

DENTAL

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VISIONIST

Digital, visionary
and sustainable.

New materials and procedures in focus
from science and practice.



Hybrid ceramics for implant-supported restorations

PD Dr. Andreas Bindl reports
on new opportunities with
VITA ENAMIC IS.

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Achieve aesthetic results with veneering composite

Tips and examples for the use
of VITA VM LC flow by master
dental technician Jürgen Freitag.

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The new generation of dental **CAD/CAM systems** and technologies



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Editorial

"Digital technologies as pulse generator: opportunity or risk?"



Since digital technologies in the dental industry contribute to the pace of progress, it is becoming increasingly important to evaluate, learn, and integrate modern techniques and materials into the daily routines at practices and laboratories. Whether innovative materials can actually meet expectations must be continuously re-evaluated.

This magazine edition addresses test results which show the extent to which restoration materials can absorb masticatory forces. In a case study, the clinical use of hybrid ceramics for implant-supported restorations is shown. Dental Visionist also addresses the question of possible ways of using hybrid ceramics for the treatment of bruxism patients.

An additional focus is the teamwork of technicians and others who treat patients. We will show, using case documents, how highly aesthetic results can be achieved using the veneering of hybrid ceramics. We will also show how characterized glass ceramic partial crowns are integrated into the natural dentition in the laboratory.

Stay curious!
DENTAL VISIONIST wishes you an enjoyable read!

Angeley Eckardt
Managing Editor



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New findings from an in vitro test

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Monitored clinical use:
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An example of good teamwork:
Semi-chairside partial crown production
with zirconia-reinforced glass ceramics

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PUBLICATION DETAILS**Publisher**

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

Editorial Production/Design/Layout

qu-int. brands | media | communication
Waldkircher Straße 12 | 79106 Freiburg

Managing Editor

Angeley Eckardt
quint. brands | media | communication
Waldkircher Straße 12 | 79106 Freiburg

Publication: three issues per year

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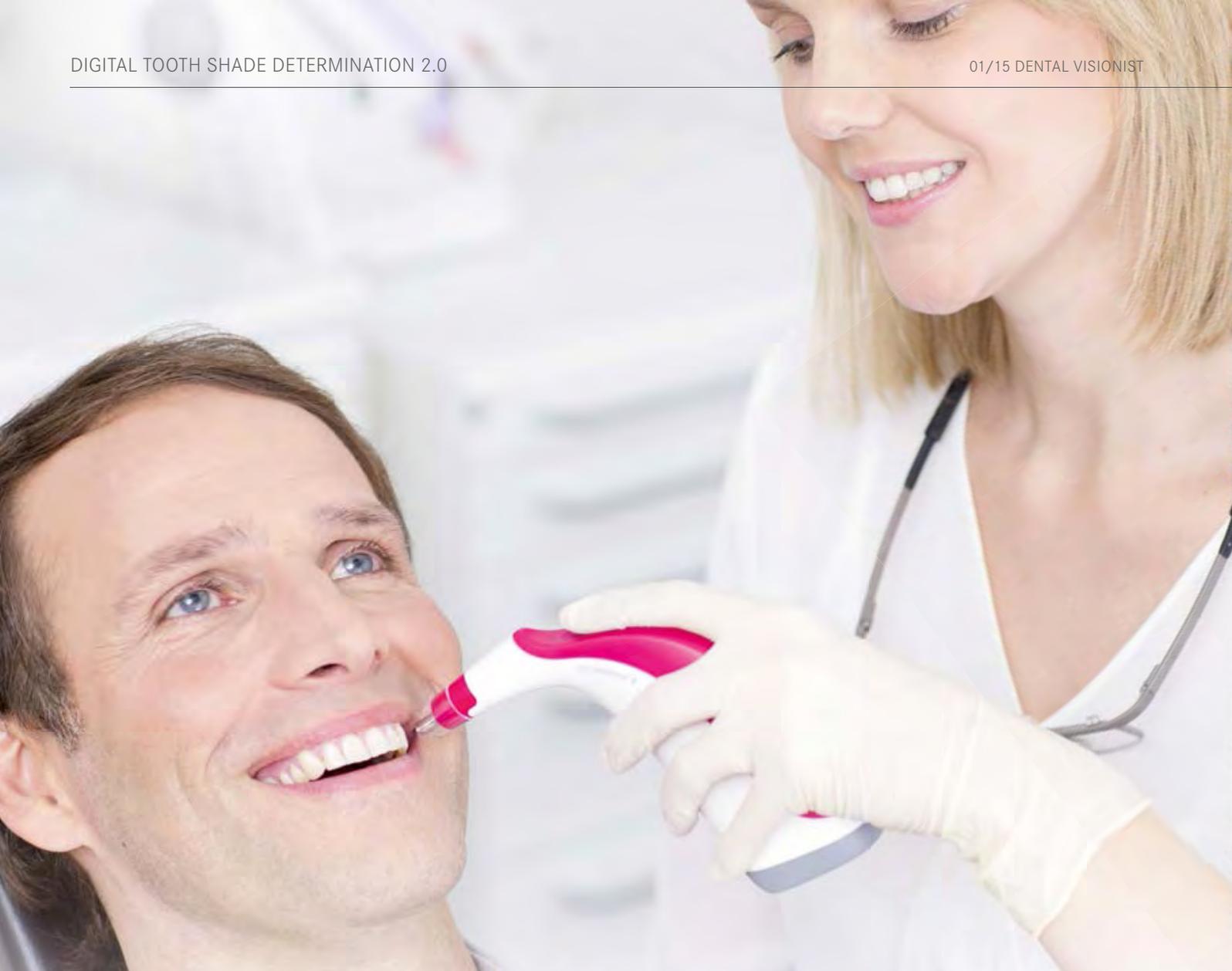
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INFORMATION

The testimonials by dental surgeons 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 testimonies from the dentists and dental technicians named reflect the status of the report authorization of 09/2015. The testimonials by developers or technical marketing 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.



Practical testing of the new digital shade determination device VITA Easyshade V

The University of Mainz determined a precision of 99.6 percent in an unpublished study on digital tooth shade determination using VITA Easyshade. In comparison, the precision for visual shade determination was 72.5 percent. The new VITA Easyshade Generation also offers, in addition to shade determination in seconds, an intuitive touch operating concept as well as interfaces for wireless shade communication. PD Dr. Lehmann reports on his first experiences in this article.





*PD Dr. Karl Martin Lehmann
Polyclinic for Prosthetics,
Mainz University Medical Center,
Mainz,
Dentists at Friedensplatz, Bonn,
Germany*

Innovative design and simple handling

"The innovative design and high-quality workmanship of the new VITA Easyshade V make an immediate positive impression." The smooth surfaces in combination with the practical touch operation are not only visually appealing, but also provide an advantage with regard to hygiene - for example, there are no difficult-to-clean crevices around buttons, according to PD Dr. Lehmann. The color touch display and Bluetooth interface also simplify handling in everyday practice.

"The innovative design and the high-quality workmanship of the new VITA Easyshade V make an immediate positive impression."

Obtain precise measurement results

The following main recommendations should lead to precise measurement results:

1. Follow the operating instructions exactly,
2. perform multiple measurements, and
3. measure before the start of treatment. The last recommendation is especially important since teeth can become dehydrated by the suction process, which can lead to shade alteration. This applies both for direct restorations with filling material and for prosthetic restorations.

Exact communication and documentation

"In addition to tooth shade measurement, we also make digital photos," reports PD Dr. Lehmann. He has discovered that with the help of photos and the VITA Assist software, information for making prosthetic restorations can be transmitted very comfortably and precisely to the laboratory. The software can also be used for documentation.

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Fig. 1 Main menu of the OLED color touch display. Shown here: Basic shade measurement, average measurement and tooth area measurement.



Fig. 2 Use of the VITA Easyshade V for determination of the tooth shade in the context of the treatment of white spot lesions.



Fig. 3 Preparation of the tooth surfaces with an adhesive system.



Fig. 4 Light curing of the applied plastic filling material.



Fig. 5 Display of the Bleached Index according to the VITA Bleachedguide 3D-MASTER in the context of a professional tooth lightening.

VITA ENAMIC absorbs masticatory forces: New findings from an in vitro test



Study results from a chewing simulator regarding force transmission on a simulated peri-implant bone show that crowns made of a relatively elastic material such as the hybrid ceramic VITA ENAMIC can reduce or absorb about 70 percent of the force compared to crowns made of the comparably rigid zirconia. Dr. Maria Menini reports on her findings in a test series in the following interview.



