SPECTRUM
dialogue
THE VOICE OF TECHNO-CLINICAL DENTISTRY
Vol. 24, No. 1 – January/February 2025

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Planning for the Year Ahead and Beyond!

Ettore Palmeri, MBA, AGD B.Ed., BA

A Happy New Year to all our readers; I wish you health, success and joy.

As we step into a new year, we realize that the Nea Year ritual symbolizes more than a flip of the calendar page, it's an opportunity to reflect on the past, celebrate our progress, and chart a thoughtful course for our personal and professional growth. In the first editorial of the year, I would like to delve into some key elements of planning that are the cornerstone for success; highlighting and setting clear intentions and following up with actionable strategies can turn New Year resolutions into lasting achievements.

As we strive to achieve personal growth and reach professional milestones, the power of a well outlined plan cannot be overstated.

As the dental industry continues to evolve, dental lab owners and technicians must plan strategically to stay competitive and grow sustainably. Below I outline key areas to focus on for the year ahead and beyond.

1. Embrace Technology

Invest in digital tools like CAD/CAM systems, 3D printing, and AI design software to enhance precision and efficiency. Conduct a technology audit of the lab, train your team, and stay informed by participating in industry events.

2. Focus on Sustainability

Adopt eco-friendly practices to reduce waste and energy consumption. Use sustainable materials and invest in energy-efficient equipment to align with growing demand for environmental responsibility.

3. Expand Services

Diversify your offerings to your dentist clients to include implant-supported restorations, clear aligners, digital dentures, and aesthetic consultations. Assess market demand and invest in training and equipment.

4. Strengthen Client Relationships

Engage with your clients and with potential regularly to understand their needs. Offer education, gather feedback, and showcase your lab's capabilities through seminars or consultations.

5. Prioritize Workforce Development

Invest in your team through training, certifications, and wellness initiatives. Develop leadership within your staff to ensure smooth transitions if changes occur.

6. Manage Economic Challenges

Regularly review expenses, adjust pricing, and build financial reserves to navigate economic fluctuations. Proactive financial management is essential.

7. Boost Marketing and Branding

Enhance your online presence with a modern website, social media content, and client testimonials. Highlight your knowledge, expertise, and success stories to attract new clients.

8. Stay Compliant

Adhere to regulations and industry standards through regular audits, updated documentation, and proactive monitoring of changes.

9. Prepare for the Future

Plan for long-term success by considering market trends, investing in research and development, and collaborating with industry partners.

By focusing on these strategies, your lab can thrive in an evolving industry. Make 2025 a year of growth and success. Sd

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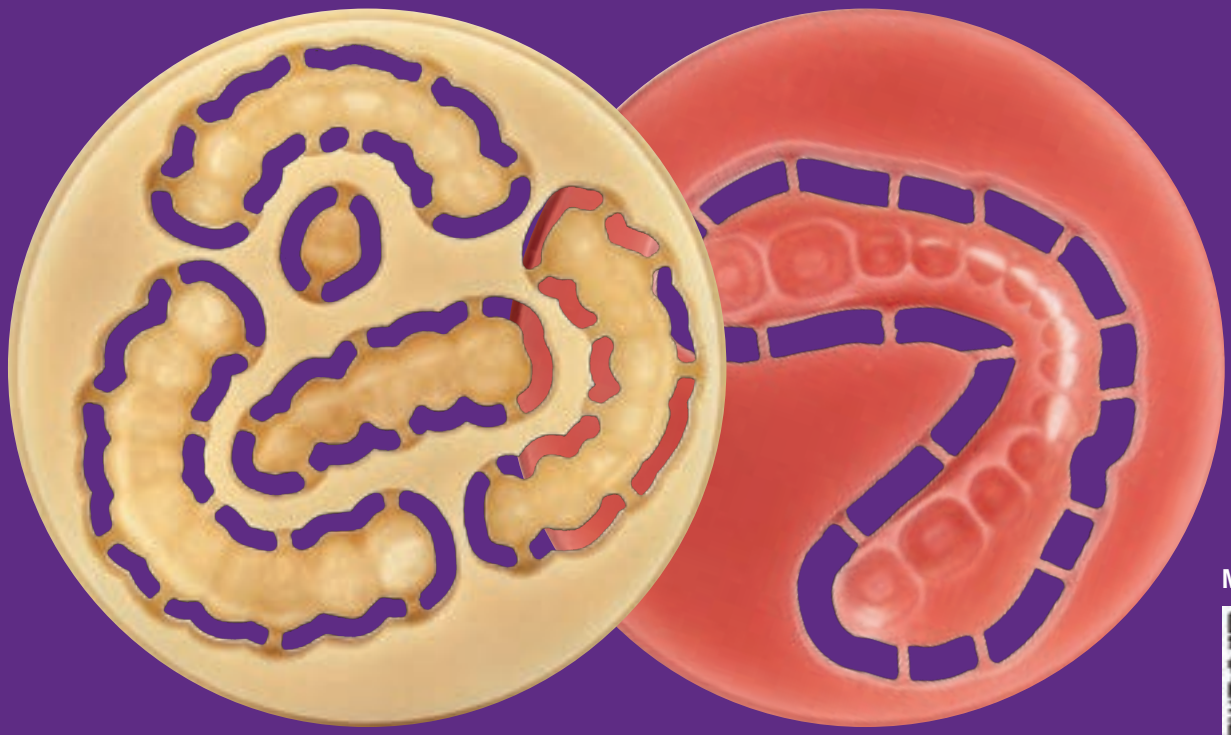

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The Immerse Opportunity of Digitalization

"We cannot change the wind, but we can adjust the sails."

— Aristotle

Andreas Nusser, Managing Director, Erhardt Dentaltechnik

We live in a world that could hardly change faster. Digitalization has revolutionized nearly all areas of our lives, and dental technology is no exception. This transformation brings a remarkable improvement in precision and efficiency, opens doors to new possibilities, but also presents challenges.

Digitalization has profoundly transformed dentistry. From digital impressions to CAD/CAM technologies and 3D printers, the possibilities seem endless. Digital processes offer unprecedented precision and efficiency. Dentists can now create detailed scans, transmitted in real time to the lab. This not only reduces the margin of error but also simplifies the entire process chain. The only limiting factor is the user—by which I mean not only the clinicians at the 10-scanner but also the dental technicians working with design software, milling machines, and 3D printers.

Technological progress requires continuous investment and training. Only through regular further education and adaptation to the latest developments can practices and labs fully leverage the advantages of digitalization.

A major debate in the dental world revolves around whether it's better to outsource certain processes or keep them in-house. Outsourcing offers the advantage of benefiting from specialized service providers, who often have state-of-the-art equipment and deep expertise. This can be especially attractive for smaller practices and labs that lack the resources for complete in-house production. On the other hand, in-house production enables practices and labs to be more flexible in responding to individual patient needs and offering customized solutions.

Whether outsourcing or in-house production, the key to maintaining high quality lies in constant development. Technological progress marches on, and what is considered state-of-the-art today may be outdated tomorrow. To stay up-to-date, dental technicians and dentists must continuously educate themselves and invest in new technologies. It is not enough to rest on past successes. Only through a proactive approach and a willingness to always seek improvement can the high quality that patients expect from modern dental practices and labs be ensured.

Dentistry is in an exciting phase of change. Digitalization offers immense opportunities but also requires adaptability and ongoing education. Whether outsourcing or in-house production, both approaches have their pros and cons. The key to success lies in always being open to new developments and tirelessly working to improve one's skills and technologies. Only in this way can we continue to ensure the high quality we strive for in the future.

Let's embrace the challenges together and seize the opportunities that modern dentistry offers. The future is digital, and it has already begun. SD

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Tune Up Your Practice Management System for the Future

Ettore Palmeri, MBA, AGD B.Ed., BA

Accounting systems and financial statements provide you with valuable information about the financial health of your lab. It is important to know what the numbers mean, how they affect the business, and what you can do to make improvements. Knowing the numbers and understanding the context and meanings as well as creating timely action plans are the keys to long term sustainable success.

Erosion of practice management systems may occur silently and go unnoticed. Management systems within the practice must be responsive to the changing marketplace and proactively direct the actions of the people within the clinic. As owners, you need to recognize the hidden signals, identify the causes, and correct the breakdown of the systems quickly to protect the business from long-term effects of economic downturns. Uncovering inefficiencies that may exist, and discovering opportunities for improvement so we can take action now.

Incoming Work

The Incoming Work Schedule is the pulse of the lab. If the schedule falls apart, everything else follows. Communicating with your dentist clients and potential clients is important as it keeps you informed on their schedules. Having patients in the chairs receiving treatment is the only source of revenue-generating activity - everything else generates expenses. If they are busy, you are going to be busy.

As a team, you need to take proactive measures in bring cases in. Explanation such as "well everyone is sick" or "it is just that time of the year, what are you going to do?" Good question! What are you going to do as a team? It is not the time to be complacent; it is the time to take actions.

Practice Collections - Turn You Accounts Receivable into Accounts Received

It doesn't matter how much you are invoicing if you don't collect the fees for your services in a timely pre-established fashion. Accounts that over 90 days outstanding are considered uncollectable. That doesn't mean that you should write off all of your 90-day accounts, it simply means that someone needs to focus on this process and be accountable for the results.

One team member or AR person must take control of the accounts receivable. If there are accounts that have been outstanding for over 90 days, make those accounts a priority.

Overhead Expense Control

A well-run lab should operate between 45-55% overhead expenses or less (based on gross production before taxes). Monthly sundry costs (consumables) should not exceed 6-8% of monthly production and staff costs should range between 25-30%. Repairs and maintenance of your equipment should be less than 2% of production. If that figure is higher, then you need to look at how the equipment is being handled and maintained. It may also mean that your equipment is ageing and needs to be replaced, in which case you should start doing some capital planning for equipment replacement.

Repeat Business / Pre-scheduled Appointments

The best way to decrease expenses is to increase revenue. When you increase the revenue and collections of the practice, all of the benchmarks for success will align.

A great way to increase revenue is to have patients booked in the schedules, who keep their appointments, value the services and who are on active continuing care. Patients need

to understand that even when the work is completed their treatment still must continue. That is not the end of your relationship, it is the beginning of regular visits to the office to maintain the integrity of the work that was done and provide preventive services for the health of the gums and surrounding tissues, and so much more.

It is important to preschedule the return visits for patients and don't leave it up to them to call you. Patients will usually only call you if there is a problem and they are experiencing some kind of discomfort. Keep in mind that their service provided is not top of mind on a daily basis and most importantly, you are providing patients with a value added service by helping them to protect their investment by scheduling regular appointments with your office.

Human Resources Management

A good human resource performance management system with clear goals and measurable objectives will increase accountability and help your employees feel connected and committed to your success. Striking a balance between being involved with your team members enough so they feel your direction and support isn't easy. Employees want to be treated as people first and workers second.

One easy way to stay connected and keep the lines of communication open is to conduct daily (starters). Hold daily morning huddles at the same time every morning to ensure team communication that results in achieving production goals or system improvements. When team members regularly connect, the working environment will become motivating and encouraging. Happy employees affect the bottom line.

Empowering employees to improve your bottom line and increase your profitability is a three-step process:

1. **Empower yourself** by keeping your eye on the numbers. Establish an operating budget and focus on what is most important to you and your practice. When you see a system that is slipping, take proactive measures to correct the system now.
2. **Empower your clients** to make good, informed decisions. Reinforce the value of your services by using powerful communications. Confidently recommend materials and patient specific, patient centered and not insurance driven.
3. **Empower your employees.** Provide them with the time, tools, training, technology, and trust to help them communicate with your dentist clients with confidence.

To make sure that your management systems are running at maximum efficiency and effectiveness, check them often and look for the hidden signs of erosion. Make any necessary adjustments quickly and your lab will run like a well-oiled and well-maintained machine that will reward you with many years of sustainable growth and profitability. SD

Stay Calm, Don't Panic!

Dr. Lawrence (Larry) Gaum, DDS, FADSA, FICD, FADI, Diplomate: National Dental Board of Anesthesiology

For several years now, I have lived in a condo. There are always numerous notes in the mail room that I seldom read because most of them are unimportant and time consuming.

However, one recently caught my eye and I read the first few lines out of curiosity.

"STAY CALM, DON'T PANIC," it read, "in the event that you discover a fire in the building."

In essence, if your condo is rapidly burning and full of smoke and flames, remain calm and go make yourself a ham and cheese sandwich washed down with a nice cold beer. Forget the fire.....DON'T PANIC.

Like bloody hell!!

I would panic like crazy, and holler and scream, as I ran down the hallway shouting, FIRE, FIRE, FIRE.

And I ask this question of my fellow colleagues in dentistry at this time,

What would you do?

What would you do if you were extracting an upper molar and fractured the palatal root which ended up in the maxillary sinus?

I know the answer, you don't have to reply.

Your heart would begin to beat faster until you were in a state of tachycardia, your stomach would begin to sink as you became weak and ready to faint as your mouth became dry as a bone. You wouldn't be able to think straight and you would be in a state of PANIC.

Finally, you would refer the case out to a specialist but only after you experienced a great deal of stress and aggravation.

How could you have avoided this terrible situation?

