interview
“Dentistry has finally arrived in the digital age”

case report
Screw-retained implant-supported restoration in the edentulous maxilla

cone beam supplement
Dynamic navigation for reliable and predictable flapless implant placement
Essential Dental Media

Dental Tribune International

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Welcome to the digital age!

“The world's largest taxi firm, Uber, owns no cars. The world's most popular media company, Facebook, creates no content. The world's most valuable retailer, Alibaba, carries no stock. And the world's largest accommodation provider, Airbnb, owns no property. Something big is going on.” These words have been said by Tom Goodwin, an executive at the French media group Havas in 2015 and has been doing the rounds since. Obviously he was right, "something is going on", although making these observations, he meant the companies that control the interface between the consumer and the provider of the goods or services, I guess we can put them in a different context as well: the world is changing very quickly today, including the world of dentistry.

Analogue versus digital workflow. Can CAD/CAM replace skilled ceramists? Can we donate our smile to somebody else? Will digital impressions eliminate the conventional ones? What if the digital cloud crashes and loses our digital storage? We try to give you the answers to these and many more similar questions in CAD/CAM magazine.

In this edition, you will find articles on practice management, digital workflow, CAD/CAM assisted treatment and treatment planning. Dr Simon Chard from UK describes his experience with CEREC and implant restorations, while Drs Richard Zimmermann and Stefanie Seitz from the US explain principles and advantages of implant insertion through the DWOS Synergy workflow. Dr Torsten Seidenstricker and Dominique Vinci (Switzerland), in an amazingly illustrated article, present symbiosis of different procedures and materials on an example of zirconium dioxide and fluorapatite glass-ceramic. In the cone beam supplement, Dr David Burgess (UK) demonstrates how useful dynamic navigation can be, especially for flapless implant placement.

I hope you will find this issue interesting, enjoy it and get ready for an exciting New Year 2018, as there will surely be a lot of innovations to write about.

Magda Wojtkiewicz
Managing Editor
editorial
03 Welcome to the digital age!
Magda Wojtkiewicz, Managing Editor

practice management
06 Don’t blink—You may miss something!
Chris Barrow

feature
10 “Dentistry has finally arrived in the digital age”
An interview with Patrick Thurm, Vice President
Technology Global Prosthetic Solutions, Henry Schein

case report
12 Implant restoration with CEREC
Dr Simon Chard
16 Implant insertion through the DWOS Synergy workflow
Drs. Richard Zimmermann & Stefanie Seitz
20 Screw-retained implant-supported restoration in the edentulous maxilla
Dr Octavian Fagaras & Milos Miladinov
26 A convincing duo: Zirconium dioxide and fluorapatite glass-ceramic
Dr Torsten Seidenstricker & Dominique Vinci

industry report
32 Combined CAD/CAM-assisted treatment, for a new, beautiful smile
Dr Marko Ahonen
36 Rehabilitation of the edentulous maxilla—digital approach
Dr Francesco Benvenuto & Giorgio Poma

cone beam supplement
42 Dynamic navigation for reliable and predictable flapless implant placement
Dr David Burgess
48 A whole new dimension of imaging precision
Julia Maciejek

industry news
52 Manufacturer news

opinion
54 Digital Workflow: a precise way to achieve state of the art smiles
Dr Miguel Stanley
58 Teeth within an hour: A ticking time bomb
Dr Göran Urde

meetings
60 EAO meeting in Madrid
62 MIS Global Conference
64 International Events

about the publisher
65 submission guidelines
66 imprint
3D technology that facilitates implant planning with instant volume measurement and bone density assessment

- Evaluate in one click the volume and bone density
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I recently took five weeks off work to go catamaran sailing in the Caribbean, get married while there and then leave my lovely new wife behind to explore the mountains and deserts of Oman with seven friends. On my return, the back issues of dental magazines were full of General Dental Council changes to its regulatory systems, the National Association of Specialist Dental Accountants and Lawyers revealing a 53 per cent increase in UK practice goodwill values in the last year, mydentist taking a break from practice purchases, the FGDP (UK) seeking independence, the risk that NHS dental contract reform could force associates to become employees and Simplyhealth announcing their name change for Denplan. Add in the Bupa purchase of Oasis before I started my wanderings and the rise and rise of digital dentistry and we have what can safely be described as a rapidly changing and disruptive marketplace.

Predictions are a dangerous game. I have been asked to submit prophetic articles on many occasions in the past. Perhaps unusually (because I am wired that way), I have always made a point of returning to the predictions some years later, just to see how close I came to getting things right. I am delighted to tell you that I have maintained an average score of 50 per cent on my guesses as to what may happen next.

The challenge, as they say, is knowing which 50 per cent and, frankly, I never have a clue. Sorry! So my purpose here is not to add yet another list of half-truths to the speculations of my peers in writing and speaking; I would rather offer some thoughts on how to survive the disruptive dental market.

Rule 1: Stay focused on the patient

No matter what big business, private equity or shareholder pressure does to the dental industry, the independent dental business owner will be able to deliver a unique selling point built on customer service. The patient experience will always be the way in which you can positively differentiate yourself. Staying in touch with patient expectations is arguably the single most important way to survive the future.
INSPIRING SPEAKERS. BREATHTAKING VIEWS
MAKE IT SIMPLE

MIS is proud to introduce the Global Conference Speakers Team:

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In a recent blog post, I mentioned a presentation given at the London-based WIRED Retail symposium. There Westfield Labs Chief Operating Officer Antony Ritch gave an interesting insight into the future of shopping: “Shoppers don’t differentiate between online and offline. Omnichannel is the only way that retailers can survive. As virtual reality, augmented reality and full-body scans of shoppers proliferate—and with Amazon launching bricks and mortar stores, the way forward is to act as matchmaker between customer and product in every environment. Shoppers always have their phones and 80 per cent of all physical sales are influenced by the internet. Stores are a social environment where friends and family come out to enjoy a day of shopping, dining and entertaining. We see the digital world in the same manner.”

When one considers this quotation alongside the conventional approach to the provision of dental customer service, there is much that will need to change in the next ten years. My belief is that disruption will be applied to the premises from which dentistry is delivered and the current model of reception, lounge, consultation room and surgery.

The patient experience will change and the device-toting, connected consumer will be at the centre of it. Something new this way comes, but as yet I am having trouble imagining what it will look like.

Rule 2: Take the time to research, listen and plan

There seem to be too many dental conferences, websites, publications and social channels. There are nowhere near enough hours in the day to stay abreast of what is happening in clinical dentistry and in business innovation. I have no miracle cure for information overload. If you are committed to your vocation, then you must prioritise that which will keep you ahead of the game and that will include attending, listening to, watching and reading the events, broadcasts and publications that will maintain your edge.

This comes at a price and the need to manage your time very carefully to avoid burn-out. Maria Popova, creator of the excellent Brain Pickings weekly newsletter, reminds us that: “Of all ridiculous things, the most ridiculous seems to me, to be busy—to be a man who is brisk about his food and his work;’ Kierkegaard admonished in 1843 as he contemplated our greatest source of unhappiness. It’s a sobering sentiment against the backdrop of modern life, where the cult of busyness and productivity plays out as the chief drama of our existence—a drama we persistently lament as singular to our time. We reflexively blame the Internet our corrosive compulsion for doing at the cost of being, forgetting that every technology is a symptom and not, or at least not at first, a cause of our desires and pathologies.”

Rule 3: Have good conversations

All problems exist in the absence of a good conversation. Many years ago, one of my original mentors advised me to establish a personal board of directors (PBD), defined as people whose opinion I trust and who have the opportunity to give me honest feedback without judgement. The only qualifications are trust, respect and mutual admiration. They do not have to be in the same business, country or demographic. My PBD has changed over the years as members have come and gone, but I still refer many of my ideas and strategies to them for a second opinion before I take risks.

I often attend meetings with owners, managers and teams in which it is obvious to me that the main reason they have progressed so slowly is that they simply do not make the time available in the working calendar to stop and listen to each other. The chase for production becomes all-embracing, whether a unit of dental activity or a sales target, and there are never enough timeouts to take the pulse of the business and its people.

The main characteristic of a Champions League dental business (if I may use that football metaphor) is the meeting schedule, which should be designed to ensure that verbal communication is the primary means by which information is shared. Here too is another way in which the independent can beat most big businesses.

Benjamin Franklin is alleged to have said, “When you’re finished changing, you’re finished”. Focus on your patient experience, stay connected to innovation and stop to listen. Master those three habits and you will be able to take advantage of whatever the world plans to throw at us next. There is, of course, a 50 per cent chance that what I have just said is correct.

Editorial note: This article first appeared in Dental Tribune United Kingdom Edition 2/17.

contact

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Since its introduction in 2013, the ConnectDental platform from Henry Schein has helped numerous dental professionals make the difficult leap into digital dentistry. This autumn Dental Tribune International interviewed Vice President of Technology Patrick Thurm to find out how dentistry has changed in the digital age and why Henry Schein ConnectDental provides guidance in an ever-growing market.

Four years ago, we met here at the EAO congress to discuss the introduction of the ConnectDental platform. How has the dental landscape changed since then, in your opinion?

In the last four years, we have seen increasing penetration of digital technology, in both dental laboratories and practices. These technologies are now used across the whole field of dentistry, not only by implantologists and increasingly orthodontists but also by general practitioners. Of course, their integration is being realised at different paces, but we are seeing increasing networking with open systems gaining more and more market share. This is having a positive impact on penetration, which is exactly what we predicted four years ago.

We no longer speak of technologies, but of integration and solutions. The International Dental Show this year clearly showed that dentistry has finally arrived in the digital age, and all large providers of materials and technologies have adjusted their portfolio to be able to contribute to this growing field.

With the ever-growing number of solutions, entering the field can be overwhelming. How does ConnectDental provide orientation?

For us, this is the main role of Henry Schein ConnectDental. The platform helps to preselect, choose and connect products to support dentists in their efforts to offer new treatment concepts and achieve higher patient satisfaction. Meanwhile, 3-D printing has also finally arrived in dentistry. In this field, we are now offering complete solutions with implant planning software that allow practices and laboratories to produce surgical guides together, which means that they no longer have to rely on external providers. This way, they can provide a service that is much closer to the patient. There are actually implantologists working with surgical guides for every implant they place.

Digital dentistry offers amazing possibilities and the ConnectDental platform makes best use of them, either as a chairside solution in combination with Dentsply Sirona CEREC or as a solution using an intraoral scanner and the services of a laboratory, for which we work closely with 3Shape and other leading manufacturers of digital impression solutions. That is also the reason we no longer call it an open system but ConnectDental Trusted Solutions, which means that the solutions we offer are thoroughly tried and tested.

Where do you see the future of ConnectDental?

