Many ways with one material

By Dan Krammer, Germany

At this unusual event, twenty participants were asked to treat a real patient by using three different treatment approaches. At the end of the session, the patient had to decide which type of restoration she preferred: the IPS e.max® CAD restoration made with a chairside method and completed by the dentist; a conventional CAD/CAM-fabricated restoration; or a restoration made of IPS e.max Press. The attending dentist and representative of the chairside approach, Dr Petr Hajný looked like he was going to break out into a sweat once he fully understood the implications of this challenge. The contestants were not to be underestimated. His preliminary work and the needs of his patient would set the standard for his fellow contestants (Figs 2 to 3g). In actual fact, the task turned out to be more complex than was initially anticipated. A wide array of fabrication options was available. The participants were able to choose IPS e.max CAD (lithium disilicate); highly translucent IPS e.max ZirCAD (zirconium oxide) either in monolithic or anatomically reduced form, ground or milled; or IPS e.max Press full-contour or anatomically reduced pressed and subsequently stained/veneered restorations; or a combination of all these versions.

The choice was extremely wide because of the exceptional versatility of the all-ceramic product portfolio of Ivoclar Vivadent (Fig. 4). For those of you who find your head spinning at the thought of all these possibilities, you will be relieved to know that the solution actually turned out to be quite simple.

This contest offered a number of possibilities for comparing different methods, such as the CAD/CAM and the conventional fabrication techniques, and analyzing them according to a number of critical aspects. Nevertheless, the patient would be the deciding factor in this challenge. She would be the one who would make the final decision, irrespective of whether the restoration was fabricated chairside, stained, veneered or fabricated with the conventional or CAD/CAM technique.

Which group would get the job done first? The conventional or the CAD/CAM representatives? The dentist, the technicians or the dentist? And at what esthetic price? All these issues would be addressed and the debates over many different matters resolved. Could the simplest restoration perhaps be the most attractive one? How important is the number of powders and colours that are used? What is the significance of the shape and surface structure of the restoration for the overall esthetics? How important are listening skills to find out what the patient really wants?

In any case, the event offered the participants a wonderful opportunity to find out all the answers to these questions and more from the most important person in this case: that is, the patient.

Now, let’s join the contestants at the ICDE in Vienna (Fig. 5) and accompany them on this exciting journey...

Fig. 1: Before the case is presented, Hannes Meissl, Technical Trainer of the ICDE in Vienna, describes the dental laboratory procedure and the available materials and equipment.

Fig. 2: Dr Petr Hajný, a dentist and dental technician who hails from the Czech Republic, describes the case and its challenges. The task is to restore the patient’s teeth 13 to 23 with all-ceramic crowns.

Fig. 3a-b: Dr Hajný shows photos of the preoperative situation. He highlights the esthetics failures of the old restorations in the central incisors. In order to enhance the esthetic appearance of the new restoration, the patient agrees to have teeth 12 and 33 and teeth 22 and 23 included in the restorative treatment strategy. The three groups – conventional laboratory, CAD/CAM laboratory and CAD/CAM chairside – are allocated a specific time in which to fabricate the all-ceramic restorations for teeth 13 to 23. The old crowns are removed from teeth 11 and 21. Tooth 11 is shown to have been restored with a metal root post in the past. Dr Hajný marks the post with opaquer to adjust the shade.
The materials portfolio from Ivoclar Vivadent is immense. Therefore, the selection and combination possibilities are extensive. While this stage is easier for the conventional group, since they are using IPS e.max Press and the associated ingots, the CAD/CAM team should also be thinking about using monolithic and individually characterized IPS e.max ZirCAD zirconium oxide restorations.

Fig. 5: Ready, steady, go. At ten o’clock sharp the participants are allowed to see the models of the case. These include a study model of the provisionally restored upper jaw and a silicone matrix, a sawcut model of the prepared upper jaw as well as model of the lower jaw.

Fig. 6: The CAD/CAM laboratory group has selected the digitalized situation and generated the case in the system. In other words, the teeth to be restored and the restorations have been defined in the software. The picture shows Daner Markovic studying the case.

