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DENTAL VISIONIST

Take advantage of beneficial new materials and technologies!

How to successfully benefit from esthetic and economic advantages.

Provide minimally-invasive restorations with hybrid ceramics

Dr. Andreas Kurbad demonstrates his experience with the veneer restoration of two upper incisors in a case study.

> Page 23

Control for natural-looking shade saturation

Using a front crown, see how Renato Carretti systematically influences the shade effect with stains.

> Page 36

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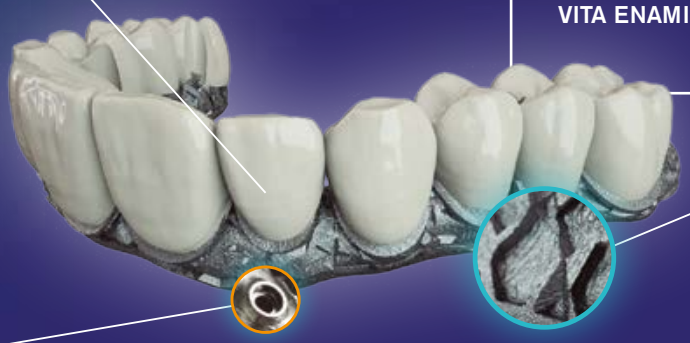

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Editorial

Take advantage of beneficial new materials and technologies!

The combination of new materials and technologies, as well as ideally coordinated workflows, is becoming more and more important in everyday practice and laboratory life.
The correct use of new materials and technologies is critical for this. In this issue of DENTAL VISIONIST, we will teach you how you can generate esthetic results and economic benefits with new approaches.

Follow numerous, successful case histories using the hybrid ceramic VITA ENAMIC. From a functional, as well as an esthetic point of view, the material has proven to have excellent potential in practical and laboratory use.

This issue focuses on digital solutions, from shade determination to prosthetic restoration. For example, you can determine tooth shades accurately and precisely using digital color measurement systems.

We are pleased to be able to show you these and many more exciting news and insights.

DENTAL VISIONIST wishes you an enjoyable read!

Felicitas Ledig
Chief Editor

Inlays with a chameleon effect
Hybrid ceramics, which ideally "fuse" with the natural hard tooth substance.

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Hybrid ceramics versus composite
The quality of the adhesive bond with various CAD/CAM materials tested.

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Complex reconstruction in the front
The challenging combination of crown and bridge restorations.

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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 07/2018. The testimonials by developers or 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.

Fig. 1 Shade determination with VITA Easyshade V was simple and fast with the push of a button.

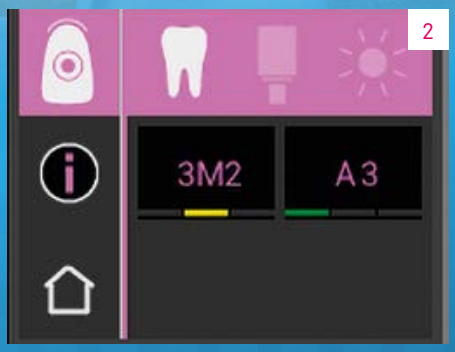

Fig. 2 Within seconds, the result A3 is shown on the display.

Fig. 3 Measured tooth and shade tabs in the color determined by the VITA Easyshade V.

Fast and reliable tooth shade determination for removable prosthetics

Prof. Dr. Alexander Hassel
Mannheim, Germany

Particularly after multiple extractions, a temporary denture should be immediately available to stabilize the situation and protect the wound areas. In addition to the fit of a temporary prosthesis, the choice of morphologically and shade-matched denture teeth is crucial for patient compliance. With the spectrophotometer VITA Easyshade V (VITA Zahnfabrik, Bad Säckingen, Germany), the tooth shade for the temporary restoration can be determined quickly and precisely, prior to surgical treatment. In this case report, Prof. Dr. Alexander Hassel (Mannheim, Germany) demonstrates the process using a classic example.

Findings and tooth shade determination

Due to severe periodontal damage, teeth 17, 14, 25 and 27 of the patient's teeth proved to be unsustainable. The teeth needed to be extracted and then replaced first with a temporary prosthesis. For this, the tooth shade was determined with the VITA Easyshade V. The measuring probe was placed flat on tooth 11 in the middle, and the measurement was triggered by pressing a button. Standardized white LED light was sent to the interior of the tooth. The remission spectrum reflected by the dentin core was then recorded by the probe, analyzed in the device and the corresponding tooth color A3 was determined. The measured value was then documented visually for the dental technician using the corresponding shade sample.

Fabrication and extraction

In the next step, the upper and lower jaws were molded with alginate, and the bite was recorded with silicone. The unsustainable teeth were erased from the manufactured and articulated upper jaw model so that the temporary prosthesis could be made with curved brackets at 13, 23 and 25. Tooth selection was based on digital shade determination and the remaining tooth morphology on the models. The teeth were extracted in the surgical session. The finished temporary prosthesis was incorporated as an immediate wound dressing, under which the healing process could proceed undisturbed.

Result and wound healing

The selected prefabricated teeth fit morphologically and shade-matched with the remaining residual dentition. Especially with a change from fixed to removable dentures, care should be taken to select the correct teeth to achieve positive patient acceptance. In the case of a partial prosthetic restoration in the anterior tooth region, this is even more important. The VITA Easyshade V is a practical aid for quickly and easily selecting denture-made teeth in the right shade. The patient felt good about the temporary prosthetic. Positive wound healing was evident in the follow-up examination after seven days.

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Fig. 4 The finished temporary prosthesis with curved brackets on teeth 13, 23 and 25.

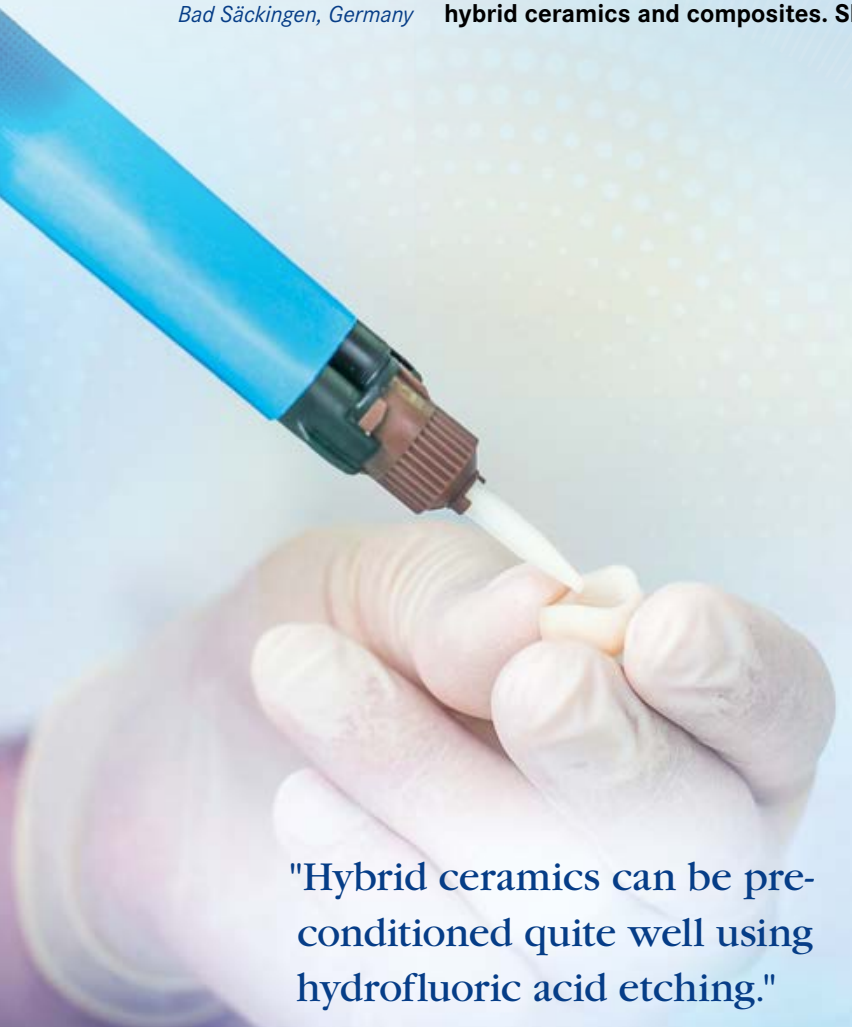
Fig. 5 After seven days, there was good wound healing of the extraction alveoli.

Fig. 6 Tooth shade and morphology harmonize with the residual dentition.

Hybrid ceramic versus composite: the quality of the adhesive bond in the test

Dr. Berit Müller
Bad Säckingen, Germany

Full adhesive attachment is a key factor in the long-term durability of indirect restorations. Reliable conditioning of the material is essential here. A specific mounting protocol must be designed for each material for this purpose. The hybrid ceramic VITA ENAMIC (VITA Zahnfabrik, Bad Säckingen, Germany), for example, consists of a polymer-infiltrated glass-ceramic matrix and can therefore be etched with hydrofluoric acid. Composites, on the other hand, are sandblasted because they have a polymer matrix in which ceramic fillers are embedded. In an in vitro study, Dr. Berit Müller (Bad Säckingen, Germany) investigated the adhesive bond of an adhesive system to hybrid ceramics and composites. She reports on her discoveries in this interview.



"Hybrid ceramics can be pre-conditioned quite well using hydrofluoric acid etching."

DV: How did you go about investigating the quality of the hybrid ceramic and composite adhesive bond?

Dr. Berit Müller: In this series of tests, the adhesive bond of Variolink Esthetic to several CAD/CAM materials was investigated. For this purpose, five specimens, with two subsamples each, were produced from each material. When conditioning the samples, the respective manufacturer specifications were followed precisely. After bonding the subspecimens, the compressive shear strength was determined by means of a universal testing machine.

