

DENTAL VISIONIST

New paths for natural, durable results

Achieving impressive esthetic results by using
new technologies and materials



Provide monolithic restorations with highly translucent zirconia

MDT Björn Czappa explains the essential manufacturing steps.

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FEM simulation with the hybrid ceramic VITA ENAMIC

Prof. Oliver Röhrle provides us with new discoveries in biomechanics via simulation.

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Editorial

"New paths for natural, durable results!"



Natural look and reliability are important standards for technicians, dentists and patients. However, particular challenges are often linked with meeting these standards. Sometimes the space is very limited, sometimes the adjacent teeth show strong discoloration or the patient has bruxism. The private practice and the laboratory must find suitable solutions for each situation.

This DENTAL VISIONIST issue addresses solving very different cases with diverse methods and options. For example, one article deals with the question of how to manufacture attractive monolithic restorations with zirconia. The use of special shade materials for excellent depth effects will also be explained. We also present a case in which glass ceramic and hybrid ceramic have been combined in a patient restoration – with esthetically pleasing results.

Another focus is on the special properties of the hybrid ceramic VITA ENAMIC. Here, for example, the abrasion stability of the CAD/CAM material was investigated in comparison to traditional ceramics and composites.

Get ready for surprising discoveries and new solutions.

DENTAL VISIONIST wishes you an enjoyable read!

Angeley Eckardt
Managing Editor



Advantages for the private practice and the laboratory: Digital shade communication of the latest generation.

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Special combination: Glass ceramic and hybrid ceramic in one restoration.

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The challenge of deep structures: Heike Assmann shows how to effectively use VITA INTERNO.

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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 testimonies from the dentists and dental technicians named reflect the status of the report authorization of 03/2016. 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.



Efficient shade communication between the practice and laboratory with new software and app solution.



Shade determination using VITA Easyshade V on the patient.



Case study: Initial photographic situation - tooth 11 is to be newly restored.



Initial photographic situation - detail image.

Digital shade communication between the practice and laboratory: a case report

In addition to digital tooth shade determination, VITA Easyshade V also enables shade communication using the VITA ShadeAssist software and the mobileAssist app (VITA Zahnfabrik, Bad Säckingen, Germany). Using the software and the app, the practice and the laboratory can rapidly and easily exchange clinical photographic material, including relevant tooth shade information. In the following technical article, dentist Knut Marcus Mau (Tuttlingen, Germany) reports on his experiences with VITA Easyshade V and the software and app solutions.



*Knut Marcus Mau (dentist)
Tuttlingen, Germany*

VITA Easyshade V enables a shade determination independent of the ambient light (1-point, 3-point or average measurement) on natural teeth and restorations. After the measurement, the results can be given as VITA classical A1-D4 or VITA SYSTEM 3D-MASTER shades. Bleached shades (ADA-compliant) can also be determined for the bleaching process and VITABLOCS shades for feldspar ceramic restorations.

initial situation and the measurement results are imported – these two pieces of information are absolutely inseparable and necessary for sound communication of the findings. For this purpose, a 3-point measurement of the different tooth regions is performed on natural teeth, and a 1-point measurement on restorations. Measurements can be taken on several teeth if necessary. The data reaches the laboratory via email or USB stick.

A multitude of application options

The VITA Easyshade V is recommended whenever restorations are to be fabricated by the laboratory – to provide the specifications and details of the order and to check the tooth shade reproduction, especially in veneering ceramic restorations. The use of the system makes sense for follow-ups with bleaching treatments, as well as in direct restorative therapy for selecting composites.

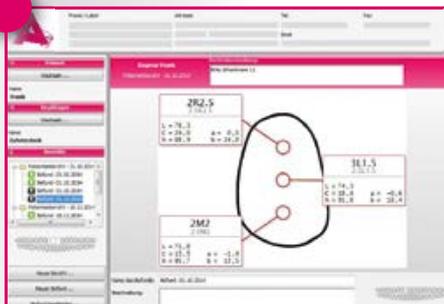
Advantages for the private practice and laboratory

This comprehensive information means that it is significantly simpler for the dental technician to produce the correct shade. Especially when using materials in VITA SYSTEM 3D-MASTER shades, the measurement results serve as a type of "recipe". In addition, the interim results can be compared with the required target shade after each firing using the VITA Easyshade V. Variations in lightness, chroma and hue can be visualized using the traffic light principle. Digital tooth shade determination with the VITA Easyshade V can be billed as a self-paying patient or private service.

Digital shade communication

First, for communication with the laboratory, the patient and dental technician are entered into the patient-related database of the ShadeAssist software and the virtual job ticket is created. Then, a clinical photo of the

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Shade determination with area measurements on the natural neighboring tooth.

