Discovering the world of dental ceramics

A blog delivers answers to questions about dental ceramics which concern dental laboratories today:

By Ivoclar Vivadent

Ivoclar Vivadent has established a new interactive online platform, whose contents address the challenges currently facing dental laboratories. In our fast-paced world, dental laboratories are confronted by many questions. They look for enhanced efficiency and cost-effectiveness; for solutions that provide reliable support in their everyday work. Many are unable to keep track of the continuously increasing variety of products, product systems and processes that are entering the market and thus seek direction.

Increasing productivity and efficiency

The new online platform www.worldofceramics.com provides useful tips on the issues that concern laboratory owners. For example, they will learn how to increase the productivity of their lab, what they should pay attention to when selecting a ceramic material or equipment and what the current trends in the field of dental ceramics are. Moreover, they will be given the opportunity to participate in the discussion and contribute their experience as well as provide further tips.

New products in October

But that’s not all. During October, dental technicians will be informed about the new products developed by Ivoclar Vivadent and how these will provide answers to today’s pressing questions for dental laboratories.

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Discovering the World of Ceramics from Ivoclar Vivadent

Natural-looking imitation of pink esthetics

Completing a denture base using the IvoBase System

By Carsten Fischer, Germany

Even in the case of complex prosthetic reconstructions, patients want their dentures to look natural in addition to having the basic functions (speaking, chewing, tasting) returned to their stomatognathic system. Dentures should by no means have an adverse effect on the patient’s esthetic appearance. Esthetic soft tissue design reflects this philosophy.

The IvoBase® denture base system offers an efficient method to create custom-made esthetic soft tissue reconstructions. The patients’ expectations can be ideally met with a flair for esthetic design and a combination of three materials – IvoBase denture base material, SR Nexco® light-curing lab composite (customization) and ideally designed denture teeth.

IvoBase System

The IvoBase System is based on a fully automated injection and polymerization process. All the components (flasks, capsules, injector, etc.) are coordinated with each other. Chemical shrinkage of the resin is compensated during the polymerization process due to thermal management in the flask. As a result, volumetric shrinkage is prevented by the continued supply of additional material during the polymerization process to provide a denture base that demonstrates a high accuracy of fit and an excellent surface finish. Chemically, the IvoBase denture base materials fall into the category of self-curing polymers but offer the qualitative advantages of heat-curing polymers. Monomer and polymer are supplied in pre-dosed capsules to ensure an optimal mixing ratio and to eliminate direct skin contact with the monomer.

The IvoBase System results in denture bases that demonstrate lifelike pink esthetics and closely resemble the light-optical properties of the natural gingiva. Characteristics can be easily applied to the denture bases to accommodate the specific expectations of the patient.

Case presentation

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Case presentation

A partially edentulous upper jaw was to be restored with a palatal free denture retained with telescopic crowns. The inner (primary) zirconia coping for the
Blood vessels enhance the natural appearance of the prosthetic gingiva parts and satisfy his esthetic expectations. Both flask halves were identical. Investing and boiling out the sprues were already achieved in the present case, which allowed this task, I used the IvoBase denture base system, which allowed me to perform according to conventional prosthetic principles while the static and functional requirements as well as the patient’s individual expectations were taken into account. Tooth position, smile line, lip volume, phonetics and other criteria were checked in the course of an esthetic try-in (Fig. 1) before fabricating the final denture.

Natural-looking artificial gingiva parts were already achieved in the wax-up and the soft tissue parts were individualized with subtle but effective touches (Figs 2 and 5).

Lab procedure
After both the dentist and patient had approved the wax-up, the denture was ready to be processed into acrylic. To perform this task, I used the Iov-base denture base system, which allowed me to transfer the wax-up to the final restoration without loss of detail.

Waxing and boiling out
Both flask halves were identical. Prior to investing the model, I placed the flask lid, access former half and filter wax component in one of the flask halves. After applying a thin coating of petroleum jelly to the inner surfaces of the prepared flask, I soaked the model with the mounted waxed-up denture with water and isolated it with stone-to-stone separating fluid. The model was now ready for being invested in plaster; a Class III dental stone was used for this purpose. I took care to place the model at the centre of the flask and to ensure a space between the anterior margin of the model and the flask of approx. 10 mm. To create a flush surface between the edge of the model and the flask housing, I moved all surplus plaster whilst it was still soft. The stone surface should be flush with the access former to prevent any air bubbles. Excess stone was skimmed off so that a flush surface resulted between the stone and the flask lid. Once the stone had set, the flask was heated in a water bath at 90°C and then the two flask halves were separated. The wax was now soft and could be easily removed in large pieces. After the full access former had been removed, I masked the base metal (Fig. 4). Prior to joining the flask halves, I masked the base metal alloy framework with opaquers. For this purpose, I used a pink opaquer for the gingival areas and a tooth-coloured shade for the areas under the microscope. These materials were first applied as a foundation layer and then placed on the model and secured with wax (Fig. 5). The aeriation filter, centring insert and frame were inserted and the flask halves assembled.

