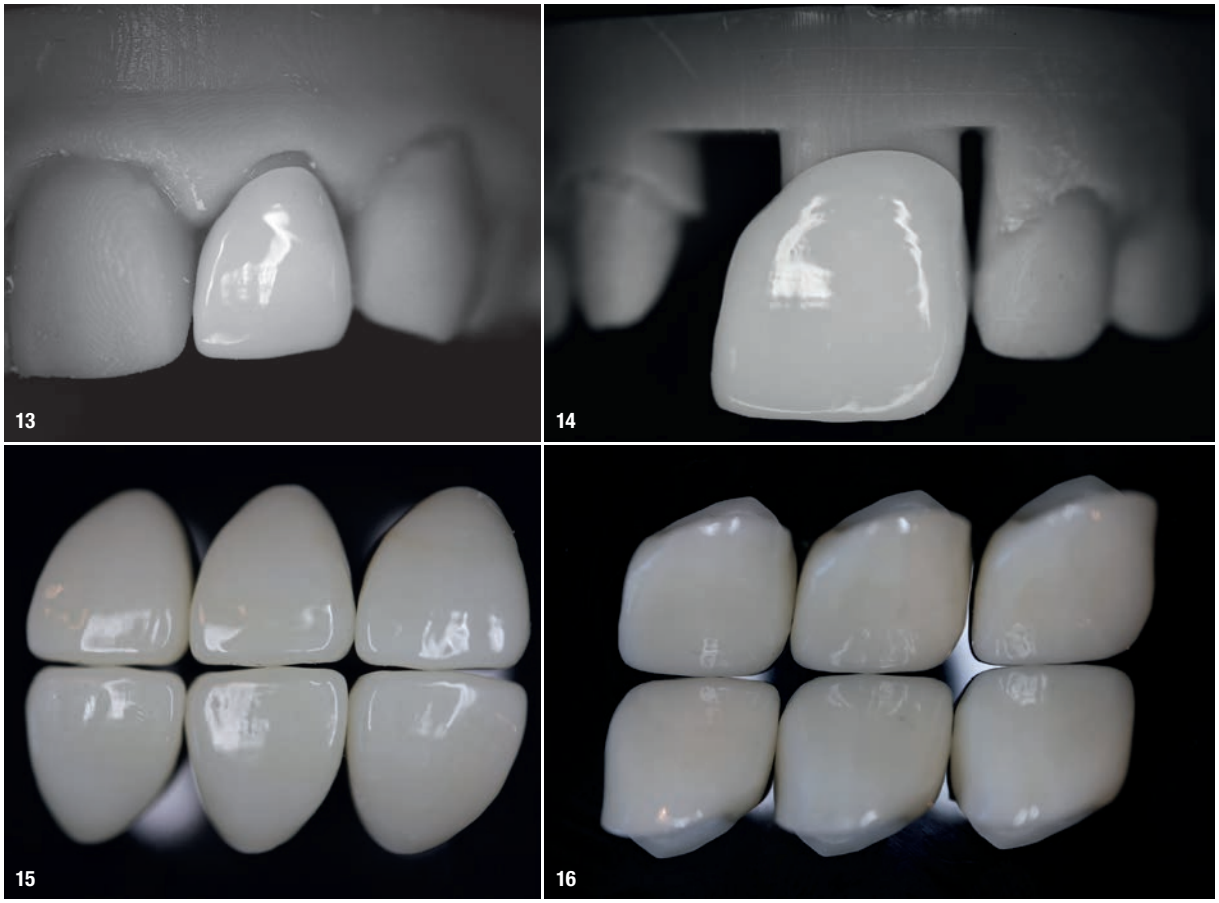

Fig. 13: Zirconia veneer. **Fig. 14:** Zirconia crown for tooth #21. **Fig. 15:** Zirconia veneers. **Fig. 16:** Zirconia crowns.

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Fig. 17: Digital workflow. **Fig. 18:** Digital workflow software.

still typically completed with an intra-oral assessment. This subjective approach can prove timely and costly, as it is a procedure that requires chair time and possible local anaesthetic. If the colour is inaccurate, which occurs about 49% of the time in dental schools,[9] it can prove frustrating for the clinician and patient.

This investigation presents a novel digital workflow (Fig. 7) for the colour verification of indirect anterior restorations, specifically zirconia veneers and anterior crowns, as an *in vitro* study.

Materials and methods

Master models for a single veneer for tooth #22 (Fig. 8) and full crowns for teeth #11 and 21 (Fig. 9) were digitally scanned (Straumann CARES 3, Straumann). A veneer for tooth #22 and full zirconia crowns for teeth #11 and 21 were digitally designed using dental software (exocad) by a dental technician and exported as STL files (Figs. 10–12). The files for the veneer for tooth #22 and the crown for tooth #21 were transferred to a commercial laboratory (Glidewell) for the fabrication (Figs. 13 & 14; BruxZir Esthetic, Glidewell). The laboratory prescription requested six identical units of the tooth #22 veneer (Fig. 15) and six identical units of the tooth #21 full crown (Fig. 16) to be fabricated and finalised in Shade A1 with graduations identical to the VITA shade tab. Once completed, the units were shipped, unpackaged and assessed.

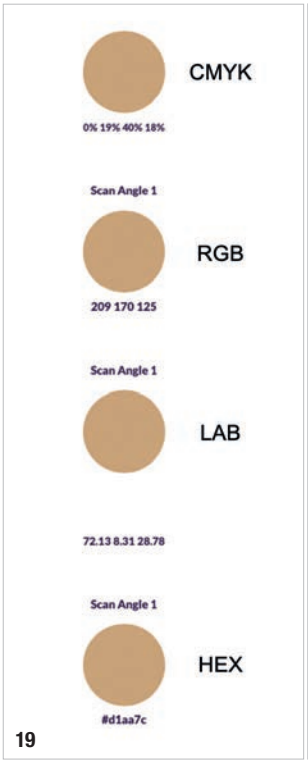
Colour verification was completed using a novel digital workflow (Fig. 17). The software (Fig. 18; Smile Shade) was opened on an iPad and paired with the wireless Bluetooth sensor. The sensor contacted the tooth and recorded the colour and then transmitted the information to the iPad, which provided a colour description. The entire process required about 3 seconds to complete (Fig. 7). The determination of colour was expressed in cyan, magenta, yellow and key (CMYK); red, green and blue (RGB); lightness, redness vs greenness, yellowness vs blueness (LAB) and hexadecimal numbers (HEX) which are all different means of describing colours objectively. The shade tab was colour identified using the novel digital workflow. The same procedure was applied to identify the colour of the six tooth #22 veneers and the six tooth #21 crowns.

Results

The colour identification of the VITA shade tab is displayed in Figure 19. The colour identification of the six zirconia veneers is displayed in Figure 20 and the six anterior crowns in Figure 21. The colour of the veneers

> “Colour verification was completed using a novel digital workflow. The software (Smile Shade) was opened on an iPad and paired with the wireless Bluetooth sensor.”

Fig. 19: Colour identification of the VITA A1 shade tab. CMYK = cyan, magenta, yellow and key; RGB = red, green and blue; LAB = lightness, redness vs greenness, yellowness vs blueness; HEX = hexadecimal numbers. **Fig. 20:** Colour identification of the zirconia veneers. CMYK = cyan, magenta, yellow and key; RGB = red, green and blue; LAB = lightness, redness vs greenness, yellowness vs blueness; HEX = hexadecimal numbers. **Fig. 21:** Colour identification of the zirconia crowns. CMYK = cyan, magenta, yellow and key; RGB = red, green and blue; LAB = lightness, redness vs greenness, yellowness vs blueness; HEX = hexadecimal numbers.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LAB
65.69 8.50 7.54
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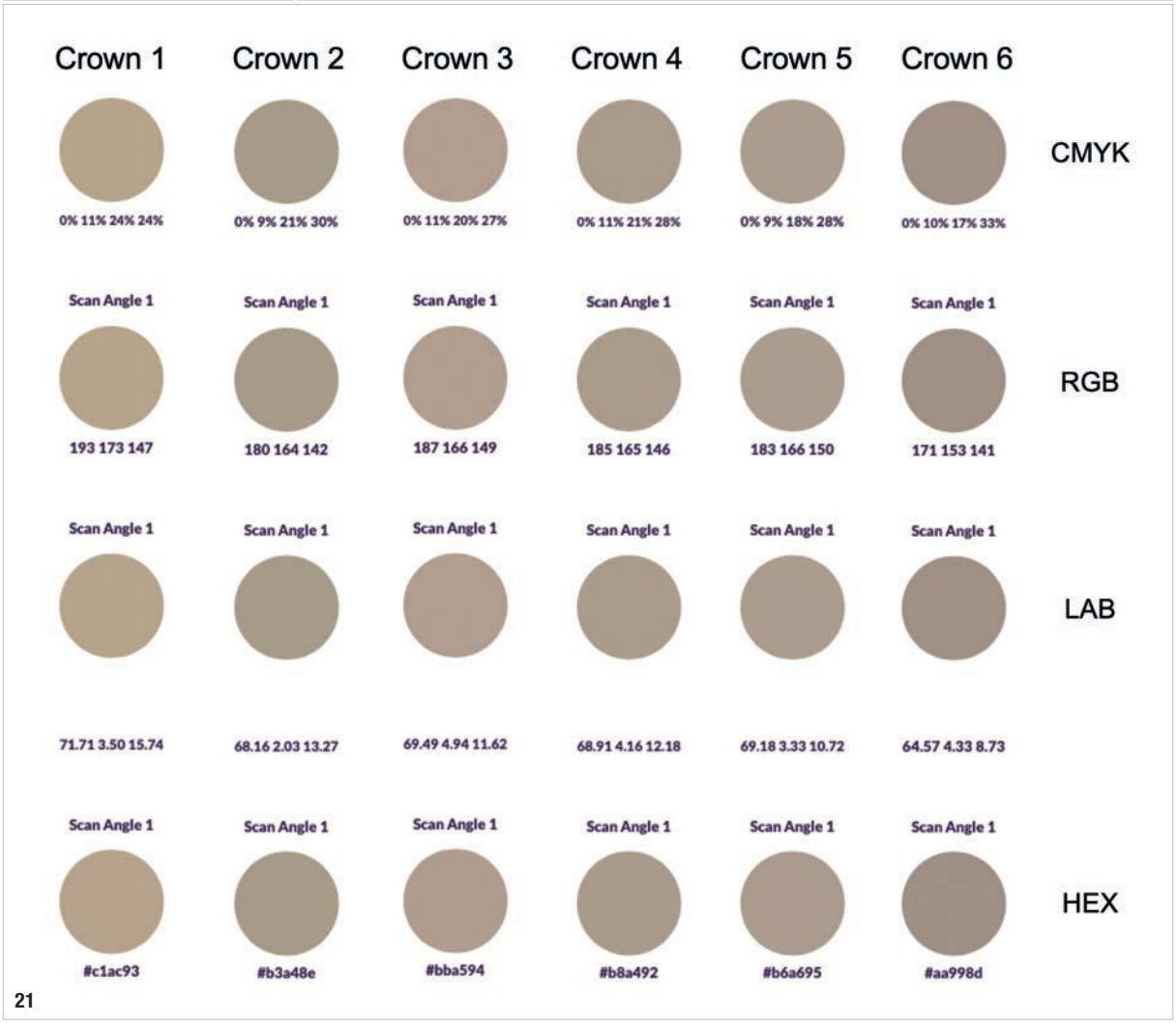
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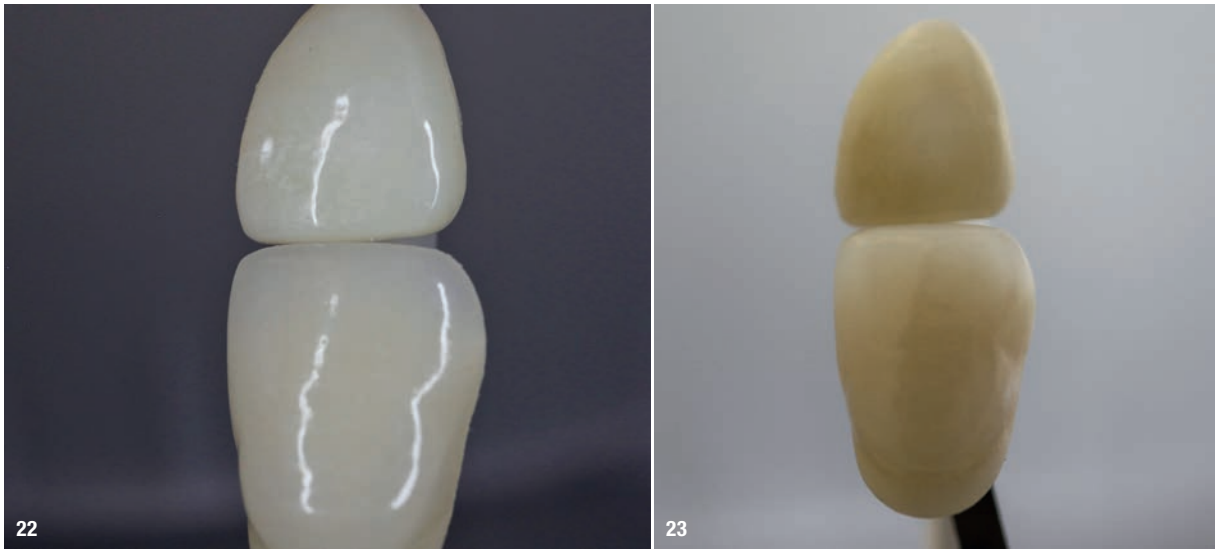

Fig. 22: Zirconia veneer with shade tab and LED light. **Fig. 23:** Zirconia veneer with shade tab and no LED light.

displayed mild variability between the six units and variability with the shade tab. The colour of the six crowns were quite consistent, but varied from the shade tab.

Discussion

The digital workflow indicated a difference in colour between each veneer, between each crown and between the indirect restorations and the shade tab. Whether the colour difference is of clinical significance will depend on the decision of the clinician and patient.

The identification of colour in dentistry can be a challenging endeavour, as it is affected by several variables.[10] Even external light may influence the colour. Figures 22 and 23 depict the zirconia veneer next to the shade tab, one with an LED ring light and one without, respectively. Similarly, Figures 24 and 25 depict the zirconia crown next to the shade tab, one with the LED ring light and one without, respectively. Although the same shade tab (A1) is present in all four images, the colour of the shade tab and the restorations may appear different.

The novel digital workflow functions with a very high dynamic range micro colour sensor that has an automatic temperature control and an inter-device repeatability of < 1 ΔE, (ΔE represents the distance between two colours), which illustrates that the software can detect very subtle changes in colour. It is a very accurate method for colour identification and verification, using a different method to describe dental colour with

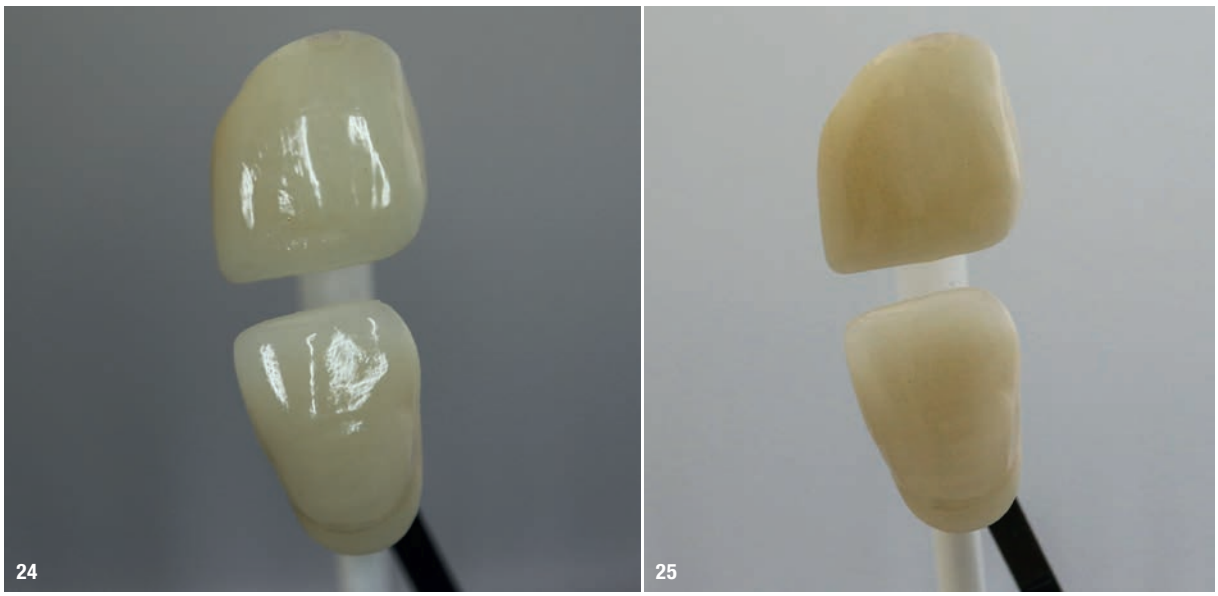

Fig. 24: Zirconia crown with shade tab and LED light. **Fig. 25:** Zirconia crown with shade tab and no LED light.

