

DENTAL VISIONIST



Efficiency and naturalness intelligently combined

How to save time in your practice and laboratory,
optimize your processes and achieve visibly impressive results.



Natural shade gradients at the push of a button

Learn how to reproduce
shade gradients with
VITA ENAMIC multiColor blanks
in the current case study.

> Page 14



Achieving dynamic results up front

Master Dental Technician
Yamamoto shows you what to
keep in mind with discolorations
and post abutments.

> Page 24

Highly aesthetic monolithic solutions

Core3dcentres: occlusally screwed
VITA ENAMIC® crown



Technological advancements now allow us to serve our customers with monolithic restorations that can be placed directly in the patient's mouth. Core3dcentres specialises in these cases, available in zirconia, as well as in the hybrid ceramic VITA ENAMIC®.

New technologies and methodologies have already outsmarted the traditional ways of working, providing the patient, dentist, and laboratory with greater precision and comfort. The speed and quality delivered by digital technology are critical in the pursuit of perfection. Core3dcentres has driven the evolution into this new era, providing the solutions and essential knowledge which have contributed to making the dream of digital dentistry a functioning production solution.

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Editorial

Efficiency and naturalness intelligently combined!



Day-to-day work in the practice and laboratory requires solutions that help achieve compelling results, both esthetically and economically.

There are a number of options when it comes to saving time and improving processes: including systematic shade determination, the introduction of innovative fabrication techniques for restorations, or the use of new material blanks with integrated shade gradients.

However, other factors also have to be taken into account in order to achieve visibly convincing results. That is why it is particularly important to plan and implement age-appropriate esthetics, especially for older people.

This edition of DENTAL VISIONIST covers a wide range of topics, including systematic shade determination, efficient fabrication techniques and material-specific luting.

DENTAL VISIONIST wishes you an enjoyable read!



Angeley Eckardt
Managing Editor



Material-specific luting

Protocol for ceramic and composite materials

> Page 6



Efficient veneering with composite

Explained step-by-step

> Page 18



Achieving a natural effect

Creating age-appropriate esthetics with VITA VM materials

> Page 22

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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 of the named dentists and dental technicians reflect the status of the report authorization of 05/2017. The testimonials by developers or technical marketing department published in this magazine are based on individual and/or internal studies conducted by VITA R&D (VITA Zahnfabrik, Bad Säckingen, Germany) and/or on the results of pilot testing.



INFO: VITA SYSTEM 3D-MASTER

Using systematic research of the distribution of natural tooth shades within the color space, the development of VITA SYSTEM 3D-MASTER provides a solution that facilitates the precise description, communication and reproduction of each patient's tooth shade.

The advantages include:

- Systematic shade determination in 2-3 steps using the dimensions of shade brightness, intensity and hue,
- as well as the exact reproduction of these shades using matching CAD / CAM and veneering materials.

Proven for over 20 years: Shade determination with VITA SYSTEM 3D-MASTER



*Hans Jürgen Lange,
Master Dental Technician
Darmstadt, Germany*

Twenty years ago, the Teuber Dental laboratory in Darmstadt made an important decision: They would only use the VITA SYSTEM 3D-MASTER color system (VITA Zahnfabrik, Bad Säckingen, Germany) for tooth shade determination, both in the laboratory and with customers. Laboratory owner and master dental technician, Hans Jürgen Lange (Darmstadt, Germany), was involved in the development and testing phase for the VITA Linearguide 3D-MASTER shade system for systematic shade determination, and had already been exposed to the benefits of this modern system early on. In the following interview, he explains why implementing the VITA SYSTEM 3D-MASTER shade guide has continued to be successful for him.



Fig. 1 The first step is to pre-select the brightness level using VITA Valueguide 3D-MASTER ...



Fig. 2 ... and the second step involves determining the shade intensity and hue with the VITA Chroma/Hueguides 3D-MASTER. Shade results in just two steps!

DV: What sets VITA SYSTEM 3D-MASTER apart from the VITA classical A1–D4 shade guide?

Hans Jürgen Lange: Because VITA SYSTEM 3D-MASTER covers the entire range of tooth shades, it is easier to determine the right shade for a tooth. The VITA Linearguide 3D-MASTER helps me and my customers determine the right tooth shade systematically in just two steps. In comparison, the VITA classical A1 and D4 shade guides only offer a Yes/No decision and a more limited selection of shades.

DV: What advantages does VITA SYSTEM 3D-MASTER offer practices and laboratories?

Hans Jürgen Lange: It has made shade communication easier between dentists and dental technicians. Information on tooth shades can be expressed more precisely with VITA SYSTEM 3D-MASTER. I get more accurate information on shade reproduction from the dentist.

DV: What success have you had in implementing VITA SYSTEM 3D-MASTER in your own laboratory?

Hans Jürgen Lange: We are now able to work more economically, as complaints about shading are virtually down to zero since we decided to implement the modern shade system. In the past, 10 to 20 percent of our cases required time-consuming shade corrections. Because we now only work with this shade standard, we have also been able to significantly reduce our inventory.

DV: How does VITA SYSTEM 3D-MASTER support you with fabricating restorations?

Hans Jürgen Lange: Because we only use VITA SYSTEM 3D-MASTER, we only work with materials that are available with 3D-MASTER shades. That means that the employees don't have to constantly switch back and forth between different material systems. That provides more certainty, more consistency and higher quality.

DV: How is the process of tooth shade determination normally organized in your practices?

Hans Jürgen Lange: We continue to transition all of our new clients to the VITA SYSTEM 3D-MASTER. We provide them with a new shade range in exchange for their old one, and we show them how the systematic tooth shade determination works in just two steps. Concerning the esthetics of the front teeth, we determine each individual tooth shade in a special room in our laboratories. This has proven to be very successful.

Report 05/17



Harmonious luting specific to the material: hybrid ceramics versus composites



*Dr. Sebastian Horvath, Dentist,
Jestetten, Germany*

Different materials require specific luting processes. This means that composites and ceramics have to be conditioned differently. VITA ENAMIC (VITA Zahnfabrik, Bad Säckingen, Germany) has a unique dual ceramic, polymer network structure with a high ceramic content (86 weight %). This is why conditioning can take place in a similar way to feldspar ceramic. New blanks on the market are sometimes referred to as hybrid ceramics. However, these are highly-filled CAD/CAM composites. In the following, Dr. Sebastian Horvath (Jestetten, Germany) explains the material-specific luting for different materials.

