Dentistry and dental technology delivered with passion

By Ivoclar Vivadent AG

About a thousand dentists and dental technicians from 47 countries attended the 3rd International Expert Symposium hosted by Ivoclar Vivadent in Spain’s capital Madrid. Thirteen renowned opinion leaders from academic institutions, dental practices and laboratories provided insights into the latest advancements in the field of “Modern restorative dentistry: Technology and esthetics.”

Robert Ganley, CEO of Ivoclar Vivadent AG, underlined his desire to advance dentistry through intense dialogue. Sonia Gómara, Managing Director of the company’s subsidiary for the Iberian Peninsula, was delighted to provide the attendees with an opportunity to get to know the work of some of the world’s most renowned dental experts.

Trending high: minimally invasive procedures

Several speeches revolved around minimally invasive treatment options. Dentists talked about outcome-oriented approaches to preparation and impression-taking methods using trays and intraoral scanning devices. Dental technicians discussed the effects of limited oral space on their choice of materials and procedures. Adhesive cementation came to the fore.

Opening speech by Robert Ganley, CEO Ivoclar Vivadent AG
Most sugar-free chewing gums in Middle East lack clear labelling on xylitol

By DTI

KUWAIT CITY, KUWAIT: The majority of sugar-free chewing gums containing xylitol that are sold in the Coop eration Council for the Arab States of the Gulf (GCC) countries do not have clear labelling regarding xy- litol content, a new study has found. According to the researchers, the product labels mention neither the recommened daily dose of xylitol for caries prevention nor the actual amount of xylitol the chewing gum contains. They also found that the majority of gums do not provide the necessary amount of xylitol for car- ies prevention.

The aim of the study, conducted by Dr Abrar al-Anzi, assistant profes- sor at the Department of Developmental and Preventive Sciences of the Faculty of Dentistry at Kuwait University and her colleagues, was to identify sugar-free chewing gums available in the GCC region that pro- vide the recommended daily dose of xylitol for the prevention of dental caries.

The daily dose recommended by various dental associations around the world ranges between 3 and 10 g of xylitol, available in the form of gums or lozenges, three to seven times a day. Taken regularly, xylitol can contribute to the prevention of caries by inhibiting the growth of Streptococcus mutans, one of the main bacteria associated with tooth decay. Moreover, the sugar substi- tute has been found to enhance remineralisation and reduce the quar- tity of dental plaque, as most plaque bacteria are not able to ferment xylitol into cariogenic end-products.

The researchers examined the concentration of xylitol in 21 brands of chewing gum (from Kuwait, Bah- rain, Qatar, Saudi Arabia, the UAE and Oman), using a special enzymat- ic kit. They found a xylitol content of less than 0.3 g per piece of gum in nine products, of 0.3-0.5 g in seven and of more than 0.5 g in five prod- ucts. According to the scientists, the majority of gums analysed did not provide the necessary amount of xy- litol for caries prevention.

Moreover, most of the prod- ucts tested lacked accurate label- ling regarding their xylitol content. On the 21 brands, only one clearly mentioned the amount of xylitol in grams on its label. Twelve products stated the percentage of xylitol (1.5- 35 per cent). The rest did not specify the amount.

“Looking at the percentage, it is not easy for the consumer to cal- culate the actual amount of xylitol in grams. A consumer should be informed of the contents and the amount used in the product so that he can make an informed decision,” al-Anzi told the Middle Eastern news- paper Muscat Daily.

The researchers have therefore recommended clear, accurate label- ling of all xylitol-containing gums sold in the GCC countries and ad- vised dental associations in the Mid- dle Eastern region to adopt the gen- eral recommendations for labelling of current xylitol products.

The study, titled “Xylitol chew- ings gums on the market: Do they prevent caries?”, was published on- line in the Oral Health and Preven- tive Dentistry journal on 12 May.

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Esthetic replacement of anterior class IV restorations

By Dr. Paulo Monteiro, Portugal

**Initial Situation**
Female patient 30 years old. Patient was not satisfied with current anterior restorations (maxillary central incisors). Patient also expressed dissatisfaction with shade and surface texture.

**Challenge**
Creating smooth and natural-looking restorations for patients who demand the highest level of esthetics can be challenging. Using materials that mimic shade and opacity of dentin and enamel is critical.

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**Fig. 1:** Initial situation: patient was not satisfied with current restorations.

**Fig. 2:** Teeth were etched after preparation using Single Bond Universal Etchant.

**Fig. 3:** Single Bond Universal Adhesive is scrubbed into the surface, air dried and light cured with Elipar™ DeepCure-S LED Curing Light.

**Fig. 4:** A silicone matrix was used to create the palatal wall with Filtek™ Z350XT Universal Restorative, shade CT.

**Fig. 5:** The interproximal enamel layer was built with Filtek™ 350XT Universal Restorative, shade A3E and light cured with Elipar™ DeepCure-S LED Curing Light. For the incisal halo, Filtek™ Z350XT Flowable Restorative, shade W was used.

**Fig. 6:** Application of the dentin layer using Filtek™ Z350XT Universal Restorative, shade A1D. For volume control the Misura instrument (LM Arte by Style Italiano) was used to leave a 0.5mm space for the facial enamel.

**Fig. 7:** Creation of mamelons and application of a small portion of Filtek™ Z350XT Universal Restorative, shade CT between the dentin layer and incisal halo to enhance translucency at the incisal edge.

**Fig. 8:** The final enamel layer of Filtek™ Z350XT Universal Restorative, shade A3E was applied and light cured.

**Fig. 9:** Sof-Lex™ Discs are used to define the outline of the restoration and create secondary anatomy.

**Fig. 10:** Pre-polishing of restoration with Sof-Lex™ Pre-Polishing Spiral.

**Fig. 11:** Polishing with Sof-Lex™ Diamond Polishing Spiral to create a final smooth and high-gloss polish.

**Fig. 12:** Final restoration is very natural-looking.

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**Dr. Paulo Monteiro** obtained his degree as a Doctor of Dental Medicine at the Instituto Superior de Ciências da Saúde-Sul and his Master’s Degree in Dental Medicine at the Instituto Superior de Ciências da Saúde Egas Moniz (ISCSEM) in Caparica, Portugal. He completed his specialization in Esthetic and Restorative Dentistry at the ISCSEM and obtained a Master’s degree in Dental Medicine. Presently he is an Assistant Professor at ISCSEM for the Aesthetic and Restorative Dentistry Post-graduation program and for the Oral Rehabilitation Department at ISCSEM. He is also involved in research of new dental materials, including composite resins, dental adhesives, dental ceramics and new technologies.

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**Legacy of Innovation Continues for 3M Oral Care**

The Anaheim Group acknowledges 3M’s contributions to the dental industry for an 11th consecutive year

By 3M ESPE

With 95 innovations launched in 2015, 3M’s designation as the Most Innovative Company in the Dental Industry was earned through an unrelenting commitment to science-based innovation. Honored with its 11th consecutive win, 3M’s rank on The Anaheim Group’s “Innovation Index” has once again placed the company in the top spot with 25 percent more innovations than any other dental company.

The Anaheim Group’s index combines the number of EC/WIPO patents, U.S. patents and U.S. 510(k) clearances, and is the dental industry’s best measure of overall technical strength and capability.

With its commitment to improving lives through science, 3M continues to improve on its own innovations. The maker of countless award-winning products such as Filtek™, RelyX™ and Scotchbond™, 3M’s breakthrough innovations are often sourced from within its own walls. Interdisciplinary collaborations have inspired many of 3M’s greatest innovations in the dental industry, including pioneering the use of zirconia restorative materials and introducing nanotechnology for enhanced esthetics and strength in universal restorative material.

“Receiving the Most Innovative honor for more than a decade is a testament to what 3M excels at—applying science to help keep people healthy,” said James D. Ingebrand, vice president & general manager, Oral Care Solutions Division of 3M. “Every day, we explore new ways to impact lives, as we consistently pursue new product and process innovations with a focus on promoting lifelong oral health for all.

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**Red & White Aesthetic Harmony**

By Shofu

Beautifil II Enamel and GINGIVA from Shofu are developed as a complementary line extension of Beautifil II to create life-like direct resin restorations. A special one push syringe ensures controlled dispensing of the smooth and creamy material that is easy to sculpt into fine details and recreate the surface textures seen in natural teeth & gum.

Inclusion specially modified multi-functional organic fillers and nano-fillers impart Beautifil II Enamel and GINGIVA with exceptional handling characteristics, longer working time, high abrasion/wear resistance, stable characteristics, longer working time, and high optical transparency. Shofu’s proprietary S-PRG fillers offer additional fluoride benefits and anti-plaque effect on the restoration surface.

Beautifil II Enamel is available in 5 natural shade variations of pink to easily mimic patient’s individual gingiva with exceptional handling characteristics, stable characteristics, longer working time, and high optical transparency. Shofu’s proprietary S-PRG fillers offer additional fluoride benefits and anti-plaque effect on the restoration surface.

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Beautifil II Enamel is available in 4 naturally translucent and opalescent shades that facilitate life-like shade reproduction and value adjustment in the final restoration to meet individual clinical needs.

Beautifil II GINGIVA is available in 5 natural shade variations of pink to easily mimic patient’s individual gingiva while restoring areas with re- ceded or missing gums/papilla, cervical defects, root caries/erosion, exposed FFM margins and abutments to achieve red and white aesthetic harmony.

