interview
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Every two years, the global dental industry convenes the largest trade show and dental business summit in Cologne in Germany for the International Dental Show (IDS). Despite many of the economic, financial and cultural issues presently facing the world, IDS 2019 (the 38th edition) marched on to record attendance and participation by clinicians, educators, auxiliaries, manufacturers, distributors and publishers, while showcasing a vast variety of products and equipment.

Koelnmesse was the centre of the dental universe for tens of thousands of participants during a full week in March, often with a crush of people trying to pass through the crowded aisles to get a glimpse of new products and technology, or watch hands-on demonstrations or brief presentations delivered by clinicians, laboratory technicians, dental hygienists and industry partners representing 2,000 exhibitors from 58 countries.

As usual, seeing everything that one might wish to see in the multiple halls was impossible. One thing was abundantly clear: there was a major emphasis on innovation and digital solutions focusing on the expanding world of CAD/CAM, 3D printing, design software from various vendors, CBCT and 3D imaging, aesthetic dentistry, smile design and the ever-expanding dental implant universe. The number of dental implant manufacturers and systems on display was almost beyond imagination!

As in previous years, Dental Tribune International (DTI) was present at IDS 2019 with an expansive and elegant lounge conceived for meeting colleagues and industry partners over coffee or a quick meal away from the din of surrounding exhibit halls. The publisher’s array of print and online publications truly illustrates the incredible scope and impact of DTI around the globe. For those who are ardent readers of CAD/CAM, we appreciate your patronage. This is one of a myriad of publications and news channels DTI offers, making the company’s portfolio an invaluable resource for all dental professionals.

For those who did not get to experience IDS 2019, keep checking the pages of DTI offerings in print or online to learn more about the innovations presented during the event. For those who want to experience IDS first-hand, the next meeting will be in March 2021—put that on your calendar and book your hotel rooms now!

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Introduction

Proper 3D implant positioning is a crucial factor for predictable implant and prosthodontic treatment. Guided osteotomy preparation and placing implants through a guide may contribute to more precise implant placement in accordance with the prosthodontic plan. In the first part of the article (published in CAD/CAM 1/2019), we described the use of 3D imaging in implant treatment planning. This study aims at the comparison of two methods in terms of repeatability and compliance with the treatment plan.

Aim of the second part of the study

The aim of the second part of the study is to present the methods of comparison of effects for both types of procedures and the initial results.

Material

The guide was sterilised and clinically used during the procedure repeated under the in vitro conditions on half of the selective laser sintered mandibular models (material: polyamide 12; 3D printer: TPM Elite P3200 SLS system; print: Solveere). The procedure was performed freehand for the other half of the models. The mandibular models, created on the basis of 3D imaging, reflected the clinical spatial conditions.

The comparative material consisted of scans of the bone bearing the implants (TSIII with standard mounts, Osstem Implant) and scans of the model of the treatment plan with inserts. The bone scans were performed with the use of the laboratory scanner ceramill map 400+ (Amann Girrbach) and saved in STL open files. The files are maps of triangles describing the surface of the 3D model. Each triangle vertex has coordinates. The denser the net of triangles, the smaller the area of the real model covered by each triangle. According to the manufacturer, the scanner accuracy is 10 µm. The compared material consisted of two STL files of the scans of models in which the implantation procedure was performed with the use of the guide, an STL file of the scan of the model after implantation performed freehand and an STL file of the virtual plan of the procedure. The file of the virtual plan was a reference point for the calculation of deviations in the groups with and without the use of the guide.
The implantation procedure was planned in DDS-Pro software (www.dds-pro.com.pl) on the basis of the CBCT scan and the optical scan of the cast model and of the model with the wax-up of the future prosthesis. In this manner, the image of the bone and mucosa surface and the localisation and the shape of the future prosthesis were obtained.

In the next step, based on the implant location plan, a digital model with inserts located in the sites of the future implants was created. Each virtual insert was located exactly in the site of the virtual implant platform and was in the shape of a cylinder with a diameter of 3.0 mm and height of 8.5 mm.

Methodology

In order to compare the samples from both groups—bone scans with implants placed freehand and with the use of guides—HP 3D Scan Version 5 software (HP) was used. Data was recorded using two methods: based on the maps of deviations and on the measuring points. For each scan, 30 maps were created, based on tolerance levels of 0.01 to 3.01 mm in 0.1 mm increments (Fig. 1).

Next, for each implant, a tolerance level was chosen for which there were no areas on the map showing variations exceeding this level. In this way, the levels not exceeded by the deviation of the implant and insert locations were established for each implant individually. The next stage of the study was finding the areas with deviations exceeding this level on the tolerance level lower by 0.1 mm (one tolerance level) than the level established for each implant. These areas were marked in pink. By choosing a number of points located close to each other and choosing a point with the highest value in these areas, the points with the highest value of deviations were marked (Fig. 2).

In the second method, the measuring points were established on the reference model. The following points were marked on the upper surface of each insert (Fig. 3): central, mesial, distal, labial and lingual. Next, for each implant, the deviation of its location relative to these points was checked. Test models were changed successively, maintaining formerly set measuring points to avoid marking them again. The location of measurement points did not change relative to the insert, but depending on the test model, the deviation value assigned to these points did.

Fig. 1: Example of deviation maps set for FH01. The pink colour indicates areas where the deviations exceeded the tolerance level established for the particular map; the remaining colours indicate areas within the accepted range.
This allowed us to maintain repeatability of measurements while testing other models.

Preliminary results of the comparison are shown in the figures. The smallest deviations were visible on implant WG02l, and the largest deviations were on implant FH01rm (Fig. 4). In order to compare the groups, a larger number of samples should be studied, but after the comparison of three initial models, we could see a great difference between implants placed with and without the help of guides. There was also a noticeable differentiation in the degree of deviations in both groups of implants. In the case of implants placed with the help of guides and freehand, there were cases of small and large deviations.

![Fig. 2: An example of the area where the established tolerance level for implant FH01l was exceeded, with some point deviations marked. Fig. 3: The placement of measuring points on implants WG01rm and WG01rd. The grey test model with implants was superimposed upon the reference model and deviation levels marked.](image)

![Fig. 3](image)

![Fig. 4: Deviation levels for particular implants set with maximum point deviations. Implant naming: W G/FH, sample number, l/r, m/d (FH = freehand; WG = with guide; l = left; r = right; m = mesial; d = distal).](image)
It should be noted that the differences between the levels where there were no longer any deviations and the maximum deviations were more similar for the procedures performed without the use of guides. This indicates that the treatment plan is followed more precisely when the guides are used.

Like in the first method, in order to compare both types of treatment, more samples should be compared. On the basis of the first three results, we observed that the greatest deviations appeared in the group of implants placed freehand (Fig. 5). In this group, larger differences between deviations at individual measuring points were noticeable. This demonstrates that the axes of the implant and the insert were inclined at a greater angle to each other and the upper surface of the implant was not parallel to the upper surface of the insert. This is especially evident for implants FH01rd and WG02l, which, despite having a similar mean deviation value, have a different degree of differentiation of deviations in the points (Figs. 6 & 7).

**Discussion**

Many factors affecting the success of implant surgery and its compliance with the treatment plan are reported in the literature. The most important of these are the type of procedure, operator’s experience and clinical conditions.

As digital technologies gain in significance, digital spatial imaging is increasingly used, as it allows consideration of not only the bone conditions but also the function and aesthetics of the future prosthetic restoration during the treatment planning. The use of CT or CBCT imaging enables reduction of the risk of damage of such structures as nerves, roots of adjacent teeth and the sinus wall. The implant procedure performed with the use of guides is assessed in systematic reviews as a technique which is less invasive and reduces the risk of postoperative complications.

Despite the limitations of this study, arising from the choice of an in vitro method aiming to achieve the highest repeatability of conditions in both groups, the preliminary results of the study are supported by the data obtained in the study conducted under clinical conditions.

Vermeulen shows that procedures performed with the use of implant guides give results more consistent with the treatment plan, even when compared with freehand procedures performed by top-class experienced surgeons. In the mentioned study, particularly important differences were seen in the deviation of implant placement.

**Fig. 5:** Absolute deviation values for implants in the areas of fixed measuring points on the inserts. Implant naming: WG/FH, sample number, l/r, m/d (FH = freehand; WG = with guide; l = left; r = right; m = mesial; d = distal).
depth for the freehand procedures group compared with the guided procedures group. What is more, deviations of implant insertion angle were significantly greater in the freehand procedures group. This may have a potentially high impact on the need to change the prosthetic design accepted at the stage of preparation for treatment.

It should be noted that guided implantation procedures are also associated with many difficulties. Owing to the limited space between the drill and the sleeve, the full range of the implant insertion angle is impossible. According to Seong-Yong Moon et al., it is critically important to consider the design of the future prosthetic restoration at the stage of planning the procedure.

What limits the usage of a guide is the jaw grading for a particular patient. The study analysed the procedures performed in five patients, entailing placement of 19 implants: with the use of a guide supported on the patient’s teeth for 11 implants, and on the mucosa for eight implants. Although it was finally concluded that the guided procedure is better than the freehand procedure, attention was paid to such significant limitations of the first method as limited jaw grading, the shape of a guide, difficulties in attaching the guide to the foundation, and the length of surgical drills.

In terms of the procedure, the most similar to the present study is that of Toyoshima et al., who analysed procedures performed by inexperienced operators with the use of guides under in vitro conditions. In the study description, the necessity of choosing in vitro conditions owing to the lack of experience of the operators was underlined. Despite the use of guides, the deviations in the implant insertion angle from the treatment plan were significant.

**Conclusion**

The initial conclusions of the study are consistent with the conclusions of scientific research analysis and confirm greater compliance with the treatment plan for implants placed in guided procedures. The comparison methods used and the research material selection in the form of STL files allowed us to analyse the procedure effect adjustment relative to the treatment plan.

*Editorial note: The study is being carried out as a part of a project in the field of scientific developmental research aimed at the development of young scientists and students enrolled in PhD studies, financed as part of the scientific activity of the Medical University of Warsaw in Poland. A list of references is available from the publisher.*

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In this interview, Dr Simon Kold explains how he and his wife and co-surgeon, Dr Louise Kold, implemented a digital workflow in their practice and talks about the lessons they learnt from it.

Dr Kold, could you please tell us a little bit about yourself and the main steps in your journey to a digital workflow?