As trusted advisers, we are committed to helping dental professionals to successfully integrate digital technology into every step of their clinical workflows. Therefore, we will continuously extend the ConnectDental platform further. On the technology side, we always try to have the best solutions in our portfolio. Since we are a global company, we are certainly positioned very well in this field and are able to include any new trend in our system through partnerships with every important provider. Within Henry Schein, we work closely with our affiliates CAMLOG and Biohorizons in implantology, and other divisions of the company, such as Henry Schein Orthodontics. We also collaborate with leading clinicians, clinics, laboratories and universities to develop excellent solutions.

Education too is a major focus and we invest a great deal of resources in this area. So there is plenty more to come.
Implant restoration with CEREC

Author: Dr Simon Chard, United Kingdom

Dental implants are a fantastic addition to the repertoire of any restorative dentist and allow us to provide a tooth replacement in a way that minimises damage to remaining dentition. The restoration of dental implants requires a sound knowledge of restorative dentistry, prosthodontics and periodontology. Traditionally, this has been carried out with an analogue impression taken with an impression coping either via an open or closed tray impression technique. A skilled technician then fabricates this restoration over a 2- to 3-week period. The time and skill required for these restorations both from the
implant restoration case report

Clinician and technician command high fees for the patient.

This case report highlights a novel method of restoring implants utilising the modern advances in digital intraoral scanning and chairside milling. It illustrates how an aesthetic single implant retained crown can be provided chairside without the need for analogue impressions (Figs. 1 & 2: Pre-operative condition).

Following a discussion of the options for replacement of LR6, the patient elected for an implant-retained solution. A MegaGen AnyRidge 4 x 10 mm implant was placed utilising a surgical guide for position of the pilot hole. An immediate temporary crown was fabricated using the MegaGen fuse abutment...
and DMG Luxatemp. A silicone index of the diagnostic wax-up was fabricated and the temporary crown was polished and taken out of occlusion while the implant fully integrated (Fig. 3).

Following 3 months of integration, the patient attended the practice for the restoration of the implant with a definitive crown. During this period, the soft tissue had been given time to mature and a beautiful molar soft tissue profile had formed (Figs. 4 & 5).

Traditionally, capturing the detail of this soft tissue profile with analogue methods is complicated and time consuming; however, utilising a digital intraoral scan (CEREC Omnicam) a “gingival mask scan” can be taken to accurately replicate this soft tissue and use it to guide the subgingival emergence profile of the restoration (Fig. 6).

Following removal of the temporary crown, a TiBase was placed into the fixture head and a scan body used as a reference point for the scanning of the implant (Figs. 7 & 8).

Following digital intraoral scanning (DIOS) of the opposing arch, working arch and buccal bite, a digital
design was created using the biogeneric individual design mode. In this design mode on the CEREC Omnicam, the software evaluates the other teeth captured in the DIOS and tries to recreate what it believes to be the closest match to the original missing tooth (Figs. 9–11).

This tooth design is then positioned digitally within an e.max meso block. This meso block has a predetermined hole within it that acts as the access hole for the screw-retained crown, as well as the orifice into which a TiBase will be bonded (Fig. 12).

This restoration is then milled from the low translucency monolithic e.max CAD Block in its purple phase (taking around 18 minutes) and checked for precision of fit on the TiBase (Figs. 13 & 14).

It is tried in intraorally to assess contacts and occlusion in static and dynamic function (Figs. 15 & 16). The restoration is then stained using Ivoclar e.max Crystall Glaze so as to provide an aesthetically harmonious restoration and glazed with Glaze Spray. It is placed in an Ivoclar Vivadent Programat CS2 firing furnace for 15 minutes to crystalise the ceramic, turning it from purple to tooth-coloured (Fig. 17).

The ceramic restoration is then bonded onto the TiBase extraorally. The fit surface of the ceramic is treated with 5% Hydrofluoric acid and silanated with Monobond Plus (Ivoclar Vivadent). The TiBase is sandblasted and also silanated. Finally, the ceramic and TiBase are bonded with multilink hybrid resin cement (Ivoclar Vivadent; Figs. 18–21).

Following the bonding, the restoration is steam cleaned to remove any residue. The final restoration (Fig. 22) is now ready to be inserted, approximately 2 hours after the patient arrived in the practice (Fig. 23).

The restoration is finally torqued down to 25 Ncm. Following this, occlusion is rechecked, but no adjustment is required at this stage following the try-in adjustments. PTFE is placed in the access cavity and the access hole filled with opacous composite (OMC Venus Pearl) and stained with Venus tints (Figs. 24–26).

In conclusion, as you can see in the final result (Figs. 27–29) an aesthetic, biologically designed and durable restoration has been fabricated. The patient has been delivered the final restoration in a single visit without the need for traditional analogue impressions.

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

about

Dr Simon Chard BDS(Hons) BSc(Hons) qualified with Honours from King’s College London Dental Institute in 2012. He is director of membership for the British Academy of Cosmetic Dentistry, was voted the Best Young Dentist in the Dentistry Awards 2015 and is a member of the Association of Dental Implantology. Dr Chard is very passionate about providing beautiful, healthy smiles for his patients and is a big promoter of using digital technology to simplify cosmetic and implant dentistry.

Dental education is something that is a major part of his professional career and he has dedicated thousands of hours to advanced training from the best dentists around the world. Further to this he regularly teaches other dentists in the topics of digital dentistry, dental photography and minimally invasive aesthetic dental techniques. Dr Chard comes from generations of dentists and works in private and mixed practice in London and Surrey.
Implant insertion through the DWOS Synergy workflow with immediate digital provisionalisation

Authors: Drs. Richard Zimmermann & Stefanie Seitz, USA

Initial situation

A 30-year-old female with a non-contributory medical history presented to the clinic for the evaluation of a maxillary edentulous site. Review of her dental history revealed that tooth #12 (ADA) was lost due to failed endodontic therapy approximately a year ago during her pregnancy and she was now ready to have it replaced. She presented with a high smile line, medium-scalloped gingiva with medium thickness, and a desire not to have any metal in her oral cavity. When discussing the various options regarding implant therapy, the patient was very interested in being evaluated for an all ceramic implant. On 11 January 2016, the FDA cleared the Straumann PURE Ceramic Implant for use within the US. Though new to the US, European case documentation has shown excellent osseointegration and soft tissue response. The Straumann PURE Ceramic Implant is a monotype style implant, meaning the abutment and implant body are one-piece.

Treatment planning

The patient was sent to get a computerised cone beam tomography (J. Morita) of the area and digital diagnostic impressions were taken using an intraoral scanner (TRIOS 3, 3Shape). Once obtained, the DICOMs were imported into the implant planning software (coDiagnostiX) while the scan files were imported into the laboratory software (Straumann CARES Visual; Figs. 1 & 2). Since the Straumann PURE Ceramic Implant are monobody in design and it is not recommend to modify the abutment, the DWOS Synergy workflow was utilised to virtually plan this case. DWOS Synergy provides real-time communication between the implant planning software (coDiagnostiX) and the lab software (Straumann CARES Visual). This feature improves implant planning by allowing the visualisation of the relationship between the proposed implant position and the proposed restoration. Modifications made to the implant position
or restoration design are immediately transferred to the other software, providing instantaneous feedback on how the modification of one affects the other. Of special interest in regard to the Straumann PURE Ceramic Implant, is that one can design the restoration and ensure that the planned position will not require modification for restorative materials. Once the planning was complete, both the surgical guide and the provisional designs were sent off for fabrication. The guide was sent to a lab to be printed by an Objet30 OrthoDesk (Stratasys) while the provisional file was sent to Straumann Milling Center in Arlington to be fabricated out of polycon ae (PMMA) (Figs. 3 & 4). During the surgical planning, utilising the DWOS Synergy workflow, a Straumann PURE Ceramic Implant (Ø 4.1 x 12 mm) was selected with an abutment height of 5.5 mm.

Surgical procedure

The Straumann PURE Ceramic Implant design is a combination of the tissue level and bone level implant—the neck of the implant mirrors the Straumann Tissue Level implant while the implant body mimics the Straumann Bone Level design (Fig. 5). As such, the surgical protocol for preparing the osteotomy for the PURE is the same as the corresponding Bone Level implant. For this case, a guide was used to prepare the osteotomy following the protocol set forth for Bone Level implants given by coDiagnostiX. Though this case was performed with Straumann Guided Surgery (SGS), a small flap was made to ensure the desired position of the Straumann PURE Ceramic Implant shoulder. SGS utilises different combinations of sleeve positions, drill lengths and drill handles to prepare the osteotomy to the correct depth. Sleeves can be placed
at three different heights from the implant level (2, 4 or 6 mm) based on the case and surgeons preference. The combination of drill length (short, long or extra-long) and drill handle (1 or 3 mm) are determined by the implant planning software that provides the surgical protocol to use at time of surgery.

The Straumann PURE Ceramic Implant system uses a series of "position indicators" that aid in ensuring the correct position of the implant during surgery. Both abutment diameters and heights have corresponding position indicators that are placed into the osteotomy for evaluation (Fig. 6). Once the osteotomy has been prepared, typically a surgeon will use a "guided implant", which has a unique driver, to ensure proper placement of the implant. However, the Straumann PURE Ceramic Implant currently does not have such a driver; therefore, the surgical guide was only used to prepare the osteotomy while implant placement was performed freehand. Bone quality was determined to be Type II. The Straumann PURE Ceramic Implant comes with a separate transfer piece for placement that snaps into place much like the Tissue Level impression cap. Three dots on the driver line up with a flat surface of the abutment portion of the implant and also indicate distance to the shoulder (1, 2 and 3 mm). The implant was placed without any incidence to the desired depth and position of the dots (Figs. 7–9). During the healing phase, a protective cap is placed over the abutment to protect it. Since the patient was concerned with aesthetics and has a high smile line, it was decided to place a provisional to provide a more aesthetic appearance. The recommendation by Straumann not to immediately load a PURE implant was taken into account during the DWOS Synergy design session by eliminating occlusal and lateral contacts. This provisional was then further modified at time of surgery by further reducing the anatomy and creating more of a custom healing abutment than immediate provisional. The provisional was cemented using temporary cement (TempBond, Kerr) and only two interrupted sutures were required to secure the flap. At the one-week follow-up the tissue was healing beautifully around the implant and the patient was scheduled for the final impression seven weeks out (Fig. 10).
Final result

The patient was in slight discomfort following the surgery, but stated that this surgery was less painful than the previous extraction. She was pleased to have the modified provisional versus a dark space in her smile.

