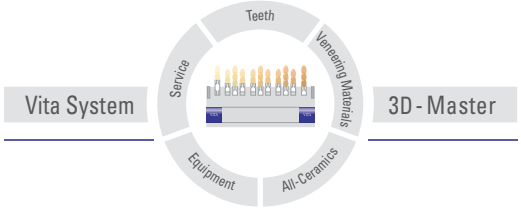
VITA All-Ceramics

Veneers made from **VITABLOCS® for CEREC®/inLab®**

Clinical and dental-technical guide
by Dr. A. Devigus and G. Lombardi

Edition 05-06



VITA

Dr. med. dent. Alessandro Devigus

Born on August 21, 1962 in Sardinia (Italy)

Education	1981-1987
1981-1987	Study at the University of Zurich, state examination
1987-1990	Assistant in a private practice
Since the end of 1990	Working in his own private practice
Since Oct. 2000	CEREC instructor at the University of Zurich
Since 2003	Lecturer at the University of Freiburg (Dept. Prof. Strub)
	Research projects at the University of Geneva (Dept. Prof. Krejci)

Main activities

CEREC (CAD/CAM) dentistry,
President of the SGcZ (Swiss Society for Computerized Dentistry),
President of the SSRD (Swiss Society for Reconstructive Dentistry)
Member of the board of the SGI (Swiss association for implantology), active member of EAED
Various courses and speeches in Germany and in foreign countries, especially on the subject of CEREC, digital photography, online education; operator and webmaster of various internet websites: e.g. http://www.dentist.ch, CEREC Network at http://www.cerec.net,
Editor of the "Dentist's Newsletter" (http://www.dentistnewsletter.com)
"Digital measurement of shades in dentistry", Quintessenz (2003)
Quintessenz Books 2003 The Fundamentals of Color (Spring 2004)
Numerous short publications, languages: G/I/E/F,
E-mail: devigus@dentist.ch

Giordano Lombardi, dental technician

Born on October 29, 1967 in Zurich (Switzerland)

Education

1987 Completion of dental technical training - Fähigkeitsausweis (national degree/certificate in Switzerland)
1990 Established his own dental-technical laboratory in Zurich,
Main fields of work: all-ceramics and implant-supported restorations.

Main activities

1992 First contact and practical experience with CEREC 1 with Dr. A. Devigus (Bülach).
Since 1997 various reports and courses on the subject of use and processing of feldspar ceramics with CEREC 1 and CEREC 2.
Since 1999 cooperation with the University of Zurich: Department for tooth-colored & computerized restorations (Prof. Mörmann)
Since 2000 CEREC inLab user and test laboratory for VITA Zahnfabrik and Sirona (Bensheim).
Provides regular courses and reports/speeches all over Switzerland on the subject of all-ceramic crowns and bridges as well as the use and processing of feldspar ceramics with the inLab System 3D.
Since 2002 he has been trainer in numerous practical courses on the subject of digital photography with cameras made by Nikon. Since 2003 cooperation with the University of Zurich: Clinic for fixed and removable prosthodontics (Prof. Ch. Hämmerle)
Since 2004 research laboratory for the University of Freiburg (Dept. Prof. Strub).
Email: lombardi@swissonline.ch

Veneers made from
VITABLOCS® for CEREC®/inLab®

Clinical and dental-technical guide
by A. Devigus und G. Lombardi

Table of contents

VITA All-Ceramics – Indication table

	Oxide ceramic					Fine-structure feldspar	
	Infiltration ceramic			Sinter ceramic			
	VITA In-Ceram SPINELL	VITA In-Ceram ALUMINA	VITA In-Ceram ZIRCONIA	VITA In-Ceram AL	VITA In-Ceram YZ	VITABLOCS Mark II	VITABLOCS TriLuxe
	–	–	–	●	●	–	–
	○	–	–	–	–	●	○
	○	–	–	–	–	●	●
	–	–	–	–	–	●	●
	–	–	–	–	–	●	●
	●	●	○	●	●	●	●
	–	●	●	●	●	–	–
 *	–	–	–	–	●	–	–
	○	●	●	●	●	●	●
	–	–	●	–	●	–	–
 *	–	–	–	–	●	–	–
VENEERING MATERIAL	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 7	VITA VM 9	VITA VM 9**	VITA VM 9**

● recommended ○ possible * maximum width: 2 pontics ** only for individualization

All-ceramic veneers – an aesthetic restoration type

Ceramic veneers are regarded as durable and aesthetic restorations. For this restoration type two thin shells are bonded to minimally prepared teeth (enamel and/or dentine) using a bonding composite. Two adhesive layers between composite and etched ceramic composite and tooth surface are obtained. This type of adhesive bonding of a ceramic veneer can be compared to a ceramic tile. The mechanical properties (stress is minimized) and the micro-structure of the intact tooth can be restored. This concept is also referred to as "biomimetics".

Composite materials are also used for the fabrication of direct or indirect veneers. Normally, they are less expensive than ceramic veneers and allow similar, highly aesthetic results over a short term. Over longer periods, however, the reliability and aesthetics of composite veneers decrease owing to discoloration, fractures and loss of surface structure and brilliance. A clinical study showed that after 2 years, 20% of composite veneers failed and there were no failure of ceramic veneers.

First publications which document the clinical use of adhesively bonded ceramic veneers date back to the early 80s. Bonding between tooth surface and ceramic is strong enough to ensure durable restorations.

The use of modern adhesive systems also allows bonding between less retentive cervical enamel and exposed dentine with the ceramic in use. The etched ceramic surface is even more retentive than the etched tooth surface.

