Metal-Ceramic esthetics without boundaries
Search: Where is the framework?

By Dr. Adrian Bacila & Florin Stoaran, Romania

We have known for some years now that abrasion, erosion and other de-
facts 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
prestated here. The most suitable,
patient-friendly and well proven
method still used a kit 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-
mision. 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 plan-
ing

A 27-year-old came to our den-
tist’s practice, Dr. Adrian Bacila in
Timișoara (Temeschburg), 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 pro-
thesically relevant in the clinical as-
sessment: multiple carious lesions,
which required treatment and were
responsible for the tooth sensitivity;
37 - tooth crown completely broken;
34, 14, 23-25, 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 reces-
sion due to periodontitis was identi-
fied in both the upper and the lower
jaw. The papilla had fully tended,
not in particular the central papilla
13-23, 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 po-
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 mastic-
tory feeling again.

As the patient had previously post-
poned 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
keep 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 esthi-
cal analysis (Figs 9 and 10), we used
the program and protocol protocol
from Digital Smile Design (DSD) ac-
cording to Dr. Christian Coachman,
São Paulo/Brasil. It includes tools
and gauges for a wide range of virtu-
al measurements and uses the infor-
manation 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 incisal
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
pulpitis, 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
45L1 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-
terial is chosen as early as possible.

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 Masanitto
 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 steps
prepared the patient’s teeth and gin-
giva for the temporary restoration.
A three month regeneration period
followed.

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Figs 17 to 19: The fired results which contribute to the illusion of depth and shape. This was done by incorporating the cusp of Carabelli (Tuberculum Carabelli) so that the cusp and fissure of the upper and lower teeth were completely aligned and an even distribution of pressure could be achieved.

**Dentin firings and assessment of the results**

The ceramic surface was compacted with a dry brush and then fired with a first dentin firing (790°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 complete the ves- tibular surface (in this case with IPS Style Ceram Dentin A3). The second dentin firing (90°C) showed no further shrinkage. Only small corrections were required with IPS Style Ceram Incisal I2, IPS Style Ceram Opal Effect OE1 and OE2 as well as IPS Style Ceram Transpa blue and in the distal areas we added IPS Style Ceram Transpa blue. We also included IPS Style Ceram Opal Effect violet and IPS Style Ceram Incisal 13. We applied IPS Style Ceram Opal Ef- fect OE1 and OE2 at the cusp and with the stained fissure design with the mesio-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 or colored glaze. The surfaces were impressed, literally "from all sides" (Figs 40 and 41). Shape and texture had been realized exactly as we had planned.

**Patient rehabilitated, dentist satisfied**

Due to the extensive restorations were first inserted and checked, (Fig. 53) and then conventionally cemented. Both dentists and patient were so delighted with the results that a whole series of photos were taken under different lighting (Figs 54 to 70). The patient felt confident again to give a wide open 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 (angle).

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 (angle).

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 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.

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.

Dr. Adrian Bacila, Romania

Florin Stoboran graduated from the Dental Technician School in Oradea, Romania, in 2004. He continued his studies in ceramics and specialized in fixed prosthetics, esthetics and implantology.
CAD/CAM Final spurt 2016: Dentsply Sirona presents inLab CAD Software 16.0

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. 

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 suprastructures. Coinciding with the introduction of this software, infiniDent, 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 infiniDent for subsequent production. The Atlantis® and infiniDent 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 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 (e.g. for 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: DENTAL LAB FREEDOM OF CHOICE.

Experience new freedom in your lab processes breaking the chains of former dependences 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.