Etched hybrid ceramic surface

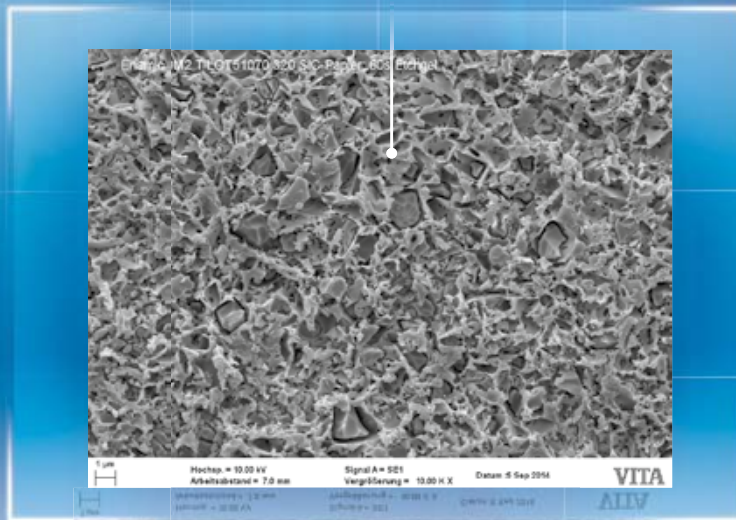


Fig. 1 REM picture of the retentive etching pattern of the hybrid ceramic VITA ENAMIC after hydrofluoric acid etching (5% hydrofluoric acid gel, 60 seconds), 10,000x magnification.

Source: VITA F&E, Bad Säckingen, Germany; Publication: A. Coldea, B. Just, E. Bojemüller, J. Fischer (2015). Shear bond strength of adhesively bonded hybrid ceramic. Conference paper, IADR / AADR / CADR General Session, At Boston, Mass., USA.

DV: Why is adhesive cementation important for indirect ceramic restoration?

Dr. Sebastian Horvath: The adhesive bond between the tooth and the restoration is essential for the long-term clinical success of purely ceramic restorations. It increases the load-bearing capacity of both the restoration, as well as the tooth. Microleakage is reduced, and the fit of the restoration is guaranteed. A prerequisite for this is a luting process that is adapted to the material.

DV: What protocol is to be used for hybrid ceramics according to the manufacturer's instructions?

Dr. Sebastian Horvath: Thanks to the dominant ceramic network, the material can be pre-treated in a similar way as with classical feldspar ceramics. First, the surface must be etched for 60 seconds with hydrofluoric acid (5%) and then carefully cleaned with water. A silane coupling agent is then applied and a bonder is applied afterwards, depending on the system.

DV: What clinical advantages can be expected from this material-specific protocol?

Dr. Sebastian Horvath: The protocol is similar to that of feldspar ceramics and is well-established. No new technique or procedural steps have to be learned, which means that no adjustment period is necessary. In addition, the hydrofluoric acid etching allows for excellent micro-mechanical retention. As a general rule, material-specific protocols are essential for secure bonds and for predictable, successful treatments.

DV: How should modern, highly-filled CAD/CAM-composites be attached according to manufacturer's instructions?

Dr. Sebastian Horvath: These materials resemble conventional composites in their basic structure. They do not have a ceramic network. They are not etched with hydrofluoric acid, but are instead radiated with aluminum oxide. In the end, a silane coupling agent is also applied, followed by the application of a bonder, depending on the system.

"Material-specific protocols are essential for predictable, successful treatments."

DV: What is important to keep in mind for conditioning the hard tooth substance before adhesive incorporation?

Dr. Sebastian Horvath: Adhesive systems have been further refined and now ensure an excellent bond despite the simple treatment process. That minimizes sources of error and ensures predictable results. For the past three years, we have had very good experiences using a one-bottle system in conjunction with a desensitizer.

Report 05/17

Read more about the **workflow for hybrid ceramic bonding** on the following pages!

Secure luting for hybrid ceramics: An overview of all the steps!

<p>1</p> 	<p>Hydrofluoric acid etching</p> <p>2</p> 	<p>3</p> 
<p>CAD/CAM-supported finished ceramic partial crown made of VITA ENAMIC.</p>	<p>On the lumen side, the hybrid ceramic is etched with hydrofluoric acid for 60 seconds.</p>	<p>The 5% hydrofluoric acid is distributed evenly with the microbrush.</p>
<p>Application of bonding agent</p> <p>4</p> 	<p>5</p> 	<p>Phosphoric acid etching</p> <p>6</p> 
<p>Silanization takes place after a thorough cleaning.</p>	<p>After the silane has been blown, the bonding is applied.</p>	<p>Phosphoric acid gel is first applied selectively in the melt ...</p>
<p>7</p> 	<p>8</p> 	<p>Bonder application</p> <p>9</p> 
<p>... and then applied in the dentine area (Total Etch).</p>	<p>The etching pattern on the rounded preparation mould.</p>	<p>The bonding ensures reliable adhesion to the tooth.</p>
<p>Application of luting composite</p> <p>10</p> 	<p>11</p> 	<p>12</p> 
<p>A low-viscosity luting composite is applied to the preparation.</p>	<p>The partial crown made of VITA ENAMIC is placed in its final position.</p>	<p>Harmonic integration of the partial crown after removal of excess material.</p>

Source:
Photographic documenta-
tion of the luting steps from
Dr. Sebastian Horvath,
Jestetten, Germany.

INFO: VITA ADIVA LUTING SOLUTIONS

VITA Zahnfabrik presented its new luting solutions for material-specific bonding of all indirect restorations made of feldspar, glass and hybrid ceramics, zirconium dioxide, composites, and metal for the first time at the IDS 2017. Thanks to the clearly structured luting set with systematically arranged and color-coded components, the bonding is simple and reliable. All components are easy to access, thanks to the handy, two-piece sets in a standard tray.



"Laser milling" – an innovative manufacturing technology for restorations

The Laser Mill system (Dental Wings, Montreal, Canada) uses millions of short, high-intensity laser pulses to remove many thin material layers from a blank and are similar to the design in the manufacture of dental prostheses. From mid-2017, the fully open digital workflow will be available from the intra-oral scanner in selected markets via the appropriate CAD software to the innovative Laser Mill unit. The first tested material for this new processing technology is the hybrid ceramic VITA ENAMIC (VITA Zahnfabrik, Bad Säckingen, Germany). In the following interview, Pierre-Olivier Roy (Vice President of Dental Wings, Montreal, Canada) explains the specifics of the technology and the advantages it holds for practices and laboratories.



Pierre-Olivier Roy, Montreal, Canada

DV: What are the significant differences between milling and laser technologies?

Pierre-Olivier Roy: The most significant difference is in that no tools are necessary for fabrication. The laser removes the material using a very short laser pulse. That is the reason why there is no wear. The detailed restoration work takes place step by step with the substance removal.