This guide for dentists and dental technicians intends to give you an understanding of the fascinating world of veneers. The authors do not claim that this brochure includes all technically relevant information. Development in dentistry is influenced by various concepts and ideas.

Indications for the use of veneers

- Minor discoloration e.g. by tetracycline, fluorosis or decalcification (see fig. 1 and 2)
- Extending or recontouring several teeth
- Diastema closure (see fig. 3)
- Abrasion, superficial changes (see fig. 1)
- Multiple composite restorations on the facial surfaces

Contraindications

- Major tetracycline discoloration (see fig. 4)
- Twisted teeth
- Extremely malaligned teeth (distinctive labial position)
- Insufficient oral hygiene and/or active periodontitis
- Refusal of patient to having teeth ground
- Bruxism (extreme parafunction, see fig. 5)

= Indication
= Contraindication

Veneers made from VITABLOCS® for CEREC®/inLab®

With the CEREC inLab system veneers can be milled and, if desired, individualized and completed directly (in a single appointment) or indirectly (on a model) and integrated using the adhesive technique. The current software allows veneers with the help of a database and the correlation (method of copying) and replication mode (mirroring of a tooth).

Direct method

- Diagnosis/indication
- Preparation of the tooth
- Application of the CEREC LIQUID / POWDER
- Optical measuring
- Designing the veneer (CAD)
- Inserting VITABLOCS
- Milling (CAM)
- Checking the fit
- Optimizing the anatomical shape

Indirect method

- Preparation of the tooth
- Impression
- Preparing the scan model
- Wax-up
- Scanning / designing the veneer (CAD)
- Inserting VITABLOCS
- Milling (CAM)
- Checking the fit
- Optimizing the anatomical shape
- Reduction
- Characterization
- Firing
- Control
- Glaze firing / mechanical polishing

Adhesive integration

Examination/clarification

- Essential preconditions are adequate oral hygiene and a healthy periodontium. Carious lesions must be treated first. The occlusal conditions should be checked. Study models and photos for case planning provide useful help for this purpose.
- A wax-up and silicone keys support the diagnosis and clinical implementation (defect-oriented preparation).
- Bleaching (external or internal) may be considered for discolored teeth. After bleaching, wait approx. 3 weeks before integrating the veneers. Teeth may darken during this period and enamel and dentine are ready for the application of the adhesive technique.

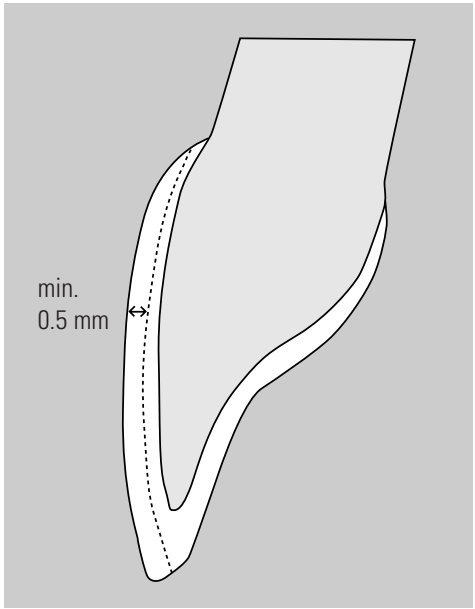
Shade selection

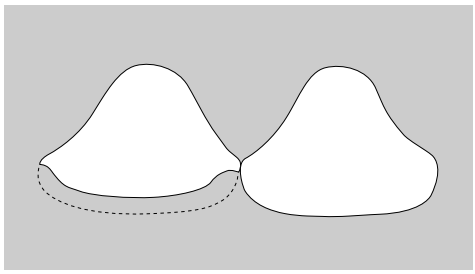
1. The shade should be selected prior to the preparation.
2. A photo of the teeth with a VITA SYSTEM 3D-MASTER sample tooth held in front of it may be a useful reference. Digital measuring systems (e.g. VITA Easyshade) can support the selection of the shade.
3. Light shades such as 1M1 or 1M2 should be preferred if several teeth need to be restored.
   Darkening light veneers is easier than brightening dark veneers.
4. A somewhat darker shade should be selected for cuspids and the cervical areas to achieve a natural appearance.
5. The opacity of the ceramic should be determined after the preparation (especially for teeth with intrinsic discoloration).

Preparation

- Correct preparation is the decisive factor for clinical success. The use of ceramic as restorative material allows defect-oriented preparation (hybrid preparation). It should be repeatedly checked visually using the silicone keys prepared for the diagnosis (see fig. on page 8).

- The control of the preparation and the use of a spacer during the fabrication in the laboratory ensure perfect control of the thickness of the ceramic and the subsequent adhesive joint. A uniform thickness of the composite during the adhesive use – together with the ceramic – results in a perfect biomechanical restoration of the tooth.