In 2002, I began working at the Herning Implant Center, which was founded by my parents back in the 1970s. In 2005, we began working with Nobel Biocare’s Teeth-In-An-Hour concept, which was our first opportunity to perform CAD/CAM-guided surgery. We found out that Nobel Biocare’s prosthetically driven implant placement offered a lot of benefits: not only could we position implants well, but we could often make surgery easier for both dentist and patient too.

Over the past few years, we have learnt that we can place implants more precisely if the procedure is guided. That’s why we began using intraoral scanning in 2011 to be able to combine surface scanning with CBCT imaging to make guide stents. Of course, correct implant placement is essential for long-term stability, which, in turn, reduces the likelihood of implant failure.

Looking back at your journey, what recommendations would you give someone who wants to invest more in digital technology and workflows?

I would say that the top thing you have to do is to bring your staff into the mix, because you will not be able to do this on your own and still be productive. It has to be a team-based digital workflow. Really, that is the most important thing. The rest will just follow.

You would never be able to do something freehand with as much precision as you can when it’s guided, so using a digital workflow has made it easier for us to deliver predictable prosthetic work.

What do you see as the benefits and the challenges of a digital workflow, and how have your staff reacted and adapted to this approach?

“In short, digital integration allows us to conduct treatments in very little time with very predictable results.”

Dr Simon & Louise Kold
One of the biggest challenges was spending a lot more time on virtual planning. However, we wanted to spend the same amount of time in the clinic as we did prior to the digital workflow integration. Louise and I decided to divide the workflow into two areas: things that only we could do, such as virtual planning and the actual surgeries, and the rest, which we could leave to our assistants.

In practice, this means that, if a patient spends two hours at our clinic for a standard implant treatment, Louise and I will only see the patient for 15 to 20 minutes. The rest of our time is spent concentrating on virtual planning, while our team focuses on patient care. For example, one assistant communicates with the patient, while another handles the scans and yet another produces the guides. This way, the patient always feels that we have time for him or her, and Louise and I can spend much more time in the treatment planning phase.

In addition, our staff have responded very positively because they are a lot more involved in scanning and producing guides than before. This responsibility makes work not just more fun but more productive as well.

Since August 2018, you have been working with the new X-Guide system, which now shares a connection with DTX Studio suite. What are your experiences with that system so far?

The possibility of combining X-Guide with DTX Studio suite has only just become a reality for us. X-Guide is a tremendous system that allows us to take on complex cases and create advanced treatments through a new type of digital workflow. It is an amazing tool that provides real-time feedback during surgery, so the surgeon can pinpoint anatomical landmarks such as the mandibular inferior nerve or the sinus floor location, even when performing flapless surgery.

Combining X-Guide and DTX Studio suite enables us to do virtual planning and then export the plan to X-Guide, so the system bypasses the need for guide stents and models. For example, we can plan implants for partially edentulous patients, export the planning to X-Guide and prefabricate provisional teeth at the same time—everything is model-free. In a way it is like working freehand when placing implants. There are close to no limits in patient selection. We have been able to treat simple flapless cases, patients with limited mouth opening, patients with the need for soft- and hard-tissue augmentation, and patients where flapless surgery is the best option.

And best of all, it is fun! Recently, we started to host regular courses for dentists from abroad, and we are able to perform five or six live surgeries in one day. Everything is guided, everything is pre-planned, including prostheses, and we still have time to provide about four hours of lectures. In short, digital integration allows us to conduct treatments in very little time with very predictable results.

Where do you see digital dentistry heading in the next few years?

I think that we are finally in a position where, most of the time, it will be easier to do guided rather than non-guided treatment. I think there will be an increased demand from patients, as well as from referring dentists, for implant placement to be guided and that there will be a big increase in digitally planned treatments.

What other benefits of digital dentistry do you see, especially for the patient?

A key part of our philosophy is that the time to teeth should be as short as possible. Whenever a patient comes in with a tooth that must be extracted, we want a new tooth to be in there as soon as possible. Our experience is that the patient will be more satisfied, and more likely to want implant treatment in the future, if the tooth is replaced immediately. The amazing part of working with digital workflows is that many provisionals can be prefabricated, even for very complex cases, like cases with multiple extractions or using the All-on-4 treatment concept.

Thank you very much for this interview.
Scan perfectly with CEREC Primescan and gain time for what is really important: your patients

Results by Dr Bernhild-Elke Stamnitz, Germany

At a practice in which digital technologies have been prioritised right from the start, new devices are a real pleasure, rather than a duty. That’s why Dr Bernhild-Elke Stamnitz, from Langen in Germany, was delighted to be one of the first dentists to be able to use CEREC Primescan, the new intraoral scanner from Dentsply Sirona, for her daily work. As a CEREC coach, she is very familiar with digital impressioning, but she is convinced, from her first experiences with the device, that CEREC Primescan represents a great advance in quality.

“I simply love new technologies,” explains Dr Bernhild-Elke Stamnitz. She has her own fully digital practice, which she has been running in Langen since 2004. During her studies in Heidelberg in Germany, she had her first encounters with CAD/CAM technologies in dentistry. “At the time, it was a long way from being perfect, but in my opinion, the idea behind it was groundbreaking,” she says. “Whereas in the early days of digital impressioning, we still asked ourselves which indications it could really be used for, today we ask ourselves: where can’t it be used?”

For Dr Stamnitz, the advantages are obvious. “First of all, it’s simply faster,” she explains. “One only has to consider the various steps of the process: lay out trays of various sizes, and try them for size. Afterwards, all of them have to be prepared for use. Then the material for the impressioning has to be selected, and the first time it might not work perfectly, so you have to repeat some steps. All of that can be omitted if you use digital impressioning.” She also sees digital impressioning as providing a path to greater sustainability because nothing has to be thrown away afterwards and the need to store materials is reduced. Most importantly for Dr Stamnitz, the focus is centred more on the patient. “Digital technologies are also a great communication tool. During digital impressioning, the patient experiences what’s going on, can see the situation in his or her mouth on the screen and is far better able to understand where and why the treatment is necessary.”

Fig. 1: Initial situation of tooth #37.

Fig. 2: Scan of lower jaw, with prepared tooth #37.

Fig. 3: The preparation margin is automatically delineated by the software, but if desired, it can be adjusted manually.
“Very good” to “simply better”

Once she had recognised it as correct and appropriate for her practice, Dr Stamnitz could no longer imagine doing her daily work without digital impressioning. In her opinion, the technology in this area has developed enormously in recent years. On the one hand, this is thanks to the software updates. The calculation of the 3D models, the quality of the initial suggestions and the accuracy of fit have improved constantly. On the other hand, the CEREC Primescan intraoral scanner, which has now entered the marketplace, speeds up and simplifies the process noticeably and produces results that have hardly been possible until now. “Impressioning was already really good before, but now, it is simply better.”

In her opinion, this can be demonstrated by several points. With CEREC Primescan, scans can be done in situations where the patient shows signs of periodontally damaged teeth, which are characterised by long crowns and exposed areas of roots. If subgingival preparations need to be made, the scanner can also reach those positions. “Until now, that has been an issue that many people have raised as an argument against digital impressioning,” says the CAD/CAM expert. “Places that are difficult to reach can easily be captured with Primescan without having to make too much effort with the scanner. That really is a great advantage.” Another important improvement is the representation of the margins of the prosthesis. This is very important for the further processing of the scan, because on the one hand, it simplifies the further process of design and fabrication when manufacturing the restoration in the practice, and on the other hand, the scan reliably delivers all the information that the technician requires. He or she can work on the model and can set the occlusion and articulation with ease. Dr Stamnitz mostly works chairside (“I make up to three teeth directly beside the chair”), but she also hands over larger jobs to her dental technician in the in-practice laboratory. “Overall, it is a very useful concept for the practice,” says Dr Stamnitz. “Digital impressioning makes sense, from both a clinical and an economical perspective,” she explains. “But the additional advantage for the patients, who really appreciate the ‘digital experience’, and talk about it to others, is just as important.”

CEREC Primescan—A practical test

A case history demonstrates how CEREC Primescan proves its worth in everyday practice. A patient came to the practice with an inadequate crown, with secondary caries, in position #37. After excavation, a new CEREC crown was to be mounted. In order to do so, the new acquisition centre, CEREC Primescan AC, with its significantly larger, tiltable touch screen, was first disinfected. Thanks to the seamless surfaces, it is possible to do so quickly, thoroughly and simply, at any time. Before beginning with the scans, the patient data was retrieved in CEREC Primescan AC, and a new case was created. Overall, the scanner was used three times during treatment: after preparation of the lower dental arch with tooth #37, for the scan of the opposing dental arch and for the scan of the buccal bite on both sides.
All of that could be delegated to an assistant, but the experienced CEREC user prefers to do it by herself: “I am interested in this technology, and—I’ll be completely honest—scanning is so much fun.”

After removal of the inadequate crown and the final preparation, it was time to use the CEREC Primescan. Dr Stamnitz describes it as follows: “As a long-time user of a CEREC Omnicam, I realised immediately that CEREC Primescan felt different in my hand. The scanner is even better balanced. The actual scanning is quick and easy—partially due to the fact that I don’t have to consider specific scanning angles or scan procedures. It all went intuitively and fluidly. The full dental arch scan was completed in less than a minute, which certainly cannot be taken for granted. What made it really special was that the patient was immediately able to see the results on the monitor with me. The scan was converted into a 3D image immediately. Compared with previous scanners, I noticed immediately that it is also able to scan other materials, such as gold crowns. Therefore, no information on the adjacent teeth or antagonists was lost. I consider that to be real progress.”

After the scan, the software automatically delineates the preparation margin. If so desired, the margin can be adjusted manually. “I find that to be a great advantage,” says the digital expert, “because that way, I can decide for myself, every time, whether I want to accept the suggestion—which, by the way, I generally do with a clear conscience.” It is operated via the touch screen (which replaces the trackball), a tool that many users, including Dr Stamnitz, wished for. Finally, the CEREC Software 5 made an initial suggestion. “I also always look at this very carefully,” she says. “The software can do a lot. I am often surprised at how good the suggestions are. Mostly, as in this case, I am very satisfied after just a few minor adjustments.”