Fig. 1 Small amounts of material are removed until the restoration is complete.

DV: What advantages does Laser Mill offer for dental laboratories and practices?

Pierre-Olivier Roy: Very delicate restoration work can be done with the extremely fine laser beam. Manufacturing with this system is more straightforward, since no tools, no compressed air, or water are needed. Installation is easy. Complex geometries can be machined without issue.

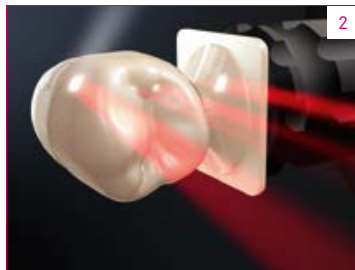


Fig. 2 Precise restoration occurs in this way, step by step with each layer removal.

DV: Why is the hybrid ceramic, VITA ENAMIC, particularly suitable for the Lasermill?

Pierre-Olivier Roy: The robust dual network structure of the hybrid ceramic makes fast, precise and predictable material removal possible. VITA ENAMIC is the first CAD / CAM material approved for clinical use because of its good material properties for laser milling. Additional ceramic chairside materials, such as VITABLOCS Mark II, will follow.

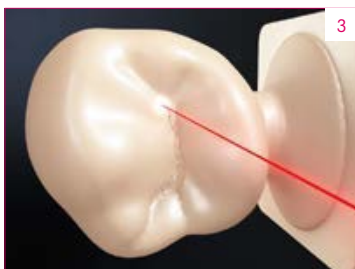
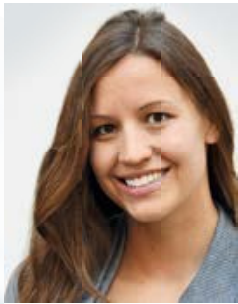


Fig. 3 The delicate laser beam makes exact restoration detailing possible.

Report 05/17

Fracture load study on implant-supported crown restorations



*Dr. Nadja Rohr, Dentist
Basel, Switzerland*

Due to the rigid ankylotic anchoring of the implant in the bone, high forces act on the superstructure, which can lead to chipping and fractures in the case of restorations made from conventional, brittle ceramics. Thanks to its dual ceramic polymer network structure, the hybrid ceramic VITA ENAMIC (VITA Zahnfabrik, Bad Säckingen, Germany) has a comparatively high dentine-like elasticity. This elasticity allows the material to absorb masticatory forces. In the following interview, Dr. Nadja Rohr (University Center for Dental Medicine, Basel, Switzerland) reports on her findings in fracture load tests with implant-supported crowns at the University of Basel.



Fig. 1 The crowns were loaded until fracturing occurred.

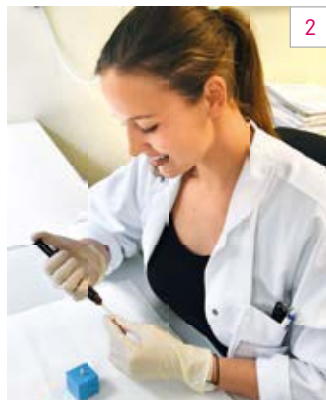


Fig. 2 Attaching the crowns to the zirconium oxide implants.

DV: In an in-vitro study, you examined the fracture load of crowns made of hybrid ceramic and traditional ceramic on one-piece ceramic implants. How did you proceed in that case?

Dr. Nadja Rohr: Standardized molar crowns made of hybrid ceramics and feldspar ceramics were attached to zirconium oxide implants (ceramic.implant, 4.0 mm, VITA Zahnfabrik) using four different attachment composites. After storing them in water for 24 hours at 37°C, the crowns reached their breaking point. The luting materials used were also characterized according to their flexural strength, E-module, tensile strength and pressure resistance.

DV: What were the differences between restorations made of VITA ENAMIC hybrid ceramic and traditional ceramic in the fracture load tests?

Dr. Nadja Rohr: With the use of hybrid ceramics, significantly higher fracture load values can be achieved as compared with feldspar ceramics.

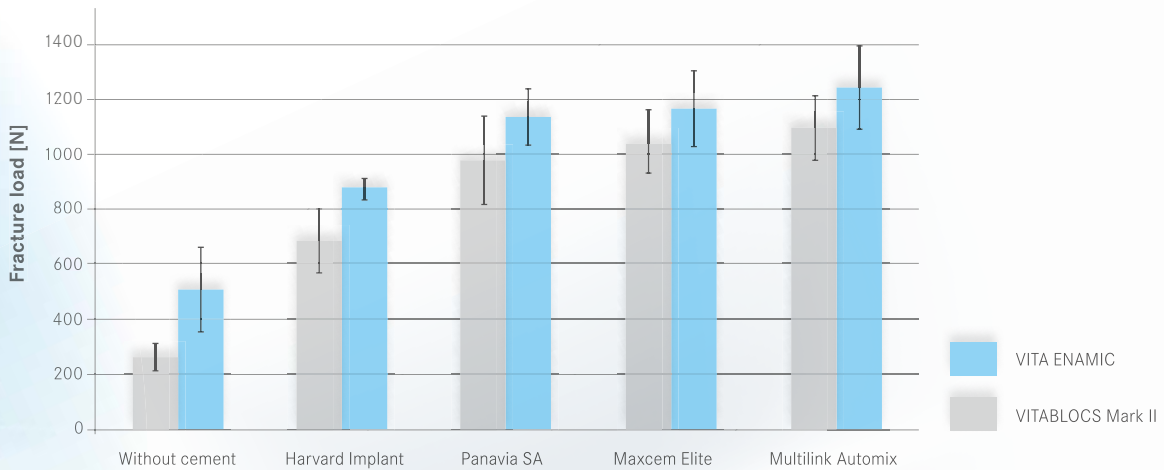


Fig. 3 Measurement results for the fracture load of the crowns (10 test samples per restoration and luting material) made of hybrid ceramic and feldspar ceramic, which were fixed with different luting composites.

