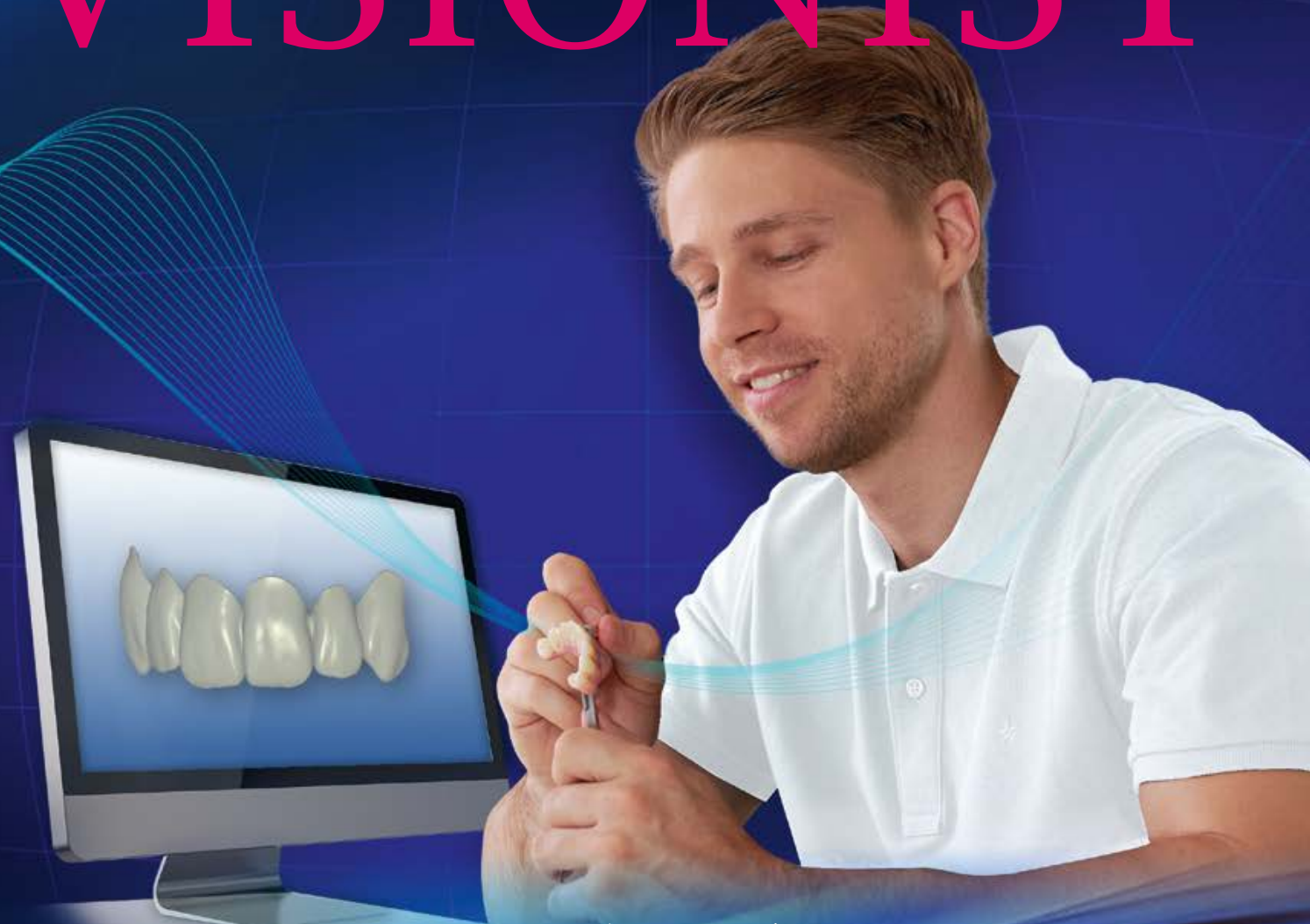


2.9

DENTAL VISIONIST



Innovative materials and concepts for digital and analog procedures

How to enjoy more clinical and esthetic success using new dental materials.



Highly esthetic veneer restoration with limited space available.

Master Dental Technician Marcio Breda explains how he was able to precisely reproduce the natural play of light using new ceramic material with limited space available.

> [Page 12](#)



Minimally invasive restoration of an incisal edge defect

A team of dental technicians demonstrates how to use hybrid ceramic to treat an incisal edge defect without damaging the tooth substance.

> [Page 28](#)

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vhf
CREATING PERFECTION

Editorial

Innovative materials and concepts for digital and analog procedures



Digitization and analog dentistry and dental technology are not a contradiction; both are necessary for the cost-effective production of highly esthetic and long-lasting restorations. Modern technologies, treatment concepts and materials must be integrated to support all essential analog and digital treatments and processing steps in practices and laboratories.

In this edition of the DENTAL VISIONIST, we will use a selection of cases to show you how new dental materials and restoration concepts can provide you with optimized support in your analog and digital workflows, and help you increase your clinical and esthetic success stories. For example, a dental technician from Brazil shares his experiences using a new veneering ceramic. A practitioner from Kazakhstan explains her approach to defect-oriented final crown restorations using CAD/CAM technology. Finally, a team of dental technicians from Germany report on the advantages of digital dentures.

We are delighted to present you with a number of unique challenges, inspiring solutions and impressive results.

DENTAL VISIONIST wishes you an enjoyable read!

Felicitas Ledig
Chief Editor



New veneering ceramic with ideal light dynamics and high firing stability

New veneering ceramic under test: the latest results from a variety of studies.

> Page 8



Defect-oriented, CAD/CAM fabricated endocrown restoration

Polychrome hybrid ceramic VITA ENAMIC makes long-lasting tooth substance preservation possible.

> Page 24



Highly efficient, digital full prosthetics with VITA VIONIC FRAME

How even complex cases can be solved at the push of a button.

> Page 40

IMPRINT/COMPANY DETAILS

Publisher

VITA Zahnfabrik H. Rauter GmbH & Co. KG
Spitalgasse 3 | 79713 Bad Säckingen

Editing/Concept/Layout

qu-int. marken | medien | kommunikation
Waldkircher Straße 12 | 79106 Freiburg

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Waldkircher Straße 12 | 79106 Freiburg

Published: twice annually

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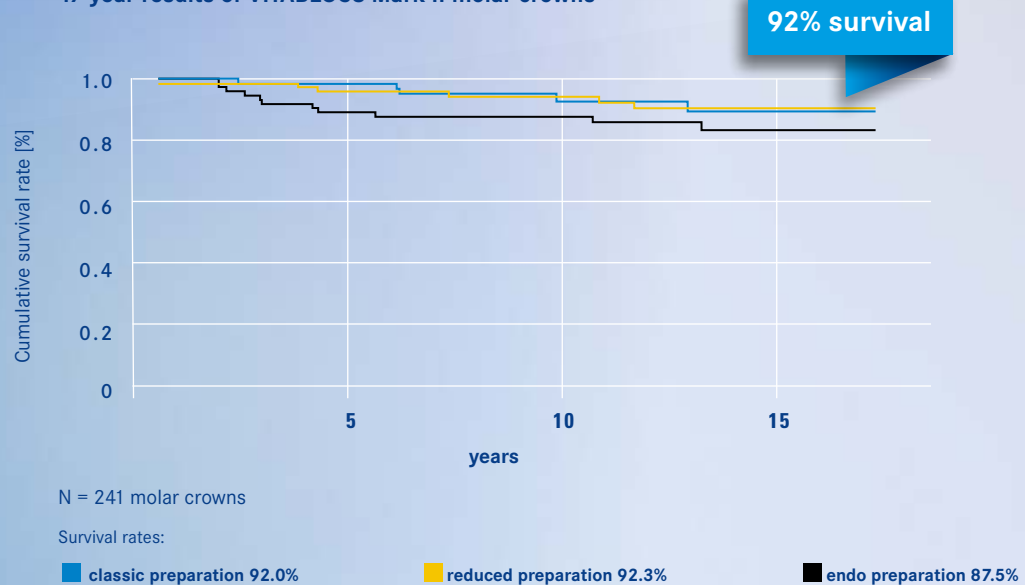
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INFORMATION

The testimonials by dentists and dental technicians published in this magazine are based on practical experience with the specified VITA materials gained during the course of processing, and/or on manufacturer information based on the data provided in the technical and scientific documentation (VITA Zahnfabrik, Bad Säckingen, Germany; download from www.vita-zahnfabrik.com). The statements of the named dentists and dental technicians reflect the status of the report authorization of 04/2020. The testimonials by developers or the technical marketing department published in this magazine are based on individual and/or internal studies conducted by VITA R&D (VITA Zahnfabrik, Bad Säckingen, Germany) and/or on the results of pilot testing.

17-year results of VITABLOCS Mark II molar crowns



Graphic 1 Survival rates for molar crowns made of VITABLOCS Mark II feldspar ceramic after an observation period of 17 years.

Source: External study 2016, University of Zurich/practice am Zürichberg, Survival rate of CAD/CAM crowns in the posterior tooth region on different preparation geometries without consideration of biological failures (PD Dr. Andreas Bindl)

Clinical success rates for CAD/CAM crowns made of VITABLOCS feldspar ceramic



*Dentist PD Dr. Andreas Bindl
Zurich, Switzerland*

The world's first dental CAD/CAM material VITABLOCS Mark II (VITA Zahnfabrik, Bad Säckingen, Germany) was launched over 30 years ago, and has since proven itself a million times over. Using the blanks made of fine-structure feldspar ceramic, single-tooth restorations can be produced with the time-saving advantages of CAD/CAM. For over 17 years, PD Dr. Andreas Bindl observed and documented the long-term clinical success of this material. In the following interview, he explains his methodology, describes the results obtained and shares his many years of clinical experience with VITABLOCS Mark II.



► The clinical baseline situation directly after the full-adhesive cementation.



► Condition of the endocrown restoration 17 years after the seating.



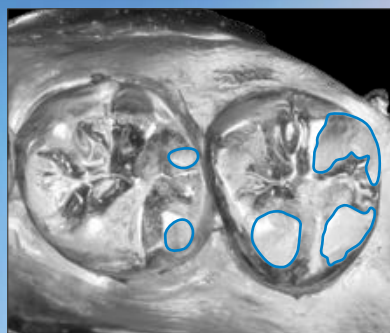
VITABLOCS ceramic has proven its excellence throughout more than 30 years of clinical applications.

DV: How did you proceed with your research and what data was collected during the clinical study?

PD Dr. Andreas Bindl: We designed the prospective study in the 1990s. The parameters we wanted to monitor and the data to be collected for this purpose were precisely defined in advance. It is not enough to simply look at the crown. This has to be carried out according to a standardized study protocol. To achieve this, we based our work on the current USPHS criteria, but with adjustments for examining the crowns. The assessment criteria included, for example, whether there was a fracture, whether the crown was still in place, the condition of the luting joint and the shade or the surface quality. The final publication that includes the data obtained from this study is currently being prepared.

DV: What clinical survival rates do VITABLOCS molar crowns achieve after an observation period of 17 years?

PD Dr. Andreas Bindl: We have made a distinction here between three different types of crown preparations. For the classic full crown preparation with normal stump height, VITABLOCS Mark II achieved a survival rate of 92%. For the reduced crown preparation without retentive stump preparation, we determined a similar value of 92.3%. Teeth that had been more severely damaged after a root canal treatment with endocrowns, still showed a very positive survival rate of 87.5% after 17 years. With this restoration, the pulp chamber is used as a retention surface for the adhesively fixed crown.