DV: In the adhesive bond of hybrid ceramics, you determined comparatively high adhesion values. What can these good values be attributed to?

Dr. Berit Müller: The good adhesive bond of the adhesion system to the hybrid ceramic VITA ENAMIC is due to the good preconditionability of the material by hydrofluoric acid etching. In addition, the comparatively high proportion of ceramic (86% by weight) also favors the adhesive bond.

DV: What is the difference between the adhesive bond to the hybrid ceramic in comparison to the composites tested?

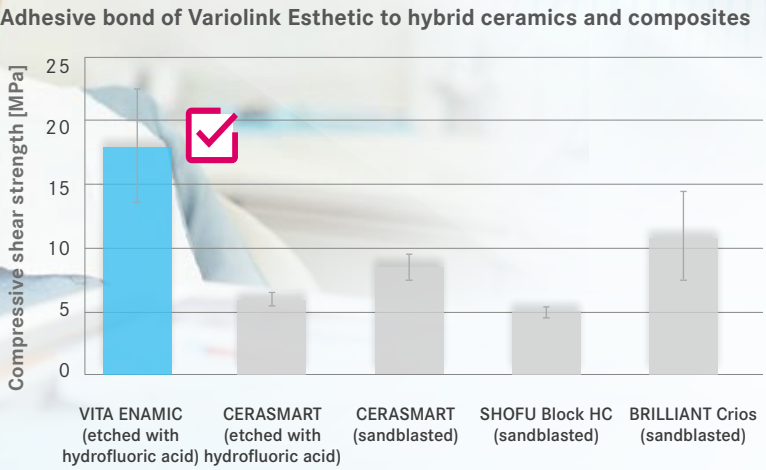


Fig. 1 Adhesive bond of Variolink Esthetic to hybrid ceramics and composites.

Dr. Berit Müller: The hybrid ceramic has a polymer-infiltrated glass-ceramic matrix, which has a firmly sintered ceramic structure. The ceramic structure is roughened on the surface with hydrofluoric acid etching. The adhesion of the ceramic network remains completely intact. The result is that the roughened surface provides for good micromechanical retention. On the other hand, composites consist of a polymer matrix in which ceramic fillers are embedded. In the case of hydrofluoric acid etching, there is a risk that the fillers will dissolve out of the polymer matrix. The enlargement of the surface is achieved here using sandblasting.

DV: What influence does the preconditioning of the restoration have on the quality of the adhesive bond, and what are the differences between hybrid ceramic and composite?

Dr. Berit Müller: The preconditioning of the materials has a great influence on the adhesive bond. As described, the adhesive surface is roughened by the hydrofluoric acid etching, and this then ensures good dentition with the composite cement, which in turn has a positive effect on the adhesive bond as a whole. However, the conditioning method must not damage the material structure more deeply. In contrast to hydrofluoric acid etching, sandblasting poses a certain risk. The material roughening is less uniform, and the damage goes deeper into the material structure.

DV: You tested two conditioning protocols for the composite CERASMART. What did you discover in this process?

Dr. Berit Müller: GC is the only manufacturer to release two preconditioning processes for CERASMART: hydrofluoric acid etching and sandblasting. Therefore, both procedures were also tested. However, the preconditioning of CERASMART using hydrofluoric acid yielded inferior results in the test compared with preconditioning by sandblasting.

DV: From a scientific point of view, what are the key success factors for adhesive attachment in everyday practice?

Dr. Berit Müller: In addition to hydrofluoric acid etching, it is primarily the chemical bond between the material surface and the adhesive material that is important. This is what the bonding agent is for. If hydrofluoric acid etching or silanization is omitted, the adhesive values are significantly worse, and the probability of debonding increases.

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Material	Surface conditioning	Adhesive
VITA ENAMIC	Etching with 5% hydrofluoric acid for 60 seconds	Monobond Plus
CERASMART	Etching with 5% hydrofluoric acid for 60 seconds	Monobond Plus
	Sandblasting with 50 µm Al_2O_3 at 1.5 bar	Monobond Plus
SHOFU Block HC	Sandblasting with 50 µm Al_2O_3 at 2.5 bar	Monobond Plus
BRILLIANT Crios	Sandblasting with 50 µm Al_2O_3 at 1.5 bar	ONE COAT 7 UNIVERSAL

Fig. 2 Surface pretreatment as specified by the manufacturer.

Source: Internal investigation, VITA R&D, Dr. Berit Müller, Report of 10/17, Test: For each CAD/CAM material, five test specimens of two sample parts were produced, glued, and then the compressive shear strength was determined by means of a universal testing machine (Type Z010 from Zwick). For detailed test data, see technical and scientific documentation
VITA ENAMIC®: download via www.vita-enamic.com.


"VITA YZ zirconia blanks
enable precise, accurately
fitting results."

What distinguishes high-quality zirconia blanks?

Michael Gödiker, Engineer
Bad Säckingen, Germany

Not all zirconia is the same. Only the best raw materials and many years of manufacturing experience ensure high-quality and reliable material blanks. This also applies to the new super- and extra-translucent zirconias. The material differences between the new generations of zirconia are explained by Michael Gödiker, Engineer (Bad Säckingen, Germany) in an interview. In addition, he reports on various test series in where he has examined, for example, the CAM processability of different zirconia variants.

Fig. 1a Visual fit check after sintering process of the VITA YZ T using a control model.

Fig. 1b Visual fitting check following the sintering process by means of a fitting model of a competitor ZrO2.

Source: Internal investigation, VITA R&D, Gödiker, 10/2014, Test: CAM-technical production of 7-unit bridge constructions, sintering according to manufacturer's instructions and visual inspection of the fit on CNC milled aluminium model.

DV: What characterizes high-quality zirconia blanks and how can I recognize the essential quality features in the dental laboratory?

M. Gödiker, Engineer: High-quality zirconia consists of chemically pure raw materials and has a homogeneous and defect-free structure. In addition, the blank production plays an important role. Only when the right processes and technologies are used and experienced specialist personnel control the processes, is a high-quality material and a precise fit guaranteed during CAM production in the laboratory.

DV: Laboratories expect precise CAM and sintering results. What conditions do zirconia blanks have to meet in order to achieve exact results?

M. Gödiker, Engineer: A blank must be edge-stable during CAM processing, and the magnification factor must first be precisely determined metrologically, so that in the end, an excellent fit is achieved. For precise sintering shrinkage, we continuously determine the magnification factor for each new production batch so that precision is ensured even for large-scale designs. In addition, in the production of VITA YZ zirconia blanks, an isostatic re-compaction takes place in order to obtain a very homogeneous microstructure, which is important both for sintering behavior and CAM processability.

DV: You investigated the edge stability of VITA zirconia in an actual test series. How did you proceed and what are your key findings?

M. Gödiker, Engineer: To study the CAM processability in thin edge areas of a design, standardized sample geometries with wall thicknesses of 0.2 mm, 0.3 mm and 0.4 mm were produced by CAM technology. After milling, the samples were examined for possible defects and the results of the test series were evaluated. My conclusion: The investigation shows that, thanks to the optimized whitening properties of VITA YZ zirconia blanks in all their variants, it is possible to produce very precise and accurately fitting results.

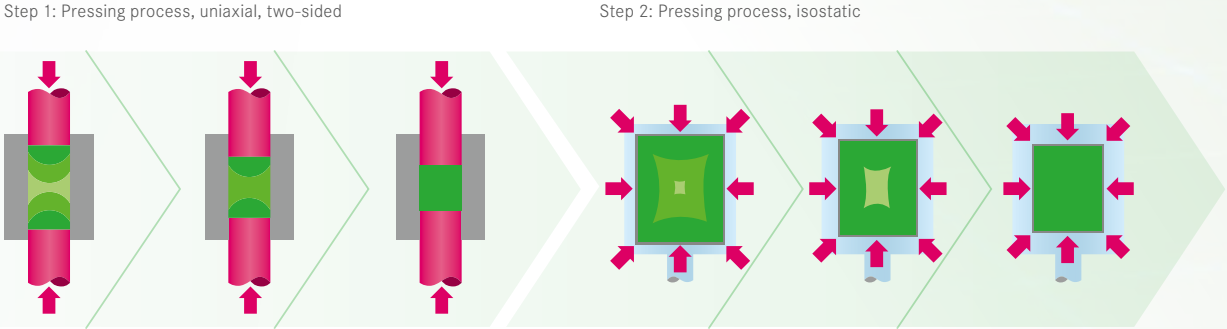

Fig. 2 Schematic representation of the pressing process for VITA YZ SOLUTIONS zirconia blanks.

Source: VITA R&D, Presentation of uniaxial and isostatic pressing processes for VITA YZ from technical-scientific documentations. VITA YZ SOLUTIONS.

VITA YZ SOLUTIONS blanks have a high edge stability.

INFO: VITA YZ SOLUTIONS

Components [unit]	**VITA YZ** T	**VITA YZ** HT	**VITA YZ** ST	**VITA YZ** XT
3-point flexural strength [1] [MPa]	1200	1200	> 850	> 600
Fracture toughness [2] (CNB method) [MPa $m^{-0.5}$]	4.5	4.5	3.5	2.5
Hardness [3] [HV 10]	12	12	13	13
Weibull modulus [1]	14	14	13	11

[1] Determination according to DIN EN ISO 6872:2015
[2] Determination according to ISO 24370:2005
[3] Determination according to DIN EN 843-4:2005

DV: The trend in recent years has continued to be translucent zirconia. To what extent are the new zirconia generations different from their predecessors?

M. Gödiker, Engineer: The aluminium oxide content, which plays an important role in aging, has been reduced and optimized. The yttrium content responsible for the stabilization was increased, which improves the particle size of the zirconia and allows a greater light transmission. At the same time, however, the bending strength and fracture toughness of the new zirconia generations are decreasing.