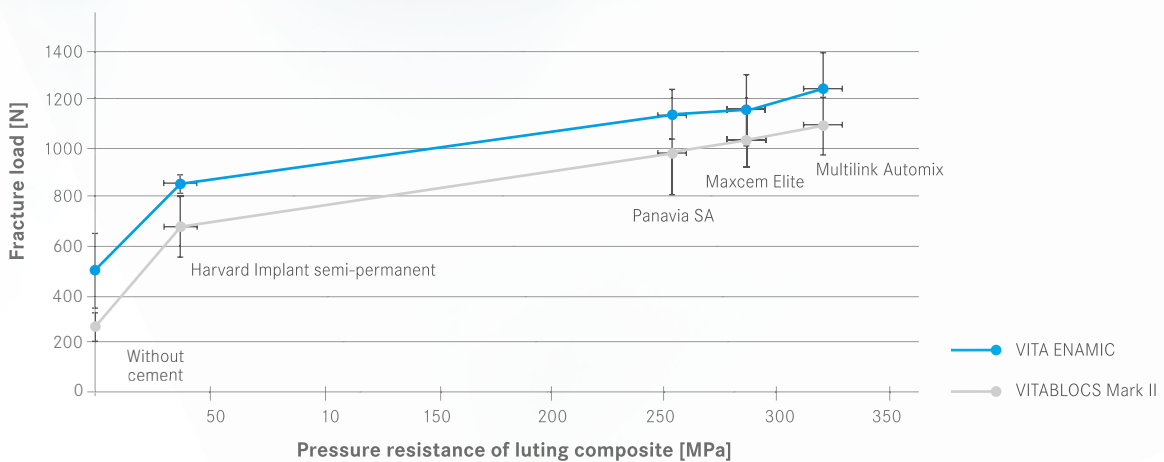


Fig. 4 Correlation between the fracture load of the crowns and the pressure resistance of the luting composites.

Source: Dr. Nadja Rohr, Universitätszahnkliniken Basel, Switzerland; Report/Literature: Rohr N., Coldea A., Zitzmann NU., Fischer J. Loading capacity of zirconia implant supported hybrid ceramic crowns. Dent Mater 14, 1 64-71 (1998) 2015;31: e279-88

"Luting composites with high pressure resistance can increase the stability of the overall system."

DV: In your test series, the crowns were bonded with self-adhesive and fully adhesive composites. Did that affect the fracture load values determined?

Dr. Nadja Rohr: High fracture load values for hybrid ceramics and feldspar ceramics were achieved with luting composites that had high pressure resistance.

DV: How relevant is the pressure resistance of a luting composite in daily clinical practice?

Dr. Nadja Rohr: High pressure resistance luting composites can increase the stability of the overall system. In the molar range there are maximum masticatory forces of up to about 1000 N. Choosing the right luting composite can have a positive effect on the clinical success of hybrid and feldspar ceramic restorations.

DV: What should be considered when choosing the luting composite and what should be taken into account during the integration process?

Dr. Nadja Rohr: Dentists should choose a luting composite that meets the clinical requirements. For attaching hybrid ceramic crowns to zirconium oxide implants, this would be an adhesive luting composite with high pressure resistance. It is important for the conditioning to be performed according to the manufacturer's instructions.

Report 05/17

CAD/CAM implant prosthetic: Implant-supported crown restoration made of hybrid ceramics



Dr. Julián Conejo, Dentist
Philadelphia, USA

The rigid anchoring of the implant body in the jaw bone means that implant-supported restorations lack the buffer function of the elastic fiber apparatus of natural teeth. Superstructures made of VITA ENAMIC can absorb masticatory forces due to their dentine-like elasticity, helping to take pressure off the implant and the antagonist teeth. VITA ENAMIC IS blanks (VITA Zahnfabrik, Bad Säckingen, Germany) have an integrated interface to adhesive/titanium bases. This allows one-piece, screwed abutment crowns without a cement gap, reducing the risk of peri-implantitis. In the following case report, Dr. Julián Conejo (Philadelphia, USA) describes restorations using abutment crowns step by step.



→ Fig. 1 After the removal of the temporary restoration, region 25 showed a naturally formed emergence profile.

1. Diagnostics and immediate implantation 2. CAD/CAM fabrication

A 45-year-old patient complained of pain in region 25 when chewing. During the clinical examination of the endodontically treated tooth, a vertical root fracture was diagnosed. Clinical and radiological diagnostics showed no signs of inflammation. For that reason, an extraction method designed to protect the bone and an immediate implant were chosen. The tooth could be extracted with the greatest possible bone content. During the inspection of the extraction cavity, an entirely intact buccal bone lamella was found. After careful examination of the alveoli, the immediate implantation could be carried out. Since the primary stability was more than 35 N/cm², immediate loading with a screwed provisional temporary restoration without occlusal contact was possible in order to form the soft tissue during the healing process.

After three months of osseointegration, the soft tissue region at 25 showed a naturally formed emergence profile. Immediately after the temporary restoration was removed, the gingival development was recorded with the CEREC Omnicam (Sirona Dental, Bensheim, Germany). A scan post was then screwed onto the implant and a scan body was positioned on it. After a radiographic control of the fit, the three-dimensional implant position was scanned. A VITA ENAMIC IS blank was selected for the production of the final restoration. The morphology of the definitive abutment crown on the virtual model included a natural design with the CEREC software 4.4 so the soft tissue received optimal support. After the restoration was milled, manual polishing was performed with the VITA ENAMIC polishing set at a low speed. This resulted in a smooth surface in the transmucosal region.



Fig. 2 To preserve the soft tissue structure, scanning was carried out immediately after the temporary restoration was removed.



Fig. 3 A scan post was screwed into the implant.



Fig. 4 A scan body was positioned on the scan post and a radiographic control was performed to check the fit.



Fig. 5 The implant position was recorded with the 3-D scanner CEREC Omnicam.



Fig. 6 The abutment crown was constructed virtually for optimal soft tissue support.



Fig. 7 The CAD/CAM machined and polished abutment crown was screwed in at a torque of 35 N/cm².

3. Luting and integration

The adhesive base was sand blasted with aluminum oxide (50 micrometer, 3.0 bar), the interface and the screw channel of the VITA ENAMIC crown were etched with 5% hydrofluoric acid for 60 seconds. In order to form reliable adhesion with the dual-curing adhesive material PANAVIA V5 (Kuraray, Noritake), an MDP primer was applied to the relevant titanium and hybrid ceramic components before attachment. The finished restoration was then bolted at a torque of 35 N/cm². The screw head was covered with gutta-percha and the screw channel was sealed with direct composite material. The final radiographic control showed ideal bone conditions and a very good fit between the titanium base and the hybrid ceramic, thanks to the ready-made interface of the VITA ENAMIC IS blank. During the follow-up appointment after one year, the patient expressed that the hybrid ceramic abutment crown had a positive natural feeling.



Fig. 8 The final result shows harmonic integration of the hybrid ceramic abutment crown into the soft tissue and the adjacent teeth.



Fig. 9 The X-ray check showed ideal bone conditions and fit.



VITA ENAMIC IS blanks allow a very good fit to the titanium base, thanks to the ready-made interface.