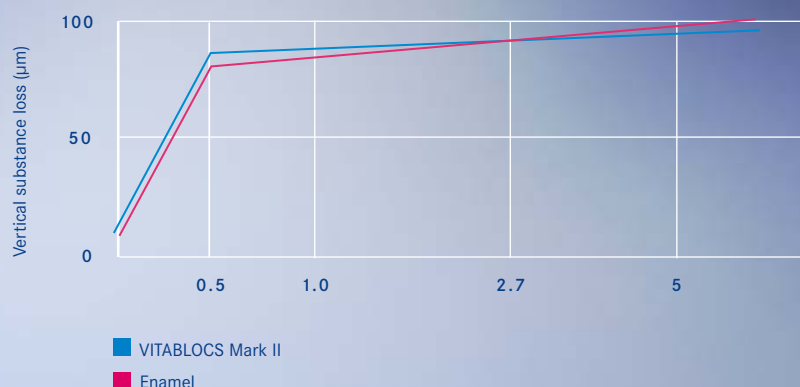


■ Abraded surfaces after 14.5 years

REM photo; functionally intact occlusal surfaces of VITABLOCS crowns after 14.5 years

Source External study 2016, University of Zurich/ practice am Zürichberg, Epoxy model of impression after 14.5 years, vapor-plated with gold, b/w photo of the model (PD Dr. Andreas Bindl)

Natural abrasion behavior



Source External study 1991, Wear of Cerec and other Restorative Materials. In Proceedings of the International Symposium on Computer Restorations: State of the Art of the Cerec Method, (Krejci, Berlin: Quintessence Publishing, 245 – 251)

Graphic 2 Studies showed that restorations made of VITABLOCS exhibit abrasion behavior similar to nature.

"VITABLOCS ceramic is one of the most esthetic dental materials because it is so similar in appearance to the natural tooth structure."

DV: What factors lead to the slightly lower, long- term durability of endocrowns?

PD Dr. Andreas Bindl: Teeth that are restored using endocrowns undergo – as previously mentioned – a higher degree of damage and for that reason, they also sometimes provide a smaller adhesive surface for adhesive bonding. This loss of retention plays a role in defects with the smaller premolars in particular. Furthermore, the adhesive bond in this type of restoration takes place mainly in the dentin, which is less favorable when it comes to adhesive values.

DV: What was the wear or abrasion resistance of the feldspar ceramic during the follow-up examinations?

PD Dr. Andreas Bindl: Exact clinical measurements are impossible, of course. It is a fact, however, that over the course of the long-term clinical process, abrasive surfaces appear on the crowns as they do on natural tooth structures. This is a good indicator and prevents non-physiological damage of the dental antagonist. The enamel-like abrasion of

the VITABLOCS Mark II ceramic is much more evident in inlay restorations. Here you can clearly see that enamel and feldspar ceramic undergo uniform wear.

DV: In your experience, how well do VITABLOCS reconstructions integrate into the natural dentition, in terms of their play of color and light?

PD Dr. Andreas Bindl: The remaining tooth structure plays a crucial role here. If it shows strong discoloration, one can expect that this discoloration will show through and affect the esthetic appearance of the restoration. In general, however, VITABLOCS Mark II has a pronounced chameleon effect; in other words, it can visually adapt to the appearance of the natural tooth structure. This results in a natural play of color and light, which is why I also like to use feldspar ceramic in the esthetically visible area. VITABLOCS ceramic is one of the most esthetic materials on the dental market because it is so similar in appearance to the natural tooth structure. Instead of polishing, the surface can also be characterized using stains and glazes.



Fig. 1a Endocrown preparation with reduced retention and primarily adhesive bond in less favorable dentin.



Fig. 1b For the intraoral scan, the endocrown preparation and adjacent teeth were powdered.



Fig. 1c The CAD/CAM-supported finished endocrown after finishing and polishing.



Fig. 1d The clinical baseline situation directly after the full-adhesive cementation.



Fig. 1e Condition of the endocrown restoration 17 years after the seating.



Fig. 2a Intact inlay (OM) on tooth 17 after 14 years.



Fig. 2b Harmonious wear between feldspar ceramic and enamel after 14 years.

DV: What should dentists consider when processing and using VITABLOCS in clinical environments to achieve excellent long-term clinical stability?

PD Dr. Andreas Bindl: On the one hand, clean, full-adhesive bonding with composite cement material is essential for a long-term stable restoration with feldspar ceramic. On the other hand, compliance with the minimum wall thickness, especially in the occlusal area, is essential to avoid fractures.



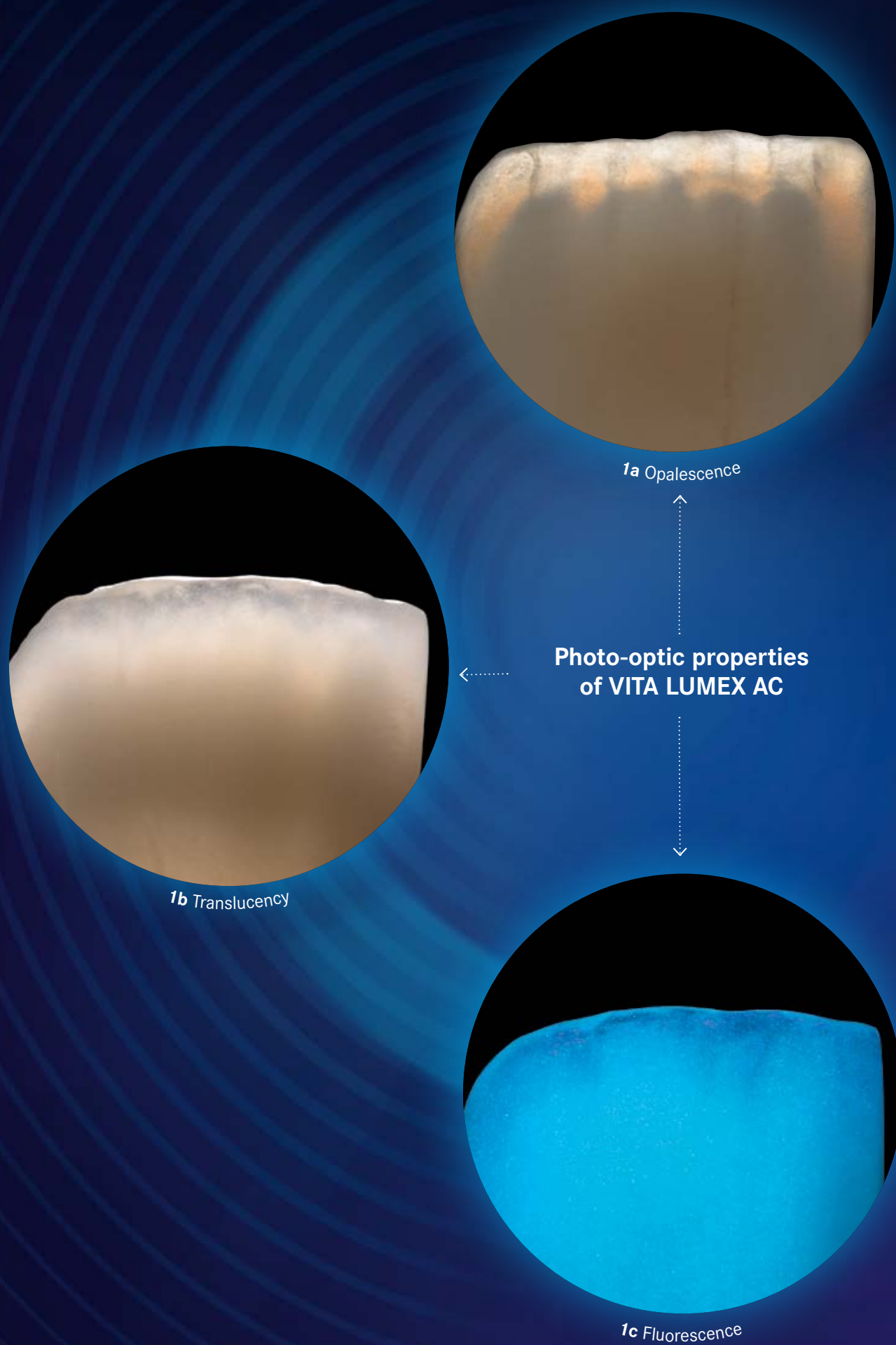


Fig 1a-c Documentation of the photo-optic properties of VITA LUMEX AC shown by photographing sample crowns using different lighting conditions and sources.

New veneering ceramic shows ideal light dynamics and high firing stability



*Dr.-Ing. Berit Gödiker
Bad Säckingen, Germany*

Modern, all-ceramic veneering materials are required to meet a variety of criteria in terms of mechanical, esthetics and application technology. For example, they should allow for reliable reproduction of tooth shade and play of light, remain stable during the modelling process and also guarantee firing results that are dimensionally stable. Furthermore, the material is expected to ensure a good bond to conventional framework ceramic and the veneer is expected to remain stable throughout its long-term clinical use. A new veneering ceramic, VITA LUMEX AC (VITA Zahnfabrik, Bad Säckingen, Germany) has been developed, thanks to meticulous materials research that meets the wide range of expectations to a high degree. In the following interview, dental material expert Dr.-Ing. Berit Gödiker answers questions concerning VITA LUMEX AC, with regard to special material characteristics and insights gained from laboratory tests.



2a

DV: VITA LUMEX AC is a leucite-reinforced, glass-ceramic veneering system. What are the special characteristics of the material and how can laboratories benefit from using it?

Dr.-Ing. Berit Gödiker: The leucite content of the glass allowed the new veneering ceramic to be adjusted in such a way that ensured an optimum bond to conventional all-ceramic framework materials such as zirconia and glass ceramic. In addition, leucite also contributes to high material strength, which means that excellent long-term durability can be expected with VITA LUMEX AC veneers.

DV: Shade fidelity is a central criterion for ensuring that restorations integrate harmoniously into the rest of the dentition. What degree of shade fidelity, with respect to the shade standard, does the new ceramic show and why?

Dr.-Ing. Berit Gödiker: VITA LUMEX AC achieves a very high degree of shade fidelity when compared to the VITA shade standards. For a precise shade formula, you need a lot of experience, modern shade measurement technology and expert specialists. VITA has

developed dental shade standards that are applied worldwide, allowing us to draw on nearly a hundred years of experience, and to familiarize ourselves with the original formulas of the shade standards. In addition, the visual analysis of shade samples in the form of material samples and restorations by experienced specialists is a key success factor.

DV: In order to achieve a vibrant play of color and light, you need ceramic material that offers the best light dynamics. What does the new veneering ceramic offer in terms of translucency, opalescence and fluorescence?

Dr.-Ing. Berit Gödiker: The degrees of translucency of OPAQUE DENTINE, DENTINE and ENAMEL materials are ideally matched to each other for an excellent play of light. Special opal materials have been developed to achieve a particularly vibrant opalescence. In addition, all of the base materials and a large amount of the effect materials exhibit near-natural fluorescence. The highly fluorescent FLUO INTENSE materials were also designed with the aim of targeted control of in-depth fluorescence.



2b

Fig 2a-b Sample representation of the visual inspection of the shade fidelity of a VITA LUMEX AC sample crown to the VITA shade standard, and for the implementation of a shade formula using ceramic powders mixed with color pigments.