Quite simply, be prepared for such things to happen.

How do you prepare?

One simple way in my clinical world is to take courses in oral surgery before trouble happens and panic sets in.

Be a Boy Scout, be prepared.

Post graduate courses will teach dentists proper surgical techniques, and also what cases not to attempt but send to a specialist to avoid panic.

I offer a 3-day hands on course in oral surgery that have received much positive feedback.

Over 20 years, I have trained 8,000 dentists who have taken my courses. They now perform surgery in their offices where as before, oral surgery was a mystery to them, they stayed away from all extractions, or if they attempted to do some extractions the stress level was extremely high.

And with reference to possible fires in your condos, participate in test runs with your neighbours and have sufficient fire extinguishers.

But, if a fire does happen, I can't guarantee you won't PANIC.

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A Must Read Book for Dental Technicians!

CAD/CAM in digital dentistry

the publication of the book "CAD/CAM in digital dentistry" fills a gap in the dental literature. The enormous speed of development in digital dentistry requires profound knowledge in the various areas of the of the digital workflow. The book provides a thread that runs from data acquisition, data processing to output using digital production techniques.

The target group includes dental technicians dentists, denturists as well as students and participants in postgraduate continuing education courses.

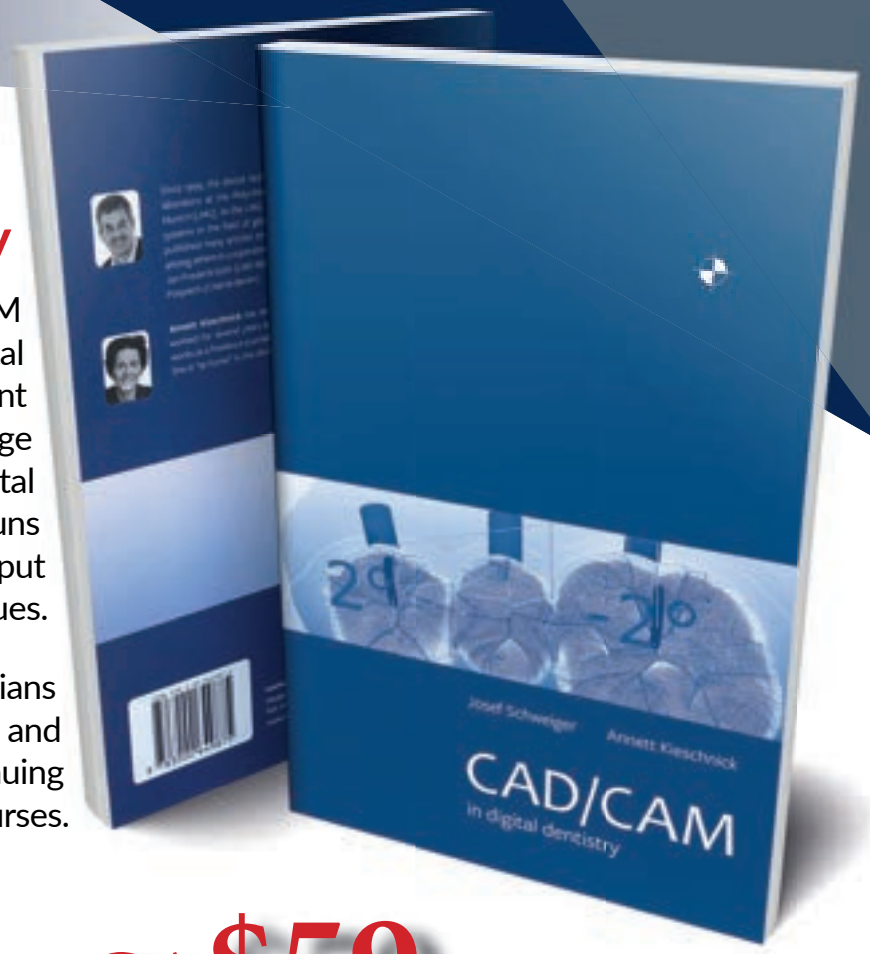

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Fig. 1: From left to right: Ralph Dittes, Claudia Stöhrle, Petra Pace, Mark S. Pace – Managing Directors and Partners Dentaurum

With the groundbreaking ceremony at Turnstrasse 36 in Ispringen, Dentaurum is creating the basis to generate further growth for the future. The global presence of the products plays an important key role in this. The building site of the Ispring-based dental technology manufacturer is located directly opposite the company's long-standing headquarters and will offer more space for production, administration, and sales.

A production hall and a three-storey building with production and office space will expand the existing operating areas and office buildings by about 30% and they will be connected to the main building by a bridge over road to avoid exposing the flow of goods and materials used in the production of delicate dental products to the weather. This would be especially true when transporting brackets and products manufactured using the MIM process, as the biocompatible feedstock is particularly sensitive to weather conditions.

Dentaurum is once again acting as a pioneer with these investments, contrary to the current restraint in the market. In recent years, the company already hired an average of 10% more employees, thus strengthening the regional and domestic economy. A constantly changing organizational structure, adapted to current political and economic conditions, gives the company the opportunity to grow in a difficult economic environment.

Sustainably focused construction

With this structural expansion, Dentaurum once again commits to sustainability and resource conservation. For example, 40% of existing buildings will continue to be used after extensive energy-efficient renovation and repair.

To avoid further land sealing, the new three-storey building will be built on the same site, replacing an old building, but adhering to high ecological standards. The partially green roof areas will be completely covered with PV panels. The extensive rainwater retention measures – some of which are open – also create an attractive environment for birds and insects. Courtyard and park areas will be covered with permeable concrete paving. The additional use of cistern water as service water rounds off the overall concept.

The employees also benefit from the new building, as the building and all workplaces are planned according to the latest ecological and ergonomic aspects. Many employees already come to work on their job bikes, and they have the comfort of a central yet green location.

Clear commitment to Germany as a manufacturing location

Dentaurum has always acted with foresight, resilience, adaptability, drive, and tradition. With its foundation at Schulberg No. 10 in Pforzheim in October 1886, the company laid the foundation for the medical technology industry in Pforzheim and the region and is the oldest continuously existing dental company in the world, active in the dental industry from day one - and is still family-owned.

"This is both an obligation and an incentive for us because we bear great responsibility and never act in the short term, but always with an eye on future generations, family and employees, true to our motto "We endeavour to create an economically strong business while contributing to maintaining an intact environment as a legacy to our children and to future generations of employees". This is underlined by our far-reaching social commitment. All this is also visible in the continued clear commitment to our production site in Ispringen and to quality "made in Germany", says Mark Stephen Pace. "We produce goods and services in Germany. Here we pay trade tax, income taxes, social security contributions and health insurance contributions in many towns and cities. We do not receive any money from the state. In this way, we support the social system in Germany and ensure urgently needed economic growth. Thus, we create, maintain, promote and secure jobs in Ispringen and throughout Germany - because we also employ suppliers and customers throughout Germany - and all this despite the many obstacles that are put in our way by politics."

At Dentaurum, more than 8,500 branded products are created in the highly complex, modern production facility. As one of the few manufacturers and full-service providers, Dentaurum, together with its sales offices in 8 countries and dealers in over 130 countries, sets standards worldwide in the fields of orthodontics, prosthetics, implantology and ceramics. Nationally and internationally, Dentaurum stands for the highest precision and quality. Customers appreciate the unique product portfolio in breadth and depth, as well as the associated many years of expertise and excellent consulting quality. SD

DENTAURUM GmbH & Co. KG

Dentaurum, the oldest dental company in the world, was founded in 1886. For 138 years, the owner-managed family business has been developing, manufacturing, and selling a comprehensive range of products for dentists and dental technicians.

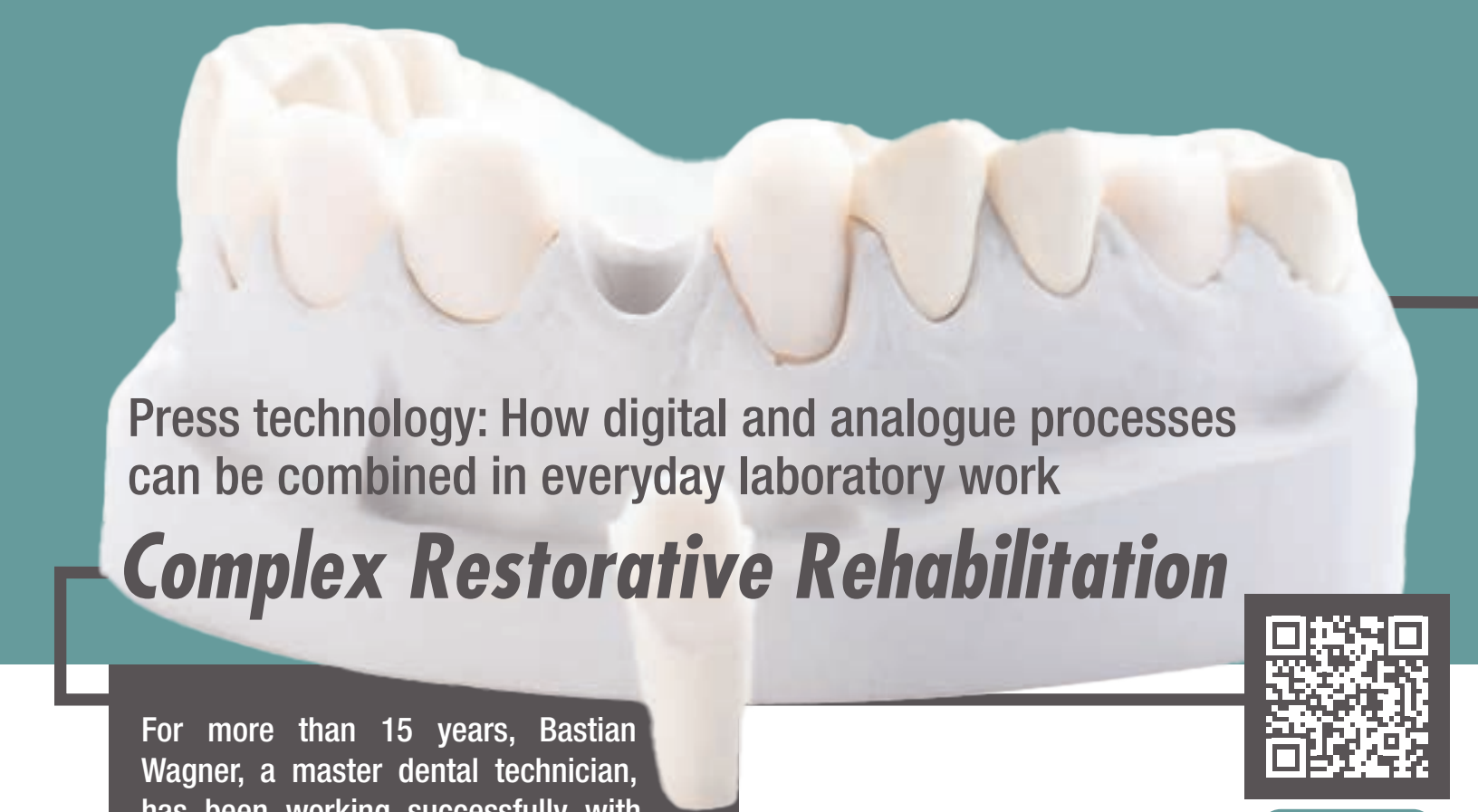
Dentaurum belongs to the 5% segment of the largest manufacturers of dental products in Germany, is headquartered in Ispringen in Baden-Württemberg and manufactures its products mainly in Germany and France. Dentaurum follows strict quality standards for excellent processing properties and high biocompatibility. The globally active dental company currently has more than 8,500 items in its range.

Numerous Dentaurum products for orthodontics, implantology, dental technology and ceramics occupy a leading position in the markets. Dentaurum is present with sales offices in Benelux, France, Italy, Spain, Switzerland, the USA, Canada and Australia and is represented with first-class products in more than 130 countries. The company currently employs around 600 people worldwide.

Dentaurum was one of the first companies to fundamentally anchor sustainability in its corporate philosophy and in all areas of the company in 1989 and has been continuously certified according to DIN EN ISO 14001 and EMAS since 1994. We are involved in selected social and sustainable projects because economic success without consideration for the environment is too short-sighted. There is a forest area of over 15,000 m² on the Dentaurum company premises, which has not been touched by the structural extensions of the buildings in recent years. The construction of our buildings meets the highest ecological standards of the corresponding years of construction. A large part of the roofs is greened. Where light is needed, lighting is provided by LEDs, with intelligent control by dimmers, motion detectors or timers.

The consumption of primary energy is reduced using waste heat and state-of-the-art control technology. Dentaurum also recycles as much water as possible. We attach great importance to service water reuse and rainwater harvesting.

Fig. 2: General view of the production hall and the three-storey production and office building with connecting bridge.