Fig. 7: The dental technicians provide the photographer with a lot of very interesting material. The dies are prepared for the creation of the restorations and the silicone matrices have been adjusted accordingly.

Fig. 8: The patient is prepared for the digital capturing of the intraoral data in the practice facilities of the ICDE in Vienna. Dr Petr Hajný, the dentist, and Vjekoslav Budičin, the dental technician, prefer to pursue a digital approach. As a result, scans are conducted with two different systems.

Fig. 9: Dr Petr Hajný and his assistant scan the patient’s jaw with the CEREC Omi- cam (Sirona Dental Systems), an intraoral dental scanner which, like the Trios machines (3Shape), does not use powder. He takes advantage of chairside workflows to design the crowns and mill them from IPS e.max CAD MT A1.

Fig. 10: CAM software of the Wieland Zerotec select CAD/CAM system with the IPS e.max CAD e.max CAD/Mill blocks in the CAD/CAM milling machine.

Fig. 11: Completed, milled crown made of IPS e.max CAD MT blocks in the CAD/CAM milling machine.

Fig. 12: Busy and highly concentrated contestants in the training laboratory of the ICDE in Vienna. The CAD/CAM group in the front and the conventionally working group at the back.

Fig. 13: There’s also time to have some fun. The contestants from the different teams and countries get on very well with each other.

Fig. 14-17: The modelled crowns, reduced crowns and frameworks are conventionally invested, placed in the pre-heating furnace, pressed, divested and then completed. The participants are well-versed in this technique and achieve the desired results in no time at all.

Fig. 18: “Look, I’m a human milling machine!” Velimir Žujić (right) jokes around with Vinko Iljadica and Alen Alić (left).

Fig. 19 and 20: Manual finishing techniques: Velimir Žujić sprinkles dentin powder on an IPS e.max Press framework that has been coated with IPS Ivocolor® Mixing Liquid allround. In the wash firing cycle, the bond is reinforced and produces a sound base for the subsequent ceramic layers.

Fig. 21: Irrespective of whether a conventionally or CAD/CAM-fabricated framework is used, these types of restorations, in contrast to monolithic ones, have to be manually layered and fired multiple times.

Fig. 22: From the computer to the hand. Some of the technicians of the CAD/CAM group decided to choose the monolithic route. Nevertheless, they are doubtful about being able to outcompete the manual group. They would have to wait until the end to find out if their doubts were justified.

Fig. 23: Dr Petr Hajný adds fine surface details to his milled lithium disilicate crowns before he finalizes them in a modified crystallization and glaze firing cycle. His chosen workflow makes him the fastest contestant and leaves him with enough time to take care of other business.
Fig. 24a and 24b: The press technique is also highly efficient when the restorations are press to full-contour and then minimal layers are applied to add fine details. Since only a minimum amount of layering ceramic is applied, there is hardly any shrinkage and the results are highly predictable.

Fig. 25: The contestants in the conventional group brought out the best in the IPS e.max materials. Here, one of the participants builds up the incisors to full contour on IPS e.max Press MO frameworks.

Fig. 27: Checking the length and alignment of the all-ceramic crowns in the articulator. The marks on the wax-up serve as a guide. It’s difficult to believe that all these steps can be accomplished by a machine.

Fig. 28: Analog version of the try-in. A good first impression was obtained by just fooling around.

Fig. 29 and 30: Ondřej Adam hard at work. In order to faithfully recreate the translucent edge of the lower front teeth in the upper jaw, he completely veneers the upper incisors. The result after the first firing cycle is shown in the picture.

Fig. 32 to 36: Not to worry, the members of the CAD/CAM group aren’t spending all their time staring at their computer monitors. They’re also having fun and taking care of some steps manually. In the end, it’s not the method that counts, but the result, which has to look as natural as possible.