Flexural strength

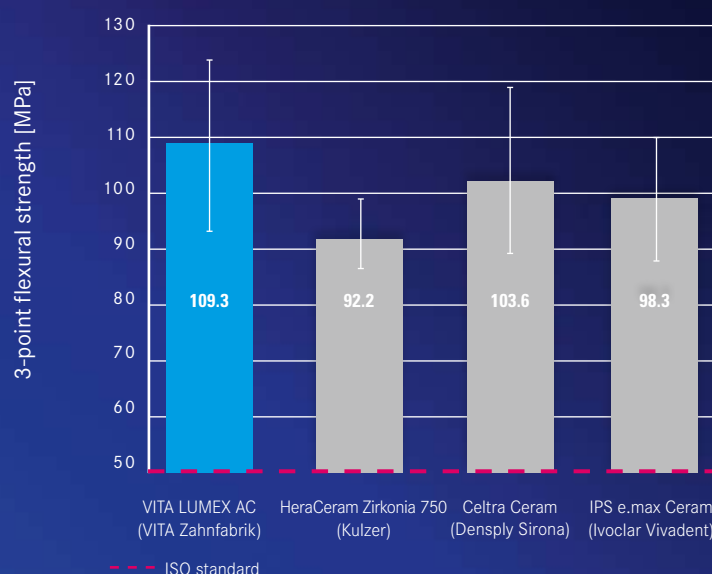


Fig. 3 Results graphic based on bending strength tests using the above-mentioned all-ceramic veneering materials

Source: Internal investigation of VITA R&D. Measurement of 3-point bending strength, according to ISO 6872 with the above-mentioned materials. Report 08/19, Dr.-Ing. B. Gödiker Test report is available via www.vita-zahnfabrik.com/lumex



When veneering with VITA LUMEX AC, the ceramic particles are micro-serrated, which leads to excellent stability.



DV: During the modelling process, it is important for the ceramic to have good stability. What are the technical material requirements for stability, and how well does VITA LUMEX AC perform in this respect?

Dr.-Ing. Berit Gödiker: The stability of the moistened ceramic is determined by the particle shape and surface of the powder particles, as well as by the distribution of the particle size of the powder. The shape and surface of the ceramic particles must be configured in such a way that micro-serration of the particles occurs during the layering process. That is why VITA LUMEX AC ceramic particles are irregularly shaped and have a structured surface. Furthermore, VITA LUMEX AC ceramic is designed so that the fine, medium and coarse grain size components exhibit an ideal ratio to one another.

DV: The dimensional stability of the ceramic after firing is another important success factor for the laboratory. How dimensionally stable did the new veneering ceramic prove to be in your studies?

Dr.-Ing. Berit Gödiker: Material samples made of VITA LUMEX AC ceramic have been examined in countless series of tests and have always demonstrated high dimensional stability,

even after repeated firing processes. The visual inspection of the test samples showed, for example, that the inserted edges do not round down. One reason for this is that with VITA LUMEX AC, the material shrinkage typical of veneering ceramic has been significantly lowered as a result of the high density, homogeneous material structure.

DV: Patients, dentists and technicians are looking for materials that offer long-term durability. What values does VITA LUMEX AC achieve in terms of mechanical properties, as compared to other materials?

Dr.-Ing. Berit Gödiker: VITA LUMEX AC exceeds the flexural strength required by the ISO standard for veneering ceramic by more than twofold, demonstrating excellent material stability in laboratory tests. In addition, the bond strength in relation to the framework material also plays an important role. Excellent bonding values were achieved with VITA LUMEX AC on both zirconia and glass-ceramic frameworks, in some cases significantly exceeding the bonding values of competitor materials.

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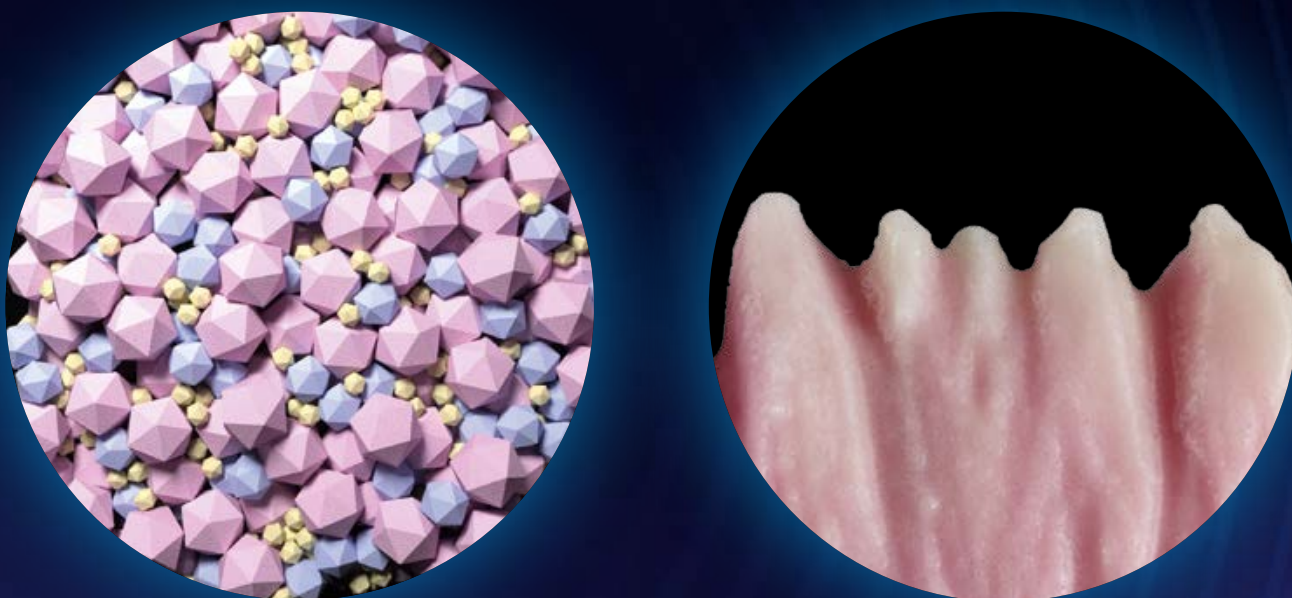


Fig. 4a-b Sample, simplified visualization of particle size distribution/micro-serration in VITA LUMEX AC, as well as sample photographic documentation of an intermediate result during layering.

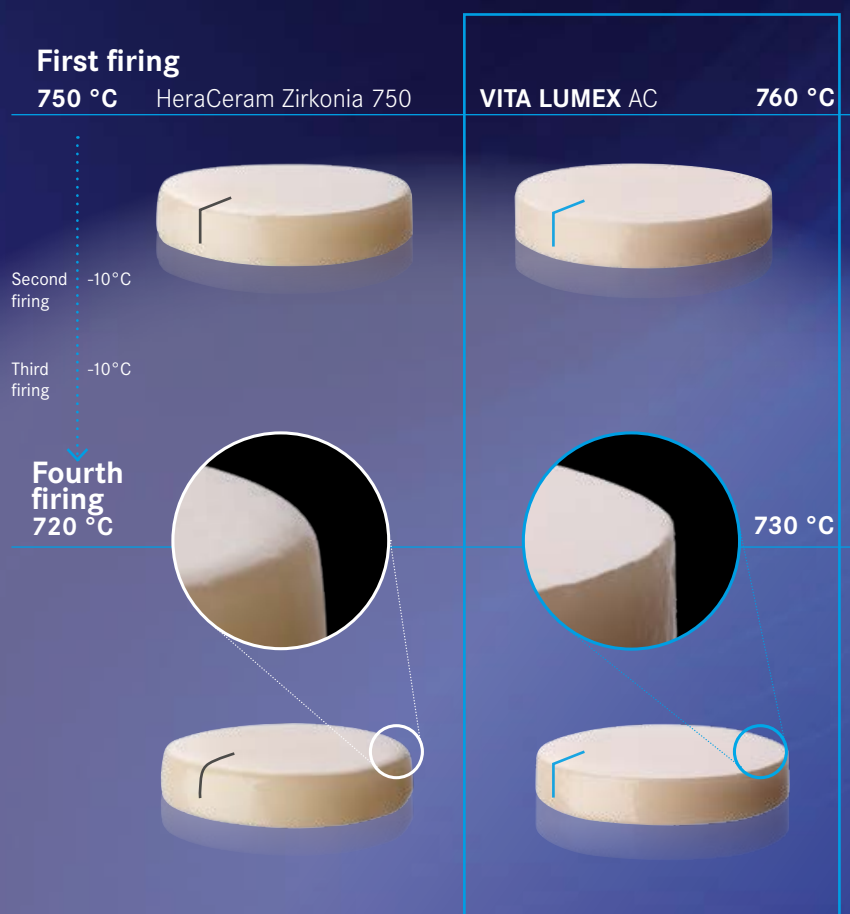


Fig. 5 Photographic documentation of the firing results of test samples of the above-mentioned veneering ceramic after several firing processes.

Source Internal investigation of VITA R&D, Analysis of firing stability after four firings with test samples of the above-mentioned materials, Report 08/19, Dr.-Ing. B. Gödiker, Test report is available via www.vita-zahnfabrik.com/lumex.



Highly individual reproduction of the color play with VITA LUMEX AC veneering ceramic if limited space is available



*Master Dental Technician
Marcio Breda
Vitória, Espírito Santo Brazil*

When veneers are used for cosmetic reconstructions, preserving tooth substance is a high priority. In these cases, patients are often treated using highly individualized, hand-layered veneers. The challenge when it comes to dental technology is in precisely reproducing the natural play of colors and light within a limited space. This requires veneering ceramics with high luminosity, such as the new VITA LUMEX AC, which reliably produces ideal light dynamics, even with minimum wall thicknesses. In addition, the veneering ceramic applied must have good fracture strength in order to ensure safe manual reworking and seating with this delicate type of reconstruction. In the following case study, Master Dental Technician Marcio Breda and Dentist Dr. Estefânia Donato (both Vitória, Espírito Santo, Brazil), show how a patient was supplied with highly esthetic hand-layered veneers made from the leucite-reinforced, glass-ceramic veneering ceramic VITA LUMEX AC (VITA Zahnfabrik, Bad Säckingen, Germany).



➔ **INITIAL SITUATION** The immediate temporary restoration was created with a silicone key of the mock-up.



➔ **RESULTS** A highly esthetic smile was created with ease.

1. The patient case

A 35-year-old patient visited the dentist's office, as she was dissatisfied with the esthetics of her anterior maxillary region. The clinical inspection showed very irregular incisal edges. The dental arch and the gingival profile were not harmonious. The length to width ratios were also not adequate. Previous defects were filled with lifeless composite fillings, and teeth 11 and 21 were discolored. The patient wanted a level dental arch, uniform tooth color and an individualized, age-appropriate appearance for her anterior maxillary region. The choice was made to use individually

layered veneers made of VITA LUMEX AC veneering ceramic for the restoration.



Fig. 2 Production of the master model.



Fig. 3 Refractory dies were produced using the master model.



Fig. 4 The finished master model was ready for fabrication of the veneers.



Fig. 8 Chromacity and translucency were harmoniously balanced.



Fig. 9 The dental arch was shaped according to the rules of esthetics.



Fig. 10 The lips and incisal edges harmonized with each other.