Conclusion

Since the Straumann PURE Ceramic Implant endosteal portion is based on the Straumann Bone Level design, it does not require additional surgical instruments or drilling protocols for placement while the specialised transfer piece comes with the implant. When placing the driver onto the Straumann PURE Ceramic Implant abutment care must be taken to align the indicator dots up with the facets, otherwise incomplete seating of the driver may occur (Fig. 11). As implant therapy has evolved, patient expectations have risen. The desire to have a natural looking, metal-free restoration is increasing as can be seen by the decrease of metal substructures for crowns and frameworks and the increase in ceramic restorations. While titanium can cause a greying of the tissues, the ivory colouring of the Straumann PURE Ceramic Implant can provide a more aesthetic outcome. Another patient was ecstatic to have the option for a Straumann PURE Ceramic Implant since her husband has a titanium implant in the anterior region and she can see the grey. All ceramic implants have the potential to provide greater aesthetic outcomes but do require more precise planning and placement. Initially, one might consider the Straumann PURE Ceramic Implant to be limited by design, to a degree it is, however the DWOS Synergy workflow can help to reduce the challenge of placing a monotype implant.

about

Dr Richard Zimmermann and Dr Stefanie Seitz
UT Health San Antonio
School of Dentistry
Screw-retained implant-supported restoration in the edentulous maxilla

A working document for the production of a milled zirconium dioxide framework

Authors: Dr Octavian Fagaras & Milos Miladinov, Romania

When veneering zirconium dioxide frameworks, manual dexterity and a profound knowledge of the materials is required. The correct use of the materials is decisive for success. A screw-retained and therefore conditionally removable restoration is a proven concept for the implant prosthetic treatment of an edentulous maxilla. Zirconium dioxide is a framework material that can support a long-lasting result. A state-of-the-art zirconium dioxide material such as Zenostar T (Wieland Dental) and innovative ceramic veneering systems (such as IPS e.max Ceram, Ivoclar Vivadent) enable natural-looking prosthetic restorations to be achieved in an efficient manner. In principle, zirconium dioxide is a sophisticated material that requires correct and skilled application.

Introduction to a patient case

An implant-supported, screw-retained bridge was planned for the edentulous maxilla. Based on defined backward planning, six implants were inserted into the patient’s jaw. After the healing phase, the implants in the visible region were provided with transversal screw-retained abutments. In the molar region, the final bridge restoration would be occlusally screw-retained.

Important parameter for framework production

A set-up of the planned restoration was used as a basis for the CAD/CAM-supported production (Zenotec, Wieland Dental) of the zirconium dioxide framework. After digitisation in the design software, the framework shape was reduced according to the cut-back technique. This method created sufficient space for the veneer. The digital structure was first milled in wax so that the fit and precision could be checked (Fig. 1). Subsequently, the framework was milled from a Zenostar T disc. During framework construction, it was necessary to include sintering drops as an occlusal support for the restoration so that distortion would be prevented during sintering in the Zenotec sintering furnace. In doing so, the restoration was not to be separated from the occlusal tongue (Fig. 2). Sintering distortion was avoided with this method. The sintering process was carried out in the compact, high-temperature Zenotec Fire P1 sintering furnace, which is supplied with pre-installed programmes. This sintering furnace can also be freely programmed so that other sintering programmes can be used. We selected the “long programme”. The heating-up and cooling-down phases...
were set as long as possible in order to achieve an exact result. It should be noted that the sintering time should not be shortened. After sintering, the framework had the required fitting accuracy. The restoration was perfectly supported with the occlusally positioned sintering drops (Fig. 3). The titanium sleeves could be easily inserted into the framework (Figs. 4 & 5).

The recommended sintering programme:
- 20–900 °C for 1.5 h (600 °C/h)
- Holding time: 900 °C for 30 min
- 900–1,450 °C for 2.75 h (200 °C/h)
- 1,450 °C for 2 h
- Cooling: 600 °C/h; from 1,450 to 900 °C
- 900–300 °C for 1.2 h

Preparing for veneering

The next working steps require not only manual dexterity but also knowledge of the material firing parameters and furnace settings. This is the only way to ensure a balanced temperature distribution in the bonding area between the framework and the veneer. This in turn results in a sound bond and uniform shrinkage of the ceramic layer. Slow cooling of the restoration prevents the risk of tension in the fired restoration, which therefore minimises the risk of
delamination. The exact fit of the restoration justifies the long firing time.

It should be noted that the programmes must be adjusted accordingly before the ZirLiner bake (IPS e.max Ceram ZirLiner, Ivoclar Vivadent):

- long heating-up time
- long cooling-down time

Ceramic system and framework

Our preferred veneering material (IPS e.max Ceram) consists of low-fusing nano-fluorapatite. The material has a crystal structure similar to that of natural dentition and allows a specifically adjustable combination of translucency, brightness and opalescence. The framework (Zenostar T) is an ideal base for the ceramic veneer. The defined cut-back enables the framework to be veneered efficiently. The reduced tooth shape allows the veneering ceramic to be applied in an even thickness. This ensures that the layered ceramic is heated uniformly during firing. For the fabrication of the prosthetic gingiva, we chose IPS e.max Ceram Gingiva materials, with which we achieved a gingival area with a lifelike appearance. The materials were applied and fired in a similar manner to the dentine and enamel materials.

Liner bake

First, the ZirLiner bake was carried out using the IPS e.max Ceram ZirLiner, a material with multiple functions. On the one hand, the ZirLiner creates a strong bond between the veneer and the framework. On the other hand, it gives the restoration depth of shade and fluorescence. We do not recommend omitting the ZirLiner, as this can increase the risk of cracks and delamination. Before the ZirLiner is applied, the framework must be free from dust and dirt. Contamination must be avoided. The IPS e.max Ceram Liner should cover the framework completely; we recommend applying the material in uneven layers. After a short drying time, it can be fired (Fig. 6).
The furnace settings have to be modified:

<table>
<thead>
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<th>Start temp.</th>
<th>Drying time</th>
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<tbody>
<tr>
<td>403 °C</td>
<td>8 min</td>
</tr>
<tr>
<td>Temp. increase</td>
<td>End temp.</td>
</tr>
<tr>
<td>25 °C/min</td>
<td>980 °C</td>
</tr>
<tr>
<td>Holding time</td>
<td>1 min</td>
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<tr>
<td>Vacuum</td>
<td>450–959 °C</td>
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Wash bake

Owing to the low thermal conductivity of zirconium dioxide, the wash bake is indispensable. The veneering ceramic sinters directly on to the framework surface, and a homogeneous bond to the fired ZirLiner is achieved. First, a wash bake was carried out in the pink aesthetic zone. The restoration was placed on to a firing tray and then fired (Fig. 7). Then the IPS e.max Ceram Transpa clear wash bake was carried out.

The recommended firing programme for the wash bake:

<table>
<thead>
<tr>
<th>Start temp.</th>
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<tbody>
<tr>
<td>403 °C</td>
<td>8 min</td>
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<tr>
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<td>25 °C/min</td>
<td>750 °C</td>
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<tr>
<td>Holding time</td>
<td>1 min</td>
</tr>
<tr>
<td>Vacuum</td>
<td>450–749 °C</td>
</tr>
</tbody>
</table>

Individual build-up of the white aesthetics

The basic tooth shade for this restoration was A2. In order to achieve a unique and characteristic result, we individualised the ceramic materials and used other effects, such as Deep Dentin and Impulse, Intensive and opalescent materials (Fig. 8). We built up the ceramic on the prepared framework according to the layering diagram (Fig. 9), using Build-up Liquids to mix the IPS e.max Ceram. We worked as closely as possible to the final tooth shape (Figs. 10 & 11) and then fired the restoration.

The recommended firing programme for the first dentine bake:

<table>
<thead>
<tr>
<th>Start temp.</th>
<th>Drying time</th>
</tr>
</thead>
<tbody>
<tr>
<td>403 °C</td>
<td>8 min</td>
</tr>
<tr>
<td>Temp. increase</td>
<td>End temp.</td>
</tr>
<tr>
<td>25 °C/min</td>
<td>450–749 °C</td>
</tr>
<tr>
<td>Holding time</td>
<td>1 min</td>
</tr>
<tr>
<td>Vacuum</td>
<td>450–749 °C</td>
</tr>
</tbody>
</table>

After firing, the bridge was trimmed and cleaned. This is ideally carried out in an ultrasound water bath or using a steam cleaner. The shape was then completed using ceramic and a second dentine bake was carried out. The firing parameters were based on the first dentine bake.

Individual build-up of the pink aesthetics

There are 13 IPS e.max Ceram shades available for the prosthetic gingiva design. With this variety, it is...
possible to almost playfully recreate the gingiva. The system’s shade guide aids in finding the correct shade. A natural reproduction is based on the anatomical prerequisites. For example, the keratinised gingiva is recreated with light pink materials, as the blood circulation is naturally less in this area, whereas the mucogingival area is imitated using more intensive materials (Fig. 12).

With some skill, a 3-D gingiva design is produced and then the bridge is fired. Again, the firing parameters are adjusted and the temperature is lowered slightly. The presented case was also produced in this manner.

The recommended firing programme for the first gingiva bake:

<table>
<thead>
<tr>
<th>Start temp.</th>
<th>Drying time</th>
</tr>
</thead>
<tbody>
<tr>
<td>403 °C</td>
<td>8 min</td>
</tr>
<tr>
<td>Temp. increase</td>
<td>End temp.</td>
</tr>
<tr>
<td>25 °C/min</td>
<td>745 °C</td>
</tr>
<tr>
<td>Holding time</td>
<td>1 min</td>
</tr>
<tr>
<td>Vacuum</td>
<td>450–744 °C</td>
</tr>
</tbody>
</table>

For the second gingiva bake, the shape was completed and the furnace temperature lowered again by 5 °C (Fig. 13). After this bake, the restoration had a distinct 3-D shape and a very natural appearance. The teeth had a good depth of colour and a warm translucency.

Completion

While finishing the restoration, full attention was paid to the texture and morphology. The harmonious interchange of raised and depressed areas gave rise to natural-looking reflections. In addition to the edges and curves, the effect of finely detailed structures is not to be under-estimated (microstructure). We therefore intentionally introduced slight irregularities in order to produce a certain liveliness. Finally, the restoration was finished with a rubber polisher and then glaze fired (without glaze material). We achieved the required gloss level by manual polishing (Figs. 14 & 15).

The recommended firing programme for the glaze bake:

<table>
<thead>
<tr>
<th>Start temp.</th>
<th>Drying time</th>
</tr>
</thead>
<tbody>
<tr>
<td>403 °C</td>
<td>6 min</td>
</tr>
<tr>
<td>Temp. increase</td>
<td>End temp.</td>
</tr>
<tr>
<td>60 °C/min</td>
<td>725 °C</td>
</tr>
<tr>
<td>Holding time</td>
<td>1 min</td>
</tr>
<tr>
<td>Vacuum</td>
<td>450–749 °C</td>
</tr>
</tbody>
</table>

Conclusion

In dental technology, manual skills and optimal materials are essential, but also a profound knowledge of materials science and material-specific characteristics is of fundamental value. In particular, when dealing with a complex restoration on a zirconium dioxide framework, correct handling is a major criterion for success. In the case presented, the framework (Zenostar T) and the ceramic veneer (IPS e.max Ceram) successfully harmonised with one another, creating a vibrant interplay of colours. Owing to accurately selected firing parameters, no delamination or late cracks are to be expected.

contact

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Miladinov can be contacted at dentaltech@dentaltech.ro.
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This patient case demonstrates how a monolithic zirconium dioxide framework can ensure stability and function in a complex prosthetic restoration. The ceramic veneering of the vestibular surfaces gives the restoration natural light optical properties, contributing to the very pleasing final results.