Fig. 39 to 42: And the winner is … the Slovakian dental technician Martin Berger from the conventional fabrication group. The patient immediately fell in love with his crowns. They are sparingly layered. Martin Berger focused on imitating the surface characteristics and the tooth shape. When he was asked how he had managed to produce such a fantastic result, he simply said that he had talked with the patient and tried to create what she wanted. In other words, very bright, monochromatic teeth. Consequently, he tried to impart the teeth with a natural appearance by incorporating morphological details.

Fig. 37: Mission accomplished. Helmut Berger has incorporated his virtual creation into the picture of the patient in order to check the length and alignment of the teeth.

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Fig. 38: The day has come to an end and the excitement is palpable. Due to the large number of entries, the panel of experts including Christian Smaha (centre), a recognized Viennese dental technician, is consulted to help with the shortlisting process.

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inLab MC X5: Open 5-axis production unit for dental laboratories

By Dentsply Sirona

inLab MC X5, the five-axis milling and grinding unit newly developed especially for the demands of dental laboratories, completes Dentsply Sirona’s inLab system. Dental technicians benefit from the greatest flexibility for the entire production process of esthetically pleasing restorations and the largest selection of materials available on the market. An independent choice of production processes and materials and complete control of the work process – these are the primary demands dental technicians make of in-house production with modern CAD/CAM systems. Dentsply Sirona’s new five-axis laboratory unit inLab MC X5 fulfills these demands and gives users new freedom – with wet and dry processing, a wide range of indications, and the free choice of materials.

Developed especially for dental laboratories

“The new laboratory unit sends a clear signal from Dentsply Sirona to dental technicians,” says Reinhard Pieper, Director of inLab Product Management at Dentsply Sirona. Users benefit from 30 years of experience with CAD/CAM in wet processing of various materials combined with new dry processing techniques – in one machine. “We implemented all of our know-how as a pioneer and innovation leader of dental CAD/CAM technology to develop a CAD/CAM laboratory machine tailored specifically to meet existing and future demands,” added Pieper. “This ensures that inLab MC X5 will be a good investment in the long term.”

inLab MC X5 is Dentsply Sirona’s first open production unit and is suitable for use with various existing CAD/CAM equipment in dental laboratories – for users with a Dentsply Sirona scanner and inlab software or for laboratories with scanners and CAD components from other manufacturers. STL restoration data can be imported easily and quickly to the CAM software module developed for inLab MC X5 and processed with inLab MC X5. In combination with the inLab X5 scanner and inlab software, the new laboratory machine is the optimal complete solution for new users of Dentsply Sirona CAD/CAM production.

Productive laboratory unit for all common processing jobs

Depending on the indication and material, the five-axis inLab MC X5 can be used for wet or dry processing. In addition, for the first time it is possible to switch automatically from dry to wet processing when working on one part. Tools used include carbide cutters and diamond grinders as well as standardized disks with a diameter of 98.5 millimeters and a height of up to 30 millimeters. Users can ensure efficient utilization of material by using the disk management function and extensive nesting functions. The specially developed multi-block holder uses CAD/CAM materials in block form. It can be loaded with up to six blocks of different materials at the same time. inLab MC X5 is thus designed to be a universal laboratory unit for a number of indications and for processing zirconium oxide, polymers, composites, wax, glass ceramics, hybrid ceramics, and prepared for metals. The machine allows the dental laboratory a free choice of all material suppliers and it benefits additionally from the material competence of Dentsply Sirona’s material partners VITA Zahnfabrik, Viroc Vivadent, Dentsply, Merz Dental, 3M ESPE, and GC.

Open, user friendly and cost effective

Thanks to the combination of the wide range of indications, free choice of materials, and open interfaces for external restoration data, dental technicians can use the machine flexibly from the start. The high-quality, functional design of the chamber of the laboratory unit ensures easy maintenance and makes it fast and easy to clean with the specially developed “easy-clean” concept. It can quickly switch among various materials and between wet and dry processing. This flexibility combined with the reasonable cost and the fact that there are no additional dongle fees makes inLab MC X5 very cost effective. The unit is delivered with its own inLab CAM software module and can be ordered from dental dealers immediately.