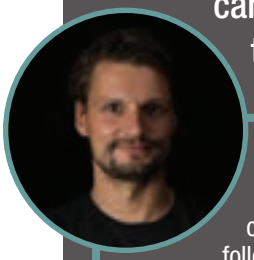


Press technology: How digital and analogue processes can be combined in everyday laboratory work

Complex Restorative Rehabilitation

SCAN ME

For more than 15 years, Bastian Wagner, a master dental technician, has been working successfully with the IPS e.max Press press ceramic from Ivoclar. He describes what he likes about the material and how he achieves impressive results in an efficient manner. Using a patient case, he shows how digital technologies can be effectively combined with the analogue press technique.



Bastian Wagner completed his training as a dental technician in 2005 as the best graduate of the Augsburg vocational school. This was followed by instructive years with MDT Hans-Jürgen Stecher. Bastian Wagner specialized in the areas of aesthetics and function, all-ceramics and implant prosthetics. In 2010/2011 he attended the master school in Munich, which he successfully completed. In 2011 he took over the management of Dr. Markus Regensburger's practice laboratory in Munich. He gained important experience and attended numerous advanced training courses at home and abroad, e.g. in Japan and France, on the topics of aesthetics, function, phonetics and implant prosthetics. Since 2015 Bastian Wagner has worked as a speaker for various dental companies. Until 2020 he worked for the Implaneo Dental Clinic in Munich, for Dr. Wolfgang Bolz, Prof. Dr. Hannes Wachtel and Dr. Paul Schuh, among others - an important time that brought him far forward in dental technology, but above all also in an interdisciplinary manner. In 2021, the step into self-employment followed with the founding of the dental laboratory "Wagner Dental Design GmbH".

People often become alert and sometimes skeptical when the advantages of a particular product are strongly emphasized. The all-ceramic press ceramic IPS e.max Press from Ivoclar is an example of such praise. When you take a closer look at Ivoclar's press technology and history, initial skepticism quickly turns into trust. On the market for around 20 years, with more than 170 million IPS e.max restorations manufactured [1] and almost as many well-cared-for patients, satisfied dentists and dental technicians, a wide range of studies and good long-term results, IPS e.max Press is a real success story. For more than 15 years, I have been producing almost all of my all-ceramic restorations with IPS e.max Press. What really sets this lithium disilicate glass ceramic apart is its unbelievably high level of flexibility. The right production method can be found for every situation. I can process the material monolithically, partially reduced or classically veneered and always use the optimal light-optical and mechanical properties (Fig. 1 and 2). To achieve successful results, it is fundamentally important to know the ceramic material, i.e. the blanks and their areas of application.

The variety of colors and translucencies of IPS e.max Press makes the technician's work easier, as the color and clouding of the press blanks is based on everyday use (Fig. 3). The color scheme is simple and clear. An appropriate level of translucency is available for every situation.

- Frameworks are pressed from the more cloudy MO blanks (MO = medium opacity) and then veneered (IPS

Fig. 1: Ultra-thin pressed restorations made of IPS e.max Press directly after devesting...

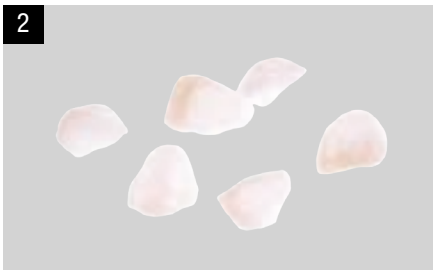


Fig. 2: … and after completion

Fig. 3: Examples of the different blanks of the IPS e.max Press press ceramic system

Fig. 4: Initial situation: The patient wanted a new treatment with improved aesthetics.

Fig. 5: Provisional restoration with optimized tooth shapes, based on a functional-aesthetic wax-up.

e.max Ceram). The entire color spectrum can be covered with four blank colors (MO1–MO4) and one bleach color (MO 0).

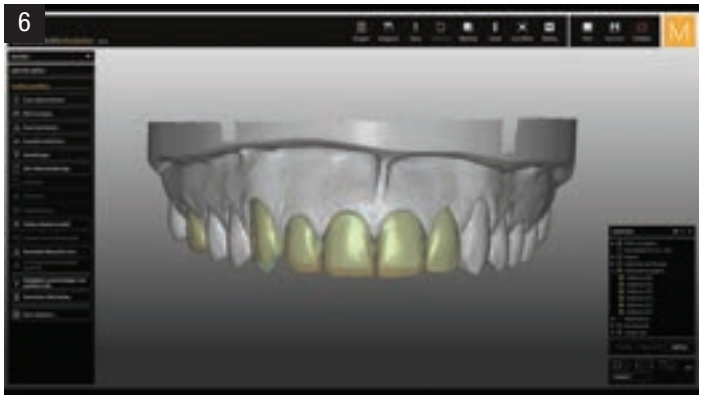
- The slightly more translucent LT blanks (LT = light translucency) offer the possibility of working out the "last bit" of aesthetics with layered ceramics after a cut-back. In addition, a good result can be achieved using a fully anatomical approach. The translucency is similar to that of natural dentin, which is why the blanks are suitable for larger restorations in the posterior region. I am impressed by the natural brightness value and the chroma - both aspects that prevent the restoration from turning grey. The integrated opalescence ensures that the restorations appear lively even at thin edges.
- Between the MO and LT blanks are the MT blanks (MT = medium translucency). This material is suitable for restorations that require more brightness than HT restorations and more translucency than LT restorations.
- If discolored stumps are to be covered, a “white”, highly cloudy HO blank (HO = high opacity) is available in three group colors (HO 0, HO 1, HO 2).
- The translucent HT blanks (HT = high translucency) are based on the light-optical properties of natural enamel. The material is well suited for inlays and onlays. The restorations "absorb" the color of their natural enamel environment and almost "disappear" into the remaining tooth substance.
- The IPS e.max Press Multi ingots feature a natural color gradient from the dentin to the incisal edge.
- With the highly opalescent IPS e.max Impulse blanks in the brightness variants Opal 1 and Opal 2, a variant for very thin, light veneers is available.

Thanks to this variety, it is possible to work fully anatomically (painting technique), partially reduced (cut-back technique) or fully reduced (classic layering technique); always with the certainty of having a stable base with sufficient strength. CAD/CAM technologies can also be integrated into the pressing technique, which also makes the process attractive for digital enthusiasts.

Hybrid: CAD/CAM meets press technology

I generally use CAD/CAM-supported production almost exclusively when producing IPS e.max Press restorations, combining the best of both worlds: the efficiency of computer-aided design and CNC-supported milling meets the high precision and aesthetics of press technology.

The restorations are digitally designed and milled from wax, and then the work continues in an analogue way. A detour? No, but a way that brings me many advantages. Restorations with thin edges and edges with steep angles can be pressed more precisely than CAD/CAM grinding. The limiting factor is the radius of the grinding body or milling cutter. The marginal seal is much more precise with pressed restorations [2]. In addition, the hybrid technology (digital and analogue) can be used to press several veneers for an anterior tooth restoration in one operation, for example. This is efficient and saves time, although this depends



Figs. 6 - 8: The digitized situation for the production of the scaffolding with the temporary solution, shown using an almost identical case

Fig. 9: The software allows the scaffolding to be easily adapted as required.

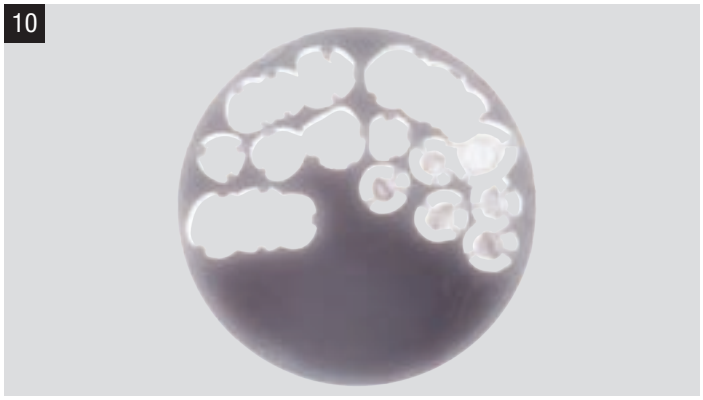


Fig. 10: Wax disc after milling out the frameworks

Fig. 11: The wax frameworks carefully separated from the disc

on the individual working method of the dental technician. In my case, there is "only" a CNC machine available, which is mainly used for dry-workable materials. But why not wax it up by hand, but use the CAD software and mill it in wax? Here, too, I have chosen the ideal path for me. The prerequisite for "my" way of working is that the CAD/CAM technology is well integrated into the workflow and that the necessary components and work steps are mastered. Anyone who is good with their digital tools will work faster in the software than with analogue methods. In addition, I always model a manual wax-up before making a denture - the emphasis is on "always". If this is done manually, the wax-up is then digitized, because after digitizing the wax-up, it is relatively easy to overlay the prepared situation with the template (matching the data) and generate a virtual construction.

Patient case

I will describe the hybrid process of digital design and analogue implementation using a patient case. The 41-year-old patient consulted the dentist's office with the desire for an aesthetic improvement of her dental situation. The gums in the front teeth area had receded, which exposed the transitions of the front tooth veneers (eight years in situ) (Fig. 4). An initial aesthetic analysis showed that the patient had a high smile line - a gummy smile. Therefore, longer dental crowns would

Fig. 12: Fitting the wax frameworks onto the model

Fig. 13: Regrowth of the edge areas

Fig. 14: Sprueing the wax frameworks for the pressing technique

Fig. 15: The muffle prepared for embedding with the wax frameworks

suit her optically well. In order to test and visualize this, an aesthetic-diagnostic wax-up was first made, which, after fine-tuning on the model, could be transferred to the temporary denture and thus into the patient's mouth using CAD/CAM technology. In addition to the new treatment of teeth 12 to 22 and the lengthening and harmonizing of the canines, action was required in the posterior teeth area of the upper jaw. Broken teeth (tooth 15, tooth 25) and other defects were found here.

This case documentation focuses on the implementation of the front tooth restorations.

If we proceed in the sense of backward planning, we always move within the scope of the desired goal. I work according to the following procedure: digitizing the wax-up, CAD design, transferring the design data to the CAM unit and producing a temporary PMMA restoration in the laboratory's own milling machine. The pleasant thing about the CAD/CAM-supported method is the possibility of being able to transfer the aesthetic "outer skin" developed in the wax-up to any type of restoration - be it for a mock-up, a temporary restoration or later in fully anatomical, partially or fully reduced frameworks for the definitive dentures. Whether and to what extent analogue processes are used before or between the digital work steps is not relevant in my view. What counts is precision, maximum benefit, high efficiency and the best possible results. The wax-up was precisely transferred into a temporary restoration. It was evaluated in the patient's mouth whether and to what extent the new tooth shapes and lengths were functionally and aesthetically appropriate and accepted by the patient and her social environment (Fig. 5).

Production of the definitive restoration

The digital production process is visualized in Figures 6 to 9 using an almost identical case as an example. First, the design of the temporary restoration - the digitized wax-up - was called up in the software and adapted to the model scan of the prepared tooth stumps (matching). One advantage of the CAD/CAM-supported workflow is that the worn temporary restoration with the functional traces can be scanned. This provides important functional information that is incorporated into the definitive denture.

The software can be used to decide whether to continue working fully anatomically or with reduced frameworks. This selection is made much easier in the CAD software, as the frameworks can be reduced and adapted accordingly at the push of a button. Reduced or vestibularly reduced frameworks are shown as examples. In combination with manual layering, the dental technician has even more options for imitating nature.

Fig. 16a: The objects were pressed with IPS e.max Press (LT blank).

Fig. 16b: After removing the pressed frameworks

Figs. 17a - 17b: Ceramic frameworks prepared for further processing in the usual manner

Fig. 18: The veneer for the canine tooth was 0.3 mm thin. The LT blank offers ideal possibilities for conveying the chroma of the natural teeth.

After milling out the wax frameworks (Fig. 10), they were carefully separated from the material disk (Fig. 11) and prepared for embedding. The wax objects were placed on the model and imperfections removed (Fig. 12). This revealed once again why I favor this – supposedly complicated – route. The representation of the edges is the deciding factor in the purely CAD/CAM-supported route. Not every preparation shape can be represented precisely with the milling machine. In such cases, it is important to regrow the edges (Fig. 13) and thus create the basis for generating a precisely fitting marginal seal using high-precision pressing technology. After the CAD/CAM-supported production of the wax frameworks, work could continue in the classic pressing technology workflow. The frameworks were ready for embedding (Figs. 14 and 15) and were transferred to pressed ceramic.

After the preparations for the actual pressing, the next step is to select the material. IPS e.max Press LT A2 ingots were used as the material for pressing the frameworks (Fig. 16a and b). The pressing process was carried out as usual: devest the frameworks, acidify them and prepare them for further processing (Fig. 17a and b).

- Tooth 12 to tooth 22: Due to the better light dynamics, the crowns should be veneered.
- Teeth 13 and 23: Due to the space available (0.3 mm), extremely thin monolithic veneers should be fabricated.
- The posterior teeth should be made fully anatomical.

The versatility of the IPS e.max Press glass ceramic was once again demonstrated. Although less translucent blanks were selected (LT = Low Translucency), the ceramic offers a broad spectrum for reconstructing teeth as naturally as possible due to its dentin-like saturation and its color gradation in 16 A–D shades. The LT blanks used are ideal for the fabrication of posterior crowns. In addition, due to their natural-looking brightness value and chroma, they can be aesthetically optimized with layered ceramics. In our case, this was the case with the four central anterior teeth. Since the canine veneers were only 0.3 mm thick (Fig. 18), the LT blanks offered sufficient translucency to convey the chroma of the natural teeth. At the same time, the material is opaque enough to slightly soften the rich color of the canines.

