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 de- 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 vestib- ular tooth surfaces, incisal edges and the occlusal surfaces, but also the type of veneering material used for the restoration with regards 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 method 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 Timişoara (Timesbüch), 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 following was recorded as pros- thetically relevant in the clinical as- sessment: multiple carious lesions, which required treatment and were responsible for the tooth sensitivity; 13 - tooth crown completely broken, 14, 15, 22, 25, 35, 36, 37, 43-45, 47 - frac- tures and breakages with partially exposed pulp, 36 and 46 - missing. The sensitivity test and Spectra examination suggested extensive endodontic treatment, which was verified by an X-ray. It was possible to avoid extractions. Gingival recession due to periodontitis was identi- fied in both the upper and the lower jaw. The papillae had fully receded, in particular the central papilla 11,21, exposing black triangles. The patient had a neutral bite (single class I), however an increase in the vertical dimension was necessary (sunken bite in the molar region).

Based on the results of the diagnosis, the dental team drafted a restora- tive plan. The dentist presented this to the patient including other pos- sible alternatives. A metal-ceramic bonded solution was decided - which included single crowns and small bridges in the lower jaw.

Metal-ceramic bonded restorations are well proven solutions with a history of very long clinical success; this is supported by in-vivo studies. In comparison to zirconium oxide, metal frameworks have the advan- tage of higher elasticity and lower hardness, which in this patient’s case should restore the natural masticatory feeling again.

As the patient had previously post- posed a visit to the dentist, the emphasis now had to be placed on rehabilitation with good long-term perspectives. This way it would be possible to minimize the amount of procedures required and therefore calm his fears.

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 centric 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 reha- bilitation (Figs 6 to 8). For the esth- etical 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 edges 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 papilla, had to be taken. The dentist then prepared the teeth for the fi- nal restoration according to metal- ceramic requirements, and gave our laboratory the impression (Fig. 15) 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 metal the crown frameworks were the non-precious metal alloy 441 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 layer.

It is effective to use a modern shade selection method from the very start, so that the best suitable opaque ma-

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Dentin fillings and assessment of the results

The ceramic surface was compacted with a dry brush and then fired with a first dentin firing (700°C). The shade and shape results are always eagerly awaited. In our patient case, the results were spectacular (Fig. 27). Knowing 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 completely cover the vestibular surface (in this case with IPS Style Ceram A1). The second dentin firing (900°C) allowed no further shrinkage. Only small corrections were required with IPS Style Ceram Incisal I3. (Fig. 40). The light transmission from the depths of the tooth was as we had hoped, as was the shade graduation (Fig. 40). 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 25, to create an age-appropriate form. Diamond burs were used in particular to create the penumbrar and longitudinal grooves (interproximal and marginal-segmental ridges). The use of gold paste allowed the careful examination of the surface texture and all surface structures, including in the posterior region (Figs 44 to 52).

After use, it is extremely important to clean thoroughly with a steam cleaner to prevent discoloration when firing.

The surfaces were individually characterized using the universal stain and glaze range IPS Fosaic, which can be used for all layering, pressed and CAD-CAM ceramics from Ivoclar Vivadent and also zirconium oxide from Wiel-

Ladental. 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 bio-

color systems we were able to produce a shade A3 tooth with a cervical area in A3.5 (Figs 30 to 37). The characteristic natural looking appearance is this. It is due to the fact that no opaque cer-

amic materials were used, but instead stains, which allowed the light to flow into the depths. Even the posterior teeth had a very vibrant de-

sign with the mesio-palatal Carabelli cusp and with the flatter fissure de-

tails (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 smoldered in some areas, the results were impressive, literally “from all sides” (Figs 43 and 45). Shape and tex-

ture surfaces had been realized exactly as we had planned.

Patient rehabilitated, dentist satisfied

The previously prepared teeth were veneered restorations were first inserted and checked, (Fig. 53) and then convention-

ally cemented. Both dentist and patient were so delighted with the results that a whole series of photos were taken of the dentures, and under different lighting (Figs 54 to 70). The patient felt confident again to give a wide open mouthed
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 aesthetic 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 homogeneous, 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.

The chosen restoration gave him his joy of life back. His confidence grew.

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 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 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 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 44 to 52: The patient is confident and self-assured once again. Is this still the same metal-ceramic as we know it?

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

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

Dr. Adrian Bacila, Romania

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

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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 system integration into the workflow. For the first time, scan data from inLab 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. The Implantology module has been extended to include screw-retained bridges and dental bars at implant level and thus allowing the FLO-X Scanbodies from Atlantis® to be scanned and identified with inLab X5 and 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, inLab Check, 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 infi niDent for subsequent production. The Atlantis® and infi niDent 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 CAD 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 constrained.

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 individualized 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

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