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 regard to tooth
shade, translucency and light trans-
mittance. 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
methods step by step, from the di-
agnostic assessment and planning to
the final insertion of the restoration.

Diagnostic assessment and planning

A 27-year-old came to our den-
tist’s practice, Dr. Adrian Bacila in
Timişoara (Timișoara), Banat/Ro-
nania. He complained of gen-
eralized, already chronic hy-
per-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 pro-
thesetically relevant in the clinical as-
essment: multiple carious lesions, which required treatment and were
responsible for the tooth sensitivity; 13- tooth crown completely broken,
14, 15-23 25, 33-44, 65-67, fractures and breakages with partially exposed pulp, 16 and 46 - missing. The sensitivity test and Spectra ex-
amination suggested extensive endodontic treatment, which was ver-
fied by an X-ray. It was possible to avoid extractions. Gingival reces-
sion due to periodontitis was identi-
fied in both the upper and the lower
jaw. The papillae had fully erode-
ded, 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 resto-
ration 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 masticato-
tory 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 aesthetic 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 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
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, re-
sulting from the degeneration of the
papillae, 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. 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
4all from Ivoclar Vivadent. This was
used 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-
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, re-
sulting from the degeneration of the
papillae, 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. 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
4all from Ivoclar Vivadent. This was
used 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-
}
Figs 17 to 19: The fired results

Fig. 24: View of the palatal build-up, shape process, and then the next firing was opaque layer (Figs 15 and 16). Any of ceramic powder and then dusted amount of IPS Style Ceram Deep light were mixed together to a ratio of 1:2 (Fig. 25) and as ultra thin access to the vestibular mamelon structure.

Information:
Tip: It is advisable to use IPS Style Ceram Mamelon materials cautiously and economically as they are extremely opaque and highly fluorescent. A very nice result is achieved if you give them a vertically curved shape. The high degree of material cohesion and edge stability of the material allows full coverage of the framework, we applied the IPS Style Ceram material to cover the complete up to the approximal-incisal areas. To finalize the design we imitated the so-called “halo effect”, which in this particular case was realized with IPS Style Ceram Dentin A4. Unlike the mammets - these effects were created with smoother transitions.

The occlusal surface was designed age-appropriately with a pronounced anatomical form. Diamond burs were used in particular to create the perikymata and longitudinal grooves. Incorporating the cusp of Carabelli the cusp and with the stained fissure design. When firing, the pigments are revealed. 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 vest

Dentin firings and assessment of the results
The ceramic surface was compacted with a dry brush and then fired with a first dentin firing (950°C). The shade and shape results are always eagerly awaited. In our patient 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 complete the vest

Fig. 25: Steps towards creating mammelons. The stability of IPS Style materials during application and the edge stability are particularly apparent here.

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 Tissue color, which can be used for all layering 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 tissue color stains we were able to produce a shade A3 tooth with a cervical area of 4.5x3 (Figs 30 to 37). The characteristic 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 mesio-palatal Cardelli cusp and with the stained fissure details (Figs 38 to 41). We carried out a glazed fire back in the usual method (750°C). The ideal texture can be determined by the amount of glaze used. Adequate. The surfaces were impressive, literally “from all sides” (Figs 42 and 43). Shape and text

Fig. 26: Final layout effects. The wide variety of IPS Style Impulse and effect materials allow ceramics to fully indulge in their passion

Patient rehabilitated, dentist satisfied
The veneered restorations were first inserted and checked (Fig. 53) and then conventionally cemented. Both dentist and patient were so delighted with the results that a whole series of photographs were taken under different lighting (Figs 54 to 70). The patient felt confident again to give a wide opened mouthed
Fig. 29: A good result after the final dentin firing: oral view of the crowns, without individualizations.

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 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.

Figs 38 to 41: 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 54 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. 55: By using the IPS Style Ceram we have and have improved his 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 oxypatite 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 reflectance 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.

Dr. Adrian Bacila, Romania

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.
experience new freedom in your lab processes breaking the chains of former dependencies with inLab and the new 5 axis milling and grinding unit inLab MC X5. Open for all restoration data, combining the largest material range and the possibility to machine both wet and dry disks and blocks – for no limitations to your production.

Enjoy every day.

With Sirona.

inLab MC X5:
DENTAL LAB FREEDOM OF CHOICE.

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 Oriented 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 congested.

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 (as 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