Dr. Maria Menini
University of Genoa, Italy

DV: Dr. Menini, what results have you determined for hybrid ceramics in comparison to zirconia and glass ceramics with regard to the ability to absorb masticatory forces?

Dr. Maria Menini: In the investigations that our research team conducted under the leadership of Prof. Dr. Paolo Pera, the restoration material used had a significant impact on the transmission of masticatory forces to the simulated peri-implant bone. By using elastic materials, the measured load transmission could be reduced. The hybrid ceramics in particular demonstrated a shock-absorbing behavior in comparison to zirconia and glass ceramics. This reduced the forces transmitted to the bone-implant interface.

DV: Why do relatively elastic materials such as VITA ENAMIC have a better ability to absorb masticatory forces than traditional glass or oxide ceramics, for instance?

Dr. Maria Menini: Elastic materials absorb masticatory forces by deforming under a load – similar to a mattress that you would jump on. In contrast, more rigid materials such as zirconia do not offer this property, so that applied forces are transmitted directly to the underlying structures (e.g., implant and bone). Hooke's law applies here: The more rigid the material (i.e., the higher the modulus of elasticity), the lower the deformation under load and the greater the force transmission and vice versa.

"The more rigid the material, the greater the force transmission!"

DV: What are the risks that may result with an implant-supported restoration from a relatively direct and rigid connection between bone and implant?

Dr. Maria Menini: In contrast to natural teeth, osseointegrated implants are rigidly anchored in the bone. This leads to a direct transmission of force to the peri-implant bone under a load. With physiological loading of the osseointegrated implant, the bone substance does actually adjust (i.e., bone turnover processes), but an excessive overload can lead to bone fractures, bone resorption and technical complications. As a result, it appears to be important to ensure a controlled force transmission on the bone-implant interface.

DV: Can elastic restoration materials possibly minimize these risks in implant restorations due to their ability to absorb masticatory forces?

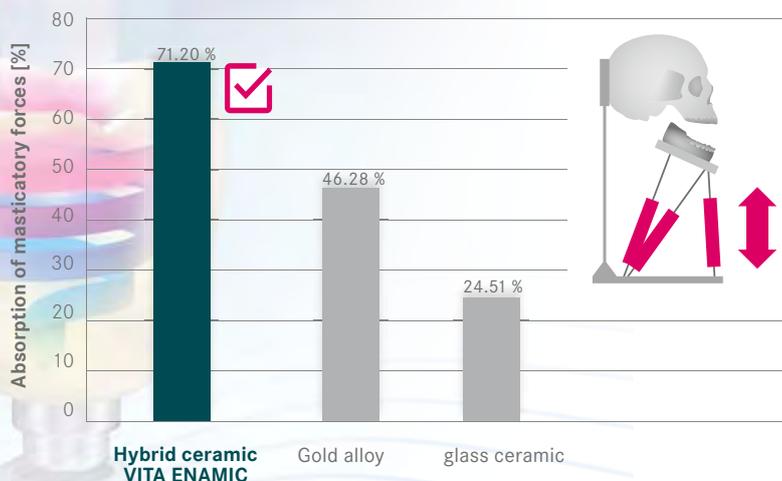
Dr. Maria Menini: Results from in-vitro studies indicate that this is possible, but clinical data is not yet available. According to our tests in the chewing simulator, the use of hybrid ceramics, composite and acrylic resins reduces the forces transmitted on the bone-implant interface by approximately 70 to 95 percent in comparison to zirconia. These findings should be taken into consideration when selecting the restoration material, especially in cases where the load must be minimized (e.g., in the context of immediate restoration).

DV: For what other clinical indications may the use of restoration materials with "force-absorbing" properties be especially sensible, and why?

Dr. Maria Menini: It can be prudent to use elastic materials if clinicians want to reduce the occlusal load. This applies for restorations on implants and on natural tooth substance, as for example in patients with parafunctions. What biomechanical effects the use of relatively more rigid restoration materials such as ceramics have on the masticatory system has not been investigated up to now. With materials containing polymer and showing tooth-like properties, however, possible negative effects could be prevented.

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Absorption of masticatory forces compared to zirconia (ZrO₂)



Material class	Modulus of elasticity [GPa]	Force transmission (N)	Force absorption (%) in comparison to ZrO ₂
Zirconia	210 GPa	641.8 N (SD 6.8)	
Glass ceramic	96 GPa	484.5 N (SD 5.5)	- 24.51 %
Gold alloy	77 GPa	344.8 N (SD 5.7)	- 46.28 %
VITA ENAMIC hybrid ceramic	30 GPa	184.9 N (SD 3.9)	- 71.20 %

Source: University of Genoa, Department of fixed and implant restorations, Dr. Maria Menini et al., Genoa, Italy; 01/2015

Note: Test report published in the technical and scientific documentation for VITA ENAMIC, VITA Zahnfabrik, Bad Säckingen, Germany

Bonding resilience between luting composites and hybrid ceramics as well as glass ceramics

For the clinical long-term durability of ceramic restorations, a resilient and reliable bond between the luting composite and the ceramic is of great importance. In the following interview, Dr. Tian Tian reports on her findings from an investigation on the microtensile adhesion strength of six luting composites to the hybrid ceramic VITA ENAMIC and the glass ceramics VITA SUPRINITY as well as IPS e.max CAD.



*Dr. Tian Tian
Dental Material Sciences,
Dentistry Faculty
University of Hong Kong, China*

DV: Dr. Tian, what conclusions can be drawn from the test results on the bonding resilience of luting composites to glass or hybrid ceramics in clinical use?

Dr. Tian Tian: The results of the investigation show that the selection of bonding material is a decisive factor which strongly impacts the long-term resistance of ceramic restorations. In all tested combinations of bonding and restoration material, a decrease in the adhesive strength was observed over time. Here, the initial adhesion values obtained are significantly different from the adhesion values after artificial aging depending on the luting composite used.

DV: For which combinations of materials were particularly high bond strength values measured, and for which combinations were they relatively low after three months of storage?

Dr. Tian Tian: After three months of storage in water, the highest adhesion strengths were determined for Variolink II (Ivoclar Vivadent, Schaan, Liechtenstein) in combination with glass ceramics. The same luting composite achieved the highest initial values with VITA ENAMIC; however, after aging, RelyX Ultimate (3M ESPE, St. Paul, USA) showed slightly better results. The lowest bond strength after three months of storage in water was measured, depending on the restoration material, with various cements.

DV: Did you observe significant differences between the material classes of glass and hybrid ceramics with regard to the adhesion to bonding materials?

Dr. Tian Tian: Similarly high adhesive strengths were obtained for all classes of materials after aging in water. There was a difference in the type of failure. In the hybrid ceramics group, it was most frequently a cohesive failure that was observed, while in the glass ceramics, it was predominantly mixed cases of failures and adhesion failures that occurred. When cohesive failures are observed, it means that failures did not happen at the interface between the ceramic and the adhesive material. In this case it is not possible to state the actual bond strength.

"For all classes, similarly high bond strengths"

DV: What are the minimum values that should be recorded in tests, so that in the clinicians can expect a resilient bond of the luting composite to the ceramics?

Dr. Tian Tian: A durable bond is dependent on many factors and must be proven by various laboratory studies and clinical tests. The determination of microtensile bond strength is one of many methods with which adhesion can be determined. It is not reasonable to give a



minimum value to be achieved. It is important to compare groups within the same study (with identical test conditions). The following applies: The longer the storage, the more significant the results are for users.

DV: Have you observed any cases of debonding in your investigation with glass and hybrid ceramics?

"Not a single case of debonding was observed."

Dr. Tian Tian: No individual case of debonding was observed during the whole test. This result indicates that the adhesion between the tested luting composites and the glass ceramics VITA SUPRINITY and IPS e.max CAD as well as the hybrid ceramic VITA ENAMIC was still relatively strong after three months of storage in water.

DV: Are there combinations of bonding and restoration materials that you would assess as especially suitable for clinical use on the basis of the test results?