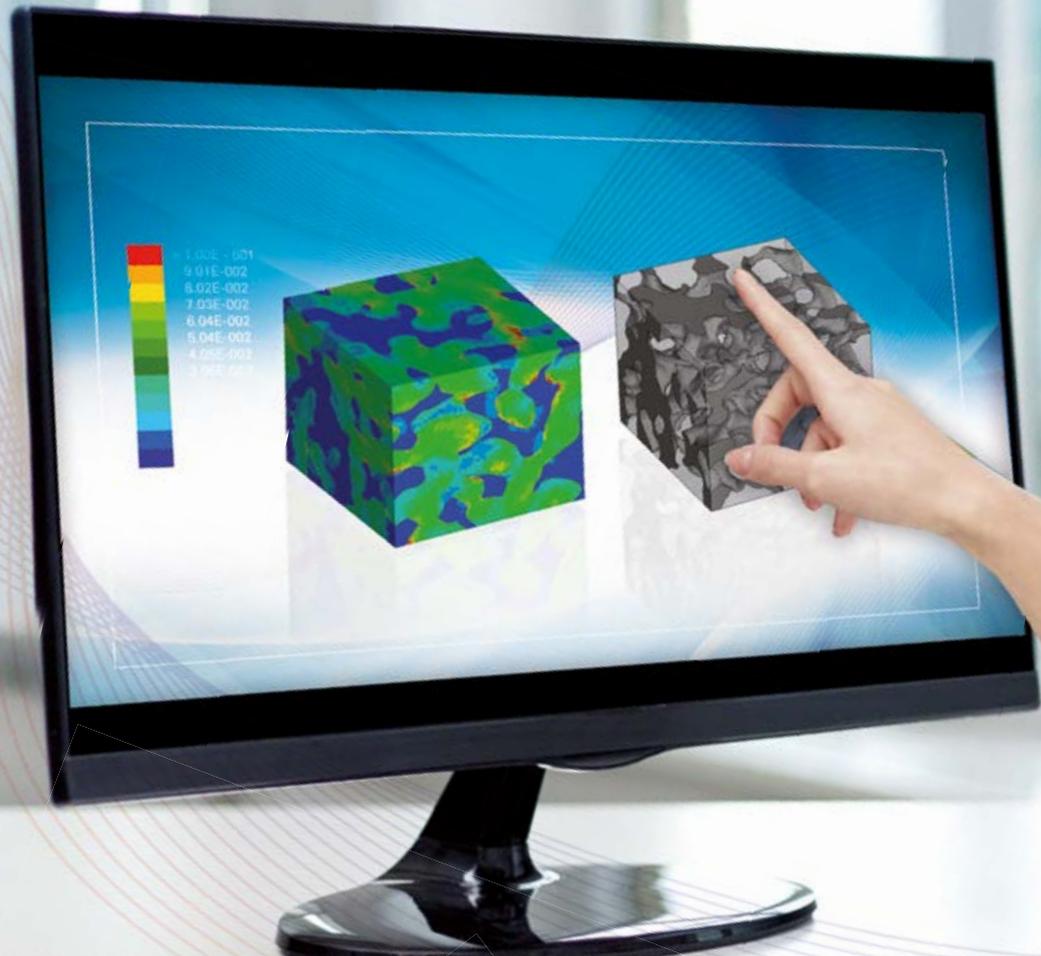


Visualization of crown 11, which is too wide at the cervical area, and the suggested correction in the description field – so that what is to be changed can be easily conveyed to the laboratory.



The result – a veneered zirconia crown – in situ.

FEM simulation with hybrid ceramics provides new discoveries in biomechanics



The Fraunhofer Institute for Manufacturing Engineering and Automation (IPA) investigated the macroscopic deformation behavior of the hybrid ceramic VITA ENAMIC using FEM (Finite Elements Method). In the virtual load test, different load situations were simulated in order to then investigate occurring stresses and strains with restorations made of VITA ENAMIC and those made of traditional ceramics. Prof. Oliver Röhrle, PhD (University of Stuttgart, Institute for Mechanics, Stuttgart, Germany and Fraunhofer IPA, Stuttgart, Germany) reports on the simulation results in the following interview.



*Prof. Oliver Röhrle, PhD
Stuttgart, Germany*

DV: Stress peaks occurring under a load can lead to the formation of cracks and damage in dental materials. What findings can an FE simulation provide in this case?

Prof. Oliver Röhrle: By analyzing stress peaks, weak points in the construction can be identified and provocation of a structural failure can determine the maximum load. This data is useful for designing materials and geometry that distribute stresses more efficiently under normal load conditions.

DV: How does the ceramic-polymer matrix of VITA ENAMIC behave under simulated load conditions, and how can the dual network structure minimize stress peaks?

INFO: FEM-SIMULATION

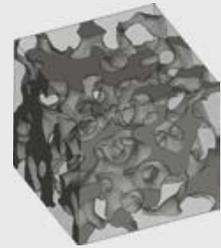


Fig. 1 Representative volume element (RVE) model illustrating the dual network structure of VITA ENAMIC.

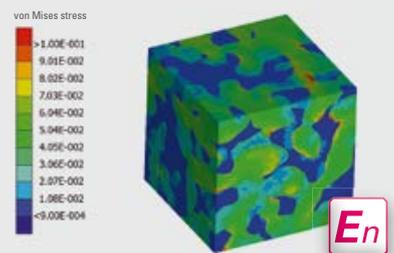


Fig. 2 A von-Mises equivalent stress can be used to visualize the forces acting on the surfaces. The color-coded illustration using the VITA ENAMIC cube explains how the ceramic (blue) and polymer (green) react differently to stress.

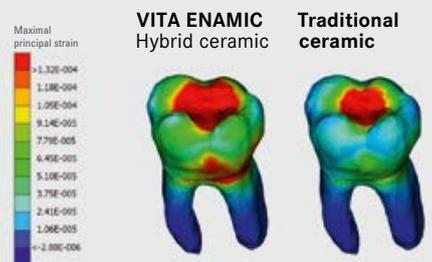


Fig. 3 Virtual tooth model made of VITA ENAMIC and ceramic.

For this simulation, a complete tooth of hybrid ceramic and one of traditional ceramic were virtually manufactured. Then a typical load test is carried out on the tooth models, assuming idealized materials. Force is applied to a ball positioned on the tooth. Here, red represents the maximum principle strain, and the blue-colored area stands for slight or no deformation. The direct comparison shows that, in the VITA ENAMIC virtual test specimen, in contrast to the ceramic tooth model, nearly the whole crown is green to red, meaning that the hybrid ceramic yielded much more and thus absorbed the pressure.

"The progression of cracks is hindered by the deformation of the polymer network!"



Prof. Oliver Röhrle: The stress concentration, which otherwise leads to crack growth, is absorbed by the extensible polymer matrix.

DV: What is the mechanical behavior of the hybrid ceramic in the FE simulation of a loading situation, and how does this differ from traditional ceramics?

Prof. Oliver Röhrle: In general, it can be said that traditional ceramics do indeed feature a high pressure resistance, but are also very brittle. In contrast, VITA ENAMIC features high tensile properties thanks to the polymer portion.

DV: Do the results for VITA ENAMIC allow us to expect a low risk of crack formation since the materials show a relatively high degree of material stretching under stress?

Prof. Oliver Röhrle: For a more precise risk assessment, a non-linear numeric investigation would be required. But yes – plasticity prevents an abrupt structural failure.

DV: In your opinion, what are the distinctive features of the VITA ENAMIC dental material with regard to its mechanical properties?

Prof. Oliver Röhrle: Because the polymer partially absorbs the nascent energy associated with a crack and deforms accordingly, the progression of the crack under a constant load is hindered.

Abrasion resistance of materials: hybrid ceramic vs. composite?

The abrasion behavior of CAD/CAM materials is a building block of long-term clinical success. Dental materials should behave similarly to enamel, but at the same time be resistant to abrasion in order to guarantee function in the long term. If relatively "soft" materials are used, this can impair function due to increased material wear. Dipl.-Min. Berit Müller (Project Leader for VITA R&D, VITA Zahnfabrik, Bad Säckingen, Germany) reports on current measurement results from abrasion tests with hybrid ceramics and composite.



Dipl.-Min. Berit Müller
Project Leader for VITA R&D,
VITA Zahnfabrik,
Bad Säckingen, Germany

Elastic composites can absorb chewing forces, which reduces the risk of crack formation. But due to their low surface resistance in comparison to traditional ceramics, these materials wear down more quickly. With the VITA ENAMIC hybrid ceramic, a dental material has been developed that combines the positive characteristics of both ceramics and composites. But what is the abrasion behavior of this new material in comparison to traditional ceramic and composite materials?