> “The novel digital workflow (…) provides a simple, efficient, accurate, objective and safe manner to verify the colour of indirect anterior restorations with the hopes of reducing errors.”

coordinate systems. A recent study indicated that shade selection with photographs indicated a ΔE < 3.7, as a comparison.[11]

The author suggests that the clinician should employ the novel digital workflow to identify the colour of a desired indirect restoration and then use it to verify that the desired colour has been used on the delivered indirect restorations. Technicians could also employ the workflow by requesting that clinicians use accurate and objective colour identification and by verifying that they have employed the appropriate colour in definitive restorations as requested. Maintaining clear and objective communication between clinicians and technicians would promote predictability of indirect restorations.

Modifications to the software are in progress that will enable the colour identification output to be expressed in common dental language, such as VITA, zirconia and lithium disilicate. Colour identification is not limited to enamel colours, but includes pink shades of soft tissue. Further research is required through a clinical case and a comparison study.

Conclusion

The verification of colour of indirect restorations remains a critical aspect of dentistry. The process can be timely and costly, especially with COVID-19 restrictions. The novel digital workflow presented provides a simple, efficient, accurate, objective and safe manner to verify the colour of indirect anterior restorations with the hopes of reducing errors.

As the spectrum of digital dentistry expands, alternative clinical technologies are being developed to maximise accuracy and efficiency while minimising the environmental impact and still maintaining the highest standard of patient care.

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This project could not have been completed without the support of several individuals and organisations. The author would like to thank Pavel Belenkov for his amazing assistance with the scanning and the digital design of the prosthetic units, Glidewell for providing the BruxZir zirconia veneers and crowns and the 3D-printed master models, Research Driven, Red Square Labs for software development, Palette for collaborative support, WORLDiscoveries, and Schulich Dentistry for internal funding to support this investigation.

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about

Dr Les Kalman is academic lead for continuing dental education and assistant professor of restorative dentistry at the Schulich School of Medicine and Dentistry of Western University in London in Ontario in Canada. His research focuses on innovations in medical devices and technologies, with an emphasis on additive manufacturing; software solutions and education advancement. He remains active in externally funded research, has published over 40 articles, holds two patents and a trademark, and has translated several technologies to industry.

He served on the board of directors of the University of Western Ontario Faculty Association and the Canadian Association of Public Health Dentistry. He serves on the Standards Council of Canada, the Ambassadors Circle and the Advanced Credentials Committee of the International Congress of Oral Implantologists. He is an academic associate fellow of the American Academy of Implant Dentistry; a fellow, master and diplomate of the International Congress of Oral Implantologists; and a fellow of the Academy of Osseointegration and of the American College of Dentists; and received the Schulich School of Medicine and Dentistry Alumni of Distinction Award and the Merck Patients First Award.

contact

Dr Les Kalman
HSA 31
Schulich School of Medicine and Dentistry
Western University
1151 Richmond St
London ON N6A 3K7
Canada

ljkalman@icloud.com

Magical All-on-4

Dr Stanko Miletic, Dr Ivan Miletic & Pavel Metelka, Croatia & Czech Republic

Fig. 1: Successful treatment results from the past with our aesthetic implant workflow.

Surgeon Stanko Miletic takes care of an effective implant treatment as a base for the prosthodontic treatment performed by dentist Ivan Miletic, who also registers the individual information of the patient for the dental technician Pavel Metelka, who digitally produces the final restoration. The digital data is stored in case of future patient services.

We have been performing full-arch or full-mouth restorations in this manner for the past eight to ten years. Just in the past three to five years, we have treated over 400 cases together in this way, most of them with the All-on-4 technique with an immediate loading protocol (Fig. 1). As material, we primarily use Ceramill PEEK White (Amann Girrbach) for the substructures, combined with single zirconia crowns made from Zolid FX Multilayer (Amann Girrbach). The crowns are cemented to the PEEK substructure, and for the anterior region, we always perform a little cut-back for an aesthetic flourish. The gingiva is layered with pink composite. In some cases, we use a selective laser melted substructure veneered with composite.

In this article, we will present a prosthodontically driven case to demonstrate the importance of team communication between surgeon, prosthodontist and dental technician. Only good team communication leads to a functional and aesthetic result. The case involved a full-mouth All-on-4 rehabilitation with immediate loading using screw-retained bridges with a PEEK substructure combined with all-ceramic single crowns. We will present each phase of the aesthetic implant workflow, from surgery to prosthodontics and the laboratory work.

Initial situation

The patient came to our office with a denture in the maxilla which he had had for more than 30 years. His teeth

Figs. 2 & 3: The patient—photographic documentation of the initial situation.

and an old bridge in the lower jaw were failing owing to periodontal disease and massive bone loss (Fig. 2). The patient wished to be able to smile again with confidence and to have a fixed, functional and aesthetic treatment. We captured initial panoramic images and decided to restore both jaws with the All-on-4 surgical protocol with immediate loading of the dental implants.

The treatment of each All-on-4 case starts with image capture (Fig. 3) and planning of the definitive restoration. In this phase, we talk very intensely with the patient to see what problems he or she had in the past and what wishes he or she has for his or her future restoration. In this first phase, we also take the initial impressions, the facebow and bite registration of the initial situation, the height registration, digital panoramic images and CBCT scans in order to plan the surgery and prosthetic steps of the case.

Implant placement

In this case, we used the All-on-4 technique to restore the edentulous upper jaw. On the CT scan we captured before the surgery, we saw that the patient had very thin bone in the maxilla. Our initial plan was to start with bone augmentation of the maxilla and then proceed later with placement of dental implants. In our first consultation with the patient, he made clear that he was not willing to undergo bone augmentation surgery. He wanted a solution without bone augmentation and with the least possible amount of surgery. After a review of the bone situation in the maxilla, we decided to implement the All-on-4 approach with the NobelSpeedy Groovy implant system (diameter: 4.0 and 3.3 mm; Nobel Biocare) to solve this case.

The surgery is a very important part of this protocol. There are certain steps that need to be fulfilled to establish an ideal situation for the prosthodontist and for the dental technician, including during diagnostics and planning, bone and soft-tissue remodelling, implant placement, restorative and aesthetic space creation, placement of multi-unit abutments and suturing. Only those who consider these steps will have a fast and easy surgery with great results and good long-term stability of the dental implants (Figs. 4 & 5). Similarly, choice of

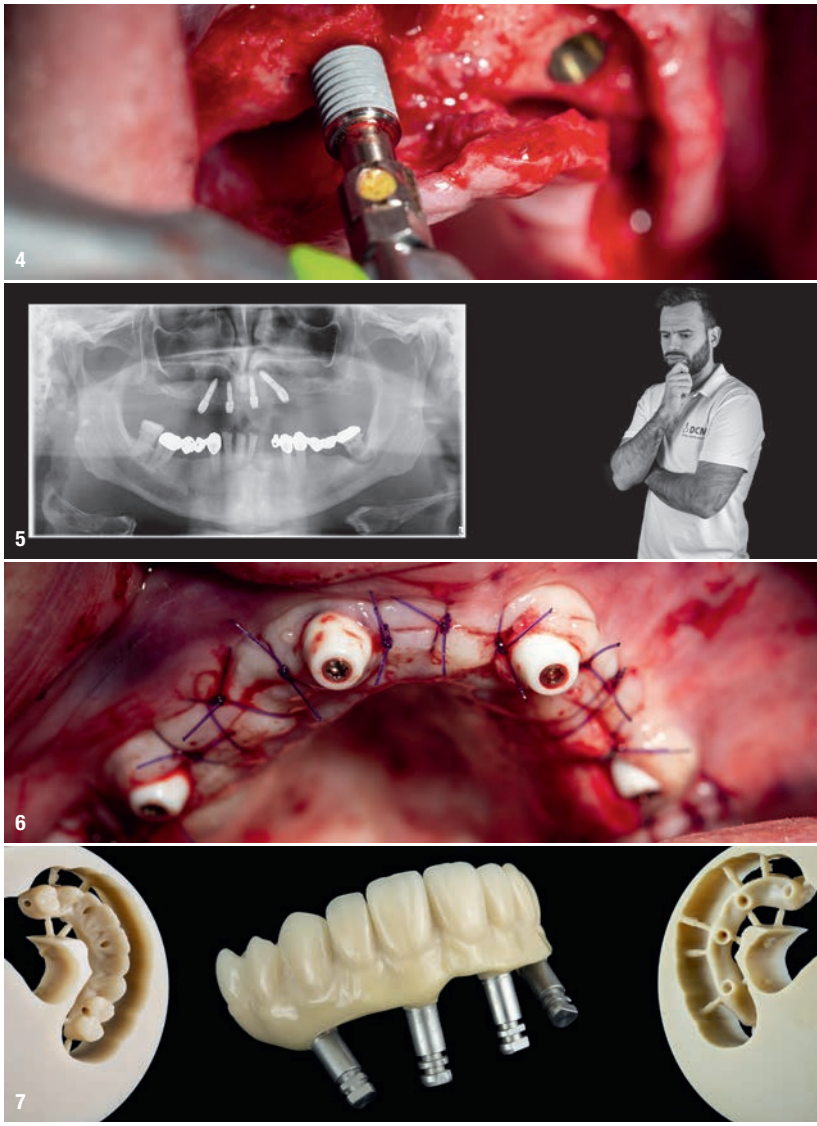


Fig. 4: Surgical procedure, placement of implants. **Fig. 5:** CT scan after the surgical insertion of the four implants. **Fig. 6:** Result immediately after surgery. **Fig. 7:** Alpha-bridge: initial temporary design.

Fig. 8: Facebow registration with the Artex facebow.

implant system and implant surface, considering how it affects primary stability and stress distribution, is very important for immediate loading of non-osseointegrated dental implants.

Prosthodontic planning

As soon as the surgery is finished (Fig. 6), we capture the impression, height and facebow registration immediately. We consider our design of the definitive restoration in the so-called alpha bridge, the initial—temporary—design (Fig. 7). This part is very important, as we can test the new height, function and aesthetics of the first design. We use Ceramill TEMP Multilayer (Amann Girrbach) for the alpha bridge; everything is done at the level of the multi-unit abutment.

After three to four months, we capture a digital panoramic scan for control and perform a percussion test of the dental implants. We then start to plan the definitive restoration. One important thing we consider in the planning is the feedback from the patient regarding the alpha bridge.

We perform the bite and facebow registration of the alpha bridge with the Artex facebow (Amann Girrbach; Fig. 8). Afterwards, we send the temporary bridge and bite and facebow registration to the dental laboratory for articulation and scanning.

Creating pictures of the patient is a great way to check the planned final aesthetics on the screen (Fig. 9). We first go through the aesthetic and functional checklist with the patient and review the aesthetics later in the pictures. Adjustments are made in the design software as needed to gain the optimum aesthetic result. After the CAD is done, we proceed to milling the beta bridge in the Ceramill Motion 2 (Amann Girrbach) using Ceramill TEMP Multilayer. We use the beta bridge as a final try-in before we start to design the definitive restoration. Also, in this process step, we take pictures of the patient and ask him or her about the look and feel of the adjusted restoration. If everything is fine, we proceed with the definitive restoration.

Definitive restoration

After the try-in of the beta bridge has been successful regarding function, aesthetics and, of course, patient approval, we start to design the definitive substructure using Ceramill PEEK as material. When designing the substructure, the basis for the later zirconia crowns is also created at the same time (Fig. 10). The substructure needs to be designed 1–2 mm deeper than we expect

Fig. 9: Aesthetic check with patient pictures.

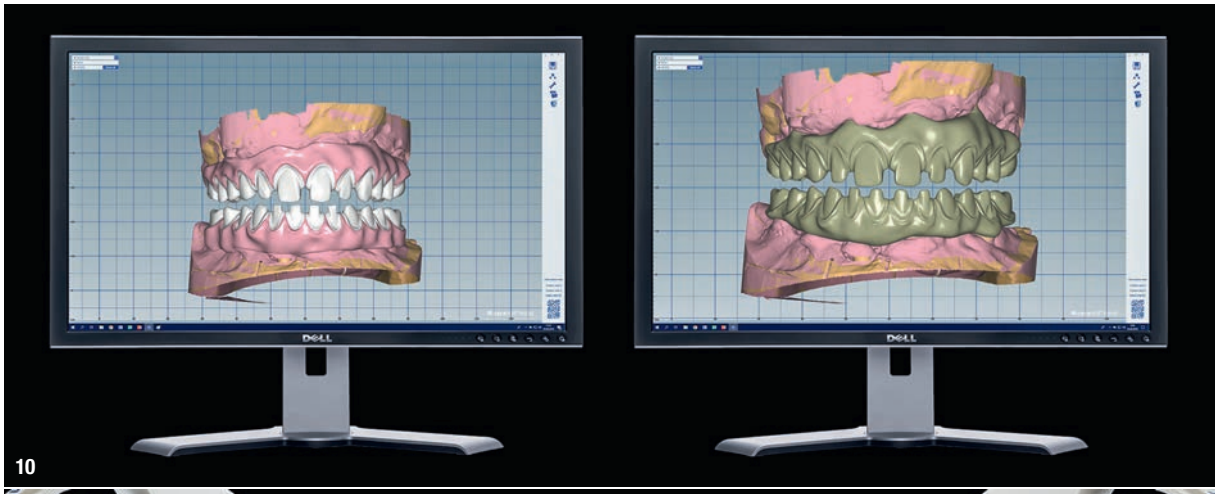


Fig. 10: CAD of the definitive restorations. **Fig. 11:** Finished milling result of the substructures made from Ceramill PEEK White.

Fig. 12: Finished milling result of the zirconia crowns made from Zolid FX Multilayer. **Fig. 13:** Zolid FX Multilayer crowns ready for the anterior veneering.

Fig. 14: Milled wax crowns and a silicone key as assistive devices for the later veneering process. **Fig. 15:** Final check of the Zolid FX Multilayer crowns.

the final margin. We will overcover the cervical margin of the crowns with gingiva in the final step. The minimum height of the substructure needs to be 7–10 mm and the width 5–8 mm and can contain cantilevers, which can be no longer then the distance between the two neighbouring implants.

The milled result on the Ceramill Motion 2 DNA is smooth and precise thanks to the great milling strategies (Fig. 11). In this case, we used Ceramill PEEK White, which helped us keep the final colour of crowns without using any opaquer after luting them on the substructure. The milling strategy can be wet or dry, but only on a five-axis milling machine. By choosing the fine strategy for undercuts, the five-axis milling on the outside shape is precise without any manual correction.

For fitting on the implants, we decided to use the InCadCam solution. For multi-unit abutments, it is the best choice for a direct fit in combination with PEEK in the Ceramill Match 2 CAM software (Amann Girrbach) and Ceramill Motion 2/ Mikro milling machines.