Initial situation

A 60-year-old patient came to the dental practice as an emergency case. In addition to aesthetic and functional problems, there was severe periodontal damage. The treatment began with an in-depth diagnosis and an informative consultation. First, teeth #25, 26, 14, 16, 11 and 12 were extracted. The periodontitis was then targeted. Treatment of the periodontitis was successfully completed approximately 13 months later. Implants needed to be placed in regions #11, 12, 14, 16, 25 and 26. The clinical situation meant that all teeth in the maxilla and some teeth in the mandible had to be restored.

Planning and temporisation

Before starting such an extensive prosthetic reconstruction, photographic documentation of the oral situation and the patient’s face is essential. Primarily, the photographs help in assessing the axes and planes in terms of optimum aesthetics and function. We work with a 3-D design program (Digital Smile System, DSS). This tool enables us to simulate the possible results virtually. Another advantage of this software is that the photographs can be used in the CAD software while the restoration is being produced. The teeth to be extracted were removed from the situation model, and the remaining teeth were prepared using the information provided by the dentist.
On this foundation, we designed a wax-up with the CAD software (3Shape) and then transferred it to wax. This was the basis for a matrix made from transparent silicone, which was sent to the practice. After the dental preparation was complete (implant placement, preparation, etc.), the matrix was filled with an auto-polymerising temporary composite (Telio CS C&B, Ivoclar Vivadent) and a temporary restoration was produced and then inserted into the mouth. The temporary restoration served as a dental prosthesis during the implant healing phase, and it allowed us to determine whether the situation, which was planned in the laboratory, harmonised in a functional and aesthetic manner in the patient’s mouth. The patient wore the adapted temporary restoration for approximately six months up to the osseointegration of the implants.

Production of the final dental restoration

Implant abutments

The wax-up was positioned on the master model and adapted based on the patient’s and dentist’s feedback. A double scan followed. We digitised both the model and the wax-up using the laboratory scanner. Subsequently, the implant abutments were produced via CAD/CAM. The implant abutments were milled from a new translucent zirconium dioxide material (IPS e.max ZirCAD, Ivoclar Vivadent). Before sintering, we stained the cervical areas of the frameworks. We used a liquid with a warm yellow tone for the infiltration. After sintering, the implant abutments were adhesively bonded to the titanium bases (TiBase, Straumann) with a luting composite (Multilink Hybrid Abutment, Shade H0, Ivoclar Vivadent) specifically designed for this indication. The self-curing composite provides excellent adhesion qualities. After adhesive bonding, the abutments were integrated.

Production of the framework

The following restorations were planned for the final prosthetic restoration:
1. a bridge in regions #11–13;
2. a bridge in regions #14–16;
3. a crown on tooth #17;
4. seven single crowns on teeth #21–24 and 27, as well as in regions #25 and 26.

We designed the tooth shape and the occlusal morphology in full anatomical contour in the CAD software. The buccal surfaces should be built up in ceramic in order to achieve optimum aesthetics. In preparation for this, the software performed a cut-back. After the framework design, the individual elements were milled from zirconium dioxide
The material used has interesting mechanical properties, which, among other qualities, guarantee the long-term stability of the restorations. The selected shade of LT sun offers a light chroma that matched perfectly the envisaged Shade A restorations. After milling the frameworks, we corrected the morphology slightly, paying particular attention to the interdental areas. For excellent aesthetic results, we infiltrated the frameworks with the special IPS e.max ZirCAD LT colouring liquids (Ivoclar Vivadent) before sintering.

In the incisal and occlusal areas, the chroma was increased and the translucency was adapted in the appropriate areas. As only the buccal surfaces were veneered in this case, the framework volume was relatively solid. We always carry out a slow sintering procedure (9 h) in our laboratory for complex restorations, such as the reconstruction presented here. Subsequently, the surfaces of the monolithic zirconium dioxide parts were polished, paying special attention to the occlusal areas. For polishing, we used polishing cones from SHOFU or anaxdent. These cones guarantee thorough polishing so that the surface can subsequently be easily polished to a high lustre. We do not use silicone cones or discs, as they leave residues on the surface, making the application of glazing materials difficult. Areas that are difficult to access during polishing are covered with a thin glaze layer.

This was followed by a restoration try-in in the patient’s mouth. The dentist checked the occlusion and function.
After conditioning of the framework parts to be veneered, a fluorescent liner (IPS e.max Ceram ZirLiner, Ivoclar Vivadent) was applied; this gave the restoration fluorescence from the depths in order to achieve light effects resembling that of the natural dentition. Non-fluorescent materials (e.g. pure zirconium dioxide) appear dull and dark. Since the framework was already coloured, we opted for a clear liner. This additionally enhanced the light transmission and contributed to the adhesion of the ceramic veneer to the zirconium dioxide. A classic ceramic veneering build-up was then carried out. We used a special indicator (Smile Line) to mix the ceramic powder in order to differentiate the individual materials better. The IPS e.max Ceram range includes Power materials, which provide an increased level of brightness, particularly for translucent framework materials. In this case, we decided to use the Power materials. A further advantage of the IPS e.max Ceram material is its excellent stability. The individual areas do not merge during the build-up of the ceramic veneer, allowing for the exact desired effects to be achieved. In order to achieve the correct shape, morphology and liveli-

The ceramic materials (IPS e.max Ceram) for veneering the buccal areas:

- Cervical Transpa orange-pink with Special Incisal yellow 50 %
- and Transpa neutral 50 % and Power Dentin A2
- Power Incisal I for greater brightness at the transition lines
- Transpa blue 50 % and Opal Effect 1 50 %
- Transpa orange-grey to create a contrast in the incisal areas
- Transpa orange-grey with Special Incisal yellow on the incisal edges
- Transpa neutral
- Transpa clear 50 % and Opal Effect 1 50 %
- Power Incisal 2

Fig. 9: The zirconium dioxide frameworks prepared for veneering in the buccal area.
Fig. 10: The ceramic build-up in the anterior region (IPS e.max Ceram).

Fig. 11: Prepared for the second firing. Finely detailed adjustments in the shape and morphology.
ness, a second firing was necessary. The restorations were then glazed and finished. We like to use the glaze material (IPS Ivocolor FLUO, Ivoclar Vivadent) in a creamy consistency.

Conclusion

In the design illustrated, only the buccal surfaces of the otherwise monolithic zirconium dioxide framework are veneered. An aesthetic and durably stable result was achieved with relatively minimal effort. The qualities of the materials are used to their full advantage. These include the excellent light optical properties of IPS e.max Ceram, in this case especially the Power materials; the high strength of zirconium dioxide; the possibility of colouring the zirconium dioxide to achieve a warmer colour effect (white zirconium dioxide is far too bright for this type of restoration, and reducing the degree of brightness would have been difficult in view of the low thickness of the veneering ceramic); and the low amount of ceramic material (this allows minimal controlled shrinkage and ensures easy handling).

contact

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Years of research, opinions and wishes of users as well as mutual cooperation have led to the creation of the efficient CAD/CAM solutions. Simple application, excellent technology and fine materials are backed by professional support, which is available throughout the process, i.e. from your desire and idea of a purchase to the training and fast solutions to any problems you may encounter during use.

**Zr DISCS**
- CC Disk Zr
- CC Disk Zr coloured
- CC Disk Zr HT
- CC Disk Zr HT coloured
- CC Disk Zr Smile
- CC Disk Multicolour

**CoCr DISCS**
- For all metal ceramics
- CTE 13,9 - 14,0 $\times 10^{-6}$K$^{-1}$
- Contains very little oxides

**Ti DISCS**
- Ti2; for crowns, bridges and simple implant substructures.
- Ti5; for crowns, bigger bridges and complex implant substructures.

**PMMA DISCS**
- CC Disk PMMA
- CC Disk PMMA Transparent
- CC Disk PMMA Pink
- CC Disk PMMA X-ray Opaque
Combined **CAD/CAM-assisted treatment, for a new, beautiful smile**

**Author:** Dr Marko Ahonen, Finland

CEREC has become part of everyday life at our practice where I and three other general dentists work. We treat not only patients from the direct vicinity, but also patients from some 600 km away; indeed, these make up around 25% of our client base today. Treatment in a single session is thus an important "added value" service for our patients. And that is reflected in our system’s take-up rate. As a practitioner, it is important to me not to have to compromise when it comes to restorations and, in particular, to have full control over the process at all times. That may sound trivial, but it has a major impact on the treatment itself, including the dental technology aspect, on my time management, as I can treat another patient during CAD/CAM production, and also on the cost-effectiveness of my practice. And, of course, one should not forget the high levels of patient satisfaction. Our patients couldn’t be more impressed with CEREC, especially when they realise the indications for which it can be used in implantology and orthodontics.

The very latest developments have resulted in numerous improvements in terms of the range of applications. CEREC is far more than just a system to produce crowns and bridges. For example, we also use it for orthodontic indications. Here, a guided scan and model analysis assist treatment. With regards to implantology, digital impressions and chairside production of the suprastructure enable a completely digital workflow.

**En route to a "10-click crown"**

The changes in the workflow are particularly evident when using the new CEREC software 4.5, which I had the chance to use during the test phase and have now been operating for four months. What stands out most is the time saved and the impressive quality of the initial proposal, with an exceptional accuracy of fit for the desired restoration. In my view, this software is paving the way to a "10-click crown"—made quickly, simply and safely. This is aided by a multitude of integrated automatic features, starting with the restoration itself—for which the software makes direct proposals—and extending to the automatic setting of the correct insertion axis. The individual steps are self-explanatory and the software works rapidly, even in the background. The intuitive software and our wealth of experience from more than 2,500 restorations are what make the system so valuable to us. I also love to share my...
passion for teeth with my patients, who clearly enjoy keeping track of what I am doing and why. The case described as follows is an apt example of precisely this.

Stronger together!

A female patient (43 years old) came to us with a rather unusual problem: she experienced discomfort when talking, and it also appeared as if she was edentulous. Her upper lip was thin and shortened; she appeared significantly older than her years. This was due to abraded anterior and posterior teeth caused by severe bruxism (Figs. 1 & 2).

Following a detailed consultation, it was decided that the patient would firstly undergo short orthodontic treatment. Due to the abrasion, both maxillary and mandibular incisors were compensatory overerupted. This creates a situation where all teeth and gingiva moves. In order to correct this kind of situation, we first have to intrude the incisors. This leads to a situation before the eruption and to an open bite anterior. The aim was to intrude the incisors to their original position and to create space for no-prep veneers. The second goal was to add as much upper lip support as possible. This can be then corrected with no-prep veneers.

Fig. 3: Clinical situation initially. Worn anterior dentition and compensatory overeruption.
Fig. 4: Clinical situation after nine months of clear aligner therapy. Total of 2 mm of intrusion was achieved.