The software learns together with the user

The reason for the significantly improved initial suggestions with the CEREC Software 5 is the use of artificial intelligence. With immediate effect, the new generation of software learns, together with the user, so that it is able to create even better initial suggestions for future versions. Not only are the initial suggestions for the crown improved by artificial intelligence, but the entire workflow is supported by the software in many areas. In this way, the indications for the restoration are automatically recognised, and the preparation margin is delineated. The axis for the model is also set fully automatically.

Dr Stamnitz is fascinated by working directly on the screen: “The workflow is very simple, and thanks to the operation via the touch screen, I can maintain my concentration. I can keep my eyes on the screen constantly.” During the design and preparations for making the crown, the patient was there, and she could watch her dentist at work. “In cases like this, the treatment experience is always something very special for my patients,” Dr Stamnitz remarks. “They are included at all times, and they are able to ask questions and they can experience, live, how the crown is made.” This one was milled from a Celtra Duo block (Dentsply Sirona), a zirconia-reinforced lithium silicate with excellent aesthetic properties and a high degree of stability. The crown was ready after just 11 minutes. Even during fitting, it was evident that it was a perfect fit. The crown was individualised and glazed with colour and glazing material. Then it was cemented into the patient’s mouth with a high-strength, dual-curing composite cement adhesive (Calibra Ceram, Dentsply Sirona). In this case, the overall time required for the treatment was about 90 minutes. This proved to be particularly advantageous to the patient, who was pressed for time.

Better quality in less time

The accuracy of the scan and the speed of the data acquisition and processing obviously have an effect on the end result—to an experienced user, this becomes apparent immediately. The structure of the crown, especially on the edges, is highly dependent on the quality of the impression, and this is where it pays to use CEREC Primescan. Dr Stamnitz: “Thanks to the new CEREC Software 5, the ground or milled restorations are worked even more finely and in more detail—and all of this in an even shorter process, from scan to insertion. I spend the time I save on the entire process on my patients. We gain the time to build up a good relationship with them. We are not simply treating a tooth. We are dealing with a patient every time. That’s exactly who should be the centre of focus, because there is more to the lovely smile we help patients to achieve than just attractive, healthy teeth.”
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Zirconia implants and digital workflow: A case report

Drs Saurabh Gupta, India & Sammy Noumbissi, USA

Introduction

Advancements made in the dental zirconia industry have given rise to new and alternative treatment options for implantology. When compared with other ceramic oxides, zirconia exhibits outstanding biochemical properties. Since its introduction to dentistry, it has been utilised as a material suitable for fixed dental prosthesis, ceramic crowns, metal-free implant abutments and prosthetic frameworks. Zirconia is highly suitable for dental implants owing to its tooth-like colour, structure, material properties and biological response. Additionally, human studies indicate minimised adhesion of bacteria to zirconia compared with titanium. Zirconia also exhibits fewer inflammatory cells within the peri-implant soft tissue.

A recently conducted systematic review showed a 95 per cent survival rate of one- and two-piece zirconia implants after one year of successful functioning.1 According to this article, the marginal bone loss and survival values of one- and two-piece zirconia implants after a year is acceptable. Also, it must be highlighted that there is a lack of data specifying the performance of zirconia implants in long-term studies, and thus, it has become increasingly important to further research these implants and to obtain more data. In the following, a clinical case is depicted in which a maxillary premolar is replaced using a one-piece ceramic implant following a digital workflow from treatment planning to prosthetic rehabilitation.

Initial situation

A 44-year-old patient attended the scheduled dental maintenance appointment complaining of a fractured tooth (Fig. 1), which had been treated endodontically and restored with a crown five years prior. The patient was a non-smoker and had an otherwise unremarkable medical history. Clinical assessments revealed little pain during percussion. A periapical radiograph confirmed the clinical findings and revealed the fracture line to be at the...
cervical margin of tooth #24. A horizontal root fracture was diagnosed and the patient agreed to his tooth being replaced with a metal-free ceramic implant.

Digital planning

A digital design software programme was used for designing the surgical guide and for implant planning. CBCT scans were combined with an open-format surface in the planning software for gaining a comprehensive clinical insight (Fig. 2). The benefits of prosthetic-based implant planning for achieving optimal function and aesthetics were considered while accounting for the current clinical situation, including bone density, soft-tissue type and anatomy, and projected prosthesis. A customised surgical guide was designed based on the planned position of the implant (Fig. 3). The provisional restoration was digitally designed and fabricated by the laboratory technician for immediate restoration.

Surgical procedure

On the day of surgery, a pre-surgical dose of 600 mg of ibuprofen and 750 mg of amoxicillin was administered to the patient. Atraumatic extraction was carried out to remove the root tip (Fig. 4). The manufacturer’s instructions were followed for placing the conventional surgical guide and preparing the implant bed. Implant indicators were used for preparing and maintaining an accurate vertical position for placing the monotype zirconia implant. A ZiBone zirconia implant (COHO Biomedical Technology) with a diameter of 4.0 mm, a body length of 11.5 mm and an abutment height of 4.0 mm was surgically placed by means of guided surgery without the need for a flap (Fig. 6). After being placed at a torque of 35 Ncm, the implant showed good primary stability. The minor buccal bone defect was corrected using bone cement (Augma Biomaterials) to enhance the vestibular ridge contour and to give the crown a natural appearance (Fig. 7). A horizontal mattress silk suture was placed for closure (Fig. 8). Also, the acrylic provisional restoration fabricated prior to the surgery using the implant design software was inserted immediately after the surgical procedure (Figs. 9–13). A chlorhexidine mouthrinse, an anti-inflammatory and antibiotics were prescribed. The suture was removed seven days after the implant placement.

Prosthetic phase

The osseointegration was successful and it was planned to restore the implant using a zirconia crown after four months. The abutment portion was prepared using Magic Touch burs (Strauss & Co.), and an intraoral optical scan (TRIOS 3 Wireless, 3Shape) was taken of the abutment portion of the monobloc zirconia implant (Figs. 14 & 15). Self-adhesive resin cement (3M ESPE) was used after cleaning and air-drying the zirconia surfaces. Excess
cement was removed carefully using dental floss after cementation of the final crown.

Control and maintenance appointments were scheduled six months and one year after placement of the implant (Figs. 16 & 17). The implant crown was still functional and no technical complications were observed at either appointment. The soft tissue surrounding the implant with respect to site #24 was quite healthy. A periapical radiograph was taken at the one-year follow-up. Bone remodelling around the implant was normal and the level of bone surrounding the border had fully stabilised. The patient was satisfied with the treatment outcome, in terms of both aesthetics and function.

Conclusion

No technical or biological complications were recorded after one year of implant functioning. Thus, the use of a zirconia implant in this case turned out to be a suitable alternative to a titanium implant. The soft tissue surrounding the implant was stable and exhibited outstanding bio-compatibility. The vertical implant position is an important factor for success of such implants, as the soft-tissue collar of the implant needs to be apically positioned at a depth that allows for soft-tissue apposition and attachment up to the restorative platform. For such a one-piece implant, the process of restoration requires cementation, which bears the risk of excess cement being retained subgingivally, leading to complications ranging from bone loss to implant failure.

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

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Introduction

In cases of severe posterior bone atrophy, Straumann Pro Arch is a solution that helps achieve fixed restoration for the patient. Straumann Guided Surgery and the coDiagnostiX planning software (Dental Wings) can produce predictable results in cases of complex bone anatomy or when implants are placed such to obtain planned multi-unit angulation. With CARES Visual (Straumann), we can obtain a precise framework fit on the original components, which is fundamental for the final restoration.

Initial situation

A 70-year-old female patient in good general health presented to a private practice with an edentulous maxilla and partially edentulous mandible seeking a full-mouth rehabilitation. Conditions in the maxilla allowed satisfactory retention of a new complete denture, which was accepted by the patient, while the mandible exhibited severe atrophy of the hard- and soft-tissue in the posterior region and hopeless teeth in the frontal area, as observed clinically and confirmed by a CT scan (Fig. 1).

Treatment planning

Bone quality in the mandible allowed placement of four implants in the anterior region, with both lateral implants tilted, and did not allow for any implants to be placed in the distal area. For these reasons, the Pro Arch concept was chosen as a treatment modality. As bone condi-
tions in the mandible were very difficult in terms of cor-
correct implant placement, it was decided to place them
with the help of a surgical guide.

The planning included several steps. First, the hopeless
teeth in the mandible were to be extracted, followed
by delivery of a complete immediate denture, as they
did not offer any stable support for a surgical guide.
Six weeks later, owing to the lack of keratinised tissue
in the premolar regions, apical repositioning and a free
gingival graft were performed (Fig. 2).

After 1.5 months, the denture was relined with a mix-
ture of barium sulphate and resin, transforming the
denture into a radiographic stent (Fig. 3). Another CT
scan was recorded with the stent in the mouth (Fig. 4).
The stone cast of the stent was poured (Fig. 5), giving
us the actual clinical picture of the mucosa, and both
cast and stent were scanned to obtain their STL files.
Using the coDiagnostiX planning software, the radi-
opaque saddle of the stent and the STL scan were
matched, which also allowed the stent to be matched
with the cast as positive and negative, thus, giving us the
soft-tissue volume. Implants were planned in a prosthetically driven manner at sites #34, 32, 42 and 44, with corresponding screw-retained abutments (Fig. 6).

Because of an open-flap procedure owing to the lack of keratinised tissue and the placement of long implants (all Straumann BLT Roxolid, SLA implants; 4.1 x 12.0 mm), it was decided to make two surgical guides: first, a mucosa-supported guide only for drilling the template fixation pins (Straumann; Fig. 7); and second, a pin-supported guide for fully guided implant placement (Fig. 8).

The software can be used to choose a screw-retained abutment in implant planning. Also, we can plan abutment placement with the engraving of implant rotation markers on the guide. This planning helps us stop at the right moment in terms of rotation at the very end of implant placement. We planned to convert the denture into an immediate temporary fixed restoration and deliver the final restoration three months after implant placement.