For the crowns, we use the highly aesthetic zirconia material Zolid FX Multilayer (Fig. 12). Since it was a full-mouth rehabilitation and we did not have to orient ourselves on existing residual teeth, we decided to produce the crowns in Shade A2/A3. Zolid FX Multilayer brought us lifelike colour shades, adequate transparency and acceptable bending strength. For the posterior region, we use full-contour crowns, and in the anterior region, the crowns have been slightly anatomically reduced (cut-back) to make space for ceramic veneering (Fig. 13). To achieve the highest possible level of detail right after milling, we chose the HD milling strategy. With that strategy, the fissures are finished with a 0.3 mm bur.

The greatest benefit of PEEK-based screw-retained bridges is that we can place the crowns directly on the model during veneering. Because we used the cut-back library developed by dental technician Knut Miller in the CAD, it is easy to veneer the anterior region and at the same time keep a constant shade for all the crowns. The veneering process gives us the freedom to play with the aesthetics, transparency, colours and natural look of the patient's smile.

Since we knew from the interviews with the patient that he was very satisfied with the shape of the anterior teeth and the height of the smile line from the temporary bridge, we used this shape as the base for the veneering. For that reason, we copied the tooth shapes from the temporary anterior crowns in the CAD software and milled the crowns afterwards in Ceramill Wax White (Amann Girrbach; Fig. 14). In the second step, we produce a silicone key, which makes the veneering process as easy as it can be. It is an efficient and predictable aid. Digital systems have many benefits corresponding to manual process steps that we can use for our reliable workflow. After veneering, we need to finally check all the details of the crowns before we cement them on to the substructure (Fig. 15).

Fig. 16: Veneering of gingival parts with composite.

Figs. 17a & b: The final result and a happy patient.

As preparation for the gingival veneering, the PEEK substructure is sandblasted with 50 µm particles under 2 bar pressure and cleaned afterwards using dry air. In the second step, we apply the primer visio.link (bredent) and light-polymerise the layer for 5 minutes. Afterwards, the crowns are cemented using a resin-based cement on the PEEK substructure and covered in addition by composite opaquer. The gingiva is veneered using GC GRADIA (GC), which is a composite-based veneering material. We cover the ceramic margin of the crowns and the visible PEEK parts with the veneering composite. The contact points on the patient's gingiva are kept in PEEK and polished to a high gloss (Fig. 16).

The patient was extremely happy with the final result (Fig. 17). The definitive restoration perfectly corresponded to his facial attributes and had great function. Our digital protocol gives us the advantage of being able to design, see and test the envisioned result in the very early beginning of treatment. This is extremely important in today's dentistry, as we can precisely adjust every aspect of the planned definitive restoration.

Our protocol also benefits the patient. The patient is involved in the planning at a very early stage and can make aesthetic changes together with the prosthodontist before the definitive restoration is started. Thanks to this method, we can avoid unwanted surprises and stress with the definitive restoration for both the dentist and the patient.

If we think into the future, this type of restoration offers further great advantages. This type of restoration can easily be repaired in comparison with a monolithic zirconia restoration, for example. If there is chipping or fractures of the crowns, the stored data of the CAD construction can be retrieved and the broken part can simply be re-milled. After sintering, the dentist can remove the damaged crown and cement the new one to the PEEK structure.

In the end, the key to success is good teamwork between all interfaces, in this case between the surgeon, the prosthodontist and the dental technician. Of course, the selection of the right material is also important.

about

Drs Ivan Miletic (middle) and **Stanko Miletic** (right) are in private practice at Dental Center Miletic in Zagreb in Croatia. Visit them at www.dental-miletic.com.
Pavel Metelka (left) is a dental technician at Dens Technika in Brno in Czech Republic.

Achieving anatomical shape, support and colour

with an Atlantis patient-specific abutment in gold-shaded titanium: A case report

Dr Fernando Rojas-Vizcaya, Spain

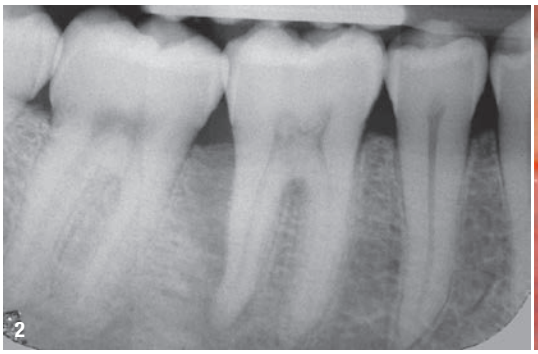
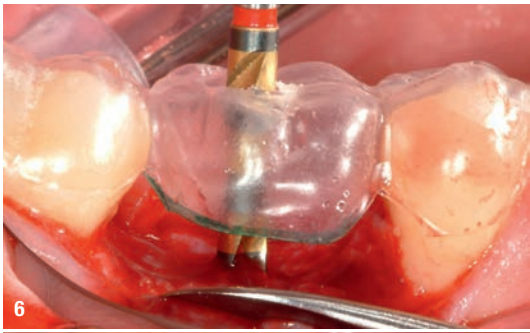
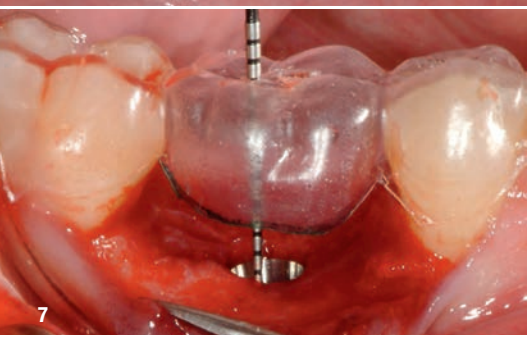
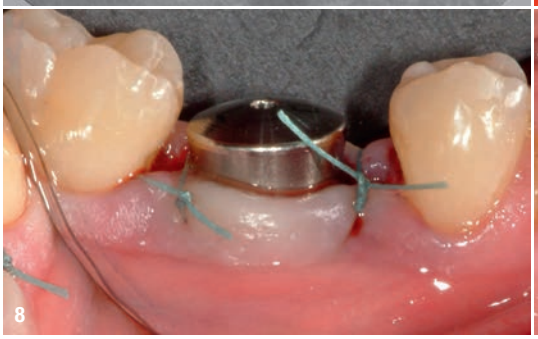
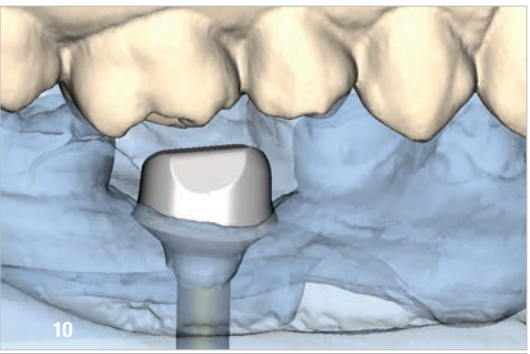



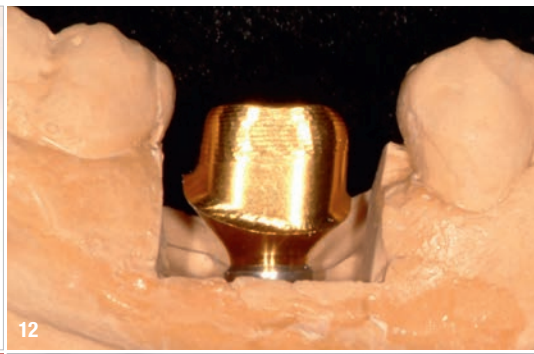
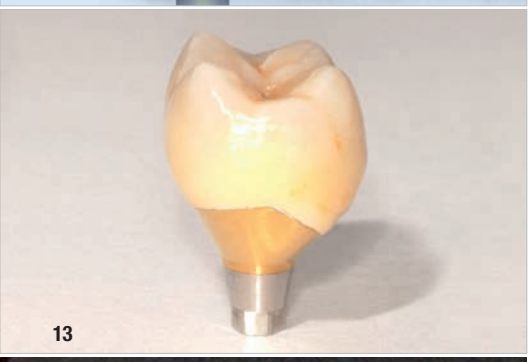

Fig. 1: A vertical fracture of tooth #46. On probing, a distal narrow isolated pocket measuring more than 15 mm in depth was detected. **Fig. 2:** On the radiograph, a radiolucency along the distal wall of the distal root with the typical J shape seen in vertical root fractures could be observed. **Fig. 3:** Tooth extraction was performed without damaging the alveolar walls. The socket was scraped and sutured without using grafting material.

The aim of this case presentation is to show a step-by-step workflow with Atlantis patient-specific abutments. The case is of a 36-year-old patient with a vertical fracture of tooth #46 who was referred to our clinic. The treatment plan was to extract the tooth and replace it with a dental implant using a conventional placement and loading protocol. The challenge was to restore the position of the gingival contour and the interproximal papillae to have the appearance of a natural tooth. In order to achieve a long-term, natural-looking result, an Atlantis abutment (Dentsply Sirona) was selected to provide the optimal anatomical shape, support and colour.



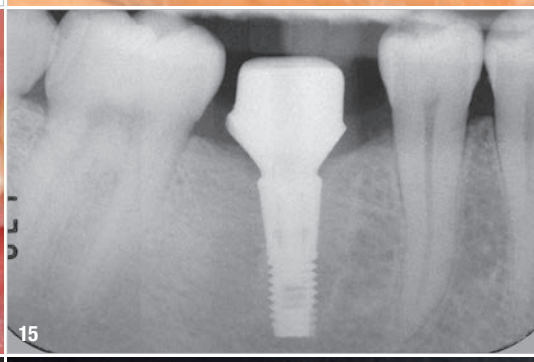



Fig. 4: After eight weeks of healing, the soft tissue over the extraction area was completely healed. **Fig. 5:** After eight weeks, the amount of bone formation into the socket allowed for implant placement. **Fig. 6:** Using a surgical stent, the osteotomy could be performed in an adequate position in 3D, using the zenith of the cervical contour of the planned restoration as a reference point. **Fig. 7:** The implant was placed 3 mm apical to the cervical contour of the planned restoration, symmetrically from the mesial to distal aspect, and 2 mm to the lingual aspect in order to preserve the buccal bone that would support the soft tissue. **Fig. 8:** A 7 mm healing abutment was placed to guide the soft tissue to an optimal healing situation. **Fig. 9:** The healing abutment was removed after six weeks, and a final impression of the implant position and the shape of the soft tissue was sent, together with the opposing model, to the dental laboratory. **Fig. 10:** The Atlantis abutment was virtually designed with the emergence width of the replaced molar and manufactured in titanium with a titanium nitride coating. **Fig. 11:** The Atlantis abutment in gold-shaded titanium, together with the Atlantis abutment screw, was sent to the dental laboratory. **Fig. 12:** The subgingival portion of the abutment would give the anatomical shape, support and colour to the surrounding soft tissue. The definitive crown restoration in zirconia was fabricated. **Fig. 13:** Definitive implant restoration with the finishing line close to the gingival margin, allowing for easy removal of excess cement in the subgingival area. The restoration was ready to be delivered to the patient. **Fig. 14:** The Atlantis abutment was placed with some pressure on the soft tissue. After a few minutes, the ischaemia disappeared, and the abutment was seated in the correct position. **Fig. 15:** Verification of correct seating of the abutment using a radiographic image. Note that the transitional portion of the abutment followed the contour of the bone. **Fig. 16:** The Atlantis abutment in gold-shaded titanium was torqued to the implant manufacturer's recommendation of 25 Ncm. The screw head was covered, and the crown was later cemented to the abutment. **Fig. 17:** After ten years, the radiograph showed a perfect fit of the restoration, the spaces created for the interproximal papillae and the position of the bone at the level of the implant. **Fig. 18:** After ten years, a perfect adjustment of soft tissue around the restoration (buccal view) was observed, filling the space for the interproximal papillae and yielding a natural-looking soft-tissue contour.

contact

Dr Fernando Rojas-Vizcaya, DDS, MS, works in the Department of Prosthodontics of the Adams School of Dentistry of the University of North Carolina at Chapel Hill in the US. He also holds the position of director of the Mediterranean Prosthodontic Institute in Castellon in Spain. He can be contacted via www.prosthodontics.es.

The prosthetic work presented in this article was prepared by certified dental technician Francisco Ortega of Labordent in Malaga in Spain.

Individual PEEK healing abutments and impression copings

Nature-conforming emergence profiles in implant therapy

By Camlog

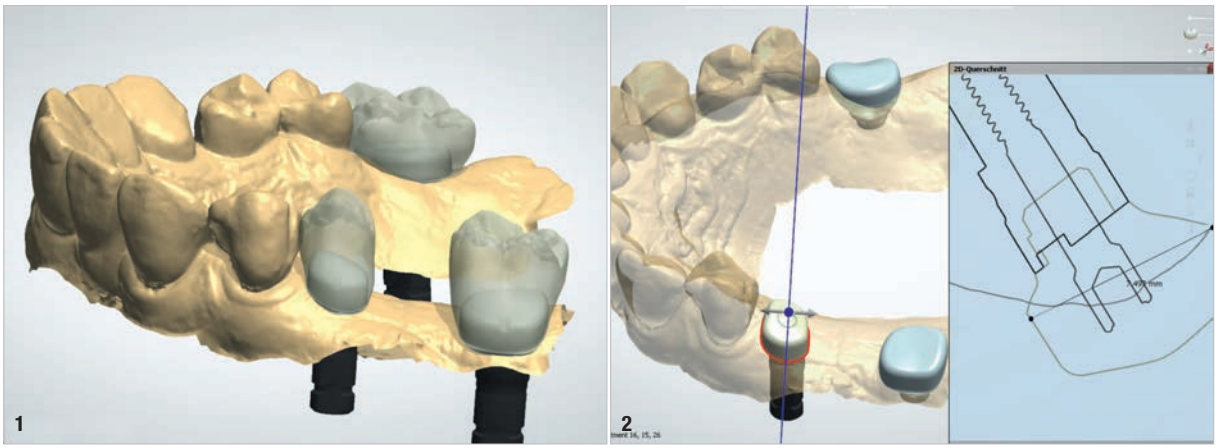


Fig. 1: Design of a customised healing abutment based on a virtual wax-up. **Fig. 2:** Design of the healing abutment and definition of the crown emergence profile. *(All images: © Dr Steffen Herzberg, Zahnärzte am Himmeloh, Witten)*

The replacement of missing teeth with dental implants is an established therapeutic approach that allows predictable results if correctly indicated. The fact that dental implants osseointegrate is no longer questioned. Today, the primary focus is on preserving the peri-implant tissue structures and increasing patient comfort while reducing morbidity and treatment time as far as possible.

Camlog has established a new workflow in implant therapy with DEDICAM Services for its new customised, anti-rotation PEEK healing abutments and PEEK impression copings, which are designed on the basis of patient-specific emergence profiles and manufactured from the same data set as part of the CAD/CAM process.

The individually tailored PEEK healing abutments and PEEK impression copings, which are identical in subgingival design, enable preoperative, intra-operative and postoperative procedures for the shaping and transfer of peri-implant soft tissue—for which intensive interdisciplinary exchange between the treating teams is an advantage. The tissue-friendly PEEK material and the optimisation of the anatomical emergence profiles offer clinical benefits in that there is no additional soft-tissue manipulation required and the shaped profile can be transferred to the master cast in a precise manner. A stable soft-tissue cuff protects and nourishes the peri-implant bone and creates the basis for a predictable aesthetic outcome of the definitive restoration.

Customised PEEK healing abutments and impression copings for Camlog implants

The individualised PEEK healing abutments and impression copings will initially be available with the connection for CAMLOG SCREW-LINE and CAMLOG PROGRESSIVE-LINE implants. They are milled in a CAD/CAM procedure from solid PEEK rod material with a diameter of 10 mm. Milling PEEK requires comprehensive knowledge of material processing and quality assurance, since the patient-specific products demand the highest precision in manufacture. PEEK has been in clinical use in implant dentistry for many years and is predominantly used to fabricate provisional restorations. The PEEK healing abutments are approved for use in the oral cavity for a duration of 180 days. They can be ordered individually or as a set including an impression coping. The posts are available for use with either the open- or the closed-tray technique. Utilising the libraries provided for the CAD software from 3Shape and exocad, registered DEDICAM customers can design the healing abutments themselves and order their subsequent manufacture. Based on the same data set, the impression copings can be manufactured upon request as well.