Test setup and measurement results

A comparison is only possible under defined laboratory conditions. For each material, five material samples were brushed with an abrasive toothpaste in a test system for 32 hours at a defined force. The weight and surface quality of the samples were determined before and after brushing. In this test, VITA ENAMIC was shown to be significantly more abrasion-resistant than the investigated composite materials. Furthermore, the determined results were very close to those of the feldspar ceramic VITABLOCS Mark II, which has been proven a million times over and which, due to its very enamel-like abrasion resistance, can be used as the gold standard¹.

VITA ENAMIC is significantly more abrasion stable than the investigated composite

Prognosis and conclusion

A test run of 32 hours simulates use lasting several years. A commercially available, although abrasive toothpaste was used in the test. If patients used a less abrasive toothpaste, then less material wear can be expected for all investigated materials. The abrasion behavior for the hybrid ceramic VITA ENAMIC determined in the test is very similar to that of the proven VITABLOCS feldspar ceramics and allows us to expect sufficiently abrasion-resistant restorations. Due to its dual ceramic-polymer network structure, VITA ENAMIC is a unique dental material that combines many positive characteristics.

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Loss of weight and surface roughness following toothbrushing wear test.

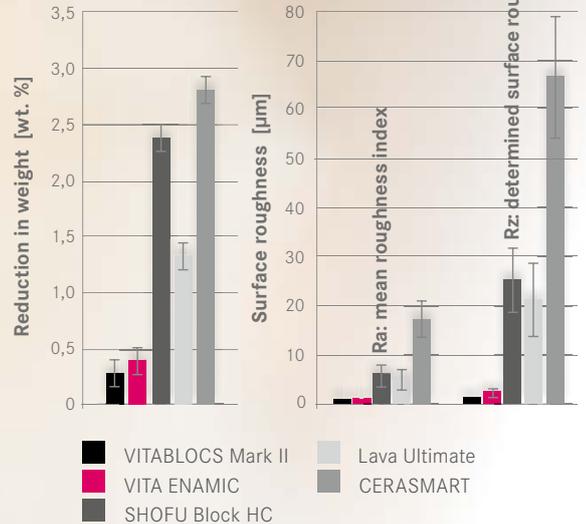
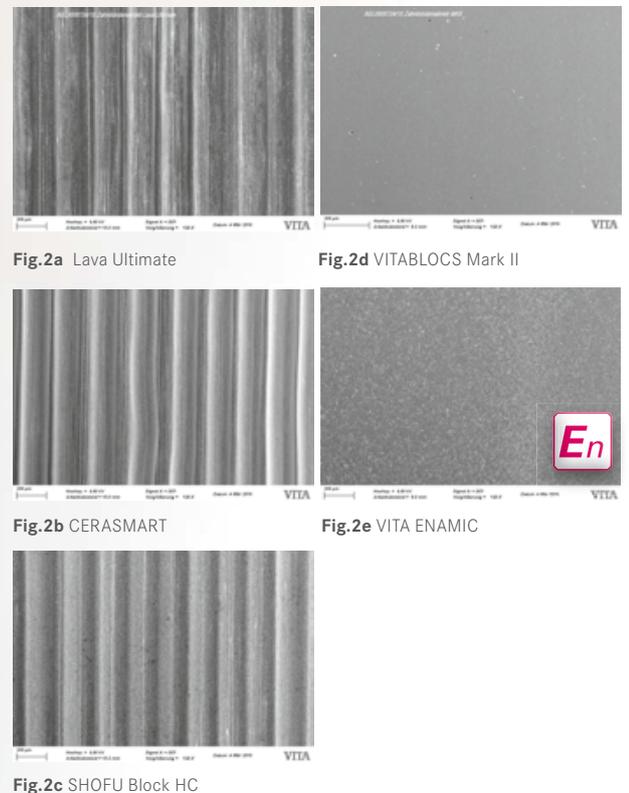


Fig. 1 Averages for weight loss and surface roughness after toothbrushing wear on the basis of 5 samples per material. The lower the parameters Ra and Rz, the smoother the surface.

Source: Internal investigation, VITA R&D, 03/2016, test report in the technical-scientific documentation of VITA ENAMIC; available at www.vita-zahnfabrik.com

SEM images of the surfaces after toothbrush wear



Source: SEM images of material samples after toothbrush wear, VITA R&D, 150-fold magnification created with scanning electron microscope EVO MA 10 from Zeiss, 03/16

References

1) Krejci, I. (1991). Wear of CEREC and other restorative materials. In Proceedings of the International Symposium on Computer Restorations: State of the Art of the Cerec Method. Berlin: Quintessence Verlag, 245-251

Hybrid and glass ceramics enable the combination of shock-absorbing properties with esthetic potential.

Glass and hybrid ceramics combined in one comprehensive restoration!

Using the example of a comprehensive restoration in the upper and lower jaw, MDT Björn Czappa (m.c. zahntechnik, Oldenburg, Germany) explains how the materials of glass and hybrid ceramics can be combined in a single restoration, and the esthetic results that are possible with this technique. In this case study, he also shows how VITA ENAMIC (VITA Zahnfabrik, Bad Säckingen, Germany) crowns can be characterized with light-curing stains to reproduce the esthetics of natural teeth.



→ BEFORE

Fig. 1 Initial situation.



→ AFTER

Fig. 12 End result.



*MDT Björn Czappa
Oldenburg, Germany*

1. Initial situation

The patient had suffered from severe headaches and neck pain for a long time. A measurement of the temporomandibular joint confirmed the suspicion of a functional disorder. The anterior maxillary teeth were irregularly abraded, producing an imbalance (Fig. 1). The already restored posterior tooth regions also exhibited significant deficits

(Fig. 2). After making a splint, the patient was pain-free within a short time. Following a successful three-month splint treatment, she then decided on a corresponding complete restoration as a permanent solution.

INFO: VITA ENAMIC STAINS



The VITA ENAMIC STAINS KIT includes six light-curing stains and accessories for the reproduction of natural shade nuances of restorations made of hybrid ceramic.

Surface sealing can be performed using the chemical glaze material VITA ENAMIC GLAZE, which increases the durability and brilliance of the shade in the oral environment.

VITA ENAMIC is advantageous here due to its increased elasticity in the high-stress lateral tooth region.



Fig. 2 The posterior tooth regions in the upper and lower jaws were also in need of restoration.



Fig. 4 All posterior tooth crowns (here, in the maxilla) were made of VITA ENAMIC.



Fig. 3 For regions 13 through 23, individual crowns were manufactured from pressed glass ceramic.



Fig. 5 For the surface characterization, VITA ENAMIC STAINS were used in combination with VITA VM LC flow veneering materials.

2. Restoration with glass and hybrid ceramics

3. Characterization and finalization

"With the patient case presented here, we embarked on uncharted territory as a dental laboratory. While the anterior teeth of the maxilla were to be restored with pressed glass ceramic (Fig. 3), everything in the posterior tooth area called for the VITA ENAMIC hybrid ceramic, which we used for the first time in this case (Fig. 4)," reports MDT Björn Czappa. The hybrid ceramic is significantly more elastic than traditional dental ceramics and acts as a sort of shock absorber. The VITA ENAMIC posterior tooth crowns were manufactured using the CAD/CAM process.