Multi-chromatic hybrid ceramics: Shade gradients at the push of a button

In March 2017, the new multi-chromatic hybrid ceramic blank VITA ENAMIC multiColor (VITA Zahnfabrik, Bad Säckingen, Germany) was introduced for the first time. The CAD/CAM blank has an integrated, natural color gradient that includes six finely nuanced layers. This allows reconstructions to be created at the push of a button, with a natural shade profile from the neck to the incisal edge. As there is no firing after the CAM production, hybrid ceramics can be directly integrated after polishing. Dr. Bernhild-Elke Stamnitz (Langen, Germany) explains the effectiveness of the manufacturing process and the esthetic potential of the new blank in the following interview.



*Dr. Bernhild-Elke, Dentist,
Stamnitz, Langen, Germany*

DV: What experiences have you already had with the new blank and how do you evaluate its esthetic potential?

Dr. Bernhild-Elke Stamnitz: I have worked with blanks in the colors 1M2, 2M2 and 3M2 in clinical trials and can say that I am thoroughly satisfied with the new multi-chromatic blank in every respect! In general, my patients find hybrid ceramics very comfortable, as the restorations feel very natural in the mouth and not like foreign bodies. The introduction of the multi-chromatic version is something that I have been hoping for for a long time!

DV: For which clinical situations is VITA ENAMIC multiColor particularly suitable and when should alternative materials be used?

Dr. Bernhild-Elke Stamnitz: The blank is recommended for many individual dental restorations that are visible, in other words, from the front teeth to the premolars, from full and partial crowns to veneers. Of course, it can also be used for reconstructing molars, but its esthetic potential is not particularly effective there.

DV: What should be considered when designing with CAD software in order to achieve a very natural color profile?

Dr. Bernhild-Elke Stamnitz: During the milling preview, the design must be positioned in the virtual blank in such a way that the individual tooth shade profile of the respective patient case is reproduced as effectively as



VITA ENAMIC multiColor is a multi-chromatic version of hybrid ceramics with an integrated, natural color gradient that includes six finely nuanced layers.



Fig. 1 Initial situation.



Fig. 2: Preparation.



Fig. 3 Positioning the construction in the blank.

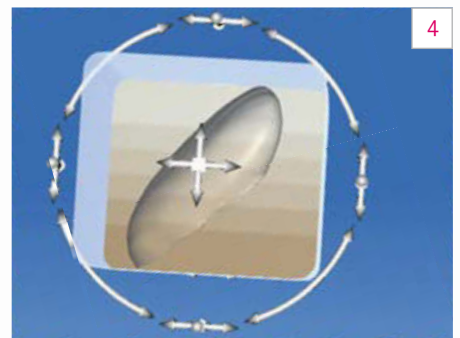


Fig. 4 Rotation of the design for a harmonious shade gradient.

possible through the integrated layer structure. The shade gradients of the blank begins with the chromatic shade range for reproducing the tooth shading, and becomes more translucent towards the incisal edge. Once you understand how the positioning works, it is really easy!

DV: What kind of advantages does VITA ENAMIC multiColor offer practices and laboratories in terms of efficiency and time savings due to the integrated color profile?

Dr. Bernhild-Elke Stammnitz: Although the characterization of a hybrid ceramic restoration is possible in principle using light-curing stains, it is not necessary for VITA ENAMIC multiColor because of the integrated shade profile. In addition, no firing procedure is required for hybrid ceramics, which allows the restoration to be integrated directly after polishing. That saves a lot of time!



Fig. 5 Situation immediately after integration.



Fig. 6 VITA ENAMIC multiColor crowns have a natural appearance in situ. After seeing the positive results, the patient requested that the rest of the teeth be restored.

DV: What method is best for polishing the hybrid ceramic restoration in order to achieve excellent high-gloss surfaces?

Dr. Bernhild-Elke Stammnitz: The polishing steps specified by the manufacturer should be followed and the original polishing pads used for the pre-polishing and high gloss polish. I combine this with a polishing paste and a goat-hair brush.

"The restoration can be integrated directly after polishing, which saves a lot of time."

Step by step from VITA ENAMIC blank to inlay



*Dr. Julia Bühler, Senior Physician
Basel, Switzerland*

VITA ENAMIC has been used clinically for more than five years. The spectrum of possible applications ranges from inlays to veneers to crowns. In the following interview, Senior Physician Dr. Julia Bühler (University Center for Dental Medicine, Basel, Switzerland) uses a case study to report on her experiences and describes key clinical success factors.

DV: How do you evaluate the clinical use of VITA ENAMIC and what do you think are the advantages, as compared to traditional ceramics?

Dr. Julia Bühler: Thanks to the material properties, there is more freedom in the preparation, e.g., when space is limited. And processing is easy: Milling and polishing can be carried out much faster.

DV: What are the key clinical success factors for using hybrid ceramics for single tooth restorations?

Dr. Julia Bühler: The more flexible preparation is less invasive. The material is more forgiving than traditional ceramics in less favorable conditions, such as with thin edges. Its easy workability is also an advantage in everyday clinical practice: Intraoral corrections/repairs can be carried out simply and safely (in this case, conditioning with aluminum oxide instead of hydrofluoric acid).

DV: What should dentists focus on and what are the critical process steps?

Dr. Julia Bühler: Complying with preparation guidelines remains essential for achieving a good, long-lasting restoration. Despite the polymer content, VITA ENAMIC is ultimately a ceramic: It is important to observe minimum layer thicknesses. During the insertion process, it is important to keep the area completely dry, and the workpiece and the tooth must be pretreated very carefully. Maintaining the right conditioning times is also essential for long-term success.

DV: For the manual finishing of VITA ENAMIC, a special polishing set is recommended by the manufacturer - what experience have you had with this?

Dr. Julia Bühler: The set works perfectly. By using different abrasive polishers for the pre-polish and high-gloss polish, restorations can be polished to a high gloss in a matter of seconds. The wear of the polishing instruments was significantly reduced with the latest generation.

DV: How durable do the restorations appear to be in the follow-up appointments, for example regarding surface quality?

Dr. Julia Bühler: I've been regularly working with VITA ENAMIC for about four years now and so far – from a subjective standpoint – I have no complaints. The surface durability seems to be comparable to more traditional ceramics. However, we will have to wait for long-term studies to be conducted.

DV: In the present case, you have characterized the inlay with VITA ENAMIC shades. How can you achieve good intraoral color durability?

Dr. Julia Bühler: It is important to have sufficient light curing. As a general rule of thumb, the darker and more opaque the shades, the longer the polymerization. The recommended minimum times from the manufacturer may be doubled.



Fig. 1 Initial situation: Tooth 26 has been restored with an insufficient amount of amalgam.