Figs. 19a - 19b: Rough firing trial of the anterior tooth restorations

Figs. 20a - 20b: The completed restorations on the model

Fig. 21: The crowns for the posterior teeth are fully anatomical and made using the press technique. The restorations in the anterior teeth area were veneered.

Rough firing try-in

The LT frameworks (cut-back) were veneered and the crowns for the posterior teeth were completed. A rough firing try-in was intended to show whether we were on the right track (Fig. 19a and b) . For demanding patients who clearly state that their new teeth “should look like...”, I always recommend a rough firing try-in. I prepare the restorations for the try-in (including glaze firing). This way, the degree of gloss can be individually adjusted during the assessment in the patient’s mouth. If necessary, appropriate corrections are made. If the try-in shows that everything is OK, the restorations can be inserted. Small corrections were made in the laboratory on the basis of the rough firing try-in. The restorations were then completed (Fig. 20a and b). The IPS e.max materials offer adequate solutions for fine corrections. With little effort, it is possible to change the brightness value without affecting the basic tooth color (Fig. 21). In these cases, I like to use the IPS e.max Ceram Power materials, for example.

Insertion date

Immediately after the adhesive bonding (Variolink Esthetic from Ivoclar) the situation in the mouth was photographed. Some excess bonding material can still be seen in the photos (Fig. 22). The marginal tissue and in particular the papillae have not yet fully formed and need a few more days to fully adapt to the ceramic restorations. Nevertheless, these images already show how well the light dynamics of the lower jaw teeth could be reproduced with a combination of IPS e.max Press LT frameworks and veneering ceramic. This was the prerequisite for the new restoration of the upper front teeth.

Result

It was important to the patient to match "her new teeth" to the natural teeth in the lower jaw. She wanted liveliness and naturalness. Even the wafer-thin monolithic IPS e.max Press

Fig. 22: Situation immediately after insertion. It is expected that the soft tissue will adapt to the ceramic surfaces in a short time.

Fig. 23: The patient's wishes were fulfilled. The restorations look wonderfully natural and match her smile.

LT A2 veneers on the canines do a good job and fulfill the patient's wish perfectly (Fig. 23). Such results are always a satisfying experience for me and show how important it is to understand tooth color. Because I can only be successful if I know what needs to be reconstructed. Provided that adequate materials are available.

Conclusion

With the concept of IPS e.max materials, Ivoclar has taken up the understanding of tooth color very well. We dental technicians have materials at our disposal with which we can react to almost any situation. And isn't that exactly what our everyday dental work is all about? We have to react to new challenges almost every day - because our work is as diverse as our patients. Ivoclar meets this diversity, but also the demand for durability and safety, with its IPS e.max concept. We can work monolithically or veneer, we can integrate digital methods or work purely analogue, we can combine different components... The possibilities are limitless - and so are our dental technology challenges.

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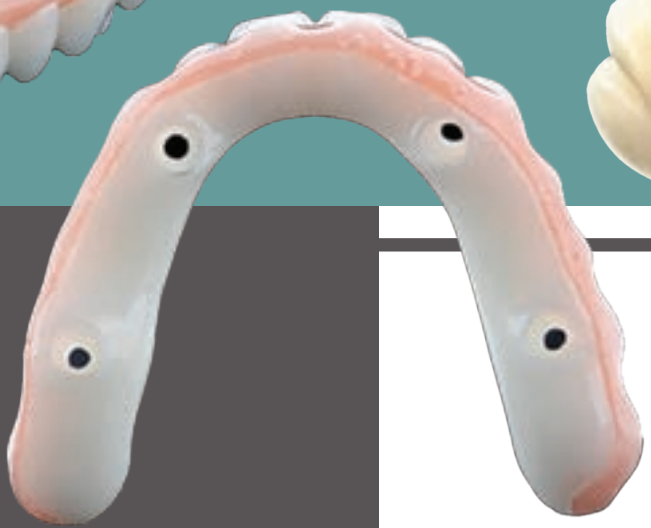
Analysis of 3D Printed Materials for Permanent Restorations



SCAN ME

Dr. Russell Giordano, DMD received specialty training in prosthodontics at Harvard School of Dental Medicine and performed research at the Ceramics Processing Research Laboratory at the Massachusetts Institute of Technology leading to a D.M.Sc. degree in 1991 and a Certificate in Prosthodontics. Dr. Giordano's research involved novel ceramics processing techniques as well as analysis of stress developed during finishing procedures. His research paper won the Arthur R. Frechette Award presented by International Association of Dental Research Prosthodontic Group. Before being appointed at Boston University, Dr. Giordano was an Instructor at Harvard in the Department of Prosthodontics where he served as Associate Director of Complete Denture Prosthodontics and Course Director of Dental Materials.

Giordano presently has several private and federally funded projects. A major research focus is ceramics and ceramic matrix composites. Projects include the testing of current ceramic restorative systems as well as the development of ceramic matrix composites with improved resistance to fracture and higher toughness. Evaluation of new dental materials systems is also an ongoing part of his research activity. Evaluation of the effects of surface finish on strength of ceramics has involved the application of novel machining systems such as the CEREC CAD-CAM system and the Celay copy milling system and 3d printing systems and materials as well as the effects of polishing, fine grind-ing, glazing and etching.

With the change in the ADA definition of a ceramic to include printed materials with at least 50% inorganic filler, numerous materials were promoted for use as permanent full contour restorations. As part of the mission of the Department of Biomaterials to analyze new materials and systems, many of these materials were investigated with respect to mechanical and physical properties. There are a number of ADA and ISO standards that apply to conventional denture materials and polymer containing dental restorations. However, none yet specifically address printed restorations. Efforts are currently underway to revise these standards to include CAD/CAM fabricated restorations and prosthetic devices. In lieu of this, the most relevant standards were used as part of the analysis of properties of these materials.

In order to meet the revised ADA definition for ceramic restorations, printed materials for permanent restorations should have an inorganic filler content of 50% or more. A simple ash method (polymer component was burned off) was used to determine filler content of several printed full contour restorative materials. The polymer component was burned off leaving the inorganic filler behind, Figure 1.

Flexural strength is one property that the dental community often uses as a criteria for material selection. While this might be important, other properties such as fracture toughness, elastic modulus, material wear, and color stability all factor

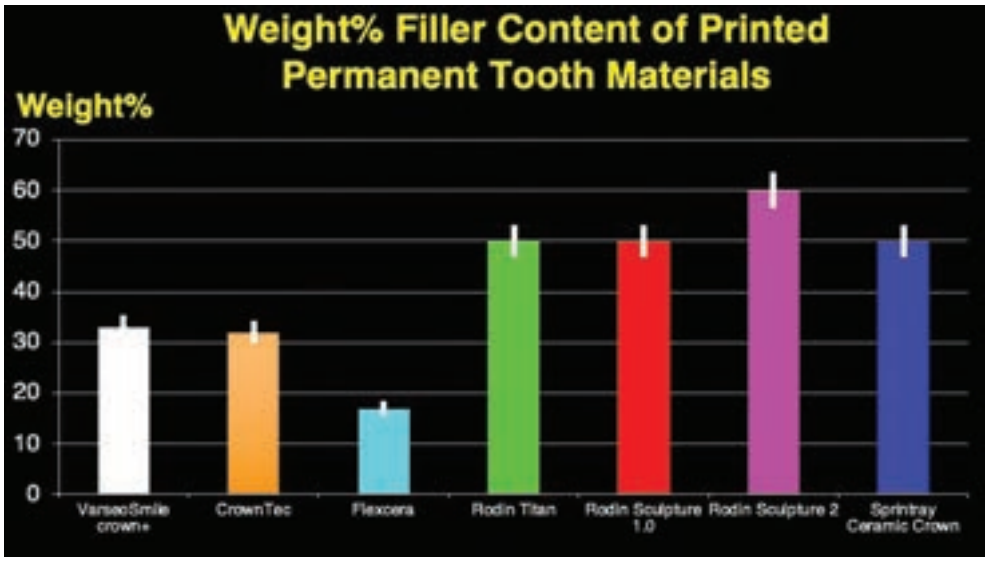


Fig. 1: Weight % of Inorganic Content Determined by Ash Method

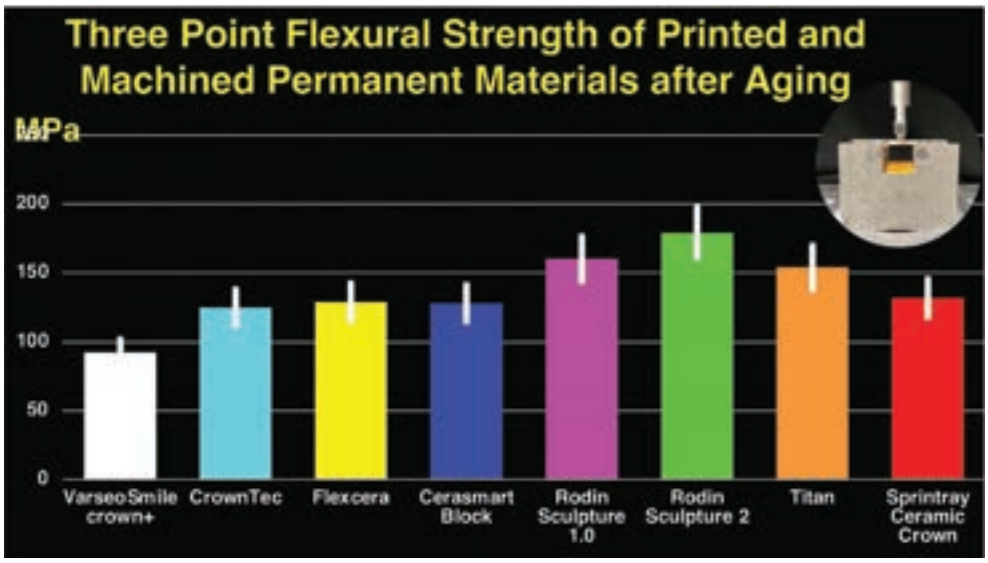


Fig. 2: Three Point Bend Strength (MPa)

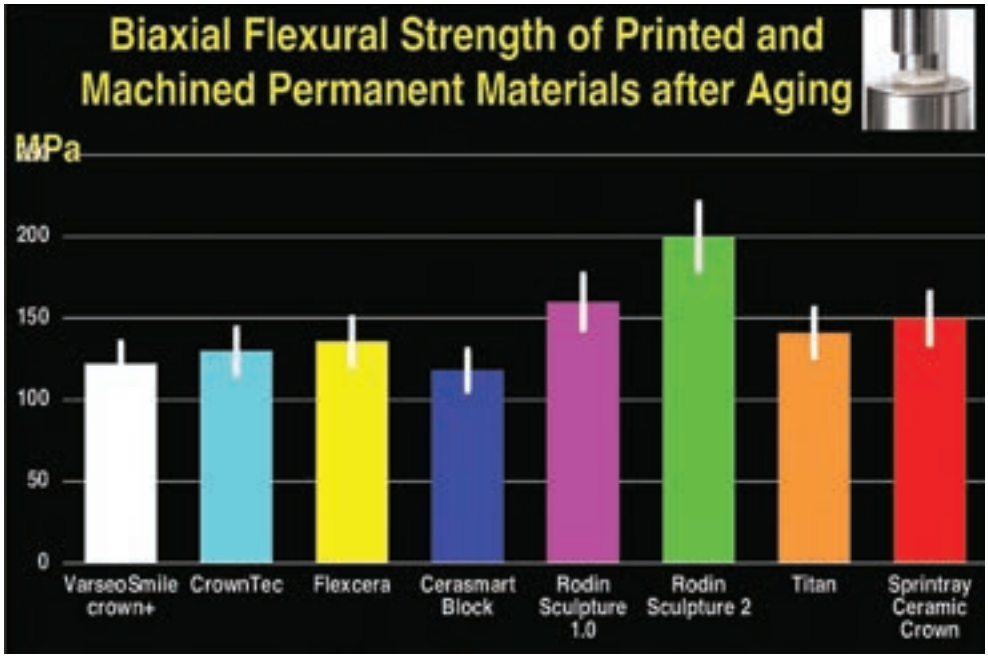


Fig. 3: Biaxial Flexure Strength (MPa)

into a comprehensive evaluation of new materials for clinical selection.

In this study two different methods determining flexural strength were used. One followed ISO 4049 "Dentistry – Polymer based restorative materials" to measure three-point flexural strength that involves testing bars of materials. Another used biaxial flexure strength that uses discs of materials. The biaxial test usually gives higher values but also is generally easier to conduct and many manufacturers reference biaxial strength of their materials. However, there currently is no biaxial strength standard for polymer containing materials; therefore ISO 6872 on Dental Ceramics was used as a guideline for the biaxial flexure strength specimens.