DV: Zirconias with enormously high translucency often have lower bending strengths. What causes the strength reduction and what does this mean for the lab?

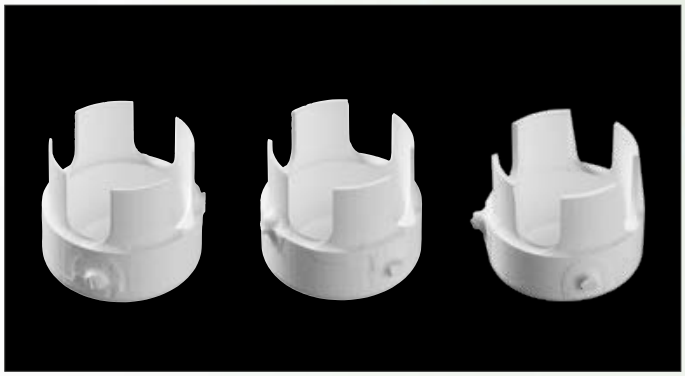

Fig. 3 "Merlon" geometries made of VITA YZ with wall thicknesses of 0.2 mm, 0.3 mm and 0.4 mm (from left to right).

Source: Internal investigation, VITA R&D, Gödiker, 08/2017, Test: Depending on the material variant, seven so-called "merlons" (= sample geometry with four merlons, see photo) with wall thicknesses of 0.2 mm, 0.3 mm or 0.4 mm were produced by CAM technology.

CAM machinability of the different VITA materials

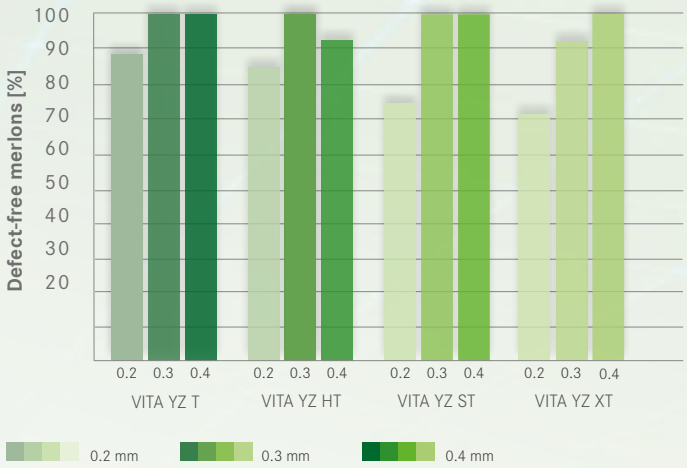

Fig. 4 CAM machinability of the different VITA YZ materials.

Fracture load after CAM fabrication with various systems

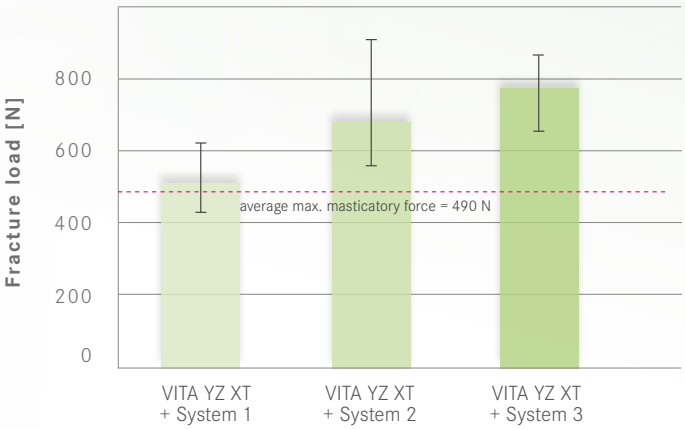

Fig. 5 Fracture load after CAM fabrication with various systems.

Source: Internal investigation, VITA R&D, Kolb, 11/2017, Test: Six stylized posterior bridges were prepared for each system, and then the breaking load was determined by means of a universal testing machine.

3-point flexural strength of the different VITA YZ types

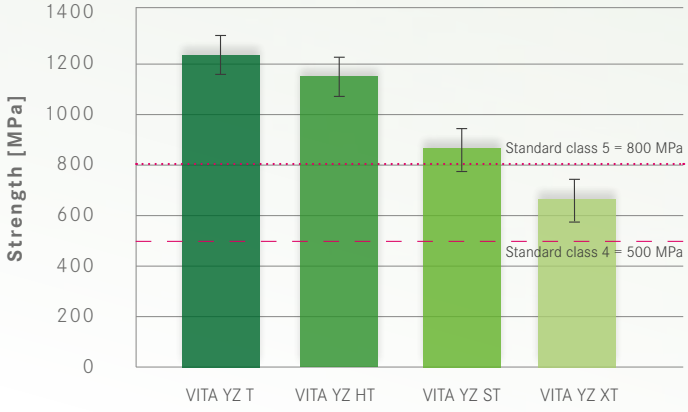

Fig. 6 3-point flexural strength of the different VITA YZ types.

Source: Internal investigation, VITA R&D, Gödiker, 08/2017, Test: 3-point bending strength measurement with 30 samples per material variant.

M. Gödiker, Engineer: The lower bending strength results, among other things, from the altered microstructure, in particular the larger particles. The conversion gain typical of zirconia, however, works better the smaller the particles are. A lower bending strength is the outcome, resulting in the issue that greater wall thicknesses and connector cross-sections are indicated in reconstructions made of these materials.

DV: How can the CAD/CAM system and the milling strategy that are used, influence the long-term stability of restorations?

M. Gödiker, Engineer: Machining zirconia blanks with unsuitable tools or too high a feed rate can cause microcracks or superficial defects in the milled structure, which then reduces the breaking load. For example, in a test series with VITA YZ XT, the material achieved different levels of stress load after CAM processing with three different systems in breaking load tests. However, many defects only become visible to the technician when macroscopic outbreaks occur. In order to provide dental laboratories with an excellent milling result, we invest a lot of time developing optimal milling strategies and testing milling tools together with our CAD/CAM partners.

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FACTS ON VITA IMPLANT SOLUTIONS (IS)

What are VITA IMPLANT SOLUTIONS?

VITA IMPLANT SOLUTIONS (IS) are hybrid ceramic, as well as composite blanks (VITA ENAMIC IS, VITA CAD-Temp IS), which have an integrated interface to adhesive/titanium bases (e.g., TiBase) and which are used for the CAD/CAM production of implant-supported dentures.

Compatibility with titanium bases?

VITA IMPLANT SOLUTIONS blanks are compatible via the integrated interface to the named adhesive/titanium bases of the following companies:

- Dentsply Sirona TiBase
- CAMLOG CAD/CAM
- Henry Schein alphatech® CAD/CAM
- Straumann® Variobase C CAD/CAM

Compatibility with implants?

VITA IMPLANT SOLUTIONS are compatible via the integrated interface to the named adhesive/titanium bases with implant systems of the following manufacturers*:

- Nobel Biocare, Straumann, Astra Tech
- Friadent, Zimmer, Medentika Implant
- CAMLOG, BIOMET 3i

*) A comprehensive, up-to-date overview of the implant systems compatible with TiBase is available at: http://www.sirona.com

An intelligent treatment concept for the implant-supported individual tooth crown

For good healing success and predictable gingiva management during implantation, the soft tissue needs as much rest as possible. Gingiva formers, which also act as a scan body, provide the opportunity to perform a scan without disturbing the healing process. In this case, Dr. Oliver Schubert, M.Sc. (Munich, Germany), shows how he implements such a process. He also explains why he uses a hybrid ceramic blank (VITA ENAMIC IS, VITA Zahnfabrik, Bad Säckingen, Germany) with an integrated interface to a titanium base. He shows how the abutment crown made of hybrid ceramic directly after the removal of the gingiva former supports the final shaping of the emergence profile.

→ **Initial situation** Situation following the extraction of tooth 26 and healing phase.

→ **RESULT** After the closure of the screw channel with composite, this is no longer visible.

Dr. Oliver Schubert, M.Sc. Munich, Germany

1. The patient case

A 55-year-old female patient presented with complaints regarding tooth 26. After careful clinical and radiographic diagnosis, the molar proved unsustainable. After extraction, the gap was to be closed with an implant and a monolithic abutment crown made of VITA ENAMIC IS. Due to the dual network structure of the polymer-infiltrated feldspar ceramic, the material shows a comparatively high elasticity, which allows the material to absorb masticatory forces. This property could be very beneficial in the long run for restorations on rigidly anchored implants. In addition, laboratory tests show that microcracks caused by a potential point overload can be stopped, thanks to the integrated polymer structure, which minimizes fracture risk. At the patient's request, the restoration of the previously root canal-treated tooth 25 was to be done later.

Fig. 2 The vestibular ridge after the bone-sparing extraction.

Fig. 3 The exposure of the alveolar ridge using full-flap formation.

Fig. 4 The implant is inserted into the prepared bone bed.

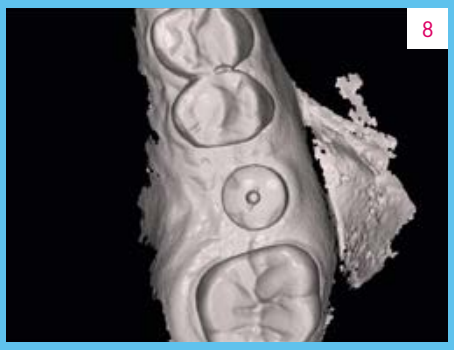

Fig. 8 The clinical situation in the CAD software digitized with the 3M True Definition Scanner.