Fig. 5: Result after nine months of orthodontic treatment...
Fig. 6: …and after placement of the veneers in the maxilla.
Fig. 7: Preparing the mandible for the veneers.
In the first stage, a scan of the complete jaw was performed using the CEREC Ortho software and the CEREC Omnicam. This formed the basis for creating the therapeutic aligners for intrusion in the maxilla and mandible in order to correct the bite (Fig. 3).

The patient wore Invisalign aligners for nine months. This created ideal gingival harmony and sufficient space to place no-prep veneers on the anterior teeth (Fig. 4).

It proved very simple to produce the veneers with the new CEREC software 4.5. The complete scan had a very positive impact on the quality of the initial proposal, enabling the software to use several teeth as a reference for the initial proposal. In line with expectations, a first-class proposal was produced for the desired restoration as previously configured. We provided the patient with a total of six veneers (13 to 23) in the maxilla in a single visit. The shape of the upper veneers were designed to maximise upper lip support.

We also orthodontically modified the position of the teeth in the mandible in order to prepare teeth 32 to 42 for veneers. The no-prep veneers were produced chairside from e.max blocks using extra-fine milling tools and were 0.2 to 1 mm thick (we use both CEREC zirconia and CERASMART in our practice). The margins were designed optimally thanks to the new software-controlled milling algorithms.

This meant no corrections at all were required; adaptation to the natural teeth was immediate and created a highly attractive result.

We were fascinated by the accuracy of the fit. Adaptation is especially good in the lingual area; the interface between the natural tooth and ceramic is barely visible. This is ultimately what we had hoped to achieve.

**For enhanced quality of life**

Our approach of starting out with orthodontic correction enabled us to greatly influence the overall visual impression of the patient’s face. Following treatment, the patient appeared younger; the teeth can now be seen when the patient talks, and the upper lip is well supported by the teeth. For us, this meant an ideal result after nine months without compromises; for the patient it meant a greatly improved quality of life._

**Editorial note:** Registered brands, trade names, and logos are used. Even if they are not marked as such in the respective places, the corresponding legal provisions apply.

**contact**

Dr Mark Ahonen graduated from University of Helsinki in 2011 and is currently doing clinical research on digital dentistry with a strong focus on guided implantology. He teaches and lectures on current and future applications of CAD/CAM technology and CBCT integration both nationally and internationally. He has a website and blog about different topics, especially about CEREC at www.cerecfinland.fi
CAD-CAM THREADED ATTACHMENTS

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Rehabilitation of the edentulous maxilla—digital approach

Initial situation

A 57-year-old male presented with a partial upper removable prosthesis, with mucous support held by cast clasps on teeth 17 and 18, which were parodontopathic. Part of tooth 27 still remained, which would be extracted; in the lower arch was a removable frame denture with cast clasps (Figs. 1–3). The patient had a very pronounced third class occlusal relationship. The patient’s request was to be able to chew properly with a stable prosthesis that could partially harmonise the volume of the perioral tissues.

In the first clinic session, alginate impressions were taken and chewing patterns were studied to produce study models on which to develop the diagnostic wax-up.

The analysis of the models showed a considerable overjet discrepancy between the two arches; the upper one showed an irregular bone crest with paraffinic keratoses caused by the existing prosthesis.

The diagnostic wax-up was then produced without considering the crests of the patient, but instead placing the dentition according to the first class occlusal relationship. This increased the vestibular flange volumes to give correct mucous support in order to restore a pleasing profile of the patient’s lip.

After the aesthetic and functional tests, the patient approved the design of a total prosthesis supported
by four bar-connected implants located in the canine areas of the maxilla.

In agreement with the surgeon, it was decided to use the diagnostic wax-up to make a surgical template that would allow the surgeon to place the implants in areas with a more favourable bone density, which also indicated exactly the axis of insertion of the prosthesis and of the primary bar.

The diagnostic wax-up was then duplicated using a 1.5 mm thick thermos disk in which the acrylic resin was cast, thus obtaining an upper flange and a palate–free flange; a second template was then produced on the lower model on which the resin diagnostics was fixed, thus obtaining a three-dimensional vision of the volumes and the sagittal assembly inclination (Figs. 4–6).

These templates allowed the surgeon to work freely on the patient's tissues and to maintain the control of the insertion axis of the future prosthesis that the patient initially approved.
Surgery

The medical and dental history did not highlight local pathologies that would contraindicate the use of osteointegrated implants for prosthetic support. The third skeletal class favoured the insertion of the implant fixture with vestibular inclination in line with the major axis of the residual crest. The guiding template, prepared in the laboratory, was positioned on the lower arch to have an intraoperative reference of the correct implant axis, and four 3.3 mm x 10 mm Straumann Standard Plus implants were inserted, a regenerative with heterologous bone (botiss cerabone) in the 22, 14 vestibular dehiscence area and in the alveoli of the 23. The bone consistency of D3, however, provided a primary stability of 35 Ncm measured with a dynamometer key. After 12 weeks, the implants were revealed, the keratinised tissues were repositioned around the healing screws and the first impression in alginate was taken. Once the models were developed, the individual fenestrated impression trays for the implant transfers were produced and then the definitive impression was taken (Figs. 7–9).

Prosthetic part

The position impression was developed with a pink silicone and in extra-hard Fujirock optiscan type 4 plaster to simulate the gingiva around the analogues (Figs. 10 & 11).

The wax rims with light-curing resin bases were produced in order to simulate the needed volumes for the labial support; its dimensions were of 22 mm height in the front and 20 mm in the back, with a thickness of 2 mm in the front and 4/6 mm in the back. Once tested and adapted the base with the Candulor occlusal fork aligning the upper wax in parallel with the bipupillary line, and laterally in parallel to the Camper plane which proceeds from the lower margin of the trago to the front nasal spine. The labial vestibulum volume was adapted to the aesthetic needs. Using the form selector, the shape of the anterior teeth was determined as corresponding to the form B63 SR Phonares II (Ivoclar), while the posterior teeth were determined as the A2 Bonartic (Candulor).

The values recorded on the Stratos (Ivoclar) articulator were transferred through the slider of the horizontal plane by first mounting the upper and consequently the lower antagonist model. The teeth were assembled, which was then tested in the oral cavity for the patient by performing phonetic tests and extraoral evaluations.
Design and milling bar

The set-up, the upper model and lower model were scanned in order to design a 2° CAD bar, using the silicone keys indicating the volumes obtained from the teeth set-up for the correction of the third class as a reference. In this case, the vestibularisation of the bar was much more accentuated to follow the tilt pattern of the teeth set-up. In the design, three Rhein’83 threaded Micro Spheres and vertical frictional attachments distally were inserted. The STL file of the bar with the corresponding construction info file was inserted in the CAM with the set-up of the specific strategies for the connections and the attachments present. The bar was milled from a chrome-cobalt disk using the 5-axis dental miller Orotig Whitec 5.2 (Figs. 12–18).

At the end of the milling cycle, the bar was detached from the milled wafer, the Sheffield test was performed, placing the bar on the model by pointing only one screw to the right and then to the left to verify the precision of the connections on the implants. The same test was performed in the oral cavity, with additional fit tests using control Rx. The threaded sleeves were cemented with composite material in the appropriate milled holes in the bar. As a result, the Rhein’83 threaded Micro Spheres attachments were screwed.
in. The counter bar was modelled with the castable Rhein’83 OT box inserted on the threaded Micro Spheres attachments, creating the housings for the retentive caps. The subsequent laboratory steps, the cast, the finishing, the polishing and the insertion of the retentive caps were performed to complete the frame (Figs. 19–24).

The secondary bar was embedded in the teeth assembly, using a silicone template previously made; the teeth were positioned one by one and adapted to make them engage with the retentions of the secondary bar. The flanges were modelled in the marginal gingival area using the Candulor modelling wax of medium hardness (Figs. 25–27).

An oral try-in of the work was done by screwing the primary bar and then inserting the prosthesis mounted on the secondary bar for a final test before the resin curing to verify the stability, retention, chewing, phonetic and support of the lips. A frontal, left and right side photograph were taken in order to carefully examine the harmony of the facial tissues (Figs. 28–30).

The model was prepared for the muffle technique by bathing it in water at a temperature of about 35 degrees. The base of the muffle was produced with a hard plaster. The flange models and the teeth were protected with a 90 Shore hardness silicone before completing the filling of the muffle with the hard plaster muff before final hardening at 50 bar (Figs. 31–33).

After 60 minutes, the muffle was put in boiling water to open the mould. The whole surface was degreased by vapour and immersed in water at 35 degrees for 10 minutes. Once the retentions of the teeth were isolated and prepared, the flanges were produced by stratifying the Aesthetic resinous masses (Candulor) with a colouring of 53 for the collar edges and 34 for the fixed gingiva, and an intense red to characterise the alveolar mucosa (Figs. 34–36).

After the resin was finished, the muffle was closed and locked in a press bar at 80 bar; the subsequent polymerisation of the resin was performed at 50 degrees for 20 minutes at three atmospheres. At the end, the muffle was opened and the prosthesis was finished and polished.

The laboratory caps were replaced with the "extra soft" yellow OT Cap Micro caps Rhein’83 and the work delivered. In co-operation, the team carried out the final checks in the oral cavity paying attention to the stability, chewing and phonetics. The patient was instructed to use the prosthesis and to clean it by using primer bar cleaners and brushes with detergents for the prosthesis (Figs. 37).

Conclusions

The patient was satisfied with the performance received from the whole team. Within a few hours of delivery, he reported having good phonetics, very good chewing efficiency and finally noticed a good harmony of his face. After six months of delivery, the patient still looked happy and smiling for the successful rehabilitation (Figs. 38–42).

This is our team’s goal: “Rehabilitate the chewing function by combining aesthetics that in our day seems to have become the primary problem for our patients.”

Contact

Dr Francesco Benvenuto graduated in 2003 at the University of Brescia. Faculty of medicine degree in dentistry. He undertook an internship at the University Clinic. His experimental thesis on microinfiltration of fiber pins with Prof. Cerutti was published in IADR (International Academy Dental Restorative). He frequents the conservative and endodontic department as a tutor where he is performing cases using the surgical microscope. SIE partner (an Italian endodontics company) is a student interested in orthogonal and surgical and restorative aesthetic endodontics, attending numerous courses and congresses. ITI (International Team of Implantology) is dedicated to the periodontal implant and regenerative surgery with the attention to implant replacement of individual dental elements and soft tissue management with periodontal plastic techniques. Annual course with Prof. Zucchelli in clinical and surgical periodontology and mucogengival aesthetics.