A three-point bend test following ISO 4049 methodology was used. Bars were printed for each test material per manufacturers recommendations. Parts were washed using isopropyl alcohol and cured using an Otoflash system under Nitrogen. The bars were tested on an Instron 5566A at a crosshead speed of 1.0 mm/min. Load at break was used to calculate flexural strength in MPa. A clinically successful composite resin block material was included for comparison in the strength tests. Results are shown in Figure 2.

A biaxial flexure strength test following ISO 6872 methodology was used. Discs were printed for each test material per manufacturers recommendations. Parts were washed using isopropyl alcohol and cured using an Otoflash system under Nitrogen. The discs were tested on an Instron 5566A at a crosshead speed of 1.0 mm/min Load at break was used to calculate flexural strength in MPa. Results are shown in Figure 3.

Flexural Modulus was determined from the three-point

bend test. Modulus values are important in evaluating a materials resistance to deformation under stresses developed during clinical use. Several years ago, a polymer-based material with a low modulus of about 2 GPa was widely used for crowns, failure rates were very high due to excessive wear, sensitivity, and debonding. Thus, we have some idea of what might be problematic with respect modulus values. These values are presented in Figure 4.

While strength is often used as the primary selection criterion for restorative materials, fracture toughness may be more important in correlating with clinical success. Fracture toughness is a measure of a materials resistance to crack propagation. Ideally, we would like restorative materials to be able to sustain damage and remain intact and function even after the damage has been sustained. This is one advantage of materials like 3Y mol% zirconia. Fracture toughness was determined using a single edge notched beam on materials fabricated according to the manufacturer's recommendations. Methodology for the polymer mased materials used ISO 20795 "Denture base materials" as ISO 4049 does not include fracture toughness testing. E.max machinable ceramic was included for comparison with fracture toughness determined as described in ISO 6872, Figure 5.

Rapid wear of restorative materials may create numerous clinical problems as proper occlusion that as created with the restoration may rapidly change due to excessive wear of the material. Although this is an important property, there are no standardized wear tests. There are very complex chewing machines as well as more basic wear tests using a pi on disc two or three body wear device. One of the most widely used methods follows one developed at the University of Alabama-Birmingham. Our laboratory fabricated a wear device based on this design and it has been used to

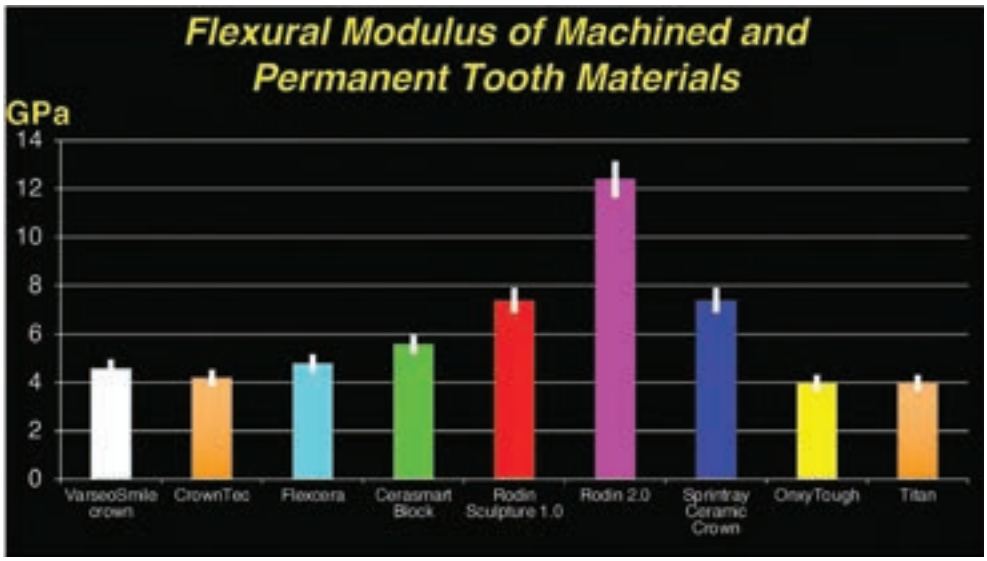


Fig. 4: Flexural Modulus (GPa)

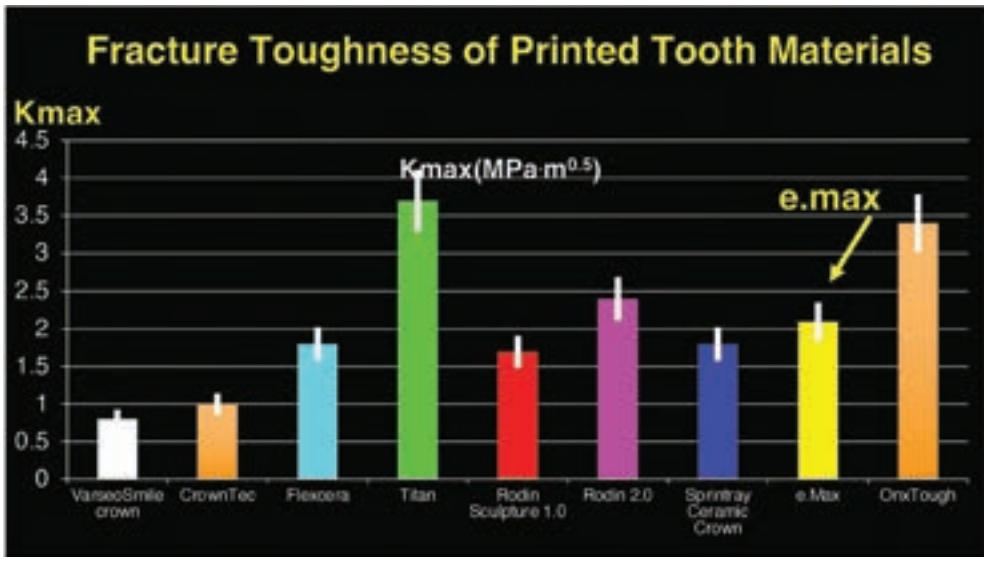


Fig. 5: Fracture Toughness Using Single Edge Notched Beam (MP.m$^{0.5}$)

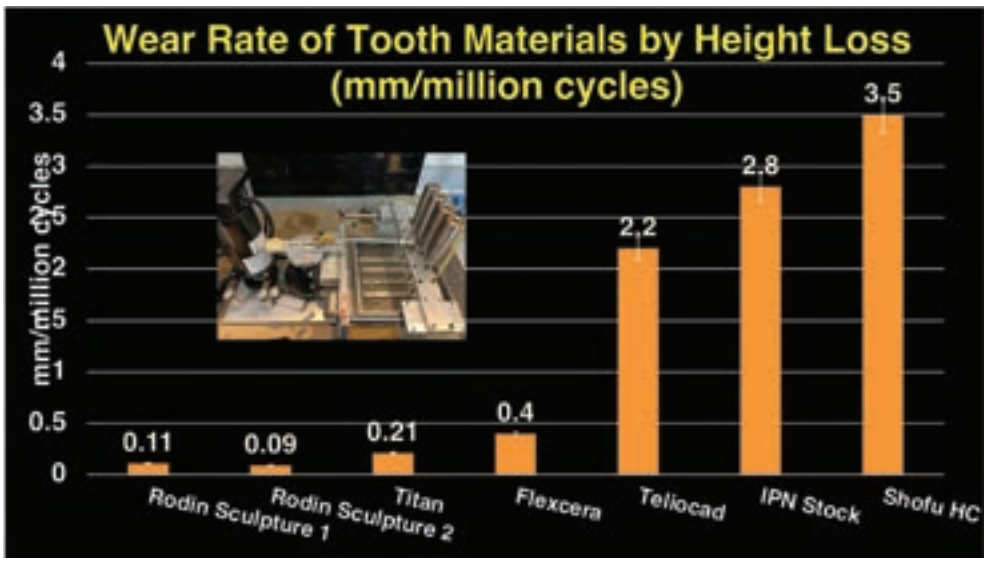


Fig. 6: Wear Test: Height Loss

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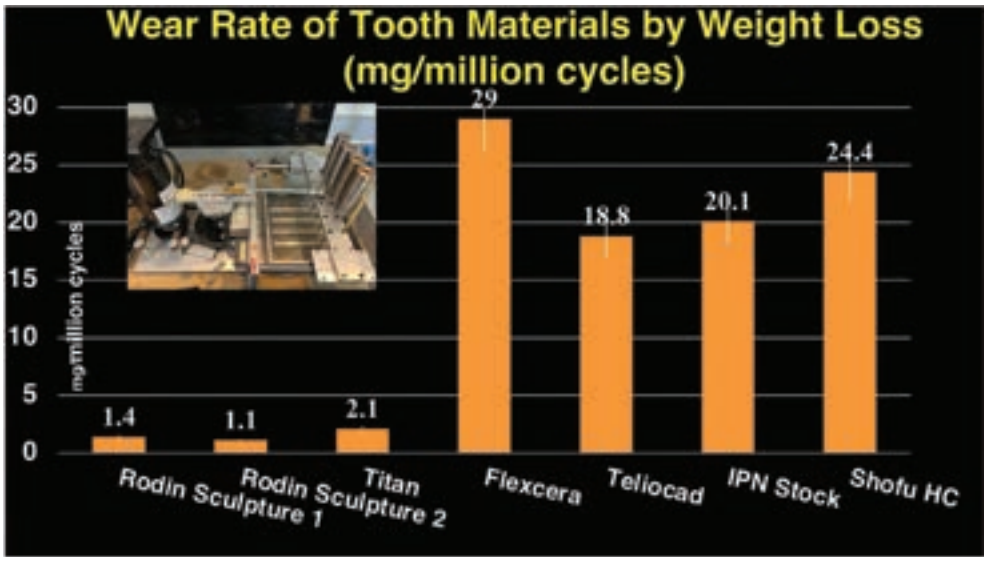

Fig. 7: Wear Test: Weight Loss

determined for the test materials and weight and height loss per million cycles. Conventional composite resin as well as denture teeth were used for comparison. Height and weight loss per million cycles are shown in Figures 6 and 7.

Initial tests on color stability were performed following an initial ISO standard (ISO 7491) on color change. Specimens were printed as discs 20 mm x 2 mm thick according to manufacturer's recommendations. These were polished using a Buehler Ecomet polisher in sequence finishing with a 1 micron diamond paste. Materials were subjected to toluidine

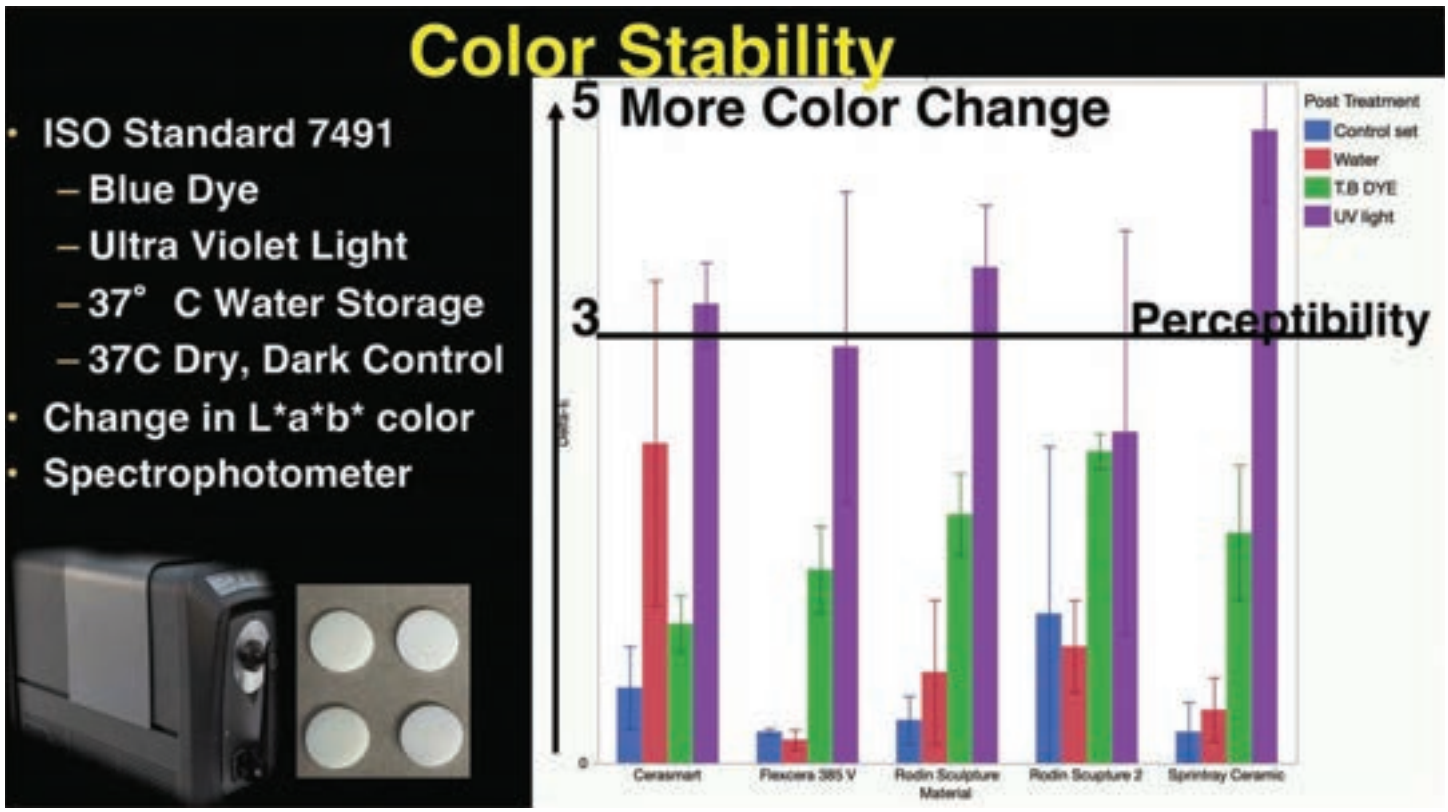

Fig. 8: Color Change of Test Materials

determine wear rates for a variety of materials and even was accepted by the FDA to support wear kindness claims about fine particle veneering porcelains. In this wear test a pin of the test material is fabricated and then this is run against a plate of Vita MKII that has been shown clinically and in lab testing to have similar wear properties as tooth enamel. Plates of the tooth analog material are on the bottom of the device and pins of the test material are on the top and weighted. A continuous flow of water is used to remove wear debris. Weight and height loss are measured for the pin. The pins are bonded to metal rods that are weighted with a 400 gm load. The pins are moved on a 39 mm path across the plates. A linear wear rate was

blue dye and UV light. The L*a*b* values and the change in ΔE values were determined before and after treatment using an X-Rite I7 spectrophotometer. Specimens were also stored in de-ionized water and in the dark (control group) for 7 days. Clinically, color differences are seen by most people when there is a difference of 2 to 4 ΔE, Figure 8.