2. Planning and preparation

A wax-up was created in order to better discuss the target situation with the patient. After a few minor changes, a silicone key was produced on the wax-up in order to transfer a direct mock-up into the mouth using low viscosity, temporary composite. The patient and dentist were satisfied with the results. Local anesthetic was applied to the anterior maxillary region and tooth shade A1 was selected for the restorations using the VITA classical A1–D4 shade guide. After a full crown preparation was performed for teeth 13 to 23, gingival resection on 11 and 21, and impressions were made of the upper and lower maxillary region, another direct temporary restoration was created intraorally using the silicone key. A master model was made with refractory dies in the laboratory and articulated with the opposing jaw model.

3. Reliable reproduction of the play of light

The basic tooth shade determined was initially reproduced on refractory dies with VITA LUMEX AC DENTINE A1, followed by a central accentuation using TRANSLUCENT smoky-white. A bluish play of light was integrated by applying TRANSLUCENT waterdrop on the edges. The anatomy of the mamelons could be reproduced using MAMELON saffron. The final shape of the six veneers was then contoured with bluish-translucent ENAMEL light, so that the play of light and color of the enamel could be precisely reconstructed. The ceramic enabled high-precision modeling during the entire layering process, thanks to its extremely high stability, which is due to the excellent microserration of the ceramic particles. Furthermore, the extremely thin veneers showed excellent shape stability after firing. The finalization was ultimately carried out using fine diamond instruments and polishers in order to achieve completely natural results in terms of shape, texture and degree of gloss.

4. Natural vibrance in the results

During the initial try-in, the patient was already enthusiastic about the results, allowing a rubber dam to be created for the final seating. After appropriate conditioning of the tooth substance, as well as hydrofluoric acid etching and silanization of the veneers, a full-adhesive integration with composite cements could be applied. Despite the limited space, the veneers made of VITA LUMEX AC ceramic showed excellent light dynamics and a very good play of colors with depth effects.

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Fig. 5 The mamelons were further accentuated with MAMELON saffron



Fig. 6 The final shaping of the six veneers was performed using ENAMEL light.



Fig. 7 The absolutely natural appearance of the six veneers was already visible in the master model.



➔ **RESULTS** The veneers made of VITA LUMEX AC showed excellent light dynamics and a very good play of color.

INFO: WHAT IS VITA LUMEX AC?

WHAT?

- VITA LUMEX AC is a leucite-reinforced, glass-ceramic veneering system with an innovative material formula for vivid and reliable results with shade accuracy

WHAT FOR?

- For the veneering of all conventional all-ceramic framework materials (zirconia, lithium disilicate and feldspar ceramic) and for the production of reconstructions without a framework (e.g., veneers)

WITH WHAT?

VITA LUMEX AC contains:

- GINGIVA- OPAQUE, OPAQUE DENTINE, DENTINE and ENAMEL materials, as well as a wide array of effect materials (e.g., OPAL TRANSLUCENT, FLUO INTENSE, and much more)
- ideally matched system components, such as brushes, firing trays, glazing materials, etc.



VITA LUMEX AC offers virtually unlimited possibilities for precise and reliable reproduction of shade effects and multi-faceted light effects.

Reproducing patient-specific natural vibrance with VITA LUMEX AC veneering ceramic



*Dental Technician
Michele Prosperino
San Severo, Italy*

When the natural dentition exhibits very pronounced shade characteristics, this poses a special challenge for dental technicians. In order to reproduce all the individual nuances of the natural play of colors, veneering ceramic and a wide range of effect materials are required. In addition, reproducing natural vibrancy becomes particularly complicated when the enamel shows a multi-faceted play of color and light, for example in the form of greyish-white transparency. Here it is necessary to reproduce the individual degree of translucency with different enamel- and effect materials. VITA LUMEX AC (VITA Zahnfabrik, Bad Säckingen, Germany) is a new veneering system that offers virtually unlimited options for precise and reliable reproduction of shade effects and multi-faceted play of light. In the following case report, Dental Technician Michele Prosperino (San Severo, Italy) shows how he successfully handled one of these very sophisticated cases with the new veneering ceramic.



→ **INITIAL SITUATION** Framework try-in and tooth shade determination using the VITA shade guide.



→ **RESULTS** A highly esthetic result was achieved using VITA LUMEX AC.

1. Patient case and material selection

A 52-year-old patient suffered fractures on all mandibular front teeth as a result of a trauma. After the teeth were preserved, the patient did not experience any discomfort. The teeth that had been loosened by the trauma had stabilized once again. After a longer temporary restoration phase, the patient now requested a definitive reconstruction. After this restoration, he wanted to be able to smile again as he did before the accident. In order to stabilize the teeth after the traumatic loosening, the dentist and patient decided to use a splinted crown restoration for teeth 32 to 42. When selecting the material, the decision was made in favor of zirconia crown frameworks, which were to be veneered with the new leucite-reinforced, glass-ceramic veneering system VITA LUMEX AC.

2. Shade determination and framework fabrication

The four front teeth were given a local anesthetic. This was followed by systematic and precise tooth shade determination using a VITA shade guide. After the preparation, a mould of the stumps was made, which was used as the basis for the master model. The translucent, pre-shaded zirconia VITA YZ T Color in brightness level LL1 was selected for the framework fabrication. Digitization was carried out using the S600 ARTI laboratory scanner, the framework design was created with the zirconia tooth software and the framework was fabricated using the CAM unit M5 Heavy Metal (all Zirkonzahn, Pustertal, South Tyrol, Italy).



Fig. 2 The washbake is done with FLUO INTENSE sand and the incisal with sesame.



Fig. 3 The basic assessment of the dentin portion is carried out with DENTINE A3.



Fig. 6 The central ceramic application of A3 with added OPAL TRANSLUCENT opal-neutral.



Fig. 7 ENAMEL light was added before the first dentin firing.

3. Highly precise veneer with shade fidelity

The new veneering ceramic is very impressive with its outstanding modelling properties, thanks to its excellent stability.

For the washbake, FLUO INTENSE sand and incisal sesame were applied cervically for in-depth control of the fluorescence. The basal dentin portion was layered with DENTINE A3, according to the determined basic tooth shade. A 50:50 mixture of DENTINE A 3.5 and DENTINE MODIFIER copper was then applied to the central palatal area. An intensification of the cervical margin was performed laterally with

A3.5, in combination with some FLUO INTENSE sand. The central ceramic application of A3 followed with added OPAL TRANSLUCENT opal-neutral. Finally, ENAMEL light was added and the first dentin firing was carried out. For the ceramic application, the new veneering ceramic was particularly impressive, due to its outstanding modelling properties, and thanks to its excellent stability. The final enamel layering for the corrective firing was carried out in the upper third of the crown with a 50:50 mixture of ENAMEL medium and clear. After the final firing, the end result showed remarkable shade fidelity. Precise reproduction of the initially determined tooth shade was incredibly successful using the VITA LUMEX AC veneering ceramic. Finally, fine rotating diamond tools and a glaze firing with VITA AKZENT PLUS GLAZE were used for the finalization.





Fig. 4 A 50:50 mixture of DENTINE A 3.5 and DENTINE MODIFIER copper was applied palatally.



Fig. 5 The intensification of the cervical margin was performed laterally with A3.5, in combination with some FLUO INTENSE sand.



Fig. 8 The final enamel layering for the corrective firing was carried out with a 50:50 mixture of ENAMEL medium and clear.

4. Ideal dynamics of light in the results

The splinted crown restoration was permanently incorporated with a self-adhesive luting composite. The patient was very enthusiastic about the highly esthetic result. The restoration showed an ideal interplay of opacity, chromacity and translucency. The specific shade characteristics of the natural teeth were reproduced precisely, resulting in a reconstruction that integrated harmoniously into the natural dentition. The ceramic could be processed very precisely and showed impressive excellence in shade fidelity, resulting in outstanding light dynamics.



➔ **RESULTS** A highly esthetic result was achieved using VITA LUMEX AC.



> INITIAL PHASE

> PLANNING PHASE



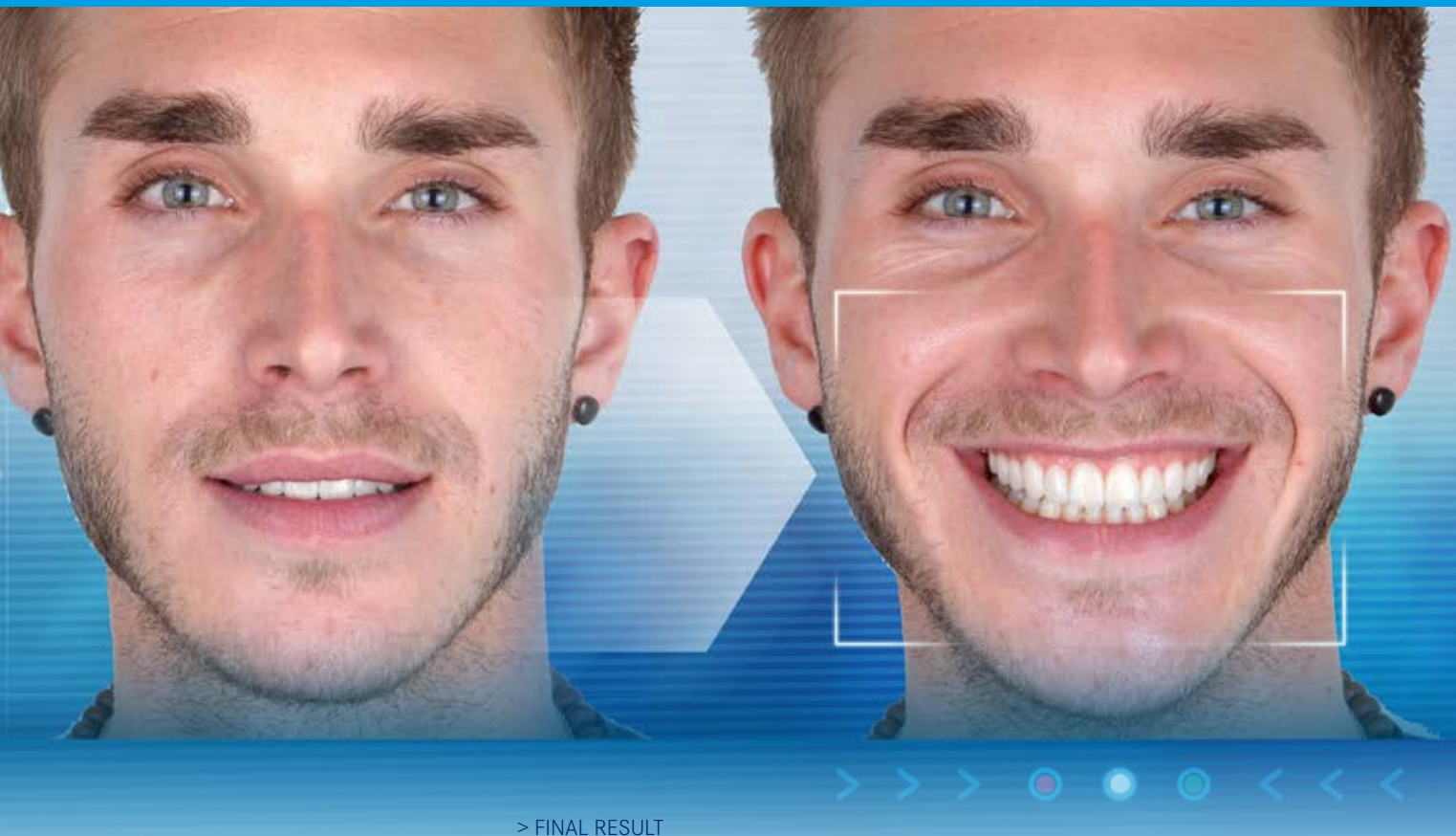
*Dentist Dr. Alexandre Richard
Lausanne, Switzerland*



*Dental Technician Xavier Bosson
Châtel-Saint-Denis, Switzerland*

Complex, cosmetic reconstruction of the front using VITA VMK MASTER ceramic

Cosmetic restoration of the esthetic zone is always associated with a number of different technical challenges. In order to successfully reproduce the natural play of form, color and light in a patient-specific, age-appropriate manner, meticulous esthetic planning is a key component. It is possible to achieve highly predictable treatment results with great teamwork between practitioners and technicians, and with the involvement of the patient. In the following, Dentist Dr. Alexandre Richard (Lausanne, Switzerland) and Dental Technician Xavier Bosson (Châtel-Saint-Denis, Switzerland), show how working together as a dentist and dental technician team helped them successfully achieve the complex, cosmetic restoration of an anterior upper jaw with veneers made of VITA VMK MASTER ceramic (VITA Zahnfabrik, Bad Säckingen, Germany) using comprehensive analog and digital planning.