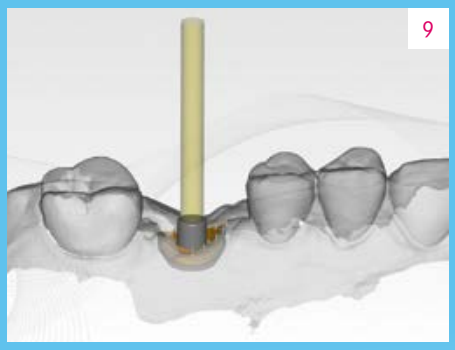

Fig. 9 The virtual titanium base as interface between implant and hybrid ceramic abutment crown.

Fig. 10 The titanium-based abutment crown constructed from VITA ENAMIC IS.

2. Implantation and scan

After bone-sparing extraction and sixteen weeks of healing, the gap in the edentulous space should be restored with the 3i T3 Tapered implant (Zimmer Biomet, Warsaw, USA). After the formation of a full flap, the bone bed was prepared accordingly and the implant inserted and aligned with the prosthetic, so a primary stability of 35 Ncm could be achieved. Subsequently, the two-part, scannable gingiva former BellaTek Encode (Zimmer Biomet, Warsaw, USA) was fixed on the implant and the wound area was fixed with microsurgical sutures. Eight weeks after implant insertion, the intra-oral scan of the gingiva former and the digital implant impression were performed. With its specific notches on the surface, the screwed-in and left-in gingiva former now also served as a scanbody. The upper and lower jaws were digitized using the 3M True Definition Scanner (3M, Seefeld, Germany).

3. Fabrication and integration

The scan data was transmitted to the Zfx Süd milling center (Munich, Germany) and downloaded there as an STL dataset. Then the scan record of the gingiva former was decrypted with the Zfx Application Manager. This automatically reduces the gingiva former, and the shape of the emergence profile is displayed in the CAD software. The abutment crown made of VITA ENAMIC IS has now been designed virtually with an idealized emergence profile. After CAM-based manufacturing, the hybrid ceramic abutment crown was bonded to the industrially produced titanium base. Immediately after unscrewing the gingiva former, the abutment crown could be screwed in to immediately support the soft tissue and provide it with its final shape. The screw channel was finally closed by Teflon tape and composite.

Fig. 5 The gingiva former was screwed on, and the surgical area was microsurgically sutured.

Fig. 6 The gingiva former BellaTek Encode after eight weeks.

Fig. 7 With its specific notches, the gingiva former also acted as a scanbody.

Fig. 11 The components of the superstructure, consisting of abutment crown, titanium base and screw.

Fig. 12 The abutment crown made of VITA ENAMIC IS glued to the titanium base.

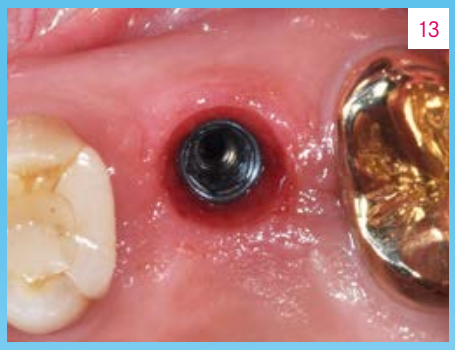

Fig. 13 The emergence profile after unscrewing the gingiva former.

Fig. 14 The abutment crown with open screw channel that was screwed in immediately afterwards.

Fig. 15 After the closure of the screw channel with composite, this is no longer visible.

→ **RESULT** A check-up after a few weeks showed excellent soft tissue conditions.

The abutment crown of VITA ENAMIC IS on an adhesive/titanium base.

CAD/CAM-fabricated, two-part implant rehabilitation in the front

Dr. Daniel Butterman
Centennial, Colorado, USA

In the anterior region, two-part abutment and crown rehabilitations are a great way to predictably shape the gingiva and achieve optimal prosthetic results. VITA ENAMIC IS hybrid ceramic blanks (VITA Zahnfabrik, Bad Säckingen, Germany) have a dentin-like elasticity. In two-part restorations, the hybrid ceramic abutment then acts as a shock absorber between the ankylotically anchored implant body and the all-ceramic crown. In the interview, Dentist Dr. Daniel Butterman (Centennial, Colo., USA) describes the esthetic and functional benefits of a two-part implant reconstruction with an abutment made of VITA ENAMIC IS and a crown of VITABLOCS TriLuxe forte.

DV: What are the advantages of a two-part, screw-retained implant reconstruction with a hybrid ceramic mesostructure and a feldspar ceramic crown?

Dr. Daniel Butterman: The combination of the force-absorbing VITA ENAMIC IS abutment with the esthetics and translucency of feldspar ceramic is a real clinical benefit for me. With it the prosthetic superstructure becomes more predictable in terms of pink and white esthetics.

DV: How do the mesostructure of VITA ENAMIC IS and a crown made from the feldspar ceramic VITABLOCS TriLuxe forte harmonize so well esthetically and functionally?

Dr. Daniel Butterman: The shade of the VITA ENAMIC IS abutment harmonizes perfectly with the polychromatic VITABLOCS TriLuxe forte crown. The translucency of the feldspar ceramic allows the warm, dentin-like color effect of the hybrid ceramic abutment to act from within.

DV: What should clinicians consider when conditioning a titanium base and hybrid ceramics in order to reliably bond all structures adhesively?

Dr. Daniel Butterman: The titanium base must be sandblasted and then conditioned with a metal primer. The adhesive surface of the VITA ENAMIC IS abutment is etched with hydrofluoric acid and then silanized. The advantage of hybrid ceramics is that the dominant ceramic network can be easily conditioned and then adhesively bonded in a proven form.

DV: How do you usually handle soft tissue management, and how can an ideally shaped emergence profile be reproducibly achieved?

Dr. Daniel Butterman: The emergence profile can be designed either as part of the surgical procedure with a temporary restoration or during exposure with a CAD/CAM-supported temporary restoration. The contours and the emergence profile can be specified as part of the computer-aided design.

DV: What are the clinical advantages of the VITA ENAMIC hybrid ceramics in treating patients with implant-supported reconstructions?

Dr. Daniel Butterman: For me, the two biggest advantages are the speed of grinding and manual preparation, which makes it possible for me to provide restorations for patients within one day. In addition, the force-absorbing properties of VITA ENAMIC help protect the implant and bone from occlusal overload.

Fig. 1 The root of tooth 12 was fractured due to overload.

Fig. 2 The bony alveolus after the extraction of incisor 12.

Fig. 3 A temporary crown was adhesively bonded to the adjacent tooth in order to shape and stabilize the soft tissue.

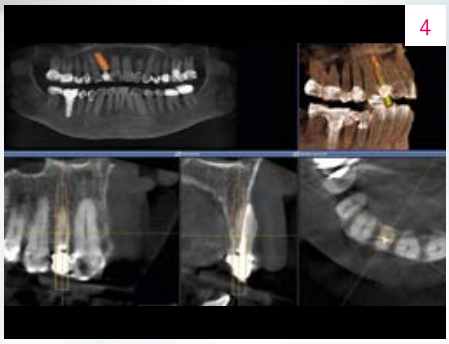

Fig. 4 Backward-planning enabled an ideal prosthetic positioning of the implant in the jawbone.

Fig. 5 An implant was inserted with the aid of a template and a gingiva former screwed on.

Fig. 6 A CAD/CAM-supported composite crown (VITA CAD-Temp) was incorporated to ideally shape the emergence profile.

Fig. 7 A scanbody was screwed onto the implant and the tooth shade determined digitally with the VITA Easyshade V.

Fig. 8 A VITA ENAMIC IS abutment and a polychromatic ceramic crown (VITABLOCS TriLuxe forte) were digitally designed.

Fig. 9 The feldspar ceramic crown and the VITA ENAMIC IS mesostructure immediately after grinding.

Fig. 10 An ideal emergence profile became visible after removal of the temporary crown.

Fig. 11 The scallop-shaped gingival curve harmonized precisely with the VITA ENAMIC IS mesostructure.

→ **RESULT** The treatment result with the highly esthetic, monolithic feldspar ceramic crown.

The potential of VITA ENAMIC multiColor in the esthetic zone

Dr. Andreas Reiger
Talheim, Germany

In the following interview, we hear from the Dentist, Dr. Andreas Reiger (Talheim, Germany), who shows us the possibilities of the VITA ENAMIC multiColor blank (VITA Zahnfabrik, Bad Säckingen, Germany) for minimally invasive esthetic reconstructions in the front. He explains this with the help of a case study of a young female patient whom he provided with four hybrid ceramic veneers with wall thicknesses of only 0.2 millimeters in the cervical area in regions 12 to 22. He also gives recommendations on what dental practices and laboratories should consider when processing hybrid ceramics.

Fig. 1 A young female patient was dissatisfied with her veneer restorations made of glass ceramic.

Fig. 2 The restorations at 12, 11, 21 and 22 showed deficits at the incisal edges.

Fig. 3 The arch of the teeth did not harmonize with the curve of the lips.

Fig. 4 The tooth axes of the incisors were irregular. The veneers had a clumsy, superimposed effect.

Fig. 5 The scan of the actual situation highlights the bumpy curve of the dental arch.

Fig. 6 A wax-up provided orientation and helped with the later construction in digitized form.

"Restorations made of polychromatic hybrid ceramic blanks look particularly natural."

DV: Why did you choose the VITA ENAMIC multiColor multichromatic hybrid ceramic blank for this patient's restoration?

Dr. Andreas Reiger: For monochrome CAD/CAM blanks, tooth shade gradient and natural translucency can only be reproduced through staining. The two polychromatic VITA ENAMIC multiColor blanks are already integrated into the finely graded layer structure. Therefore, restorations made from this material blank are already very dynamic from within.

DV: What clinical challenges did you face in this case, and what could multichromatic hybrid ceramics help solve?

