Metal-Ceramic esthetics without boundaries

Search: Where is the framework?

By Dr. Adrian Bacila & Florin Stoboran, Romania

We have known for some years now that abrasion, erosion and other def- fects caused by stress and diet, are issues which are becoming increas- ingly common. Now we see that this type of problem is occurring more and more frequently amongst under 30-year-olds who consume modern acidic drinks. An extreme example with a dreadful initial situation is presented here. The most suitable, patient-friendly and well proven method still used a lot today is the metal-ceramic restoration.

There are special requirements to be considered when creating a life- like rehabilitation of teeth in young adults: not just in terms of the vestibular tooth surfaces, incisal edges and the occlusal surfaces, but also the type of veneering material used for the restoration with regard to tooth shade, translucency and light trans- mission. The correct choice from the start makes the dental technical work quicker and easier. To make our work with metal easier and in order to achieve convincing light optical results, we chose the new ceramic IPS Style Ceram from Ivoclar Vivadent (Schaan/Liechtenstein). The follow- ing article describes our production (Schaan/Liechtenstein). The follow- ing article describes our production methods step by step, from the diag- nostic assessment and planning to the final insertion of the restoration.

Diagnostic assessment and patient preparation

A 27-year-old came to our den- tist’s practice, Dr. Adrian Bacila in Timișoara (Timişoara), Banat/Romania. He complained of gen- eralized, already chronic hyper- sensitivity and poor esthetics. He had long postponed his visit to the dentist and had neglected his teeth; he was now determined to have his dental defects corrected (Fig. 1 to 3).

The first steps in the practice and the laboratory

Almost all teeth required root canal treatment (Fig. 4). This was carried out under the operating microscope and completed with root post and subsequent crown restoration. This was also possible in tooth 13. The preparation was carried out accord- ing to the Dr. Domenico Massironi technique. The final impression was taken with the impression material Impregum® from 3M ESPE using the double cord retraction method. In addition, the patient underwent periodontitis treatment once and was thoroughly instructed in oral hygiene. These treatment measures prepared the patient’s teeth and ging- giva for the temporary restoration. A three month regeneration period followed.

The temporary restoration, fabri- cated in the laboratory for this heal- ing phase, was necessary for verify- ing the endodontic situation and in particular to allow the gingiva time to recover (Fig. 5). This served as a vertical dimension therapy with a so-called functional and esthetical “test drive”.

The vertical dimension was not changed. It was validated by the tem- porary restorations for 3 months. The temporary restorations were produced in a centrifugal relationship. Functional diagnostic procedures, a sophisticated treatment plan and an extensive esthetic analysis of a photo status were required to pro- duce the temporary restoration - measures that formed the basis for the patient’s individual dental rehabili- tation (Figs 6 to 8). For the esthi- cal analysis (Figs 9 and 10), we used the program and procedure protocol from Digital Smile Design (DSD) ac- cording to Dr. Christian Coachman, São Paulo/Brazil. It includes tools and gauges for a wide range of virtu- al measurements and uses the infor- mation from patient’s portraits with a variety of facial smile expressions.

This extensive input showed that the anterior length of the existing crowns in the upper jaw could be maintained. However, the tooth an- gles needed to be changed and the bucco-lingual position of the initial edg- es had to be moved in order to accommodate the lower incisors and the lower lip. Function and esthet- ics played an important role in the design.

The three-month therapeutic trial run showed that further measures to eliminate the black triangles, resulting from the degeneration of the pulp, had to be taken. The dentist then prepared the teeth for the final restoration according to metal- ceramic requirements, and gave our laboratory the impression (Fig. 11) to cast the master model.

Preparing and covering the framework

The following information is based mainly on the dental technically interesting upper jaw. We wanted to use the new mixed-glass ceram- ics IPS Style Ceram, so the metal we chose for the crown frameworks was the non-precious metal alloy 449 from Ivoclar Vivadent. This was cast in the conventional method, and included holding pins to protect the framework during the follow- ing procedures. The metal copings were carefully finished. An oxide firing was carried out in preparation for the ceramic layer. Time and care- invested in this phase prevents bub- bles in the ceramic later.

It is effective to use a modern shade selection method from the very start, so that the best suitable opaque ma- terials and copings are produced.
After use, it is extremely important to clean thoroughly with a steam cleaner to prevent discolouration when firing.