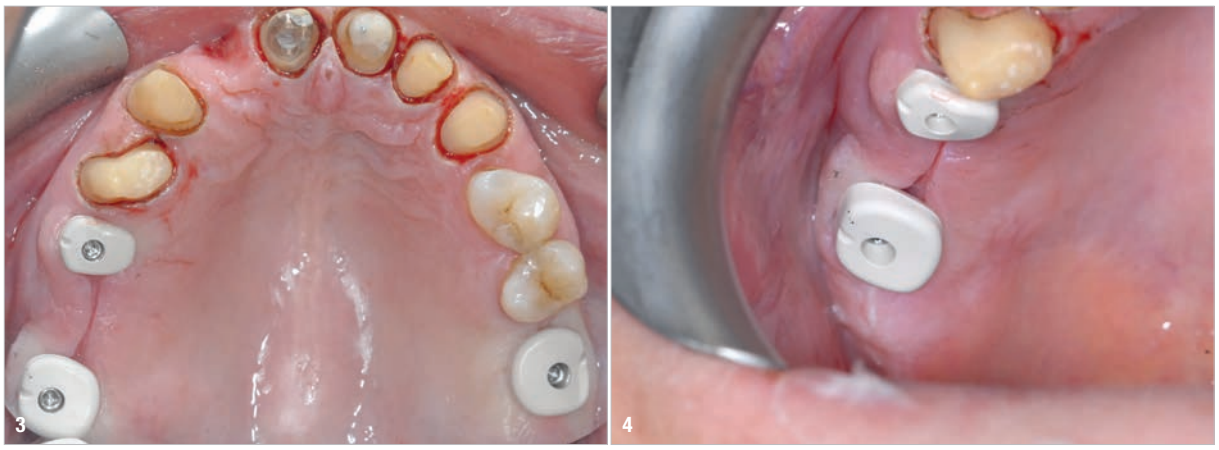


Fig. 3: Customised PEEK healing abutments inserted immediately after implant exposure. **Fig. 4:** The customised PEEK healing abutment supports the soft tissue for healing of the mucosa in an anatomical way.

For easy orientation of the individual products in the oral cavity, it is recommended to apply a visual marking in the form of a small indentation on the healing abutment, as well as the impression copings.

By integrating the digital process chain and the multifaceted workflow possibilities in the dental practice and laboratory, patient-friendly concepts can be realised in a cost-efficient manner and are easily adapted to the individual infrastructure and requirements of the respective treating team. In addition to 3D radiographic diagnostics, virtual 3D implant planning, intra-oral scanning and guided implant placement, individually created implant components achieve the optimal conditions for a customised prosthetic restoration. Besides individual planning, customisation extends to every prosthetic component, which can be manufactured in an individualised and precise way by means of CAD/CAM technology. The application of the customised PEEK healing abutments is characterised by great flexibility of the workflow. In the following, three possible workflow options are shown.

The digital way

Based on the implant planning, which employs backward planning, the anatomical emergence profile is established, the subgingival area is designed to support the tissue and the height of the healing abutment is determined. In addition to a surgical guide, the healing abutment and, if desired, the impression coping are ordered from Camlog regarding their design and manufacture. Alternatively, the design can be done in the laboratory by using the DEDICAM CAD library. After guided surgery, owing to the exact positioning and alignment of the implant's internal configuration, the healing abutment can be placed as part of the one-stage immediate restoration procedure. The inserted healing abutment heals uncovered, and the soft tissue shapes itself anatomically based on the cap's emergence profile. If covered healing is preferred, the healing abutment is inserted after exposure, in conjunction with soft-tissue thickening in the form of a roll flap if necessary. If the healing abutment has shaped the soft tissue such that it is adequately supportive, the

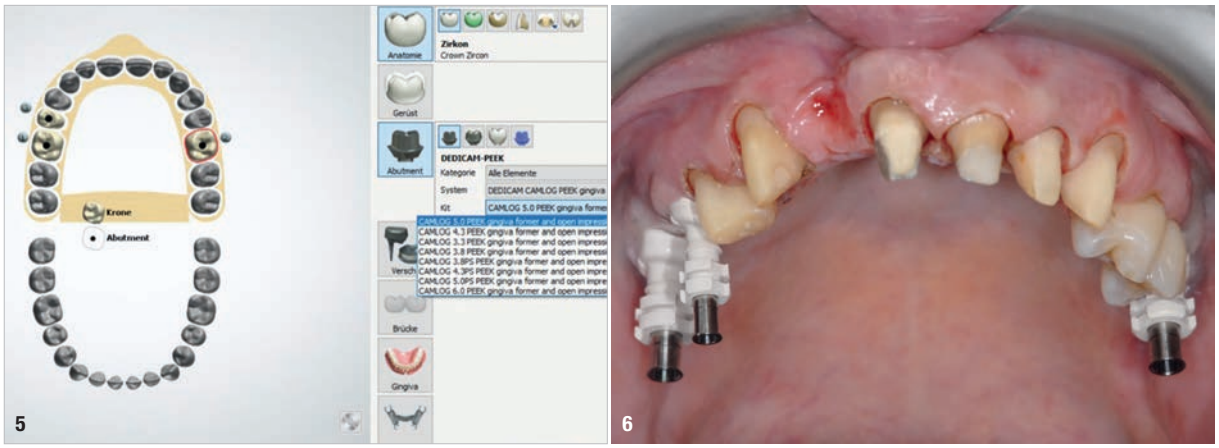


Fig. 5: When using 3Shape Inbox, customised impression copings, which are of subgingival design identical to that of the healing abutments, can be ordered with one click. **Fig. 6:** After healing of the soft tissue, the customised impression copings allow the exact transfer of the soft-tissue situation and the implant position to the model, even in complex restorative cases.

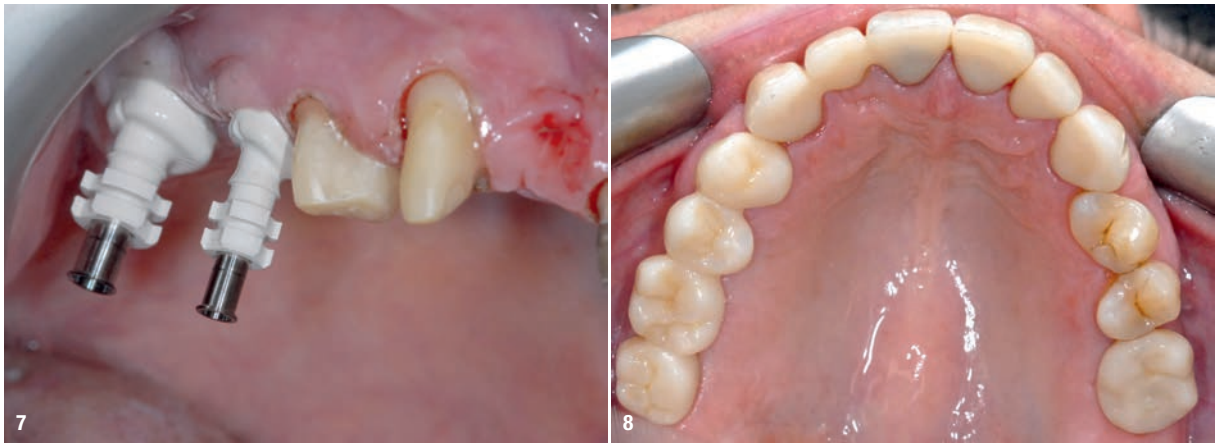


Fig. 7: The design of the impression copings ensures the anti-rotation transfer of the situation to the master cast. **Fig. 8:** The definitive restoration with a stable and anatomically formed peri-implant mucosa.

design can additionally be used without modification to design the definitive abutment. If changes are required, the current soft-tissue situation can be recorded using an intra-oral scan taken from the implant shoulder. However, for complex rehabilitations with bridge restorations on the implants, analogue impression taking with the PEEK impression posts has been proved to be advantageous.

The partially digital way

The partially digital way is characterised by collaboration between the surgeon, referring dentist and dental technician. In coordination with the prosthodontist, the surgeon places the implants and scans them prior to covered healing. When the implants are exposed, the customised healing abutments are employed to anatomically shape the peri-implant soft tissue. After tissue healing, the prosthetic restoration commences in the practice of the referring dentist. There, the dentist deals with a perfectly shaped mucosa, which is transferred to the laboratory for the fabrication of a master cast by means of the individual impression copings in an analogue procedure without any additional effort. Based on the preferences of the dental technician, the implant restoration is then fabricated in either analogue or digital fashion.

Outsourcing to the production centre— a mix of analogue and digital

The surgeon takes an implant impression or scans the implant position intra-operatively. He sends either the physical models or the scan data together with a situation scan and an opposing arch scan to Camlog. The skilled dental technicians at the DEDICAM Service centre design the patient-specific healing abutment in consultation with the treating clinician and submit a manufacturing order for the healing abutment and impression coping to the production centre. There, both are manufactured with high precision and are available in the practice when the implant is exposed in order to obtain the best clinical conditions for an anatomically shaped mucosa.

Conclusion

With the individual PEEK healing abutments and impression copings, the workflow is flexible and convenient for everyone involved. The virtually designed patient-specific emergence profile can be safely controlled from the time of implant placement until the realisation of the definitive restoration. There is no need to manipulate the soft tissue, as would be the case after removing a standardised healing abutment. An impression coping with exactly the same emergence profile, since it is created from the same data set, prevents the mucosa from collapsing and transfers the shaped soft-tissue profile for the fabrication of a form-congruent abutment. The easy handling, the achievement of a predictable result and the reduction of treatment appointments, pain and work steps distinguish this patient-friendly treatment concept. The work required for crafting a model or a silicone key for analogue fabrication of individualised impression copings with composite is eliminated. With this treatment concept, surgeon and prosthodontist work closely together with the laboratory and Camlog for the ultimate benefit of the patient.

PEEK has established itself in implant therapy as a tissue-friendly material for provisional restorations.[1–3] In addition to optimising the mucosa and preserving the alveolar bone, an anatomically designed emergence profile creates the basis for the natural red–white aesthetics of the implant restoration. The use of customised healing abutments and impression copings is time- and cost-efficient and a valuable part of a patient-friendly treatment concept.

DEDICAM Services are not available in all countries. Please contact your local BioHorizons Camlog sales representative for further information.

Editorial note: A list of references is available from the publisher.

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KATANA Zirconia—the science behind superior product properties

Mathias Fernandez y Lombardi, Germany

Fig. 1: At Kuraray Noritake Dental, all the powder is produced in-house. **Fig. 2:** KATANA Zirconia blank ready for milling.

Users of dental zirconia are spoilt for choice these days. Countless manufacturers offer zirconia materials that differ in their mechanical and optical properties and indication range. What is not apparent at first sight is that the available products also differ with respect to the quality of the CAD/CAM blanks offered. Blank quality is highly dependent on the quality of the raw materials and is affected by different aspects during raw material processing, pressing and pre-sintering. This has a huge impact on the surface quality, edge stability, fit and processing requirements of milled restorations.

Raw material production

Pre-shaded dental zirconia typically consists of metal oxides, including zirconium oxide, yttrium oxide and aluminium oxide, as well as additives like binders and colour pigments or ions. Most manufacturers of dental zirconia obtain prefabricated powder from an external industry partner, the most popular option being Tosoh Corp. In contrast, Kuraray Noritake Dental relies on an end-to-end in-house process. This includes the production and addition of the components forming the company's innova-

Sintering Program Setting 1: General Sintering

	UTML	STML	HTML / HT
High Temperature	1550 °C / 2822 °F		1500 °C / 2732 °F
Hold Time	2 hours		2 hours
Rate of Temperature Increase	10 °C / 18 °F minute		10 °C / 18 °F minute
Rate of Temperature Decrease	-10 °C / -18 °F minute		-10 °C / -18 °F minute

3a

Sintering Program Setting 2: Fast Sintering*

	UTML	STML	HTML / HT
High Temperature	1560 °C / 2840 °F		1515 °C / 2759 °F
Hold Time	30 minutes		30 minutes
Rate of Temperature Increase	35 °C / 95 °F minute		35 °C / 95 °F minute
Rate of Temperature Decrease	-45 °C / -49 °F minute		-45 °C / -49 °F minute

3b * For single crown and 3-unit bridge restorations.

Figs. 3a & b: Overview of the recommended sintering protocols. Fast **(a)** and general **(b)** sintering.

Fig. 4: The KATANA Zirconia block displays superior optical properties after 18 minutes of sintering compared with representatives of major competitors' raw material after 30-minute and 60-minute sintering programmes designed by Kuraray Noritake Dental based on the manufacturer's recommendations.

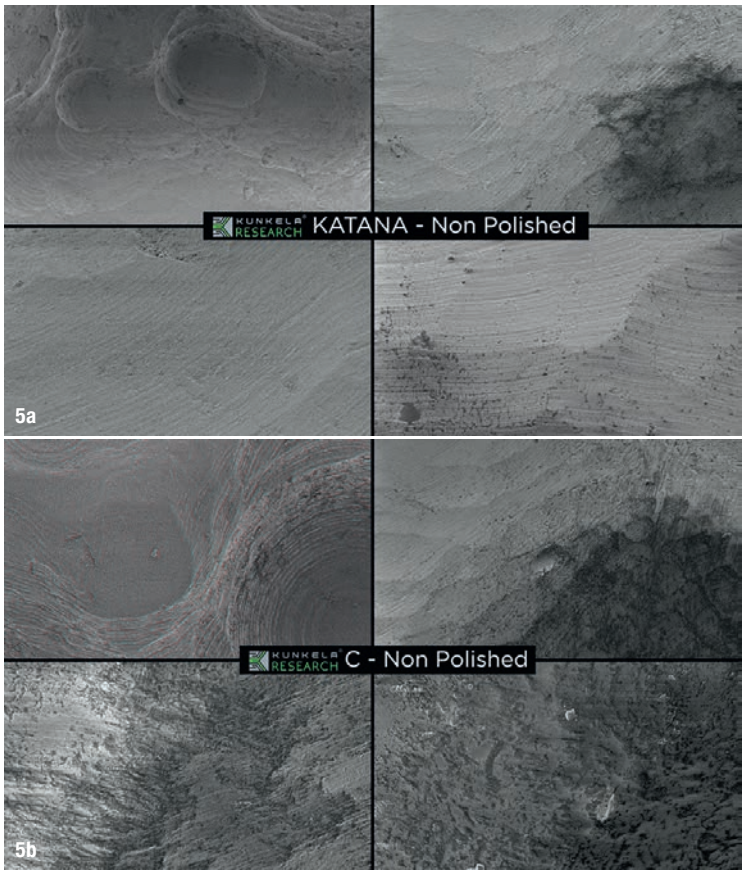
tive multilayered technology, which makes it possible to match the shades in the polychromatic blanks precisely to the colours of the VITA classical A1–D4 shade guide.

Since more powder production steps are carried out in-house, this gives the company full control of the quality of the raw materials, their grain size and the purity of the formulation (Fig. 1). It also allows for a precise alignment of the mechanical and optical product properties. Properties of zirconia restorations that are affected by the powder quality and composition include translucency and shade appearance, flexural strength, ageing behaviour and sintering performance.