Dr. Andreas Reiger: The young patient was dissatisfied with the esthetic appearance of her veneers on the maxillary incisors. As part of the new restoration, the labial surfaces of the incisors had to be relocated palatally in order to achieve a harmonious curve of the dental arch. Of course, I wanted to proceed in a minimally invasive manner during the follow-up preparation and not "sacrifice" any additional tooth substance. The thin minimum layer thicknesses of the hybrid ceramics, which were only 0.2 mm in the cervical area, were particularly advantageous.

Fig. 7 Minimally invasive contouring of vestibular tissue with defined preparation margins.

Fig. 8 The view shows how the dental arch was leveled during the preparation.

Fig. 9 The cranial view of the constructions shows a harmonious curve of the incisal edges.

Fig. 10 The designed veneers were very graceful, due to the lower minimum layer thickness of the hybrid ceramic.

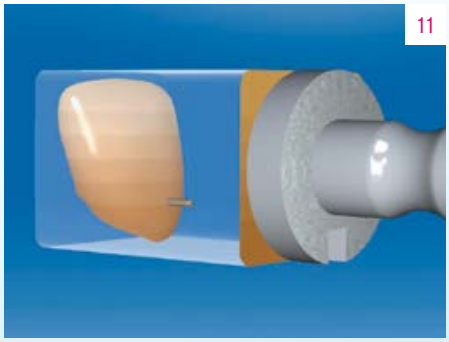

Fig. 11 With the positioning of the veneers in the virtual blank, the translucency and shade gradient can be controlled.

Fig. 12 The patient was very satisfied with the esthetic result.

Fig. 13 The restorations were integrated in shape and shade into the residual tooth substance.

Fig. 14 The incisal restorations now harmonized with the curve of the lips.

→ **RESULT** The shade and translucency gradient in six layers made the restorations appear dynamic and natural.

INFO: WHAT IS VITA ENAMIC MULTICOLOR?

VITA ENAMIC multiColor is the polychromatic hybrid ceramic blank for reproduction of the natural shade gradient at the push of a button. The CAD/CAM blank has an integrated shade and translucency gradient from the neck to the incisal edge. The blank has a total of six finely nuanced layers. Using intelligent CAD software, the reconstruction can be individually positioned in the virtual blank in order to be able to control the shade and translucency gradient in a targeted manner.

VITA ENAMIC multiColor is especially suitable for monolithic restorations in the esthetic zone.

"It is especially in cases of narrow wall thicknesses that the hybrid ceramics can display their potential."

DV: In your opinion, which processing and treatment steps were decisive in this case for clinical and esthetic treatment success?

Dr. Andreas Reiger: The planning was extremely important in this case so that the patient and I knew in advance which result was possible. In the lab, a classic wax-up was created on prepared situation models, which I scanned in order to be able to orient myself according to the biogeneric calculation of the veneers for determining the definite length and width.

DV: What should clinicians look for in the extraoral and intraoral finalization of hybrid ceramic crowns in order to achieve near-natural, vibrant results?

Dr. Andreas Reiger: Here's the motto: "Less is more!" Natural teeth are dependent on their morphology and surface texture. The labial surfaces of restorations should not be completely flat. Prior to the high-gloss polish, a lifelike texture must be specifically incorporated. The finely nuanced shade and translucency profile of the VITA ENAMIC multiColor block in six layers automatically ensured a natural appearance of the restorations. As a result, an individualization with stains would be omitted.

DV: What is the esthetic potential of the new multichrome blank for front-end restorations and what are its limitations?

Dr. Andreas Reiger: Especially at low thicknesses which are supported by natural hard tooth substance, the material can fully reveal its minimally invasive and esthetic potential. In addition, the restorations can be incorporated directly after polishing without crystallization, sintering, healing and individualization firings. In the case just described, the patient had a complete restoration in five hours.

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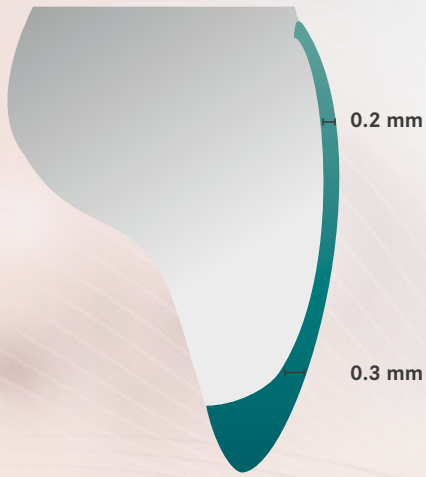
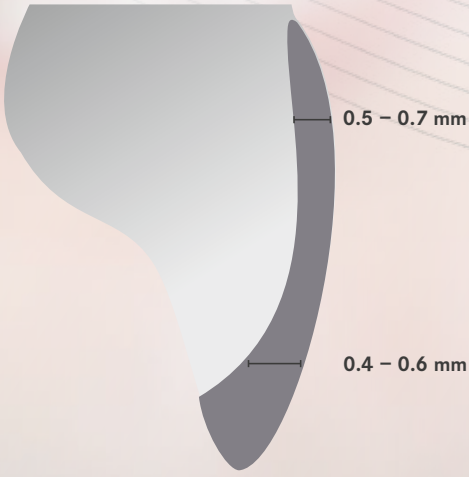
The dual ceramic-polymer network structure enables edge-stable processing, even with thin wall thicknesses.

VITA ENAMIC hybrid ceramic



Traditional ceramic



Minimally invasive veneer restoration with hybrid ceramics

Dr. Andreas Kurbad
Viersen, Germany

Esthetic corrections with veneers should be minimally invasive and limited to the enamel and, despite the thin layer thickness in the mouth, develop a natural play of shade and light. The multichromatic CAD/CAM hybrid ceramic blank VITA ENAMIC multiColor (VITA Zahnfabrik, Bad Säckingen, Germany) has an integrated shade and translucency gradient with six finely graduated layers. The natural appearance of the tooth can be reconstructed almost at the touch of a button. Characterization with stains can usually be omitted. The dual ceramic-polymer network structure of the hybrid ceramic allows narrow wall thicknesses of up to 0.2 millimeters, while remaining very edge-stable. These are the best conditions for restoring two upper middle incisors, as Dr. Andreas Kurbad (Viersen, Germany) shows in this case report.

1

INITIAL SITUATION Erosion and abrasion led to a shortened incisor and the loss of the morphology of teeth 11 and 21.

2

Fig. 2 With the software Smile Designer Pro, ideal middle incisors were constructively simulated.

1. The esthetic challenge

A 45-year-old female patient presented in the office and was dissatisfied with the esthetic effect of her front teeth. The middle incisors had presumably lost incisal edge contour and length, due to abrasive and erosive processes. In addition, the anterior teeth were clearly discolored. The patient wished to restore a natural appearance to these teeth using minimally-invasive therapy. For targeted therapy, the situation was scanned with the CEREC Omnicam (Dentsply Sirona, Bensheim, Germany), and photos were taken of the situation. The software Smile Designer Pro (Tasty Tech, Toronto, Canada) simulated the extension of the incisal edge and the re-contouring of the morphology. On this basis, a clinical mock-up was created which satisfied all participants.

Fig. 3 With a transparent silicone key and light-curing composite, the mock-up was fabricated intraorally.

Fig. 4 The mock-up corresponded to the esthetic expectations of the patient.

Fig. 5 The minimally invasive preparation during the application of a micro chamfer in the cervical area.

Fig. 9 The sheer veneers made of VITA ENAMIC multiColor immediately after grinding out.

Fig. 10 The incorporation of texture and morphology with the rotating diamond tool.

Fig. 11 A simple high-gloss polish was enough to finish the restorations.

2. CAD/CAM-supported fabrication

The mock-up was scanned intraorally to be included in the virtual design in the CEREC software as a biogeneric copy. Due to the vestibular loss of substance on teeth 11 and 21, the preparation was performed in a very minimally invasive manner with a micro chamfer, applied in the cervical area. The clinical situation was now rescanned so that the virtual construction of the veneers and their CAD/CAM-based fabrication could take place. When working with rotating diamond tools, the focus was mainly on the surface texture. Finally, the veneers were polished to a high gloss and were incorporated in the same session.

VITA ENAMIC multiColor enables the reproduction of the natural shade gradient with the push of a button.

Fig. 6 The clinical situation was scanned with the CEREC Omnicam.

Fig. 7 The design of the hybrid ceramic veneer in the CEREC software.

Fig. 8 With the CEREC-Smile Design Application, the restorations can be evaluated together with the lips.

Fig. 12 The finished veneers just before the clinical try-in.

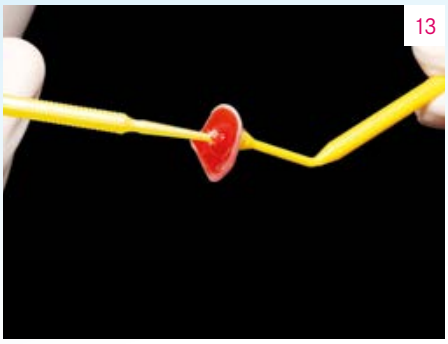


Fig. 13 Conditioning with hydrofluoric acid creates a micro-retentive surface.

Fig. 14 A light-curing one-component adhesive was applied to the tooth surfaces.

3. Seating and final results

After clinical try-in, the two restorations were fully adhesively incorporated. The dominant feldspar ceramic network (86 wt%) of the hybrid ceramic veneer was etched in a proven manner with hydrofluoric acid and then silanized. The conditioning of the enamel was carried out with phosphoric acid and a light-curing single-component adhesive. After incorporation with a shade-matched composite cement, the hybrid ceramic veneers fit harmoniously into the esthetic zone. Thanks to the rapid production without any crystallization or sintering firing and the integrated shade gradient, the two central incisors could be efficiently and esthetically restored. The patient was highly satisfied with the minimally invasive and fast result.

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Fig. 15 Both veneers integrated completely and naturally into the esthetic zone.

→ **RESULT** The curve of the incisal edges harmonized with the curve of the lips.