**Surgical procedure**

On the day of surgery, two impressions were taken: first with the guide for the pins for stable drilling (Fig. 9), then with the existing prosthesis (Fig. 10) for its correct conversion into an immediate restoration. The first mucosa-supported guide was used for drilling the sites for template fixation pins (Fig. 11). Next, the guide was removed, the flap was raised and the second guide was fixed with the pins at the corresponding sites (Fig. 12).
Implant beds were prepared (Figs. 13 & 14) and Straumann BLT implants placed with a torque setting of more than 35 Ncm, following the protocol to allow correct subsequent screw-retained abutment placement (Figs. 15 & 16). Bone around the implants was prepared with bone profilers (Straumann) for the same reason (Fig. 17). The crest was flattened (Figs. 18 & 19), screw-retained abutments were screwed to 35 Ncm (Fig. 20) and covered with healing caps, and the wound was sutured (Fig. 21).

Prosthetic procedure

Provisional restoration

On the same day of the surgery, the existing denture was converted into an immediate temporary fixed restoration by adjusting it on temporary abutments directly in the mouth (Fig. 22), and an impression was taken as a double-check. The restoration was tightened to 15 Ncm (Fig. 23). Ten days later, the sutures were removed, the control CT scan was recorded (Fig. 24) and...
the results were assessed with the coDiagnostiX evaluation tool.

Final restoration
Two months after the implant placement, impressions were taken and the precision was checked with a verification jig (Figs. 25 & 26). The vertical dimension of the provisional prosthesis was followed when mounting the casts in the articulator (Figs. 27 & 28). The analogue set-up was tried in (Fig. 29), then scanned by the Straumann CARES 7 series scanner together with the model. The framework on Straumann Variobase screw-retained abutments was designed in CARES Visual following the set-up anatomy (Fig. 30), then milled from titanium (Fig. 31). The passive fit of the framework was checked, and it was then veneered with resin with the denture teeth in place (Figs. 32 & 33). Variobase abutments were cemented into the prosthesis, and the final restoration was tightened to 15 Ncm (Fig. 34). Screw holes were closed with PTFE tape and composite.

Treatment outcomes
This case shows how digital technologies help achieve good results in complex surgical conditions and facilitate immediate predictable temporisation. It demonstrates that correct prosthetically driven implant planning results in a satisfactory final restoration.

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Dr Nikolay Makarov graduated from the Moscow University of Medicine and Dentistry in Russia and the University of Siena in Italy. He obtained an MSc from the Sapienza University of Rome in Italy, specialised in dental surgery at the Moscow University of Medicine and Dentistry, and was an ITI Scholar at the University of Geneva in Switzerland. Dr Makarov is an ITI Fellow and the director of an ITI Study Club in Moscow. He combines private practice with doctoral study at the implant prosthetic department at the Sapienza University of Rome.
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When a patient presents to your dental practice with questionable and/or non-restorable teeth requiring full-mouth extractions, the greatest concern is whether implants can be placed at the same surgical visit and if so whether the patient will be able to walk out with fixed teeth. Having an implant system in your practice that allows you to load or progressively load, so that these patient demands are met, allows you to position your practice at a whole new level. Of course, certain parameters must be met in order to facilitate this type of treatment. This includes the quality and quantity of bone, the presence of infection, the patient’s health and the skills of the dental provider. Additionally, the selection of the most appropriate materials for the most ideal situation must be met.

A patient presented to my practice for a consultation wanting to restore his dentition to proper form and function (Fig. 1). He complained of generalised discomfort due to the gross caries and periodontal disease that was readily apparent (Figs. 2 & 3). There were several teeth in both arches that had so much extensive decay that only the root tips were apparent upon clinical examination. Also, there was hyper-eruption in certain areas of his posterior dentition, as well as a deep impinging bite in the anterior.

Planning

The clinical evaluation included information regarding lip length and support, existing position of the natural teeth, occlusion, restorative space, and phonetics. In addition, digital images of frontal, side and occlusal views of the dentition, as well as facial shots, were captured with a Nikon D7200 (PhotoMed).
A CBCT scan and panoramic radiograph using the CS 8100 3D (Carestream Dental; Figs. 4 & 5) was taken to accurately capture the information needed to properly plan treatment for this case to ensure the most ideal outcome, especially since the patient had discussed his frustration with previous treatment that did not last very long or address his primary needs or requests. Using CS 3D Imaging Software (Carestream Dental), dental implants were virtually planned in key positions in both arches (Fig. 6).

To further develop a treatment plan, diagnostic model impressions were taken using Panasil (Kettenbach) Heavy Body and Light Body polyvinylsiloxane impression material (Figs. 7 & 8), poured up and forwarded to the dental laboratory. These models were then mounted on an articulator (Stratos 100, Ivoclar Vivadent) for further analysis in order to meet the patient’s aesthetic and functional needs.

Financing options using a third-party payment option (Lending Club) were discussed with the patient. This discussion was a very important part of facilitating acceptance of his care, since it made the cost of treatment more feasible.

A 3D virtual treatment plan was further developed from our planning with CS 3D Imaging Software, integrating it with the photographs and models with the assistance of 3D Diagnostix (3DDX; Fig. 9). A virtual online integrative meeting with 3DDX allowed for a comprehensive review of the assembled digital and clinical information to formulate an optimal treatment plan that would fulfil the necessary requirements for aesthetics, form and function.

The implants that would be utilised for this case were OCO Biomedical’s Engage dental implants. These implants are known for their unchallenged high implant stability at placement, which is a critical success factor in these immediate loading cases. With the combination of its patented Bull Nose Auger tip and mini Cortic-O Thread, the Engage implant system offers practitioners a bone-level implant with high initial stability for selective loading options.

The Engage implant is self-tapping for an enhanced mechanical lock in the bone. The Bull Nose Auger tip will not proceed any deeper than the initial pilot drill preparation, locking into the base of the osteotomy. Engage implants have a proprietary surface treatment designed...
to increase the surface area of the implant for optimal bone ingrowth and stability.

Once the virtual plan had been orchestrated and fully confirmed, the next appointment would be the planned surgery. The patient was appropriately sedated with intravenous medications, and local anaesthesia was administered in both arches. The maxillary teeth were atraumatically extracted utilising the Physics Forceps (GoldenDent). The tissue was then reflected using the Reflector instrument (GoldenDent) so that the bone levelling surgical guide (3DDX) would be fully seated and fixed with its respective retention pins (Fig. 10).

Once the appropriate bone levelling had been accomplished with the surgical handpiece, the universal implant surgical guide was positioned into the bone levelling guide and the sites for the implants were initiated with a designated 1.8 mm pilot drill in its appropriate key from the OCO Biomedical Guided Surgical System Kit (Fig. 11), utilising the Mont Blanc surgical handpiece (Anthogyr) and AEU 7000 surgical motor (Aseptico) at a speed of 1,200 rpm with copious amounts of sterile saline. Sequential osteotomy formers and keys from the OCO Biomedical Guided Kit were then used to shape the final osteotomies. Once the osteotomies were complete, a rotary implant driver was used to place the dental implants until increased torque was necessary (Fig. 12). The ratchet wrench was then connected to the adapter and the implants torqued to final depths, reaching a torque level of about 40–50 Ncm.

A baseline Implant Stability Quotient reading was taken of these implants utilising the Penguin RFA unit (Aseptico). Since the initial readings were all above 70 and the quality of bone after levelling was good, multi-unit abutments (OCO Biomedical) were tightened into the Engage dental implants at 25 Ncm, followed by temporary cylinders at 15 Ncm. Any residual areas around the implants or in the sockets were grafted with a cortical mineralised and demineralised bone grafting material to optimise the area for regeneration (Fig. 13).

The prefabricated immediate provisional arch restorations (3DDX) with pre-drilled access openings were inspected before being tried in (Fig. 14). The maxillary provisional restoration was tried in to verify a passive fit over the temporary abutments. Once confirmed, a polyvinylsiloxane gasket was placed to avoid the restoration (Fig. 15) locking on during the relining procedure with Rebase II Fast hard reline material (Tokuyama Dental). After the material had polymerised, the immediate provisional restoration was removed and any access material removed with the Torque Plus (Aseptico) laboratory handpiece and an acrylic bur (Komet Dental).

Fig. 10: Maxillary bone levelling guide. Fig. 11: Maxillary implant surgical guide. Fig. 12: Engage dental implant. Fig. 13: Implants with corresponding multi-unit abutments.

Fig. 14: PMMA maxillary and mandibular restorations. Fig. 15: Insertion of provisional restoration.
The same procedures were accomplished in the lower arch (Figs. 16–18); however, while the provisional restoration was being trimmed and polished, the mandibular tori were surgically removed before suturing the soft tissue.

Once trimmed and polished, the provisional arch restoration was seated and tightened with a torque wrench at 15 Ncm. The access openings were filled three-quarters of the way with PTFE tape, followed by Cavit (3M) filling material.

Seven days postoperatively, the patient returned with very little discomfort, swelling and bruising. He was very pleased with his new maxillary and mandibular fixed provisional restorations (Figs. 19 & 20). With the patient no longer anaesthetised, the occlusion was checked again to confirm there were no interferences in lateral and protrusive movements. The next step in his treatment would consist of full-arch impressions for the definitive restorations approximately four to five months postoperatively.

Conclusion

Having the ability to take a patient from start to finish in fewer appointments in your practice allows you to position yourself as a provider that can fulfil your patient’s surgical and restorative needs. With the proper training and appropriate materials, a dental provider may provide extraction, grafting and implant placement within one appointment at one location. Not only does this allow you to reduce the number of visits for the patient, but this type of service also helps maintain the cost to the patient, since he or she is not seeing multiple dental providers. Most importantly, this enables the dental provider full control of the surgical and prosthetic outcome. Depending on the patient’s desires, the clinical conditions of the oral environment and the skills of the provider, a dentist may choose to extract teeth, level bone and graft with guided dental implant placement within his or her dental practice.

about

Dr Ara Nazarian maintains a private practice in Troy in Michigan in the US with an emphasis on comprehensive and restorative care. He is a diplomate of the International Congress of Oral Implantologists and the director of the Ascend Dental Academy. He has conducted lectures and hands-on workshops on aesthetic materials, grafting and dental implants throughout the US, Europe, New Zealand and Australia.
Dr Michael Bornstein is Clinical Professor in Oral and Maxillofacial Radiology and Associate Dean for Research and Innovation at the University of Hong Kong in China. He has followed the ongoing evolution of low-dose CBCT imaging closely, encourages all clinicians to increase their use of dose limitation measures, and has said that the radiation dose to the patient will continue to become lower. Dr Bornstein is one of the leading CBCT imaging experts in the dental community. He was one of the speakers at Planmeca’s booth at the 2019 International Dental Show (IDS) in Cologne in Germany and gave a presentation titled “Low dose CBCT protocols in dental medicine and their impact on daily clinical practice”. It covered the changes and paradigm shifts that have taken place in the field of dental 3D imaging, with a particular emphasis on low-dose protocols. Highlights of this presentation are given in this short article.