The denture base materials are available in seven shades. For the case presented here, I selected IvoBase High Impact in shade 54-V. I removed the monomer container from the presoaked capsule, joined the fluid and powder and mixed the two components to a homogeneous mixture. With a few easy manipulations I attached the centring insert and flask to the capsule and then placed them into the injector according to the manufacturer’s instructions. Next, I selected the relevant injection program and then started the injection process (Fig. 6). The process was fully automated and, with the RMR function added, took approx. 65 minutes to complete. The RMR function further reduces the already very low content of residual monomer to below one per cent. As the injection and polymerization process were exactly matched to the material, chemical shrinkage was completely compensated. Once the program had been complete, I removed the flask and cooled with water. Divesting was performed under a dental press. The Iovbase System includes a divesting aid to facilitate this process. Having detached the flask halves, I carefully removed the denture from the stone core and separated the wax acrylating final result (Figs 7 and 8). All wax-up areas were faithfully reproduced in the acrylic.

Completing the denture
Now, I directed my full attention to finishing the denture. The advantage of using this system became most apparent at this stage, as hardly any reworking was necessary. The finely modelled surface structures and textures of the wax pattern were replicated in the acrylic without loss of detail. In a few quick steps, the denture base was ready for final customization (Fig. 8). With SR Nexco, the artificial gingiva can be given an individual touch and natural-looking characteristics to suit the patient’s expectations. SR Nexco ideally complements the Iovbase denture base material (shade 54-V) (Fig. 9).

I applied a light-curing conditioner (SR Connect) to the acrylic surface to create an adhesive interface that would allow the application of individual shade characteristics (Figs 10 and 11). After that, I focused on creating subtle details to reproduce a natural depth effect. I applied a light-curing composite and together, these materials were first mixed together and applied with a small round brush. After that, I returned the teeth to the silicone key. Next, I applied a thin coating of Separating Fluid to the stone surfaces of the cooled flask and flask halves (Fig. 4). Prior to joining the flask halves, I masked the base metal alloy framework with opaquers. For this purpose, I used a pink opaquer for the gingival areas and a tooth-coloured shade for the areas under the microscope. These materials were first applied as a foundation layer and then placed on the model and secured with wax (Fig. 5). The aeriation filter, centring insert and frame were inserted and the flask halves assembled.

The basal surfaces of the cleaned teeth were roughened with jet medium and mechanical retentions applied with a small round bur. After that, I returned the teeth to the silicone key. Next, I applied a thin coating of Separating Fluid to the stone surfaces of the cooled flask and flask halves (Fig. 4). Prior to joining the flask halves, I masked the base metal alloy framework with opaquers. For this purpose, I used a pink opaquer for the gingival areas and a tooth-coloured shade for the areas under the microscope. These materials were first applied as a foundation layer and then placed on the model and secured with wax (Fig. 5). The aeriation filter, centring insert and frame were inserted and the flask halves assembled.

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I applied a light-curing conditioner (SR Connect) to the acrylic surface to create an adhesive interface that would allow the application of individual shade characteristics (Figs 10 and 11). After that, I focused on creating subtle details to reproduce a natural depth effect. I customized the vestibular areas and applied fine capillaries on the facial side using a mixture of different shades. Key anatomical features should be borne in mind when characterizing soft tissue parts to achieve a life-like reproduction. For instance, keratinized gingiva has a light pink colour because less blood normally flows through it. By contrast, the mucogingival areas receive a far larger supply of blood and are interspersed with fine blood vessels. These details and textures were previously used to reproduce with the SR Nexco range of materials. Attributes of the prosthesis, such as interlocking soft tissue invasion and shading of alveoli and festooning were already created in detail in the wax-up and transferred to the acrylic without loss of detail using the Iovbase System. The SR Nexco gingiva materials and my technical skills enabled me to individualize the prosthetic gingiva by applying materials in different shades in a targeted fashion to attain a natural-looking final result (Figs 12 and 13).

Prosthesis aesthetics that very closely resembles healthy soft tissue is the result of this approach. Fine details of texture—such as subtle stippling, slightly accentuated alveoli or free gingiva margins—give artificial gingiva a natural appearance. The Iovbase denture base material beautifully harmonizes with the SR Nexco range of materials. The one-of-a-kind gingiva, hair brushes, a high-gloss buff and Universal Polishing Paste effectively result in a smooth and glossy surface, without loss of surface texture or shade characteristics.

Conclusion
The Iovbase injection process provides a one-step method to process waxed up denture bases into high-quality PMMA. Wax-up setups can be transferred 1:1. Polymerization shrinkage is mostly compensated by the siloxane-based SR Gel to prevent the formation of an inhospitable gap and, therefore, no silicone was applied to the gingiva-coloured parts, which was necessary. The finely stippled gingiva-Clear material gives artificial gingiva a natural appearance. The Iovbase denture base material beautifully harmonizes with the SR Nexco range of materials. The one-of-a-kind gingiva, hair brushes, a high-gloss buff and Universal Polishing Paste effectively result in a smooth and glossy surface, without loss of surface texture or shade characteristics.