**TRIOS scans most accurate and consistent**

3Shape’s intra-oral scanner TRIOS delivered the most accurate results when compared with other leading scanning systems in a recent study. (Photograph: 3Shape)

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By DTI

BALTIMORE, USA/FREIBURG, Germany: A new study evaluating the accuracy of six leading intra-oral scanners in the dental market has found 3Shape’s TRIOS to be both the most accurate and consistent performer of the scanners tested.

The study, which was conducted jointly by the University of Maryland in Baltimore and the University of Freiburg in Germany, aimed to compare the ability of intra-oral scanning systems of different brands to accurately scan a single molar abutment tooth in vitro. The analyses included the following six scanners: iTero (Align Technology), 3M True Definition (3M ESPE), PlanScan (Planmeca), CS 3500 (Carestream Dental), TRIOS and CEREC AC Omnicam (Sirona Dental Systems).

In order to compare the accuracy of each system, the investigators used an industrial grade, highly accurate reference scanner to create a digital reference dataset for an acrylic dental model. A single trained, experienced dentist then scanned the acrylic model on three separate occasions using each of the six intra-oral scanning systems.

Trueness (accuracy) was defined by superimposing the three digital datasets over the reference dataset, with 5D comparisions then performed. Precision (consistency) was defined by superimposing each dataset over the other two datasets obtained and then evaluating for 5D deviations.

Of the 18 datasets analysed, the smallest deviations for the trueness measurements (+ standard deviation) between the reference dataset and the various intra-oral scanner datasets were obtained from TRIOS (4.5 ± 0.9 µm), followed by CS 3500 (9.8 ± 0.8 µm), iTero (9.8 ± 2.5 µm), 3M True Definition (9.8 ± 0.8 µm), Plan-Scan (10.9 ± 10.8 µm) and CEREC AC Omnicam (16.2 ± 17.1 µm).

As for precision values, here too 3Shape’s TRIOS was identified as the most accurate (4.5 ± 0.9 µm), followed by 3M True Definition (4.5 ± 1.0 µm), iTero (7.0 ± 1.4 µm), CS 3500 (7.2 ± 1.7 µm), CEREC AC Omnicam (8.2 ± 4.0 µm), and PlanScan (16.2 ± 5.0 µm).

“The TRIOS scanning technology in combination with the wand design, seems to be beneficial for capturing high quality datasets with excellent trueness and precision values,” the investigators said.

However, the results obtained do not provide any information about the quality of a fabricated restoration based on these digital datasets, the researchers stressed. Moreover, in an in vivo design, the outcomes might be different owing to the presence of blood, saliva, and patient movements, they concluded.

The study, titled “Evaluation of the accuracy of six intraoral scanning devices: An in vitro investigation,” was published in Volume 02, Issue 4 of the ADA Professional Product Review.
SIDEXIS 4 update gives users many new functions and technical improvements

By Dentsply Sirona

Improving performance, integrating SICAT Suite or connecting an external camera: the software update gives users many new functions. With a new SQL server, compatibility with Windows 10 and other operating systems, the technical functions have also been expanded.

At the end of last year, the SIDEXIS 4 imaging software received the internationally renowned Red Dot Award Best of the Best in the “Communication Design” category for its outstanding user friendliness. The new 4.1.3 software update from Dentsply Sirona Imaging now combines additional functions for users with technical modifications that further optimize the practice workflow. Especially in combination with the ORTHOPHOS SL, the SIDEXIS 4 software forms a highly functional and efficient unit. The update also offers advantages for networking with practice management systems and implantology planning or orthodontic analysis programs.

New functions make it easier to use

The software update now makes it possible to connect intraoral cameras from other manufacturers, as well as via Windows Driver Model. When imported images without an imaging date are provided, the user can enter the information manually to have the images displayed chronologically in the timeline. The update also provides additional image information: The anatomical region and external image type are displayed for every image. To facilitate work for users, it will now be possible to use copy and paste to insert images into another application, such as image processing or patient management. The program also allows images to be moved retroactively to allocate them to another patient.

No more switching between SICAT Suite applications

The integration of the SICAT Suite software package with the SICAT Function and SICAT AIR applications into the SIDEXIS 4 interface represents a considerable added value for users. SICAT Function allows the three-dimensional visualization of jaw movements for the diagnosis and treatment of cranio-mandibular dysfunction (CMD). Users can use SICAT Air to order protrusion appliances to treat obstructive sleep apnea. Planning data created by the two software applications are displayed in the timeline and from there can be opened again directly in the SICAT Suite. The package is integrated into the phase bar of SIDEXIS 4 with its own “Plan&Treat Phase.” The applications can therefore be selected directly and treatment planning can be started. The loading times for the required 3D image data were reduced by 50 percent.

SIDEXIS 4 – state-of-the-art technology

The technical aspects of the SIDEXIS 4.1.3 software version were expanded to Windows 10 and other operating systems. Instead of the previously used SQL Server 2008 R2 database managing system, the SQL Server 2014 is now installed both during initial installation of SIDEXIS 4 and in the case of an update.

Fig. 1: With SIDEXIS 4.1.3 images can be allocated to another patient.

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Esthetic replacement of maxillary premolar with immediate implant placement and metal ceramic crown over CAD/CAM abutment

By Dr. Larry R. Holt, USA

This article describes treatment to solve a common dental complication (loss of tooth due to vertical root fracture). Contemporary implant therapy and subsequent CAD/CAM laboratory procedures provide an elegant solution to this patient’s dental emergency. Treatment was accomplished during a period of approximately six months.

The patient is a healthy, 32-year-old female with an unremarkable medical history. Her dental history and general dental health are excellent. Unfortunately, she suffered a vertical fracture of tooth #5, which necessitated its extraction (Fig. 1).

The treatment plan was for extraction and immediate implant placement with concurrent bone grafting as required. A temporary partial was planned to provide esthetic replacement and to support and shape tissue during the healing process. Final restoration was to be a cemented PFM crown supported by an Atlantis gold hue abutment.

Material selection was based on patient’s cross bite occlusion that transitions from normal to cross bite across this particular tooth’s occlusal table. Crown and abutment could potentially be subject to occlusal stress due to this transitional relationship.

A restoration that provides maximum strength was desirable from a path of patient’s crossbite transition for long-term stability of the restorations.

The patient has a thin biotype, and the gold hue abutment provides both strength and the gold color that provides a more natural tissue color. The gold color provides “warmth” of color in the critical transmucosal region. Titanium abutments provide strength but can telegraph a greying affect on thin tissues.

Treatment began with a preoperative appointment to take necessary records (impressions of both arches, facebow transfer, shade taking, bite registration and clinical photography).

Prescriptions to lab was provided including a partial denture fabricated from duracetyl resin and to develop a tooth born surgical guide. Lab was instructed to seat the extracting site by removing the tooth from the strategic area. This model was duplicated for fabrication of the two appliances.

Laboratory product was provided to surgeon. Atraumatic extraction was accomplished and immediate implant (Legacy Three, Implant Division) placed with facial bone grafting (Figs. 2 & 3). There was a healing screw placed and site was closed with appropriate membrane and suturing techniques.

There was a healing screw placed and site was closed with appropriate membrane and suturing techniques. The unilateral partial was not delivered at time of surgery. Patient was seen in restorative office, and the partial (Duratek, Drake Precision Laboratories) was modified to provide tissue support and begin development of an ovate tissue site. Partial was delivered uneventfully. These appliances are extremely retentive and not subject to dislodgement or pressure over the implant site during function. Patient was seen at one week for postoperative check and adjustment of temporary appliance (Fig. 4).

Patient was instructed to return to surgical clinic in approximately four months for final evaluation prior to restorative procedures.

Four months after surgery, the patient was seen by surgeon to uncover the implant, remove the healing screw and place a temporary abutment. The temporary partial was adjusted to accommodate the added height of the healing abutment (Fig. 5). Patient was instructed to return to restorative office for definitive restoration of the implant in approximately three weeks.

Patient was appointed with restorative office for evaluation and to develop necessary records for laboratory fabrication of the definitive restoration. Implant site was evaluated and deemed adequately healed to proceed with restorative procedures (Fig. 6).

Healing abutment was removed and a closed tray impression coping was fitted onto the implant (Fig. 7). Radiograph was taken to confirm complete seating of the impression coping. A full arch impression was taken with heavy body PVS impression material (Panasil Plus Panasil Light Body, Body Fast Set, Kettenbach GmbH) and shade map were taken. All clinical product was sent to laboratory along with shade photography and a complete written prescription. A PFM high noble crown and Atlantis gold hue custom abutment were prescribed. The abutment was ordered as tissue contouring with a rim deep margin placement circumferentially (Atlantis, Dentipsy Implants).

The use of a custom abutment allows modification of transmucosal tissue profile and to ideally position margins. Tissues were previously shaped with the ovate pontic of the temporary partial. The final crown was planned to be chairside custom stained. Lab was cautioned that occlusion on this restoration was in the path of patient’s cross bite transition from normal to cross bite.

The temporary partial (Drake Precision Dental Laboratories, Charlotte, N.C.) partnered with Atlantis (DENTISPLY Implants) for abutment design and milling and then fabricated the PFM crown (Figs. 9-10). The patient was appointed for definitive restoration delivery.

Delivery appointment was uneventful. Healing abutment was removed and the Atlantis abutment was placed (Fig. 11). Because of positive tissue pressure from immediate function, the abutment was slowly placed with incremental turns of the retention screw. Tissue Blanching was carefully observed.