Cone beam computed tomography (CBCT) is an imaging technique that has been a game changer in dentistry over the last decades. It has allowed clinicians to easily acquire 3D images that have a significantly higher diagnostic value than traditional 2D images do. However, this improvement is not one completely without downsides, as the additional dimension comes at the cost of higher effective radiation doses to patients. Their exact biological effects have been difficult and sometimes even impossible to measure, but potential harm from high radiation dose levels should not be ignored.

Although the risks of CBCT imaging are very small to individuals, they are still significant when examined in the context of large population bases. Dr Bornstein states that six to eight patients per million are at risk of developing cancer related to dental imaging in their lifetime. This is why ways to reduce patient doses without losing diagnostic image quality are considered so valuable.

Over the past five years, there has been an ongoing shift in the minds of radiologists from ALARA to ALADA—from capturing images that are as low as reasonably achievable to as low as diagnostically acceptable. One could even say that finding an optimal balance between image quality and dose is at the core of modern dental imaging. Dr Bornstein’s own research has indicated that images can be used for diagnosis as intended when using ultra-low-dose imaging protocols.

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are not always that easy to implement. That is why they need to be straightforward and intuitive. I think it is safe to say that our smartphones, for example, would never have become so popular if they were very difficult to use."

It was always possible to manually adjust the dose levels of various radiographic units, but it was not that easy. Various manufacturers have also struggled to maintain a diagnostically acceptable image quality at lower doses. Activating Planmeca Ultra Low Dose, however, is as easy as pressing a button. Furthermore, it can be used with any resolution or volume size, as the protocol does not rely on taking fewer frames or using a smaller rotational angle to lower the patient dose.

"Planmeca was one of the first to come up with a preset modality that makes it very easy to apply dose limitation measures. By doing this, they were also leading the way for many others."

The broad field of radiology

Dr Bornstein went to dental school at the University of Basel in his native country of Switzerland and went on to become an oral surgeon. Working as a dentist further expanded his interests and led him to the world of oral and maxillofacial radiology and diagnostic imaging. He soon discovered that radiology is quite an extensive discipline that encompasses not only 2D and 3D radiographic imaging but also ultrasound and magnetic resonance imaging in some countries.

"Radiology is a broad and challenging field. Because it is so technically driven, it is also very innovative. I think these factors together have kept me so interested and enthusiastic about it," Dr Bornstein elaborated.

Although he now resides in Asia, for Dr Bornstein, IDS still holds a special significance—as is the case for countless dental professionals worldwide. In fact, he has witnessed the international atmosphere significantly strengthen at the exhibition over the years. "Being from Switzerland, IDS has always been on my agenda, although I don't go every time. In contrast to many other fairs and exhibitions, it seems to still be growing, and has become more and more international," Dr Bornstein commented. "Twenty years ago, IDS was still very European- and German-centric. Now, I think it has become much more of a global village for dentistry."

No limit to how low doses can go

Although significant strides have already been made in lowering patient doses to levels unimaginable in previous decades, Dr Bornstein still sees much room for improvement. "I would say there is no limit really to how much lower doses can go. Ten years ago, nobody would have even said that ultra-low-dose imaging would provide reasonable image quality, so I hope this shift will continue," he said.

"Maybe in ten or 20 years, the term ‘low dose’ will not even be applied anymore, because all 3D imaging will be low dose. Maybe the low doses we talk about today will be the regular doses of the future."

Reference

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About

Originally from Basel, Dr Michael Bornstein is an oral surgeon turned radiology expert. He headed the section of dental radiology and stomatology at the University of Bern in Switzerland from 2007 to 2014. Currently, Dr Bornstein holds the position of Clinical Professor in Oral and Maxillofacial Radiology and is Associate Dean for Research and Innovation at the University of Hong Kong’s Faculty of Dentistry. His key fields of research include dental CBCT imaging, stomatology, guided bone regeneration procedures and dental implants. During his academic career thus far, he has published over 140 original articles and authored numerous case reports, review articles and book chapters.
In recent years, the technology associated with endodontic therapy has undergone a veritable revolution. For years, intraoral radiographs were used as the basis for diagnosis and for planning root canal therapy, despite the fact that these images did not provide a faithful reproduction of the endodontic anatomy. This created a series of technical problems, which, although they could be partly overcome by the operator's personal experience, to some extent remained unresolved, especially in the field of diagnosis.

I personally started using cone beam computed tomography (CBCT) for endodontic purposes more than ten years ago. Although the machines that I used then were far from ideal for this specific purpose, the possibilities offered today by increasingly sophisticated technologies have greatly improved my diagnostic and interventional capabilities. In order to make an accurate diagnosis, an endodontist needs to perform a highly detailed assessment of the canal and pulpal anatomy, which requires high-definition examination techniques and software that enables the endodontist to rotate the tooth accurately and easily. This may seem obvious and trivial, but is not. Indeed, over the past ten years, I have had the opportunity to work with a large number of devices and dozens of software programmes, but only very few have proven to be suitable for endodontic purposes. For a few years now, I have been using ACTEON's trium technology, with extremely satisfactory results. The imaging is very accurate and highly detailed, and above all, the user friendliness of the ACTEON Imaging Suite makes it possible to identify even slight differences between the different radiographic slices, differences that are of paramount importance for making a correct endodontic diagnosis and for the therapeutic decision-making process itself. Clinician experi-
ence alone is not sufficient for establishing the correct approach to be adopted in the case of endodontic disease, and very often clinical cases that were initially scheduled for orthograde treatment, after CBCT assessment, turn into cases for endodontic surgery or vice versa. We can therefore state that the capability we have now of performing these studies in a quick and easy manner has drastically reduced the number of incorrect diagnoses and, consequently, the number of clinical errors.

The case with which I would like to start my clinical review is a perfect example of how difficult it is to establish the origin of the patient’s symptoms on the basis of an intraoral radiograph alone. Not only does the 2D study fail to establish with certainty the presence of a lesion, but more importantly, it is impossible to establish the size, morphology and type of the lesion. An analysis of the 3D imaging, however, provides a clear picture of the clinical situation: the coronal and sagittal slices revealed the presence of a large lesion extending from the apex of the mesial root of this molar to the furcation, while the axial slices allow us to conduct a precise analysis of the endodontic anatomy and, in particular, the shape of the mesial root, which in this case was fused with the palatine
root. A full overview of the case can, therefore, guide the decision-making process and direct the treatment plan towards a specific type of treatment (Figs. 1–4).

In the maxillary premolar shown in Figures 5 and 6, the fistulogram revealed the presence of an apical lesion that extended coronally to approximately the middle third of the root. The clinical decision could, therefore, propend towards orthograde retreatment; however, CBCT gave us a very different view of the situation compared with the radiograph, as it indicated that a prior treatment had irreversibly damaged the tooth, which would therefore have to be extracted.

The situation was entirely different for the mandibular premolar shown in Figures 7 to 9, where, in the absence of any radiological signs of a lesion and despite the apparently correct endodontic approach adopted by another colleague, the patient complained of persistent pain which was both spontaneous and triggered by percussion of the tooth. In this case, the previous excellent root canal therapy would suggest an endodontic surgery approach, which could guarantee a higher success rate than retreatment. Given this diagnostic doubt, it was decided to perform a 3D study, which revealed an endodontic lesion caused by an untreated lingual canal. This correct diagnosis, thus, made it possible to perform selective intervention on the remaining pulp, leading to successful treatment of the untreated canal.

Undeniably, one of the most complex conditions to treat is external invasive root resorption, where the extent of the defect affects the treatment options. It therefore becomes sensible to perform a preoperative evaluation of the location and extent of the resorption, and the potential for recovery, thus, depends on correct 3D planning of the procedure, which can only be achieved after examination of the CBCT images. It is very important to be able to view the slices of the tooth correctly in all three planes, focusing in particular on the axial slices, which will prove to be strategic from an endodontic diagnosis point of view.

Comparing the two teeth shown in Figures 10 to 22 demonstrates just how important it is to analyse all the slices of the CBCT study correctly. We can see that, in the maxillary molar, the lesion penetrates into the pulp chamber, starting from the root’s distal surface, but remains within the coronal third of the tooth, without sig-
nificantly affecting the integrity of the pulp chamber floor (Figs. 10–15). The clinical images illustrate the operative treatment phases, from resorption debridement through to repair using bioceramic cement (Figs. 16–19). The final radiographic images confirm the validity of the conservative and endodontic treatment of the tooth. The situation is completely different for the mandibular molar, where the evaluation of the CBCT scan clearly reveals the extent of the resorption, which invades the pulp chamber floor until the furcation, a situation that cannot be determined from observing the preoperative radiograph alone (Figs. 20–22).

Preoperative CBCT evaluation is useful in cases requiring a surgical approach, not only in order to confirm the presence of a lesion but also to plan the procedure and, in particular, identify the type of surgical incision to be used, based on its size and location (Figs. 23–25). This specific case is characteristic of this situation. The intraoral radiograph did not make it possible to ascertain
the extent of the lesion, which involved not only the apical region of the premolar but also a distal edentulous segment. This region would need to be treated with regenerative therapy in order to guarantee correct healing of the area, with subsequent insertion of a membrane, the flap must be protected using a totally different approach to that required for endodontic surgery. The intraoperative images illustrate the various stages of the procedure (Figs. 26–28). The CBCT scan performed 12 months later confirmed complete healing of the apical lesion and perfect graft integration (Figs. 29–31).

Another compelling advantage of this 3D technology is the possibility of using a minimally invasive approach for performing cavity access. For demonstration, the next case involves a dens in dente. The CBCT scan shows a separation between the two canal systems of the canine and the decay involves the portion of tooth where the dens in dente is present. The treatment plan therefore involved root canal therapy for just one portion of the pulp, while the other was to be kept vital. The image sequence of the treatment shows how it was possible, using CBCT and a surgical microscope, to perform a minimally invasive access, which spared much of the canine’s clinical crown and kept the disease-free portion of the tooth vital. The radiographic follow-up confirmed complete healing of the lesion and the vital part of the canine did not present any signs of disease six years later (Figs. 32–37).