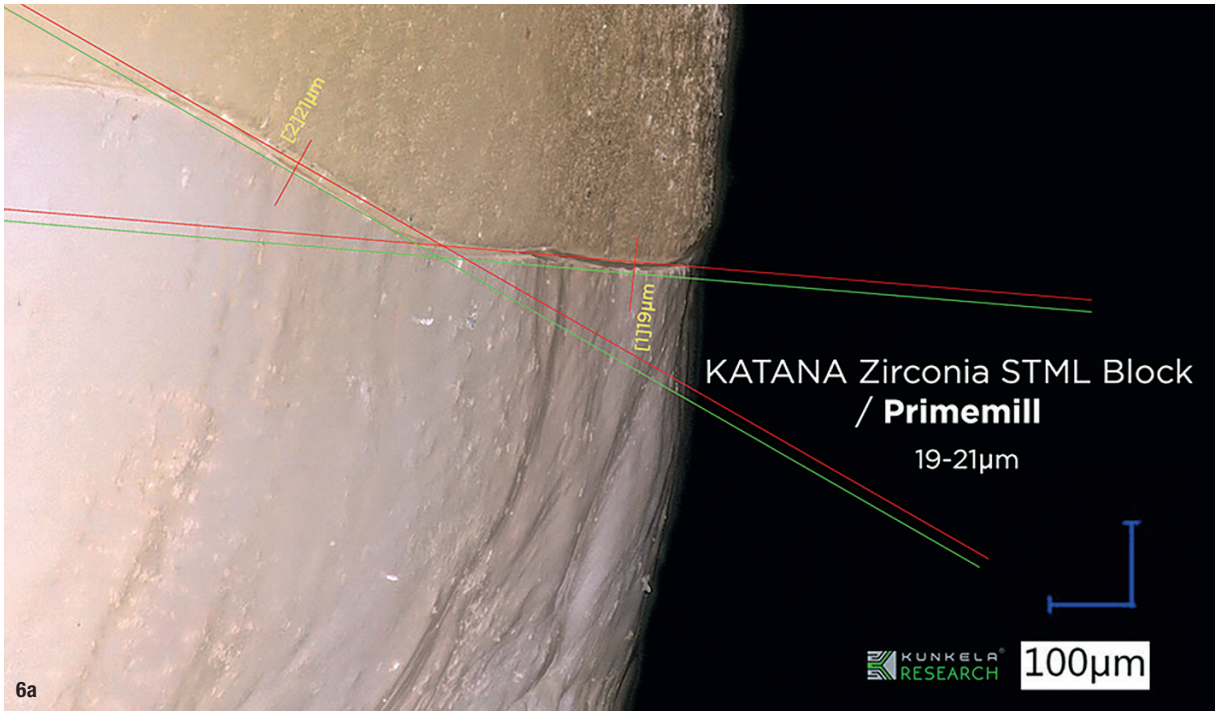
Blank pressing

Zirconia discs and blocks used for CAD/CAM processing are usually produced by uniaxial and isostatic pressing. In the uniaxial compaction process, pressure is applied to the powder from one direction (uniaxial) or two directions (biaxial), whereas the isostatic compaction process involves virtually equal pressure applied from all sides. Hence, isostatic pressing typically results in a more uniform density distribution throughout the blank and a higher material homogeneity. These factors are prerequisites for a predictable processing and sintering behaviour and affect the fit of the final restoration. For optimal mechanical and optical properties of the zirconia material, it is essential to avoid large porosities, air pockets and impurities caused by airborne particles that are trapped during pressing.

At Kuraray Noritake Dental, a unique and extremely meticulous pressing process achieves a uniform pressure distribution and low risk of contamination by airborne



Figs. 5a & b: SEM images of non-polished KATANA Zirconia **(a)** and a competitor's material **(b)** at 33× magnification. The four images of each material show the surface structure at different areas of a molar crown. In all areas, the surface of the restoration made of the competitor's material is rougher and shows more porosity than the surface of the KATANA Zirconia crown directly after milling, according to Dr Josef Kunkela's research results. One of the contributing factors to this result is the more densely pressed blanks with smaller grain sizes of KATANA Zirconia. *(Images: © Kunkela Research Academy by Dr Josef Kunkela)*

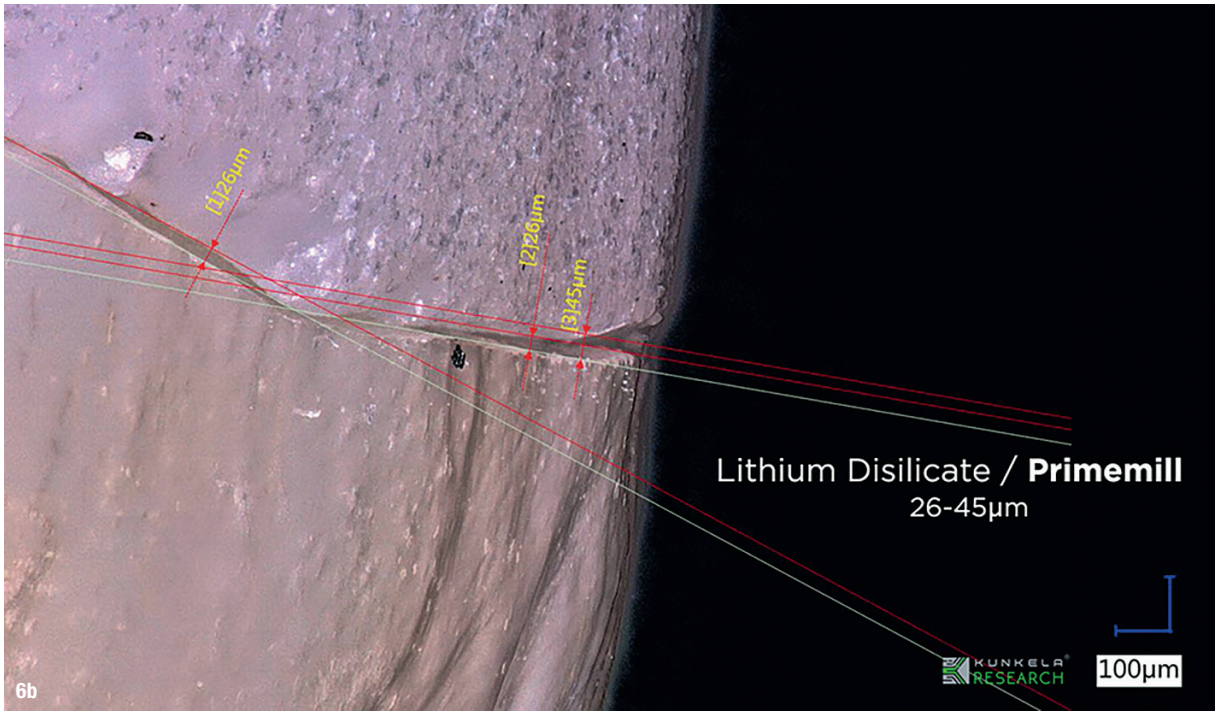


Figs. 6a & b: SEM images revealing the fit of restorations made of two different materials: KATANA Zirconia Block STML **(a)** and lithium disilicate **(b)** on a tooth abutment. The KATANA Zirconia restoration shows a more regular margin and more precise fit (with a cement gap of 19–21 µm) than the lithium disilicate crown (cement gap of 26–45 µm). *(Images: © Kunkela Research Academy by Dr Josef Kunkela)*

particles. This specific procedure reduces gravitation forces and contributes to having as high a density of zirconia material as possible. All the high-level preparation processes, from raw material production to pressing, are responsible for the high edge stability and surface quality of restorations milled from KATANA Zirconia.

Pre-sintering

The pre-sintering procedure is necessary in that it gives the pressed blanks the required stability to be machinable with milling tools. The selected temperature profile and duration of the pre-sintering cycle determine the



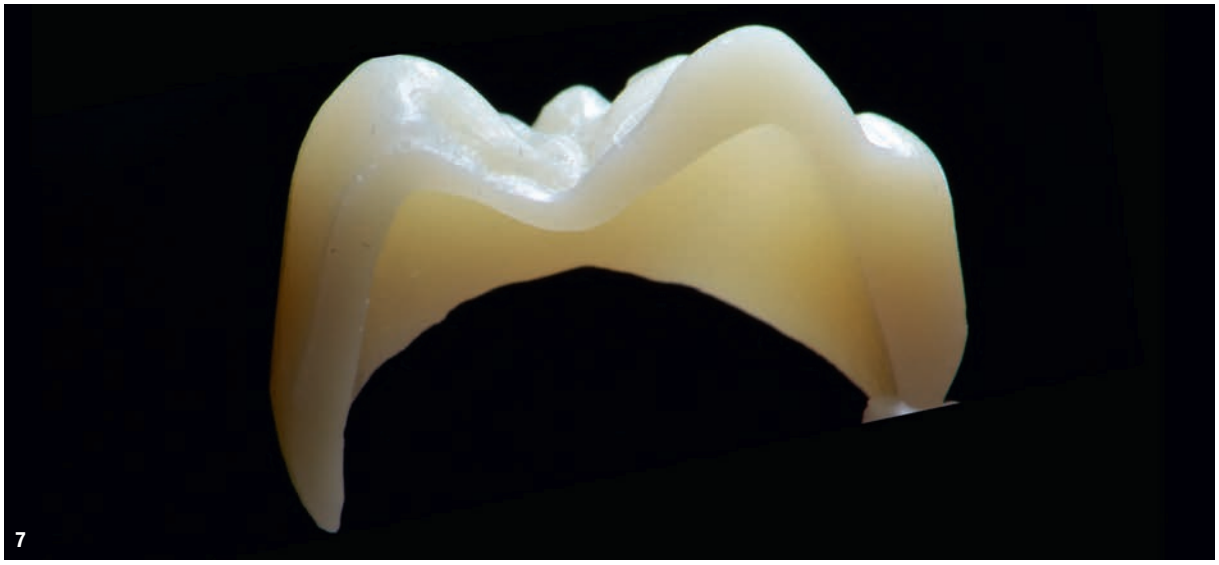


Fig. 7: Extremely regular margins of a KATANA Zirconia crown after milling, which is also a result of the favourable material structure.

material's strength and processing properties and have an impact on the final sintering process.

The unique pre-sintering procedure carried out in the production facilities of Kuraray Noritake Dental results in blanks that are stable in their pre-sintered state (Fig. 2). Although more stable, pre-sintered KATANA Zirconia is machinable with common diamond-coated milling tools without any increased risk of breakage or higher tool wear.

Fast sintering for the laboratory

The unique procedure has a positive impact on the surface smoothness after milling and can significantly shorten sintering times. In fact, the speed sintering programme offered for all variants of KATANA Zirconia is the fastest one on the market. In the dental laboratory, the sintering times may be reduced to 90 minutes (the material is removed from the furnace at 800 °C) for single-tooth restorations and bridges of up to three units (Fig. 3).

Fast sintering for chairside

Using the KATANA Zirconia block with Dentsply Sirona's CEREC system, it is possible to sinter single crowns up to three-unit bridges in 18–30 minutes without compromising the mechanical or optical properties.

Unique KATANA Zirconia properties

Together, these efforts taken by Kuraray Noritake Dental to produce dental zirconia of exceptionally high quality make all the difference. The KATANA Zirconia series—KATANA Zirconia Ultra Translucent Multi Layered (UTML), Super Translucent Multi Layered (STML), High Translucent Multi Layered (HTML) and High Translucent Mono Layered (HT)—has a homogeneous, high-density structure with low porosity and a high level of purity (Fig. 4). This optimises the performance of the blanks during machining.

Surface roughness

An optimised processing behaviour leads to regular restoration margins, smooth surfaces and a precise fit of the restorations (Fig. 5). The latter is due to the fact that the milling behaviour and volumetric shrinkage during final sintering are highly predictable so that a user designing a 20 µm cement gap will get what he or she desires. Owing to the great control over optical properties and precise match to the VITA classical A1–D4 shades, KATANA Zirconia is considered to be one of the most aesthetic dental zirconia options available on the market.

Excellent marginal fit (Figs. 6 & 7)

In order to ensure all the desired material properties, including aesthetics and strength, one thing is essential: the machining carried out in the dental laboratory—milling and sintering—needs to adhere to the recommended protocols. This means that the milling machine and furnace should be cleaned and calibrated on a regular basis, which provides the conditions for optimised zirconia processing, from the powder to the final, true-to-life dental restoration.

contact

Mathias Fernandez y Lombardi
is EU scientific manager of dental ceramics and CAD/CAM materials at Kuraray Europe. He can be contacted at dental.eu@kuraray.com.

“I would love to inspire more women to get involved in digital dentistry”

An interview with Dr Alison Simpson, a general dentist from Rothwell in the UK, honoured with the first Smart Integration Award

By Dentsply Sirona

In November 2019, 24 female dentists from seven nations received Dentsply Sirona’s first Smart Integration Award for visionary treatment concepts. One of the winners was Dr Alison Simpson, a general dentist from Rothwell in the UK. She was honoured with the first Smart Integration Award for sharing her story of success in using the digital workflow. In this interview, Dr Simpson told us about her background, discussed changes in the dental industry and shared her ideas about technology and the future of the dental practice.

Since 2019, Dentsply Sirona has been honouring innovative women in digital dentistry with the Smart Integration Award.

Dr Simpson, what challenges did you encounter when setting up your new clinic in 2015?
I really enjoyed designing the clinic because I was able to learn from past experience, for example, when creating the best patient flow throughout the clinic. Furthermore, I enjoy rising to a challenge. I took an old shell of a building and put my own individual stamp on the place in every detail. I've always invested a great deal of time in new technology, and we were fully digital from the outset. With digitalisation comes a considerable amount of new software and even hardware. Although this was quite overwhelming at the beginning, I knew it was the best thing to do. It was a huge learning curve. However, it is very satisfying and fulfilling when you reach, or get close to reaching, the top of that curve.

Could you tell us a little bit about the employee structure that you have within the practice?
My whole business model is very much a team-based one, in which the patient regards us all as a team, and does not just focus only on me as the dentist. I want my patients to feel that they are, in a way, part of that team, part of the family and part of the community that we are trying to build here.

Initially, I needed to onboard the right personalities to create that team and that family. I knew I needed the right assistants to drive forward the digital workflow and to really understand my vision and why it is so important to me for the patients to have a fantastic experience.

So you put a key focus on long-term relationships and adherence to treatment plans?
Yes. I felt that the key to growing the business was by creating an environment where our patients wanted to be there and wanted to come in and see us. My aim was to get away from a clinic that looked like a dental clinic and to make it feel more like a boutique hotel. In my clinic, there is much more emphasis than usual on emotion and on meeting the patients' needs. I want my patients to feel that they are being cared for, not just from a dental perspective but also from a supportive, emotional one.

Regarding adherence to treatment plans, we believe that by delivering on our promises from the start of any treatment and creating expectations that we can meet by using structured and tailored plans is crucial in order to build patient trust and to create that supportive cushion we strive for.

What would a cross section of your patients look like in the area in which you are practising?
We have a relatively diverse demographic. I feel that people who come here value not only our clinic but also their own dental health. We find parents bringing their children and also older patients trying to maintain their dental health. We have patients who are looking for a complete smile makeover and those who only want to tweak what they have. We have patients who are wealthy and also those who have to save money in order to afford the smile they have always wanted, a smile we can deliver.

Dr Alison Simpson, director and principal at Trinity Dental in Rothwell in the UK.
(All images © Dentsply Sirona)

Do you find that patients are better informed now than in previous years?
Absolutely. When I graduated, I felt as if I needed to educate patients and give them their options. Nowadays, it is so much easier for people to do their own research into treatments in order to know what is available and where it can be found. It is easy to find the right person who can provide the service that a patient wants on the internet. Patients now know what they want before they see us, but this was not the case 20 years ago.

> "I believe that digitalisation is really about to take off, and I find it an incredibly exciting time to be in dentistry."

Does digitalisation play a major role in the UK? Do you expect it to move in that direction in the future among dental professionals?
Yes, I believe that digitalisation is really about to take off, and I find it an incredibly exciting time to be in dentistry. I am so glad that I am part of the movement. As for digital dentistry, colleagues who do not yet use intra-oral scanners should embrace this technology or they will soon be left behind. Patients are now aware of the benefits of digital dentistry, and I think it won't be long before they seek out the dentists who use digital dental technology. In a society increasingly driven by quick or even instant results, where everyone is becoming their own brand representative, delivering quick results and showing people what their smile could look like is crucial. If dentists are not onboard with this move, they will be left behind.

"Digital dentistry, by its very nature, offers far greater rewards to those who approach it with a team mentality."