The abutment was fully seated and, within five minutes, tissue blanching had disappeared. The Atlantis abutment was torqued to manufacturer’s specifications (to Ncm). A radiograph was taken to confirm final seating of the abutment. The PFM crown was tried on and interproximal contacts adjusted to allow complete seating of the crown. Occlusion was marked with appropriate articulating paper and adjustments were accomplished, with particular attention to functional path and centric contacts.

The final occlusion respected the cross bite while providing a light occlusal contact that became normal in intensity upon biting force. All functional contact was adjusted to be in minimal contact during excursions. Adjacent teeth provided partial group function.

Once all clinical adjustments were done, a laboratory technician was consulted for final shade matching. The initial shade was very close to ideal. The technician accomplished minor modifications (minimal characterization staining and reduction in final surface gloss). Proximal contacts and occlusal table were polished.
The crown was lined with silicone tape and then bite registration material was injected into the crown to fabricate a cementation jig (Fig. 12). This step is very important to avoid excess cement extrusion during final glazing.

All pre-cementation procedures were completed, including removal of excess cement extrusion during final glazing. The crown was then seated on the previously fabricated cementation jig to extrude excess cement. Cement adaptation to internal walls of crown was confirmed and the crown was seated over the custom abutment. Excess cement was removed by combination of hand instrumentation and dental floss after initial cement setting.

The crown was left under biting pressure with cotton roll over occlusal table for five more minutes to allow for cement to fully set. Mesial and distal of crown was confirmed and thoroughly dried. Intraorally, the abutment was thoroughly cleaned and dried in preparation for cementation procedures. Attending dental assistant maintained cheek retraction and dry field.

The walls of the crown were lined with implant cement (Dental Implant Cement, radiopaque, Premier). The crown was then seated on the gingival sulcus. This treatment provided an elegant solution for this all-too-common dental emergency. The patient was extremely pleased with the result (Figs. 13-15).

References
Fixed and Removable Implant Restorations:  
A Solution for Every Arch

By Dr. Paresh B. Patel, USA

When a patient presents with an edentulous arch or terminal dentition, implant treatment can be provided that improves not only form and function, but also quality of life. For patients desiring better chewing capability, stability, esthetics and comfort than a traditional denture can offer, both removable and fixed implant restorations are superior alternatives. While the appropriate implant solution can vary depending on the patient’s oral health, anatomy, quality and quantity of bone, and financial resources, full-arch prosthetics have progressed to the point where virtually every patient can be restored. Although fixed, implant-supported restorations offer the highest levels of stability, function and patient satisfaction, removable overdentures are a dramatic improvement over conventional complete dentures as well. Both treatment options effectively mitigate the bone resorption that occurs following the loss of teeth, helping to preserve the oral and facial structures and, by extension, the self-confidence of the fully edentulous patient. Determining which solution is appropriate requires a careful evaluation of the individual patient’s circumstances and desires. Even when an implant overdenture is delivered, the prosthesis can eventually be converted to a fixed restoration. As evidenced by the case that follows, in which one arch is restored with an implant overdenture and the other with a BruxZir® Full-Arch Prosthesis, practitioners today have a great deal of clinical flexibility. Whatever prosthetic approach is adopted, immediate, life-changing relief can be provided to patients suffering from terminal dentition or an uncomfortable, poorly functioning traditional denture. Further, the dramatic overhaul of this patient’s oral health demonstrates the life-changing capabilities of implant therapy, which helped him overcome severe functional and esthetic challenges that were impacting practically every facet of his life prior to treatment.

Case Presentation
A 47-year-old male presented with terminal dentition in both arches resulting from periodontal disease and severe caries (Figs. 1a–1c). The patient had already lost many of his teeth, and the dentition that remained had been rendered unstable by his periodontal condition (Fig. 2). He had saved up enough money for a fixed implant restoration for his upper arch, for which he desired the most functional, lifelike prosthesis possible. While he couldn’t afford such a restoration for both arches, he wanted a removable appliance for his mandible, with the option of later upgrading to a fixed prosthesis. The patient accepted a treatment plan in which his maxilla would be restored with a BruxZir® Full-Arch Prosthesis and his mandible with an Inclusive® Locator Implant Overdenture. Fabricating his mandibular prosthesis from monolithic zirconia would ensure maximum long-term durability. This was important provided the relatively young age of the patient, who would not have to worry about his upper prosthesis succumbing to fractures, chips or stains. His lower appliance would be held in place by connecting to the implants via Locator® attachments (Zest An- chor, Escondido, Calif.), which are an economical means of improving prosthetic retention and stability. The overdenture caps that connect to the Locator attachments would be incorporated in the prosthesis chassis, though it should be noted that many clinicians elect to have the laboratory handle this step. The surgical phase of treatment called for the extraction of the patient’s remaining teeth followed by implant placement on the same day as surgery, including a screw-retained, fixed provisional for his upper arch.

Figures 1a–1c: Preoperative condition of the patient. Note the high lip line, severe cervical decay present on the patient’s remaining teeth, and lack of gingival support.

Figures 2a, 2b: Note the dramatic change in the appearance of the patient, who left with chairside-converted dentures in place on the same day as surgery, including a screw-retained, fixed provisional for his upper arch.

Figures 3a–3c: Maxillary implants with parallel pins in place exhibit the axial placement of the anterior implants and the tilted angulation of the posterior implants.

Figure 4a–4c: The Inclusive Tapered Implants were threaded into place, achieving excellent initial stability.

Figure 5: Multi-unit abutment with canals in place illustrates connection of the implant’s angulation to establish a uniform prosthetic platform around the arch.

Figure 6: Traditional dentures were fabricated in advance of the surgical appointment so they could be immediately converted to serve as temporary appliances during the healing phase.

Figures 7a, 7b: Same-day conversion of the maxillary denture to an immediate fixed prosthesis was achieved by adding multi-unit temporary cylinders using cold-cure acrylic and trimming the appliance into a horseshoe shape.

Figure 8a: Preoperative panoramic X-ray exhibits periodontal disease, cervical caries, terminal state of the patient’s dentition, and the compromised state of the surrounding periodontium, which had rendered the teeth mobile.

Figure 8b: Note the high lip line, severe cervical decay present on the patient’s remaining teeth, and lack of gingival support.

Figure 9: Postoperative panoramic radiograph illustrates All-on-4 configuration of maxillary implants and axial placement of the mandibular implants, which would facilitate a passive fit of the lower overdenture. Note the temporary cylinders attaching the provisional maxillary denture to the implants.

Figure 10: A 47-year-old male presented with terminal dentition in both arches resulting from periodontal disease and severe caries (Figs. 1a–1c). The patient had already lost many of his teeth, and the dentition that remained had been rendered unstable by his periodontal condition (Fig. 2). He had saved up enough money for a fixed implant restoration for his upper arch, for which he desired the most functional, lifelike prosthesis possible. While he couldn’t afford such a restoration for both arches, he wanted a removable appliance for his mandible, with the option of later upgrading to a fixed prosthesis. The patient accepted a treatment plan in which his maxilla would be restored with a BruxZir® Full-Arch Prosthesis and his mandible with an Inclusive® Locator Implant Overdenture. Fabricating his mandibular prosthesis from monolithic zirconia would ensure maximum long-term durability. This was important provided the relatively young age of the patient, who would not have to worry about his upper prosthesis succumbing to fractures, chips or stains. His lower appliance would be held in place by connecting to the implants via Locator® attachments (Zest Anchor, Escondido, Calif.), which are an economical means of improving prosthetic retention and stability. The overdenture caps that connect to the Locator attachments would be incorporated in the prosthesis chassis, though it should be noted that many clinicians elect to have the laboratory handle this step. The surgical phase of treatment called for the extraction of the patient’s remaining teeth followed by implant placement on the same day as surgery, including a screw-retained, fixed provisional for his upper arch.
the immediate placement of eight dental implants. CBCT scans were taken to help determine the optimal placement of the implants within the available bone and away from the patient’s vital or anatomical evaluations. The CBCT scan determined that there was sufficient height, width, and quality of bone to place the implants in the appropriate locations and angulations via freehand surgery. Four 4 mm Inclusive Tapered Implants (Gliderow Direct, Irvine, Calif.) would be placed in each arch to support the fixed maxillary and mandibular prostheses.

At the surgical appointment, the patient’s remaining teeth were removed, and a flap was raised to visualize the socket sites and areas of implantation. Bone leveling was performed on the patient’s mandibular arch to elevate the patient’s smile transition line above the upper lip.

The maxillary osteotomies were positioned to facilitate an All-on-4 configuration, with the posterior implants tilted to maximize the anterior-posterior (A-P) spread, avoid the sinus, and accommodate the patient’s bone limitations (Fig. 3). Osteotomies were created for the placement of four mandibular implants, as opposed to the minimum of two required for a Locator overdenture. This would enhance retention of the overdenture while affording the possibility of modification and delivery following the placement of the implants (Fig. 6).

Having achieved sufficient primary stability, the Inclusive Tapered Implants placed in the patient’s maxilla could be immediately loaded. Thus, the upper denture was trimmed and modified to connect to the temporary cylinders (Figs. 7a, 7b). This would satisfy the patient’s desire to leave the surgical appointment with a fixed, fully functional maxillary provisional implant prosthesis. Figure 8 illustrates the verification jig representing the verification jig, screw access holes of the eventual prosthetic design were accurate before milling the final restoration from monolithic zirconia.

The implant verification jig was attached to the implants so a precise final impression could be taken (Figs. 9a–9c). The custom tray provided from the soft tissue. Then the provisional implant prosthesis was screwed into place during function.