To reproduce the natural esthetics in the posterior tooth area, the hybrid ceramic restorations were characterized using the light-curing stains from the VITA ENAMIC STAINS KIT and slightly individualized using the veneering composite VITA VM LC flow (VITA Zahnfabrik) (Fig. 5). For the characterization, the hybrid ceramic restorations were conditioned, and then the stains were applied. In the next step, the intermediate polymerization was performed, and finally the surfaces were sealed with VITA ENAMIC GLAZE, increasing the durability of the stain characterization in the moist oral environment (Fig. 6).



Fig. 6 Prior to sealing the surfaces with VITA ENAMIC GLAZE, the shade application is fixed with polymerization.



Fig. 8 The restorations for the maxilla on the model.



Fig. 7 Manufactured posterior tooth crowns (here, the lower jaw).

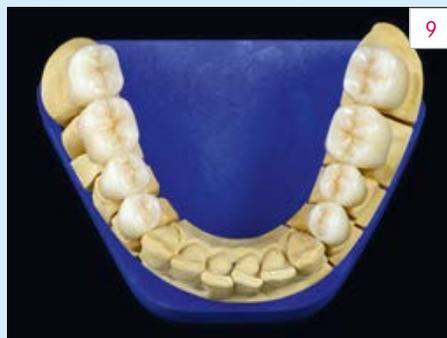


Fig. 9 The restorations for the mandible on the model.



Fig. 10 Situation immediately after integration.

4. Summary

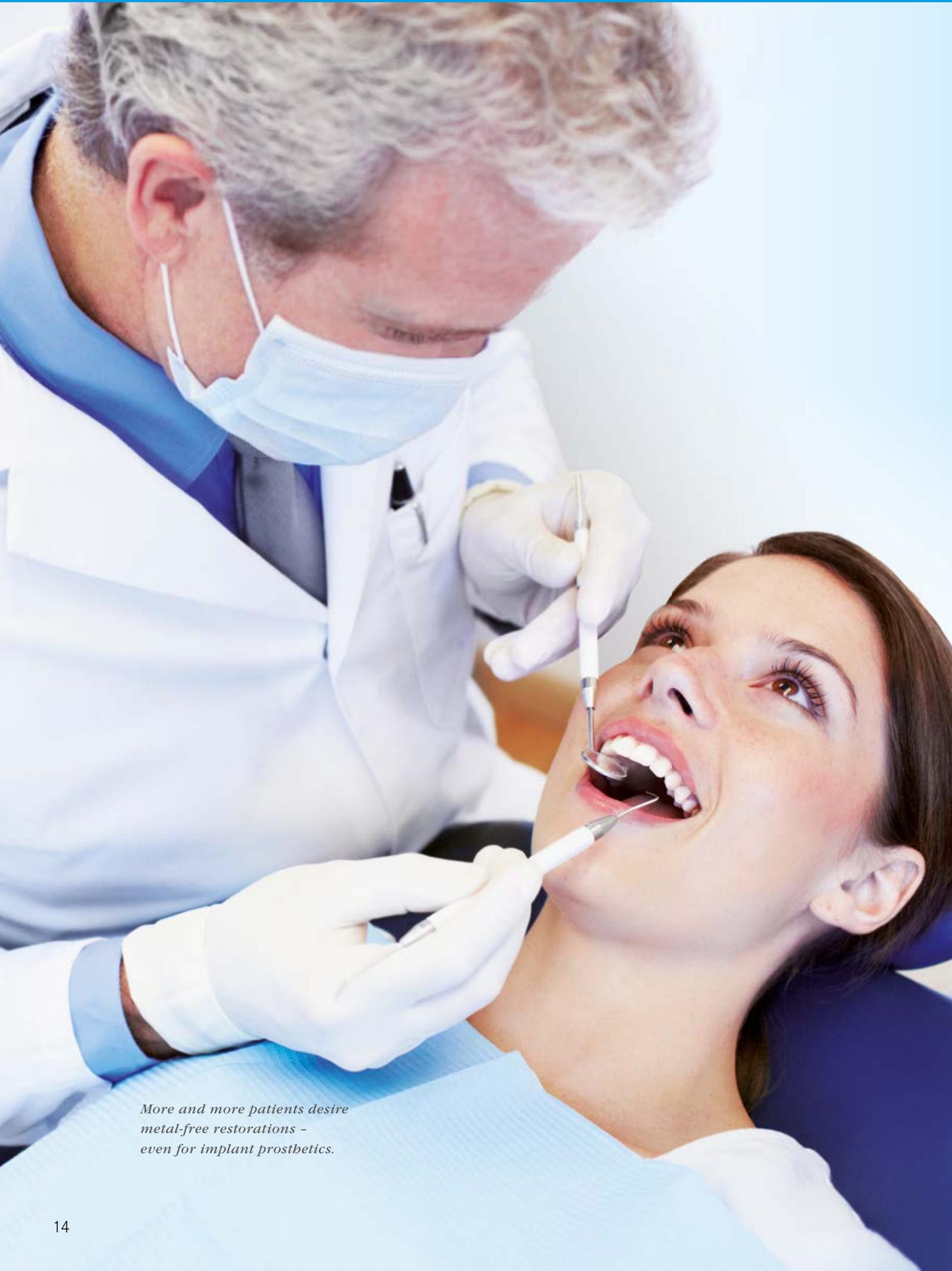
"For us, the processing of these VITA materials was a first, and I can say that they were outstanding to work with," says MDT Björn Czappa. His conclusion: If you exercise a little patience and take your time as you go and consistently follow the manufacturer's instructions, very good results are possible (Fig. 7 through 11).

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A special thank you to Ms. Marita Heeren for the photographic images.



Fig. 11 The patient is pain-free and happy with the treatment results.



More and more patients desire metal-free restorations - even for implant prosthetics.

A metal-free overall solution: hybrid ceramics and zirconia implant



Dentist Dr. Sigmar Schnutenhaus
Hilzingen, Germany

Full ceramic restoration concepts have become established in private practice. In implant-prosthetic reconstructions, titanium implants are frequently used, but ceramic implants are also growing in popularity. VITA Zahnfabrik (Bad Säckingen, Germany) has been offering a zirconia implant through ceramic.implant since 2014. Using a case report, Dr. Sigmar Schnutenhaus (Hilzingen, Germany) describes how a complete, metal-free implant-prosthetic restoration can be achieved using a superconstruction of VITA ENAMIC and ceramic. implant.



→ **BEFORE** Initial situation, female patient, 53 years old: interdental gap in region 45 is to be closed with an implant prosthetic.