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Giorgio Poma, dental technician graduated in 1999 at the Leonardo da Vinci Professional Institute for Dental Technology in Bergamo. In 1999 he attended the “Total Prosthetic Complete Method” course at the Ivoclar Center in Naturno with the Speaker Tocco Antonio. Since 2009 he has worked as an employee at the S.D.A. Studi Dentistici Associati S.r.l and specialises mainly in total and removable dentures. From 2013 to 2015 he participated in various courses organised by Candulor with the speaker Odt. Ivano Bortolini. In 2016 he participated in the course organised by Merz Dental with rapporteur Odt. Giorgio Garuffo. He attends the course "The Implant Support Facility" organised by Odt. Carlo Borromeo. Participate in Basic and Master courses at Rhein’83. At the end of 2016 he started a collaborative relationship with Rhein’83 where he realised for the first time in Bologna at the course “Modern techniques in removable prosthesis, Cad Cam and implantology master course” addressed to Dental Technicians and Dental Professionals. Since 2017 he has been working as an employee at the Techno Dent Laboratory of Calcinate (BG). He collaborates with Dentistry in the province of Bergamo, Brescia, Monza Brianza and Catania. Publication on "Teamwork Clinic" of June 2016 entitled “Overdentures on distal bars with micro threaded retentions".

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Calcinate
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Dynamic navigation for reliable and predictable flapless implant placement

Author: Dr David Burgess, United Kingdom

Case report

A 52-year-old female patient was concerned about the appearance of her smile. Her upper right first molar and second premolar had been missing for several years (Figs. 1 & 2). She was otherwise a fit and healthy non-smoker.

The patient was unwilling to consider a denture and was not keen for the symptomless adjacent teeth to be prepared for bridgework, particularly the upper right first premolar, which was unfilled. She did not wish to have any form of removable prosthesis. She chose to have implant-supported crowns, as she wanted the final restoration to be as close as possible to having natural teeth.

Clinical examination and planning

Clinical examination suggested that the buccopalatal width of the maxillary ridge was wide enough to consider flapless surgery. This had added appeal, as the patient was travelling a great distance for the treatment, so wished to minimise the number of appointments and the potential for postoperative complications.

Computer-guided dynamic navigation with Navi-dent by ClaroNav was used in the preparation of this case. Scanning and planning took place during the assessment visit, 48 hours before implant surgery. A NaviStent was fabricated and a fiducial marker attached, prior to the CBCT scan. Fabrication of the
NaviStent is quick, easy and takes place chairside, using a unique thermo-plastic material which is moulded directly onto the patient’s existing dentition. The NaviStent is designed and fabricated to ensure a high level of stability, while providing unrestricted access to the planned implant sites.

The scan was taken with a Morita 3-D CBCT system, which provides high definition, distortion-free images for accurate diagnosis and planning. Radiographic and CBCT examination revealed approximately 9 mm of bone depth, from the crest of the ridge to the floor of the maxillary antrum, in the upper right second premolar site, and no more than 5 mm bone depth in the first molar site. Planning took place immediately after the scan, with the patient present, so she could see the proposed treatment on the Navident software. She felt reassured by the care being taken to achieve optimum implant positioning, with minimal risk of potential complications, and was extremely impressed with the technology.

The Navident planning software allowed the placement of the implants to be restoratively driven. The size, shape and position of the intended crowns was

Fig. 4: Calibration of drill axis.  
Fig. 5: Calibration of pilot drill tip.  
Fig. 6: Preparation of upper right second premolar implant site.

Fig. 7: The pathway of the drill could be followed clearly on the Navident computer screen.  
Fig. 8: Navident provided visual confirmation of the position of the drill tip to accurately gauge the correct depth.  
Fig. 9: Calibration of 3.5 mm drill tip.  
Fig. 10: Preparation of premolar site with 3.5 mm drill.
planned prior to treatment and the consequent position of the implants determined, so that the optimum restoration could be achieved.

Due to the limited bone depth in the first molar site, augmentation of the ridge was planned by utilising the internal sinus lift (or Summer’s) technique. The minimally invasive procedure allowed placement of dental implants in a site with reduced bone depth, without causing iatrogenic sequelae through damaging an intact Schneiderian membrane.

**Flapless procedure**

Treatment was carried out under local anaesthesia. The flapless procedure resulted in minimal trauma to the gingival tissue overlying the ridge. The previously constructed NaviStent, and the drill tag and jaw tag supplied by ClaroNav, were prepared immediately prior to surgery (Fig. 3). In accordance with the Navident protocol, the axis of the drill and tip of the pilot drill were calibrated (Figs. 4 & 5) and verified before site preparation.
commenced (Fig. 6). Using computer-guided surgery, the pathway of the drill could be followed clearly on the computer screen positioned in front of the patient (Fig. 7). Approximately 1 mm of bone was left intact in the upper right first molar site ready for the sinus lift. Navident provided visual confirmation of the position of the drill tip to accurately gauge the correct depth (Fig. 8). Preparation continued using a 3.5 mm drill bit, which, again, was calibrated and verified before use (Figs. 9 & 10).

A 3.5 mm diameter and 8 mm length Dentsply Ankylos C/X implant was placed 1 mm subcrestally in the upper right second premolar site. A guide pin was placed in the upper right first molar site to check the depth and alignment (Fig. 11). The NaviStent was removed and the site was prepared for the sinus lift osteotome (Figs. 12 & 13). The osteotome was tapped gently with a surgical mallet until the remaining thin layer of bone infractured and was elevated (Fig. 14). The Schneiderian membrane was carefully raised through manipulation with the

Fig. 19: Computer-guided navigation enabled the implants to be placed reliably and predictably within optimum bone, without the need to reflect a flap. – Fig. 20: Sulcus formers prior to fitting of the final restorations. – Fig. 21: The gingival tissue after removal of the sulcus formers. – Fig. 22: Custom-made Atlantis titanium abutments fitted to the implants. – Fig. 23: Linked Lava zirconia crowns after cementation. – Fig. 24: Post-restoration radiograph.
osteotome and a heterogeneous bovine bone graft material (Bio-Oss, Geistlich) was introduced into the implant site (Fig. 15). A 4.5 mm diameter and 6.6 mm length Ankylos C/X implant was then placed 1 mm subcrestally (Figs. 16 & 17). Both implants had good primary stability on placement. Ankylos Balance posterior sulcus formers were fitted, without the need for additional closure with sutures (Fig. 18).

Implant placement in optimum bone

Navident was used to guide the implant site preparation dynamically, to ensure implants were placed in the pre-determined position without the need for a static drilling guide. This facilitated placement of the implants in the optimum amount of bone without inadvertent damage to the maxillary sinus membrane. It also ensured that their alignment made future impression taking and restoration straightforward. The ability to watch the drill virtually on the CBCT scan, as the implant sites were prepared, allowed the exact point at which to cease vertical drilling to be judged visually.

Assessment, planning and placement were carried out within 48 hours, due to the patient’s limited ability to attend for appointments. Using Navident, there is no reason why this could not be achieved in one visit.

Computer-guided navigation enabled the implants to be placed reliably and predictably within optimum bone, without the need to reflect a flap (Fig. 19). Consequently, the patient experienced no postoperative swelling or bruising and she reported very little discomfort after treatment. This outcome satisfied the primary objective of aiming for clinical perfection, whilst ensuring the patient experienced the least trauma possible.

The implants were restored four months after placement, with custom-made Dentsply Atlantis titanium abutments and Lava zirconia crowns (3M ESPE; Figs. 20–25).

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MScConSed has been principal of Carbis Bay Dental Care in Cornwall since 1988 and has placed over 2,000 implants. Throughout his career, he has striven to combine clinical perfection with the ultimate in patient care. He has been a willing pioneer of new technology, particularly in the field of digital dentistry. Dr Burgess was the first UK clinician to introduce the Navident dynamic navigation system into his implant treatment workflow, with the objective of achieving a higher degree of precision and greater patient comfort. He is also a member of the Dynamic Navigation Society as a Master Clinical Trainer, providing courses for implantologists who wish to experience how dynamic navigation can help to simplify their digital workflow. More information can be found on http://dns.claronav.com.

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A whole new dimension of imaging precision

Author: Julia Maciejek, DTI

Like many fields in dentistry, implantology has been transformed by technological innovations since its humble beginnings more than half a century ago. As the aesthetic and osseointegration properties of implant materials have continued to improve, the number of dental patients opting for implants has risen steadily. With this increase in procedures has come a demand for atraumatic and safe surgery with fewer postsurgical complications. Since 2005, French company ACTEON has established itself as a leader in digital medical imaging and high-frequency ultrasonic devices. Supported by its excellent clinical results, ACTEON continues to push the boundaries of what is possible in implantology as it seeks to provide products that optimise both the patient’s and the dentist’s experience.

With an emphasis on research and development in dentistry and medicine, ACTEON has successfully expanded its offering and introduced several new products earlier this year. Its two multidisciplinary research and development teams and four manufacturing plants are all located in western Europe: in Mérignac (equipment and pharmaceuticals) and La Ciotat in France (dental imaging), Tuttingen in Germany (medical imaging) and Milan in Italy (dental imaging). These teams work very closely together and production processes are highly controlled owing to their geographical proximity. This is further enhanced through collaboration with international dental surgeons, leading to the manufacture of devices that, according to ACTEON, deliver the best results for patients through minimally invasive and less traumatic treatments.

ACTEON granted Dental Tribune International an exclusive look behind the scenes of its 3,200 m² manufacturing plant in Milan, where many of the company’s intraoral and extraoral imaging devices are produced. The team was proud to introduce its flagship model: X-Mind trium. This extraoral radiographic unit was first introduced at the International Dental Show (IDS) in 2015 and received a major update just in time for the 2017 fair. It offers a complete range of innovative solutions for diagnosis and treatment planning. Considerable attention has been paid to image quality and homogeneity, including X-ray emission, processing, stability and geometry. “X-Mind trium combines CBCT, panoramic and cephalometric imaging, which is why it is called a three-in-one device,” explained Claudio Giani, director of imaging research and development at the Milan site. He demonstrated that CBCT
imaging is accomplished using a rotating gantry with a fixed X-ray source and a detector. Giani told us that, during the rotation, multiple sequential projection images, ranging from 150 to 450, are acquired to complete the arc. This procedure varies from a conventional medical CT scan, which uses a fan-shaped X-ray beam in a helical progression to acquire individual image slices of the field of view (FOV) and then stacks the slices to obtain a 3-D representation.

When we first approached X-Mind trium, we noticed right away the distinctive ergonomics of the radiographic unit. The device has an extremely short U-arm, which moves around the patient during the image acquisition phase. This is supported by the patented kinematics and collimation and aids comfortable positioning of the patient’s jaw. The entire system is designed with ergonomic efficiency in mind and takes up very little space in the practice room. With a secondary collimator (X-ray tube assembly) installed, the patient is not exposed to additional collimator movements.

Excellent quality assurance

ACTEON produces high-end quality products that undergo a tried-and-tested quality control process. “The production of X-Mind trium has risen month after month, especially since we obtained U.S. Food and Drug Administration approval and then launched X-Mind trium in the US,” stated Alvise Reither, the Milan factory manager. He explained that, by changing the factory’s layout and the flow of materials, new workflow processes were established. The manufacturing plant is continuously expanding, and with additional operators, it is able to meet the demands of the market. “In this factory, we use the Kanban approach principle, which means that we produce on stock, but finalise the product based on order. This way, we can balance demand with available capacity,” added Reither.