Dr. Tian Tian: The results of this investigation show that Variolink II attained a very high adhesive value with all three ceramics after three months of aging in water. In order to make general statements about the long-term

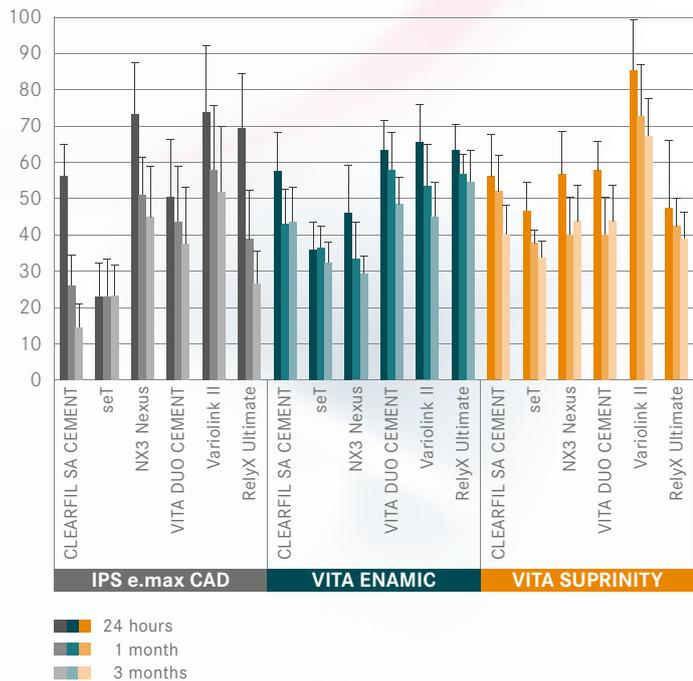
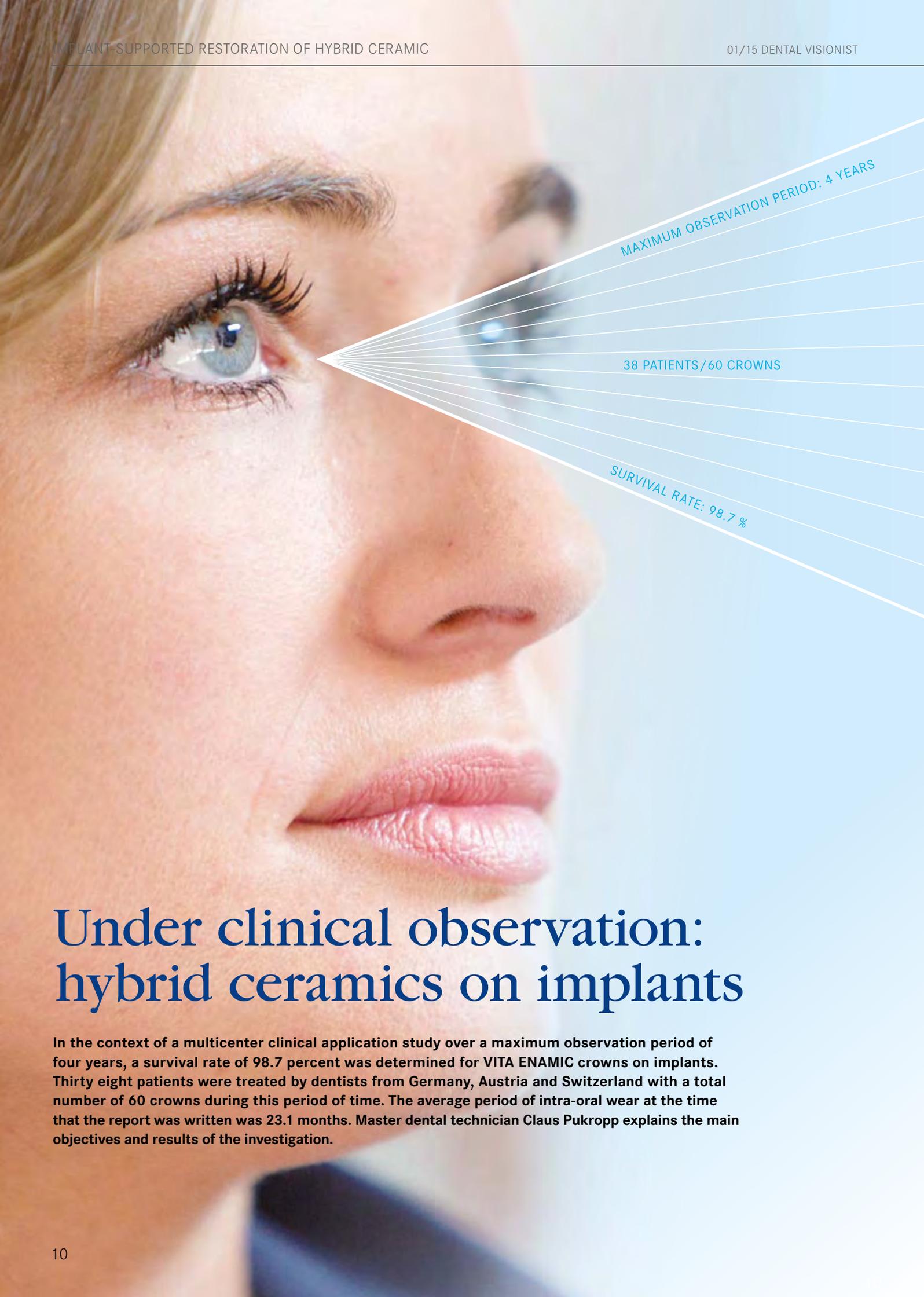


Fig. 1 Investigation results on bonding durability, University of Hong Kong, China. **Source:** University of Hong Kong, Dental Faculty, Department of Dental Material Sciences, Dr. Tian Tian et al., Hong Kong, China; 03/2015 **Note:** Test report published as poster abstract "Evaluation of bonding durability between CAD/CAM ceramics and resin cement" IADR 2013, Boston, USA

durability of the adhesion between luting composites and glass or hybrid ceramics, however, additional studies with longer aging and additional clinical studies are necessary.



MAXIMUM OBSERVATION PERIOD: 4 YEARS

38 PATIENTS/60 CROWNS

SURVIVAL RATE: 98.7 %

Under clinical observation: hybrid ceramics on implants

In the context of a multicenter clinical application study over a maximum observation period of four years, a survival rate of 98.7 percent was determined for VITA ENAMIC crowns on implants. Thirty eight patients were treated by dentists from Germany, Austria and Switzerland with a total number of 60 crowns during this period of time. The average period of intra-oral wear at the time that the report was written was 23.1 months. Master dental technician Claus Pukropp explains the main objectives and results of the investigation.



Master Dental Technician
Claus Pukropp
Head of Technical Marketing,
VITA Zahnfabrik,
Bad Säckingen, Germany.

The objective of the investigation was to prove the suitability of the hybrid ceramic VITA ENAMIC for implant-supported crown restorations. To determine the survival rate (Fig. 1), debonding of the crown and partial or full fracturing (chipping) of the crown body was assessed as a loss criterion.

Areas of the jaw restored and types of restorations performed

In this clinical observation, the implant-supported restorations were done in the maxilla 41 percent of the time and in the mandible 59 percent of the time. 91 percent of the reconstructions examined were located in the mainzone of chewing pressure (premolar and molar area). A total of eight different implant systems were used.

"The results show a high survival rate for VITA ENAMIC crowns."



The majority of implant abutments were manufactured as follows: In 90 percent of the cases, individual abutments or monolithic abutment crowns of VITA ENAMIC on TiBase adhesive bases (72 percent) or alternative titanium bases (18 percent) were fabricated. The determined data on the implant-supported restorations therefore follow the trend, recognized in the literature, towards CAD/CAM-manufactured and screw-retained solutions.

Survival rate of VITA ENAMIC implant-supported crowns

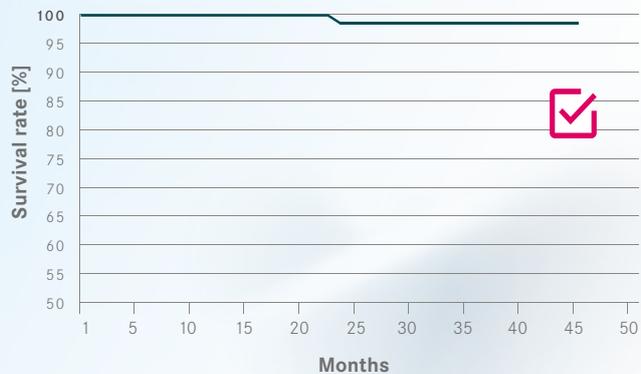


Fig. 1 Survival rate of VITA ENAMIC crowns on implants

Source: Multicenter clinical application study; VITA Zahnfabrik, Claus Pukropp et al., Bad Säckingen, Germany, 11/2014

Note: Study report published in the technical and scientific documentation for VITA ENAMIC, VITA Zahnfabrik, Bad Säckingen, Germany

An initial summary

The results of the study demonstrate comparable or higher survival rates¹⁻³ for VITA ENAMIC implant crowns than for alternative materials. Over the entire observation period, only one crown fracture (after 25 months) was documented. This fracture could be attributed, according to information from the dentist, to a significantly thinner wall than the recommended minimum wall thickness (1.0 mm occlusal). In combination with the absorbing and damage-tolerant properties, the initial clinical results for VITA ENAMIC implant-supported crowns allow us to expect long-term durability.