> FINAL RESULT



Fig. 2 The tooth shade and white spots disturbed the patient.



Fig. 3 Using an app, the tooth proportions could be changed virtually.



➔ **INITIAL SITUATION** The incisal edge was very uneven.

1. A patient with high expectations

A 27-year-old patient, who is a dental technician, was dissatisfied with the color and shape of his upper front teeth, and wanted a cosmetic restoration using veneers. Due to his professional background, his esthetic expectations were naturally high. Clinically, there was an uneven incisal edge and faint white spots. According to the patient, he grinded his teeth in his sleep. Grinding marks were visible. Clinically, no interfering contacts could be diagnosed. The patient did not experience any discomfort. To reconstruct the appearance of the esthetic zone and the anterior cuspid guidance in a patient-specific manner, the dentist and dental technician decided to use individually layered veneers.

2. Analog and virtual planning

Using the Smile Designer Pro app (Tasty Tech, Toronto, Ontario, Canada) and portrait photos, the restoration of 15 to 25 was digitally constructed, according to the established concepts of Smile Design. Based on anatomic impressions, models were fabricated and then articulated for a wax-up. After a final discussion on the wax-up, it could be transferred intra-orally using a silicone key and temporary composite (Protemp 4, 3M Aspen, Seefeld, Germany). After some minor additive and subtractive optimizations, the patient was satisfied and a mould was made of the final situation.



Fig. 4 The virtual before/after provided the initial guidelines.



Fig. 5 With the help of a wax-up, a direct mock-up was prepared.



Fig. 6 The tooth shade was determined using the VITA SYSTEM 3D-MASTER.



Fig. 10 The provisional solution corresponded to the mock-up.



Fig. 11 The master model with platinum foil on the stumps.



Fig. 12 The dentin section was layered with LUMINARY 1 (white) and DENTINE 1M1.

3. Preparation and layering

Before preparations, the tooth shade 1M1 was determined using the VITA SYSTEM 3D-MASTER shade guide. The mock-up preparation then followed. After the impression was taken, a temporary restoration was fabricated using the spot-etch technique. The ten veneers were created on a fabricated master model using the platinum foil technique from the veneering ceramic VITA VMK MASTER. The dentin section was reproduced with fluorescent LUMINARY 1 (white) and DENTINE 1M1. The internal characterizations were carried out using VITA INTERNO Stains 01 (white) and 02 (sand). The enamel portion could be achieved using alternating layers of TRANSLUCENT 1 (whitish), 2 (yellowish-brownish), 4 (neutral) and 5 (light blue), as well as neutral OPAL TRANSLUCENT 1 and whitish ENAMEL 1.

4. Fixing and highly esthetic results

During the clinical try-in of the finished veneers, the contours of the cuspids were given a more bulbous shape using composite. The space between the cuspids and the lateral incisors was closed in the same manner. This gave the dental technician an accurate indication of the requested corrections. After the correction firing, the final incorporation of the surface texture and the high-gloss polishing, the veneers could be cemented using dual-curing composite cement after hydrofluoric acid etching and silanization. Using veneers made of VITA VMK MASTER ceramic, a highly esthetic appearance could be achieved in terms of shape and color. The lips and incisal edges harmonized well with each other. The patient expressed his great satisfaction with the final results of the cosmetic reconstruction with a relaxed smile.



Fig. 7 Images taken with a polarizing filter show the shade nuances.



Fig. 8 A controlled mock-up preparation allowed for a minimally invasive procedure.



Fig. 9 The clinical situation after minimal tooth substance removal and with slight tapering.



Fig. 13 The result of the layering after firing.



Fig. 14 The final try-in of the veneers on teeth 11 and 21.



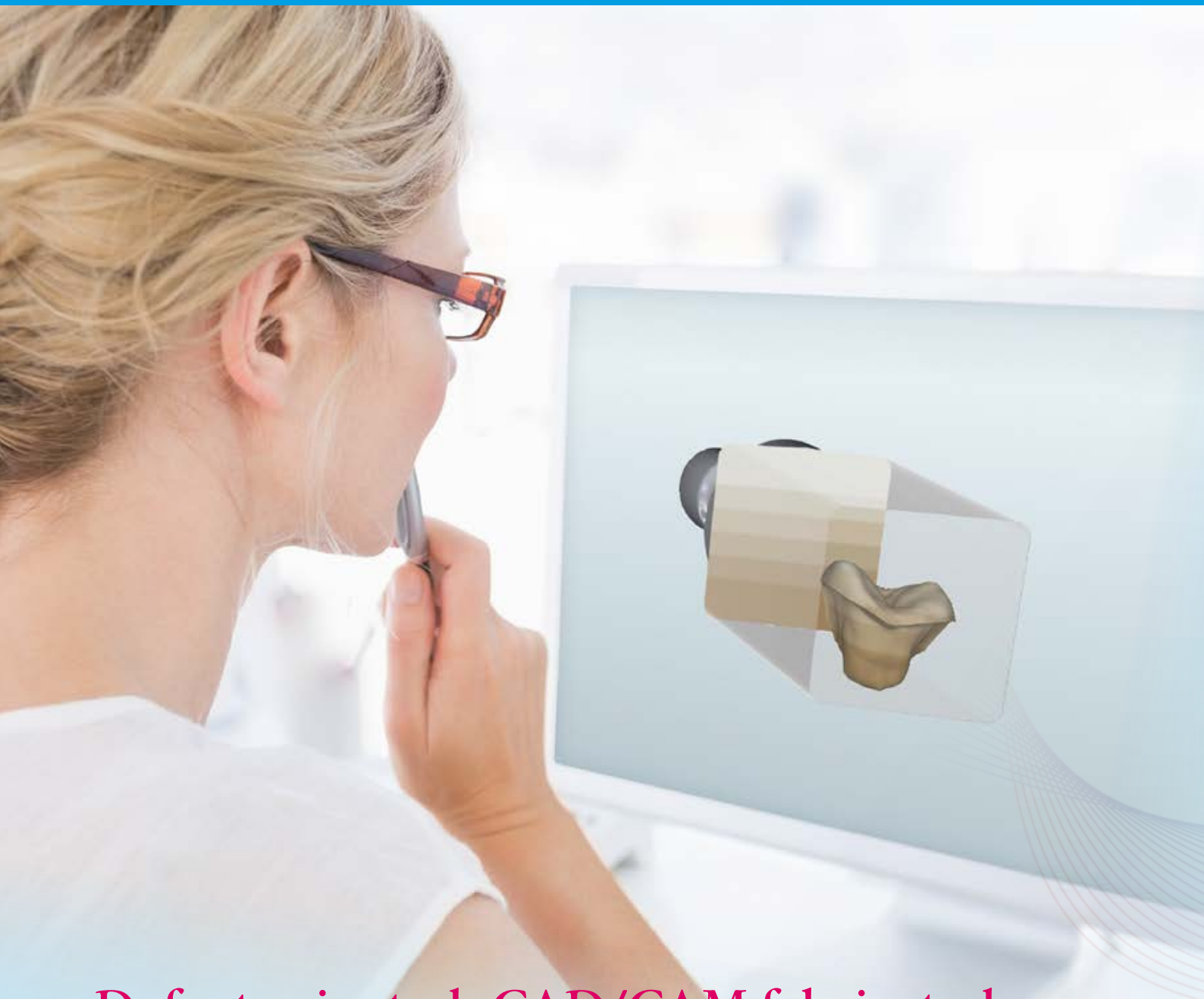
Fig. 15 The clinical situation after six weeks. The papillae showed complete regeneration.



Fig. 16 The veneers showed a highly esthetic appearance in terms of shape and color.



→ RESULT The patient was delighted with his new smile. The lips and incisal edges harmonized with each other.



Defect-oriented, CAD/CAM-fabricated endocrown restoration with polychrome hybrid ceramic



*Dentist Dr. Oxana Naidyonova
Karaganda, Kazakhstan*

Using endocrowns to restore deeply damaged teeth that have undergone root canal treatment is a defect-oriented and minimally invasive procedure. In contrast to full crown preparations, tooth substance preservation is a top priority for endocrowns. However, in these kinds of cases, this requires CAD/CAM materials such as the biomimetic hybrid ceramic material VITA ENAMIC (VITA Zahnfabrik, Bad Säckingen, Germany), that allow for extremely delicate reconstructions with minimum wall thicknesses and material properties that exhibit tooth-like behavior. In the following case, the hybrid ceramic was also selected because its high edge stability allows it to be processed precisely with CAM technology, and it ensures a secure adhesive attachment, according to the proven all-ceramic protocol. Dentist Dr. Oxana Naidyonova shows her step-by-step procedure in the following case study.



Fig. 1 The insufficient composite filling on tooth 14 (OD) had led to inflammations in the interdental space.



Fig. 2 After removal of the old composite filling, an inflammatory bleeding of the gingiva appeared on the proximal box.



Fig. 3 To stop the bleeding and make all areas visible, a distal gingivectomy was performed and a retraction thread was inserted.



Fig. 4 Based on the intraoral scan, a virtual model was created for the construction.

1. The patient case

A 28-year-old male patient visited the clinic after an endodontic treatment and filling therapy on tooth 14, due to consistent food remnants in the distal proximal space that were difficult to remove and often led to local inflammation. The clinical evaluation found that the filling restoration (OD) was insufficient. The X-ray check showed nothing out of the ordinary. The patient opted for a new, time-efficient CAD/CAM-supported restoration. VITA ENAMIC multiColor polychrome was selected for the reconstruction. This CAD/CAM blank has an integrated shade and translucency gradient, and a natural play of colors and light that can be conveniently reproduced at the push of a button.

2. Clinical steps

Before the preparation, the tooth shade 2M2 was determined using the VITA Toothguide 3D-MASTER (VITA Zahnfabrik, Bad Säckingen, Germany), and the appropriate blank in the shade 2M2 was selected. After local anesthesia was applied, the composite filling was removed. And after full-adhesive conditioning, all undercuts were evened out with a low-viscosity composite. The remaining cavity walls were only reduced with a shoulder preparation. This was followed by the insertion of a retraction thread, as well as a gingivectomy of the enlarged and inflamed gum areas on the distal box so that an optical scan could be used to detect all relevant areas.

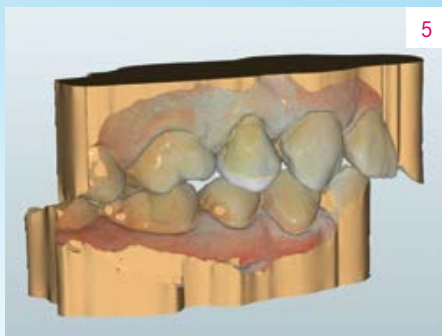


Fig. 5 The finished virtual design of the endocrown restoration in the vestibular view.