At the next appointment, the wax rims were seated, the jaw relationship was recorded using convention-al denture technique, and a bite registration was taken (Figs. 10a, 10b). A new master cast of the maxilla was produced based on the custom tray containing the verification jig, screw access holes were created in precise ligatures. The CAD design was used to mill a provision implant prosthesis from polyethylene (mCMe) (Figs. 20a, 20b). This appliance was tried in and worn for a trial period, thus ensuring an accurate prosthetic fit. The final impression was taken using a closed-tray impression.

The impression was returned to the lab so the final restoration could be fabricated. To evaluate fit, esthetics, occlusion, and teeth positioning, function and esthetics were verified (Figs. 21a, 21b). With both appliances in place, the interocclusal wax setup was used to fabricate the maxillary complete denture in place during function. A new master cast of the maxilla was produced based on the custom tray containing the verification jig, screw access holes were created in precise ligatures. The CAD design was used to mill a provision implant prosthesis from polyethylene (mCMe) (Figs. 20a, 20b). This appliance was tried in and worn for a trial period, thus ensuring an accurate prosthetic fit. The final impression was taken using a closed-tray impression.

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relationship was checked (Figs. 22a, 22b). Minor occlusal adjustments were made directly to the maxillary provisional implant prosthesis, as PMMA is easily modified. Slight alterations were also made to the lower implant overdenture. Then, blockout shims and the retentive overdenture caps were seated over the Locator attachments (Figs. 23a, 23b). Quick Up self-cure material (VOCO America; Indian Land, S.C.) was added to the recess wells of the overdenture caps. In this manner, the overdenture caps pro-

sions needed for a passive fit.

Figure 24: Quick Up cold-cure acrylic was used to pick up the denture caps in the prosthesis. NOTE: In many cases, the doctor elects to have the overdenture caps processed by the lab.

Figure 25: The black processing inserts were replaced with the appropriate retentive caps, which are color-coded according to strength.

Figure 26: Patient with the final Locator overdenture

Figure 27: The definitive mandibular restoration was milled from BruxZir Solid Zirconia, incorporating the slight adjustments that were made to the PMMA provisional appliance.

Figure 28a, 28b: The final BruxZir Full-Arch Implant Prosthesis was milled from BruxZir Solid Zirconia, incorporating the slight adjustments that were made to the PMMA provisional appliance. The definitive mandibular restoration was milled from BruxZir Solid Zirconia, incorporating the slight adjustments that were made to the PMMA provisional appliance.

Figure 29: The definitive mandibular restoration was milled from BruxZir Solid Zirconia, incorporating the slight adjustments that were made to the PMMA provisional appliance.

Figure 30: The definitive mandibular restoration was milled from BruxZir Solid Zirconia, incorporating the slight adjustments that were made to the PMMA provisional appliance.

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Figure 83: The definitive mandibular restoration was milled from BruxZir Solid Zirconia, incorporating the slight adjustments that were made to the PMMA provisional appliance.
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Designing real smiles with digital tools

By Drs Eduardo Mahn, Gustavo Mahn, Carlos Cáceres, Luis Bustos, Chile & Christian Coachman, Brazil

Dental materials and clinical procedures have changed dramatically in the last decades. Probably the main advances that have occurred during the last two decades have been in the fields of implantology and adhesive dentistry, but the main revolution is the development of digital dentistry. Although these changes have certainly made diagnostics and certain procedures easier, the basis, such as function and the biological aspects, remain essential. At the same time, we have experienced major improvements in ceramics and composites, helping us to fulfill our patients’ aesthetic demands.

A basic prerequisite for these indications is an in-depth understanding of the facial and dental aesthetic parameters. The clinician needs to understand the challenges that each clinical case presents and has to be able to develop an appropriate treatment plan that approaches the case from a multidisciplinary perspective. Tooth proportions need to be considered in relation to gingival aesthetics and in relation to gingival zeniths. It is pointless to make aesthetic and in relation to the facial midline, the results can be frustrating. Another important aspect is the proper analysis of the patient’s smile and display (Figs. 1 & 2). When photographs are taken, people tend to be shy, especially at the beginning and even more so if the person taking the photographs is not a professional photographer and the setting is a dental practice. Figure 3 shows the intra-oral view, where besides the obvious diastema and the hypomineralised areas of both central incisors, the major discoloured areas of both mandibular lateral incisors, which were certainly in need of some sort of treatment, are apparent. It is important to try to make a video while conversing with the patient about normal daily issues to avoid overlooking aspects that need to be considered in the treatment plan. The conversation will relax the patient and evoke natural smiles and laughs in response to something humorous or silly that we might say. Figure 4 shows the differences between the social smile we achieved with our traditional photographs (Figs. 1 & 2) and the spontaneous smile, which was captured during dynamic recording. In this particular clinical case, had we based our treatment plan on the social smile photograph, we would have failed to visualise the display of the mandibular incisors, which showed unpleasant stains.

The next step was to analyse the patient from the facial perspective based on the details of her teeth. The digital smile design (DSD) concept diagnoses aesthetic problems from a facial perspective and, based on a simplified digital analysis of a few photographs, proposes treatment options and assists with communication between the various specialists in the team.

The first step is to draw a horizontal and a vertical line. The photograph is centred, moved and rotated until the bi-pupillary line is horizontal. The facial midline is subsequently ascertained. Then the same lines are superimposed on to a similar photograph, which has also been centred, but this time taken with lip retractors in place (Figs. 5±c). The same photographs are then magnified and analysed (Figs. 6 & 7). The upper lip line is recreated and then superimposed on to the photograph taken with lip retractors in place as reference of its position (Figs. 8 & 9). Then the tooth proportions are measured and their ideal contours are drawn using the instructions given by the clinician.

This procedure reduces chair time dramatically and increases patient acceptance. Owing to easily accessible software such as Microsoft PowerPoint and Keynote, these effects are easily and quickly created by anyone with minimal training. Recently, new software has been released that simplifies the procedure even more; DDS software for iPads (www.digitalsmiledesign.com). The procedure is based on overlapping certain areas of the teeth in the manner previously described. The result can be seen in detail in Figure 12 and the display in Figure 13. A comparison from the facial perspective between the preoperative situation, the traditional mock-up and the digital mock-up can be seen in Figure 14. The digital mock-up can be created.

A photograph taken from the 12 o’clock position is used for the analysis of the labio-palatal position of the teeth and superimposed on to the analysis done previously (Fig. 11). Once the clinician is clear about the treatment possibilities and limitations, a digitally designed mock-up can be created.

First, an impression is taken and a stone cast is then fabricated. Afterwards, the technician waxes the necessary teeth depending on the instructions given by the clinician. The next step is taking an impression from that wax-up. The excess is removed and a flowable self-curing composite material (usually bis-acrylate) is applied to the silicone guide and then placed in the patient’s mouth. After a few minutes, the excess is removed and the patient is able to see the changes and the clinician is able to evaluate the proposal directly in the mouth. Generally, photographs are taken of the new situation and analysed. The option of a digital mock-up is much simpler. Once the final forms have been created, a photograph is superimposed on to them, and the texture of the new teeth is created. As seen in Figure 14, the results of the traditional and the digital methods are similar.
and it is difficult to differentiate between them. The protocol is based on photographs and videos that are taken during the first appointment. The analysis is performed, and eventually the case is discussed with the team if necessary. Once the presentation is ready, the treatment plan is presented in a visually attractive way to the patient (Fig. 15). Finally, whether to use ceramic or composite restorative materials is considered depending on different factors. Our philosophy is based on the minimally invasive concept. As long as we can provide the patient with the same aesthetics, durability and predictability of ceramics, we will select composites. In cases in which many teeth are involved, multiple diastemas are present or occlusal imbalances may jeopardise a successful outcome and major changes need to be made, our choice leans towards ceramics. Whatever approach is chosen, it is of paramount importance for the clinician to understand the ceramic and/or composite system he or she is using. In this particular clinical case, the ceramic system used was IPS e.max Press and the composite system was IPS Empress Direct (both Ivoclar Vivadent) because of its simple layering concept, its natural-looking shades and long-lasting gloss. The correspondences between the shades of both systems make them easier to combine.

Once the treatment plan has been accepted by the patient, the treatment begins with preparation and demarcation in order to be as conservative as possible (Fig. 16). Figure 17 shows the detail of the hypomineralised areas of the mandibular lateral incisors. The areas were excavated with a redcoloured bur (Komet Dental) and etched with phosphoric acid ExciTE F (Ivoclar Vivadent) was used as a bonding agent, and IPS Empress Direct Dentin A1 and Enamel A1 were placed using a novel instrument called OptraSculpt Pad (Ivoclar Vivadent).

The maxillary teeth were prepared and impressions taken. Figure 20 shows the six veneers fabricated by master dental technician Victor Romero (Santiago, Chile). Then they were tried-in with a specially designed glycine-based paste, components of the Variolink Esthetic cementation kit (Ivoclar Vivadent). Figure 21 shows how dramatic the change in value can be with this type of cement. This procedure is especially helpful when one or two veneers are seated, and the value needs to be slightly corrected in order to match them to the adjacent teeth. The veneers were then bonded and the final result can be seen in Figure 22, where the preoperative situation is shown against the similar results achieved with the digital mock-up compared with the final outcome. Figures 23 and 24 show the integration of the six maxillary ceramic veneers and the two direct composite restorations performed on the mandibular lateral incisors at the three-month follow-up. All this work was integrated from the facial perspective, as seen in Figure 25. The satisfied and spontaneous patient can be observed in Figure 26.