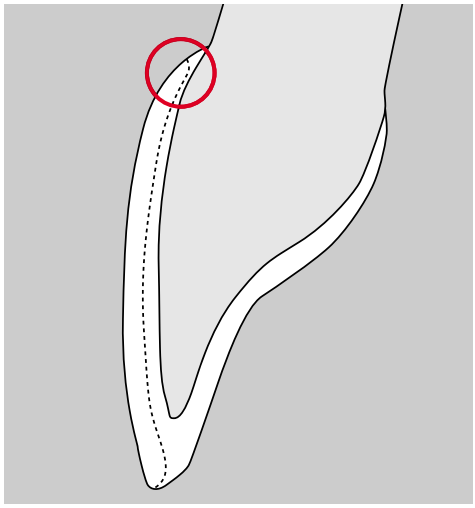


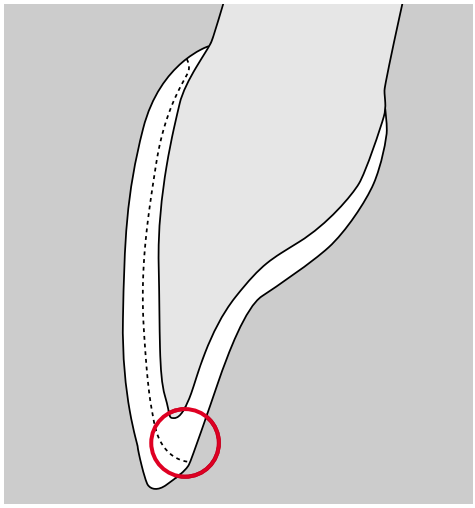
- **The individual steps of the preparation are:**

1. Gingival reduction. First prepare a small chamfer slightly above or on the level of the gingiva (for seriously discolored teeth slighty subgingival chamfer may be required). The enamel is very thin in this area. The preparation depth may be 0.3 to 0.5 mm in these areas. A chamfer diamond instrument should be used.

2. Enlarge the preparation into the area of contacts without removing them. The contact areas are only integrated into the preparation in case of diastema closure. In these areas follow the approximal contour of the gingiva.

3. Then grooves are prepared in the facial surface (approx. 0.5 to 1.0 mm depending on the degree of discoloration and the correction required). Alternatively, recesses (for diagnostic purposes) can be prepared using a diamond-coated round bur. The preparation should be checked repeatedly using a silicone key.





4. The labial surface can be prepared using the same chamfer-shaped diamond instrument. Anatomic reduction based on the information from the wax-up and the initial situation is the target of the preparation. Undercuts and sharp edges should be avoided. Exposed gingiva areas can be desensitized (e.g. Gluma Desensitizer, Heraeus Kulzer) or sealed using a light-curing adhesive.

5. It is not necessary to integrate a palatal/lingual shoulder in the incisal to increase the stability. If the length of the teeth is not changed, a chamfer can be prepared (fig. 1). If the teeth are to be extended, slight shortening (reduction) (fig. 2) may be useful. Check the occlusion. If possible, the transition zones of ceramic/enamel should not be in the contact area.

6. Use Interdental Strips, e.g. Compo-Strips (Premier), Sof-Lex Strips (3M Espe), Enhance Strips (Dentsply) or VisionFlex Diamond Strips (Brasseler) to "open" the contact areas slightly to allow placement of a thin metal matrix (0.05 mm) for adhesive cementation.

7. The facial surface of the preparation can be smoothed using diamond finishers or rubber polishers.
   Attention: Do not polish the preparation margins.

Note on limiting factors:

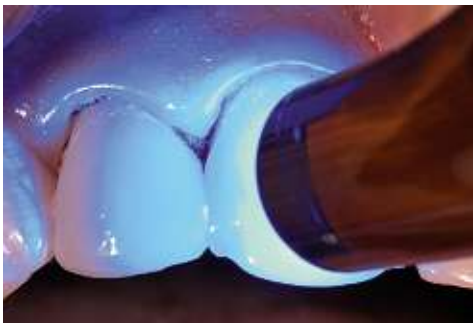
In the CEREC 3 and inLab system the grinding tools used represent a limiting factor.

Impression for the indirect technique

- In most cases it is not necessary to place a retraction cord. If, however, a retraction cord is placed, this should be done after the preparation.
- Take an impression of the entire jaw using a polyvinyl siloxane (Imprint II, 3MEspe; Aquasil LV, Dentsply/Caulk; Take 1, KerrHawe; Affinis, Coltène/Whaledent) or a polyether material (Permadyne or Impregum, 3MEspe).
- In case of uncertain occlusal conditions, a bite registration device can be prepared.

Information about the indirect technique:

When using the indirect technique, only an optical impression in the patient's mouth is taken using the 3D camera. For this purpose the tooth surface must be coated (optical contrast) with titanium oxide powder (VITA CEREC POWDER).



Temporary restorations – indirect technique

Depending on the clinical situation,
the 3 following possibilities are available:
1. No temporary restoration
2. Simple temporary composite restoration
3. Individual temporary restoration, produced with a silicone key

Functional and aesthetically appealing temporary restorations can be used for diagnostic purposes and as an aid for the final veneer.

1. In case of small preparation depth, a temporary restoration can be omitted. Temporary cements are quite difficult to remove from the surface and may affect adhesion of the final restoration.

2. A microfiller composite (e.g. Filtek A110 or Silux Z250 or Filtec Suprem Plus, 3MEspe; Tetric, Ivoclar Vivadent; Durafill VS, Heraeus Kulzer; etc.) can be used for direct modelling of direct composite veneers on the tooth and spot-wise adhesive cementation. We prefer this method (see fig.) for a limited period of wearing.

3. A transparent thermoforming material is also suitable for the fabrication of temporary restorations.

- The shape and texture of the diagnostic wax-up can be precisely transferred to the preparation.
- Soft tissue is protected.
- An arbitrary number of temporary restorations can be fabricated (e.g. in case of loss of a temporary restoration).
- The fabrication process is simple and requires little time.

Note:

Temporary restorations are not required when using the direct technique.

Communication with the laboratory/technician

- Photos of the prepared teeth
- Determination of the opacity of the ceramic
- Determination of the shade and type of characterization
- Description of the veneer length (silicone key) and the preparation borders (identification on the model)
- Description of the surface anatomy (texture)

1. Take a photo of the tooth to be prepared using a shade sample as a reference. Digital cameras are perfectly suited and simplify communication with the laboratory.