In summation, many materials do not meet the ADA definition for a ceramic due to low filler content. Overall, the material properties of several of the printed materials compare favorably with machinable composite resins and conventional ceramics with respect to mechanical and physical properties.

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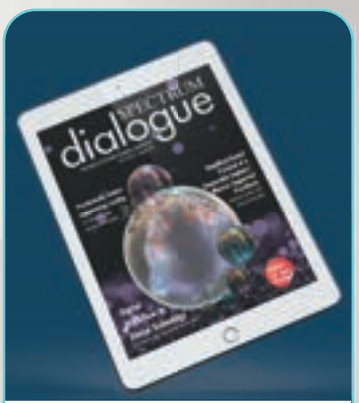

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A Story about Teamwork, Technology, and the Emotions Behind It

The Journey to a New Smile: A Case Report

SCAN ME

Ralf Dahl is a Master Dental Technician (1991, Master School Düsseldorf) and, since 1994, the owner and managing director of Mb Dentaltechnik GmbH. He is a member of the "dental excellence-international Laboratory Group," the EDA, and the DGÄZ.

The Master Dental Technician specializes in lectures and practical workshops in the field of veneering techniques and all-ceramic materials.

His areas of expertise include polychromatic veneering techniques in ceramics, the functional and aesthetic fabrication of all-ceramic inlays, onlays, veneers, and full crowns, as well as the production and veneering of crowns and bridges made from oxide ceramics and lithium disilicate.

Additionally, Ralf Dahl is a guest lecturer at the Master School in Freiburg and the author of numerous professional articles.

Dr. medic. stom. Alina Lazar has been running her own practice since 2001. Her main areas of focus are implantology and aesthetic dentistry. She is a member of the Leading Ladies in Dentistry, KOL GC Europe, KOL Dentsply Sirona, and an international speaker on the topic of the influence of aligners in aesthetic dentistry.

Further professional milestones include:

Since October 2023: Chair of the Board for Certified Members of the European Society of Cosmetic Dentistry (ESCD).

Since September 2018: Chair for International Affairs on the ESCD Expanded Executive Committee.

2017: Became a certified member of the European Society of Cosmetic Dentistry (ESCD) and country representative for Germany, as well as a ClearSmile Inman Aligner Clinical Instructor, IAS Academy London.

In 2013, she received her certification for Inman Aligner and Digital Smile Design.

Behind every restorative therapy, there is not only clinical expertise, craftsmanship, and modern technology but, above all, a person. In this article, the author team reports on a young patient embarking on the journey to a new smile. For Dr. Alina Lazar, a dentist with a deep understanding of aesthetic needs, and CDT Ralf Dahl, a dental technician with an eye for details and aesthetics, this challenge marked the premiere of their collaboration. Together, they fulfilled a heartfelt wish for the patient.

In dentistry, there are many moments when craftsmanship, science, and emotions converge. This article describes one such story. The patient dreamed of shining with a radiant smile on her wedding day. This desire posed a challenge requiring expertise and an aesthetic sense. The patient's goal was clear: an aesthetic improvement of her upper anterior teeth (Figs. 1 and 2). With her wedding fast approaching, time was tight. It quickly became apparent that this was not just about clinical know-how. Achieving an outstanding result necessitated the involvement of a dental technician specialized in aesthetic reconstructions. Thus, this patient case became the premiere collaboration between us as a working team. Expectations were high, and the timeframe was tight: six months until the young woman's wedding.

Fig. 1: Initial situation from the front…

Fig. 2: … and side view

Fig. 3: An aesthetic analysis is needed that integrates the face in addition to the teeth.

Fig. 4: Close-up and depiction of the block-like shift of the lower anterior teeth

The countdown is on…

Each patient is unique. Therefore, a comprehensive analysis is the starting point of any treatment. Often, the focus is only on the teeth. However, it is not just the shape and color of the teeth that define a patient's smile. The harmonious overall picture is created by the interplay of the face, lips, gums, and teeth. Especially in aesthetic rehabilitation, it is important to start with an aesthetic analysis (Fig. 3). The face is like an open book and provides us with much information, e.g., about malocclusion and symmetrical proportions. Important aesthetic parameters include the extraoral midline, the interpupillary line, and the intercommissural line.

Aesthetic Analysis

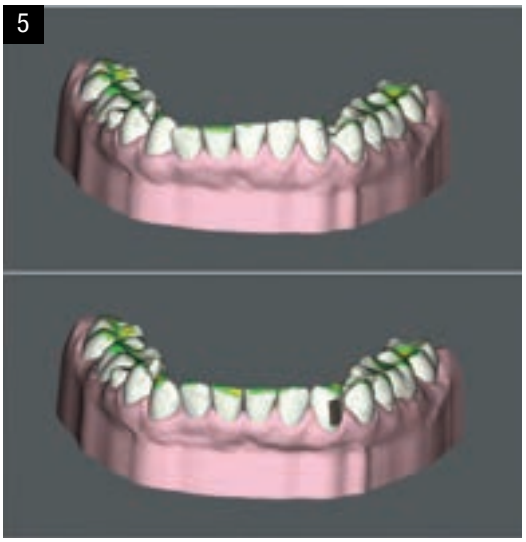
In this case, a slight extraoral shift of the midline to the left was identified. Additionally, the intercommissural line showed a discrepancy from left to right. Noteworthy was the significant volume difference in the right lip area compared to the left. An offset between the extraoral and intraoral midline was also identified. The clinical findings revealed crowding in the upper jaw, which was interpreted as a relapse following orthodontic treatment. Additionally, enamel chipping, a composite restoration on the endodontically treated tooth 11, and a mildly pronounced gummy smile were diagnosed; overall, initially a relatively simple case for an aligner-bleaching-veneers concept. However, although the case initially seemed like a simple candidate for an aligner-bleaching-veneers concept, a detailed examination of the lower jaw revealed its full complexity. The lower anterior teeth showed a block-like shift. While the right side was intruded and buccally protruded, the left side showed extrusion and retrusion (Fig. 4). This specific configuration explained the lip position noted in the aesthetic analysis. The cause of the situation was a poorly positioned retainer. The retainer on the right canine had broken years ago, causing this negative development in an otherwise positive retainer function. The block movement of the lower jaw had to be attributed to this circumstance.

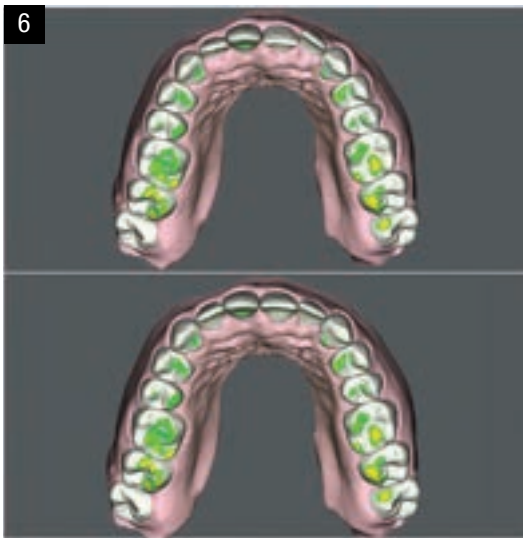
Aligner Therapy

Before we could begin treatment planning, we needed detailed photographic documentation, a panoramic X-ray, and a digital scan of the teeth. It was clear that initial correction with aligners was necessary to regulate the occlusal plane in the anterior teeth area (Figs. 5 and 6). The time constraint posed a real challenge, as the time window allowed for only ten aligner trays per jaw (SureSmile Aligner, Dentsply Sirona). After using the seventh tray, an interim scan and model creation, it was time for the dental technician team to get active.

Dental Mock-up

The dental analysis began with evaluating all the information provided by the dental practice. Efficient communication, both by phone and digitally, is crucial for success. "Well communicated" simplifies the implementation of desired improvements and overcomes the spatial distance between workplaces. The first step involved creating a wax-up. With an eye for fine details and dental symmetries, the proportions of the teeth, particularly the length-to-width ratio, were idealized. Correcting the midline shift required high attention. To accommodate this adjustment in the gingival contour, an electrosurgical procedure was necessary. The precisely crafted





Figs. 5-6: Planning the aligner therapy to optimize tooth position in the upper and lower jaws

Fig. 7: Mock-up trial

Figs. 8-9: Veneers (Initial LiSi Press) with individual layering (Initial LiSi) on the model

wax-up was converted into a mock-up using the injection molding technique. The crystal-clear silicone Exaclear (GC Europe) meets the requirements of aesthetic reconstructions thanks to its good flexibility and high stability. The material used for the mock-up – made using the injection process – was GC Gradia Light Body D and Light Body E. This high-strength, light-curing nanohybrid composite, based on ceramic polymer technology, offers ideal aesthetic properties. This was important, as an intraoral trial of the delicate composite veneers (mock-up) provided a visual guide to the intended result (Fig. 7). The mock-up also provided valuable information for further dental work, enabling the realization of the final work and allowing for fine adjustments if necessary.

The Wedding Date Approaches

With the completion of the pre-prosthetic work, the wedding date was within reach. Despite the approaching deadline, time pressure must not affect the quality of the work. Every step must be taken with care, calmness, and thoughtfulness. Hasty or ill-considered decisions could lead to unnecessary corrections and additional work, which would be difficult to manage within this tight timeframe. Thus, it was a balancing act between efficiency and precision, with the patient's well-being and desire at the forefront.

Preparation of the Teeth

The preparation of the four anterior teeth 11, 12, 21, 22 was guided by the mock-up using a minimally invasive preparation set (by Alina Lazar, Horico). Particular attention was paid to tooth 11, which was endodontically treated and consequently showed dark discoloration. For a harmonious color match, tooth 11 required slightly more intensive preparation compared to the surrounding vital teeth. To minimize enamel loss, contact points on teeth 12 and 22 were preserved, while those on the central incisors were removed. The impression was taken using conventional techniques and sent to the dental laboratory for further processing.

Fabrication of the Veneers

The conventional impression offers an advantage over digital scanning by providing a precise representation of the surface structure, which can be accurately reproduced in ceramic restorations. For fabricating the ceramic veneers, the preferred method was press technology with subsequent layering. The material of choice was Initial LiSi Press (GC Europe), a highly aesthetic lithium disilicate ceramic offering high flexibility in various translucency levels. LiSi MT was used for the non-discolored teeth, while LiSi LT, in a lighter shade, was used for the slightly discolored tooth stump 11. Thanks to the increased color value and higher white content in LiSi LT, a significantly improved coverage of the underlying structure can be achieved without resulting in an unnatural or too opaque appearance. Given the complex color scheme, all pressed frameworks were individually layered (Initial LiSi, GC Europe). This allowed

Figs. 10-11: Lip view after the veneers were placed

Figs. 12-14: The honest and authentic smile of the patient at the end of the treatment speaks for itself.

Fig. 15: Radiant smile on the wedding day

for the creation of mammelon structures and ensured natural translucency and impressive depth effects (Figs. 8 and 9).

Placement of the Veneers

The ceramic veneers were trial-fitted in the practice using the Try-in Paste from G-CEM translucent (GC Europe) and then permanently cemented with G-CEM ONE. G-CEM ONE is a universal, self-adhesive resin cement with dual-curing capability for strong, durable bonding of indirect restorations on various substrates. The material can optionally be used with a primer. The veneers were cemented according to the manufacturer's protocol (Figs. 10 and 11).