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Advanced Restorative Techniques and the Full / Partial Mouth Reconstruction. Articulator Selection and Clinical Stages. Part 4

By Prof. Paul Tipton, UK

A highly respected specialist in Prosthodontics, Paul has written many articles for the dental press and is an expert lecturer in his field with Tipton Training Academies in Manchester, Leeds, London and Dublin. After gaining his Masters Degree in Conservative Dentistry in 1999, he was awarded the Diploma in General Dental Practice by the Royal College of Surgeons four years later and received Specialist status in Prosthodontics in 1999 from the GDC. An ex-professional cricketer with Lancashire County Cricket Club, he is currently the President of the British Academy of Implant Dentistry. He is one of the UK’s most successful dental teachers in the fields of Restorative, Cosmetic and Implant Dentistry over the last 20 years with more than 2000 dentists completing a year long certificate courses from one of the Tipton Training Academies (www.tiptontraining.co.uk).

Introduction

The full mouth or partial reconstruction is one of the most challenging procedures in Restorative Dentistry. In order to successfully restore and maintain teeth, the dentist must find out why the teeth arrived at this state of destruction. Tooth wear can result from abrasion, attrition, and erosion as well as iatrogenic problems with previous restorations. Research has shown that these mechanisms rarely act alone and there is nearly always a combination of the processes. Evaluation and diagnosis should account for the patient’s diet, the present state of the occlusion and dental history. Emphasis must be placed on the evaluation of occlusal prematurities preventing condylar seating in RAP. Factors that may contribute to parafunctional habits or bruxism are important to understand and manage in order to successfully restore and maintain the newly restored dentition. When there is a complete understanding of the etiology of the definition’s present state a treatment plan can be established, taking into account the number of teeth to be restored, condylar position, space availability, the vertical dimension of occlusion (VDO), the choice of restorative material and the choice of articulator and ways of programming it.

Articulator Selection

There is a large choice when assessing what type of articulator is correct for the patient and restoration. In terms of classification, articulators range from hand held casts or simple hinges articulators to fixed condyle or average value articulators to semi-adjustable and to fully-adjustable.

When dealing with the complexity of the full mouth or partial reconstruction, the choice narrows to average value v semi-adjustable v fully-adjustable. The accuracy of the articulator also depends upon how it is used and programmed. All of these articulators require the use of face bow, arbitrary or kinematic (to record the true hinge axis) to mount the upper cast. Mounting the lower cast to upper cast is then done with an individual jaw registration taken at an open vertical if mounting around RAP and closed vertical if mounting around ICP.

Finaly with the semi-adjustable and fully-adjustable, programming of the posterior (condylar) determinants of occlusion can be done using lateral and protrusive check bites, cadax imaging or by using a pantograph.

The more adjustable the articulator the more accurate the restoration can be but all articulators have limitations and are only as accurate as the dentist/technician that is using it.

Restorative Stages

Following on from the third article in this series which dealt mainly with the diagnostic stages of a full mouth reconstruction we now look at the clinical stages which will be illustrated by the first case study. This gentleman Fig. 1 was referred for treatment of his severe upper anterior wear. The patient was over closed and due to the wear now in a pseudo-class III edge to edge occlusion (Fig. 2). After initial diagnostic stages which included cosmetic imaging (Fig. 3), diagnostic waxing (Fig. 4) etc, the patient was ready for initial tooth preparation.

Tooth Preparation

This will be dependent upon the type of restorative material to be used eg. PFM, scanned and milled porcelain, adhesive porcelain. Whilst the shift in recent years has been to all ceramic restorations, the PFM is often the restoration of choice as it allows a more conservative preparation on both anterior and posterior teeth with only part of the gingival margin area prepared for porcelain (labial) and the rest a conservative 0.5mm light chamfer for metal (Fig. 5). There is also the added longevity in both of these areas of the mouth. The reader is referred to the work of Shillingburg for a full description of PFM crown preparation. In this instance the classic PFM crown was used to restore the upper anterior teeth.

Tooth preparation should be done in stages so as to maintain control of the condylar position and vertical dimension. Providing the patient has adequate posterior stability (from amalgams, cores, prototype crown etc) then the initial tooth preparation should be the upper and lower anterior canine to canine teeth.

When completing a full-mouth reconstruction upper and lower preparations should done together so as to be able to establish ideal anterior guidance in both protrusive and lateral movements. Once prepared the dentine is sealed and prototypes are relined, trimmed and fitted (Fig. 6). No impressions or jaw registrations are taken at this time.

The aim of the tooth preparation stage is, over three long visits,
to place prototypes on all the teeth and then to spend time reassessing occlusal planes, aesthetic concerns and of course occlusal scheme and comfort of the patient.

The long term success of the final restoration is directly proportional to the skill and time in preparing and planning prototypes and their adjustments. It is easy to lose vertical dimension, occlusal stability and ideal sealing of the condyle in the fossa if this stage is hurried.

If increasing vertical dimension then either the timing of the preparation and prototypes is changed to accommodate all initial procedures in one week or full occlusal contacts need to be re-established on posterior teeth during the interval between fitting of the anterior prototypes and the final segments of the posterior.

Impressions / Jaw Relationship

Once the patient has confirmed that they are happy with the aesthetic appearance, is symptom free, having an ideal occlusal scheme with multiple contacts on all teeth and the condyles in RAP with smooth shallow anterior guidance the next stage of treatment is to take impressions and jaw registrations. This can be done in several ways. A similar sequencing of events can occur as anterior prototypes are removed, retraction cords placed, teeth re-prepared, sealed and impressions, jaw registrations and facebow recordings made with the posterior prototypes maintaining occlusal contacts, vertical dimension and a stable RAP position.

Alternately there are times when the full arch needs to be delivered to the patient at one go. This may be the case when anterior and posterior teeth are linked together in bridgework, there are limited number of appointments, patients are travelling long distances or vertical dimension is being increased on the fully adjustable articulator. This then requires the use of duralay bonnets or copings on all teeth and the use of...
a pickup impression, described later in the series.

Once anterior impressions, jaw registrations and facebow recordings are again taken the prototypes are relined, trimmed, cemented and are adjusted once more.

Try In Stage
The anterior restorations are now produced by the technician to the biscuit bake or "try in" stage and are tried in the mouth and the occlusion is adjusted using the mouth as the ultimate articulator.

Cementation
As described earlier all articulators have limitations as do the materials and techniques we use. Once upper and lower have been checked and adjusted they are sent back to the technician for glazing and then to the dentist for cementation (Fig. 7). This same sequence is then performed on one side of the mouth with upper and lower posterior and then finally the other side of the mouth.

Conclusions
Patients requiring full mouth or partial reconstruction are or have usually been bruxists. As such they may often brux again which is one of the limiting factors to the longevity of our restorations. Careful post restoration occlusal adjustment and refinement are essential, followed by the post restorative occlusal splint for night time wear (Fig. 8). The final smile is shown in Fig. 9, 10.

Case Study 2
This lady was referred with a failing dentition, periodontal disease and Tmj dysfunction (Fig. 18). Her examination revealed several hopeless teeth and an almost edge to edge occlusion with limited anterior guidance on her anterior teeth.

In view of the limited guidance available the fully-adjustable articulator was chosen as the posterior determinants of occlusion and posterior guidance (condyles) have a greater bearing on mandibular movements and occlusal anatomy.

Following our standard diagnostic procedures, teeth prepared several teeth were removed (Fig. 12), prototypes fitted (Fig. 13), implants placed and the occlusion was adjusted so that BCP=ICP around RAP. A re-organized approach was used so as to reduce Tmj dysfunction and provide the patient with the ideal 5 principles of gnathology (occlusion) as discussed in earlier articles.

The fully-adjustable was programmed by using a facebow (Fig. 14) the cadiax (Denar) (Fig. 15, 16) to record intercondylar distance, immediate and progressive side shifts and the shape of the superior and posterior walls of the fossa (Fig. 17, 18).

The goal of the restoration was to move the maxillary teeth forwards and move the mandibular teeth posteriorly by occlusal adjustment, thereby establishing a deeper overbite and overjet and better anterior guidance (Fig. 19)

The final restoration and smile can be seen in Figs 20, 21.

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**User case study on the new composite bloc BRILLIANT Crios by COLTENE in the fabrication process of a CAD/CAM CEREC crown**

By Dr. Med. Dent. Christoph G. Häuslens, Switzerland

The application fields of the new composite bloc include crowns, inlays, onlays and veneers as well as implant-supported crowns. BRILLIANT Crios is a reinforced composite bloc for the fabrication of permanent restorations using a CAD/CAM milling programme. This is available in Low Translucence (LT) and High Translucence (HT) shades and in sizes 12 and 14. The material properties allow extended pre-operative preparation, tapered margins and polishing. In addition, the BRILLIANT Crios bloc can be used for the fabrication of composite materials as part of material sampling, for example IPS Empress (Ivo- clair Vivadent), the surface structure of the ground crown appears very smooth and the residual lug is small-
er after milling. This facilitates its re-
moval with a diamond and nothing remains visible after brief polishing. Polishing can be performed after milling using a conventional rotary polisher or milling paste. The crown in question also passed the check for cracks or material chipping. A check of the precision fit on the plaster model was good (Figs. 3 and 7), so that we decided to try-in and then place the restoration on the patient.