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- 3) Rinke S, Lange K, Roediger M, Gersdorff N. Risk factors for technical and biological complications with zirconia single crowns. *Clin Oral Investig.* 2015 Feb 7.

Making patients happy: Can VITA ENAMIC increase patient satisfaction?

In medicine, the term "compliance" describes the objective of achieving cooperative patient behavior in the context of therapy. Compliance is therefore a key element for the success of therapy and patient satisfaction. However, it can be a major challenge to make patients with high expectations happy. Dentists report on how hybrid ceramics, with their special properties can contribute to making patients happy in the following interview.



*Dr. Michael Maier
Munich, Germany*

DV: What do your patients say about restorations made of VITA ENAMIC, and how do they evaluate them, especially with regard to the intraoral wearing comfort of the hybrid ceramics?

Dr. Michael Maier: My patients are usually very satisfied with the restorations made from hybrid ceramic. The restorations not only blend in well with the overall oral appearance, but also cannot be distinguished from the natural tooth substance. The wearing comfort is therefore evaluated very positively. So far, not one of my patients treated with VITA ENAMIC has yet reported a "foreign body sensation" when chewing.

**"The wearing comfort is
evaluated very positively!"**

En

DV: Are there patient groups who react especially positively to reconstructions of hybrid ceramics, and if yes, why?

Dr. Michael Maier: Thanks to the inert elasticity of the material, masticatory forces are partially absorbed by the hybrid ceramics, so that the natural (residual) tooth substance can be partly "protected" by the "shock absorbing effect." This seems to be especially advantageous for patients with parafunctions such as bruxism. The shock absorbing properties allow us to expect that they would be suitable for implant-supported restorations as well, to which patients will certainly react positively.

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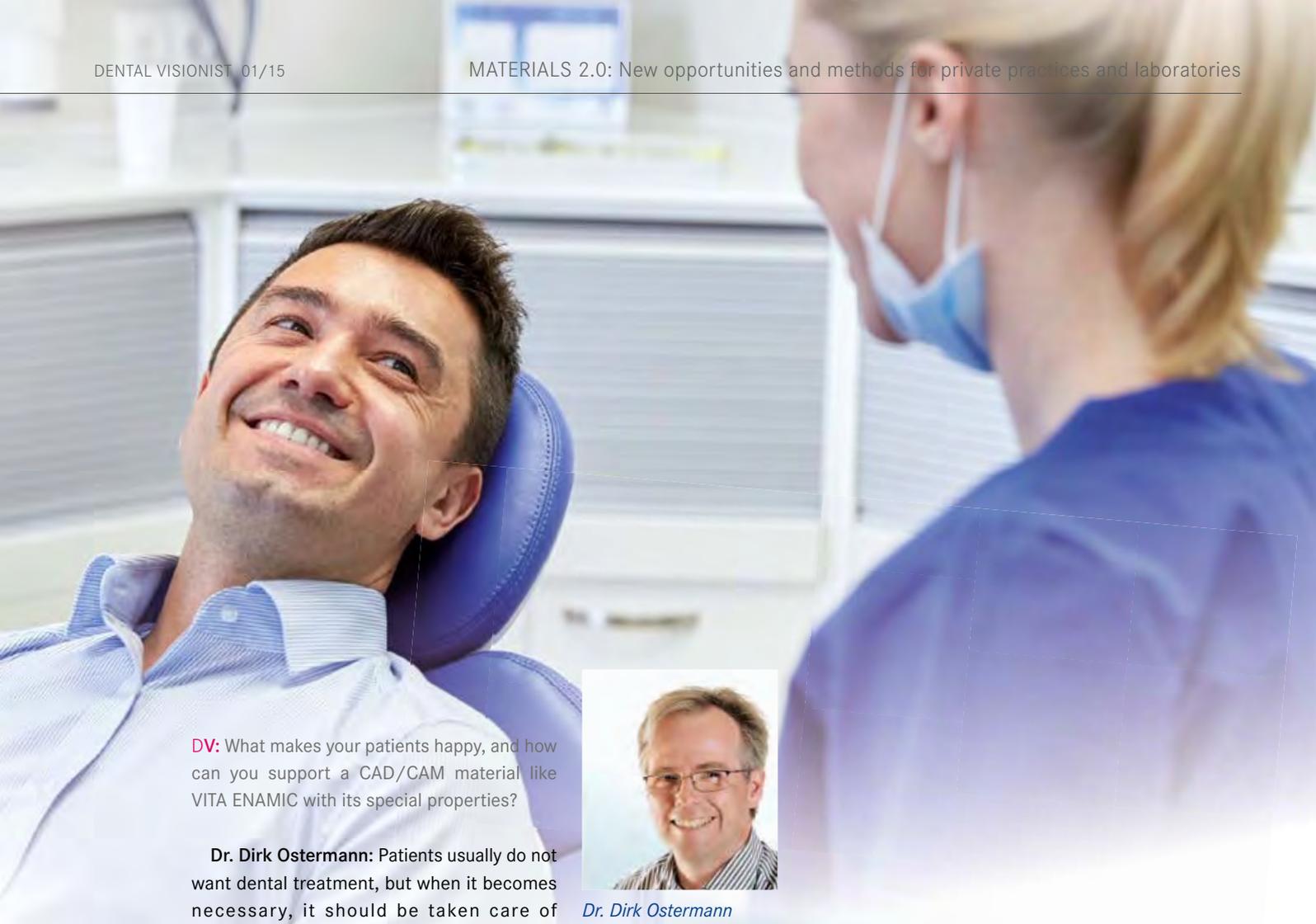


Fig. 1a Insufficient restorations at teeth 25 and 26 requiring a replacement.



Fig. 1b Situation following insertion of a crown and an onlay made of hybrid ceramic.

Source: Practice of Dr. Michael Maier



DV: What makes your patients happy, and how can you support a CAD/CAM material like VITA ENAMIC with its special properties?

Dr. Dirk Ostermann: Patients usually do not want dental treatment, but when it becomes necessary, it should be taken care of comfortably and as quickly as possible, and the result should also be durable for the long term. The CEREC technology, in combination with high-quality materials, makes this possible. Thanks to special properties, the hybrid ceramic offers advantages such as an efficient processability, high durability and an antagonist-friendly abrasion behavior.



*Dr. Dirk Ostermann
Hanover, Germany*

"Highly durable and still quick to process."



DV: How important to your patients is a restorative treatment within one session, and what kind of advantage does the hybrid ceramic bring to you in this regard?

Dr. Dirk Ostermann: Patients like to leave the dentist's office as quickly as possible, so chairside therapy in one session is a very important criterion for most. For greater loads in the lateral region, high-strength glass ceramics have been widely used up to now, which usually requires crystallization firing and therefore often requires a second appointment. In this case, the hybrid ceramic is a modern material alternative that is highly durable and still quick to process!