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**Dr Fabio Gorni** was a consulting professor in endodontics at the San Paolo hospital associated with the University of Milan in Italy. He is an active member of the Italian Society of Endodontics and of the Italian Academy of Microdentistry, a specialist member of the European Society of Endodontology and a member of the American Association of Endodontists. From 1994 to 1998, he served on the member acceptance committee of the Italian Society of Endodontics, and from 1998 to 2001, he was the society’s cultural secretary. He was president from 2003 to 2005. He has lectured at several courses and congresses in Italy and worldwide, and published numerous scientific articles in national and international journals. In collaboration with Dr C.J. Ruddle, he produced a series of scientific videos called *The Endodontic Game*, since distributed in Europe, the US, Canada, Australia and Asia.
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Texture Superimposition

Study Models

Virtual Setup

Clear Aligner

Indirect Bonding
Computer-guided surgery is among the most exciting advancements made in digital dentistry throughout recent years. In this interview, Prof. Dr Ronald Jung and Dr Marc Balmer, both working at the University of Zurich, Switzerland, talk about the current state of computer-guided implantology and the advantages of dynamic navigation in particular.

With the emergence of new digital technologies, novel treatment approaches have become available to clinicians—particularly in the field of implant dentistry. However, some implantologists are still sceptical of them. Why do you think that is? And what do you think is holding back more widespread utilisation of computer-guided-implantology right now?

For the utilisation of static or dynamic guidance, clinicians need to invest time to learn to use the new technology and protocols and adjust their workflow to create a streamlined process in their private practice. Clinically, static guides provide no tactile feedback, reduce access to drilling sites and delay time from scan to surgery. Dynamic navigation eliminates these disadvantages, yet it requires a higher initial purchase investment.

Let’s talk about the use of computer-guided implantology. What types of cases are you going into thinking that you must have, or are probably going to need surgical guidance? What are the advantages of dynamic navigation?

There are four major points: complex anatomy, high aesthetic demanding situation, flapless surgery and immediate loading. The big advantages are flexibility and visibility during surgery. Planning is simpler because no guide needs to be designed and fabricated. Treatment can be adapted any time during operation and the access to the operation field is unimpeded. Furthermore, a dynamic navigation system provides you with live feedback during the operation. In comparison with surgical guides, one could say that a static guide holds your hand, while a dynamic navigation system gives you more information during treatment. Moreover, with dynamic navigation there is increased safety and predictability because an accuracy check is always easily available.

Has it already proven itself in research and clinical practice? What results can it achieve compared with free-hand surgery?

Research in the field of dynamic guided implantology is ongoing. Some comparisons to free-hand and statically guided surgery, both in vitro and in vivo are already available. A recent JOMI publication showed that dynamic navigation is about two to three times more accurate than free-hand surgery, especially in angulation.
What can clinicians do to better implement a digital workflow in implant treatment?
Clinicians should educate themselves about the latest technologies available and be ready to make an initial investment in training and be open to changing work habits. Newer developments in the field of dynamic navigation facilitate the process. The new generation of dynamic navigation systems require no preparations of stents or clips during 3D-imaging and no intraoral scans. In fact, the diagnostic scan can often be used for guidance as well. Also, with much simplified planning, the clinician can now easily and quickly plan the procedure themselves, rather than delegate it to technicians.

You also mentioned postgraduate studies. Clinicians need more exposure to dynamic navigation in order to gain more skills or to determine that they want to incorporate the technology into their workflow. Can you tell us about any programme that you have at the university?
All postgraduate students in our clinic are exposed and trained to multiple systems. This way, they can gain experience in static, as well as in dynamic navigation. They decide for themselves which systems fit better in their workflow.

You also mentioned being a “mentor clinician” for the programme. Does that mean you’re still available to clinicians who complete the programme, even after it’s over?
Yes, of course. We have an alumni programme and we stay in touch with all our former students on a professional and friendly basis.

Last question: How will dynamic navigation further change digital dentistry in the future?
Dynamic Navigation has an enormous potential for further developments. Beyond handpiece guidance, it can be applied to other fields of dentistry, for example for root canal preparation and orthognathic surgery. In the longer term, it would enable the introduction into dentistry of other modern technologies such as virtual and augmented reality and robotics.

Editorial note: Watch a video recording in which Dr Balmer is teaching a postgraduate student using Navident via the QR Code below.

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Why reviews have grown in importance

Chris Barrow, UK

“Before contacting you, I read all of your lovely reviews”—my clients are hearing that from patients every week nowadays. I’m not sure who actually taught us all to read and write reviews, but I have a sneaking suspicion that the source is Jeff Bezos at Amazon. We have fundamentally changed our buying habits as a result. Now, even the provider (if it’s Uber or Airbnb) can review us.

The thing is, we don’t believe advertisers any more. They would say that, wouldn’t they? That their product is good for us and is the best. Yeah, right. In fact, the only advertising that we can actually believe (most of the time) is price. “We are the cheapest” is a message that can easily be checked before you have experienced the product or service (but be careful of those hidden extras). The paradox of advertising is that if you were actually the best you wouldn’t need to advertise, which leaves us asking “what’s the catch”?

The new buying process is to note recommendations from family, friends or colleagues and then to double-check that recommendation by reading online reviews from other people. Observation followed by verification. That is why it has become imperative that you collect those reviews as part of a robust protocol in your business:

· Step 1: deliver great customer service
· Step 2: do great dentistry
· Step 3: conduct a strong post-treatment review
· Step 4: make it easy for patients to submit Google and Facebook reviews (the minimum number of aggregate reviews required is 100—so that Google’s algorithms can see you).

This is important, urgent, crucial. Reading reviews is now an essential stepping stone in the research and discovery process undertaken by potential new patients, whether they are looking for a dependable quality or an affordable price.

One hopes the patients looking for quality and experience have already been referred by another dentist or a family member, friend or colleague. They are reading extra reviews for reassurance that the referrer was correct. Paradoxically, the “low price” patients want to make sure they aren’t being scammed by a rapid turnaround clinic that is compromising too much on customer service and clinical care.

The one-star review

Fairly often now, I am asked what to do with a one-star review. Chances are that you will get a one-star review at some stage; it happens to the best in my client base, so we can conclude that none of us are immune to this risk. I would advise you to quickly pass through the stages of disbelief, anger, frustration, bewilderment and remorse—and get on with dealing with it.

There are three options:

1. If it is a legitimate grievance and you agree that something went wrong at your end, acknowledge, apologise, thank, contextualise, make restitution—do that publicly.

*For example: Mr Smith, thank you for your review. Although it is painful to see and read a one-star review, we acknowledge that, on this occasion, we got it wrong and could have done a lot better.*

Here at XXX Dental, we care for over 2,000 patients, and the overwhelming majority of the time, we strive for excellence, but we are also human and can make occasional mistakes. When that happens, we always thank the individuals who bring this to our attention and then take steps to learn from the experience and adapt our systems. In this case, we will be doing YYY differently going forward. In order to rectify your situation, we would like to propose ZZZ solution and, if you would care to contact the practice directly, we will be happy to discuss this with you.

2. If it is a grievance with which you disagree (your version, or the version reported to you, is different), respond in private and offer a conversation.

*For example: Mr Smith, thank you for your review. It is very painful to see and read a one-star review, and on the very rare occasions on which that happens, we always look very carefully at the circumstances to see where we need to improve.*
Having researched the chain of events at our end, there seems to be some confusion as to what actually happened in your case and I want to get my facts absolutely correct before deciding on the next steps. Would it be possible to speak with you personally and confidentially about your perception of what happened please?

3. Then there is the person who writes one-star reviews as a hobby, looking for a way to draw attention to himself or herself or deal with issues of low self-esteem by having a pop at you. Sadly, social media has given these individuals a stage. Do not respond; don’t give it oxygen. You may not be able to remove the review, but you can contextualise it by having an overwhelming majority of five-stars. If you have five reviews and one of them is a one-star, the one-star might be right. If you have 99 five stars and one one-star, the public will make their own minds up.

That said, the public will read that one-star review first. An enterprising young dentist e-mailed me last week to tell me the story of the patient who had written an excellent and positive review and then posted it as a one-star because she got her ones and her fives mixed up. The dentist fiendishly suggested that we could all enlist a patient to make that mistake. I’m not so sure I’m happy with the integrity of that, although I admire his ingenuity.

Reviews are here to stay and are an essential part of your marketing collateral. It pays to keep a careful eye on them and to be ready to respond.

The challenge of getting the review

Getting patients to write reviews remains a challenge. Let me remind you of Dr Robert Richter, who spoke at last year’s Stars of Dentistry conference and shared with his audience that 100 patients visit his clinic every day and, on average, one writes a review. Manage your own expectations on this and those of your team—it takes a lot of asking to get a review.

Equally, make it as simple as possible for the patient to submit the review. I bought a new camera recently at Dixons Travel duty-free at Manchester Airport. My customer service experience was simply excellent: the chap serving me was enthusiastic, super-helpful and a pleasure to deal with (he even sprinted between terminals before my departure to secure the model I wanted). I was motivated to reward him with praise, but the resulting e-mail from Dixons required a visit to a website and around ten pages of questions to answer about my experience—you know, all those multiple-choice options, the kind of review that you get from a hotel chain. After giving a 10/10 on the first page, I was told that I was 8 per cent (?) of the way through the review process. With no time for that, I closed the page and went back to my e-mails.

So how do we get patients to take the time? The patient will write a lousy review to seek revenge for lousy customer service or clinical experience—you have been warned. If I had been disappointed at Dixons, I may well have been motivated to complete the laborious journey to claim my revenge.

Patients will write lovely reviews to reward you for looking after them—provided you make it simple and quick for them. It’s a simple enough formula for you and your team to pop on to a staffroom noticeboard: “When we are lousy, patients will seek revenge. When we are lovely, they will offer reward. Ask for reviews. Make sure we get the right kind.”