The surfaces were individually characterized using the universal stain and glaze range IPS fritocolor, which can be used for all layering, press and CAD-CAM ceramics from Ivoclar Vivadent and also zirconium oxide from Wieland Dental. This enhanced the restoration’s macro and micro texture and created more expression. We began with the base shade A2. Through individualization using the IPS fritocolor stains we were able to produce a shade A3 tooth with a cervical area in A3.5 (Figs 30 to 37). The character and surface had an outstandingly natural looking appearance. This is due to the fact that no opaque ceramic materials were used, but instead stains, which allowed the light to flow into the depths. Even the posterior teeth had a very vibrant design with the mesial palatal Carabelli cusp and with the stained fissure details (Figs 38 to 41). We carried out a glaze firing bake in the usual method (750°C). The ideal texture can be determined by the amount of glaze material applied. The thicker the application, the glossier the result. The surfaces were individually carved exactly as we had planned.

**Dentin firings and assessment of the results**

The ceramic surface was compacted with a dry brush and then fired with a first dentin firing (900°C). The shade and shape results are always eagerly awaited. In our patient case, the results were spectacular (Fig. 27). Knowingly our past experience with previously successful applications, these were the results we had expected. We must emphasize first and foremost: The IPS Style Ceram ceramic shrinks only minimally. Based on our experience this material has the lowest shrinkage of all ceramics we have used before. We needed to add only a small amount to complete the vestibular surface (in this case with IPS Style Ceram Dentin A3). The second dentin firing (960°C) showed next to no shrinkage. Only small corrections were required with IPS Style Ceram Impulse 4. The layered build-up maintained its shape and the youthful design did not change. In addition, the translucency of any of its steep cusps (Fig. 28). The light transmission from the depths of the tooth was as we had hoped, as was the shade gradation (Fig. 29). If corrections are necessary and therefore further ceramic firing, rest assured, the shade and colour will not change.

**Finishing the surface and shade characterization**
The next step was to work on the facial surfaces of the teeth to 15 and 21 to 23 to create an age-appropriate form. Diamond burs were used in particular to create the perikymata and longitudinal grooves (interproximal and marginal-segmental ridges). A final amount of gold pastes allowed the careful examination of the surface texture and all surface structures, including in the posterior region (Figs 44 to 52).

**Patient rehabilitated, dentist satisfied**

The veneered restorations were first inserted and checked (Fig. 55) and then conventionally cemented. Both dentist and patient were so delighted with the results that a whole series of photos was taken in various lightings and under different lightings (Figs 54 to 70). The patient felt confident again to give a wide open moutned...
smile. The chosen restoration gave him his joy of life back. His confidence grew.

Conclusion

According to the manufacturer, all colour components in the IPS Style contain oxyapatite crystals in different quantities. For this reason, the opaquer is also an essential part of the colour concept of the restoration. In the end result, the metal-ceramic IPS Style Ceram impressed us in particular through its natural translucency and the depth of light transmission. IPS Style helps the dental technician to achieve highly esthetic restorations efficiently with easy material handling and a low level of shrinkage during firing. There are no particular specifications to observe in terms of design on the metal. The dental restoration is so vibrant and life-like that no one would think it had a metal substructure.

One specific advantage of the visual properties of IPS Style is that the outline of the framework is not seen through the ceramic as sharp edges. Due to the high degree of reflection and wide range of light-scattering, much less Deep Dentin material is required for concealing in comparison to conventional metal-ceramic materials. Less space is required for the ceramic. Without the problem “framework outline”, less experienced ceramic technicians are also able to use the IPS Style Ceram layering ceramic.

Dental technical assessment of the new veneering ceramic

How the IPS Style Ceram is for us dental technicians: We are able to fully concentrate on the layering technique and build-up process. The IPS Style materials are very easy to work with: finely granulated and homogenous, with a pleasant and individually adjustable consistency. They are stable. Sharp edges and detailed structures can be easily created. The layers adhere well to one another.

In addition, a very important point is the working efficiency. The ceramic has a low degree of shrinkage, only slight over-contouring is required. The built-up morphology design is maintained. Our assessment, which also applies to this patient case: When using the IPS Style materials, the ceramist can let his artistic abilities and skills run free.