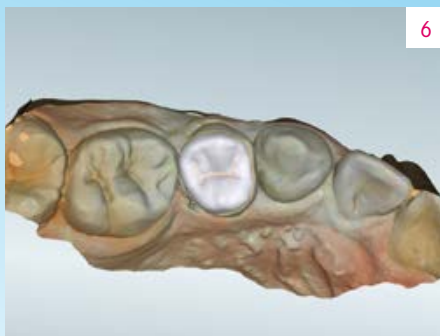


Fig. 6 The virtual design in occlusal view before nesting in the virtual block.



Fig. 7 Thanks to six finely nuanced layers, the shade and translucency gradient of the restoration could be controlled with the positioning.

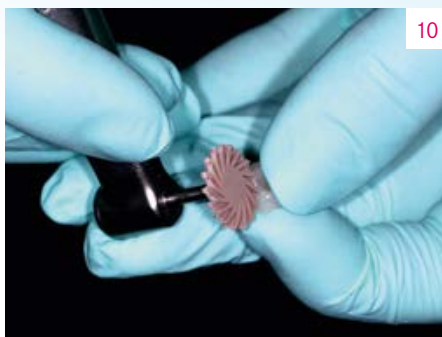


Fig. 10 The finished hybrid ceramic crown was then polished to a high gloss.



Fig. 11 Under the rubber dam, the fully adhesive seating began with phosphoric acid etching of the cavity.



Fig. 12 Condition immediately after full-adhesive seating, before removal of the cement residues.

3. CAD construction and CAM fabrication

After the CAD design was complete, the restoration could be positioned in the virtual VITA ENAMIC multiColor blank with its six finely nuanced layers, so that the translucency and shade gradient corresponded to the clinical situation. This was followed by fabrication using the MyCrown Mill grinding unit (FONA Dental, Bratislava, Slovakia). After the restoration was finished with fine diamonds, the fissures were conditioned with hydrofluoric acid (5%) and silane in order to characterize them with light-curing composite stains. The final step was the high-gloss polish.

4. Full-adhesive seating and final result

A rubber dam was created for the fully adhesive seating in order to prevent contamination, and to ensure absolute dryness and a sustainable bond. The adhesive surfaces of the restoration were conditioned using hydrofluoric acid (5%) and silane. In order to create a retentive etching pattern on the enamel areas and to prepare the dentin for the adhesive bond, the cavity was etched with phosphoric acid and then an adhesive was applied. For bonding, the composite Micerium (Micerium, Avegno, Italy) in the shade HRI was heated to give it a lower viscosity for insertion. Lastly, light curing and removal of the composite residues followed. As a result, the polychrome hybrid ceramic restoration was integrated harmoniously into the natural tooth structure, producing very esthetic results. The follow-up appointment three months later showed a healed and inflammation-free gingiva around the restoration.



Fig. 8 The highly translucent, hybrid ceramic block in the color 2M2 clamped in the grinding machine.



Fig. 9 The CAD/CAM-supported restoration after the preparation at the clinical try-in.



Fig. 13 Immediately after the final seating, the gingiva was still irritated and inflamed.



Fig. 14 During the follow-up after three months, healthy gingival conditions appeared.



The polychrome hybrid ceramic blank VITA ENAMIC multiColor has an integrated shade/translucency gradient.



➔ **RESULT** Thanks to the very good light-optical properties, the reconstruction made of VITA ENAMIC multiColor integrated perfectly into the natural tooth substance.

Minimally-invasive restoration of an incisal edge defect with CAD/CAM hybrid ceramic

The worldwide unique CAD/CAM hybrid ceramic VITA ENAMIC consists of a structure-sintered glass ceramic matrix that is infiltrated with polymer. The dual ceramic-polymer network allows for very delicate reconstructions with wafer-thin, precise marginal areas of up to 0.2 millimeters. Thanks to its dentin-like elasticity, its enamel-like abrasion behavior and its natural light transmission, the CAD/CAM material exhibits excellent functional and esthetic integration into the natural tooth structure. In the following case study, Dentist Dr. Sheng Fang (Chengdu, China) and Dental Technician Feng Li (Chengdu, China) show how they were able to restore an incisal edge defect with a minimally invasive process on the central maxillary anterior tooth using the hybrid ceramic VITA ENAMIC (VITA Zahnfabrik, Bad Säckingen, Germany).



Dentist Dr. Sheng Fang
Chengdu, China



Dental Technician
Feng Li
Chengdu, China



➔ **INITIAL SITUATION** The initial situation with fractured tooth 21 when the patient first presented at the dental practice.

1. The patient case

A 21-year old patient visited the dentist's office because the composite structure of her distal corner of tooth 21 was fractured due to secondary caries. She wanted a long-term, permanent restoration to be integrated harmoniously into her tooth structure. Because this restoration was scheduled to be minimally invasive and required a reconstruction with thin walls, the dentist and dental care team opted for a CAD/CAM-supported reconstruction using the hybrid ceramic VITA ENAMIC.

2. Tooth shade determination and material selection

Precise color information is essential in making the correct choice when it comes to the shade-matching material blank. To ensure optimal shade integration of the existing incisal edge defect on the reconstruction, the tooth shade was determined using the VITA Linearguide 3D-MASTER shade guide, after applying local anesthesia. Systematic tooth shade determination was carried out in two steps. In the first step, a brightness level from 0 to 5 was determined using the VITA Valueguide 3D-MASTER shade guide. The color intensity and shade were then determined using the appropriate shade guide from the VITA Chroma/Hueguide 3D-MASTER. This resulted in the selection of tooth shade 1M2. Since this primarily involved a restoration of the translucent enamel area, a translucent HT blank in the color 1M2 was selected for the CAD/CAM-supported fabrication. To prepare for the digital impression, only the caries was removed and the enamel edges of the defect were slightly tapered.

Since hybrid ceramic can be processed precisely even with thin wall thicknesses, the patient could undergo a minimally invasive treatment.

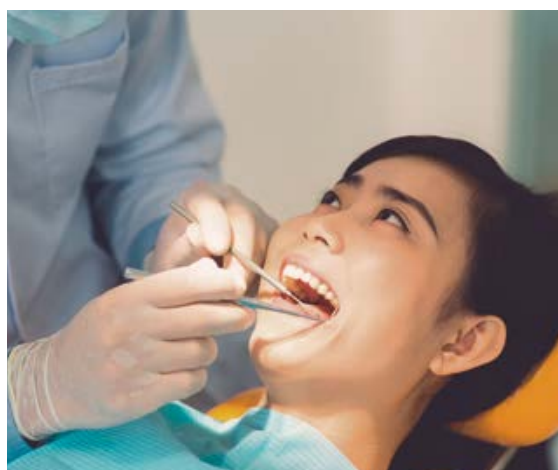




Fig. 2 Secondary caries had formed under a direct composite abutment, which led to a filling fracture.



Fig. 3 The tooth shade was systematically determined in two steps using the VITA Linearguide 3D-MASTER.



Fig. 4 The caries was removed under local anesthesia and the edge areas in the enamel were slightly tapered.



Fig. 5 The CAD/CAM-supported finished restoration made of VITA ENAMIC with wafer-thin edges.



3. CAD/CAM fabrication and finishing

This was followed by the intraoral scan with the CEREC Omnicam 4.2 and the virtual design of the restoration using the CAD software inLab CAD 15.2. The order was sent to the inLab MC XL milling unit and executed there (all Dentsply Sirona, Bensheim, Germany). Afterwards, the sprue was removed and the restoration was finished with fine diamond instruments. Lastly, the final finishing was done using the VITA ENAMIC Polishing Set technical. During the try-in, the partial restoration was a perfect fit and could be etched on the adhesive surfaces using hydrofluoric acid and then silanized. The tooth substance was pre-treated using the acid etching technique and then an adhesive was applied. This was followed by final seating using composite cement.

4. Finalization and summary

After the cement residues were removed, the transitions between tooth and restoration were evened out using the VITA ENAMIC Polishing Set. The delicate restoration showed a very harmonious integration in the natural tooth structure, thanks to its natural play of colors and light. Due to the comparatively low brittleness of hybrid ceramic - even with very thin wall thicknesses - and its thinly tapered edges, hybrid ceramic can be precisely processed and the patient provided with minimally invasive treatment. Using the digital workflow to create an efficient fabrication of the indirect restoration made it possible to treat the patient in one session. The dental team and the patient were completely satisfied with the results of the final restoration.

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→ RESULT The final situation after the fully adhesive integration with composite.



Implant Prosthetic Crown Restoration with Toothlike Properties



*Dental Technician Andrea Lombardo
Verona, Italy*



*Dentist Dr. Mauro Fazoni
Verona, Italy*

Implant-supported restorations are firmly anchored into the bone. That is why it is important for implants to be made with restoration materials that are able to absorb chewing forces, minimizing the risk of overstressing the antagonist, the restoration and the peri-implant bone. The natural hard tooth substance is a balanced hybrid made of resistant enamel and equally elastic dentin. Dentist Dr. Mauro Fazoni and Dental Technician Andrea Lombardo explain how this natural recipe for success can be transferred to implant-supported crown restorations. In the following case, the authors used two different CAD/CAM materials for the superstructures: the hybrid ceramic VITA ENAMIC IS and the feldspar ceramic VITABLOCS TriLuxe forte (both: VITA Zahnfabrik, Bad Säckingen, Germany), in order to intelligently combine elasticity and wear resistance.



➔ **INITIAL SITUATION** The initial situation with persistent primary teeth that are not worth preserving in regions 34 and 35.

1. Patient case and material selection

A 32-year-old patient presented at the practice with two persistent primary teeth that were no longer worth preserving, as they had failed to attach to tooth 35 and 45. After a thorough consultation, the patient decided to have the deciduous teeth extracted and undergo an implant restoration. In order to reproduce the elastic dentin, the abutments were scheduled to be fabricated individually from the hybrid ceramic VITA ENAMIC IS, due to its dentin-like elasticity. The pre-integrated interface allowed for efficient CAD/CAM-supported fabrication and guaranteed a precise fit to the titanium base. Reproducing the play of colors and light, as well as the functional properties of the mineral enamel was to be achieved using crowns made of the polychrome feldspar ceramic VITABLOCS TriLuxe forte.

2. Surgery and CAD design

The two deciduous teeth were extracted under local anesthesia. After a healing period of three months, two Ankylos implants were inserted at tooth 35 and 45. After healing and exposure of the implants, scanbodies were placed and the situation was digitalized using the Omnicam. Using the inLab software (all: Dentsply Sirona, Bensheim, Germany), abutments and crowns could now be designed in line with the natural tooth structure and then produced with the CAD/CAM materials VITA ENAMIC IS and VITABLOCS TriLuxe forte. The coronal margins were not created subgingivally, in order to ensure a simple and clean adhesive cementation of the crowns under the rubber dam. Additive manufacturing was used to produce a model with integrated implant analogs to check the fit (XFAB, DWS, Vicenza, Italy).



Fig. 2 After the implants healed, they were exposed and scanbodies were set up for the virtual impression.



Fig. 3 The scanned intraoral situation in the lower jaw in the inLab CAD-Software.



Fig. 7 The peri-implant gingiva was well formed and completely free of inflammation.