Efficient in processing, ideal in result: inlay restoration with VITA ENAMIC ST.

Inlays with a chameleon effect made from VITA ENAMIC ST hybrid ceramic

Prof. Dr. Alexander Hassel
Mannheim, Germany

The ideal inlay material should have the ability to be processed efficiently and at the same time, edge-stable in thin edge areas. Incorporation, occlusal grinding and final intraoral polishing should be easy to implement. Optically and functionally, an excellent inlay restoration must "fuse" with the natural hard tooth substance. The following case report by Prof. Dr. Alexander Hassel (Mannheim, Germany) shows to what extent the supertranslucent hybrid ceramic VITA ENAMIC ST can meet these expectations.

→ **INITIAL SITUATION** The initial situation with the fractured composite filling at 37 and insufficient and discolored margins at 36.

→ **RESULT** The lifelike treatment result with CAD/CAM-supported inlays made of VITA ENAMIC ST from the occlusal direction.

1. Initial clinical situation

At the annual checkup, the patient presented with a fractured composite filling on 37, and 36 showed insufficient and stained margins. Radiologically, an additional carious defect was diagnosed distally on 36. The patient wanted new restorations that were long-lasting and tooth-colored. After detailed consultation, the decision was made for two inlays made of the supertranslucent hybrid ceramic VITA ENAMIC ST. This is a material with a dual network structure of ceramic (86 wt%) and polymer (14 wt%).

Fig. 2 The clinical situation after excavation and preparation, as well as covering and leveling of the areas near the pulp.

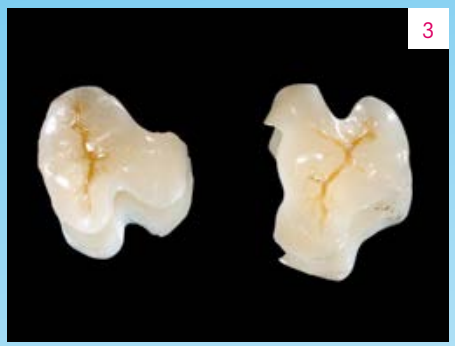


Fig. 3 The finished inlays for 36 and 37 after processing and characterization.

Fig. 4 Due to the dominating ceramic network, the hybrid ceramic can be etched with hydrofluoric acid.

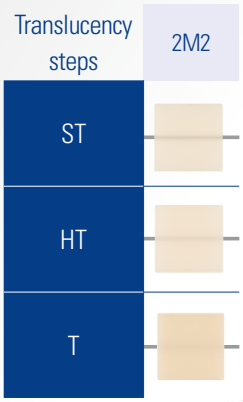
Fig. 8 Light curing of the thinly applied, dual-curing adhesive.

Fig. 9 The air block VITA ADIVA OXY-PREVENT prevented the formation of an oxygen-inhibiting layer.

Fig. 10 Thanks to the excellent chameleon effect, the hybrid ceramic inlays fused optically with the hard tooth substance.

INFO: WHAT IS VITA ENAMIC ST?

VITA ENAMIC blanks are available in translucency levels T (Translucent), HT (High Translucent) and ST (Super Translucent). VITA ENAMIC ST is a supertranslucent blank material primarily suitable for reconstructions, such as inlays and veneers, that are limited to the enamel. Since the ST variant enables extraordinary light transmission, the dental prosthesis integrates invisibly into the natural residual tooth substance like a chameleon. If the residual tooth substance shows discoloration in clinical findings, it is advisable to use the HT and T variants.



2. Preparation, impression, fabrication

After excavation and preparation, the areas close to the pulp were adhesively covered with flowable composite, leveled and shaped. The models were digitized in the dental practice laboratory (imetric, Courgenay, Switzerland) to construct the inlays using the exocad software (exocad, Darmstadt, Germany). The restorations were ground with the Milling Unit N4 Impression (vhf, Ammerbuch, Germany) and then worked out manually. For occlusal characterization with the light-curing VITA ENAMIC STAINS, the dominant ceramic network was first etched with hydrofluoric acid and then silanized. After painting the fissures with VITA ENAMIC STAIN 3 (brown) and intermediate curing, the surface of the inlays was sealed with VITA ENAMIC GLAZE and polymerized.


5

Fig. 5 The silanization is analogous to the conditioning of feldspar and glass ceramics.


6

Fig. 6 As part of the total-etch technique, the cavities were conditioned with the 37% phosphoric acid VITA ADIVA TOOTH-ETCH.


7

Fig. 7 VITA ADIVA T-BOND I + II was applied to the etched hard tooth substance for full adhesive bonding.

3. Systematic, fully adhesive bonding

The conditioning of the adhesive surfaces was implemented analogously to the conditioning of the occlusal surfaces before staining. Following phosphoric acid etching of the cavities with VITA ADIVA TOOTH-ETCH, the two-coat application and the controlled polymerization of the dual-curing and unfilled bonding agent VITA ADIVA T-BOND I + II was performed. The fit of the inlay was not compromised by the filler. The composite cement VITA ADIVA F-CEM in the shade A2 was applied to the cavities, and the inlays were inserted. VITA ADIVA OXY-PREVENT prevented the formation of an inhibition layer during light curing. Due to the dentin-like modulus of elasticity and the pronounced chameleon effect of the material, the hybrid ceramic restoration integrated into the residual tooth substance extremely well, both functionally and esthetically. For more information on the quality of the hybrid ceramic adhesive bond, see page 6.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→ **RESULT** Both vestibular inlay areas are also harmoniously integrated.

Fig. 1 Exemplary representation of a sintered reconstruction from a VITA YZ ST Color blank.

Fig. 2 Partially veneered anterior bridge made of VITA YZ ST zirconia, veneered with VITA VM 9.

Fig. 3 Monolithic posterior bridge made of VITA YZ ST zirconia, stained with VITA AKZENT Plus.

New zirconia generations tested: Central findings from everyday laboratory work

Hans Jürgen Lange, Master Dental Technician Darmstadt, Germany

Master Dental Technician Hans Jürgen Lange (Darmstadt, Germany) has tested the new, highly translucent zirconia blanks VITA YZ ST and VITA YZ XT (VITA Zahnfabrik, Bad Säckingen, Germany). For the two zirconia variants, translucencies of 46 and 50 percent were determined in laboratory tests. Thanks to their particularly high translucency, the new zirconias are particularly suitable for monolithic and vestibular partial veneer reconstructions in the anterior and posterior region. In the following interview, Hans Jürgen Lange reports on his first experiences with these zirconia blanks.

DV: In your experience, what are the indications for the new super and extra-translucent zirconia VITA YZ ST and XT?

Hans Jürgen Lange, MDT: In the posterior region, I am now using VITA YZ ST instead of lithium disilicate monolithically. Although the bond is greater, VITA YZ ST has a more translucent effect, allowing a natural vitality. After minimal cut-back and individualization, VITA YZ XT is my highly esthetic choice for the anterior region. Due to the high translucency, however, the stumps must not show any discoloration here.

DV: How do you rate the light-optical properties of the new VITA zirconias in comparison with zirconia and glass ceramics from other manufacturers?

Hans Jürgen Lange, MDT: The light-optical properties and the play of light are very good in the VITA YZ ST and XT variants and compare favorably to the competition. Compared to the glass ceramics, I like the play of light of the translucent zirconia variants even better.

DV: The new zirconias are offered both as uncolored white and as a pre-dyed shade variant. When do you prefer which variant?

Hans Jürgen Lange, MDT: I prefer the pre-stained shade discs here. Due to the high shade fidelity, I experience no surprises in the reproduction during my everyday work in the laboratory, and I have a standardized and safe handling procedure for all my employees.

DV: A prerequisite for reliable shade reproduction is the shade fidelity of the materials used. How do you rate the shade fidelity of the color blanks to the VITA classical A1-D4 shade guide?

Hans Jürgen Lange, MDT: The VITA YZ Color blanks I have processed so far show a very high agreement with the dentin shade of the VITA shade standard. VITA YZ restorations have an increasingly brighter and more vivid effect after incision of the tooth stump from the incisal and occlusal direction.

DV: With VITA YZ SOLUTIONS, a complete zirconia package is now available for every indication. What influence does that have on your material assortment?

Hans Jürgen Lange, MDT: Since VITA YZ XT and ST are each available as pre-dyed color blanks in 16 VITA classical shades, I now have the right zirconia for every patient and for every indication, from the single crown to the multi-unit bridge. This means I have a greater variety in stock and can quickly and efficiently implement any case. Because of this, lithium disilicate will be used less and less in the future.

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Fig. 4 The magazine of a CAM unit is equipped with a VITA YZ ST blank.

The microveneering of zirconia with VITA VM 9

Zirconias in the crown and bridge technique allow a monolithic construction of the occlusion with "chewing edge protection," which is minimally veneered following vestibular sintering. This partial veneering, called "microveneering," can effectively save processing time, and at the same time, minimize chipping risk. In the following case report, Vincent Fehmer, Master Dental Technician, and Nicole Kalberer, Dentist (both of Geneva, Switzerland), demonstrate all essential fabrication steps of the CAD/CAM technical production of a reconstruction from a VITA YZ blank up through the vestibular veneering with VITA VM 9 (VITA Zahnfabrik, Bad Säckingen, Germany).

Nicole Kalberer, Dentist
Geneva, Switzerland

Vincent Fehmer,
Master Dental Technician
Geneva, Switzerland

→ **INITIAL SITUATION** The bridge abutments were supplied with metallic pin/stump superstructures.

→ **RESULT** The finished stained and glazed bridge construction on the model.