With concepts like the Smart Integration Award, Dentsply Sirona aims to bring more women's ideas into the field of dentistry and to create a network for women. There are more and more women dentists and dental students in dentistry, and that trend is continuing. Is this something that you've observed personally in the UK?
Even when I was at dental school about 20 years ago, there were more women than men in dentistry. I think it's just taken a while for companies to catch on to that fact. However, what surprises me is that lectures, workshops and digital symposiums are primarily male-dominated, even as far as the audience is concerned.

I find it worrying that women don't participate in or even go to these conferences. I always ask my colleagues why they don't want to attend. Many of them are just too busy because they are looking after families or working only part-time. I would love to inspire more women to get involved in digital dentistry. I find it quite upsetting that many women are not involved in this field.

How did COVID-19 affect dentistry and your work in relation to patient care? Did the role of digitalisation change? Does digitalisation now play an even greater role?
Like every aspect of life, COVID-19 has had a tremendous impact on our clinic and on dentistry as a whole. Since reopening, the focus has been on keeping the staff, the patients and our families safe. This was not only in terms of negating as far as possible any chance of catching the virus but also in terms of making people feel safe in the clinic, so that we could continue to provide our renowned care with minimum stress. My team was flexible and supportive, so I didn't feel alone in the decision-making.

Same-day dentistry treatments were, and are, increasingly reassuring for patients, as the volume of traffic through the clinic continues to go down. Patients have reduced both their own and our risk of infection by completing their treatment in one appointment. Additionally, there has been a huge uptake of SureSmile treatment, the whole process of which is digital.

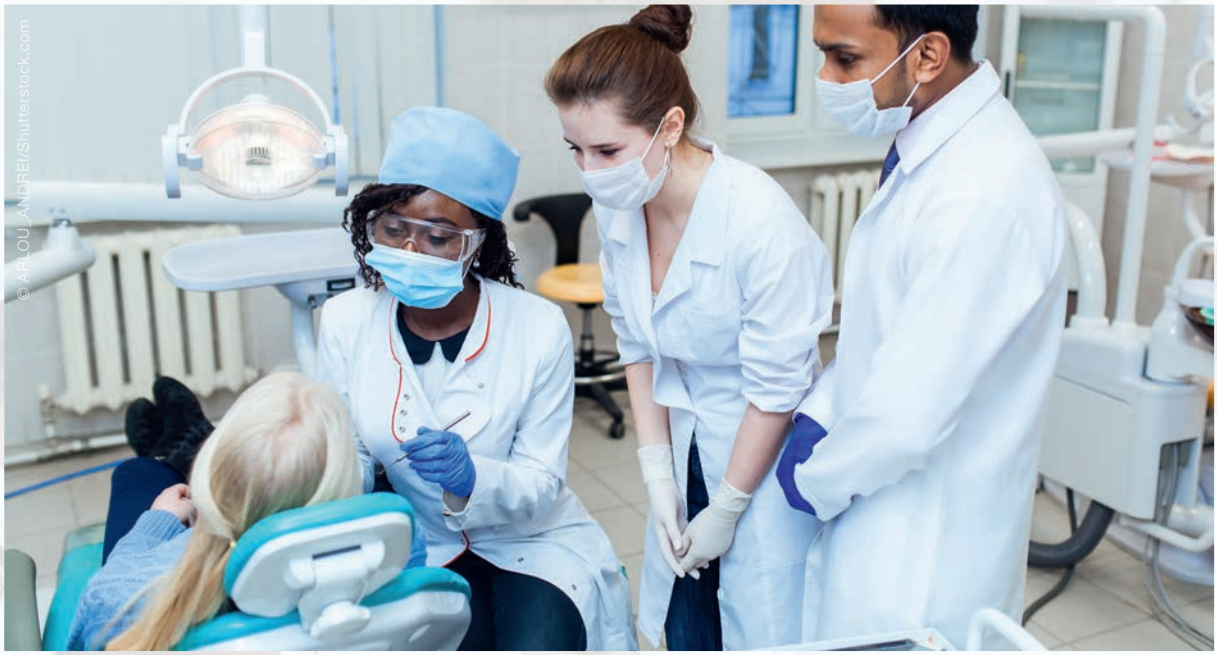
In many ways, COVID-19 has accelerated the uptake and acceptance of new digital processes in the dental world. We have been able to reduce face-to-face consultations and offer virtual meetings, and patients find these more acceptable owing to increased convenience and time efficiency.

Do you have any specific goals, either within dentistry or otherwise related to your career and business?
I would like to inspire other dentists, both male and female, to get onto the digital pathway because I have gained so much fulfilment from it. I know from my own experience how much it can enhance a patient's treatment journey. My key piece of advice for those seeking to get into digital dentistry is that they should try to surround themselves with team members who have the same goals and desires. Digital dentistry, by its very nature, offers far greater rewards to those who approach it with a team mentality. I wouldn't be where I am now without the team that I had around me on my digital journey.

Editorial note: More information about the Smart Integration Award can be found online at https://lp.dentsplysirona.com/en/smart-integration-award.html.

New report addresses equality, diversity and inclusion in dentistry

By Iveta Ramonaite, Dental Tribune International



Some of last year's events, including the Black Lives Matter protests, have prompted dental professionals to seek more opportunities to diversify the profession.

Seeking to show the commitment of the dental profession to fight discrimination and bias in dentistry, the Diversity in Dentistry Action Group (DDAG) has recently published a report on equality, diversity and inclusion in dentistry. The report urges those in the profession to listen to those whose voices have been under-represented and to take collaborative action to make dentistry more inclusive.

The DDAG is a strategic oversight group that was formed by the Office of the Chief Dental Officer England in June 2020 as a response to the Black Lives Matter movement, which has prompted a widespread discussion on race and equality and has encouraged some organisations to reconsider their work practices and core values. The group aims to unify the dental profession in order to facilitate the effort to tackle discrimination in the field.

The report, which was published in May 2021, lists the dental organisations which have agreed to take some key steps towards change. These steps include continuously addressing racism and discrimination, seeking and creating opportunities for representation and inclusion, and committing to organisational level change.

Commenting on the report, Dr Raj Rattan, dental director at Dental Protection and a member of the DDAG stakeholder group, said in a press release: "We welcome this vital report and are pleased it has been supported by a wide range of dental organisations. There is a duty on all of us in the dental profession to ensure we play our part in creating a culture of equality, diversity and inclusion."

The topic of discrimination has received increased attention in the past year, and some higher education institutions, such as the University at Buffalo School of Dental Medicine, have already stepped up their efforts to make dentistry more diverse by facilitating entry into the profession for people of colour. However, there is still more work to be done in order to have a truly diverse dental workforce.

"An ongoing commitment is needed if we are to reap the many benefits of cultural competence within the profession and reduce the risk of ethnocentricity. This can affect the patient experience and may also have a detrimental effect on treatment outcomes," Rattan concluded.

Editorial note: The DDAG report can be found online (www.fgdp.org.uk/).

“There must be academic proof that (...) digital dental tools are really reliable”

Mari Koivunen, Finland


Dr Janos Vág

Dr Janos Vág became a dentist out of necessity, but he would have preferred to have become a computer science engineer. However, when it was time to choose his educational path in 1989, there were few opportunities for engineers. His father, a dentist, suggested that he could make use of his scientific and technical interests in dentistry as well, so Vág decided to follow in his father’s footsteps.

Indeed, for the past decade, Vág has also been able to combine his interest in computer science with his profession in following the evolution of digital dentistry. Working as a clinical associate professor and head of the conservative dentistry department at Semmelweis University in Budapest in Hungary, Vág has established an impressive academic track record, having published 49 articles—with 370 citations—in peer-reviewed journals.


Dr Janos Vág believes that industry standards could help make intra-oral scanning solutions easier to compare, and studies measuring their efficacy more helpful and reliable. *(All images: © Semmelweis University)*

In addition to his academic research, Vág has a great deal of clinical experience. For five years, he worked at a dental practice, focusing only on clinical work. Today, he practises as a conservative dentist with an emphasis on restorative dentistry and endodontics. He also performs oral surgery and prosthetic treatments—it is common in Hungary for dental specialists to cover larger treatment areas.

Digital dentistry makes work fun

Although digital dentistry has been an industry buzzword for several years now, Vág said that going digital is still not on the agenda for many dentists. “Using digital workflows will completely change the work at the dental practice,” he noted. “However, most dentists are still not taking any steps to becoming digital dentists. This is not only the case in Hungary, but in the US and on a global scale as well.” He added: “In dentistry, we should be ready for new things that might not be beneficial in the first few months, but are good fun and make our work much better. Through these investments, dentists can also gain more patients, who might never go back to their previous dentists if they lack the technology.”

Starting from September, undergraduate students at Semmelweis University will learn how to make inlays, onlays and single crowns using an array of CAD/CAM solutions that include an intra-oral scanner, design software and a milling machine. The goal is to teach students how to prepare a tooth for scanning and digital restorative design, according to Vág. “Fortunately, digital dentistry is not the future; it is the present,” he said.

The need for academic proof

While some dentists are not even considering going digital, others are ahead of the existing academic research in their use of digital dentistry. They immediately try out new technology and find out by themselves how to make best use of it. “Some dentists already manufacture, for example, complex bridges using only digital impressions as the basis,” Vág said.

“At the same time, they wonder why we are even studying the scanners, because they have no issues with their treatments whatsoever. But if you want to get the majority of dentists to go digital, there must be academic proof that

intra-oral scanners and other digital dental tools are really reliable instruments," he emphasised.

Vág believes that it is important to conduct research on intra-oral scanners, since general dentists cannot otherwise really judge trueness and accuracy, even though they can easily compare other characteristics, such as the weight of the scanner or usability of the scanning software.

Currently, however, it is difficult for dental professionals to make conclusions based on research findings. For the past few years, Vág has studied the differences between intra-oral scanners in precision and trueness. He has found that it is almost impossible to perform any comparisons and meta-analyses between the scanner studies mainly because most studies use different methods, making the data and results incomparable. "From the scanning set-up to the superimposition analyses and statistics—all studies are so different that they cannot be compared," he explained.

According to Vág, it is obvious that a 10-year-old scanner cannot be compared to a recently introduced scanner, as there has been rapid technological development in that time. However, this conclusion cannot be made based on the research alone owing to varying methodologies.

Industry standards could help make studies more helpful and reliable

To tackle the problem of incomparable studies, Vág suggests that future studies, journals and companies should employ standardised tables for each new scanner and data set used in the study. "For example, there are standardised ISO sheets for testing dental filling materials, which everyone must follow for every measurement, such as strength and flowability," he said. "Our industry needs standardised methods for testing intra-oral scanners as well—especially now, when differences between the devices are subtle but nonetheless significant for the treatment outcome," Vág added.

Currently, it is also difficult to interpret the results of the intra-oral scanner studies for practical clinical work owing to the lack of a common methodology. Often there are only statistical differences in the study results, and these do not affect the end result of a treatment.

Vág noted: "If the trueness of one scanner is 50 µm, the dentist wonders if it could mean that there will be 50 µm gaps in a bridge manufactured using those intra-oral scans. The answer is no, even if the milling error is assumed to be zero, because the measurement method does not give a clinically meaningful value. We cannot actually say for sure. Additionally, the fabrication process includes so many different steps that can affect the outcome."

According to Dr Janos Vág, the dental industry "needs standardised methods for testing intra-oral scanners".

Current research

Vág recently authored a paper reporting on research in which he and a group of other researchers studied the effect of software updates and materials for intra-oral scanners. According to him, it was surprising to learn how little these matters had been studied before, and the analysis showed that they could have a significant impact on study results.

"It was surprising, because many researchers use different *in vitro* models to test intra-oral scanners, and they never even consider that the materials of the models might make a difference," he said. "At the same time, everybody knows from experience that software updates can make a huge difference. It can turn a scanner into a completely new device, but its effect had still not been studied."

> "Digital dentistry is not the future; it is the present."

Although the impact of materials and software updates proved to be notable in the study, the results do not mean that intra-oral scanner accuracy would not yet be sufficient for all indications or full-arch scans. In contrast, the general problem with scientific studies is the time it takes for them to be published, during which a scanning system's software might have been updated several times. "The process from creating the experiment to analysing the results and writing the paper takes a long time," Vág said. "When a study is published, the data might already be out of date due to software updates. This way, a scanner tested in a study might already be much better than what we see in the literature," he added.

Academic research is nevertheless still needed to convince the masses of the reliability of digital dental solutions. "Once there is no more feedback from clinicians, meaning every restoration fits, there will be no more need for intra-oral scanner accuracy research," Vág declared.

“The future is certainly looking bright”

An interview with Heikki Kyöstilä, chairman and CEO of Planmeca

By Claudia Duschek & Jeremy Booth, Dental Tribune International

Heikki Kyöstilä founded Planmeca in 1971. As the company marks its 50th birthday, Dental Tribune International asked Kyöstilä if he had ever considered selling the successful dental business, to which he replied: “Quite frankly, no.” *(All images: © Planmeca)*

This year, Planmeca is celebrating 50 years of contributions to modern dental practice. Many of our readers will know Heikki Kyöstilä, chairman and CEO of the Finnish dental manufacturer. Kyöstilä has been credited with putting Finland on the global dental map, and he has remained humble and customer-focused even as Planmeca set sales records and grew into a household name in dentistry. Dental Tribune International spoke with Kyöstilä to find out more about Planmeca’s achievements and about the man who founded one of the largest dental manufacturers in the world.

Mr Kyöstilä, you founded Planmeca in 1971 as a small-scale business; however, you quickly adopted a global approach. What was the rationale behind the founding of the company and what have been the greatest obstacles so far during its development?
Back in the 1960s, when I was working as a sales representative for a Finnish dental supply company, almost all dental products sold in Finland were imported. I realised that—especially when it came to patient chairs—the design and ergonomics of these products could easily be improved. That is why I decided to set up my own business. I thought, “Why not start manufacturing products of our own?”

The beginning was financially tough, since Finnish banks did not easily grant loans to start-up companies. I had to sell my sailing boat—my only possession, back then—in order to raise an initial capital of 5,000 Finnish marks, which is roughly the equivalent of €7,000 today.

However, having realised that the Finnish dental market simply was not big enough to build upon, I immediately aimed for the international market. Today, there are only around 4,000 dental professionals in Finland, whereas the number is close to 2 million globally. Luckily, I had the opportunity to take part in the International Dental Show in Munich in 1971. I exhibited my first products at the fair—an ergonomic dental stool and an instrument cabinet.

One of the biggest challenges in the beginning was simply putting Finland on the map and getting the word out about Finnish dental products. It was not only our company that was unknown but also our country of origin. Many of our customers had no idea where we were located; however, little by little, we began to gain a foothold in the industry.

What have been the greatest milestones in the history of Planmeca?
Businesswise, I would say that the achievement that I am personally the proudest of is that of having secured the largest individual sales deals in the history of dentistry. Planmeca entered the US market in 1983 with the sale of 10,000 patient chairs, and we delivered over 1,000 dental units to Saudi Arabian dental institutions in 2012.

In terms of technological innovations, one of our most significant milestones was the development of the Planmeca Dimaxis all-in-one software concept in the 1990s. It really was a groundbreaking and bold innovation at the time and was launched long before the term “software ecosystem” became a buzzword.

The Dimaxis concept paved the way for many new ideas that would further improve the daily dental workflow.

I am also extremely proud of our algorithm expertise. We have already managed to lower patient doses considerably and cancel from 3D images the effects of patient movement. We continue to work tirelessly to keep introducing new innovative algorithms that will further improve image quality and help to provide the best basis for diagnosis.

Today, Planmeca is one of the world's largest privately-owned dental manufacturers. Have you ever been tempted to sell the business or to consider consolidation with a larger dental group?
Quite frankly, no. Naturally, we have received many offers over the years, but selling a company that is the result of the life's work of so many people is not a decision one would take lightly. We also want to preserve our independence—the independence to change our course, if needed, to make fast decisions and product modifications based on the feedback that we receive from customers, and to invest in new companies and product development.

> "For me, above all else, financial success means that I am able to secure the workplaces of my staff and create new career opportunities for young people."