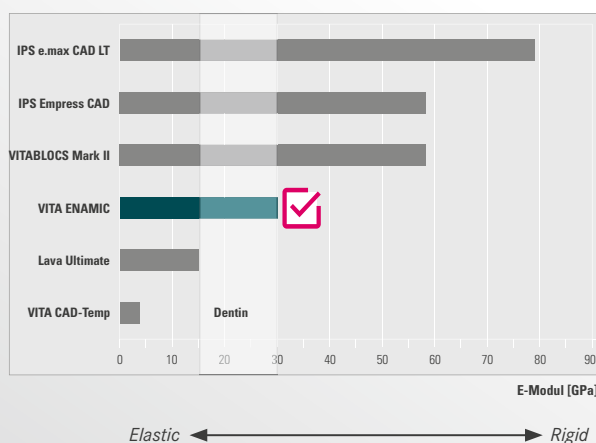


Fig. 8 During the try-in, the implant prosthetic superstructures were a tension-free fit.

MODULUS OF ELASTICITY DENTAL MATERIALS

VITA ENAMIC is the unique global dental hybrid ceramic with a dual ceramic-polymer network structure. With an elasticity of 30GPa, VITA ENAMIC is in the same range as human dentin. Thanks to the integrated elasticity, the material provides chewing-force absorbing properties, thereby minimizing the risk of functional fatigue.

Modulus of elasticity*



Source: Internal study VITA R&D; Berechnung der Elastizitätsmodule o. g. Materialien aus Spannungs-Dehnungs-Diagrammen von Biegefestigkeitsmessungen, report 03/12, published in Scientific documentation VITA ENAMIC, download via www.vita-enamic.com

***) Note:** With an elasticity of 30 GPa, VITA ENAMIC is in the same range as human dentin. There are a wide range of references concerning the modulus of elasticity of human dentin in literature. Source: Kinney JH, Marshall SJ, Marshall GW. The mechanical properties of human dentin: a critical review and re-evaluation of the dental literature. Critical Reviews in Oral Biology & Medicine 2003; 14:13-29.

3. CAM production of implant-retained dentures

After CAM production, manual finishing and a check of the fitting, the hybrid ceramic abutments were adhesively bonded to the titanium base. For this purpose, the adhesive surfaces of the abutment were etched with hydrofluoric acid (5%) for 60 seconds and then silanized. The adhesive surfaces of the titanium bases were blasted with 50µm aluminum oxide at 1.5bar, and a metal primer was applied. The adhesive bonding was done using an opaque composite cement. After hardening and removal of the excess, the final hardening was completed under glycerine gel, in order to prevent an oxygen inhibition layer from forming. Finally, the fissures of the CAM-fabricated and manually prepared feldspar ceramic crowns were characterized with the ceramic stains VITA AKZENT PLUS EFFECT STAINS 06 (russet) and then glazed with glaze paste.



Fig. 4 The virtual model of the lower jaw was used as the basis for the production of a control model using additive manufacturing.



Fig. 5 The model was created using additive manufacturing with integrated implant analogs in regions 34 and 35.



Fig. 6 The soft tissue healed until the final restoration with gingiva formers.



Fig. 9 The design of the crown edges could be optimized on the hybrid ceramic.



Fig. 10 The situation in region 34 immediately after full-adhesive seating of the feldspar ceramic crown made of VITABLOCS TriLux forte.



Fig. 11 The feldspar ceramic crown on 35 looked completely natural.

4. Try-in, final result and conclusion

The clinical try-in showed perfectly healthy soft tissue conditions and a smooth fit of the restorations after the removal of the gingiva former, and were ready to be prepared for final seating. To achieve this, the adhesive surfaces of the abutments and crowns were etched extraorally with hydrofluoric acid and silanized. After the abutments were screwed in, a rubber dam was placed. The crown was then adhesively bonded to the abutment intraorally. The full-adhesive bond between the hybrid ceramic abutment and the feldspar ceramic crown resulted in a biomimetic unit that reproduced the tooth structure very well, both esthetically and functionally. Thanks to the chewing-force absorbing properties of the hybrid ceramic, good long-term durability is expected for this restoration. The integrated color gradient in the feldspar ceramic crowns give this monolithic restoration an esthetically convincing look.



→ RESULT Both implant-supported prosthetic restorations integrate harmoniously into the natural dental arch.

This article was initially published in the CAD/CAM International Magazine of Digital Dentistry, Italian edition no. 02/2019.

PRÄZISE

1.

SHADE DETERMINATION & CHECKS

2.

CAD DESIGN

3.

CAM FABRICATION

4.

CHARACTERIZATION

RESULT

ÄSTHETISCH

Efficient, monolithic restoration of the front teeth using XT zirconia



*Dentist Dr. Manuel Ruiz Agenjo
Santander, Spain*



*Francisco Pérez, Manager Fresdental,
Pedreguer, Alicante, Spain*

For high-strength, monolithic anterior tooth restorations, there is now extra-translucent, polychrome zirconia that achieves a level comparable to that of glass ceramic, in terms of light transmission and play of colors. The VITA YZ XT multicolor blanks (VITA Zahnfabrik, Bad Säckingen, Germany) are representative of this new generation of exceptionally translucent, esthetic zirconia. In order to restore the esthetic zone on both a monolithic and individual level, coloring liquids are sometimes used to reproduce the specific color characteristics for the depth of natural dentition. In the following case, the dental team consisting of Dentist Dr. Manuel Ruiz Agenjo (Santander, Spain) and Francisco Pérez (Manager of the Fresdental Milling and Training Centre, Pedreguer, Alicante, Spain) demonstrates how they were able to restore a patient's central front teeth efficiently, precisely and above all, esthetically using extra translucent zirconia and ideally matched shading liquids, thanks to an expertly matched material system.



Fig. 2 During the preparation, a precise preparation limit and all-ceramic design was achieved.



Fig. 3 The gingiva was retracted with threads and Teflon to cover all relevant areas during the impression making process.



INITIAL SITUATION The initial situation with lifeless and insufficient metal-ceramic crowns on 11 and 21.

1. Patient case and material selection

A 51 year old male patient came to the dentist's office because he was unsatisfied with the esthetic appearance of his middle upper incisors. The clinical examination revealed lifeless and misshapen crowns with insufficient, visible metal edges. The new restoration was to be implemented efficiently, using CAD/CAM-produced monolithic crowns, made from the extra-translucent zirconia VITA YZ XT. The restoration was colored individually, using the ideally balanced VITA YZ SHADE LIQUIDS coloring liquids, in order to reproduce the natural play of colors, and customize for the needs of the patient.

2. Clinical steps

A great deal of emphasis was placed on detailed analog preparations, in order to ensure precise and efficient digital implementation. After local anesthetic was applied, the tooth shade D2 was determined using the VITA classical A1-D4 shade guide. The two crowns were then slit and removed. The stumps were carefully prepared. Careful attention was paid to defining clear preparation margins and round preparation moulds suitable for ceramics, so as not to create any stress peaks in the restoration. In order to reach all relevant areas with the one-step A-silicone impression, the gingiva was held with retraction threads and Teflon tape. The master models were produced and scanned, based on the impression.



Fig. 4 The impression with A-silicone was done at one time with Light and Heavy Body.



Fig. 5 Digital photographs with the selected shade guide were taken for the laboratory.



Fig. 6 The master model produced was digitalized using the lab scanner.



Fig. 10 The basic color and the chroma in the cervical third were intensified with D3 coloring.



Fig. 11 VITA YZ EFFECT LIQUIDS Orange was used for incisal infiltration.



Fig. 12 VITA YZ EFFECT LIQUIDS Grey and Blue were used for central characterization.

3. CAM fabrication and coloring

The digital construction of the monolithic crowns was done using the exocad software (exocad, Darmstadt, Germany). Afterwards, the crowns were milled from a VITA YZ XT multicolor round in the Fresdental production and training center with the CAM unit CORITEC 250i (imes-icore, Eiterfeld, Germany), and ultimately finished manually. The next step was to color the crowns with the VITA YZ SHADE LIQUIDS. The coloring liquid in the shade D3 was used to intensify the base shade and to increase the chroma in the cervical third. VITA YZ EFFECT LIQUIDS Orange (incisal), Grey and Blue (central), as well as Pink (lateral and incisal) were used for further characterization of the central and incisal area. In the last step, sintering then followed in the VITA ZYRCOMAT 6100 MS (VITA Zahnfabrik, Bad Säckingen, Germany). Since only tested raw materials are used for VITA YZ blanks, the sintering shrinkage is precisely determined for each batch, and the blanks have a homogeneous microstructure, thanks to subsequent isostatic compaction, resulting in a precise fit of the crowns.

4. Final result and conclusion

After surface texture was incorporated with rotating instruments and polishing, the crowns were coated with a glaze firing. During the clinical try-in, the patient and the dentist were very satisfied with the results, and the crown were attached with a self-adhesive. Thanks to the minimal, tooth-conserving post-preparation and monolithic reconstruction, the patient was treated very efficiently. The restorations made of polychrome and extra-translucent zirconia integrated harmoniously into the dental arch, showed natural light transmission, and, thanks to the coloring, exhibited all the individual color characteristics.

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A precise fit of zirconia crowns is a prerequisite for good long-term durability.

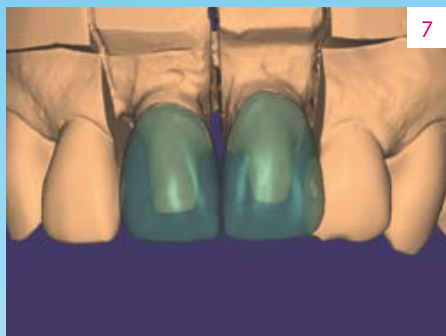


Fig. 7 In the exocad CAD software, crowns were constructed on stumps 11 and 21.



Fig. 8 The two crowns were milled out of the polychrome VITA YZ XT Multicolor.



Fig. 9 After the manual finishing process, the crowns could be individualized in color.



Fig. 13 Lateral and incisal characterization using VITA YZ EFFECT LIQUIDS Pink.



Fig. 14 The results immediately after sintering in VITA ZIRCOMAT 6100 MS.



Fig. 15 During the check, the model was a perfect fit.



→ RESULT The two crowns fit harmoniously into the natural dental arch and look absolutely natural.



Extra-translucent VITA YZ XT zirconia shows a natural light transmission and can be individually shaded with VITA YZ SHADE or EFFECT LIQUIDS.

CAD/CAM fabricated anterior crown made of glass ceramic with a natural play of shade and light



*Master Dental Technician Marcio Breda
Vitória, Espírito Santo, Brazil*

Single tooth reconstructions located in the esthetic zone pose one of the greatest challenges to dental professionals. For optimal reproduction of the multifaceted play of colors and light of natural teeth, several requirements must be met. These include collecting comprehensive and precise tooth shade information, as well as using CAD/CAM material that has both high shade fidelity and excellent light dynamics. In the following case study, Master Dental Technician Marcio Breda and Dentist Dr. Glauco Rangel Zanetti (both: Vitória, Espírito Santo, Brazil) show how they were able to efficiently and esthetically implement an anterior restoration using the high-strength glass ceramic VITA SUPRINITY PC and the veneering ceramic VITA VM 11 (both VITA Zahnfabrik, Bad Säckingen, Germany).