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Accurately colour zirconia using the Amann Girrbach colouring concept

By Amann Girrbach

Colour zirconia restorations accurately and reproducibly – this is performed successfully using the Ceramill Colouring Liquids from Amann Girrbach. The colouring liquids were developed and adapted according to the specific material characteristics of the respective zirconia group (LT, HT, SHT) to ensure consistently exact and reliable results based on the VITA classical shade guide. All shades of the VITA classical shade guide can only be reliably matched right away using this optimal harmonisation of material and colouring solution.

Three material-specific Ceramill Liquid sets have been created that are used for easily and precisely customising the milled restorations.

A compact liquid set with 4 basic shades and 2 shade modifiers was therefore developed specifically for the slightly translucent zirconia Ceramill ZI (LT), which only requires an aesthetic basis for the porcelain veneer due its use as an anatomically reduced framework material.

A clearly designed set of colouring solutions in the 16 VITA classical tooth shades and shade modifiers for the incisal/occlusal surfaces and gingival region is also available for each of the (super-) highly translucent zirconia materials Ceramill Zolid and Ceramill Zolid FX (HT/SHT), which are also used for monolithic restorations. The shades can be applied directly to the restoration without mixing and optimise the reliability and efficiency of the workflow. Both liquid sets provide the maximum degree of aesthetics, customisation and cost-effectiveness as they are coordinated with one another as well as with the specific working and material parameters for Ceramill Zolid and Ceramill Zolid FX.

The Amann Girrbach colouring concept is completed by the Ceramill Stain&Glaze set, which can especially be used to enhance the light dynamics and in-depth shade effect of monolithic restorations.

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Ceramill Liquid FX Set including colouring guide

The STRONG alternative to lithium disilicate.

Highly aesthetic and reliably stable – Ceramill Zolid FX anterior restorations with precise staining concept according to the VITA classical shade guide.
The Fascination of Simplicity

By Dr. Patrice Lalet, France

After 50 years of research and development, CEREC can claim to be highly user-friendly. For many dentists, this technology makes treatment safety, ease of use and the enhanced user comfort of the system especially interesting.

New software features, which further enhance user comfort and make the system interesting for newcomers of all ages. Starting out in the world of CAD/CAM production is not normally a cause for concern for younger dentists who have grown up using PCs, mobile phones and tablets. And experience has shown that even less technology-savvy dentists quickly get used to the computer support - making treatments extremely safe thanks to its intuitive operation.

Nevertheless, during this initial period, CEREC training is highly recommended to allow users to learn how to use the system as quickly and safely as possible.

Intuitive user guidance leads to impressive results. CAD/CAM technology is appealing thanks to its impressive results. Its usability means that even dentists who have not grown up as “digital natives” can use CEREC easily. An easy-to-operate camera replaces the conventional impression technique using a tray and impression material. Quick, digital, extremely precise - and no prior powdering is required. The various restorations are then designed with the intuitive CEREC software with user guidance and active feedback. The subsequent in-house production of the restoration ensures precise results and enthusiastic responses from patients. It also increases the value added in the practice. And the possibility of single visit dentistry, which leads to more comfort for the patient and the dentist.

Brief case report

A very typical example for CEREC treatment is presented in the following case: A 42-year-old patient came to my practice to improve the look of her anterior teeth. Since the teeth emerged at the age of 6 or 7 years she suffered from a lack of enamel. So we decided to make crowns on lively teeth. With the aid of the CEREC Bluecam we captured the preparation, the antagonist and the bite situation and the 3D preview appeared on the monitor in the CEREC software.

On the basis of these intraoral impressions the software generated a virtual 3D model. When generating the initial proposal for the four crowns, the software used the biogenetic modeling function. We sent the design of the restorations to the CEREC milling unit and clamped a bloc made of zirconia-reinforced Lithium-Silicate. The transparency of the ceramic assured very natural looking teeth. We added stain and glaze to obtain this result. After characterization, we placed the crowns and the patient could leave the practice with a new nice smile.

Quo vadis, cerec?

Powder-free impressions in natural colors, designing in an intuitive software and the grinding of a wide range of innovative materials - all these treatment steps are possible in every practice with CEREC. It is the only professional CAD/CAM system worldwide, which allows you to offer all-ceramic restorations in a single visit with a clear conscience. Using the latest digital technology there are no limits to construct fully anatomical bridges as well as implant restorations.

With the patient specific surgical guides CEREC GUIDE 2 for a safe placement of implants and the CEREC ORTHO software for orthodontic treatments CEREC enables an incomparably broad range of applications to the practitioner and the patient to ensure optimal treatment result.

Dr. Patrice Lalet has been a CEREC user for 15 years and received his certification as a CEREC trainer from ISCD in 2004. Dr. Lalet is member and co-founder of the French CEREC Training team e-dentisterie.