The retention phase was designed as follows: In the upper jaw, a complete Essix retainer (1 mm) was used to maintain position and protect the veneers. In the lower jaw, a fixed retainer was placed from tooth 33 to tooth 43. Additionally, an Essix retainer was used to ensure optimal preservation of tooth position. For the patient, this moment marked the crucial point. Would the veneers and the preceding measures meet her high expectations? Her emotional reaction to the result was moving for all of us: the genuinely happy smile showed that her wish had been fulfilled (Figs. 12 to 14).

From a professional perspective, the goal was also achieved. The veneers blend harmoniously into the overall picture. Thanks to the precise color selection of the GC LiSi Press blank and the individual layering, even the discoloration of the endodontically treated tooth 11 was completely masked. An outstanding feature from a dental perspective is the authentic depiction of the incisal edge. Moreover, despite minimal preparation of only 0.5 mm, an impressively natural surface texture was achieved. It is fascinating what is possible in dentistry today to make patients happy through minimally invasive procedures.

The Finale of the Smile

The patient's journey, which began with the dream of radiating with a perfect smile on her wedding day, was completed (Fig. 15). In the end, we see a happy young woman with a smile that comes from the heart. From a dental technician's perspective, such a smile is always the most beautiful way to show teeth to others. It is the result of teamwork, precision, and the desire always to achieve the best for the patient. The story ends here, but the patient's radiant smile will surely last for many years. Her journey was not just a technical process but an emotional experience marked by trust and a common goal. This story is a vivid example of how art, science, and emotions can merge into a harmonious whole in dentistry. A smile that not only shows the beauty of the teeth but also the story and emotions behind it. Sd

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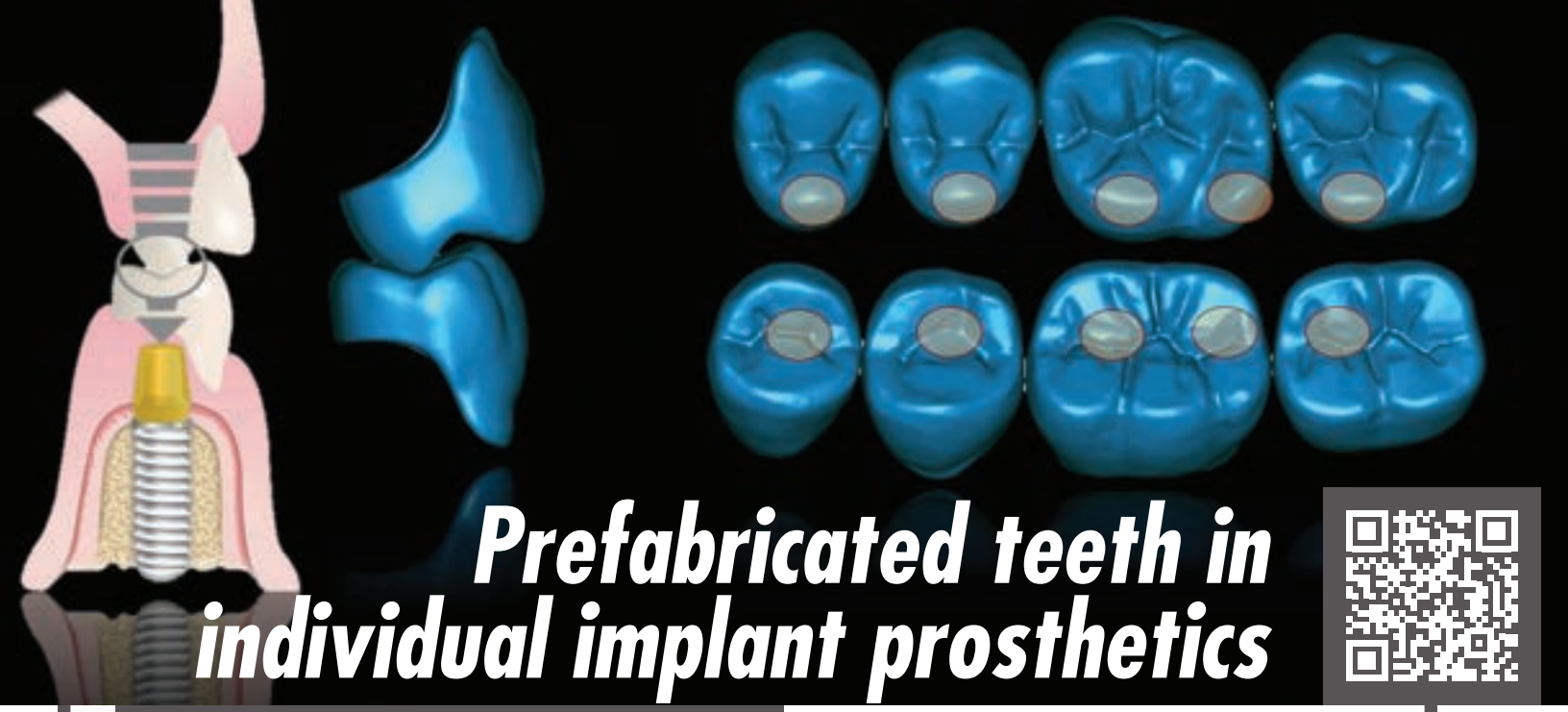

Prefabricated teeth in individual implant prosthetics

SCAN ME

Patrick Zimmermann and Dominik Mäder present a report on a new range of prefabricated teeth, SR Ortholingual S DCL

Patrick Zimmermann, *MDT* **Dominik Mäder,** *DT*

About the Authors

Patrick Zimmermann is a master dental technician and owner of Zahnmanufaktur Zimmermann and Maeder AG.

Dominik Mäder is a dental technician and owner of Zahnmanufaktur Zimmermann and Maeder AG.

Total prosthetics is one of the most challenging fields in dental technology. The authors have several years of experience in this 'ultimate discipline', and in this article, they will describe their experiences with the new prefabricated teeth, SR Ortholingual S DCL (Ivoclar Vivadent). They explain in detail about implant supported dental restorations, which can be set-up with lingualized posterior teeth, according to a proven occlusion concept. At the same time, the article speaks for the recognition of individual complete prosthetics. In recent years, complete prosthetics seem to have become the poor relation in dental restorations. Digital technology and full ceramics dominate the specialist media. However, complete prosthetics is still very much present in everyday dental laboratory life.

To trivialize and/or neglect the subject in education and training would be irresponsible in the long term. One look at the demographic trend shows that an increase in edentulous patients is to be expected in the coming years. In addition, the challenges are greater. Reasons are, for example, that the age at which patients receive initial treatment with full dentures is often when their adaptability is reduced, and a strong resorption of the alveolar bone has occurred.

In addition, the number of younger dentists with experience in the art of producing removable dentures is diminishing (Grunert, 2008). For this reason, we will continue to work intensively with complete prosthetics, in close collaboration with dentists, in order to be able to offer patients state-of-the-art, safe treatment concepts.

High patient expectations

In our opinion, it would be wrong to assume that the production of a full denture for an edentulous patient is economically unattractive. It is a question of perspective, because in terms of price, full dentures offer individual flexibility.

We are currently seeing a generational shift in older patients – from the postwar generation to the baby boomers (Schimmel et al, 2017).

These patients have become accustomed to the high level of dental care and dental technological possibilities available, and they do not want to miss out on this in old age.

Many elderly patients want aesthetic restorations that do not obviously look like dentures.

Thanks to the multitude of technologies and procedures available, it is possible to provide the patient with a restoration specifically suited to their requirements, from a wide range of processing techniques.

The end result can be a highly aesthetic, individually fabricated denture, or the 'simple' digitally manufactured full denture.

Function and esthetics are always highly important, irrespective of production technique.

Complete prosthetics in implant technology

Due to increased patient expectations, complete prosthetics have also increased in relevance in the field of implantology.

We have to differentiate between the implant-supported fixed or partially removable bridge restoration and the removable hybrid restoration, ie with two retention elements. We will focus on the graduated implant concept from the Clinic for Reconstructive Dentistry and Gerodontology (Professor Dr M Schimmel) in Bern.

If possible, an implant restoration should last a lifetime. Manual strength and skill play an important role here.

In many cases, due to the advantages, the removable option is selected (hygiene, patient comfort, and so on) (Schimmel and Zimmermann, 2017). Here, at least two implants are used in the edentulous lower jaw and at least four implants in the upper jaw as retention for the removable restorations.

Some examples of retention elements are bars, stud-and-anchor attachments (for example, Novaloc, CM Loc, locators), ball-head attachments or retention caps, depending on each individual patient situation. This is a relatively cost-effective concept, which has proven to be very successful among patients.

A higher-quality, fixed full-arch restoration option, which has proven its worth, is the Straumann Pro-Arch concept (Schimmel and Zimmermann, 2017). With regard to setting the teeth up, the same principles apply for implant-supported total prosthetics as for mucosa-supported dentures. The fundamental specifications for the fabrication of full dentures and the correct model analysis must be mastered.

In order to ensure long lasting functionality of implant-supported restorations, the static aspects as well as the set-up and occlusal concepts must be taken into account. In addition, the materials (for example, prefabricated teeth) must be carefully selected.

Prefabricated teeth made from DCL acrylic

The number of implant-supported restorations is increasing, as is the demand for prefabricated teeth with increased abrasion resistance. Hardly any patient will accept that the prosthetic teeth have to be replaced or renewed shortly after their new dentures were finished.

In our laboratory, we prefer to use prefabricated teeth, which guarantee a long service life from a material science point of view.

Demands on the prefabricated teeth are:
- Biological tolerance
- Abrasion resistance
- Plaque resistance
- Shade stability
- High grinding strength
- Good polishing qualities
- A good bond with the denture base material

One material that meets these requirements is the double cross-linked (DCL) acrylic used by Ivoclar Vivadent for various prefabricated tooth lines. In order to understand why the material is ideal for implant prosthetics, it is important to have an insight into the science behind the material.

The DCL acrylic is a modified polymethyl methacrylate variant (PMMA), in which the polymer filler and matrix are evenly cross-linked (Figure 1). The DCL material displays a higher compressive strength but a similar flexibility to that of conventional PMMA. This is due to the double cross linking (matrix, polymer filler), which has eliminated the classic weakness of conventional PMMA teeth, for example exposure of non-cross-linked, soluble polymer beads during grinding.

The intelligently designed material structure of DCL acrylic ensures good stability and high abrasion resistance. As a result, the total prosthetic restoration can expect to have a longer service life.

In addition, the DCL acrylic is distinguished by a secure bond with the denture base material and is less susceptible to discolouration.

Prefabricated teeth with lingualized occlusion

One of the basic requirements when setting the teeth up on a full denture is to set each individual tooth in such a way that the denture will not tilt under masticatory pressure.

There are various set-up concepts, one of which is the classic Gerber method (according to Professor Dr. Albert Gerber).

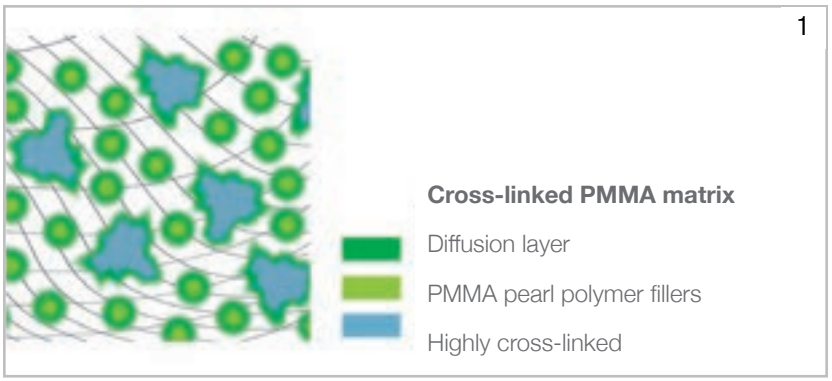

Fig. 1 — Graphic representation of the components in DCL acrylic, a strongly modified PMMA variant

Fig. 2 — The SR Ortholingual S DCL, with a lingualized occlusal concept, is ideal for implant prosthetics

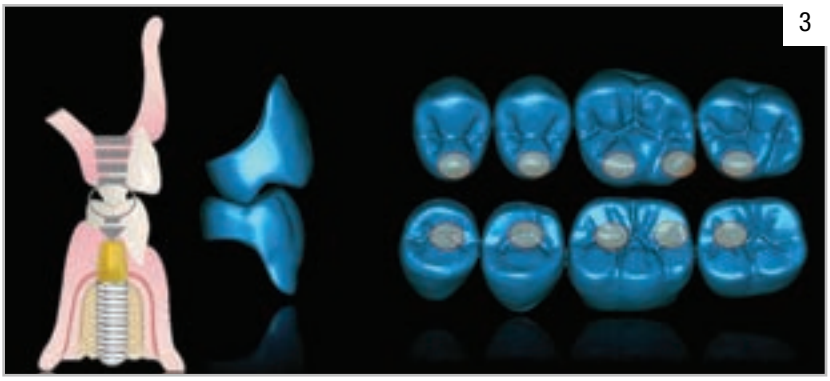

Fig. 3 — Graphic representation of the occlusion concept (lingualized occlusion according to the mortar-pestle principle)

Fig. 4 — Model of an edentulous lower jaw with an implant supported bar. Ideally, a precise model analysis is always carried out before the implants are inserted, in order to prepare and achieve an optimal starting position for the functional set-up

This method takes into account the forces generated during mastication and their transferral through the denture onto the supporting alveolar ridge.