Chris Barrow has been active as a consultant, trainer and coach to the UK dental profession for over 23 years. His main professional focus now is through his Extreme Business company, providing coaching and mentorship to independent dentistry around the world via face to face meetings, a workshop programme and an online learning platform.
Over a century of experience

Prima Digital, a growing division of the Prima Dental Group

Prima Dental is the only UK bur manufacturer with over 150 years of heritage in dental manufacturing. 90 of those in bur manufacture. We have the most advanced, efficient, flexible and accurate grinding machines in the dental bur business and sell our products in over 90 countries worldwide. We have 250 employees based at our headquarters in Gloucester in the UK, and over the past three years, we have invested over £15 million in technology. This has created a new factory, a research and innovation centre, and training facilities and generated our second Queen’s Award for Enterprise.

Dr Marilyn Goh was appointed Head of Research and Innovation and £1 million was allocated to our newest division, Prima Digital. From this, we have produced a range of select milling tools with unparalleled precision and performance, which save our customers money. Dr Goh’s background in aerospace was a perfect partnership for this division.

Robust testing pervaded the design phase and the tools were only released to market once they had passed all control checks. Further to submission of the patent, Dr Goh sits on the ISO/TC 106/SC 9 committee for dental CAD/CAM systems. Prima Digital is a driving force for change.

The process
We partnered with five European universities for the initial testing phase, including the UK’s leading university of medicine and dentistry, which will be releasing its full findings imminently. The testing included carbide grain size, carbide grade (lifetime of tool), analysis of coating types, crown accuracy and geometries (Table 1).

Independent testing
An independent report has shown that Prima Digital tools perform more precisely and more consistently than the market leader. This study was undertaken by the UK’s leading university of medicine and dentistry. The aim of the study was to evaluate the quality of milled crowns using topographic analysis.

Crowns from a digital model were milled using three set of tools (ø 2.0 mm, ø 1.0 mm, ø 0.6 mm) made by three manufacturers. The volumes of the outer and inner surfaces of the milled crowns were measured and compared with that of the digital model.

The results for the outer surface are summarised in Table 2. Prima tools were found to generate the least deviation from the digital model (Figs. 1–4). The results for the inner surface are summarised in Table 3. Prima tools were found to generate the least deviation from the digital model (Figs. 5–8). In conclusion, the Prima tools were proved to be able to produce a more accurate restoration compared with the tools used in this test.

Launch
Debuting at LMT LAB DAY Chicago in 2018, our current range offers both coated and uncoated tools which are compatible with

<table>
<thead>
<tr>
<th>University</th>
<th>What they tested</th>
<th>What they did</th>
</tr>
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<tbody>
<tr>
<td>UK university (materials science)</td>
<td>Carbide grain size</td>
<td>Looked at different carbides and quality of substrate</td>
</tr>
<tr>
<td>UK university</td>
<td>Carbide grade (lifetime of tool)</td>
<td>Completed 18 months’ testing of 600 zirconia blocks against two leading competitors</td>
</tr>
<tr>
<td>UK university</td>
<td>Analysis of coating types</td>
<td>No data</td>
</tr>
<tr>
<td>UK’s leading university of medicine and dentistry</td>
<td>Crown accuracy</td>
<td>Performed internal testing of deviation from digital model</td>
</tr>
<tr>
<td>European university</td>
<td>Geometries</td>
<td>Looked at zirconia cutting and lowest cutting forces</td>
</tr>
</tbody>
</table>

Table 1: Initial testing of Prima Digital tools.
Independent report shows that Prima Digital tools perform more precisely and more consistently than the market leader.

The Report
In partnership with a leading UK University of Medicine and Dentistry

1.0 Aim of the study
To evaluate the quality of milled crowns using topography analysis. Crowns from a Digital Model were milled using three set of tools Ø2mm, Ø1mm, Ø0.6mm made by three manufacturers. Volume of the Outer Surface and the Inner Surface of milled crowns were measured and compared with the Digital Model.

2.0 Results – The Outer Surface

This table summarises the results for the Outer Surface. Prima tools have found to generate the least deviation from the digital model.

<table>
<thead>
<tr>
<th>Manufacturer</th>
<th>Disc 1</th>
<th>Disc 4</th>
<th>Disc 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prima Digital</td>
<td>0.067</td>
<td>0.060</td>
<td>0.070</td>
</tr>
<tr>
<td>Competitor 1</td>
<td>0.020</td>
<td>0.150</td>
<td>0.120</td>
</tr>
<tr>
<td>Competitor 2</td>
<td>-0.140</td>
<td>-0.120</td>
<td>0.020</td>
</tr>
</tbody>
</table>

Deviation of milled crown volume from the digital model remains consistent throughout the life of the tools.

Deviation of milled crown volume from the digital model increases when tools wear out.

Milled crown volume tends to be smaller than that of the digital model. Even though a small deviation of 0.02 is observed at Disc 7 chipped margins at crowns will still cause crowns to be rejected.

Fig. 1: Outer surface of the digital model. Fig. 2: Scan of Prima Digital milled crown. Fig. 3: Scan of Competitor 1 milled crown. Fig. 4: Scan of Competitor 2 milled crown. Table 2: Summary of results for the outer surface.

Fig. 5: Inner surface of the digital model. Fig. 6: Scan of Prima Digital milled crown. Fig. 7: Scan of Competitor 1 milled crown. Fig. 8: Scan of Competitor 2 milled crown. Table 3: Summary of results for the inner surface.
Roland DGA, Amann Girrbach, vhf camfacture and Wieland Dental machines. Manufactured in-house, partnering with one of the world’s leading chemical vapour deposition (CVD) coating companies, Prima Digital’s premium tools are surpassing market-leading competitors. Our uncoated tools excel with a 30 per cent harder carbide and our coated tools provide a cost-saving of up to 40 per cent per restoration compared with market leaders.

What sets us apart?
The Prima Digital philosophy and three most important elements for exceptional tool-making:
– high-quality substrate;
– patent-pending precision geometry; and
– innovative CVD diamond coating.

We adhere to these principles unfailingly, utilising two separate substrates, optimised blade geometries for zirconia milling and only the highest quality coating. The multi-fluted design means less cutting force is required and, therefore, the tool life is extended.

The uniqueness of Prima coating
The question we found ourselves asking was: what coating is best for pre-sintered zirconia? We studied other industries that utilise coatings, such as aerospace (Boeing and Airbus), Formula One and nuclear engineering to find the best for use with zirconia. We then brought that technology back to dentistry, resulting in a partnership with a world-leading coating company.

Prima Digital uses tungsten carbide as our tool substrate. The inherent hardness of carbide gives good wear resistance, but paradoxically, it is also very delicate. In order to further improve the resistance attributes of a carbide tool, a coating harder than the carbide is needed. After researching methods, we elected to use CVD as opposed to physical vapour deposition. We carefully selected our tool substrate to have a high adhesion rate for coating, which ensures high wear resistance of tools, meaning a longer life.

The grading of our CVD coating is the highest possible, up to ten times the thickness of diamonds than our competitors and a low coefficient of friction. During extensive testing, our coating did not chip once. What does this mean? It means for the consumer that the lifespan of our coated tools is second to none. A long tool life equates to greater time in use and, more fundamentally, a reduction in unit cost.

Looking forward
At Prima Digital, we are always looking to the future. Our manufacturing capabilities mean that further ranges for additional milling machines will be released later in 2019. We are currently testing new tools suitable for milling materials other than zirconia.

To find out more about how Prima Digital can enhance your laboratory’s performance, please contact us at sales@primadigital.com or visit www.primadigital.com.
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The new CONNECT
MIS introduces comprehensive abutment system for a screw-retained solution

Recently, MIS Implants Technologies released the CONNECT abutment system, a broad, comprehensive solution which offers dentists the ability to maximise the tissue level restorative concept, enabling the entire prosthetic procedure and restoration to occur far from the bone and at any level of the connective tissue. Because of its versatility, the CONNECT may be used in multiple- or single-unit restorations, for both digital and conventional procedures. It may also be used for provisional or final prosthetic restorations. The new abutment system is easy to use and convenient, and is supplied sterile with the tools necessary for a simple procedure, making it advantageous over other screw-retained systems available.

Tali Jacoby, Implants Product Manager at MIS, is excited about the new CONNECT system: “It is a one-time abutment, which enables a prosthetic procedure above the connective tissue level, distancing the micromovements from the bone.” The CONNECT allows for a broader range of screw-retained prostheses in the aesthetic zone and may be used in one- or two-stage procedures. It supports long-term biological stability by increasing the distance from the bone and providing ultimate sealing. Additionally, in CAD/CAM restoration planning, the abutment may be scanned and is incorporated into a partial or fully digitally guided procedure.

Dr David Norre of Belgium has been using the CONNECT since its release. “I think the most important reason I use the CONNECT is because I can avoid repeated disruption of the soft tissue, which reduces the risk of bacteria entering the site,” he explained. Therefore, the new CONNECT provides Dr Norre and his patients with a safer, more predictable solution and an aesthetically pleasing result over time.

Awards for TRIOS 4 intraoral scanner and the TRIOS MOVE+
3Shape wins two Red Dot design awards

3Shape, a global leader in 3D scanners and CAD/CAM software solutions, has received two prestigious Red Dot awards for high-quality product design. The two design awards were presented to the just-released 3Shape TRIOS 4 intraoral scanner and the TRIOS MOVE+.

The 3Shape solutions were selected by the Red Dot global jury from more than 5,500 entries. The distinction marks the fifth and sixth 3Shape solution given a Red Dot product design award over the past three years.

Nikolaj Deichmann, 3Shape co-founder and co-CEO, said: “We are very proud to receive the Red Dot awards and appreciate the jury’s recognition. The awards not only highlight the value of our solutions, they also celebrate our company’s design philosophy. 3Shape creates solutions to enable dental professionals to better care for their patients. But an important part of that is making sure that the form and function of our solutions is equally outstanding. The Red Dot awards acknowledge this.”

3Shape TRIOS 4 is the world’s first intraoral scanner that allows for timely detection of both surface and interproximal caries with a single scanner. Now with the release of the brand-new TRIOS 4, intraoral scanners will no longer be used only for restorative and orthodontic applications. These are diagnostic applications that do not emit radiation. The wireless TRIOS 4 delivers its caries innovation without compromise to ergonomics or an increase in the size and weight of the scanner.