2. Determine the required opacity of the ceramic. It is defined by the color of the tooth to be prepared.

3. Inform the laboratory about the shade you have selected for the final restoration (veneer). Do not forget to describe the shade of the prepared teeth as well.
   Take a photo or make a drawing of the distinctive features such as discolored areas.
   Digital measuring systems (e.g. VITA Easyshade) can support shade matching.

4. Describe the length and location of the preparation margin.

5. Describe the surface structure and other distinctive anatomical features.

Note:

Communication with the technician is also recommended for direct individualization in the practice.

Model fabrication – indirect technique

- All type IV stones are suitable for model fabrication.
  When using the CEREC camera or the laser scanner of the inLab system, an agent which increases the contrast (VITA CEREC POWDER or Scan Spray, Dentaco) must be applied on the preparation.

- For specific use in the CAD/CAM technology the CAM-Base super-hard stone (Dentona) was developed. Thanks to its optical properties, surface coating with CEREC POWDER is omitted.

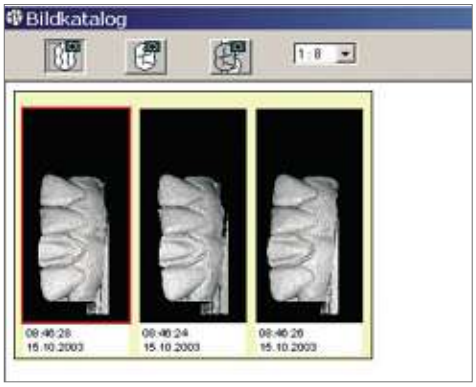
- Fix and align the scan model in the CEREC scan holder.
  Do **not** block out master and scan model!
  Do **not** use spacer varnish!

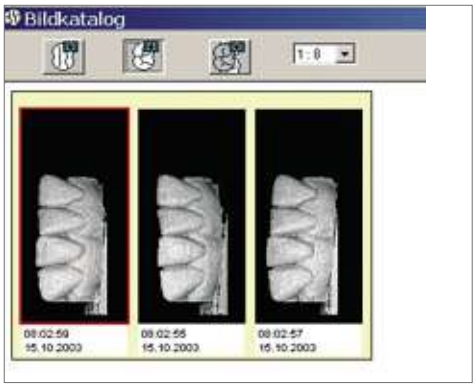
- Insert the scan model in the CEREC grinding device and fix with the screw.
- In a second process, the wax-up (occlusion) is scanned.

Direct technique

Optical impression (digital capturing) with the CEREC 3 camera.

Computerized design – direct and indirect method





The two scanning processes take approx. 22 minutes (18 minutes for the preparation and 4 minutes for the occlusion).

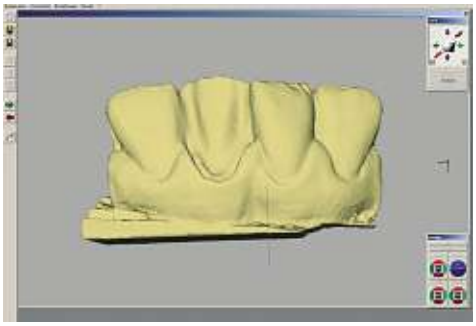
In this time the model is captured from three different angles. Scanned data are shown on the monitor as contrast pictures in the catalogue of the CEREC 3D software.

The upper screenshot shows three photos of the preparation and the lower one shows three photos of the occlusion from different angles.

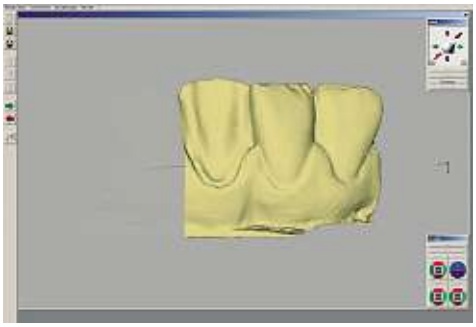
Since 2005 the scan process can be sped up significantly using Sirona's inEos scanner with its extremely short scanning times ranging from 10 sec for scans of single teeth and 45 sec for scans of full jaw models.

Important information:

Since the software is continuously updated, these instructions only refer to software version dated end of 2003. For detailed instructions on designing please read the current inLab and CEREC 3 manual.



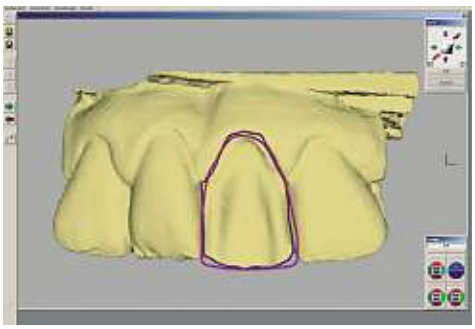
- 3D picture of the scanned and exposed preparation.



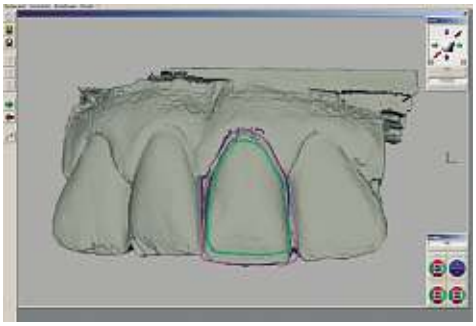
- "Virtual sawcut model" Creating the distal cut.

- Creating the mesial cut.