Fig. 2 Preparation: Even when VITA ENAMIC is used, the minimum layer thicknesses of the material must be adhered to.



Fig. 3 Preparation: If dentine support is insufficient, it is recommended to reduce the cusps.



Fig. 4 Production result: Hybrid ceramics can be milled very quickly.



Fig. 5 Post-processing: The VITA ENAMIC Stains Kit is recommended for shade characterization.



Fig. 6 Situation under the rubber dam: Fine adjustments and final polishing are made easy with the polishing set.



Fig. 7 Final result immediately after the removal of the rubber dam: The hybrid ceramic has already adapted perfectly to the natural tooth substance.

"Hybrid ceramics are more forgiving in less favorable conditions, such as with thin edges, as compared to traditional ceramics."



Veneering metal frame-works with composite – explained step by step

Veneering metal frameworks and secondary composites have long been regarded as an esthetic and material compromise. However, with modern veneering composites, esthetic results can be obtained that are comparable to ceramic veneers.

VITA VM LC flow (VITA Zahnfabrik, Bad Säckingen, Germany) is a composite of this new generation. The thixotropic property of the material offers both high stability during the application, as well as excellent flowability during the modeling process. Erfurt dental technician Norman Zacharias from Das Dentallabor - innovations for your smile (Kirchheim, Germany), shows how VITA VM LC flow can achieve highly esthetic results, step by step in the following article.



→ INITIAL SITUATION: NEM bridge framework on two implants.



→ RESULT: Implant bridge veneered with VITA VM LC on a model.



*Norman Zacharias,
Dental Technician
Erfurt, Germany*

1. Concept and preparation

We have been working with VITA VM LC flow since October 2016. The following documentation shows an example of a NEM bridge on two implants, which has been veneered with the veneering composite according to the layer concept of dental technician Björn Czappa. In the

first step, the framework was sandblasted and then conditioned using a primer.

This was followed by the application of PRE OPAQUE bonding agent, and a thin layer of OPAQUE was then applied until a glossy cover layer was achieved.





Fig. 2 The glistening, thin-flowing PRE OPAQUE increases the reliability of the composite on metal frameworks and achieves a very uniform opaque layer.



Fig. 3 The framework must be completely coated with OPAQUE. The result is a well-covered and glossy surface.



Fig. 4 On the reduced dentine body, CHROMA PLUS mamelons are applied with stains and flow, and the edge is reinforced.



Fig. 8 Preparation with carbide burs and rubber polishers.



Fig. 9 A thin layer of modeling liquid (after about 30 seconds) allows composite and stains to be reapplied; The latter are covered with a transparent material (WIN).

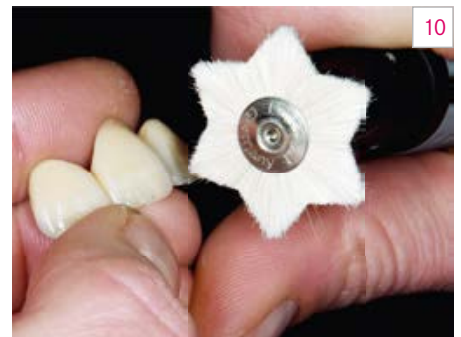


Fig. 10 A star-shaped goat-hair brush provides the surface structure for the pre-polish and high gloss-polish (Acrypol and Abraso-Starglanz, Bredent).

2. Veneering steps

CHROMA PLUS materials started to be applied to the tooth necks or the basal section of the pontic. The dentine body was not layered in this case. Instead, a fully anatomic wax-up was created and transferred to the framework using a silicone key, which was completely filled with flow BASE DENTINE. The fully anatomic structure was light-cured and then roughly worked out, in order to reduce the proportions for incisal materials and effect materials.

The core of the incision was reinforced with CHROMA PLUS (CP3, light orange-brown) and mamelons were applied. VITA VM LC PAINT (PT5, light orange-brown) was used to add additional accents. Then, with subtle nuances of EFFECT ENAMEL (EE11, grayish translucent),

a translucent effect was achieved on the dentine that was already layered, which did not appear dark in the mouth later on. The edges were brightened with EFFECT ENAMEL (EE1, whitish) and a line of Retzius was replicated. Finally, the bridge was finished with melt material (ENL light). VITA VM LC GEL was applied to prevent the inhibition layer before final polymerization.



Fig. 5 Strips are created with effect materials to achieve additional translucence.

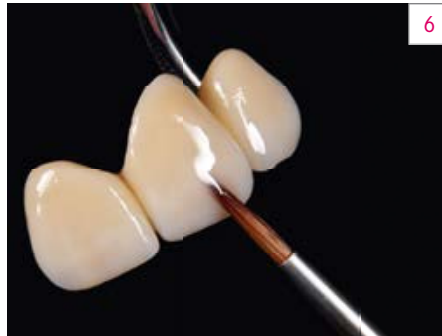


Fig. 6 Construction of the final tooth mould with melt materials.

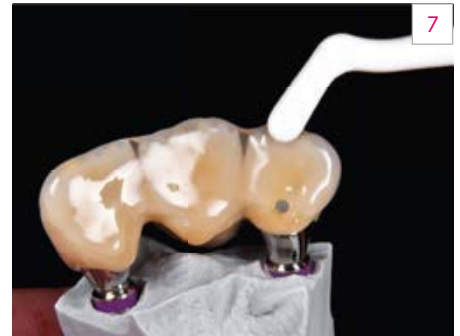


Fig. 7 In order to prevent the formation of an inhibition layer, a thin but opaque layer of VITA VM LC GEL is applied with a spatula before final polymerization (2 x 180 seconds).



Fig. 11 Final result on a model



Fig. 12 VITA VM LC flow enables a high degree of individuality.



Fig. 13 Palatal view.

3. Recommendation for finalization

Fine carbide burs as well as the corresponding rubber polishers, without stones or diamonds, are suitable for the final processing. If additional materials or stains are to be applied afterwards, it is necessary to wet the surface with modeling liquid. Applied stains are thinly coated with transparent material (WIN transparent). For the polish, a goat-hair brush that does not affect the processed surface structure is recommended.

4. Conclusion and experience

"CHROMA PLUS materials have fascinated me from the very beginning. They cover the shades completely without creating a shine and ensure natural depth," Zacharias reports. As a general rule, practical knowledge with the VITA VM system can be transferred 1:1 to the VITA VM LC flow veneer composite. For example, the effect materials are processed in the same way as the VITA VM ceramics. The fully anatomic layer construction using counters works perfectly, even without insulation. "My overall conclusion: Excellent results are easily achieved with VITA VM LC flow," says Zacharias.