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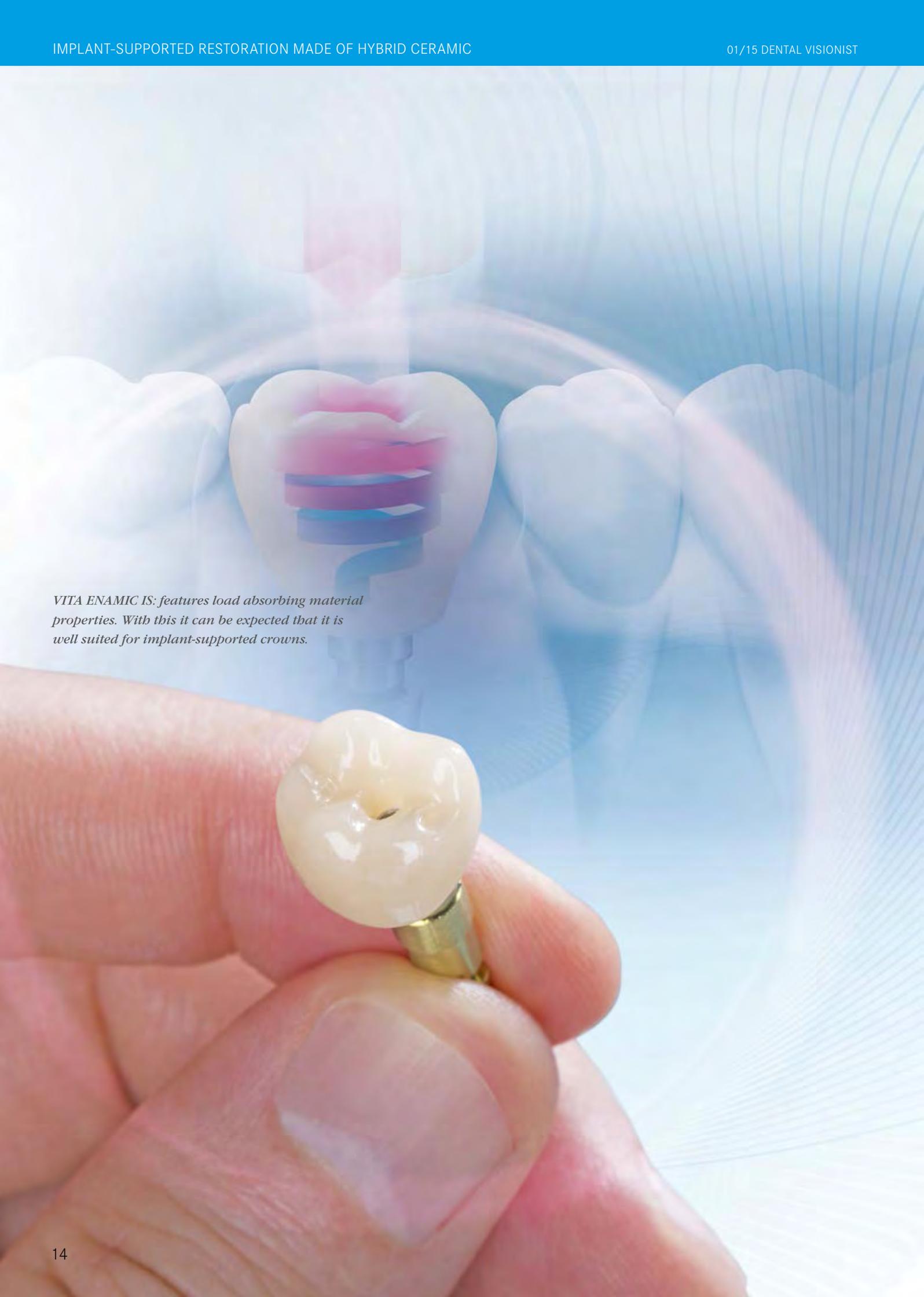


Fig. 2a An insufficient amalgam filling.



Fig. 2b The inserted restoration made of VITA ENAMIC.

Source: Practice of Dr. Dirk Ostermann

A hand is holding a white, crown-shaped dental restoration on a metal post. The background shows a dental arch model with a central tooth and a pink and blue spiral structure. The overall scene is set against a light blue background with a grid pattern.

VITA ENAMIC IS: features load absorbing material properties. With this it can be expected that it is well suited for implant-supported crowns.

Implant-supported restoration made of VITA ENAMIC IS

At IDS 2015, the VITA IMPLANT SOLUTIONS (IS) blanks with an integrated interface to a titanium/adhesive base (e.g. TiBase) for implant-supported crown restorations were introduced for the first time. In his case report, PD Dr. Andreas Bindl demonstrates the treatment of a patient with VITA ENAMIC IS in the lateral region.



➔ BEFORE

Fig. 1 Initial situation.



➔ AFTER

Fig.12 Final result.



*PD Dr. Andreas Bindl
Department of Computer-Supported
Restorative Dentistry,
Center for Dental Medicine
University of Zurich and Practice
at Zürichberg, Switzerland*

1. Initial situation

A 75-year-old patient came to our practice for the prosthetic treatment on two implants (Biomet 3i, Palm Beach Gardens, USA) in regions 25 and 26. After three months of closed healing, the soft tissues were healthy (Fig. 1), and the implants were completely osseo integrated (Fig. 2).

The plan was to expose and prosthetically restore the implants within one treatment session. This has the advantage, in addition to the general time and cost savings associated with chairside treatment, that there is no repeated manipulation of the soft tissues. This procedure has only been feasible since the introduction of the CEREC Software Version 4.2 (Sirona Dental, Wals, Austria).

INFO: WHAT ARE VITA IMPLANT SOLUTIONS (IS)?



VITA IMPLANT SOLUTIONS (IS) are blanks which have an integrated interface to an adhesive/titanium base (e.g., TiBase) and are used for the CAD/CAM fabrication of implant-supported dental restorations. VITA IMPLANT SOLUTIONS are available in three variants: VITA CAD-Temp IS composite blanks for temporary restoration and shaping of the emergence profile, as well as VITA ENAMIC IS hybrid ceramic and VITA SUPRINITY IS glass ceramic for the fabrication of the final superstructures.

The blanks are suitable for the CAD/CAM fabrication of mesostructures (two-element solution) and/or abutment crowns (single-element solution) for tooth-colored implant-supported superstructures. VITA IMPLANT SOLUTIONS are compatible with the implant systems of many manufacturers (e.g., Nobel Biocare, Straumann, Biomet 3i, Dentsply, and many more) via the integrated interface for the adhesive/titanium base (TiBase, Sirona Dental GmbH, A-Wals).

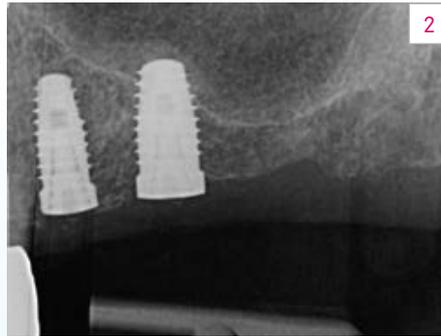


Fig. 2 X-ray image of both implants after three months of healing.



Fig. 4 Screwed scan posts with scan bodies prepared for digital implant molding.



Fig. 3 Screwed scan posts on the exposed implants.

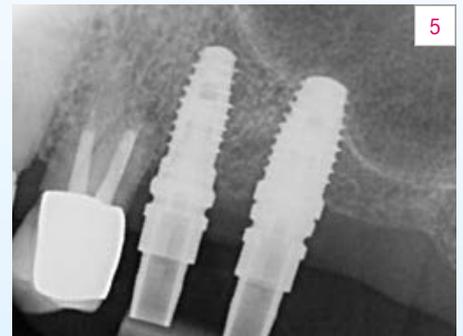


Fig. 5 Seamless fit of the scan posts on the implants.

2. Digitalizing and design

First, the implants were exposed and compatible scan posts and scan bodies (Sirona Dental) were fixed to these (Fig. 3 and 4). The correct position was examined with the aid of an x-ray image (Fig. 5). Then, the digital molding (CEREC Omnicam, Sirona Dental) of the situation was performed using scan bodies, followed by scans of the antagonists as well as the buccal bite registration. The 3D model was calculated, and the one-part abutment crowns constructed, taking into consideration all relevant information with the CEREC Software V 4.4 (Fig. 6 through 8).

3. Manufacture and integration

After milling in the CEREC MC XL milling unit, the VITA ENAMIC IS crowns were reworked and polished extraorally with the instruments of the VITA ENAMIC Polishing Set. Bonding on the TiBase was done according to the manufacturer's instructions with the Multi-link Hybrid Abutment (Ivoclar Vivadent, Schaan, Liechtenstein). After insertion, the crowns showed a precise fit (Fig. 9) and fit well into the overall picture (Fig. 10 and 11). Figures 12 and 13 show the result after four weeks. The gingiva is well healed, but it still has to form a tight gingival collar around both abutment crowns.

The material features a dentin-like modulus of elasticity.



