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.

Contact Information

Ivoclar Vivadent AG
Bendererstrasse 2
9494 Schaan/Liechtenstein
Tel.: +423 235 35 35
Fax: +423 235 33 60
E-mail: info@ivoclarvivadent.com
www.ivoclarvivadent.com

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 – Ivocerox® 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. 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. Characterizations can be easily applied to the denture bases to accommodate the specific expectations of the patient.

Case presentation

A partially edentulous upper jaw was to be restored with a palatal-free denture retained with telescopic crowns. The inner (primary) zirconia copings for the inner (primary) zirconia copings for the

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Fig. 1: Carefully dividing after the initially automated polymerization process.

Fig. 2: Finishing requires only a few steps as the wax-up is processed into the acrylic without loss of accuracy.

Fig. 3: Characterization: subtle stippling and fine red blood vessels enhance the natural appearance of the prosthetic gingiva parts.

Fig. 4: The basal surface 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 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 telescope teeth. These materials were first applied as a foundation layer for the gingiva parts. Then I placed the model and secured with wax (Fig. 5). The aeration filler, 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. I removed the monomer container from the precurred capsule, joined the fluid and powder and mixed the two components to a homogeneous mixture. With a few easy manipulations I centered the insert and flask in the capsules and placed them into the injector according to the manufacturer’s instructions. Next, I selected the relevant injection program and started the injection process (Fig. 6). The process was fully automated and, with the RMR function added, took approx. 65 min 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. Only once the program had been complete, I removed the flask and cooled with water. Divestment was performed by using a divesting aid to facilitate this process.

The IvoBase System includes a divestiging aid to facilitate this process. Having attached the flask halves, I carefully removed the denture from the stone core and separated the capsule using a separating disc (Fig. 7). 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 characterizations to suit the patient’s expectations. SR Nexco ideally complements the IvoBase 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 characterizations (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 SR Nexco in different shades of different shapes. 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 were easily reproducible with the SR Nexco range of materials. Aspects of the gingiva’s three-dimensionality including alveoli and festooning were already created in detail in the wax-up and transferred to the acrylic without loss of detail using the IvoBase 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).

Fig. 5: The final result (Figs 12 and 13).

Fig. 6: The IvoBase injection process provides a predictable method to process waxed up denture bases into high-quality PMMA. Waxed-up setups can be transferred 1:1. Polymerization shrinkage is mostly compensated by the SR Nexco and IvoBase composite and together, these two materials create natural esthetics. The use of goat’s hair brushes, a high-gloss buff and Universal Polishing Paste effectively produces a perfectly smooth and glossy surface, without loss of surface texture or shade characteristics.

Result
Artificial esthetics 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 IvoBase denture base material beautifully harmonizes with the silicone key composite and together, these two materials create natural esthetics. The interplay of colours. The compact and smooth surface is not only esthetically pleasing but also provides optimum conditions for denture hygiene (Figs 14 and 15).

Conclusion
The IvoBase injection process provides a predictable method to process waxed up denture bases into high-quality PMMA. Waxed-up setups can be transferred 1:1. Polymerization shrinkage is mostly compensated by the SR Nexco and IvoBase composite and together, these two materials create natural esthetics. The use of goat’s hair brushes, a high-gloss buff and Universal Polishing Paste effectively produces a perfectly smooth and glossy surface, without loss of surface texture or shade characteristics.

Contact Information
Carsten Fischer
sirius ceramics
Lyoner Strasse 44-48
60528 Frankfurt on the Main
Germany
info@sirius- ceramics.com
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.

Contact Information

Amann Girrbach AG
Herrschaftswiesen 1
6842 Koblach | Austria
Web: www.amanngirrbach.com

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 technology is so highly user-friendly that tasks can be handled quicker, more easily and more successfully. Using dental CAD/CAM technology for the first time is easier than you would think and technology for the first time is fully. Using dental 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.

The translucency 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. CEREC 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.  

About the Author

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.