We would like to thank Dr. Adrian Bacila for the good working cooperation.

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Florin Stoboran graduated from the Dental Technician School in Oradea, Romania, in 1994. He continued his studies in ceramics and specialised in fixed prosthodontics, aesthetics and implantology.

Florin Stoboran

Fig. 30 to 32: Checking the results after the application of stains and after the glaze firing. The translucency, the shade and light transmission are pleasing to the eye from all perspectives (angles)

Figs 33 to 37: Checking the results after the application of stains and after the glaze firing. The translucency, the shade and light transmission are pleasing to the eye from all perspectives (angles)

Figs 38 to 42: A trick we used: The deliberate incorporation of Carabelli cusps to avoid a cross-bite and to achieve an even distribution of masticatory forces. Even though this shape is different from the patient’s original bite, it provides the patient with greater comfort.

Figs 42 to 43: The finished upper crowns after having been polished, as given to the dentist.

Figs 44 to 52: Careful examination of the surface texture and tooth shape

Figs 53 to 71: The patient is confident and self-assured once again. Is this still the same metal-ceramic as we know it?

Fig. 53: X-ray examination and checking the fit

Fig. 54 to 71: The patient is confident and self-assured once again. Is this still the same metal-ceramic as we know it?
By Dentsply Sirona

The inLab CAD SW 15.0 software has been an indispensable part of the digital workflow in dental labs for over a year now. The extensive update inLab CAD SW 16.0 now offers additional options. The wide range of inLab applications has now been extended even further with new indications, tools and functions as well as the option for additional implant systems. The improved and optimized workflow for the first time, scan data from infos X5 for superstructures can also be transmitted to Atlantis®. Dentsply Sirona continues to enable access to individual implant restorations for dental laboratories.

Following the successful market launch of inLab Software 15.0 last year, the first update is now available. The latest inLab CAD SW 16.0 offers new features across all CAD modules. In the Removable dental prosthesis module, dental splints and individual impression trays can be designed for the first time using the new inLab Splint plugin.

The Implantology module has been extended to include screw-retained bridges and dental bars at implant level, thus allowing the FLO-X Scanbodies from Atlantis® to be scanned and identified with inlab SW 16.0. Starting next year, the scan data can be transmitted to Atlantis® for the design and production of superstructures. Coinciding with the introduction of this software, infinDent, Dentsply Sirona’s production center, is launching a new production service for directly screw-retained bridges that have been independently designed by the customer in inLab CAD SW 16.0. The corresponding design dataset can be exported directly from the inLab software to infinDent for subsequent production. The Atlantis® and infinDent services will be launched as a beta phase for selected customers in November. After successful completion, it will then be available for all inLab X5 users. For the production of individual adhesive abutments (TiBase), the following implant systems are also supported by inLab SW 16.0: Astra Tech Implant System EV and Ankylos from Dentsply Sirona Implants as well as BioHorizons and Osstem TS.

For the production of restorations on other milling machines, STL data export via the inLab software interface module is required. In addition to the actual STL dataset, the additional *.sci file (Sirona case information) is also created. This supplements the STL data with additional information, such as implant positions, preparation margins, information on materials, etc.

As the only laboratory software on the market with J.O.B.S. (Jaw Orientated Biogeneric Setting), inLab supports rapid patient-specific positioning of teeth with minimal of corrections, even for work over long spans. The inLab CAD SW 16.0 is now extending this convenience with a new function: inLab Check. The new plugin tests the designed restorations with an FEM analysis for critical, strain-sensitive areas and visualizes these areas. The tool offers inLab users practical design support for large, complex cases or where space is restricted.

The inLab CAD SW 16.0 now runs under both the Windows 7 and Windows 10 operating systems. Furthermore, it comes with numerous optimizations in terms of processing power, tools and design options, like screw channel design, additional tooth shapes for the restoration design (for example a third premolar in tight spaces) or the implant independent tooth position in the design of implant bridges.

In addition, the current inLab CAM Software 16.0 update for the inLab MC X5 and inLab MC XL production units will be available free of charge as an automatic update or internet download in the next few days.

More information at: http://www.sirona.com/inlab

Screw-retained bridges and bars at implant level with the inLab CAD SW 16.0 Implantology module.

inLab MC X5:
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