Planmeca rapidly expanded its international business as early as the 1980s with the establishment of subsidiaries in the US, Italy and Sweden; and yet your headquarters has remained in Helsinki. How has being located in Finland contributed to the success of the company and how important has investment in the national economy been for you?
I have always believed in Finnish know-how and education. Despite our global success, I wanted to keep the company's production located in Finland in order to preserve the agility, low hierarchy and entrepreneurial spirit that has defined the company from its early days. When everything is in close proximity, it is so much easier to make fast decisions and product modifications. Also, Finnish design is recognised around the world, and this has always been one of our key competitive advantages.

Planmeca has come a long way since Chairman and CEO Heikki Kyöstilä exhibited the first Planmeca products at the International Dental Show in Munich in 1971.

For me, above all else, financial success means that I am able to secure the workplaces of my staff and create new career opportunities for young people in Finland.

What is a typical working day for Heikki Kyöstilä?
Before the pandemic, I used to spend around 100 days every year travelling for business—meeting our customers and partners around the world. Meeting them in person has always been the spice of my working career. Naturally, those meetings are now taking place online.

Every day is different in this fast-paced company and industry. I really like to take the time to talk to my staff, to visit our production facilities and to stay up to date with whatever is going on in each department—whether it be product development, design, marketing, production or human resources.

What do you do when you're not running one of the world's largest dental companies?
My workdays are still quite long; for me, however, the dental business is both a career and a hobby. When I do have the time, I enjoy playing golf—in Helsinki in the summer and in Spain in the wintertime.

Despite the economic consequences of the COVID-19 pandemic, the Planmeca Group achieved sales of €764 million in 2020. How has Planmeca stayed strong throughout the last twelve months and what kinds of changes has the company undergone so far during the pandemic?

Heikki Kyöstilä has been in the healthcare business since the 1960s. "For me, Planmeca is a way of life and I certainly do not see retirement as an option anytime soon. I want to continue to stay close to my customers and staff, and I want to be involved in everything that is going on in the company. Working together with dental professionals towards a mutual goal of better patient care is truly rewarding."

"(The) need for dental care has certainly not diminished despite the changing world."

No one could have imagined the events of 2020—it was a year unlike any other. They say that necessity is the mother of invention, and we certainly had to discover new ways of working and of interacting with our customers. When the pandemic began, we quickly realised that we must move customer interactions online. As a starting point, we organised a full series of webinars in several different languages as part of our new Time to Learn training concept. These webinars have allowed our customers to further improve their expertise and to make the most of their Planmeca equipment. Webinars have proved to be an effective way for us to cover highly topical themes such as infection control. We have already organised over 100 webinars in different languages.

All in all, we have been lucky that many of our customers have been able to keep their services open most of the time—at least partly—and the need for dental care has certainly not diminished despite the changing world.

Before the pandemic, Planmeca participated in thousands of dental events, trade fairs and congresses worldwide. How have you managed to build and maintain relationships with your customers and partners over the past months?
Indeed, it has always been very important for us to meet customers at events around the world and, especially, to welcome guests here in Helsinki. Before the pandemic, thousands of dental professionals visited our headquarters every year. This has not been possible during the pandemic and we have had to arrange these meetings virtually, which has actually brought us even closer to our customers in many ways.

For example, we took our popular Digital Dentistry World Tour online for the first time ever. It was a completely new type of dental event that was streamed in eight languages. Thousands of viewers from over 100 countries were able to tune in at the same time, and it was quite exciting to meet so many of our customers at once.

What lies in the future for Planmeca, and where do you see the company's greatest potential for growth in the near term?
The future is certainly looking bright. We have several interesting dental and medical projects underway in our R & D department. We continue to deepen our knowledge, expertise and involvement in different specialty areas, such as orthodontics, medical imaging and new 3D applications. This will allow us to explore new technological possibilities and business opportunities.

At the age of 75, is retirement an option for Heikki Kyöstilä?
For me, Planmeca is a way of life and I certainly do not see retirement as an option anytime soon. I want to continue to stay close to my customers and staff, and I want to be involved in everything that is going on in the company. Working together with dental professionals towards a mutual goal of better patient care is truly rewarding.

EU wakes up to new medical device regulations

By Jeremy Booth, Dental Tribune International

After a three-year transition period and a delay of 12 months owing to the SARS-CoV-2 pandemic, new regulations now apply for medical devices for human use in the European Union. The new and stricter rules mainly apply to those who manufacture, import and sell medical devices; however, dental professionals should be aware that distributors must keep a register of any complaints or reports received from health professionals and patients relating to devices and forward these complaints to the device manufacturer or importer.

Commonly referred to as the MDR (Medical Device Regulation), Council Regulation (EU) 2017/745 came into effect on 25 May 2017 with a grace period of three years. The MDR repealed Council Directive 93/42/EEC, known as the Medical Device Directive (MDD), and Council Directive 90/385/EEC, which regulated active implantable medical devices in the EU. An additional directive—Council Regulation (EU) 2017/746, known as the *In Vitro* Diagnostic Regulation (IVDR)—came into effect in tandem with the MDR and is set to regulate *in vitro* diagnostic medical devices when a five-year transition period expires in May 2022.

The European Commission, in April last year, announced a 12-month delay of the application of the MDR. A statement from the commission explained that the decision was made so that member states, health institutions and commercial operators in the medical devices industry could prioritise efforts to combat the pandemic. "Shortages or delays in getting key medical devices certified and on the market are not an option right now," commented Margaritis Schinas, vice president for promoting our European way of life, in the media release. Indeed, the MDR is denser and more complex than its predecessor and transposing the directive has been a mammoth task for all stakeholders.

What will change under the EU's new medical device regulations?

Compared with the repealed MDD, the MDR changes device scope and the way that medical devices are classified. For example, the legislation includes new rules for devices that use hazardous substances and for software applications. Some devices have been reclassified under the MDR, and the directive regulates certain devices that were previously exempt from medical device regulations.

The MDR also brings changes to the oversight process. Under the new directive, only notified bodies that are designated under the MDR can verify medical devices as being fit for use in the EU. Notified bodies that were designated under the MDD must be newly designated under the MDR. According to a white paper published by the Brussels-based European business law firm contrast and the Association of Dental Dealers in Europe—seen by Dental Tribune International—the public health situation in Europe has hampered efforts to designate enough notified bodies. Since some notified bodies that were designated under the MDD may not receive designation under the MDR, it is expected that some medical device manufacturers will need to change notified bodies.

Other examples of the various changes brought by the MDR include a redefined economic operator concept, which differentiates between manufacturer, authorised representative, importer and distributor. All economic operators must conform to the directive and the responsibilities of these stakeholders are expected to increase.

The MDR also brings heightened post-market surveillance to the medical devices market, and EU member states are required to adopt penalties for any infringements of its requirements. Unique identifiers must be placed on medical devices so that they can be registered on a new European database. Named EUDAMED, the database will record the registration of devices, the accredited notified bodies, and also certificates and reports of incidents relating to the safety and clinical performance of devices.

Distributors will be required to keep a record of any complaints or reports that they receive from health professionals and immediately forward them to the manufacturer and/or importer of the device in question. Distributors of medical devices must also keep a register of non-conforming devices and devices that were recalled or withdrawn from sale.

Editorial note: The full text of the MDR is available online (https://eur-lex.europa.eu/eli/reg/2017/745/oj).

With their partnership, Dentsply Sirona and 3Shape aim to provide solutions that benefit clinicians and patients.

Dentsply Sirona and 3Shape announce strategic partnership

By Dentsply Sirona & 3Shape

Dentsply Sirona announced recently that it has entered into a partnership with 3Shape, a Danish developer and manufacturer of 3D scanners and CAD/CAM software solutions. The first step of this partnership focuses on a facilitated collaboration for better access between 3Shape's intraoral scanner 3Shape TRIOS and Dentsply Sirona's SureSmile Aligners.

As part of their steps to innovate dentistry and lead the digital transformation, Dentsply Sirona and 3Shape have agreed to work on multiple strategic opportunities in order to improve digital dentistry and oral health. In the immediate term, the partnership will focus on a collaboration for better access of TRIOS users to SureSmile Aligners. Opening the platforms to the 3Shape system allows dental professionals to benefit from greater choices, more flexibility and smoother workflows in the future.

"The collaboration with 3Shape supports our goal of tailoring our product solutions to the needs of our customers. We want to give dental professionals real added value with digital technologies that can be easily integrated and are an intelligent advancement in their routine workflows," said Don Casey, chief executive officer of Dentsply Sirona. "Open systems allow the integration of new functions into existing practice and laboratory structures. We are convinced that we have an excellent partner for this with 3Shape and look forward to additional partnership opportunities in the future."

TRIOS intraoral scanner.

For 3Shape, the new partnership means an additional service for its customers. “3Shape’s goals and solutions are based on an open ecosystem philosophy and on working together with other companies to provide better and more cost-effective solutions that will benefit clinicians and their patients,” explained Jakob Just-Bomholt, chief executive officer of 3Shape. “We’re very excited that TRIOS users can now take advantage of the leading SureSmile Aligners treatment through a smoother workflow,” he added.

The partnership between Dentsply Sirona and 3Shape opens opportunities to develop together in selected areas. The connection from 3Shape’s TRIOS scanner to SureSmile will be improved and streamlined to allow 3Shape customers smoother access to the fast-growing clear aligner system. Pioneered by orthodontic specialists, SureSmile Aligners are designed using advanced software to ensure they fit perfectly and deliver the exact tooth movements needed to achieve great results in the shortest possible time. The cloud-based SureSmile software offers various options for treatment planning and implementation. Unlike the situation with conventional concepts, dental practitioners always maintain control of the treatment process. The 3Shape TRIOS intraoral scanner gives clinicians a great starting point for their clear aligner workflow now seamlessly integrated with SureSmile software.

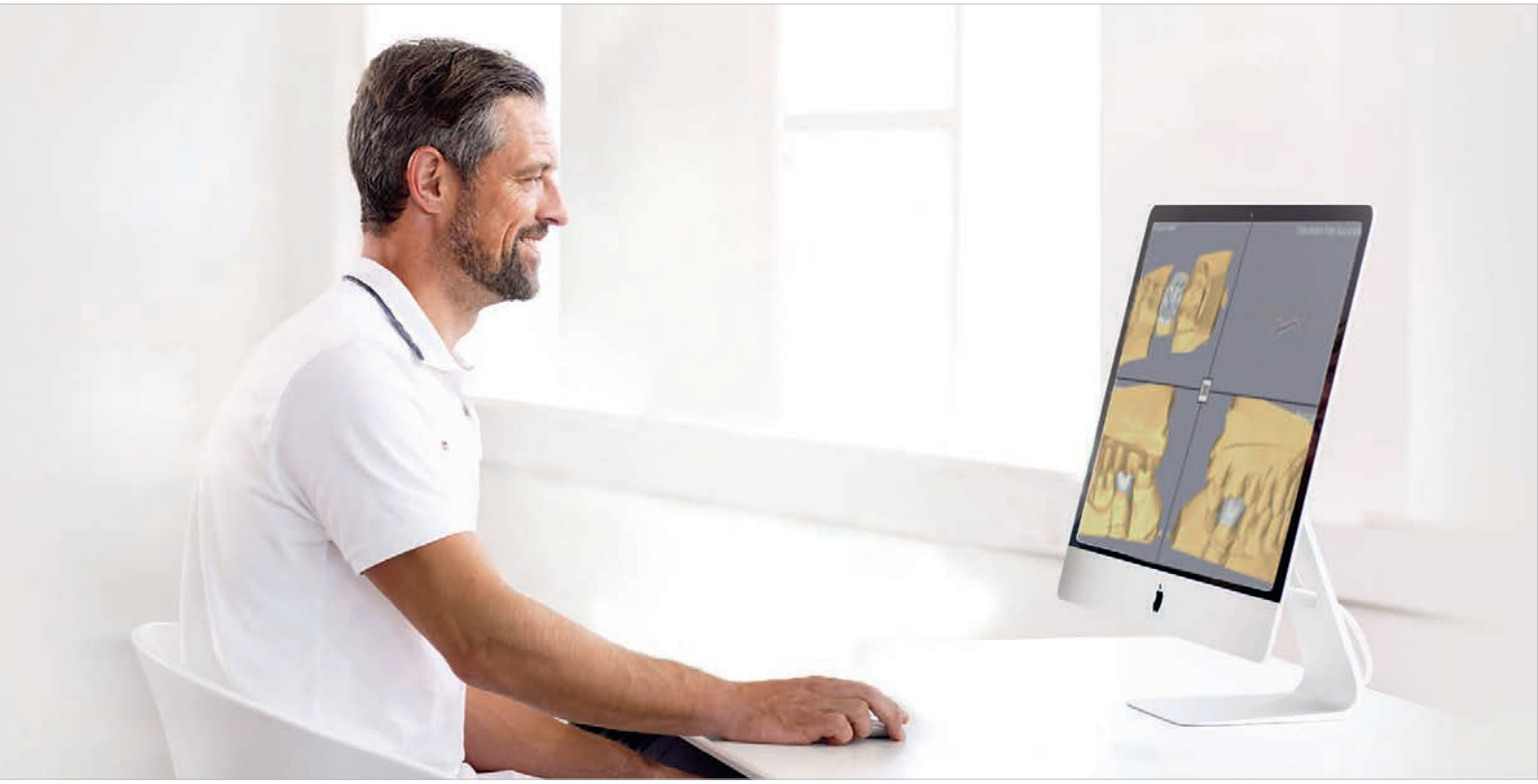
SureSmile Aligner.

Dr. Terri Dolan, vice president and chief clinical officer at Dentsply Sirona, is convinced that dental professionals will find this partnership very valuable. She stated: “Open platforms and smooth workflows are beneficial for a range of treatment options and add to our core goal of offering clinicians the possibility to work with different workflows and partners. Finally, this collaboration helps patients reach their desired outcome—both sooner and smarter.”

Dentsply Sirona | 3shape

3Shape Automate: Redefine your approach to digital design

By Brendan Day, Dental Tribune International



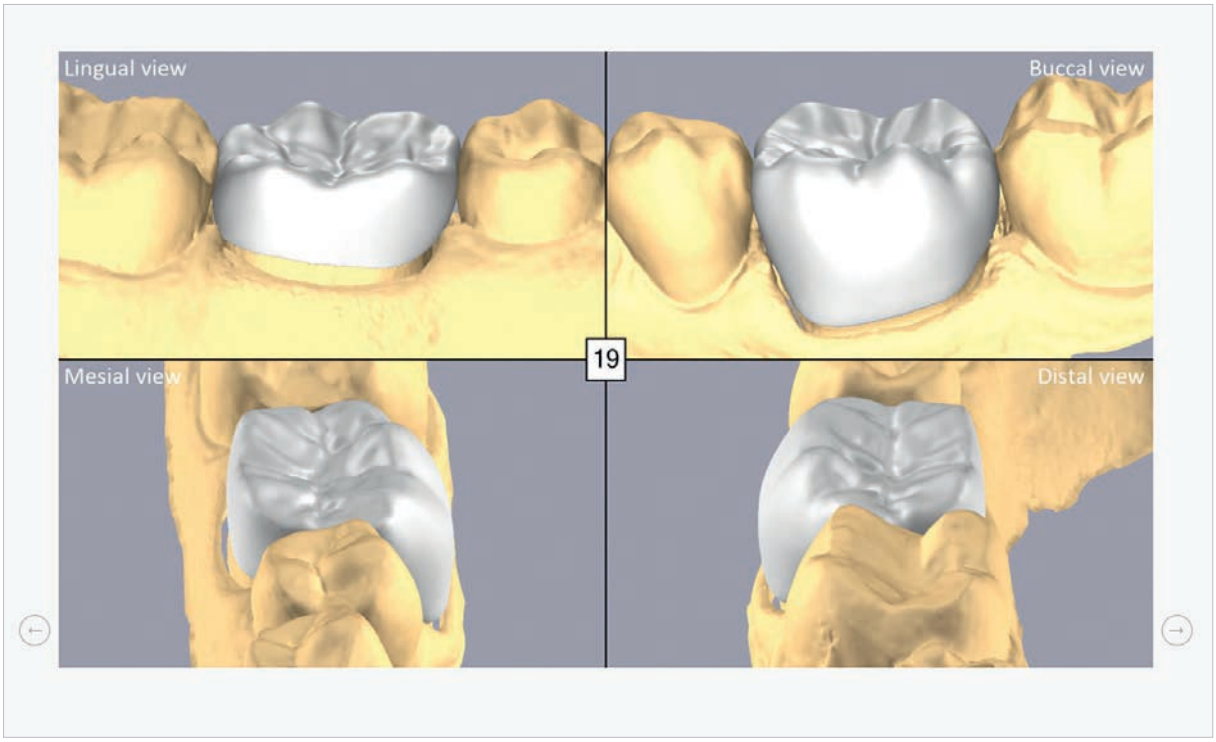
3Shape Automate makes it easier than ever for dental laboratories to outsource restorative design.