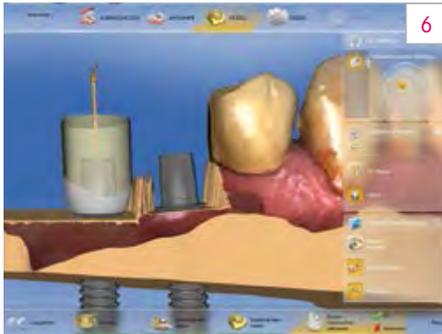


Fig. 6 Determination of the restoration axis for the computer-supported design of the abutment crowns.

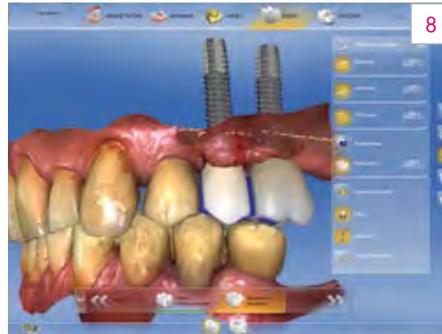


Fig. 8 ... taking the minimum strengths and occlusal contacts into consideration.



Fig. 10 Clinical situation ...



Fig. 7 Development of the full anatomical design proposal ...

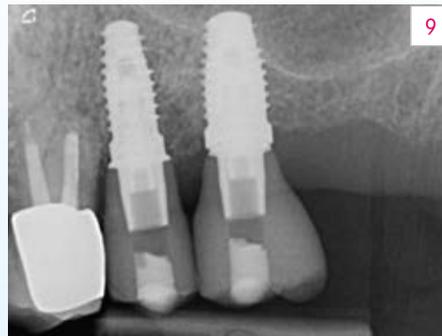


Fig. 9 Control x-ray image following integration of the restorations.



Fig. 11 ... immediately after conclusion of the treatment.

4. Summary

With VITA ENAMIC IS blanks, direct screw-retained implant-supported restorations can be manufactured and integrated within one treatment session. Hybrid ceramics also exhibit a modulus of elasticity that is similar to that of dentin. To what extent this results in a reduction in masticatory forces applied on the implant and whether this will positively impact the survival rate of implant-supported restorations is currently being studied.

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Fig. 12 Result ...



Fig. 13 ... four weeks after integration.



Hybrid ceramics in the laboratory: Esthetic results with VITA VM LC flow veneering



*Jürgen Freitag, MDT
 Bad Homburg, Germany*

With the low-viscous VITA VM LC flow veneering composite and the hybrid ceramic VITA ENAMIC, highly esthetic results can be achieved. The positive processing properties of the new veneering composite, such as the excellent fluidity combined with good stability, have especially convinced master dental technician Jürgen Freitag. In the following article, he describes the technical processing steps and provides tips for use in everyday laboratory work.



→ BEFORE

Fig 1 Blank crowns on model

1. New restoration in the anterior tooth region

A 39-year-old patient required a new restoration of the anterior teeth 12, 11 and 21 as a result of an accident, since the existing metal ceramic crowns were fractured. The patient wanted a solution that was as economical as possible but also esthetically attractive. It was determined to fabricate three crown frameworks of VITA ENAMIC in the dental practice and to veneer these individually in the dental laboratory.

2. Fabrication and conditioning

After the computer-supported design and fabrication of the crown framework, they were prepared for veneering with VITA VM LC veneering composite. Then they were etched and thoroughly cleaned, then silanized with VITASIL. Finally, VITA VM LC MODELLING LIQUID was applied. After a short dwell time, application of the flow materials was begun. Figures A through E (page 20) show the technical processing steps in the laboratory using an anterior crown as an example.

PRACTICE REPORT



Fig. 2 Individualized and polished anterior tooth crowns on the model.



Fig. 3 Perfectly molded and individualized palatal surfaces of the restorations.



Fig. 4 Check of the lightness value of the crowns using a black-and-white image.

3. Processing hints and experiences

For incisal, bluish-translucent effects, our own experience shows that the enamel-effect material EE9 is very well suited. This can be precisely modeled due to the high stability of the flow material - even the finest points are retained. After a short period of light-curing, the effect material EE1 and the clear glass WINDOW material (WIN) are applied. For shape correction, the neutral translucent material (NT) is used. To prevent the development of an oxygen inhibition layer and to simplify molding, the application of a thin layer of VITA VM LC gel is recommended after a short period of light curing and before final polymerization.

4. Finalization and integration

The crowns in this clinical case, which were veneered according to the technical processing steps described, were completed after cleaning under running water (Fig. 1) and technically polished with the VITA ENAMIC Polishing Set (Fig. 2). Following adhesive integration, the restorations could not be visually differentiated from the metal-ceramic crowns (Fig. 3). Figure 4 shows a black-and-white image for the checking of the lightness values. Note the harmonic transition to the gingiva which appears completely free of irritation and contributes to the overall aesthetic impression (Fig. 5).



→ AFTER

Fig.5 Final result

PROCESSING EXAMPLE

Esthetic veneering with VITA VM LC flow

step by step for excellent results.



Fig. A Reduction of an anterior crown made of VITA ENAMIC (cut-back technique) and roughening of the surface with fine-grain diamond.



Fig. B Reduced crowns prepared for veneering.



Fig. C Situation after application and polymerization of the enamel effect material EE9.



Fig. D Following application of the effect material EE1 and the VITA VM LC PAINT material PT5 (orange-brown) for optimization of the incisal effects.



Fig. E Completed crowns on the model.



Hybrid ceramics in practice: A CAD/CAM material for patients with functional disorders?

The treatment of patients with functional disorders is a challenge for dentists. The extent to which the hybrid ceramic VITA ENAMIC with its dentin-like elasticity may be a material for patients with bruxism is described by Dr. Sjoerd Smeekens in this article. Although reconstructions of VITA ENAMIC are still experimental for this indication, he has already implemented them with clinical success.



➔ BEFORE

Fig. 1 Initial situation.



➔ AFTER

Fig.14 End result.



*Dr. Sjoerd Smeekens
Beuningen, Netherlands*

1. Initial situation

The 48-year-old patient had suffered for ten years from severe temporomandibular joint pain and headaches, resulting in a depression which had led to his inability to work. Numerous visits to the doctor and treatment attempts (including occlusal splinting) had brought no relief. The patient rejected the corrective jaw surgery recommended because of the existing class III skeletal abnormality due to the uncertain therapy outcome. Figures 1 through 3 show the initial situation.

2. Preliminary treatment

After referral to our clinic, we first tried to stabilize the occlusion via a reversible correction of tooth position. The optimal length of the incisal edges, the occlusion plane and the horizontal and vertical dimension were determined with a maxillary bite registration of wax (Fig. 4). It was shown that, through an elevation of the vertical dimension by 8 mm, a correction of the angle-class III relationship was possible. For the long-term evaluation, a PMMA splint for permanent use was fabricated on the basis of the bite registration (Fig. 5 and 6). Ten hours after its insertion (Fig. 7), the patient reported, with tears of joy, that he was pain-free. This condition has been maintained for the wear time of two years.



Fig. 2 The extraoral examination shows a reduced lower third of the face.



Fig. 4 Step-by-step determination of the optimal vertical dimension.

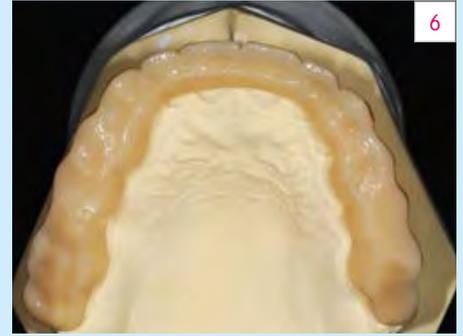


Fig. 6 ... on the model ...



Fig. 3 Intraoral examination: Situation at maximum intercuspitation.



Fig. 5 Therapeutic splint of PMMA ...



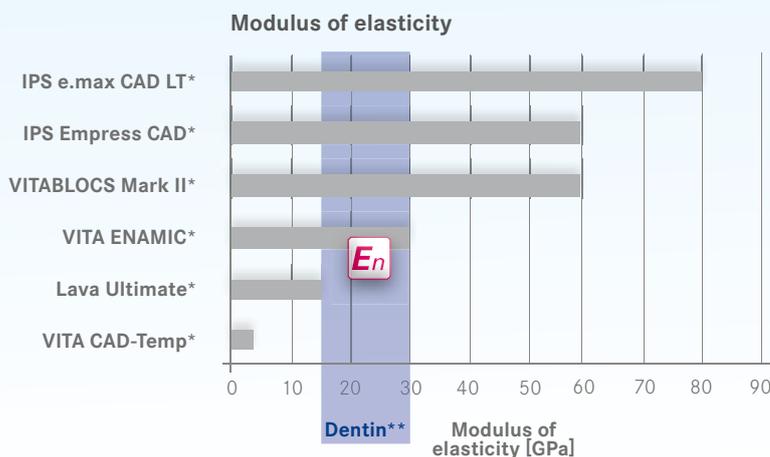
Fig. 7 ... and in the patient's mouth.