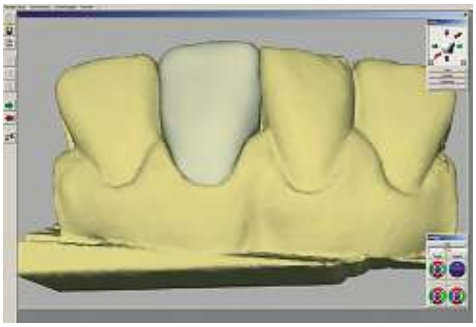
- Drawing in the preparation border, supported by the automatic edge detector.



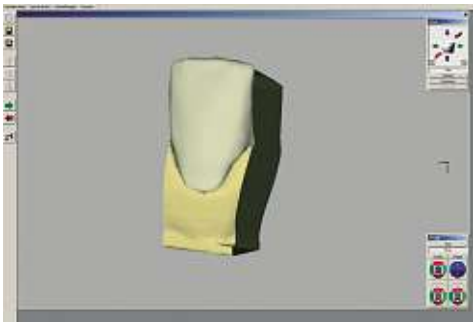
- Suggestion for the equator which can be edited (changed).



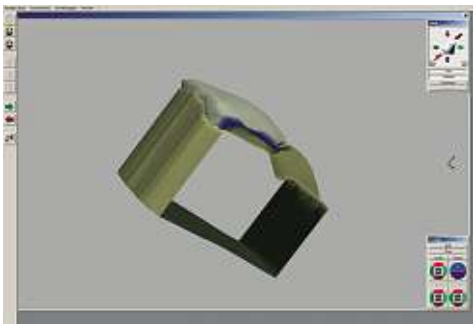
- Shows the scanned wax-up and initial situation. It serves as "correlation area".



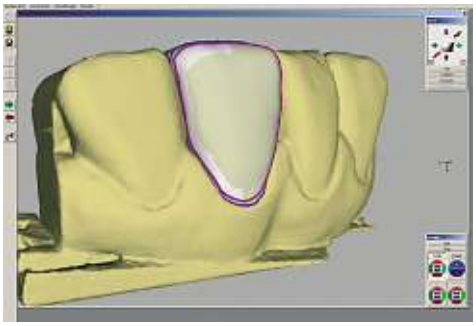
- A design suggestion is calculated and shown on the monitor.



- The designed veneers with adjacent teeth being hidden.

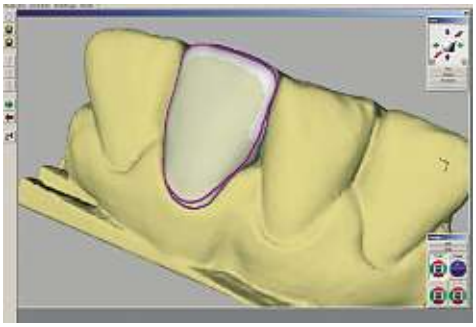


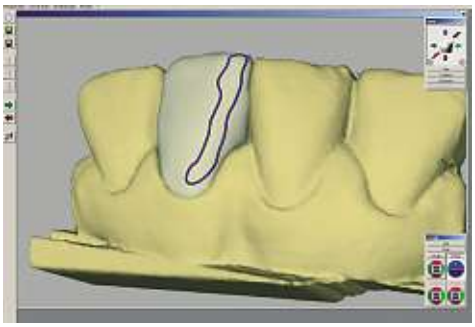
- Rotating in all directions to give you fine visualization results.



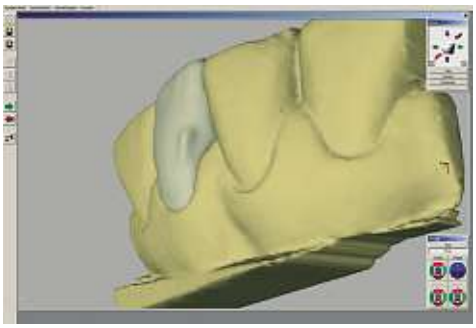
Freeform tools

- "Scale tool"
  This tool allows enlarging or reducing highlighted areas (e.g. approximal contact).

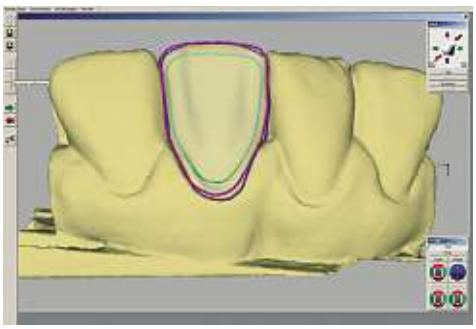




- "Shape tool"
  This tool is used to highlight and modify lines or surfaces.

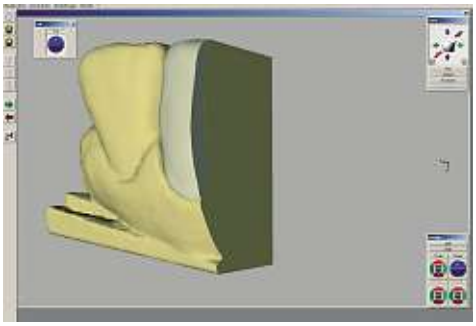


- "Drop Tool"
  This tool corresponds to a virtual "drop of wax" which can be applied or removed.