➔ **RESULT:** Convincing esthetics with natural shade reproduction can be achieved easily and efficiently.

Report 05/17



For age-appropriate esthetics: Natural effects with VITA VM materials



*Carolin Wehning,
Dental Technician
Bocholt, Germany*

It becomes especially challenging for dental technicians to produce natural, age-appropriate reconstructions in the visible area of the mouth for older people. It is recommended to establish a very planned procedure based on the characteristics of the natural teeth for the individualization and characterization of such a restoration. This is the only way results can be achieved that fit harmoniously into the remaining tooth substance. Dental technician Carolin Wehning (Bocholt, Germany) shows how such a complex case can be solved with VITA VM 9 veneer ceramics and VITA INTERNO materials for internal characterization (all VITA Zahnfabrik, Bad Säckingen, Germany) in the following case study.



➔ **INITIAL SITUATION:** Composite structure at 21 after distal transverse fracture of the tooth crown.

1. Assessment and planning

A 77-year-old patient entered the dental practice after a coronal transverse fracture at 21, which had already been treated with a direct composite structure. Clinically, the results were morphologically and esthetically inadequate. On the adjacent natural tooth 11, age-related discolorations, initial white and brown spot lesions in the cervical area, and a vestibular transverse dark brown crack were apparent. The dentist and patient decided to restore the tooth with a full ceramic crown for long-term stabilization, in which the color effect of the adjacent tooth 11, was to be reproduced in detail. In order to achieve a predictable result, the situation was molded and a model was developed for a wax-up. Tooth 21 was prepared for a full crown and a master model was produced using a precision mould.



Fig. 2 After matching the wax-up with the master model, the functional cap could be designed.

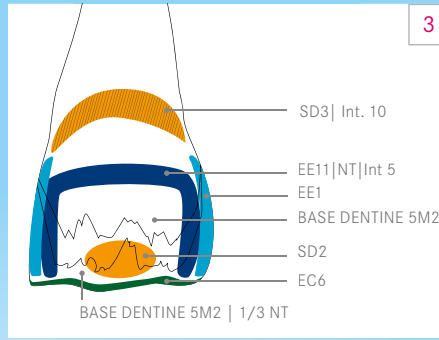


Fig. 3 After determining the basic tooth shade 5M2 with the VITA Toothguide 3D-MASTER, the layer scheme is sketched.



Fig. 4 The crown framework, prepared for veneering.



Fig. 5 After a dentine firing, VITA INTERNO can be used for a second time to give depth with individual shade nuances.



Fig. 6 The VITA INTERNO stains allow for a multifaceted and age-appropriate reproduction of the natural teeth.



Fig. 7 The final fully ceramic crown has an age-appropriate morphology, surface texture and shading.



Fig. 8 The shading and lighting of the restoration fits perfectly in the overall picture.

2. CAD/CAM fabrication and veneering 3. Finalization of the restorations

The crown framework was made of CAD/CAM-supported VITA YZ HT zirconium dioxide. For a deep initial fluorescent effect, a wash firing was performed with EFFECTLINER 5 (orange) and EL6 (green-yellow). "Layering with VITA VM 9 was the basis for reproducing the basic shade. The VITA INTERNO materials then enabled me to intensify the deeper individual shade nuances after the wash and dentine firings," said Wehning, describing the key steps of ceramic reproduction. INT04 (orange) and INT11 (gray-brown) were used in the cervical and interdental areas; INT5 (terracotta) was used in the center. The inside areas were nuanced with shades of INT8 (blue), INT5 (brown), and INT7 (anthracite); the incision with INT2 (sand). Cracks and brown spots could be reproduced with INT10 (brown), and white spots with INT1 (white).

After working out the basic morphology with the stone and the details with a fine diamond, the inside crack was pulled from the outside with a fissure bur to achieve a three-dimensional effect. The surface texture was kept as smooth as possible, in accordance with the patient's age. After the glaze firing, only a goat-hair brush and diamond polishing paste were used to slightly reduce the gloss effect. After trying out the fully-ceramic crown, the patient was very satisfied with the result, and a self-adhesive bond was applied. The shade and form of the restoration integrated harmoniously with the other teeth. The ceramic veneer in combination with two stain-colored fires made it possible to achieve an age-appropriate esthetic.



RESULT: The patient is very satisfied with the final esthetic result.



Natural care for discoloration and metallic post abutments



*Show Yamamoto,
Master Dental Technician
Tokyo, Japan*

Natural restorations of incisors is the most demanding of the dental disciplines. Cases of discoloration of the dentine and/or metallic pivot teeth/stump teeth pose a special esthetic challenge. Here, dental technicians have to choose a material mix which provides a reliable mask, but also allows for natural shading and lighting. In the following case, Master Dental Technician Show Yamamoto (Tokyo, Japan) shows how such a clinical situation can be successfully solved with the VITA YZ zirconium dioxide and VITA VM 9 veneering ceramic (VITA Zahnfabrik, Bad Säckingen, Germany). The clinical treatment and intraoral photography were carried out by Dr. Takuya Yada (Tokyo, Japan).



➔ **INITIAL SITUATION:** Initial clinical situation with the insufficient, metal-ceramic crown 21.



Fig. 2 After the crowns have been removed, discolored dentine and a metallic structure appear.



Fig. 3 The tooth shade was determined using VITA Linearguide 3D-MASTER.



VITA AKZENT Plus offers a wide range of varnishing, masking and glazing shades for individual characterization of all dental ceramics.



Fig. 4 Digital verification with the VITA Easyshade V.



Fig. 5 Polar eyes filters eliminate reflections and make characterizations visible.



Fig. 6 The wash firing with VITA AKZENT Plus EFFECT STAINS reproduces the basic shade.

1. Initial situation and treatment planning

A patient came to the dental practice and expressed the desire to receive a new single crown for tooth 21. The color and characterization of the dull metal ceramic crown did not blend in well with the natural remaining teeth. The metallic crown rim was visible cervically and only partially covered with a direct composite filling. After the imperfect crown was removed, discolored dentine and a metallic stump tooth appeared. No secondary cavities could be diagnosed clinically. The radiographic examination showed a sufficient root canal treatment without periapical inflammatory signs. To mask the discoloration and metallic stump tooth, a crown framework of zirconium dioxide VITA YZ TColor in brightness level LL1 was planned. The VITA VM 9 fine-structure feldspar ceramic was selected for ceramic veneering in order to ensure a natural color and lighting.