1. The patient case

A 24-year-old female patient had suffered trauma on tooth 11. After a successful root canal procedure, the fractured crown was stabilized using direct composite. Since the osseous growth was now complete, the patient requested a final permanent restoration that met her esthetic expectations, including her youthful tooth anatomy. For efficient production, the zirconia-reinforced lithium silicate ceramic VITA SUPRINITY PC was selected for the crown using CAD/CAM fabrication, with a slight individualization using VITA VM 11 veneering ceramic.

2. Clinical steps and CAD/CAM

After the tooth shade was determined using the VITA classical A1-D4 shade guide, the decision was made to use a blank with the tooth shade A1 and translucency level T. After local anesthesia was applied, a full crown preparation was performed on tooth 11 and a retraction thread was inserted into the sulcus. The impression for the master model was created using A-silicone. The model was digitized using the Ceramill Map 400+ laboratory scanner, and the design was then realized using the Ceramill Mind CAD software. Finally, the anterior crown could be ground out of the VITA SUPRINITY PC blank in the Ceramill Motion 2 (all by Amann Girrbach, Pforzheim, Germany).

3. Esthetic finalization

The manual reworking and anatomical reduction of the incisal area were carried out using fine diamond instruments and rubber polishers. Incisal individualization of the crown was performed using BASE DENTINE A1, ENAMEL light and bluish-translucent EFFECT ENAMEL (EE9). After the firing, the morphology and surface texture were finalized using diamond polishers. Once the final glazing using VITA AKZENT PLUS GLAZE LT was complete, the crown was ready for the clinical try-in.



Fig. 1 Tooth 11 was prepared for a final permanent restoration with a full crown.

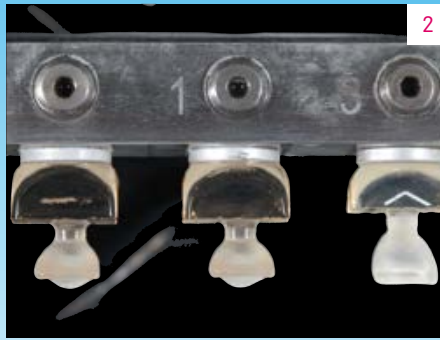


Fig. 2 The CAD/CAM-fabricated crown in the middle immediately after the milling.



Fig. 3 After finishing and minimal cut-back, the crown was individualized incisally with VITA VM 11.



Fig. 4 Palatal view of the finished crown on the model.



Fig. 5 Depending on the exposure the crown shows ...



Fig. 6 ...a different....



Fig. 7play of color and light.



Fig. 8 View into the crown lumen with hydrofluoric acid and silane for a fully adhesive fixation.



Fig. 9 The crown with full adhesion applied before removing the excess composite.

4. Fully-adhesive bonding and results

Dentist, dental technician and patient were all extremely satisfied with the esthetic appearance, and a fully-adhesive bond could be applied to the crown using composite cement, after hydrofluoric acid etching and silanization of the lumen. "The patient had very light teeth with pronounced opalescence. In reproducing these properties, the VITA VM 11 veneering ceramic and the VITA SUPRINITY PC glass ceramic harmonized perfectly with each other," explained Marco Breda, impressed by the interaction between the two ceramic materials.

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→ RESULT The crown integrated harmoniously into the dental arch and showed a highly esthetic play of color and light.



*Dentist
Dr. Christiane Weber
Rheine, Germany*



*Master Dental Technician
Franz Hoppe
Wallenhorst, Germany*



*Dental Technician
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VITA VIONIC SOLUTIONS (VITA Zahnfabrik, Bad Säckingen, Germany) is a comprehensive material system for the digital production of full dental prosthetics. With **VITA VIONIC FRAME**, this system includes a tooth frame solution for CAM technology modifications of the prefabricated prosthetic teeth, according to the digital prosthetic set-up, a bonding system and various material blanks for CAM production of try-ins and prosthetic bases. The VITA tooth library integrated in the CAD software also offers a unique variety of set-up concepts, ensuring that even complex cases can be solved virtually at the touch of a button. In the following case report, Dentist Dr. Christiane Weber, Master Dental Technician Franz Hoppe and Dental Technician Benjamin Zilke describe how they were able to use the VITA VIONIC material system and the CAD/CAM solution Ceramill FDS (Amann Girrbach, Pforzheim, Germany) to implement an esthetically and functionally outstanding, full prosthetic restoration in a highly efficient way.

Highly efficient, digital total prosthetics with VITA VIONIC FRAME



Fig. 2 The scan of the two working models in relation to the jaws, according to the axis relationship in the articulator.

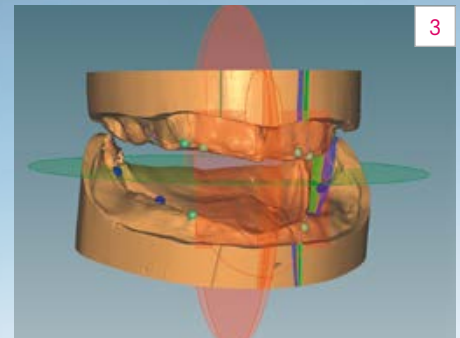


Fig. 3 The CAD software Ceramill Mind guided through the virtual model analysis according to TiF®.



1. Initial situation

A 70-year-old patient visited the practice because he was not satisfied with the function and esthetics of his total prosthetic restorations. He wanted a new restoration with a firm, stable fit and age-appropriate, vibrant prosthetic teeth producing an esthetic appearance. In order to provide the patient with an efficient total prosthetic restoration, the dental technology team decided to use digital production. In addition to its efficiency, the digital workflow also ensures a high degree of fitting precision for the dentures, as CAM denture bases can be produced with absolutely no deformation. In order to meet the esthetic expectations of the patient, the team opted for the VITA VIONIC FRAME dental frame solution with the highly esthetic VITAPAN EXCELL anterior teeth, which are particularly impressive due to their golden ratio.

2. Analog preparation and digitalization

For successful digital production, all clinically relevant information must be transmitted to the laboratory via an analog method. A precise anatomical impression, an exact-fit functional tray, a mucodynamic impression that suctions in place without shifting and a convincing jaw relationship determination are therefore essential. The working models were initially digitized individually in the laboratory scanner Ceramill Map 400+. Afterwards, the scan of the two models was performed with the Ceramill Fixator in relation to the jaws, according to the axis relationship in the articulator. After the vestibular scan of the models without jaw relationship determination, the four data sets could be matched, whereby the models were digitally available in the correct vertical dimension.

➔ **INITIAL SITUATION** Except for the pointedly tapering hyperplastic mucosal tissue in the incisal area, the lower jaw also offered stable conditions.

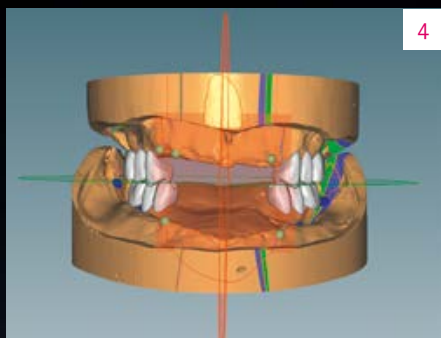


Fig. 4 At the touch of a button, the posterior teeth could then be set up with VITAPAN LINGOFORM.

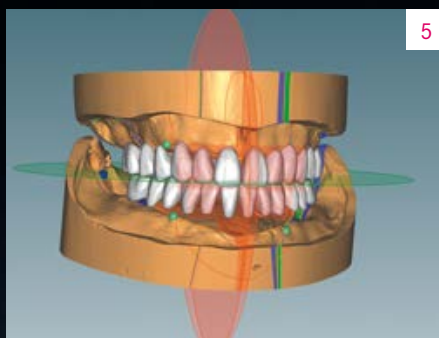


Fig. 5 With a second push of a button, the VITAPAN EXCELL was positioned in the anterior region.

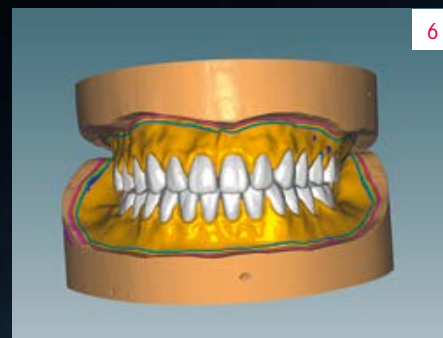


Fig. 6 Afterwards, the functional edges could be defined and the denture bases could be designed.

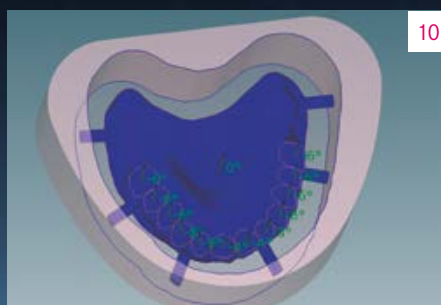


Fig. 10 Nesting of the designed maxillary base in VITA VIONIC WAX.



Fig. 11 No occlusal modifications were necessary during the clinical try-in. The esthetic results were very impressive.



Fig. 12 The completed total dentures after finishing, polishing and individualization of the lip shield using VITA VM LC flow.

3. Digital dentures at the touch of a button

The STL data set was transferred to the CAD software Ceramill Mind. The guided digital model analysis was performed according to TiF® (total prosthetics in function). After selecting the posterior teeth VITAPAN LINGOFORM and the anterior teeth VITAPAN EXCELL from the tooth library in the CAD software, the digital set-up could be implemented at the push of a button. Afterwards, the direction of insertion and the functional edges were determined virtually using a variety of design tools, and the denture bases were designed. In the next step, the design data was transferred to the CAM unit Ceramill Motion 2 and a gingiva-colored denture base was milled from a VITA VIONIC WAX material blank for try-in. Finally, the denture teeth were finished in the VITA VIONIC FRAMES CAM-technically basal-circular to fit the milled cavities of the base and fixed in the wax base.

4. Finishing the digital dentures and conclusion

After successful clinical try-in of the wax-up, the bases were permanently milled from the PMMA VITA VIONIC BASE. After cleaning and conditioning the denture teeth, they could be permanently bonded into the milled alveoli of the base with the unique two-component adhesive VITA VIONIC BOND with high precision and absolutely gap-free. For this purpose, the bonding adhesive was applied with a fine brush to the cervically conditioned tooth and the caries of the base. This was followed by polymerization within twenty minutes at 55 °C and 2.0bar. Finally, the mucogingival anatomy was individually shaped with the flowable and light-curing veneering composite VITA VM LC flow. During the seating process, the patient was impressed by the stable fit and natural appearance of his delicately designed new restorations.



Fig. 7 The finished fabricated total prosthetic restorations in final bite position.



Fig. 8 Finally, the dynamic occlusion was checked in the virtual articulator.

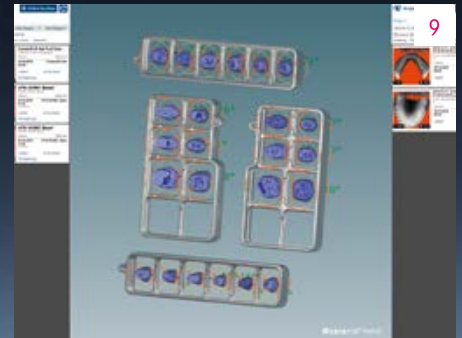


Fig. 9 The VITA VIONIC DD FRAMES in the CAD software before the circular-based CAD modification of the denture teeth.



Fig. 13 The mucogingival anatomy was reproduced naturally using the veneering composite VITA VM LC flow.



RESULT The integrated definitive total prosthetic after CAD/CAM-supported fabrication. The restoration appeared vibrant and completely natural.

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