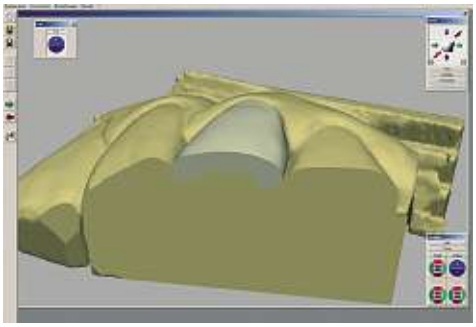


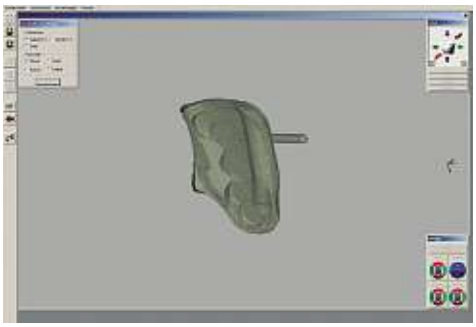
- "Edit Tool"
  Semi-tansparent view of the design is also possible for enhanced visualization.

These tools allow the ability to individually modify surfaces and lines within the 3D design.

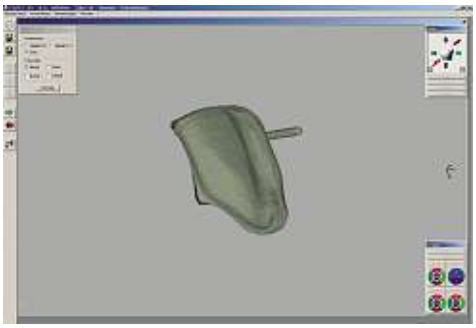


- "Cut Window"
  In the cut window you can easily move through the restoration (similar to a tomogram). Areas which are too thin can be perfectly recognized.

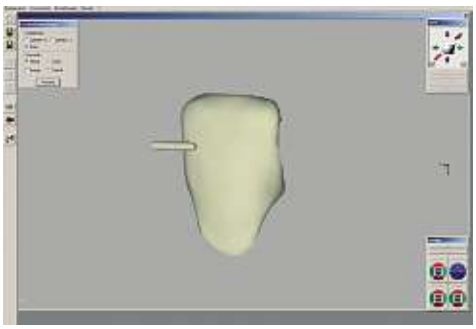




- "Milling preview"
  Provides a preview of the milling result.
  The difference between the standard and the "Endo" mode can be clearly recognized.



- In the "Endo" mode the inner surface is additionally milled with the conical diamond tool. The bearing area will then be finer.



Note:

The "Endo" mode should always be selected for veneers.

VITA **VM®9** Indication and properties

VITA VM 9 is a fine-particle ceramic for veneering bridge and crown frameworks made of yttria-stabilized zirconium dioxide (Y-ZrO_2) with a CTE of approx. 10.5 · 10^{-6} K^{-1}, such as e.g. VITA In-Ceram 2000 YZ CUBES for inLab.

The VITA VM 9 materials excel by their refraction and reflection similar to natural enamel. The use of the fluorescent and opalescent additional materials enhances the esthetic results. Please observe the information in the corresponding working instructions (No. 1190E).

The use of the VITA VM 9 materials also allows individualizing milled restorations made from **fine-structure feldspar ceramic blocks** with a CTE (20-500 °C) of approx. 9.3 · 10^{-6} K^{-1} for the CEREC and inLab CAD/CAM system.

- VITABLOCS Mark II for CEREC/inLab
- VITABLOCS ESTHETIC LINE for CEREC/inLab
- VITABLOCS TriLuxe for CEREC/inLab

For this purpose the VITA VM 9 ESTHETIC KIT for VITABLOCS for CEREC (Order No. BV9EKC) containing a special selection of VITA VM 9 materials as well as accessories is available.

Since both the basic ceramic material as well as the veneering material exhibit a fine-particle structure, VITABLOCS restorations individualized with VITA VM 9 veneering material offer exceptional protection of opposing teeth.

VITA**VM®**9 – **Physical properties**	Unit of measure	Value*
CTE (25-500°C) – dentine	10^{-6} K^{-1}	8.8 - 9.2
Transformation point – dentine	°C	approx. 600
Softening point – dentine	°C	approx. 670
Solubility in acids – dentine	mg/cm^2	approx. 10
Average particle size – dentine	mm (d_{50})	approx. 18
Flexural strength	MPa	approx. 100
* Measurements performed by VITA Zahnfabrik		

Contraindication

VITA VM 9 must not be used for direct veneers on copings made from VITABLOCS.

Alternatives for direct technique for veneers made from VITABLOCS

- No characterization, only polishing of the ceramic surface
- External individual characterization with ceramic stains (external staining) and/or layered ceramic
- Individual characterization of the inner surface with colored bonder materials (internal staining)

Pretreatment

- Veneer immediately after the grinding process on the working model.
- Labial view.

- Incisal view with lug.

- The lug is removed with a diamond-coated tool. Any premature contacts are ground off carefully from the inner side of the veneer. The mesial and distal contacts are checked.

Important information:

Since grinding of sintered dental ceramic products produces dust, always wear a face mask or grind when wet. Additionally, use an extraction unit and work behind a protective screen.

Restorations made from VITABLOCS fine-structure feldspar ceramic must not be reworked using tungsten carbide tools since they produce microcracks and damage the ceramic.

Use only fine-grained (4 µm) diamond abrasive tools for contouring and diamond finishers (8 µm) for prepolishing. When reworking, exert only limited pressure and cool with water (wet grinding system).

VITA SHADING PASTE
Assortment for VITABLOCS for CEREC 3D-MASTER. Fluorescent stain pastes for incividualizing and characterizing.