To ensure bonding between the mounting material and the milling paste, use ONE COT 7 UN-
VERSAL bond (COLTENE) only. An etching step with hydrofluoric acid is not necessary.

ONE COT 7 UNIVERSAL was applied to the sandblasted and cleaned mounting area of the restoration and rubbed in for 20 seconds (Fig. 6). Excess adhesive was removed with oil-free compressed air for 5 seconds. Bonding to the tooth substance and/or composite can be carried out using a suitable adhesive. ONE COT 7 UNIVERSAL Bond is recommended here (procedure according instructions for use). We used this adhesive throughout in our case.

Prior etching of the enamel areas with phosphoric acid is recommend-
ed and was carried out by us. For bonding of the restoration, a dual-
curing resin cement, i.e. Duocem® (COLTENE), or a light-curing compo-
te can be used. The BRILLIANT Crios crown is now ready for insertion. After bond-
ing our full crown with Duocem® (COLTENE), the edges were cleaned, excess was removed, and then every surface of the restoration was light-
cured for 30 seconds (light output > 800m W/cm²) and then worked on with a rubber polisher. Milling of the occlusion proved simple and quick. The gloss of the entire composite crown already appeared after a short time. Furthermore, when readjusting the occlusal contact points, we were able to polish immediately, which is much more difficult to do with ceramic, and in particular, with fired crowns.

ADC/CAM restorations made from the new Crios blocs can be charac-
terised, modified or also repaired at any time. Modifications can be made directly without prior treatment. In case of intraoral repairs, the restora-
tion surface is cleaned with clearing paste, and then roughened using a diamond rotary instrument. In both cases, ONE COT 7 UNIVERSAL is applied to the surface to be treated and cleaned with compressed air for 5 seconds. This is followed by light-curing for 30 seconds (also see instructions for use ONE COT 7 UNIVERSAL). Colour shades or compo-
sites (i.e. BRILLIANT Ever-Glow, COLTENE) are then used afterwards according to the respective manu-
facturer’s instructions. The mate-
rial discussed for the fabrication of a CEREC crown is a composite with the following technical features. The flexural strength and the modulus of elasticity are represented in the following graphs.**

For comparison purposes, the ce-
ramic and composite materials of other manufacturers were used. The good flexural strength and the e-
modulus, which is similar to dentine, make the material more elastic than ceramic.

**Conclusion**

Handling is conveniently simple and the clinical result after placement and a few weeks later is very good (Figs. 8 + 9). The following points result in time saving and “service benefits” versus ceramic restorations:

- No firing of the restoration required (i.e. with IPS e.max CAD).
- Grils of the composite is easy to achieve, also much easier than with IPS Empress CAD.
- No etching with hydrofluoric acid or silanisation necessary.
- If repaired, repairs with composite are easy to realise, analogous to a fill-
ing.
- Dentin like e. modulus, less brittle-
tless than ceramic.

Long-term studies are necessary to compare the clinical results with ce-
ramic materials. In terms of applica-
tion, this material proved excellent. The patient was very satisfied with the result and praised the pleasant wear comfort of the composite res-
toration versus his previous ceramic crown immediately after treatment. Next we would like to attempt res-
toration of an implant with a single crown.

---

**Fig. 1:** Initial situation, single X-ray of tooth 37 with exist-
ing root filling and abutment post

**Fig. 2:** Plaster model with prepared tooth stump 37

**Fig. 3:** Milling bloc BRILLIANT Crios, colour shade A2 HT

**Fig. 4:** Milled crown with residual lug (separation point from bloc)

**Fig. 5:** Crios crown on plaster model

**Fig. 6:** ONE COT 7 UNIVERSAL is applied to the bonding sur-
face of the crown and rubbed in with a dental brush for 20 s.

**Fig. 7:** The finished BRILLIANT Crios crown on the plaster-
model in occlusion

**Fig. 8:** Clinical situation after placement and polishing

**Fig. 9:** Follow-up after 4 weeks

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**Source:** www.scientific.coltene.com / 27.08.2015

**Acknowledgements:** The application of the new composite bloc was supported by COLTENE, Switzerland.
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Treatment of the worn and spaced dentition—An ultrasonic approach, multidisciplinary approach

By Dr. Andrew Wakefield, UK

Tooth surface loss (TSL) can present in various clinical forms and has a wide range of aetiological factors. Dental erosion, attrition and abrasion are commonly observed in general practitioners, the first two often being seen in younger patients. The superimposition of TSL and malocclusion and/or tooth size and position discrepancies can compound the problem because of the coincident loss of form, function and aesthetics. It can also create difficulties in planning treatment options, with treatment strategies having to be drawn from multiple disciplines and integrated harmoniously to achieve long-term success. There are also other important issues to consider, treatment of tooth wear involves altering the vertical dimension of occlusion (VDO) and orthodontic treatment alters the position of the teeth, both often complex, lengthy and high cost procedures in their own right, never mind in combination. If the patient is young the cost of ideal treatment can be prohibitive and they will expect long-term longevity from the treatment provided and materials used. These are conflicts which probably will require some form of compromised treatment being embarked upon. It also needs to be borne in mind that the protection of valuable remaining natural tooth tissue is sacrosanct and this puts pressure on the ethical practitioner to be as conservative as possible. It is advisable to check in these cases to ensure that the patient is fully aware of any compromises chosen, the reasons behind the decisions made and to involve them in the decision making process itself. Fortunately with the advent of modern hybrid nano-composite materials and innovative orthodontic and restorative techniques, treatment can be designed to be progressive in nature, with patient led decision making, success can be achieved at the straightforward level, treatment can be modulated very well to the new VDO. This will also create space for the orthodontic phase. 1. To retract the upper anterior teeth with removable aligners by a sufficient amount to enable their subsequent restoration to aesthetically acceptable mesio-distal dimensions and to create interproximal contact, but not so much as to create a problem with soft tissue closure. This would take approximately three-four months during which time the patient would be accommodating to the new VDO established in phase 1. 2. To retain the teeth in their new positions for life using a palatal wire bonded retainer locked into the composites veneers for added flexural strength.

Case Study

The case study illustrates a simple multidisciplinary approach through the use of occlusal therapy combining centric relation direct composite build up of worn occlusal surfaces of upper and lower molars and premolars to re-establish a comfortable VDO. The resulting increase in anterior space was utilised for the use of occlusal therapy combining the skills of a dental technician and the orthodontist. The orthodontic movement is therefore crucial in these cases to protect the patient’s comfort and satisfaction. The 3D printed model of the patient was performed on it in order to see if the composite veneers could be performed in order to see if the precision it would allow the subsequent placement of appropriately sized composite veneers which would have interproximal contact. Once the incisors had been retracted into the pre-planned position, an accurate wax-up was made on a study cast and a full coverage clear silicone matrix, strengthened by 3mm Invis

Aims of treatment

1. To create a mutually protected occlusion where the anterior teeth incline the posterior teeth in all excursive movements of the mandible.
2. To avoid any preparation to the teeth whilst providing treatment according to sound biomechanical principles.
3. To prevent further pathologic wear of all teeth and to cover all exposed enamel.
4. To secure retainers for life the positions of the upper incisors after orthodontic movement.
5. To improve the aesthetics and restore the patient’s confidence in the appearance of his smile.
6. To perform the treatment in a sensible time frame and as cost effective as possible.

Treatment plan

Four Phases

1. To establish a stable posterior occlusion at an increased VDO using centric relation and simple direct composite buildups onto the occlusal surfaces as an occlusal deprogrammer to discourage the anterior slide and allow the mandible to go back.

This will also create space for the orthodontic phase.

To recreate the incisal anatomical form using direct nano-hybrid composite labial veneers. Precision in form will be assured by using a full clear silicone stent made over a diagnostic wax-up, with the wear of a pre-evaluative temporary to assess patient comfort and satisfaction.

To retain the teeth in their new positions for life using a palatal wire bonded retainer locked into the composite veneers for added flexural strength.

Before treatment smile

Before treatment upper arch

Before treatment lower arch

Before treatment left side smile

After increasing VDO with posterior occlusal buildup

After posterior occlusal buildup left view

Upper occlusal at end of treatment

This was achieved in centric relation (not done definitively as the final adjustment of the occlusal scheme was performed later after the establishment of the anterior guidance). The increase in the VDO anteriorly was approximately zmm. A standard IAS Inman Aligner was fitted to the upper arch with the aim of retracting the incisors. This occurred over a four month period with IAS Clear Aligners used for refinement of position at the end. During this time the patient accommodated very well to the new VDO. The 3D printed model of the predicted outcome of the orthodontic phase proved doubly useful, first for consent, but also because a wax-up of the composite veneers could be performed in order to see if the precision it would allow the subsequent placement of appropriately sized composite veneers which would have interproximal contact. Once the incisors had been retracted into the pre-planned position, an accurate wax-up was made on a study cast and a full coverage clear silicone matrix, strengthened by 3mm Invis

Discussion

The treatment proved to be a successful cost effective choice for the patient, primarily due to accurate planning, realistic expectations, good compliance and avoidance of excessive laboratory fees. At six months recall, there is no evidence of marginal breakdown of the composite and the wire is still bonded and preventing relapse of the treatment. The case is now established and can be copied later if a move to ceramics is ever considered. In this type of additive

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case where there is no labial enamel erosion or thinning, ceramics are very much a second choice material since veneering or crowning necessitates enamel preparation to get good margins for the technician to work to in order to avoid over-contouring the restorations. In addition, crowning would have made reliable acid etch bonding of a retention wire impossible on the palatal side and macro-retention grooves in the palatal ceramic surface would necessitate more aggressive palatal-surface preparation to make sufficient space so as not to weaken the ceramic. Ceramic veneers would fare no better as their palatal margins would be right on the line of the bonded retainer and the bonding footprint for the wire to enamel would be much reduced, both increasing chances of failure. The flexural strength of an incisor comes primarily from the labial and the palatal enamel, which was left intact in this case. High strength composite bonded over both the unprepared labial and palatal enamel surfaces gave an optimal biomechanical result as the flexural strength of the incisors will have been substantially increased. This should reduce the chances of marginal breakdown of the composite in the long term. To further reduce flexural stresses on the upper incisors, the small ledge created by the bonded wire acts as a vertical stop for the lower incisors to occlude against, favourably transmitting forces down the vertical axis of each tooth. The psychological impact of the treatment has been substantial. There was a total transformation of his appearance and smile, with a noticeable effect upon the patient’s self-confidence. The patient’s identical twin has followed his brother’s treatment closely and it is looking like I might need to repeat the process all over again! If not, we have a good control subject for the future in order to observe what might have happened had my patient not had this treatment.