Given its emphasis on research and development, 3Shape has always been focused on delivering innovative market-leading technological solutions to dental professionals. In keeping with this aim, the company has now launched 3Shape Automate, the world's first digital dental design platform to be exclusively powered by artificial intelligence (AI).

Hosted on the 3Shape website, 3Shape Automate makes it easier than ever for dental laboratories to outsource restorative design when dealing with an unforeseen number of incoming orders. Its intuitive self-service model allows for technicians to set up an unlimited number of orders, put in their customised design preferences, upload scans and select their desired turnaround time. 3Shape Automate's AI technology then creates and delivers the design proposals at the selected time—regardless of how many designs have been ordered.

"3Shape Automate has three key benefits for dental labs: speed, consistency and scalability. But for me, personally, I think that the biggest advantage is its scalability," explained Dr Karl Hollenbeck, head of AutodontiX, a 3Shape division dedicated to developing AI technology applications within dentistry.

He continued: "Labs experience rush periods or have times when they need to cope with an overflow of orders. There are times when a designer is out sick, on vacation, or maybe he or she is just in a jam and doesn't want to work overtime. In these situations, 3Shape Automate is the answer."



The technology powering 3Shape Automate has already been used to create more than 70,000 restorative designs. *(All images: © 3Shape)*

According to Hollenbeck, many of the dental laboratories that have used 3Shape Automate "have raved about how much more cost-effective their manufacturing processes are".

"They say blank management is much more efficient because you can collect cases and simply match them with the right blanks," he remarked.

"Since 3Shape Automate is AI-driven and open 24/7, you can upload hundreds of cases to the platform and still choose for the designs to be delivered in five minutes. And they will definitely be ready in five minutes."

An outstanding acceptance rate

Prior to its launch, 3Shape Automate was rigorously tested for several months under the name Express Crown by the 3Shape-owned design service FullContour. Though small tweaks were made along the way to optimise the platform, its predictable AI-driven results have already proved to be extremely popular with participating dental technicians, according to FullContour CEO Rob Laizure, Jr.

"We rolled the platform out slowly, but it has now already been used to create more than 70,000 designs," he said. "In addition, over 90% of the time, they review these designs and accept them without making any modifications. Since the technicians only pay for the designs that they accept and download, this figure really shows how effective 3Shape Automate is for outsourcing your restorative design needs," Laizure, Jr added.

In Laizure, Jr's opinion, another factor contributing to 3Shape Automate's high rate of design acceptance is the platform's easy-to-navigate interface. When users log in for the first time, they are presented with a guided tour of the website that takes them through the instructions for use, design preferences, turnaround times and more.

"3Shape Automate has been designed to be extremely user-friendly," he said. "It guides technicians through everything that they really need to know to be able to upload their first case without having to call for support or watch any walk-through videos beforehand. Not only is the AI behind this service extremely powerful, it's also very easy to use."

Try 3Shape Automate for free

The 3Shape Automate platform is currently available for monolithic single premolar and molar crowns and can be accessed 24/7 in the US as well as in several European countries. The full list of these countries is available online at www.3shape.com/en/services/automate.

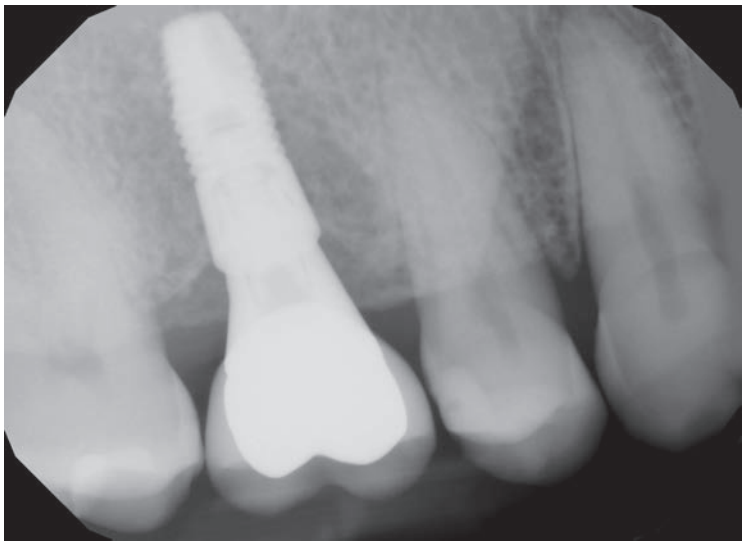
For dental technicians interested in trialling this new design service, 3Shape is providing an introductory offer of €40/US$50 in credit (details available online).

Patient-specific screw-retained single-tooth restorations

Atlantis CustomBase solution: Never go standard

Atlantis CustomBase solution.

Each implant patient is unique and one size does not fit all. The Atlantis CustomBase solution for patient-specific screw-retained single-tooth restorations provides a solid foundation for predictable outcomes. The solution is available with an angled screw access channel so that the clinician can optimally position the screw access channel to help improve aesthetics, function and installation.



Atlantis CustomBase solution designed with emergence profile and patient-specific design of the abutment core and height, for optimised retention and support of the crown.

With the Atlantis CustomBase solution, the parameters expected from a screw-retained solution have been widened, from design capabilities and unique angled access installation to implant compatibility.

The parameters for minimum risk and maximum success include patient-specific design of core and height for optimised retention and support; optimal positioning (30°) of the screw access channel for improved aesthetics, function and installation; customised emergence profile for enhanced tissue management; and placement of material junction of abutment and crown considering biological principles.

Eighty published clinical studies and case reports document the success of using Atlantis abutments on different implant platforms. In addition, Atlantis solutions are backed up by a comprehensive warranty.

www.dentsplysirona.com/atlantis

Extension of the integrated Ceramill CAD/CAM workflow

Digital solutions lead the way into the dental practice

Through its Ceramill Direct Restoration System (DRS), Amann Girrbach is extending its integrated digital workflow to the dentist, thus closing the existing communication gap between the dental practice and the laboratory. In this process, both partners contribute their core competencies to provide patients with definitive and functional dentures even more quickly and in a less complicated manner—smaller units are also possible on the same day, depending on the local distance between the two partners.

Depending on the type of collaboration desired, three team workflows are available in combination with the corresponding Ceramill DRS kits. In each case, the central basis of these workflows is the new AG.Live digital platform, which offers both infrastructure and patient case management at a realisable consistency and efficiency previously unattainable and takes the flow of information and work between the practice and the laboratory to an entirely new level.

The Ceramill DRS Connection Kit is the basic and entry-level variant, with which dentists and laboratories can take full advantage of digitisation. It consists of the Ceramill Map DRS intra-oral scanner, the associated scan software and the connection to AG.Live. Any order data, including all the required information, can therefore be shared seamlessly and in real time with the laboratory via AG.Live. This eliminates the need for handwritten job sheets and conventional impressions. All that is physically necessary is transport of the restoration to the practice for insertion in the patient's mouth, even on the same day in the case of simple restorations. This leads to a better dental experience for the patient and ultimately attracts new patients to the practice and generates more orders for the laboratory.

If the preferred material is zirconia, the Ceramill DRS High-Speed Zirconia Kit, consisting of the Zolid DRS high-speed-sintering zirconia and the corresponding Ceramill Therm DRS sintering furnace, can optimally support the laboratory in fabricating straightforward zirconia restorations on the same day.

To provide patients with restorations even quicker in a further step, the system can be expanded in the dental practice with the Ceramill DRS Production Kit at a later stage. This allows simple restorations to be fabricated in the practice and placed in the patient's mouth in a single session.

Further information can be found at **https://expo.aglivecon.digital/en/planets/ceramill-drs**.

MIS announces new dates for its fifth global conference

By MIS Implants Technologies

After the long-awaited announcement of the new dates for the fifth MIS Global Conference, the MIS team is hard at work getting ready for this global meeting. As major global events were affected by the COVID-19 pandemic, which led to uncertainty and rescheduling, the conference is now planned to be held from 19 to 22 May 2022 in Marrakech in Morocco and will include a three-day scientific programme of lectures by world-renowned experts, hands-on workshops and exciting social events.

World-class speakers and experts in their fields

Like for previous global conferences, the scientific committee is determined to present the most relevant and important topics and cases as part of the scientific programme. Speakers have been carefully selected to share new concepts, breakthroughs and a view into their vast collective experience and knowledge.

Exotic views and spellbinding entertainment

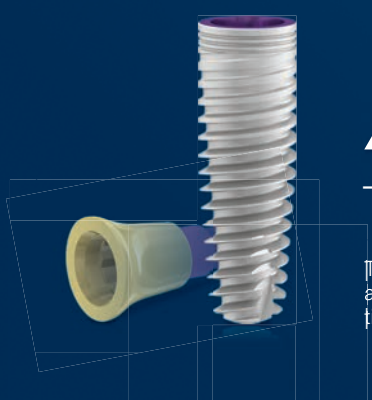
With a location such as Marrakech, conference guests can count on being met with a rich pallet of beautiful and colourful sights, exotic tastes and smells, and unique experiences to be remembered. The meticulously planned and spectacular evening affairs, which characterise every MIS Global Conference, are sure to be part of this highly anticipated event.

Twenty-five years of making it simple

Last year, MIS Implants Technologies celebrated its 25th anniversary. During these two and a half decades, the company has taken on countless challenges, explored many developments and celebrated numerous breakthroughs. Today, MIS is an established global business and one of the major competitors in the dental implant market.

For further info and details, please visit the MIS website www.mis-implants.com.

IT'S SIMPLE WHEN YOU HAVE ALL THE OPTIONS



mis® | C1

THE CONNECTION FOR PREDICTABLE BIOLOGY. **MAKE IT SIMPLE**

The MIS C1 conical connection implant system offers uncompromising accuracy, with high initial and biological stability and a safe, yet simple, procedure. A consistent concave emergence profile of the C1 prosthetic components improves soft tissue esthetic results. Learn more about the C1 implant and MIS at: www.mis-implants.com

International events

Expodental

9–11 September 2021
Rimini, Italy
www.expodental.it/en

EAO Digital Days

12–14 October 2021 (online event)
Italy
www.eao.org/congress

IDS—International Dental Show

22–25 September 2021
(onsite and online event)
Cologne, Germany
www.ids-cologne.de

Dentex—International Dental Equipment Exhibition

21–23 October 2021
Brussels, Belgium
www.dentex.be/en

FDI World Dental Congress

26–29 September 2021 (online event)
Australia
www.fdiworlddental.org/fdi-world-dental-congress

AAP Annual Meeting

4–7 November 2021
Miami, US
www.am2021.perio.org

Dental-Expo

27–30 September 2021
Moscow, Russia
www.en.dental-expo.com/dental-expo-en

ADF—Conference and Exhibition

23–27 November 2021
Paris, France
www.adfcongres.com/en

CEDE—Central European Dental Exhibition

7–9 October 2021
Łódź, Poland
www.cede.pl/en

GNYDM

28 November–1 December 2021
New York, US
www.gnydm.com

How to send us your work

Please note that all the textual components of your submission must be combined into one MS Word document. Please do not submit multiple files for each of these items:

- the complete article;
- all the image (tables, charts, photographs, etc.) captions;
- the complete list of sources consulted and
- the author or contact information (biographical sketch, mailing address, e-mail address, etc.).

In addition, images must not be embedded into the MS Word document. All images must be submitted separately, and details about such submission follow below under image requirements.

Text length

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

We can run an unusually long article in multiple parts, but this usually entails a topic for which each part can stand alone because it contains so much information.

In short, we do not want to limit you in terms of article length, so please use the word count above as a general guideline and if you have specific questions, please do not hesitate to contact us.

Text formatting

We also ask that you forego any special formatting beyond the use of italics and boldface. If you would like to emphasise certain words within the text, please only use italics (do not use underlining or a larger font size). Boldface is reserved for article headers. Please do not use underlining.

Please use single spacing and make sure that the text is left justified. Please do not centre text on the page. Do not indent paragraphs, rather place a blank line between paragraphs. Please do not add tab stops.

Should you require a special layout, please let the word processing programme you are using help you do this formatting automatically. Similarly, should you need to make a list, or add footnotes or endnotes, please let the word processing programme do it for you automatically. There are menus in every programme that will enable you to do so. The fact is that no matter how carefully done, errors can creep in when you try to number footnotes yourself.

Any formatting contrary to stated above will require us to remove such formatting before layout, which is very time-consuming. Please consider this when formatting your document.

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

Please place image references in your article wherever they are appropriate, whether in the middle or at the end of a sentence. If you do not directly refer to the image, place the reference at the end of the sentence to which it relates enclosed within brackets and before the period.

In addition, please note:

- We require images in TIF or JPEG format.
- These images must be no smaller than 6 x 6 cm in size at 300 DPI.
- These image files must be no smaller than 80 KB in size (or they will print the size of a postage stamp!).

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Questions?

Magda Wojtkiewicz
(Managing Editor)
m.wojtkiewicz@dental-tribune.com

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Imprint

Publisher and Chief Executive Officer
Torsten R. Oemus
t.oemus@dental-tribune.com

Editor-in-Chief
Dr Scott D. Ganz

Managing Editor
Magda Wojtkiewicz
m.wojtkiewicz@dental-tribune.com

Designer
Franziska Schmid

Copy Editors
Sabrina Raaff
Ann-Katrin Paulick

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Executive Producer
Gernot Meyer

Advertising Disposition
Marius Mezger

Art Director
Alexander Jahn

International Headquarters

Dental Tribune International GmbH
Holbeinstr. 29, 04229 Leipzig, Germany
Tel.: +49 341 48474-302
Fax: +49 341 48474-173
General requests: info@dental-tribune.com
Sales requests: mediasales@dental-tribune.com
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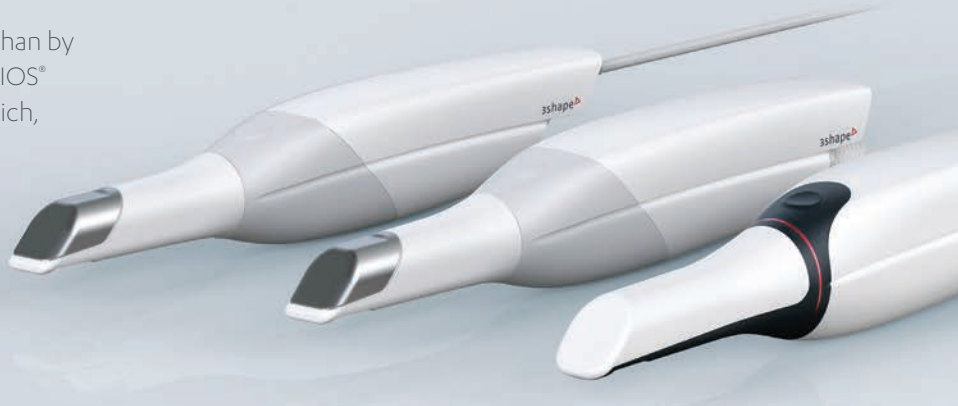

1. 80% of studies (4 of 5) show patients choose digital impressions over conventional. 88% of studies (7 of 8) show clinicians choose digital impressions over conventional (Chandran et al. 2019).

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1. Measuring method: JIS Z 8802:2011

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