→ **AFTER** Result after integration of the implant crown in region 45.

The demand for full ceramic therapeutic agents is also bringing about a rethinking of implant prosthetics. Implants made of zirconia have been offered for some time, and among other things, ensure excellent soft tissue management. "We have been working with ceramic.implant for several months now and have also discovered that the VITA ENAMIC hybrid ceramic is an ideal material for the superconstruction," reports Dr. Sigmar Schnutenhaus.

By combining the ceramic implant with a hybrid ceramic crown, the common patient preference for an overall metal-free solution can be taken into consideration.

The implant from ceramic.implant is a one-part cylindrical implant with modified zirconia surface (cer.face® 14). The VITA ENAMIC hybrid ceramic, as a material for manufacturing the superstructure, combines the advantages of a conventional ceramic with the positive properties of a composite. Thanks to the comparably elastic properties, chewing stresses can be absorbed to a certain extent. For the restoration of single tooth gaps in the posterior tooth region, we consider the therapy option presented here to be ideal.

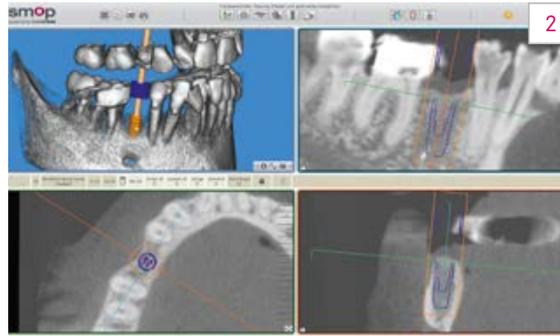


Fig. 2 Virtual planning of the implant position.



Fig. 4 The inserted ceramic implant prior to closure with sutures.

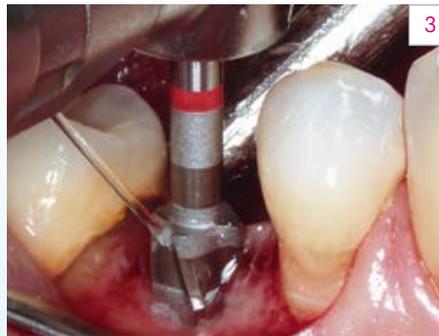


Fig. 3 Preparation of the implant bed.



Fig. 5 Optimal soft tissue conditions following the healing period. Impression of the implant with the transfer cap follows.

1. Treatment planning

Since ceramic implant is a one-piece implant, planning becomes extremely important. We favor virtual implant planning. The anatomical situation is evaluated using a DVT (Fig. 2). A wax-up modeled on the situation model serves as a template for the superstructure. The DICOM data from the DVT and the STL data from the wax-up are combined in the planning software and the implant position evaluated.

2. Insertion of the implant

When the implant is inserted, either the template-guided or conventional process can be selected. After preparing the implant bed, the implant is inserted in the bone (Fig. 3 and 4), the surgical area is closed with two sutures, and the patient is discharged from the practice with a temporary restoration.

INFO: ceramic implant



The ceramic implant is a one-piece zirconia implant. It is available in diameters of 4.0, 4.5 and 5.0 mm and in lengths of 8, 10, 12 and 14 mm (the latter is not available in a diameter of 5.0 mm). Its special implant design provides a very good primary stability, so that there is no need for the patient to wear a protective splint. The special implant surface (cer.face 14) enables rapid and secure healing with intensive implant-bone contact. Following a healing time in the mandible of only two months (four months in the maxilla), there is a stable level of bone.

The new zirconia implant ceramic implant from vitaclinical.

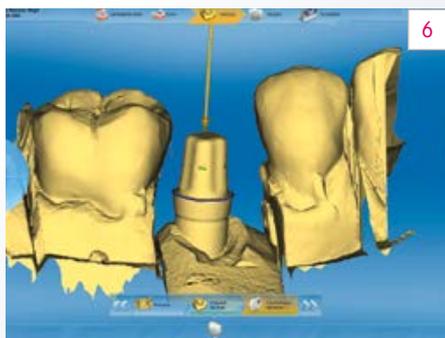


Fig. 6 Scan and CAD construction of the crown for the final restoration.



Fig. 7 Situation prior to fixation of the prosthetic restoration.

3. Manufacture of the superstructure

There is usually an ideal soft tissue situation after the necessary healing period. The adherence of the peri-implant gingiva around the zirconia implant is normally perfect. Special caps are available for the pick-up impression, which ensures a precise transfer of the situation from the mouth to the model (Fig. 5). After digitalization of the implant model, the crown is constructed using CAD software (Fig. 6). The CAM manufacturing of the superstructure then takes place using a VITA ENAMIC blank. Hybrid ceramic reconstructions can either be polished or characterized with light-curing stains after the grinding process. According to the manufacturer's instructions, the crowns should be cemented to the one-piece zirconia implant using a luting composite. The edge of the crown is ideally positioned in the visible area so that the danger of potential cement residues in the peri-implant area is eliminated.

Reduced complexity through simple surgical protocol and efficient implementation of the superstructure.

4. Result and conclusion

Figures 7 to 9 show the situation before and after the prosthetic restoration with VITA ENAMIC. The implant crown is ideally integrated in shape, shade and function. If a metal-free implant prosthetic restoration is desired, the dentist can implement an overall functioning concept with the presented material combination. The simple surgical protocol during implantation and the efficient implementation of the superstructure must be highlighted. The ceramic implant is a ceramic material alternative to titanium implants. The excellent soft tissue adaptation must be emphasized. In addition, the VITA ENAMIC hybrid ceramic is very well suited for the superstructure due to its material properties.

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Fig. 8 Final control x-ray



Fig. 9 Result following integration of the implant crown in region 45.

Monolithic restoration made of HT zirconia



*MDT Björn Czappa
Oldenburg, Germany*



*For monolithic restorations:
VITA YZ HT blanks combined
with VITA YZ HT SHADE LIQUID.*

MDT Björn Czappa (m.c. zahntechnik, Oldenburg, Germany) has tried out the CAD/CAM blanks VITA YZ HT (VITA Zahnfabrik, Bad Säckingen, Germany) and explains in the interview how esthetically pleasing monolithic restorations can be manufactured from the highly translucent zirconia using coordinated shade liquids and stains. He also describes the essential processing steps and provides valuable tips for using the VITA YZ HT SHADE LIQUIDS.

DV: For what indications are monolithic restorations of highly translucent zirconia useful?

MDT Björn Czappa: In principle, in limited space conditions, to prevent chipping, and whenever speed is important. Finally, the decision must be made on an individual patient basis as to whether monolithic zirconia can be used.

DV: What are the main steps for characterizing with the VITA YZ HT SHADE LIQUIDS following CAM manufacture?