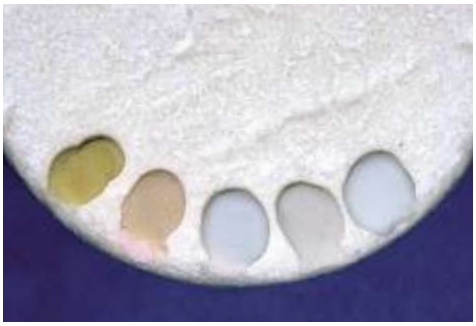
Characterization

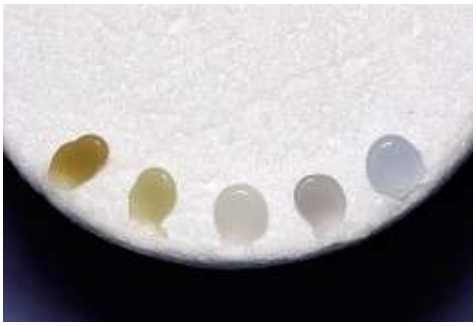
- The thickness of the entire buccal surface of the milled veneer is reduced. It serves as a "substrate" for the VITA VM 9 veneering material.
- The minimum thickness of the "substrate shell" is at least 0.5 mm to avoid distortion during the firing process.
- Remove grinding particles from the veneer with steam or alcohol. Fix on the working model with organic transparent wax.
- Veneer after anatomic reduction and immediately after machine milling.
- VITA VM 9 ESTHETIC KIT
  for VITABLOCS for CEREC for individualizing and characterizing milled restorations made from VITABLOCS for CEREC.

Important information:

Before applying the VITA VM 9 materials, modelling liquid (VITAVM MODELLING LIQUID) should be applied to the milled restorations to achieve adequate wetting. Noncompliance will result in the fact that the ceramic material will come off the basic structure.

VITA Shading Paste stains can not only be used for external characterization of restorations made from VITABLOCS. After the reduction of the substructure, stains can be integrated into fissures and mamelon structures (see firing chart) before starting actual layering with VITA VM 9 materials. Enhanced shade effect from the depth is achieved especially in cases of limited space.





- Desired shade effects can be assessed more easily by fabricating firing samples with thin margins using preselected VITA VM 9 materials.

Important information:

Perfect adaptation of the tooth shade to the shade indicator (tab) with VITA VM 9 veneering material is only possible at a minimum layer thickness of 1 mm.

- Use internal fluorescent materials to veneer thin veneers. Accordingly, the thin ceramic layers are perfectly adapted to the shade of the shade indicator. After veneering, the thickness of the completed veneer is 0.7 to 1.0 mm depending on the preparation depth.
- VITA VM 9 materials are only applied to the labial side. The basic material of the VITABLOCS on the palatal side is not covered.

- Shade contrasts and fluorescent effects can be achieved with the VITA VM 9 BASE DENTINE*, DENTINE* and INTERNO materials. The Interno materials 2* and 4* are particularly suitable for the cervical and approximal areas.
- Depending on the chroma, mamelons are reproduced using a mixture of MAMELON and EFFECT CHROMA materials.

- The Interno* materials can be mixed will all dentine and enamel materials or diluted and used as internal stains.

* Materials not included in the VITA VM 9 ESTHETIC KIT.

VITA INTERNO
assortment with materials for the reproduction of anomalies in the interior of the tooth

Recommended firing of VITA VM 9 in the VITA VACUMAT

Predr. temp. °C	→ min.	↗ min.	↗ °C/min	Temp. approx.°C	→ min.	VAC min.
500	6.00	7.43	55	925	1.00	7.43

- VITA VACUMAT for firing the VITA VM 9 veneering material.

- Veneer after first firing. If certain areas were characterized excessively, they can be reduced using diamond-coated abrasive tools.

Important information:
Since grinding of sintered dental ceramic products produces dust, always wear a face mask or grind when wet. Additionally, use an extraction unit and work behind a protective screen.

- Try-in of the bisque bake in situ using Vaseline for fixation.

- The tooth body is shaped with dentine. In the cervical area a mixture of EFECT CHROMA and EFFECT ENAMEL is produced and the contour is shaped. Depending on the desired translucency, the incisal edge is built up with ENAMEL and EFFECT OPAL.

- Second firing is also carried out under vacuum.

Recommended firing of VITA VM 9 for second firing in the VITA VACUMAT

Predr. temp.	→ min.	↗ min.	↗ °C/min	Temp. approx. °C	→ min.	VAC min.
500	6.00	7.40	55	922	1.00	7.40

- Result after second firing.

- Silver powder is used to analyze the shape and surface structure, which can be optimized by grinding.

Surface individualization with stains and glaze firing

- Perform glaze and stain firing with VITA Akzent or SHADING PASTE stains according to the table on page 27.
- To achieve uniform luster, the surface should be smoothed with a rubber polisher.
- Prior to individualizing the shade and glazing, clean the restoration carefully with a steam cleaning unit.
- Apply glaze material, e.g VITA Akzent Glaze thinly, see left fig.

Recommended firing – glaze firing with VITA Akzent in the VITA VACUMAT

Predr. temp.	→ min.	↗ min.	↗ °C/min	Temp. approx.°C	→ min.	VAC min.
500	4.00	7.27	55	910	1.00	0.00

- The completed, glazed veneer on the working model.
- Instead of glaze firing, mechanical polishing (e.g. Dia-Glace, Yeti; Karat Diamond Polishing Paste, VITA) can be performed.

- Longitudinal section through a VITABLOC Mark II veneer individualized with VITA VM 9.