3. Material selection

Only after successful elevation of the vertical dimension were the permanent restorations fabricated. The objective was to preserve the healthy tooth substance through a non-invasive procedure. In order to achieve an exact fit here, a restoration material that can be milled very thin at the edges is required. Furthermore, a material with properties as close as possible to that of the natural teeth was requested. These prerequisites are met by VITA ENAMIC with its high durability and elasticity as well as the possibility of adhesive bonding.

4. Fabrication of the definitive restorations

For the precise transfer of the optimal tooth position, the digital molding was performed once with and once without the splint. The superimposed scans formed the basis for the virtual design of the monolithic restorations made of VITA ENAMIC (Fig. 8 and 9). After fabrication, these were characterized and polished (Fig. 10 and 11). When they were tried in, they exhibited a high-precision fit, and the patient was very satisfied with the shade; therefore, the adhesive bonding was performed immediately. To create an invisible transition to the tooth substance, pre-warmed composite filling material was used.



*) Source: Internal study, VITA R&D, technical and scientific documentation for VITA ENAMIC; last revised: 08/2015
 **) Note: There are considerable variations concerning the modulus of elasticity of human dentin in the literature.

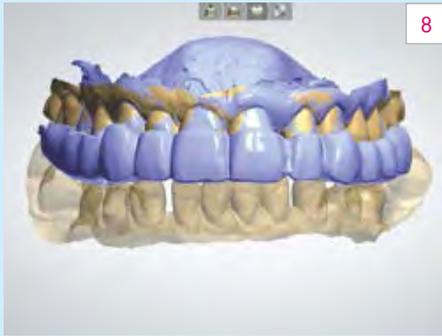


Fig. 8 Superimposition of the data sets of digital molding with and without splints in.



Fig. 10 Restorations fabricated from VITA ENAMIC ...

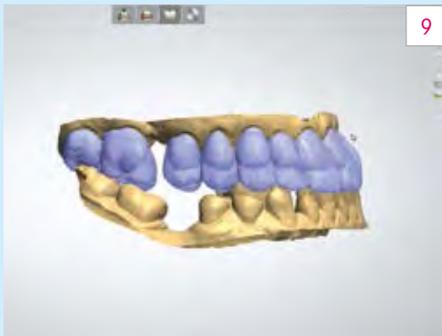


Fig. 9 Virtual design of the individual tooth restorations using superimposed scans.



Fig. 11 ... on the model.

5. Summary

With the integration of the restorations of VITA ENAMIC (Fig. 12 through 14), the patient's self-confidence increased and he took up a new profession. This example shows that the presented non-invasive treatment concept can lead to outstanding results - associated with a significant increase in quality of life, even in patients with extreme functional problems.

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Fig. 12 Situation immediately after integration.



Fig. 13 Overview/occlusal view of the maxilla.



*Inspiration from nature:
Imitating the characteristics
of natural teeth
with ceramic stains.*

Semi-chairside partial crown fabrication with zirconia-reinforced glass ceramics

PD Dr. Sven Rinke and Dr. Anne-Kathrin Schmidt report on the example of a monolithic partial crown restoration of zirconia-reinforced lithium silicate ceramic (VITA SUPRINITY, VITA Zahnfabrik, Bad Säckingen, Germany) and how aesthetically pleasing results can be achieved with short processing times using teamwork between the practice and practice laboratory.



PD Dr. Sven Rinke
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Polyclinic for Dental
Prosthetics,
University Medical
Center Göttingen,
Germany



Dr. Anne-Kathrin Schmidt
Hanau, Germany



→ BEFORE Fig. 1 Initial situation/preparation.



→ AFTER Fig.10 End result.

1. Initial situation

A 44-year-old female patient came in for a post-endodontic prosthetic partial crown restoration. According to her wishes, an all-ceramic material was selected for the restoration. The reconstruction was performed using a semi-chairside workflow with involvement of the practice laboratory.



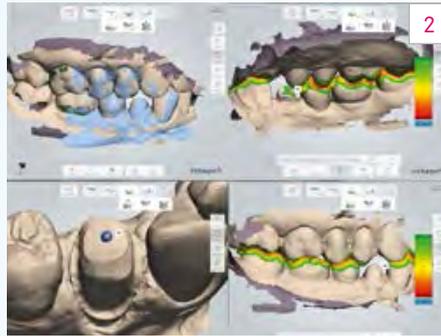


Fig. 2 Screenshots of the digital molding and control of the substance removal.



Fig. 5 Shade characterization with VITA AKZENT Plus stains.



Fig. 3 Restorations of VITA SUPRINITY immediately after the grinding process.



Fig. 6 Try-in of the restoration.

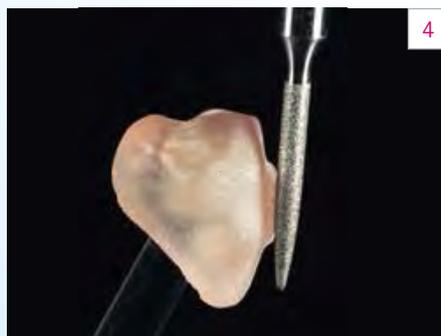


Fig. 4 Removal of the crosspiece with a fine-grain diamond grinder.



Fig. 7 Conditioning of the partial crown with 5-percent hydrofluoric acid (VITA CERAMICS ETCH).



Glass ceramics with integrated translucence, fluorescence and opalescence: VITA SUPRINITY.

2. Preparation and CAD/CAM fabrication

Preparation was carried out according to the proven guidelines for ceramic restorations¹ (Fig.1). After digital intraoral molding with the powder-free scan system cara TRIOS (Heraeus Kulzer, Hanau, Germany), the data set, including tooth shade information, was transmitted (digital photo with tooth shade reference) to the practice laboratory. This was followed by designing the partial crown and CAM fabrication using the Ceramill Motion 2 (Amann Girschbach, Koblach, Austria) from VITA SUPRINITY in the shade A2 and translucence level HT (high translucence) (Fig. 2 and 3). The highly translucent blanks are especially suited for inlays and partial crowns.

3. Reworking and integration

After removal of the sprue, manual reworking with fine-grain diamond tools (Fig. 4) and the crystallization firing at 840°C, the restoration was characterized with the VITA AKZENT Plus stains (VITA Zahnfabrik) (Fig. 5). The entire fabrication process lasted about one hour. This was followed by the final try-in (Fig. 6). Transparent, temporary cements (e.g., Temp Bond clear, Kerr Corporation, Orange, USA) have proven good for fixation. For the final integration with dual-curing adhesive luting composites, the VITA SUPRINITY restoration is conditioned with 5-percent hydro fluoric acid (20 sec.) and after cleaning with silane bonding agent (60 sec.), and the prepared tooth substance is conditioned



Fig. 8 Application of a 2-component adhesive to the tooth substance conditioned with phosphoric acid.



Fig. 9 Final intraoral polishing using polishers from the VITA SUPRINITY Polishing Set clinical.

INFO: EFFICIENT CHARACTERIZATION WITH STAINS

With a total of 19 VITA AKZENT Plus stains, as well as the appropriate glazing materials, practices and laboratories can simply and efficiently characterize VITA SUPRINITY restorations.

The fluorescent stains are also suitable for the characterization of all dental ceramic materials, regardless of the CTE (coefficient of thermal expansion).

Depending on the processing preference, practice and laboratory users can use the application forms of powder, paste or spray (for BODY STAINS and GLAZE).



4. Summary

using 30-percent phosphoric acid (Fig. 7 and 8). For any occlusal corrections after integration, final polishing (Fig. 9) with the two-step VITA SUPRINITY Polishing Set, VITA Zahnfabrik) is recommended.

The semi-chairside workflow offers the following advantages: In comparison to pure chairside fabrication, the dentist gains additional treatment time and, at the same time, the dental technician works model-free and is highly efficiently. The good machine processability of VITA SUPRINITY and the high initial fit precision of the restorations enable short process times. Thanks to good optical properties, good aesthetic results can be achieved with VITA SUPRINITY just by staining (Fig. 10).