MDT Björn Czappa: When using this staining method with a brush technique, the SHADE LIQUID is first applied to the neck of the crown, the body portion and the incisal area. The effect is intensified by repeated application of the liquid. If needed, additional stains can also be used.



Fig. 1: CAM-manufactured crowns of the zirconia VITA YZ HT. Note: Before coloring, go over the entire occlusal surface lightly with fine diamonds so that the liquid can adhere well to the surface.

DV: Which of the liquids are recommended, in particular for use in the occlusal and incisal area, and what effects can be achieved with this?

MDT Björn Czappa: A natural depth effect is achieved with blue, transparency in the area of the cusps with grey. The supplementary shades of Chroma A-D are appropriate for interdental and cervical areas and to intensify fissures.

DV: After coloring, the zirconia restorations must be dried. What needs to be taken into consideration during drying, and how, specifically, is this to be done?

MDT Björn Czappa: The restorations can be dried under a 250 Watt infrared lamp or with the drying program Pre-Dry VITA YZ HT SL in the firing unit. After that, they can be sintered in the VITA ZYRCOMAT 6000 MS using the HighSpeed mode.

DV: After coloring, the restorations are characterized with stains and glazed. Why is this step important, what needs to be taken into consideration here?

MDT Björn Czappa: To protect the neighboring teeth from abrasion by the zirconia, the areas in occlusion should be polished to a high gloss, and the restoration then coated with a double layer of glaze. VITA AKZENT Plus GLAZE LT, for example, is suitable. The glaze firing temperature must not exceed 850°C.



Fig. 2 The liquid is first applied around the neck of the crown.



Fig. 3 Depending on the desired intensity, this process can be repeated up to four times.



Fig. 4 The body and incisal or occlusal regions are colored.



Fig. 5 The incisal and occlusal surfaces can be designed with blue and grey, ...



Fig. 6 ... with blue providing depth effect and grey translucence.



Fig. 7 Before sintering, the restorations must be completely dried.



Fig. 8 Restorations after the sintering firing and before the final characterization with VITA AKZENT Plus Stains.



Fig. 9 The characterized and glazed restorations on the model.

Excellent depth effect with ceramic restorations



CDT Renato Carretti
Zurich, Switzerland

The reproduction of individual characteristics – such as mamelon structures, anomalies and calcifications – is a special challenge if these lie within the depths of the inner tooth structure.

In this case, the VITA INTERNO stains (VITA Zahnfabrik, Bad Säckingen, Germany) for the internal characterization of restorations offer a multitude of possibilities. The stains, for example, can be mixed in with veneering materials and provide for more luminance from the depths. In the following case study, CDT Renato Carretti (Zurich, Switzerland) reports on the effective use of these stains.



→ BEFORE

Initial situation of provisional restoration of tooth 22.

1. Initial situation

In the present case, a male patient (55 years old) was to have a full ceramic crown made for region 22. The challenge was to bridge the shade differences between the neighboring teeth and to pick up the individual characteristics of tooth 12. The base shade 3M2 was determined for the restoration. The patient rejected a new restoration for tooth 11.

2. Manufacturing steps

"My first choice for the restoration of anterior teeth are crowns made of VITABLOCS RealLife (VITA Zahnfabrik). The blanks have an integrated 3-D shade gradient and offer a very natural-looking translucence," says CDT Renato Carretti. The crowns were slightly reduced in the first step and rebuilt with VITA VM 9. For color effects from the depths, the VITA INTERNO stains were used. Finally, restorations can still be characterized with VITA AKZENT Plus stains and glazed.



Fig. 2 Exposed and built-up tooth stump.



Fig. 5 Mesial and distal, EE9 (bluish translucent) was used for construction, and in the middle, a mixture of Int02 and NT was used.



Fig. 8 ... and during the try-in in the patient's mouth.



Fig. 3 The CAD/CAM-manufactured and manually reduced crown framework made of VITABLOCS Reallife.



Fig. 6 A halo effect was achieved in the incisal area with a mixture of BASE DENTINE, NT and Int02.



Fig. 9 Increase in color effect by the application of Int04 and Int01. This was then completed in the correction firing with a mixture of BASE DENTINE, NT and EE3.



Fig. 4 Cut-back framework characterized with VITA INTERNO (incisal Int03/z=cervical Int04).



Fig. 7 The result after firing.



Fig. 10 After the glaze firing comes manual polishing with pumice to achieve a natural, matte glaze.

3. Information and tips

When using VITA INTERNO stains, special care must be taken to overlay them with ceramic. As the name suggests, these are stains for internal application. Normally I do not fire them - instead I just do a fixation firing so that they remain in place," reports CDT Renato Caretti. Because of the intensive color effect, the stains should be used very sparingly.

4. Result and conclusion

The case documentation shows that what may appear on the model as over-accentuated color play is often just right in the patient's mouth. The naturally matte luster was achieved by polishing once again manually with pumice after the glaze firing. In the view of the dental technician, the overall result in this case may be assessed as the best possible compromise, and one that meets the patient's wishes.



→ AFTER

Fig. 11 The result corresponds with the expectations and desires of the patient.

Tips & Tricks: Important details about VITA INTERNO stains



How the VITA INTERNO stains (VITA Zahnfabrik, Bad Säckingen, Germany) can be effectively used for internal characterization, and which options are available for the dental technician is reported by MDT Heike Assmann (Lage/OWL, Germany) in the following interview.



Fig. 1 Incisally reduced crowns.



Fig. 4 The body of the crown was filled out with VITA VM 11 EFFECT OPAL (EO) 1 and WINDOW (WIN).



Fig. 7 VITA INTERNO stain Int12 mixed.



Fig. 2 Completion of the tooth shape: in the cervical region with VITA VM 11 SUN DENTINE and in the body with VITA VM 11 TRANSPA DENTINE in the correct tooth shade.



Fig. 5 Mesial, distal and discreetly between the mamelons, a mixture of EO2 and WIN was applied to achieve a beautiful interplay between opal and transparent materials.

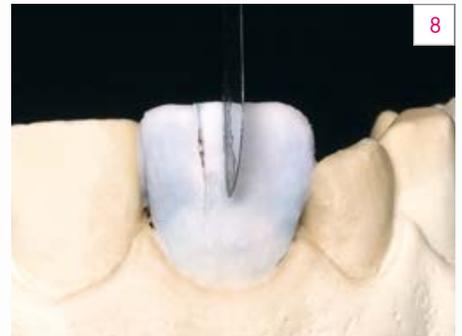


Fig. 8 To replicate hairline cracks, Int12 was inserted in fine lines into very thin cuts made with a scalpel.



Fig. 3 Mamelons can be simply reproduced with a mixture of TD and VITA INTERNO (Int02 medial/ Int09 distal and mesial).



Fig. 6 Completion of the overall shape of the restoration with a mixture of EO1 & WIN. The halo effect was achieved by mixing WIN and TD.