1. The clinical situation

The bridge abutments of teeth 45 and 47 had to be newly restored in a 68-year-old female patient. She wanted a natural-looking restoration with no visible metallic edges. Both metallic pin/stump assemblies were left on the abutment teeth, so as not to unnecessarily weaken the root area. The root canal fillings were radiologically sufficient and free from inflammation. The two stumps were prepared and the clinical situation conventionally molded to be digitized after model fabrication with the CEREC inEos X5 laboratory scanner (Dentsply Sirona, Bensheim, Germany). The decision was made to use the zirconia VITA YZ HT in order to adequately mask the stumps. The vestibular area should be constructed as partially reduced in order to be able to individually design these free spaces through microveneering.

2. Construction and sintering

The bridge was constructed with fully anatomical occlusion using the inLab software 16.1, with chewing edge protection and vestibular reduction. The reduction on 45 turned out to be more mesiovestibular in order to give the neighboring tooth even more space for the reproduction. Before sintering, the restoration was generally stained with VITA YZ HT SHADE LIQUID A2. In order to give the monolithic bridge part three-dimensional depth, the cusp slopes were accentuated with chroma A. An inward translucence was generated at the cusp tips with the selective application of Blue. For a more chromatic effect in the cervical area, the zirconia was also infiltrated with Chroma A.

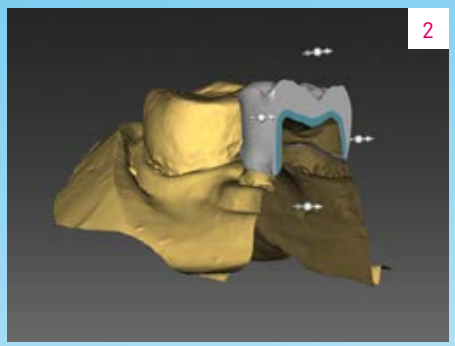

Fig. 2 The vestibular components were designed in a reduced manner.

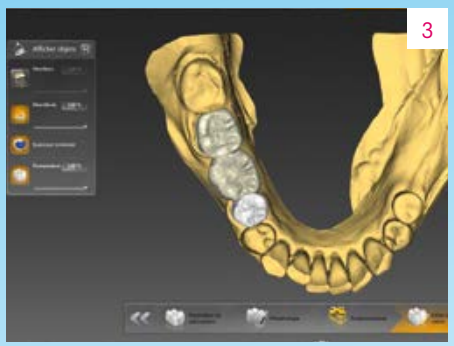

Fig. 3 The bridge was designed with chewing edge protection.

Fig. 7 The mesiovestibular reduction of tooth 45 made it possible to create a harmonious transition.

Fig. 8 The first veneering ceramic application with VITA VM 9 BASE DENTINE A3.

3. Characterization and finalization

After sintering, the vestibular veneer was layered and fired with the feldspar veneering ceramic VITA VM 9 BASE DENTINE in the shade A3, and with ENAMEL, decreasing from incisal to cervical. In the case of a corrective firing, after minimal shrinkage, only the approximal contacts had to be optimized with ENAMEL. This was followed by the final characterization with VITA AKZENT Plus stains. The fissure area was characterized with EFFECT STAINS 06 (ES 06, rust red). For an increase in chroma on the cusps, we used ES 04 (sunny yellow) and 05 (orange). A translucent effect of the cusp tips was achieved with ES 11 (blue) and 12 (gray-blue). After a fixation firing, the glaze firing took place with VITA AKZENT Plus GLAZE LT.

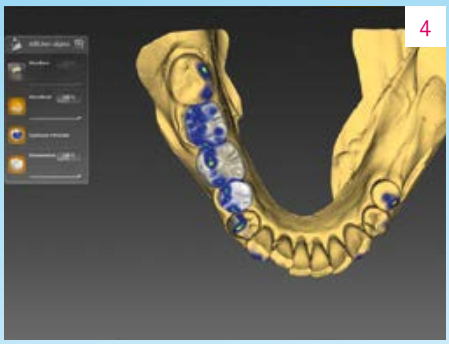

Fig. 4 The occlusal contacts were consistently constructed of zirconia.

Fig. 5 The bridge construction after infiltration with VITA YZ HT SHADE LIQUIDS and sintering.

Fig. 6 The cusp slopes had been chromatically infiltrated in advance, the cusps tops bluish.

Fig. 9 For the first firing, ENAMEL was also layered decreasingly from incisal to cervical.

Fig. 10 Finally, the corrective firing was carried out with ENAMEL.

Fig. 11 The finished stained and glazed bridge construction on the model.

4. Final result

After final high-gloss polishing, the bridge construction could be clinically tested and finally self-adhesively bonded. The occlusally monolithic and vestibularly reduced construction was efficiently manufactured in the digital workflow. The combination of targeted shade infiltration, minimal vestibular microveneering and final staining, resulted in a lifelike bridge restoration. The metallic stump abutments were reliably masked. The patient was very satisfied with the fast, esthetic restoration.

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→ **RESULT:** The final cemented bridge construction had a lifelike, natural effect.

Precisely controlling shade saturation with VITA AKZENT Plus CHROMA STAINS

DT Renato Carretti
Zurich, Switzerland

In the case of reconstructions that have an intermediate shade in whole or in part, near-natural reproduction of the tooth shade is typically demanding. The chroma of the restoration must be adjusted selectively or completely to consistently match the tooth shade. With the new VITA AKZENT Plus CHROMA STAINS (VITA Zahnfabrik, Bad Säckingen, Germany), the shade saturation of ceramic restorations can be controlled in a targeted manner. Dental Technician Renato Carretti (Zurich, Switzerland) uses an anterior crown to show how the shade effect can be systematically influenced with the new stains.

1

→ **INITIAL SITUATION** Condition of tooth 12 after full crown preparation, intraoral scan and provisional restoration.

1. Patient case

Tooth 12 of a retired woman had been repeatedly restored with composite. Due to the size of the defect, chipping and fractures of the direct restoration occurred again and again. After careful consideration, the patient decided to have the tooth fully crowned. This was no easy task. Due to the aging process, the neighboring natural teeth in the esthetic zone showed an individual play of shade and light that had to be reproduced ceramically. For the demanding single-tooth reconstruction, it was to be anatomically reduced from the vestibular side, and multichromatic zirconia and the multi-faceted veneering ceramics VITA VM 9 were to be used. In the first session, the tooth was prepared, scanned and provisionally restored. The determined basic tooth shade was between A2 and A3.

2. Vestibular individualization

The crown framework made of zirconia was designed, milled and sintered in the CAD/CAM workflow. The vestibular reduction was cervically layered with VITA VM 9 BASE DENTINE A3, and the body area was layered with A2. Due to the high translucency of the natural residual dentition, NEUTRAL and a very thin layer of WINDOW were used on the incisal edge. For a translucent depth effect, the flanks were accentuated with bluish translucent EFFECT ENAMEL 9. This was followed by the first dentin firing. The restoration was still too bright on try-in. The cervical area was then characterized with a three-to-one mixture of BASE DENTINE A3 and EFFECT CHROMA 3 (light yellow). A translucent effect on both flanks was achieved with EFFECT STAINS 11 (blue).

Fig. 2 For the raw and stain try-ins, the temporary was removed.

Fig. 3 The raw firing try-in after the first dentin firing still shows a crown that is much too bright.

Fig. 4 The play of shade at the incisal edge and the body area was reproduced with VITA AKZENT Plus CHROMA STAINS A and B.

Fig. 5 After the stain firing, all participants were satisfied with the result.

VITA AKZENT Plus CHROMA STAINS specifically control shade saturation.

3. Play of shade with VITA AKZENT Plus

In order to replicate the multifaceted shade nuances in the incisal edge and in the body area of the crown, VITA AKZENT Plus CHROMA STAINS was used on a selective basis. "The CHROMA STAINS are very intense and also visible in a thin layer. This is fantastic, especially with monolithic restorations," says Carretti, describing the benefits of the stains, which allow a targeted control of chroma staining. The mesial and distal incisal area, as well as the body area, were characterized with CHROMA STAINS A, and the middle incisal area with the more intense B. After visual intraoral comparison in the patient, all characterizations were fixed with a stain firing.

4. Result and conclusion

After a follow up clinical try-in, all participants were satisfied with the result. After the completion of the crown with fine diamond and sandpaper, the glaze firing could be carried out. For a natural effect, the gloss was finally reduced with a polishing brush and pumice, without reducing the shade effect. The controllable chroma of the VITA AKZENT Plus CHROMA STAINS enabled a play of shades that matched the natural residual dentition. The restoration met the high expectations of the patient.

RESULT The crown was polished and finally integrated. The resotration harmonized with the remaining tooth substance.

INFO: WHAT IS VITA VM 9?

VITA VM 9 is a highly esthetic, fine-structure feldspar ceramic for the full and partial veneering of framework constructions made of zirconia and feldspar ceramic.

The main components of VITA VM 9 are pure potash and soda feldspar, which contribute a brilliant shade effect and very good physical properties.
Thanks to its homogenous surface, VITA VM 9 has excellent milling and polishing properties.

Complex crown and bridge restoration in the anterior tooth region

Han Luo, Dental Technician
Tianjin, China

Combining crowns and bridges in the anterior is more than just a morphological challenge. When patients are dissatisfied with the esthetics of a former procedure, it is particularly important to pay special attention to true shade reproduction and a lively play of shade and light. VITA VM 9 veneering ceramic (VITA Zahnfabrik, Bad Säckingen, Germany) is made of natural feldspar and offers the possibility of reproducing natural three-dimensional characteristics from the inside out with its intricate pastes. In the following case study, Dental Technician Han Luo (Tianjin, China) demonstrates how the veneering system was used to find a highly esthetic solution for a complex case.

1

INITIAL SITUATION The inadequate initial situation with esthetically lifeless and dull reconstructions.