Moreover, ACTEON applies significant quality controls during all processes, from the assembly of the core of the machine to final testing, which includes checking of the components and the configuration of the workstation. According to the factory manager, this procedure has been streamlined significantly in comparison to last year. Reither showed us a large number of testing cabinets containing devices being checked. With complete concentration, employees in front of computers verify the correctness of every step before the X-Mind trium units are distributed. It is in this context that a large quantity of X-Mind trium devices are manufactured, tested and shipped each week.

“We have an excellent product quality. We want to ensure a high-quality standard, so employees take turns at the workstations. We also want to make sure that each employee knows and understands all the processes leading up to the finalisation of the product, establishing an appreciation of the importance of each step in the assembly. We further want our employees to respect ACTEON’s standard of quality. This follows the two steps of the quality control: (1) checking that all cables and parts are well assembled and (2) testing the machine’s functionality in the testing cabinets. Our quality manager also inspects the components when they are sent to us and before we put them into stock. No parts are assembled externally. A mix of components, cables, mechanical parts, motors and sensors are assembled by hand. That is also part of our quality management,” Reither detailed.
Sharp images

Excellent image quality is essential for treatment planning and diagnosis. In CBCT, exposure is incorporated in the FOV. This means that only one rotational sequence of the gantry is necessary to acquire enough data for image reconstruction. In implantology, a CBCT image is indispensable for planning simulation and determining the exact nerve location. With only one image, the entire dental arch can be visualised, which allows for optimal diagnostic planning possibilities. X-Mind trium has a range of FOV options displayed in detail and without movement artefacts. He emphasised that the exposure time is very low and the reconstruction time is three seconds. We saw that, with a cephalometric image, the entire maxillofacial area is shown, making it highly suitable for oral and maxillofacial surgeons. Furthermore, it has a small voxel size of only 75 µm and a fast reconstruction time of 29 seconds. X-Mind trium can be equipped with one or two sensors for an efficient workflow.

Low radiation dose

With X-Mind trium, high radiation exposure is a thing of the past. The low-radiation protocol decreases the required amount of X-ray emissions by a third using the algebraic reconstruction technique. This means that the radiation dose for the patient can be reduced by 50 to 70 per cent. This low-dose imaging guarantees a maximum FOV with minimal radiation exposure to the patient. “This is essential because we do not care only about good images but also about the well-being of the patients,” stated Reither. Furthermore, the software of X-Mind trium monitors radiation and ensures that the levels of exposure are kept low.

User-friendly software

Computer scientists would say the software is as important as the hardware. ACTEON provides intuitive and ergonomic imaging software that has all the required functions—scanning, measuring, editing, commenting. In the factory cellar, Reither explained the special features of the ACTEON Imaging Suite software and stated that it can be linked to most practice management software and all ACTEON imaging products, such as the X-Mind trium, CBCT and panoramic devices, and intraoral scanners. It is compatible with both macOS (and soon iOS) and Windows and has a TWAIN driver for full compatibility with all imaging software. This gives practitioners the ability to move around and interact directly with their patients.

The radiographic unit is in continual operation at most dental practices. It is clearly imperative then to ensure that dental professionals have the skills to adequately handle the devices and take high-quality images.
images with the correct settings. "The user-friendly software enables the customer to either use the workstation provided or use their own. However, with the workstation provided, our professional and efficient team of service technicians can perform remote connections to solve problems of configuration or calibration. We want our customers to choose the software option that is best for them," explained Reither.

Safe surgery

X-Mind trium offers extraordinary functionality in the field of implantology, making it suitable for more demanding treatments. Misleading or insufficient information obtained from a radiograph can lead to the loss of an implant, one of the worst scenarios for both the patient and the dentist. "In pre-implant procedures, accurate measurements of the bone density and volume are essential to guarantee a higher success rate in implantology. The 3-D capability of X-Mind trium also facilitates safer osseointegration," said Giani. Clinical decision-making has seemingly become easier than ever with X-Mind trium.

Certainly, our tour would not have been complete without a look at ACTEON’s well-known Piezotome ultrasonic brand. Thousands of dentists worldwide have adopted the company’s celebrated Piezotome devices as their choice for pre-implant surgery, with Piezotome Cube representing ACTEON’s new standard. It is a powerful ultrasonic device with a rotary motor, as well as a handpiece and a tip, ensuring optimum performance. Leading oral surgeon and implantologist Dr Angelo Trödhan successfully uses Piezotome Cube in his everyday treatment procedures. "The Piezotome’s ergonomics makes the device naturally intuitive and reliable. Furthermore, it enables surgeons with less experience to perform a variety of treatments. In accordance with the cutting selectivity, soft tissue (membranes and nerves) is preserved. During piezoelectric surgery, fine and precise cuts minimise bone loss. In 98 per cent of cases, patients do not need to use analgesics postoperatively and barely any swelling is observed. Surgery with Piezotome Cube maintains the patient’s quality of life," said Trödhan.

In implantology, bone grafting materials may be necessary for the implant to succeed. For this reason, QUALIOS was developed, and it was first introduced at IDS 2017. The material has a unique bone-supporting structure and high level of mechanical resistance. Its large interconnected pores make it particularly suited to bone colonisation, and it is completely resorbable, ensuring high-quality bone regeneration. Being entirely synthetic, it is free of any contamination risk that comes with products of animal or human origin. It is clear from this that QUALIOS complements ACTEON’s implantology product line.

In ACTEON’s continuous product expansion, patients’ well-being continues to be the top priority. We felt the passion employees put into their daily work to support ACTEON’s innovative portfolio for imaging and piezoelectric surgery. These products have positioned the company as a pioneer in oral surgery and dentistry. They are less invasive, safer and faster to operate, and provide patients and practitioners with the best treatment options available.
Nobel Biocare announces entry into metal-free implant market at EAO

At the 2017 EAO congress, Nobel Biocare has announced that it has entered into a partnership agreement with Dentalpoint, a leader in ceramic dental implants, to add a zirconia implant solution to its portfolio.

According to Nobel Biocare President Hans Geiselhöringer, the implant range is “the first truly metal-free, two-piece screw-retained implant solution” and therefore will provide a new option in addition to Nobel Biocare’s leading range of titanium dental implants with the clinically proven TiUnite surface.

With 275 million potential edentulous patients around the world, the innovations from Dentalpoint, known for its ZERAMEX implant brand, are intended to help clinicians meet the growing demand for metal-free solutions.

In further news, Nobel Biocare released the findings of the largest meta-analysis of a single implant brand to date. It has confirmed the clinical success of the TiUnite surface, which was launched 17 years ago and has been evaluated in over 465 publications featuring more than 89,500 implants.

The results have confirmed that implants with the TiUnite surface have a remarkably low early failure rate and support long-term clinical survival. In the review, early implant and patient level survival rates both exceeded 99 per cent at one year, and the late implant level survival rate was estimated at 95.1 per cent (91.5 per cent at patient level) after ten years.

“This meta-analysis unequivocally confirms what extensive internal testing and external validation have documented for over 15 years—that the TiUnite surface supports peri-implant health, bone maintenance and overall success long-term,” said Geiselhöringer.

www.nobelbiocare.com
Roland DG to establish new 3-D business brand, DGSHAPE

In order to increase visibility for its growing 3-D segment, Japanese manufacturer Roland DG has announced the transfer of its digital businesses, consisting of the development and sales of 3-D milling machines, 3-D printers, engraving machines and photographic impact printers, to a new, wholly-owned subsidiary, DGSHAPE Corporation. The spin-off, which begins operating in April, will be located at the Roland DG headquarters in Hamamatsu.

According to the company, its series of DWX dental milling machines has become a major driver of growth of Roland’s 3-D business, accounting for 60 per cent of sales in the segment in 2016. In addition, industrial inkjet printer sales accounted for 70 per cent of digital printing business sales in the same period.

Consequently, the company decided to embark on restructuring its dentistry-focused 3-D business by launching it under the new brand of DGSHAPE and transferring it to an autonomous company.

“Spinning the 3-D business off as a separate company would allow the management of DGSHAPE to implement speedy decision-making and business execution,” commented Roland DG President Hidenori Fujioka on the decision to transfer the business to a new subsidary. “Led by a young executive team—Representative Director, President and CEO Kohei Tanabe is 39 years old—I hope DGSHAPE will advance the innovative concept of 3-D digital fabrication, exploit next-generation technologies, and take bold steps to develop cutting-edge products and solutions.”

In addition to Tanabe, Hisashi Bito will serve as Director and Chief Technology Officer, Kouichi Hashimoto as Outside Director, and Toru Kajikawa as Audit and Supervisory Board Member. The executive board will be formally appointed at an extraordinary general meeting in March.

www.dgshape.com

cost-effective scanners

3Shape’s new lab scanners

Digital dentistry specialist 3Shape has launched a new line of cost-effective scanners for the dental laboratory. According to the company, the E scanners deliver high-quality images and offer advanced scanning features and precision CAD/CAM workflows, like other 3Shape scanners, but at a more affordable price.

The E scanners feature two 5-megapixel cameras each, Blue LED and multiline high-speed scanning for optimal detail capture and accuracy and thus enable laboratories to complete more cases in less time. Moreover, features like 3Shape’s reliable impression scanning, which allows laboratories to scan conventional impressions directly without having to pour a model, and Auto-start, which starts scanning as soon as the model is placed inside the E scanner, save additional time and costs.

www.3shape.com

3Shape’s new affordable E scanners make advanced CAD/CAM accessible to laboratories of all sizes.
Digital Workflow: a precise way to achieve state of the art smiles

Author: Dr Miguel Stanley, Portugal

The 13th Annual MegaGen International Symposium was held at the Takanawa Congress Centre, Tokyo, Japan, on the 14 and 15 October. Some of the world’s most renowned dentists were on stage, for over two days, giving lectures of science and technology.

The title of this meeting was “Digital Smile”, so most of the topics were related to the field of digital dentistry. The title of my lecture was: “Cloud dentistry”—how the cloud is helping dentists and patients around the world achieve state-of-the-art smiles through digital technology and platforms.

I have been practising dentistry for 20 years now, and it is safe to say that the first technology I invested in, back in 1999, was a digital intraoral X-ray and intraoral camera. Previously, these were made by a company named Trophy, which is now Carestream. I am currently on my third generation of X-ray devices. I have always been a big fan of lower doses of radiation, both for my patients and for my team. In 2008, we got the CBCT from Kodak, which is also from Carestream. This has revolutionised the way that we practise implant dentistry because this third dimension is essential for understanding sensitive parts of the anatomy. This allows us to place more implants, more safely and better than ever. The same way that we have transitioned from analogue cameras to digital cameras, dentistry is shifting from analogue traditional procedures to digital procedures.

More recently, in the last two years, we have invested heavily in technology that allows us to really enter an era of digital dentistry in its totality. I am talking about intraoral scanners, 3-D printers, and software and technologies that allow us to produce surgical guides, from partial to fully guided surgeries.