References

The full list of references available from the publisher.
The impact of CAD/CAM on dental practices

Interview with Dr Jonathan L. Ferencz who shares his experiences with CAD/CAM technology in dental practice

By 3Shape

In what way has CAD/CAM made a major difference to your dental practice and patients?

The first time I really experienced the difference CAD/CAM has made for my patients was with one patient, a very successful partner at a well-known architectural firm. He came in on a Friday afternoon around 2 p.m. and said, “John, I’m very sorry to bother you but the crown on my front tooth just cracked. I’ve got a really important dinner tonight with clients and I’m going away on a 14 day ski trip with my family. If I don’t make the trip, I’m in trouble. If you made me a temporary, I would be most appreciative.”

His crown was in two pieces. I told him that I believed that we could do a new crown with CAD/CAM and not just make him a temporary.

As a follow-up, he later told me that he must have really bored his clients at dinner that night, because the only thing he talked about was the crown we made in that one visit.

If you look at this case and compare it with what used to happen in the old days, that same procedure would have taken three visits.

Now, whenever I see an emergency in our schedule that involves something broken, I think that we can turn it into a definitive solution and not just a stopgap of placing a temporary and the patient returning the next week. I know that now we can fit a crown using a TRIOS digital impression and our laboratory. For patients like the one in this example, digital is a lifesaver.

Is there not a financial loss by not having the follow-up visits?

No, not at all. One charges the same fee regardless of the number of visits because the patient is charged for the procedure and not per visit. So for us, we actually save time and money. In addition, not having to wear a temporary crown is of great benefit for patients. They do not have to come back to our office.

Are there more advantages of this technology?

Another important advantage of digital technology is its potential for patient education. For example, I had a patient with a lateral incisor that was perfect from the facial aspect, but from the lingual, there was an amalgam restoration, a composite restoration and a vertical crack from the incisal edge to the gingiva. But how can you show that to the patient when it is on the lingual side?

In the old days, I would have tried with a mirror or taken a photograph and loaded it on the computer or an iPad. This would have taken 20 minutes. The patient would have been looking at his or her watch, thinking about getting out of the office. The key in situations like these is speed. So, now I have started doing is taking a scan and obtaining a color digital impression in 3D.

If I scan the patient, I can take the image of the lateral incisor, flip it and point out to the patient what I see that he or she cannot. The scan shows the crack. The patient would ask me to suggest treatment and I would recommend scheduling a crown. The patient would agree because it is such a convincing demonstration. We are helping patients to codiagnose.

So the scan serves to educate and, in a way, empower the patient?

The best patient is an educated patient, but the communication or educational process has to be quick and intuitive. It cannot entail capturing an image, loading it onto the computer, locating the image, etc. So now, rather than taking out the camera and iPad, I reach for the TRIOS.

The idea of having a scanner in every room and having a hygienist pick up the scanner is becoming a reality in our practice.

Do you envision scanning being a routine part of a patient visit?

There is so much information that I can now see from looking at the enlarged scan. It is like looking through my loupes that give four and a half times the magnification. With a scan, I can expand the image on my screen to be as large as I like. Basically, I can imagine us using a scanner for not just some patients, but EVERY patient. I definitely see a day when we scan each patient as part of our routine.

Do you think that one day decisions on treatment could be made by just reviewing digital scans?

Yes, I do. I mean, I do imagine a day when I could be sitting in my beach house in the Bahamas leafing through scans on my laptop. It would be nice, but it will not happen because so much of our success is based on relationships and personal contact.

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Dr Jonathan L. Ferencz is a diplomate of the American Board of Prosthodontics and Clinical Professor of Prosthodontics and Oclusion in the Department of Prosthodontics at the New York University College of Dentistry, where he has taught since 1972. He is also Adjunct Professor of Restorative Dentistry at the University of Pennsylvania School of Dental Medicine.
The right system for the demands and needs of dentists and patients

By Dentply Sirona

CEREC satisfies an impressive scope of clinical demands. And now patients can look forward to full-contour zirconia restoration within one session – a material that is known for tremendous strength and biocompatibility, and which offers various clinical workflow advantages for practitioners.

Bensheim/Salzburg. For more than 30 years, CEREC has been offering patients a functional and aesthetic dental restoration. CEREC technology, we have naturally combined these two trends. The result is the new CEREC Zirconia workflow. We believe that adding full contour zirconia to the existing materials available within CEREC gives the clinician the maximum flexibility to handle nearly any clinical situation. And to be able to do it all in a single visit certainly adds patient and practice benefits.

What is special about this workflow? Zirconia has been used in dentistry for close to 20 years so the material is familiar to clinicians. The innovation now is delivering full contour zirconia in a single visit. To do this, we have developed the CEREC Squeezer furnace. Due to its extremely fast sintering speed, it enables dentists to fabricate crowns and small bridges made of zirconia oxide in a single visit. In addition to fast sintering, glazing is also possible with this furnace – a first in the market. The short workflow is both convenient and economical.

Our CEREC Zirconia blocks are available in 10 shades on the basis of the VITA Classic Shade Guide®. All our CEREC milling units are now wet and dry milling capable. Dry milling is the preferred method for zirconia since it eliminates a drying step before sintering, saving us time. The whole process is guided by our new software CEREC 4.4i which makes it very easy even for beginners since the sintering and glazing information is automatically transferred to the furnace by the software. The staff does not need to program the furnace – this is all taken care of in the software. We are convinced that this workflow is the natural extension to our current material setup.

What does that mean for patients? Like before with CEREC, patients get longlasting, high-quality, affordable care in a single session. But now with full contour zirconia we have expanded our indications into cases where strength of the material is paramount.

In our experience, patients really appreciate single visit treatments. A recent US survey, for example, showed that patients recommend clinicians with CEREC dentist 34 percent more often than patients whose dentist does not work with CEREC. As advancements they mention the time savings, the reduced number of injections and the elimination of impression material and temporary crowns. In Germany, according to another patient survey, the majority of patients would be willing to pay more for treatment in one session, and two thirds of respondents would be willing to travel further (or even change dentists) in exchange for that benefit.

By now expanding CEREC’s indication with full contour zirconia, even more patients can experience the benefits of single visit dentistry.

What do you think the advantages for dentists are? For dentists, full contour zirconia is the first material acting as a good substitute for the industry standard PFM and even full cast restorations. The reasons the material is very strong and, from a mechanical point of view, sufficiently capable of bearing clinical stress. Full contour zirconia also means we don’t have problems with chipping, which can be an issue with conventional milled layered prosthetics. Moreover, the material is biocompatible and less expensive to manufacture. The biggest advantage for dentists is reliability. The material is nearly indestructible and they don’t need to change their tooth preparation technique or cementing protocol. Zirconia is adding to our already excellent portfolio of materials, however with a very crucial role. It has abundant strength and is well suited for those cases where durability and longevity are the primary concerns.

Due to its strength, zirconia is often said to be problematic with regard to wear of the antagonist. What role does this play? Yes, it is kind of counter-intuitive. On the one hand you have this incredibly strong material and we automatically think it must be abrasive against the antagonist. In fact, we have learned through numerous studies that the abrasion is not caused by the hardness, but primarily by the surface roughness. This means the smoother the surface, the less the abrasion. It has been suggested that a polished full contour zirconia crown is less abrasive than a crown made of other materials. Consequently, even bruxism is not a contraindication for the use of zirconia.

How does full contour zirconia behave in terms of accuracy of fit? Very positively. Since the zirconia blocks are presintered, the material is 25 percent larger than in the final, full sintered state. Because the Finisher 10 milling instrument is relatively smaller than standard grinding burs, the margins, lumen and occlusal are all milled with the greatest detail. And, since there is no facing on a metal framework there are no overcontoured margins. Overall we see superb fit coming from full contour zirconia restorations and we’re excited to bring these benefits chiroprade.

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2. Envia GmbH/ Gernal Dental patient survey, November 2015

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Accredited hands-on courses in Aesthetic Dentistry in Dubai

By Dental Tribune MEA/CAPP Events

DUBAI, UAE: Centre for Advanced Professional Practices (CAPP) Events announces new courses in Aesthetic Dentistry in November 2016. The courses are aimed at dental professionals who wish to receive additional C.E. Credit Hours alongside bringing their knowledge to the next level.

All below mentioned hands-on courses are part of the annual Dubai Dental Week between 01-07 November 2016 at Jumeirah Beach Hotel.