→ AFTER

Fig.10 End result.

References

- 1) Frankenberger R, Mörig G, Blunck U, Hajtó J, Pröbster L, Ahlers MO: Präparationsregeln für Keramikinlays und -teilkronen unter besonderer Berücksichtigung der CAD/CAM-Technologie [Preparation rules for ceramic inlays and partial crowns, with special consideration of the CAD/CAM technology]. Teamwork 6 2007, p. 684–690

When it comes to details – HD milling meets glass ceramics!

Since 2014, HD milling (high definition milling/grinding) is possible with the Ceramill Motion 2 (Amann Girrbach, Koblach, Austria). Thanks to special processing tools and verified milling strategies, precise dental restorations can be fabricated from VITA SUPRINITY and other materials with a high degree of detail. Master dental technician Peter Ewert reports on his experiences in the following interview.



*MDT Peter Ewert
Ewert Zahntechnik
und Service GmbH,
Soest, Germany*

DV: What are the advantages for you, personally, of HD milling, especially in the computer-supported processing of ceramics such as VITA SUPRINITY?

MDT Peter Ewert: Thanks to the new function of HD milling, it is possible, even with computer-supported fabrication, to precisely create the finest details such as fissures in the lateral tooth region. This minimizes the reworking effort. We also work with controlled pressure and optimal rpm. This allows prevention of damage to the ceramic by heat development or pressure.

DV: What "degree of detail" can be achieved with the HD milling of a glass ceramic such as VITA SUPRINITY?

MDT Peter Ewert: The smallest available milling tool has a diameter of only 0.4 mm. This enables a more precise reproduction of details than it would be possible using press technique. Moreover the use of industrially fabricated blanks and CAD/CAM technology brings an additional leap forward in terms of quality.

Such detailed structures can be achieved with handpieces, but only with a very high expenditure of time.

DV: What processing advantages do the new zirconia-reinforced glass ceramics offer to the laboratory user, in your opinion?

MDT Peter Ewert: We have switched from lithium disilicate to the zirconia-reinforced lithium silicate ceramics (ZLS) from VITA, primarily for two reasons: On the one hand, VITA SUPRINITY demonstrates a higher firing stability in the crystallization process, so that a more precise fit of the restorations can be achieved, in our experience. On the other hand, thanks to this property, the created surface structure is better retained after the glaze firing.

"The esthetic potential of VITA SUPRINITY is huge. Glass ceramics are therefore suitable for many indications."



Fig. 1 Blanks made of zirconia-reinforced lithium silicate ceramic VITA SUPRINITY ...



Fig. 2 ... after processing with the Ceramill Motion 2 milling machine.



Fig. 3 In keeping with our experience, the restorations feature a very precise fit.

DV: What esthetic potential does VITA SUPRINITY offer, and for which indications is it especially suited, in your opinion?

MDT Peter Ewert: The esthetic potential of the material is huge, so that it is suited for numerous indications. It is often our choice of material for the fabrication of crowns, inlays and onlays in the anterior and lateral tooth region. VITA SUPRINITY can also be used for prep and non-prep veneers in the anterior tooth region. It would be desirable if it were approved for short-span bridges.

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With the Ceramill Motion 2 System, the finest details can be technically recreated with CAD/CAM.



A SOLUTION FOR MANY SYSTEMS: VITA CAD/CAM MATERIALS

Many CAD/CAM systems of partner companies were validated for the processing of VITA CAD/CAM materials by VITA Zahnfabrik. In the context of validation, the respective material-specific parameters are stored in the software so that the material and fabrication unit are ideally adjusted to each other in the production process.

In addition to VITA CAD/CAM blanks with system-specific holder systems (e.g., for CEREC/inLab, Ceramill Motion 2, KaVo ARCTICA/Everest Engine), many VITA materials are also available today as UNIVERSAL SOLUTIONS. These are equipped with a universal holder system or are offered as a universal disc geometry. Solutions for the following dental CAD/CAM systems are available:

- CORITEC series (imes-icore GmbH)*
- DWX series (Roland Digital Group)*
- CS 3000 (Carestream Inc.)*
- K-/S model (vhf camfacture AG)*
- ULTRASONIC series (SAUER GmbH / DMG Mori Seiki AG)**
- RXD series (Röders GmbH)**

The VITA blanks can be used in the fabrication unit with a universal holder system in the proven manner using an adapter. Computer-supported fabrication can therefore be immediately implemented without the necessity of learning new technologies or specific procedures.

*) The CAD/CAM system partner has been validated by VITA Zahnfabrik for processing specific VITA CAD/CAM materials.

***) Processing of specific CAD/CAM materials is recommended by VITA Zahnfabrik for this CAD/CAM system or line of systems.

Validated system partnership in practice

imes-icore GmbH is a validated CAD/CAM system partner of VITA Zahnfabrik (Eiterfeld, Germany). For processing with the CORITEC system, VITA Zahnfabrik (Bad Säckingen, Germany) now offers material blanks with a universal holder system and in a universal disc geometry. How VITA materials have been proven in processing with this system so far, and how system parameters adjusted specifically to the material prove advantageous in daily laboratory work are reported in the following interview with MDT Reinhard Sroka.



*MDT Reinhard Sroka
Petersen Dental,
Rheinfelden, Germany,*

DV: Which VITA materials have you already processed with your CORITEC system, and how do you evaluate the results achieved with regard to quality, fit and other parameters?

MDT Reinhard Sroka: With our fabrication unit, the CORITEC 550i, we regularly process the zirconia VITA YZ Disc, among others. It can be extremely efficient. For example, we can mill with a high machine throughput, even while maintaining the highest quality standards. The same applies for VITA ENAMIC, which especially exhibits a very good edge quality. Our first experiences with VITA SUPRINITY show that this material can be processed more easily and with more stable edges than other materials in its class.

DV: Is it important for you that the CORiTEC unit has been validated for the processing of selected VITA CAD/CAM materials by VITA Zahnfabrik, and if yes, why?

MDT Reinhard Sroka: Validation is meaningful since there is a material-side testing of the processing templates stored in the CAM software and of the entire workflow through comprehensive tests. In this way, we have received confirmation that the desired quality standards are being achieved. This fact can be successfully communicated by the quality seal stating that it is a "VITA-authorized milling center" and also helps to keep existing customers over the long term as well as to win new customers.

DV: For which indications do you prefer to use which VITA materials, and why?

MDT Reinhard Sroka: We use the available VITA YZ in different variants because of its high reliability as a standard material in the the fabrication of crowns and bridges (frameworks). VITA ENAMIC is used for monolithic crowns as well as inlays and onlays - the hybrid ceramic is pleasing because of its tooth-like properties and is growing in favor. We regard VITA SUPRINITY as good for restorations in the anterior tooth region (e.g., veneers), because of its good optical properties and the optimized edge stability.

DV: What new opportunities do you see in the processing of new materials such as VITA ENAMIC or VITA SUPRINITY?

MDT Reinhard Sroka: In my estimation, there are new ways to treat patient groups for whom traditional ceramics have reached their limits, especially with VITA ENAMIC. This is due to the dentin-like elasticity of the material, which works especially well for restorations on implants or in patients with parafunctions.



Fig. 1 Creation of a crown framework.



Fig. 3 Inspection of the approximal contact of a VITA ENAMIC inlay on the model.



Fig. 2 Manual veneering of an anterior tooth crown.



Fig. 4 Polishing of a monolithic crown of hybrid ceramic.

"A material-specific validation of CAD/CAM systems is meaningful for ensuring quality standards."

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The screenshot displays the Dental Visionist website interface. At the top, the logo "DENTAL VISIONIST" is visible. Below the logo, there is a grid of article thumbnails. The first thumbnail on the left is a red box with the text "1.14 ISSUE". To its right are three thumbnails: "CAD/CAM: is a variety of materials a blessing or a curse?", "Initial findings of a follow-up evaluation of VITABLOCS crowns", "Clinical case study: esthetic anterior restoration with VITA SUPRINITY", "New prospects and opportunities - digital dentistry 2.0", "VITA ENAMIC, new developments from science and research", "Non-invasive restorations using hybrid ceramic", "Clinical case study: VITA ENAMIC - a material for endodontic restorations?", and "VITA ENAMIC from the perspective of a laboratory user". A mouse cursor is pointing at the "VITA ENAMIC, new developments from science and research" thumbnail.



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