We are also now using Low Level Laser Therapy for healing, T-scan for testing the occlusion, and I believe that we are turning my clinic into a type of laboratory of the future in terms of dentistry. Recently, we founded a department for Research and Development, headed by Dr Ana Paz, which ensures that all the data is collected from our clinicians and confirms that the science is solid around the treatment sequences that are performed.

One of the cases that I presented in Japan, and which I believed profoundly marked my team and
Figs. 3 & 4: R2 Gate digital planning. – Figs. 5–10: Implant guided surgery with R2 Gate surgical guide. – Fig. 11: CBCT images after implant surgery. – Figs. 12–14: PMMA structures and DSD design using a smile donator. – Figs. 15–17: Intraoral scanner and gum modulation with GrandioSO composite (VOCO). – Figs. 18 & 19: Final situation.
I the most, was of a young 27-year-old patient, who we treated free of charge. She had lost everything in her life: her husband, her home, her job, and now she was about to lose her child. The reason was because she could not get work due to the total destruction of her smile.

We got in touch with MegaGen, Carestream, and VOCO, and a few other companies that came together and helped us deliver what I believe to be digital magic in dentistry.

With the CBCT, my team shared the DICOM files with the team in Korea and Romania, who manufactured the R2 Gate fully guided surgical template and pre-milled PMMA prosthetic structure from molar to molar, using a smile design platform. And since it was fully digital, pre-milled customised zirconia abutments were placed on the day of the surgery and screwed down to support the PMMA structure. This took a few weeks, and we received this through the mail. Once we had the material needed, surgery went very smoothly, and on the same day we placed all the implants. Some of them were placed using the latest root membrane technique, and we delivered the PMMA. The whole procedure took two hours, changing this patient’s life dramatically forever. In the following weeks and months, we took intraoral scans and started designing the fully milled zirconia structure. Please follow the images illustrating this case.

To sum up, I feel that digital technologies will help and assist younger generations of dentists achieve incredible results, because these treatment sequences can be planned by teams in other parts of the world, and mitigate responsibilities by ensuring that the quality of the treatment plan is perfect. However, I guess that the greatest message that all dentists should take home is that, even though self-driving cars are coming, you will still have to know how to drive. By this, I mean that you still have to understand how to practise gold standard classical dentistry; even though robotics and digital dentistry can really speed things up, you still have to know what you are doing.

I believe that the future in dentistry is bright and fun, and I am really excited for the things to come.

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Teeth within an hour: A ticking time bomb

Author: Dr Göran Urde, Sweden

In my lecture at this year’s EAO meeting, attendees received an overview of over 50 years of working with implants and why we did it in certain ways back then and why we do it differently today. When I started placing implants, they were only for specialists in oral surgery and prosthetics. Periodontists were not even allowed to listen to our lectures. One also had to be thoroughly trained if one wanted to purchase implants. Companies kept records of the clinician’s success rates and if he or she had a higher than normal failure rate, they showed him or her the door to figure out alone what had gone wrong.

In some instances, the warranty did not even apply if the dentist was not very good. I wish we had a similar system today to save patients from less skilled peers. Later, everyone was allowed to take a course and to place implants. Often, these were just weekend courses after which the dentist was supposed to be a fully qualified surgeon and prosthodontist and knew everything, including single-tooth restoration, full-arch rehabilitation of severely resorbed jaws with bone grafts and immediate loading concepts. It was totally absurd. To place implants, one needs to be well trained—learn to walk before one starts to run.

To my delight, I see that more and more implant companies are abandoning weekend courses and instead offering high-quality courses over a longer period. Attendees have to treat patients under supervision and companies even offer mentor support, which means clinicians are receiving guidance in conducting their treatments. The best courses are of a
general nature, where the sole purpose is to train dentists to place implants and do this well and not how to do it with a specific implant system.

One thing that worries me a great deal is all the copy-cat versions of implants that are being marketed to less experienced dentists who cannot determine what a good product is. I always tell my audience to never treat patients differently to how they would treat their own family. The unfortunate thing is that I often see members of the audience looking down because they feel admonished. They do not understand that they get what they pay for and that failures are very costly and can hurt both their reputation and patients.

Another topic that gets me going is the marketing of new teeth in an hour. Patients that for decades have not taken care of their natural dentition are now being treated in accordance with concepts like immediate loading. Within an hour, any remaining decayed teeth are removed and replaced with implant-supported crowns and bridges in the belief that the patients will start taking care of their new teeth. Unfortunately, this is not realistic.

In my opinion, this is a ticking time bomb. It is just a matter of time before patients will come back with problems like peri-implantitis and failing implants. Who is going to sort that out? In the good old days, patients had to cooperate first and then we placed the implants. Maybe this was a bit harsh, but success rates were higher then and fewer patients ended up with problems. One does not have to be a rocket scientist to understand that, with a mouth full of pathogens, the success rates will go down.

I have been heavily involved in developing concepts like “Tooth Now”, according to which a tooth is extracted and immediately replaced with an implant and loaded with the final abutment and a temporary crown, with extremely high success rates when it comes to both implant survival and even more so the aesthetic outcome. Therefore, I am not against immediate loading at all, but case selection is very important. That is why good training courses conducted over longer periods are so important.

Guided surgery is both, good and bad. The saying of “garbage in, garbage out” is apt in this regard: if one has the wrong information or interprets the digital information incorrectly, one might get into trouble if a fully guided surgical template is based on that. I do not agree with fully guided surgery as it is today, as I believe our brain needs to be connected instead of just computers. Do not get me wrong, I love to work with digital planning tools like NobelClinician (Nobel Biocare) to optimise my treatments, but instead of fully guided I prefer to use simpler surgical and/or pilot bur guides that do not force me to drill in a certain way...

Editorial note: At EAO 2017, Dr Göran Urde presented a paper titled “Evolution of surgical protocols in implant dentistry” as part of the scientific programme.

contact

Dr Göran Urde is the director of the Futurum Clinic at the Malmö University’s Faculty of Odontology in Sweden.
Under a blue Spanish sky and with temperatures soaring above 30 °C, the 26th Annual Scientific Meeting of the European Association for Osseointegration (EAO) took place at the Feria de Madrid fairgrounds.

Lectures started with insightful discussions on changes and developments in implant placement protocols. Overall, more than 50 clinical experts from all over the world spoke at this year’s event. Among them were prominent figures in dentistry, such as Prof. Mariano Sanz from Spain, Dr Christian Coachman from Brazil and Dr Christoph Hämmerle from Switzerland. In the guest country session, held on 7 October, clinicians from Latin America presented their research to a professional audience for the first time. While most of the papers were delivered in English, the organisers assured simultaneous interpreting into Spanish for some of the sessions.

At the opening ceremony held on Thursday (5 October), EAO President Prof. Alberto Sicilia Felechosa from Spain welcomed everyone to the congress and thanked the Spanish society of prosthodontic and aesthetic dentistry (Sociedad Española de Prótesis Estomatológica y Estética; SEPES) for co-organising the event. He said that, according to the latest figures, over 4,000 dental professionals had registered for the three-day conference, which was held in the Spanish capital from 5 to 7 October 2017.
Spain for the second time since the first edition took place in 1992. Spanish attendees were then addressed by SEPES President and congress chair Dr Nacho Rodríguez Ruiz.

Also during the ceremony, several members of the EAO were awarded honorary membership of the EAO, including Past President Dr Franck Renouard from France.

In addition to the educational offering, attendees could try out the latest products and technologies in their field at the trade exhibition. Over 130 manufacturers and dealers, including international heavyweights like Nobel Biocare, Straumann and Dentsply Sirona, were showcased their latest innovations. Attendees could also learn about the new products and clinical solutions in detail at industry symposia running concurrently with the main programme.

Information about the 2017 congress and programme is still available online and through the EAO SEPES 2017 mobile app, which can be downloaded from the iTunes Store and Google Play.

Founded in 1991 by leading dentists interested in osseointegration, the EAO is now a worldwide authority in the fields of reconstructive surgery and prosthetic rehabilitation. In addition to its large annual event, which attracts between 2,000 and 4,000 professional visitors annually, the association holds master clinical courses throughout the year. It furthermore offers members and non-members the opportunity to obtain a postgraduate diploma in implant dentistry.

The next EAO meeting will take place in Vienna in Austria from 11 to 13 September 2018._
The next MIS Global Conference will take place from 8 to 11 February in the beautiful Atlantis Resort in the Bahamas. One of the highlights of the event will be a series of TEDxMIS discussions, an independently organised TED event that will feature world-leading thinkers and achievers in the field of implant dentistry.

After the tremendous success of the last MIS Global Conference in Barcelona, with its fascinating scientific programme, high-level lectures and impressive social events, the next edition too promises to deliver an intense and unforgettable experience in every respect, MIS Implants Technologies has announced.

The scientific committee, headed by Prof. Lior Shapira, Chairman of the Department of Periodontics at the Hebrew University—Hadassah Faculty of Dental Medicine in Jerusalem in Israel, has undertaken the mission of making this year’s conference particularly worthwhile. The scientific programme is aimed at addressing contemporary treatment possibilities and providing insight into the present and future of dental implants as part of clinical dentistry. “The podium will be occupied by high-quality clinicians, researchers, and educators—who will share with you their extraordinary experience and clinical excellence,” Shapira said.

With the official launch of the V3 Implant System in the US currently underway, MIS is devoted to bringing the dental world the latest innovations and is committed to helping clinicians improve patient care. At the conference, various workshops will provide an opportunity for meaningful learning in an intimate environment, with accomplished experts in specific areas of interest.

The two-day main programme will feature prominent speakers presenting their expertise for potential translation into everyday practice. Among the topics to be addressed are evolution and horizons in implant therapy, biological principles and predictable aesthetics, long-term forecast for implant therapy and going digital.

**TEDxMIS**

In the spirit of “ideas worth spreading” and a commitment to innovation, MIS has further announced its partnership with TEDx. TEDxMIS is an independently organised TED event that will take place on 10 February and feature world-leading thinkers and achievers in the field of implant dentistry. The goal of the TEDx discussion is to give conference guests the opportunity to experience a unique series of fast-paced, eye-opening talks that will inspire them and provoke meaningful engagement with their peers.

As part of its commitment to promoting young clinicians, MIS is continuing the tradition of holding a clinical case competition during the global conference, with this year’s focus on modern technologies and techniques in clinical practice. The best 15 clinical cases will be presented as posters at the conference venue and prizes awarded to the three winning cases.

**Breath-taking views and spectacular entertainment**

As in past events, this conference is expected to provide an extraordinary environment for knowledge sharing and the opportunity to meet with peers in the international dental community. This year, however, conference attendees will also enjoy one of the most beautiful and exotic locations in the Atlantic Ocean: the Atlantis Resort on Paradise Island. When they are not engaged in workshops and lectures, guests will be able to take in the marine habitat, sports activities, culture and colours of the Bahamas. Full of impressive and fun events, the MIS Global Conference entertainment programme will leave guests with fond memories and looking forward to the next gathering, the company stated.
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