Fig. 9 The final result on the model.

DV: In combination with which framework and veneering ceramics can I use the VITA INTERNO stains?

MDT Heike Assmann: With all veneering ceramics – that's the great thing! Regardless of whether it's in combination with VITA VM 9, VITA VM 11, VITA VM 13 or VITA VMK Master – the materials function independently of the individual CTE. I consider the VITA INTERNO KIT to be a universal solution. It is recommended for esthetically pleasing restorations and when esthetic options with classic ceramics are already exhausted. It is a great instrument for achieving impressive natural look and thus an "invisible" restoration.

DV: What do I have to pay attention to if I want to use the stains to achieve a greater depth effect in my restorations?

MDT Heike Assmann: The VITA INTERNO stains can be easily mixed into other ceramic materials such as dentine materials. Thanks to its strong luminance, a true-to-nature reflection of color effects from the depths is possible. The VITA INTERNO stains themselves do not lose their natural color effect after several firings. For me, the VITA INTERNO stains are the best on the market for nature-like results!

DV: What colors can you recommend in particular for the imitation of calcifications and mamelon structures?

MDT Heike Assmann: The broad VITA INTERNO color palette makes it possible to imitate mamelon structures that are completely individual to the patient. For whitish structures, for example, Int01 can be used, and for brownish mamelons, Int10 can be used. Depending on the mixture ratios, even transparent or translucent ceramic materials can be lightened or tinted with the stains. For the reproduction of calcifications and cracks, Int12 (splinter) can be used. The stains themselves were developed for this purpose and make it possible to produce wonderful results. Only a little practice is needed to vary all effects according to the goal. Excellent results are possible!

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INFO: VITA INTERNO

VITA INTERNO are fine-grained, color-intensive and strongly fluorescent stains for the internal characterization of

ceramic restorations. The stains, which can be used independently of the individual CTE, can be combined with all VITA veneering ceramics and can be mixed with each other. The VITA INTERNO assortment includes 14 colors.



*MDT Heike Assmann
Lage/OWL, Germany*

Technologies and materials ideally matched

In 2014, Core3dcentres International were certified by VITA as the first authorized milling center worldwide. Since then, Core3dcentres milling centers around the world have processed VITA CAD/CAM materials according to validated quality standards. With the validation of software and hardware, we are pursuing the goal of matching production technologies ideally to each of the materials used. MDT Sebastiaan Cornelissen, CEO of Core3dcentres International (Maartensdijk, Netherlands), reports in the following interview on his experiences regarding the processing of VITA CAD/CAM materials.



Fig. 1 Initial situation.



Fig. 2 CAD/CAM-produced Table Tops made of VITA ENAMIC.



*MDT Sebastiaan Cornelissen
Maartensdijk, The Netherlands*



*Using modern technologies
optimally with validated
processes.*

DV: Why is a fine attunement of production technology and materials so important?

MDT Sebastiaan Cornelissen: Each material has totally specific properties. For optimal production results and flawless production processes, a fine attunement is absolutely necessary.

DV: In what form could VITA support you in the validation process in order to develop ideally matched processing strategies for the respective materials?

MDT Sebastiaan Cornelissen: VITA has invested much time and money in its own knowledge base: specialized technicians, comprehensive CNC knowledge, specific test protocols for the validation and many other things. As a result, the development of attuned processing strategies in the milling center can be realized in a very short time.

DV: What advantages does the milling center have from a validation, and to what extent do your customers also profit from this?

MDT Sebastiaan Cornelissen: The validation guarantees coordination between material manufacturers and the milling center, and provides an up to 100 percent adapted technique and workflow, highest accuracy of fit, material safety, etc. in the result.

DV: Which CAD/CAM systems do you work with, and which VITA materials do you prefer to use today?

MDT Sebastiaan Cornelissen: We work with machines from DMG MORI (Winterthur, Switzerland) and imes-icore (Eiterfeld, Germany) and the CAM software hyperDENT (FOLLOW-ME!, Munich, Germany) and the CAD software from 3Shape (Copenhagen, Denmark). VITA ENAMIC and VITA glass ceramics, among others, are processed with these technologies.

DV: What VITA materials, in your opinion, have especially advantageous properties and how can you and your customers profit from this?

MDT Sebastiaan Cornelissen: We have VITA ENAMIC – the only genuine CAD/CAM hybrid ceramic on the market – to thank for our enormous growth. CAD/CAM-manufactured VITA ENAMIC restorations are fixed adhesively, according to the same protocol as for feldspar ceramics. VITA ENAMIC can also be milled to be extremely thin and is ideal for non-prep restorations such as tabletops.

DV: What trends and developments do you see for the next five years for CAD/CAM materials and manufacturing technologies?

MDT Sebastiaan Cornelissen: Blanks with integrated shade gradient for monolithic restorations become more important. The milling and grinding technology remains, in our opinion, the fastest and most economical production path for the foreseeable future.

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Fig. 3 The hybrid ceramic is easy to process ...



Fig. 4 ... and offers a natural esthetic.



Fig. 5 The result about 1 month after integration – We now process cases like these on a weekly basis.

From the laboratory to the authorized milling center



*MDT Rigo Dombrowski and
CDT Anja Dombrowski-Wagner
Gladbeck, Germany*

Since 2014, selected milling centers can have their manufacturing processes validated in the context of a VITA authorization program. For this purpose, the software and hardware used are qualified and validated for ideally attuned processes and the processing of selected VITA CAD/CAM materials. In the interview, MDT Rigo Dombrowski and CDT Anja Dombrowski-Wagner (Bio Dental Art, Gladbeck, Germany) report on the advantages that this program offers dental manufacturing centers.

DV: Mr. Dombrowski, why have you had your milling center validated?

MDT Rigo Dombrowski: We saw the chance to further improve the quality of our CAD/CAM-manufactured restorations. Even the system qualification showed us potential for optimization. Through the precise, fine attunement of CAD/CAM materials and processes, it is ensured that we, as a milling center, can exhaust the full potential of the VITA materials. It is not just us who are profiting from this, but also our customers and patients.

DV: Ms. Dombrowski-Wagner, what processes and materials have been validated?

CDT Anja Dombrowski-Wagner: We decided to have the procedure surrounding the processing of the pre-shaded zirconia blanks VITA YZ (in the T and HT variants) validated. We use these in the disc geometry for the manufacture of crowns and bridge frameworks, Maryland bridges and monolithic restorations. For the design and manufacturing process we use scanners and CAD software from 3Shape (3Shape, Copenhagen, Denmark), the CAM software ZYKLONcam (KON-AN-TEC, Münster, Germany) and various CAM systems, which have been appropriately qualified.

DV: Mr. Dombrowski, why do you use VITA zirconia?