The following hands-on courses will be available in Dubai between 05 November 2016 at Jumeirah Beach Hotel:

1. Digital Smile Design Part 1 & 2
c02-03 November 2016, 09:00 - 18:30
Dr. Eduardo Mahn, Chile
2. Smile Design & Aesthetic Restorative Options Part 1 & 2
c02-03 November 2016, 09:00 - 18:00
Prof. Brian Millar & Mr. Bill Sharpling, UK
3. Restorative & Aesthetic Certificate Module 2
c02-03 November 2016
Dr. James Russell, UK & Prof. James Prichard, UK
4. The Style Italiano Approach to Veneers
03 November 2016, 09:00 - 18:00
Prof. Angelo Potiguara, Italy
5. Non Prep Veneers and Modified Non Prep Veneers
03 November 2016, 09:00 - 18:00
Dr. Eduardo Mahn, Chile
6. Direct Veneers. How to use the Right Shade and Texture and Achieve the Desi Shade
04 November 2016, 09:00 - 18:00
Dr. Eduardo Mahn, Chile
7. Tips and Tricks of non- Surgical Powered Instrumentation and Polishing to Brighton Smile
04 November 2016, 09:00 - 18:00
Dr. Geoge Sorgiano, USA
8. Modern Preparation and Cementation for Inlays, Onlays and Occlusal Veneers
05 November 2016, 09:00 - 18:00
Dr. Eduardo Mahn, Chile
9. Advance Composite Course (Closing, Dymaskers and Correction of Png Laterals)
06 November 2016, 09:00 - 18:00
Dr. Eduardo Mahn, Chile
10. The New Concept of Alignment, Bleaching and Bonding (Inman Aligner Certification)
06 November 2016, 09:00 - 18:00
Dr. Tif Qureshi, IAA UK
11. Inlay-Veneers
06 November 2016, 09:00 - 18:30
Dr. Munir Silwadi, UAE
12. Veneers Vs Crowns: the Challenge in Smile Design
07 November 2016, 09:00 - 18:00
Dr. Eduardo Mahn, Chile
13. Indirect Inlays, Onlays & Partial Crowns
07 November 2016, 09:00 - 18:30
Dr. Munir Silwadi, UAE
14. Practical Clinical Orthodontics Fellowship Module 1
07-12 November 2016, 08:00 - 16:00
Dr. Dubravko Perica, USA

Upon completion of the hands-on courses delegates will receive accreditations from ADA C.E.P., Health Authority – Abu Dhabi (HAAD) and Dubai Health Authority (DHA).

Contact
The above mentioned courses have limited spaces available and all interested participants are requested to contact CAPP Events to reserve their places or visit www.cappmea.com/aesthetic2016.
The British Academy of Restorative Dentistry (BARD) is an organisation whose core purpose is the education of dental clinicians, aiding in the improvement of Oral Health by offering them a flexible learning pathway.

These pathways can lead to MRD via PG certificate, Diploma, MSc and MCIndent. Members are encouraged and given the opportunity to improve their skills in all aspects of dentistry from the very basic principles to advanced treatments and concepts. Our members are not limited to just dentists, dental technicians are also part of the BARD Family.

The BARD Conference 2016 was held at the Forest of Arden Marriott Hotel & Country Club on 3rd and 4th June. Friday (the first day of the event) was kicked off by an address from Professor Tipton giving his Presidents address and subsequent statement which gave a touching view on the experience.

Professor Tipton giving his Presidents address

Tipton Air) as well as Loupes (Orascptic Sirona, Kerr, Periproducts and Dentatus) with discussions of Implants (Ossux, Nobel Biocare, Arton System), Polymer PEEK used for fixed/removable prosthesis. There was a bustle of activity, time, there was a bustle of activity, technology and support exceeded expectations.

Programme which looks towards promoting health and dental care in society, usually would not be treated in this way. Periodontal Litigation and Tooth wear are both increasingly problematic.

Dr Adam Toft, Conference Chair, was amazed and baffled by an illusionist, there was a few “how did he guess that, just by looking at me?” comments. This reception was followed by a Charity dinner support The Vine trust Amazon Hope Foundation and Hatem Algrafee and Ken Gresham opened the weekend with a talk on Cerec by Julian Caplan. There were an entertainingly Mike Dunford, who showed how to talk to the media and more about IPS dentures and the stages of production as well as how dentists and technicians can work together well. The conference ended with Sharif Khan sharing his knowledge on making dentistry comfortable not only for the patient but for the dentist too. Travelling from Dubai, Crawford Bain shared his wisdom on maintenance of the ageing dentition and the main point he shared was to plan for failure at time of treatment planning. Over the two days all the speakers directed their talks to dentistry in everyday practice the different pointers on a more one-to-one level during the extended breaks which was appreciated.

The BARD conference is intended to be more than just an educational experience. It is also designed to be a fun and enjoyable occasion, especially when it comes to social evenings. The Saturday evening started with a drinks reception where everyone was amazed and baffled by an illusionist, there was a few “how did he guess that, just by looking at me?” comments. This reception was followed by a Charity dinner support The Vine Trust Amazon Hope Foundation.

Sponsors of the event made a fantastic contribution, the response and support exceeded expectations. There were an array of exhibitors offering the latest in materials, products and innovative technology designed in making the clinical practice more economical, effective and efficient. The exhibitors tied in with the lecture topics making their presence more valuable. The focal point of the event was the conference where there were demonstrations of a new non-metal Polymer PEEK used for fixed/removable prosthesis. There was allocated time during the extended breaks and lunch, for delegates to visit the exhibitors. Looking over the two Sponsors area during this time, there was a buzz of activity, with discussions of Implants (Osstem, Nobel Biocare, Artien System/Biomet), dental products/equipment (DMG, NSK, Henry Schein, Ivoclar Vivadent, Opodent, GC, Denzlystrona, Kerr, Priestaproduc and Den tal Air) as well as Lespex (Oraplastic and Lemenzue). Over at the Tipton Training Booth, attendees could sign up to a range of theory and hands-on courses. Demonstrations of digital scanning and restoration production could be seen with Cerec. Alport & Vincent, core 3D and 3W teeth dental talked about and showed the good quality work they produce, which gave the delegates a rare chance to discuss different approaches and treatments with lab technicians on a face to face basis. Braemar Finance provided their valuable knowledge in all things money/investment. There were dental experts from The Luke Barnett Centre for Cosmetic Dentistry, an opportunity to talk to Porsche and sit in a Tesla. All in All there were products and services to suit everyones dental and some non-dental needs.

The weekend catered for a broad spectrum and the feedback was positive. Delegates were inspired to go back to their own surgeries and incorporate what they had learnt, with a big buzz of interest in the next conference. Preparations and talks have already started and after the hugely positive comments from this year’s conference, the goal being to keep up the high standard and wide range of topics, exhibitors and delegates as well as another superb social event.

The next BARD Conference is looking to be held at The Belfry Hotel and Resort in the Spring/Summer of 2017. Go to www.bard.uk.com for further information/details
Thirty-three people from 18 countries: International summit for Dentsply Sirona treatment center experts

By Dentsply Sirona

Dentsply Sirona treatment centers must meet the needs of different users all around the world. In order to achieve an in-depth understanding of these needs and use them as the basis for further development, the company invited 33 selected users from 18 countries to an exclusive event in Bensheim. It provided the experts for the first time, with a special platform to exchange experiences and opinions, both with Dentsply Sirona and each other.

Bensheim/Salzburg: At Dentsply Sirona, the definition of quality comprises the designing of products according to users’ wishes and needs, which may differ from country to country. This is why international dentists are becoming increasingly involved in product development processes. "Listening" was therefore the motto of the first global Key User Summit, a three-day symposium for selected users of Dentsply Sirona treatment centers. From May 30 to June 1, the 33 dentists met at the German production site in Bensheim for an attractive program that included exchanging experiences, further development and training.

Ergonomic treatments

An important aspect of the symposium was working in ergonomic treatment positions. Thomas Senghaas, a dentist from Hamburg, clearly demonstrated how the new generation of treatment centers can support dentists while they work. "Up to now, I was not aware of these ergonomic training courses, so this was very valuable input for me," said Dr. Michael Panthwey from Calgary (Canada). The range of topics also included brief seminars on integration, the digital workflow and infection control as well as an entertaining coaching presentation on community-collaborating with colleagues and patients given by prominent keynote speaker Georg Wawschinek from Vienna.

"It is important for us to understand the details of the clinical challenges dentists face," summarized Mariangela De Natale, product manager for Treatment Centers and organizer of the first summit. "This is why talking to dentists from different countries is so important because this is the only way we can develop products that make dental treatments better, faster and safer."

Important exchange of experiences among users

The participants were equally enthusiastic. Dr. Sun Rui Hong from China said, "The dental world was so small for us and now it has become much bigger. It is vital to exchange experiences with colleagues as this results in a far better understanding of how we can make the best use of our Dentsply Sirona equipment." All of the participants praised the sense of community. Rui Hong called it "a new family."

Dentsply Sirona provided the high-quality and extensive transfer of knowledge. The participants gained practical insights into the treatment center creation process during a tour of the Dentsply Sirona production halls. The guests from around the world also enjoyed a tour of the historical city of Heidelberg, including a visit to the castle.

Opening speech by Robert Ganley, CEO Ivoclar Vivadent AG

Experts Circle and award ceremony

Seminars and opinions, both with Dentsply Sirona's platform to exchange experiences among users

Next Symposium to be held in Rome

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