Important features in this concept are the lingualized, bilaterally balanced occlusion and the tooth-to-tooth occlusion, which are aspects that play a role in implant-supported total prosthetics.

The lingualized occlusion concept, in which the narrow supporting surfaces of the upper palatal cusps come into occlusal contact with the lower lingual fossae, enables the autonomous masticatory stability of individual teeth, which is required in many situations. This means that horizontal shearing forces are reduced, and the prosthesis and implants remain secure.

We have been using the SR Ortholingual S DCL (Ivoclar Vivadent) for some time now, which are designed for lingualized occlusion (Figure 2).

The design of the SR Ortholingual S DCL takes into account the essential principles of lingualized occlusion (mortar-pestle principle).

Ideal partner for implant prosthetics

We like to use the SR Ortholingual S DCL in implant prosthetics due to its special design. The upper teeth have dominant palatal cusps and the lower teeth have a pronounced functional central fossa (Figure 3).

The centric contacts are concentrated in the fossae of the lower teeth. The buccal cusps are set-up out of contact. This means the teeth are ideally suited for a lingualized set-up in tooth-to-tooth occlusal contact. If necessary, a tooth-to-two-tooth intercuspidation can be set up.

The teeth also meet our expectations from a material science aspect. They are made of the DCL acrylic and have a high abrasion resistance and long service life.

Together with the SR Vivodent S DCL anterior tooth sets, the Ivobase system for pressing the denture base and the light-curing laboratory composite SR Nexco gingiva, we are able to produce restorations that are functionally and aesthetically pleasing and, at the same time, provide long-term stability.

Experiences from everyday laboratory life

Here is a demonstration piece as an example: implant-

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- Identifying the Three Smile Patterns
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Figs. 5 - 6 — A pair of articulated models with a bar and without dentures in the mandible and with both dentures set-up according to Gerber in lingualized occlusion (SR Ortholingual S DCL)

Figs. 7 - 8 — Close-up view: the prefabricated teeth in the anterior region (SR Vivodent S DCL) have a strong, individual and natural appearance. The characteristic design of the pink aesthetics (SR Nexco Gingiva) gives a life-like appearance (SR Ortholingual S DCL)

supported bar in the edentulous lower jaw and full denture in the edentulous upper jaw (Figures 4 to 11).

We produce many restorations of this type for patients and achieve good, stable results in function and aesthetics using SR Vivodent S DCL anterior teeth, SR Ortholingual S DCL posterior teeth, the Ivobase system and the SR Nexco Gingiva.

The prefabricated anterior teeth are distinguished by their characterized aesthetic appearance. The authentic surface texture and layered build-up of the teeth provides an age appropriate, vibrant appearance, resembling that of natural dentition.

The exceptional shape design allows for a high level of individuality. The natural, anatomical tooth shape with 'real' curvature allows a lifelike set-up. The teeth can be individually adjusted by grinding lightly (for example, age and gender). The layered build-up gives a natural appearance and has a good level of translucency.

The posterior teeth have a multifunctional set-up design, which means they can be set-up according to the concept followed, either in a 1:1 or 1:2 teeth intercuspidation. The predefined cut facets simplify the set-up procedure. The teeth are easy to trim and polish.

The design remains beautifully natural despite the lingualized shape. The anatomical shape of the teeth allows an individual set-up without making the interdental areas unnaturally large.

The length and width of the teeth are large enough to cover individual abutments – or, as in Switzerland, the popular root-pin copings can be concealed. This, amongst other factors, means the teeth can be used well for implant-supported complete prosthetics. Sometimes, the teeth are a little too short in the lingual and/or palatal region, but this can usually be compensated well.

In our daily laboratory routine, we use the SR Ortholingual S DCL posterior teeth and the SR Vivodent S DCL anterior teeth for all our removable prosthetic requirements. The DCL acrylic is distinguished by its abrasion resistance and shade stability.

Figs. 9 - 10 — Occlusal view of the upper and lower dentures. The teeth can be trimmed well, which means that facets can be cut into the teeth to give a more natural appearance and help with the functionality of the restoration

Fig. 11 — Vital and real: in complete prosthetics, there are many ways that lead to the final result – high-quality and individualized as shown here or using simple steps. However, there is no compromise on the static and function requirements

Conclusion

Total prosthetics continues to play an important role in dental laboratories and practices. The number of edentulous patients will continue to increase in future.

In addition, the older generation is changing. The 'new old people' are accustomed to a high standard of dental medicine and want their dental restorations to be inconspicuous – aesthetically as well as functionally. In order to meet these high demands, it is essential to be well skilled and competent in the field of complete prosthetics. The dental technician is an important partner for the dentist, because total prosthetics is an ultimate discipline for them too. Sd

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Questions for:

Press technology: How digital and analogue processes can be combined in everyday laboratory work

Complex restorative rehabilitation

Bastian Wagner

1. **Which key advantage of the IPS e.max Press material is highlighted in the article?**
   a. Low cost of production
   b. High level of flexibility in processing methods
   c. Exclusive compatibility with CAD/CAM systems
   d. Rapid degradation for temporary restorations
2. **What type of blank is recommended for covering discolored stumps?**
   a. HT (High Translucency)
   b. MT (Medium Translucency)
   c. HO (High Opacity)
   d. LT (Low Translucency)
3. **Why is the hybrid workflow (digital and analogue) preferred for restorations with thin edges?**
   a. It is faster than analogue methods alone.
   b. It allows for more precise marginal seals.
   c. It eliminates the need for manual layering.
   d. It reduces the material cost significantly.
4. **The IPS e.max Press Multi ingots are characterized by a natural color gradient from dentin to the incisal edge.**
   a. True
   b. False
5. **The use of CAD/CAM technology eliminates the need for analogue processes in hybrid workflows.**
   a. True
   b. False

Questions for:

Analysis of 3D Printed Materials for Permanent Restorations

Dr. Russell Giordano, DMD

1. **What is the minimum inorganic filler content required for printed materials to meet the ADA definition of ceramic restorations?**
   a. 25%
   b. 50%
   c. 75%
   d. 100%
2. **Which test was used to determine the flexural modulus of the materials?**
   a. Biaxial flexure strength test
   b. Wear test using pi-on-disc device
   c. Three-point bend test
   d. Single edge notched beam test
3. **What type of testing device was used to measure wear rates in the study?**
   a. Instron 5566A
   b. Otoflash system
   c. Customized wear device based on the University of Alabama-Birmingham design
   d. X-Rite I7 spectrophotometer
4. **There is currently no standardized method for testing the biaxial flexural strength of polymer-containing dental materials.**
   a. True
   b. False
5. **The fracture toughness test for polymer-based materials followed ISO 6872, which also applies to machinable ceramics.**
   a. True
   b. False

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Questions for:

A Story about Teamwork, Technology, and the Emotions Behind It

The Journey to a New Smile: A Case Report

Dr. Alina Lazar and Ralf Dahl, CDT

1. **What was the initial clinical finding in the patient's upper anterior teeth?**
   a. Severe enamel erosion and tooth loss
   b. Crowding and enamel chipping
   c. Missing teeth in the upper arch
   d. Severe periodontal disease
2. **What material was used for fabricating the final ceramic veneers?**
   a. Zirconia
   b. Initial LiSi Press
   c. Composite resin
   d. Porcelain fused to metal
3. **Which procedure was necessary to correct the gingival contour?**
   a. Gingivectomy with a laser
   b. Electrosurgical procedure
   c. Crown lengthening surgery
   d. Orthodontic extrusion
4. **The aligner therapy allowed for only ten trays per jaw due to the time constraints.**
   a. True
   b. False
5. **The patient's veneers were permanently cemented using a self-adhesive resin cement called G-CEM ONE.**
   a. True
   b. False

Questions for:

Prefabricated teeth in individual implant prosthetics

Patrick Zimmermann, MDT and Dominik Mäder, DT

1. **Current demographic studies indicate a decrease in the number of edentulous patients in the coming years.**
   a. True
   b. False
2. **SR Ortholingual S DCL teeth are used in implant prosthetics due to:**
   a. upper teeth having a pronounced functional central fossa
   b. lower teeth having dominant palatal cusps
   c. the centric contacts are concentrated in the fossae of the lower teeth
   d. all of the above
3. **PMMA is the result of evenly cross-linked polymer filler and matrix.**
   a. True
   b. False
4. **A basic requirement when setting teeth up on a full denture is to:**
   a. select larger teeth for better aesthetics
   b. set each individual tooth so that the denture will not tilt under the forces of mastication
   c. select inexpensive teeth that can be replaced economically as they wear
   d. none of the above
5. **The Gerber Method of setting up teeth includes:**
   a. lingualized, bilaterally balanced occlusion
   b. tooth-to-tooth occlusion
   c. reduced horizontal shearing forces
   d. all of the above

Once you have completed the questionnaire, fill out the information below. You can photocopy this form. Then simply complete the form and submit to Spectrum dialogue online at www.palmerimediagroup.com/ce or by fax to 905-489-1971. It's that easy!

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A new clinical and technical protocol for ultra-thin zirconia veneers (0.2 mm)

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The working protocol includes the production of a resin mock-up to check functional, phonetic and aesthetic aspects. Based on the mock-up, the dental technician can produce a preparation guide marking the tooth areas that the dentist has to prepare for the minimally invasive application of the veneers. Veneers preparation and cementation is then performed based on a proven protocol developed by Zirkonzahn, which includes both technical and clinical working steps:

- cleaning and isolation of the working area
- tooth preparation
- veneers preparation
- bonding preparation and application, curing

SCAN ME

International courses on Prettau® Skin® are available, where dental technicians and dentists can learn the complete workflow using the correct parameters, focusing on both clinical and technical procedures. For more information and registration call +39 0474, email elena.chudakova@zirkonzahn.com or scan the code (QR code).

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Spectrum Days Across Canada

Palmeri Media Group is pleased to announce the dates for the 2025 Spectrum Day schedule across Canada;

Calgary: June 14th | Vancouver: October 4th
Montreal: October 25th | Toronto: November 7th

All events will now be techno-clinical in nature, inviting Dentists, Dental Technicians, Denturists, and Hygienists to participate.

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SPECTRUM DAY
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Ivoclar introduces Ivotion Base Print – its first 3D printing material for the efficient production of esthetic denture bases

The Ivoclar Group introduces Ivotion Base Print, its first 3D printing material for permanent applications which stands out for high quality, durability and esthetics. The material allows for the efficient 3D printing of denture bases in proven PMMA quality and integrates seamlessly into the 3D printing workflow from Ivoclar. In combination with the PrograPrint system, Ivoclar optimizes digital dental technology, providing dental labs worldwide with innovative solutions for enhanced accuracy and accelerated denture fabrication.

3D printing revolutionizes dental technologies, enabling the fabrication of dental restorations with greater accuracy and improved efficiency. The seamless integration of this technology into digital workflows opens up entirely new possibilities for dental technicians, from planning and design to the final fabrication. The Ivotion product line from Ivoclar is a key component of this development, leveraging innovative solutions to digitally fabricate high-quality, esthetically pleasing dentures.

Ivotion Base Print: the new dimension in denture fabrication

Ivotion Base Print is the first 3D printing material for permanent applications in Ivoclar's portfolio. This new product has been developed to meet the highest expectations in denture prosthetics. Ivotion Base Print stands out for its proven PMMA quality, enabling the fabrication of robust, durable and esthetically refined denture bases. The material not only provides excellent wearing comfort and high accuracy of fit but also allows for efficient fabrication, significantly optimizing workflows in dental labs and between labs and practices.

Further information can be found at: ProArt Print Material | 3D Dental Printers | Ivoclar

Media contact within the company:

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716-264-2121

Pac-Dent, Inc is announce the launch of Rodin® Glaze N2-Free and Rodin® Palette N2-Free Naturalizing Kit

Pac-Dent, Inc. is excited to announce the launch of Rodin® Glaze N2-Free and Rodin® Palette N2-Free Naturalizing Kit, a groundbreaking resin characterization system set to redefine the staining and glazing procedure for printed dental restorations. This innovative system has been designed for surface detailing across a wide range of dental restorations, including hybrid ceramics, PMMA resins, and CAD/CAM composites, ensuring compatibility with various workflows.

Rodin® Glaze N2-Free offers a new level of restoration finishing by neutralizing the oxygen inhibition layer, ensuring complete polymerization without the tacky surface commonly caused by oxygen exposure during the curing process. Designed to enhance durability, Rodin® Glaze N2-Free offers a high-gloss, natural-looking finish that resists discoloration, staining, and mechanical wear, ensuring long-lasting, lifelike restorations. With curing times ranging from as little as 40 seconds to a few minutes based on device settings, Rodin® Glaze N2-Free allows clinicians to seamlessly integrate this new technology into existing workflows, enhancing both efficiency and patient satisfaction.

For more information on Rodin® Glaze N2-Free and Rodin® Palette N2-Free, please visit the product pages at https://www.rodin-3d.com/

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