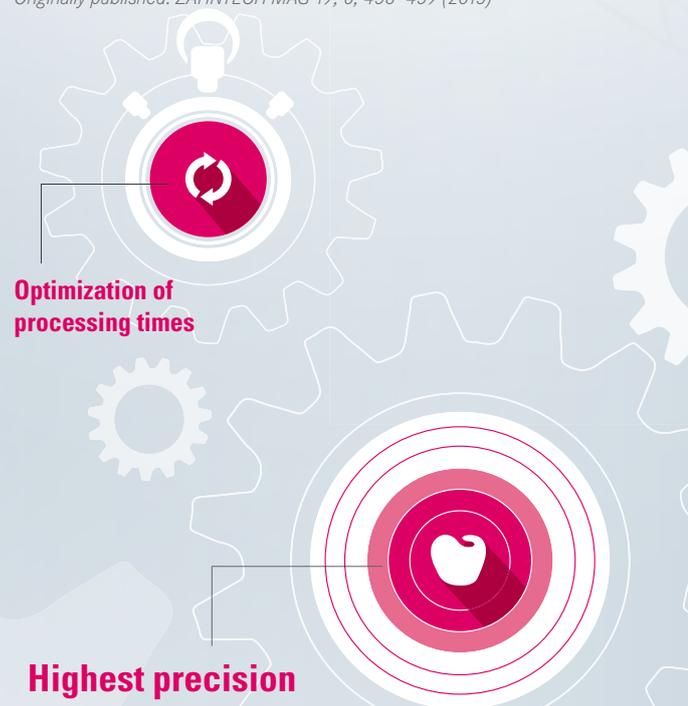
MDT Rigo Dombrowski: We have tested many zirconias from different manufacturers and price classes in recent years. These tests have shown that, cheaper blanks in particular, frequently show quality fluctuations. Above all, the stability of the materials varied perceptibly depending on the batch, and this affects the milling results. Based on our findings, we chose VITA YZ. The reasons for this, in addition to the consistently high quality, was the excellent experience we've had with other VITA products, and the fact that the blanks are produced in Germany.

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The seal of approval confirms validated workflows for the manufacture of high-quality restorations.



Optimization of processing times

Highest precision



Fig. 3: Anja Dombrowski-Wagner at one of the two CAD workstations in the milling center.



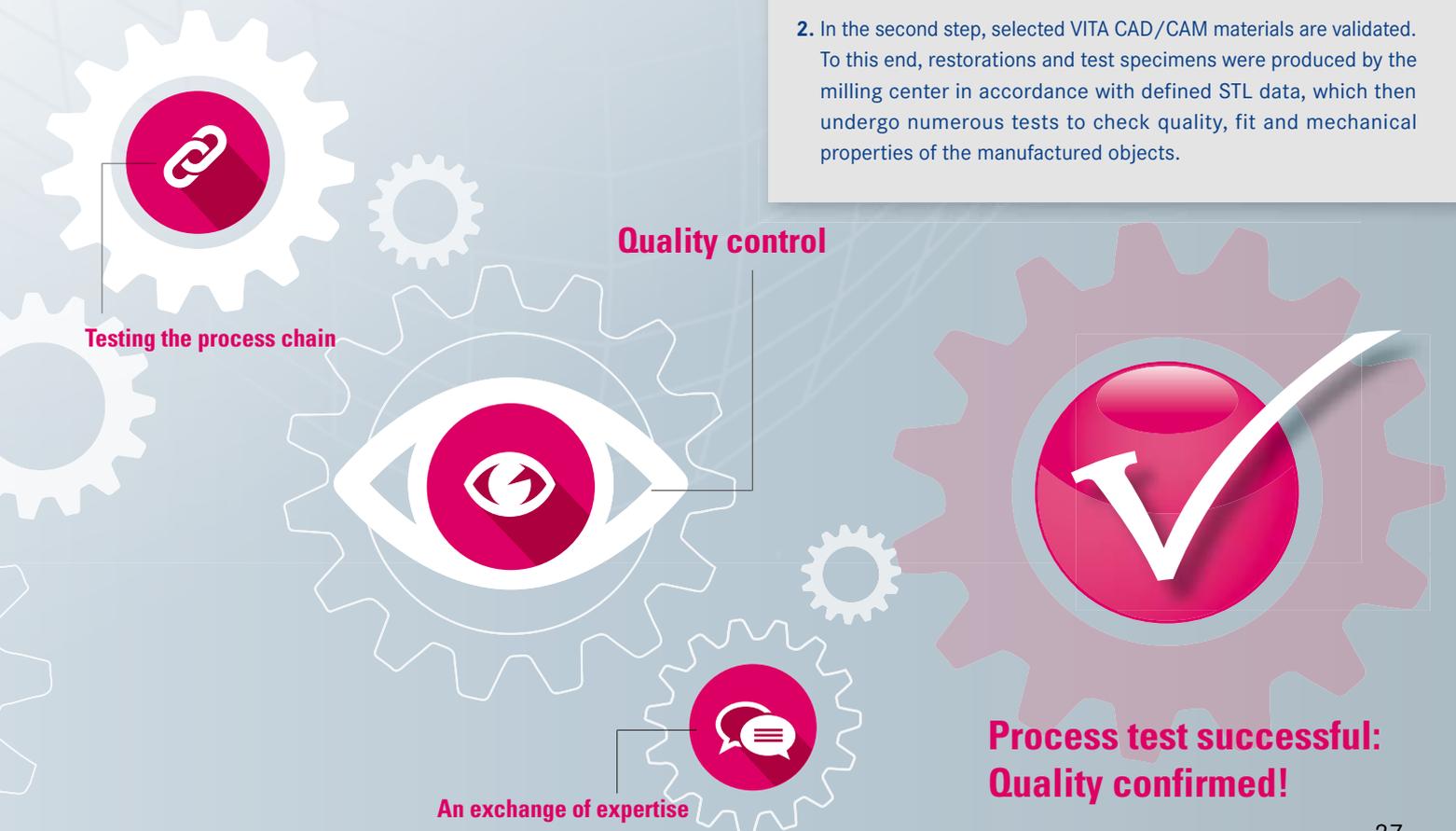
Fig. 4: Rigo Dombrowski operating one of the four manufacturing units.



Fig. 5: The validation of the manufacturing process with VITA CAD/CAM materials such as VITA YZ.

INFO: VALIDATION BY VITA – HOW DOES IT WORK?

1. In the first step, the CAD/CAM system used is qualified. For this purpose, VITA cooperates closely with various system providers (scanners, CAD-/CAM software and CAM systems) in order to further develop milling strategies, for instance, and optimize processes and results.
2. In the second step, selected VITA CAD/CAM materials are validated. To this end, restorations and test specimens were produced by the milling center in accordance with defined STL data, which then undergo numerous tests to check quality, fit and mechanical properties of the manufactured objects.



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