2. Shade determination and framework fabrication

The prepared tooth stump was molded and a temporary restoration was prepared using a silicone key. The framework was first waxed against a master model and subsequently fabricated with CAD/CAM support. Special attention was paid to the tooth shade determination with the VITA Linearguide 3D-MASTER in two systematic steps (brightness + shade intensity and shade tone). The result was verified by a digital three-point measurement with the VITA Easyshade V digital. "I think the combination of visual and digital shade determination contributes to the precision of the final shade information," Yamamoto said, emphasizing the importance of this step. 3M2 was finally determined to be the base shade. A polar eyes filter, which eliminates reflections, was used to visualize characterizations and internal effects.



Fig. 7 The dentine core is created and individualized with VITA VM9 BASE DENTINE 3M2.



Fig. 8 Condition of restoration after first dentine firing.



Fig. 11 Melt was coated with NEUTRAL, EC1, EE3, EE4, EE5, EE8, EE9, and WINDOW.



Fig. 12 A fixation mold was taken during the try-in of the raw firing.

3. Veneering step by step

To reproduce the basic shade on the zirconium dioxide framework, a mixture of VITA AKZENT Plus EFFECT STAINS 5 and 3 (both orange) was initially used. After the firing, it was layered with VITA VM9 BASE DENTINE 3M2 in a similar way to the specific base shade and cervically individualized with EFFECTLINER 6 (green-yellow), 2 (beige), and 3 (brown), CHROMA PLUS 3 (light orange-brown), green-brown EFFECT CHROMA 10 (EC10) and GINGIVA G2 (orange-pink). After the first dentine firing, 3M2 and TRANSPA DENTINE 3M2 were veneered and combined with SUN DENTINE 3 (orange-red), light ENAMEL, EC10 and 3 (light yellow), blueish EFFECT ENAMEL 10 (EE10) and neutral EFFECT OPAL 1 (EO1). After the second dentine firing, whitish characterizations were created with fine vertical and horizontal lines using different INTERNO STAINS. The melt was finally layered from a mixture of NEUTRAL, WINDOW (WIN), EC 1 (white) and numerous EFFECT ENAMELS.

4. Finalization and treatment result

In order to be able to create the ideal morphology of the crown and shape of the soft tissue, a fixation mold was made in the course of the clinical try-in. Based on this mold, a new master model was made with the light-curing VITA SIMULATE preparation material as a stump material on 21, in order to definitively check the crown shape. After a minimal cut back, the dentine core was modified with 3M2, the melted material with EO5 (dark violet) and a mixture of WIN with EE7 (orange translucent). The shape and surface texture of the adjacent incisors were finally created with diamond tools. The treatment results showed a natural and vivid single incisor crown that is integrated harmoniously into the esthetics.

Report 05/17



Fig. 9 Layering 3M2 with individual effects for the second dentine firing.



Fig. 10 Two separate firings are used to characterize horizontally and vertically.



Fig. 13 Final form and texture were designed with diamond tools.




Fig. 14 A golden texture marker helps to visually highlight the surface structure.



VITA VM 9 is a fine-structure feldspar ceramic that is ideally adapted to the CTE value of zirconium dioxide frameworks.



→ RESULT: The final restoration on 21 harmonizes perfectly with the natural adjacent teeth and has natural shading and lighting.



**Gold-palladium framework
efficiently veneered
with VITA VM 13 metal
ceramics**



*Cyril Perregaux, Master
Dental Technician
Geneva, Switzerland*

Complete tooth loss can create a stressful and emotional situation, particularly for young patients. In these cases, the challenge is to offer the patient an age-appropriate, esthetic restoration with reliable long-term stability. VMK restoration (VITA metal ceramics) can be used in this case and is a proven material combination that has been used for many years in clinical situations. In the following case report, Master Dental Technician Cyril Perregaux (Geneva, Switzerland) shows the production of an implant-supported gold-palladium framework, which he veneered with VITA VM 13 (VITA Zahnfabrik, Bad Säckingen, Germany).



Fig. 1 Master models with implant posts and immediate prostheses.



Fig. 2 The new set-up for prosthetic orientation and treatment planning.

1. Clinical challenge

A 20-year-old patient suffered from a general tooth formation disorder. For this reason, all of the teeth in her upper and lower jaw had to be extracted under full general anesthetics. For the healing process, immediate prostheses were fabricated with VITA PHYSIODENS prosthesis teeth (VITA Zahnfabrik, Bad Säckingen, Germany) to give the patient a natural, young appearance. However, the prostheses also provided important prosthetic information for the planned permanent, implant-supported rehabilitation. After a healing phase of several months, eight implants were inserted in the upper jaw and six in the lower jaw.

2. Set-up and fabrication of provisional material

After the shaping and bite registration, a new set-up with VITA PHYSIODENS enabled a precise prosthetic orientation, taking into account the implant positioning in the new, post-operative situation. With the vestibular and lingual silicone keys of the set-up, the prosthetic teeth could be adjusted to the temporary abutments screwed on to the master model. Using the vestibular and lingual silicone keys, the set-up was transferred to plastic and inserted as a long-term provisional restoration.



Fig. 3 The silicone keys reflect the dimensions of the set-up.



Fig. 4 An implant-supported provisional restoration was fabricated using the silicone matrix.



Fig. 7 The three screwed-in bridge frameworks per jaw in the articulator.



Fig. 8 The opaque framework according to the selected basic tooth shade.

3. Framework completion and veneering

After several weeks of adjustments, new fixation molds were taken to produce a master model. The articulation was carried out in a similar way to the provisional bridges. The framework was also modeled and cast in wax using the silicone key. Successively controlled by means of a silicone key, the finished bridge frameworks were finally veneered with VITA VM 13. Cyril Perregaux recommends: "Before the blending is complete, a clinical try-in should be carried out in order to prevent any possible issues such as interfering contacts. This minimizes the risk of cracks occurring after insertion through milling."

4. Seating and final results

All six bridges were screwed in intraorally and the screw channels were sealed with a composite. The gold-palladium framework provided a solid and economical solution. VITA VM 13 allowed for a highly esthetic and age-appropriate veneering. Meticulous planning and regular clinical testing were the key factors for success. The young patient was very satisfied with the final results of the treatment.

Report 05/17



Fig. 5 The matrix allows dimensional control of the framework.



Fig. 6 The bridge frameworks are cast in a similar way to the wax-up.



Fig. 9 Approximate and morphological finalization after the last fitting.



Fig. 10 The final restorations in the articulator, ready to be screwed in.



VITA VM 13 is a highly esthetic fine-structure feldspar ceramic that is ideally suited to the CTE value (approx. 13.8 - 15.2 $\mu\text{m} / \text{mK}$) of classic firing alloys.



Fig. 11 A beautiful smile with natural, age-appropriate care.



Fig. 12 Red and white esthetics in balanced harmony.

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