1. The clinical case

The case involves a 40-year-old patient with inadequate anterior crown and bridge restorations. The plastic veneers were lifeless and dull, showing strong discoloration. In addition, the basic rules of esthetics had not been taken into account: The incisal edge, tooth axes, angle characteristics and symmetrical line of the marginal area of the gingiva were clearly lacking harmony. There was also a radiological and clinical diagnosis of secondary carious lesions. The patient requested new restorations with a natural appearance that integrated into the remaining teeth. The masking zirconia frameworks were to be veneered with VITA VM 9.

Fig. 2 After pretreatment for preservation, the stumps could be repaired.

Fig. 3 Framework constructions made of zirconium dioxide after the wash opaque firing with EL4 (yellow), INT02 (sand) and 05 (coral blush).

Fig. 6: Condition after the second firing with clearly visible shade nuances.

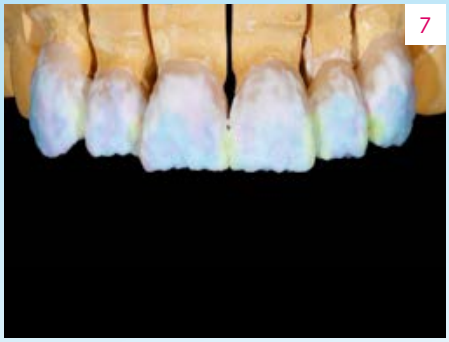

Fig. 7 Lateral areas and lower third, EO1 (neutral). Middle and upper third with whitening ENL.

2. Tooth shade determination and creation of the framework

To determine the accurate tooth shade, the VITA Toothguide 3D-MASTER was used in conjunction with the VITA VM 9 shade indicator classical and the VITA INTERNO shade sample disc. A detailed layer sketch was created based on these references. The old bridge and crowns were removed and the carious lesions were provided with a composite for preservation. This was followed by finishing the stumps, the impression and production of the master model. Based on the scanned model, the bridge framework from 21 to 23 and the crown frameworks at 11, 12 and 13 were produced and sintered with CAD/CAM support. The wash opaque firing was then carried out using EFFECT LINER 4 (yellow) and VITA INTERNO 02 (sand) and 05 (terracotta).

Fig. 4: BASE DENTINE 2M1, cervical EL4 (yellow) and INT05 (terracotta), as well as EC8 (beige) in the middle area.

Fig. 5: After the first firing, cervical EL4 (yellow), incisal BD 2M1 and MM3 (light orange) were applied.

Fig. 8 The condition after the first glaze firing already shows a varied play of light.

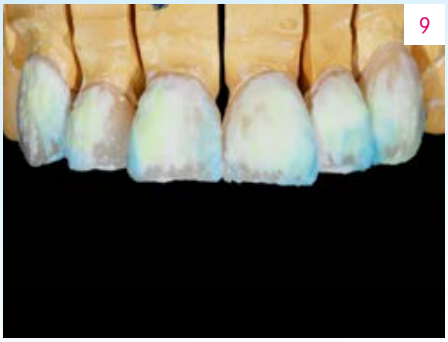

Fig. 9: Lateral layering using E01 (neutral) and E03 (bluish). Incisal and medium-level whitening ENL.

Fig. 10: The condition immediately after the second glaze firing.

3. Three-dimensional veneering

"Reproducing the individual characteristic features of the natural teeth in ceramic was a true dental challenge. A number of shade nuances had to be taken into account," said Han Luo, describing the sophisticated ceramic veneering. "In order to mimic the cervical area, I combined yellow EFFECT LINER 4 (EL4) with INTERNO 05 (terracotta). In the middle, EFFECT CHROMA 8 (beige) was used. To achieve the reproduction in the incisal edge, I applied an alternating layer of light orange MAMELON 3 (MM3), bluish EFFECT OPAL 3 (EO3), whitening ENAMEL (ENL) and NEUTRAL (NT), as well as EFFECT ENAMEL 6 (reddish-translucent), which was used for a natural ceramic reconstruction."

4. Finalization and summary

After the last firing, the final finishing work was completed using diamond tools. Additional accentuation was carried out using a rubber polishing disc. The individual characteristics were accomplished with a combination of a glaze firing and VITA AKZENT Plus EFFECT STAINS 06 (rust-red). After the clinical try-in, the bridge and crowns were definitively integrated. Thanks to the accurate determination of the tooth shade, excellent planning and dental abilities, natural and lively restorations were achieved using VITA VM 9. Everyone involved was highly satisfied with the esthetic results.

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RESULT The natural end result after finishing, characterization and glaze firing.

Monolithic single crown in the esthetic zone

Dr. Shoji Nakamura, Dentist
Japan, Tokyo

The restoration of individual incisors in the front remains the supreme discipline of dentistry. Usually, in this case, a framework is fabricated, which is then veneered to reproduce the vitality of natural teeth. But thanks to polychromatic materials and intelligent CAD software solutions, esthetically pleasing results can now be achieved with monolithic restorations. Dentist Dr. Shoji Nakamura (Japan, Tokyo) shows how the middle incisors can be restored monolithically with the feldspar ceramic VITABLOCS RealLife (VITA Zahnfabrik, Bad Säckingen, Germany) on the basis of precise tooth shade determination and custom blank selection.

1

→ **INITIAL SITUATION** Initial situation with strongly rotated and non-vital middle incisor 11.

1. The patient case

A 67-year-old female patient was dissatisfied with the position and shade of tooth 11. The tooth proved to be non-vital. Due to the massive rotation of tooth 11, the patient was advised to have her dental arch orthodontically leveled. However, she rejected this proposal in favor of a a fast, inexpensive and esthetic restoration. To achieve this, she was willing to accept an invasive preparation. The full crown restoration was to be CAD/CAM-based and made of feldspar ceramic. Pre-prosthetically, tooth 11 was successfully treated with a root canal.

2. Tooth shade determination and blank selection

The VITA Easyshade V digital spectrophotometer (VITA Zahnfabrik, Bad Säckingen, Germany) was used to determine an accurate tooth shade and make a precise block selection. In this case, the basic tooth shade 3M2 was determined, and the most suitable blank was suggested in block mode for the digital workflow. In order to be able to reproduce the near-natural shade progression from cervical to incisal, we chose VITABLOCS RealLife in 3M2C, which has an accurate, three-dimensional layer structure between the dentin and incisal edge.

Fig. 2 The tooth shade determined in block mode by the VITA Easyshade V was 3M2.

Fig. 3 The rotation was balanced out during the preparation.

Fig. 4 After the intraoral scan, the shape of the crown was virtually designed.

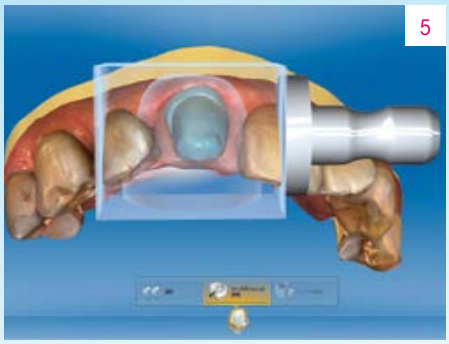

Fig. 5 VITABLOCS RealLife was positioned on the preparation.

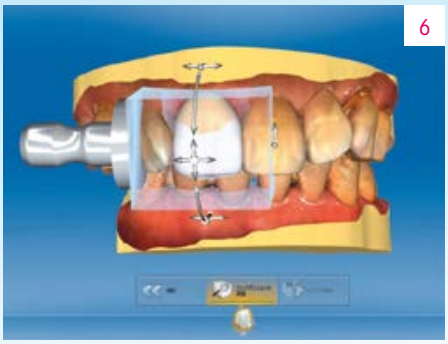

Fig. 6 The three-dimensional shade and translucency gradient was optimally adjusted.

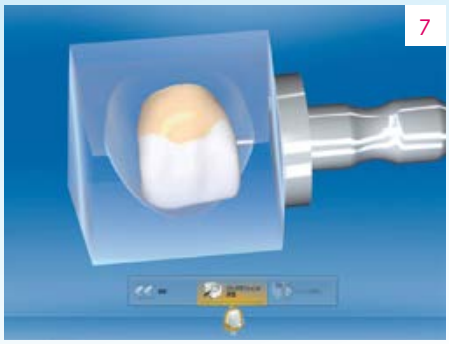

Fig. 7 The nesting of the crown restoration directly before milling.

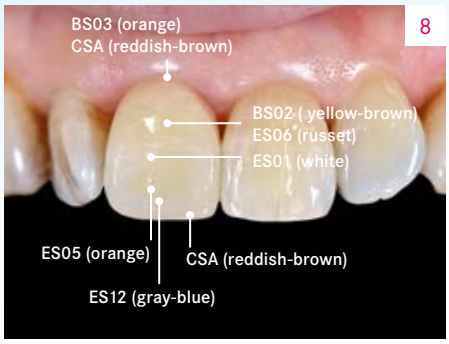

Fig. 8 The crown was individually characterized with VITA AKZENT Plus stains.

Fig. 9 After the final cementing, the monolithic restoration was integrated in the esthetic zone.

3. Treatment procedure and construction

After preparation, the situation in the upper and lower jaw was scanned with the CEREC Omnicam. Finally, the crown was constructed using the CEREC software 4.4 (Dentsply Sirona, Bensheim, Germany). Since the neighboring tooth 21 had little translucency, the incisal third of the crown was made more opaque by the corresponding positioning in the virtual blank. The monolithic crown was finished following removal of the sprue with fine diamond and rubber polishers.

4. Characterization and integration

The final characterization was carried out with VITA AKZENT Plus stains to highlight the individual shade nuances. In the result, the definitively integrated monolithic restoration blended harmoniously into the esthetic zone. The coordinated virtual positioning of the restoration in the three-dimensional layer structure of VITABLOCS RealLife enabled the esthetic appearance of the adjacent incisors to be solidly reproduced, with the stains then replicating the last subtle nuances. The patient was extremely satisfied.

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→ **RESULT** The patient was very satisfied with the fast and efficient restoration.

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