3Shape TRIOS MOVE+ is one of three hardware set-up options for the TRIOS intraoral scanner. TRIOS MOVE+ now features a larger 15.6 in. touch screen attached to an arm and an elegant, easy-to-move stand with a mounted PC. Dentists can easily move and position the TRIOS MOVE+, as well as use its touch screen as a canvas to design and discuss treatments with patients. TRIOS MOVE+ helps to drive patient involvement and case acceptance in conjunction with 3Shape patient excitement apps like TRIOS Treatment Simulator and TRIOS Smile Design.
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IDS 2019: Leading global trade fair of the dental industry reaffirms its position

By DTI

The International Dental Show (IDS) 2019, which ran over five days, from 12 to 16 March, in Cologne in Germany, more than fulfilled the high expectations of the international industry, again underlining its exceptional position as the undisputed leading global trade fair of the dental industry. The show was able to replicate the very good results of the previous event and the organisers realised their ambitious goals for greater internationality and higher quality in supply and demand. The outcome of the trade fair consequently led to satisfied exhibitors and trade visitors.

With 2,327 companies from 64 countries participating, IDS 2019 welcomed 20 more exhibitors, as well as over 160,000 trade visitors from 166 countries. The overall number of visitors rose by 3.2 per cent and the number of foreign trade visitors by 6.0 per cent. The exhibition space was expanded by over 4.0 per cent up to 170,000 m².

Mark Stephen Pace, Chairman of the Board of the Association of the German Dental Industry (VDI), which is involved in organising the event, remarked: “The strengths of this leading trade fair can be expressed in the words ‘sporting, fair competition’: the comprehensive and internationally unique offering, as well as the exceptional performance and innovative strength of the industry, combined with the firm intention of all market players to improve continually and pursue success in direct competition. Anyone who wants to be successful in the dental industry faces performance comparison in Cologne. It is, thus, no surprise that the level of internationality of IDS has grown so substantially.”

Gerald Böse, President and CEO of Koelnmesse, which stages the show, added: “IDS is a trade fair in a class of its own and always sets new benchmarks. It manages to surpass the already excellent results of the previous event every time.” Both visitors and exhibitors are impressed by IDS: it is only here that one encounters supply and demand of such an extent, quality and level of internationality. “IDS is the undisputed leading global trade fair for the dental industry,” he continued.

The dental world does business at IDS

The official figures confirm the high level of internationality at IDS: 73.0 per cent of the exhibitors came from abroad (64 countries) and 62.0 per cent of the visitors from 166 countries, including Argentina, Australia, Brazil, Canada, Chile, Egypt, Japan, Korea, New Zealand, South Africa and the US, as well as many European countries. The number of countries of origin thus increased once again by 6.0 per cent. IDS 2019 recorded significant growth in the number of visitors from Asia (+23.1 per cent), Eastern Europe (+19.6 per cent), Africa (+17.0 per cent), Central and South America (+14.6 per cent) and North America (+5.3 per cent).

However, it was not only the level of internationality and number of visitors that particularly pleased IDS 2019 exhibitors; many also commented on the high quality of the visitors. An independent survey confirmed this: about 80.0 per cent of those who completed the survey were involved in procurement decisions, and 32.0 per cent of them decisively. The decision-making power among foreign visitors was even higher: over 49.0 per cent of the survey respondents stated that they were autonomously responsible for procurement decisions.
At the booths, it was reported that all of the occupational groups of the industry from all over the globe were present. According to the survey, the largest groups came from dental practices, dental laboratories and the dental industry, but schools and universities were also strongly represented. Almost 30.0 per cent of the respondents were either board members or company or plant managers.

Almost 80.0 per cent of the visitors who completed the survey were satisfied or very satisfied with the range of exhibition offerings. More than 93.0 per cent said that they would recommend a visit to IDS to a good business acquaintance, and 70.0 per cent of the respondents were already planning to visit the next IDS in 2021.

Dr Markus Heibach, Executive Director of the VDDI, was also pleased with the outcome of the trade fair: “The high level of satisfaction of our trade visitors and exhibitors is for us impressive confirmation of our efforts to make our guests’ stay as pleasant and successful as possible by offering them a cosmopolitan, hospitable and perfect service.”

High interest in innovations

IDS is the ideal business platform, especially for new companies on the dental market seeking to establish themselves with high-quality innovations. Steve Plakotaris, CEO and Managing Director of Australian start-up Dr Mark’s HyGenie, confirmed this: “As a world first oral hygiene innovation, with global brand potential, it made perfect sense to debut our company and removable oral appliance hygiene range at the world’s biggest and busiest dental industry showcase. Despite being a small Australian start-up, we felt right at home at IDS and the results have exceeded all our expectations. Contacts, connections and new friends are being made every hour of every day. We look forward to booking our place at IDS 2021.”

Both trade representatives and users were extremely interested in the state-of-the-art products and technologies on display. The focus of IDS 2019 was on products and systems for improved digital workflows and additive manufacture, new prophylactic formulas and filling materials, innovative intraoral scanners and implant designs, as well as flexible workflows for management of the laboratory.

German dentist and dental technician associations strike a positive balance

“IDS is a phenomenon: the atmosphere is so international, thirsty for knowledge and open that it was simply very inspiring once again this year. Digitalisation can improve the workflows of practices, but shouldn’t be implemented non-critically or too hastily,” said Dr Peter Engel, President of the German Federal Dental Association (Bundeszahnärztekammer), which is an IDS partner.

He underlined the significance of the dental industry as a major employer and economic driver in the health sector.
“A local dentist employs between four and five employees on average. Trained dental employees are the heart of every dental practice—without them a practice wouldn’t work. Skilled dental employees, therefore, require recognition, as well as inspiration and know-how,” he explained.

The same applies to dental technicians. Dominik Kruchen, President of the association of German dental technician guilds (Verband Deutscher Zahntechniker-Innungen), also an IDS partner, summed up as follows: “IDS demonstrated at what speed the digital dental world is developing. One has to weigh up the risks, recognise one’s own opportunities and take investment decisions based on good judgement.” On the role of dental laboratories, Kruchen commented that master dental technicians and their teams are irreplaceable experts in the provision of dental restorations. In close collaboration with dentists, their expertise, for example regarding the selection and use of different materials, ensures an individual offering for patients. “Well-trained young professionals are important for a strong dental technology trade. Highly trained young dental technician apprentices once again impressively demonstrated their skills at this year’s IDS in the scope of the Gysi prize competition,” he emphasised.

Social commitment of dentists

Following tradition, the German Federal Dental Association’s conference of aid organisations took place at IDS. It is a source of ideas for dental aid projects and offers a forum for personal exchange. Around 60 dental aid projects and organisations are currently represented within the association’s network, the essential aim of which is to provide mutual assistance and exchange. The projects provide aid and support in a number of ways within Germany and Europe, as well as worldwide. In Germany, for example, many dentists are very committed to helping people of lower socioeconomic standing and those in need of emergency assistance. These dentists treat people without health insurance and offer aid organisations both monetary and in-kind support. Many dental aid organisations are engaged in international projects that provide assistance in acute humanitarian situations such as natural disasters and in crisis regions or offer patients dental treatment locally.

IDS 2019 compared with IDS 2017 in figures

Hosted over a gross exhibition area of 170,000 m² (2017: 163,000 m²), 2,327 companies from 64 countries participated in IDS 2019 (2017: 2,305 companies from 60 countries). These included 628 exhibitors from Germany, of which 18 were new IDS participants (2017: 644 exhibitors, including 20 new companies), as well as 1,699 exhibitors from abroad, of which 49 were new IDS participants (2017: 1,661 exhibitors, including 44 new companies). The share of foreign exhibitors was 73 per cent (2017: 72 per cent). Including estimates for the last day of the fair, over 160,000 trade visitors from 166 countries attended IDS (2017: 155,000 trade visitors from 156 countries), approximately 62 per cent of whom (2017: 60 per cent) came from abroad.*

The 39th IDS is scheduled to take place from 9 to 13 March 2021.

Photographs courtesy of Koelnmesse (www.ids-cologne.de).

* The figures relating to visitors, exhibitors and exhibition space for this trade fair were determined and certified according to the standardised definitions used by the Society of Voluntary Control of Fair and Exhibition Statistics.
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Nobel Biocare is set to reshape implantology with new implant solution at upcoming Madrid symposium

At its Global Symposium in Madrid, Nobel Biocare will present a new implant system designed to challenge conventional methods of dental implant care. Developed in collaboration with an international network of researchers from acclaimed international institutions, the new Nobel Biocare N1 system will feature not only a new biologically driven design, but also a unique site preparation method that was created with the goal to further reduce complexity and streamline workflows during implant and restorative procedures.

Experience gained from clinical use of this new concept over the last 18 months has indicated it to be more efficient than currently used drilling protocols. The new N1 system marks the next step in the latest wave of innovation coming from Nobel Biocare, which began with the introduction of the Xeal and TiUltra surfaces for abutments and implants at the International Dental Show in Cologne in Germany. Both surfaces will be also available on the new system, which is planned for release in CE markets in fall 2019. Dental professionals who want a pre-launch experience with this new concept can register for the Nobel Biocare Global Symposium in Madrid in order to secure their seat for this landmark event.

One of three global meetings to be held over the next three years, the symposium in Madrid will host over 60 internationally acclaimed experts of whom several will, among other important advancements in implant dentistry, share their experience with the N1 system.

From enhancing aesthetics and improving long-term clinical outcomes to implementing a fully integrated digital workflow, participants will have plenty to learn and discover about how to bring their clinical skills to the next level. A number of special hands-on workshops will further show them how to best implement the latest dental solutions into their own practices.

The Nobel Biocare Global Symposium in Madrid will take place at the Madrid Marriott Auditorium Hotel & Conference Center from 27 to 29 June 2019.

Dental professionals who want to know more about the programme and how to register for the event should immediately contact their local Nobel Biocare sales representative. Information are also available online at nobelbiocare.com/global-symposia.
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9–12 June 2019
Beijing, China

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2–4 August 2019
Hong Kong, China
www.hkideas.org

**ICOI World Congress**
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New York, USA
www.icoi.org

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4–8 September 2019
San Francisco, USA
www.world-dental-congress.org

**AAOMS Annual Meeting**
16–21 September 2019
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www.aaoms.org

**CEDE**
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Poznan, Poland
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**Dental-Expo**
23–26 September 2019
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www.dental-expo.com

**EAO Annual Scientific Meeting**
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www.congress.eao.org

**ICOI World Congress**
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- the complete list of sources consulted and
- the author or contact information (biographical sketch, mailing address, e-mail address, etc.).

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

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

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

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

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**Questions?**

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