Survey of recommended firing programs for characterizing veneers made from VITABLOCS in the VITA VACUMAT®

	Vt °C	→ min.	↗ min.	↗ °C/min	ca. Temp. °C	→ min.	VAC min.
Stains-fixation firing of VITA SHADING PASTE or Akzent	500	4.00	5.00	76	880	0.30	0.00
1. firing (dentine firing)	500	6.00	7.43	55	925	1.00	7.43
2. firing (correction firing)	500	6.00	7.40	55	922	1.00	7.40
Glaze firing with VITA Akzent glaze	500	4.00	7.27	55	910	1.00	0.00
Glaze firing with VITA Akzent finishing agent	500	4.00	7.27	55	910	1.00	0.00
Glaze firing with VITA SHADING PASTE "glaze"	500	4.00	7.16	55	900	1.00	0.00
Correction firing with CORRECTIVE	500	4.00	7.05	55	890	1.00	7.05

Important information

When using dental ceramic, the firing result largely depends on the individual firing procedure of the user, i.e. among other aspects the type of furnace, the location of the temperature sensor, the firing tray as well as the size of the workpiece during the firing cycles.
Our recommendations with regard to practical applications (regardless of whether they have been provided orally, in writing or in the form of practical instructions) are based on numerous own experiences and tests. The user, however, should consider this information only as a general guideline. If surface, transparency and degree of gloss should not correspond to the firing result that is achieved under optimal conditions, the firing procedure must be adjusted correspondingly. The firing temperature displayed by the furnace is not decisive for the firing procedure, but the appearance and the surface condition of the firing object after the firing process.

- Veneers can also be characterized individually by applying stains (external) or composite stains (internal) (= colored adhesives; Coltène Whaledent or Ivoclar Vivadent). Teeth without highly transclucent areas and with minor internal changes (see fig. 1) are particularly suitable.

- Surface discoloration can be reproduced with ceramic stains.

  Cave: A layer of stain which is too thick inhibits the penetration of light and hence results in an unnatural appearance.

- 2 different systems are available for characterizing with ceramic stains:

VITA SHADING PASTE. Assortment containing
8 fluorescent stain pastes for simple surface invividualization:
- premixed
- simple application
- reduced assortment of shades
- suitable for numerous cases

VITA Akzent assortment containing 20 fluorescent stain powders for surface individualization:
- needs to be mixed with stain fluid to obtain the desired consistency
- wider range of shades

Step by step procedure

- Veneer made from a VITABLOC immediately after milling.
  The lug is cut off using a diamond grinding tool.

- If required, the veneer is fitted on the model.
  Fine diamond polishers are suitable for finishing.

- To check shape and surface, a metal powder can be applied.

- Grinding particles are removed from the finished
  veneers using steam or alcohol. Then the veneer is degreased.
  Use diamond-coated tweezers to hold the veneer.

- The selected Akzent stain and Akzent Finishing Agent
  are mixed to obtain the desired consistency.

- A thin transparent layer of stain is applied to the veneer beginning from the approximal surfaces (fig. 1).

- The incisal surface is only wetted with Finishing Agent (fig. 2). A distinctive incisal edge effect can be achieved through the use of Akzent No. 13 and 17. Additional shade characteristics can be imitated with suitable stain mixtures. When reproducing fine structures such as enamel cracks, the Akzent stains should not be mixed with Finishing Agent to avoid running of stains. A comparison with a shade sample (tab) from the VITA SYSTEM 3D-MASTER toothguide is used to check the result.

- The characterized veneer is placed on a firing tray and fired in the VITA VACUMAT or ATMOMAT. Firing under vacuum is not required for glazing. Fig. 3 shows the veneer after the first firing.

- In the next step glaze material (VITA Akzent Glaze) is applied in a highly liquid consistency (fig. 4). Minor shade corrections can be integrated into the glaze material during the application.

- Additionally, mechanical polishing of the glazed veneer (fig. 5) is possible. For this purpose, e.g. Dia-Glaze (Yeti) or Karat diamond polishing paste (VITA) can be used.

Survery of recommended firing programs for surface characterization of veneers made from VITABLOCS® in the VITA VACUMAT® or VITA ATMOMAT®

	Predr. temp.	→ min.	↗ min.	↗ °C/min	Temp. approx.°C	→ min.	VAC min.
Stains firing	500	3.00	8.26	50	922	1.00	0.00
1. glaze firing with Akzent or SHADING PASTE "glaze"	500	3.00	8.21	50	918	1.00	0.00
2. glaze firing with Akzent or SHADING PASTE "glaze"	500	3.00	8.21	50	918	1.00	0.00

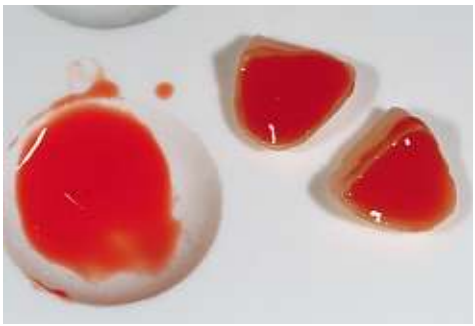
- For firing ceramic stains the VITA VACUMAT or the VITA ATMOMAT are suitable.
- The use of VITA VM 9 neutral material and Finishing Agent allows minor corrections such as approximal contacts. This correction firing process can also be carried out without vacuum.
- Increased translucency from the depth can be achieved in the incisal area through the use of VITABLOCS TriLuxe. Natural nuances within the restoration can already be recognized prior to characterizing with ceramic stains. Excessive application of stains inhibits the penetration of light and results in an unnatural appearance of the veneer already during the try-in.

Try-in and integration of the veneer – direct and indirect method

- The individualized veneer is tried in the patient's mouth. Vaseline or a glycerol gel are suitable contrast agents and should be used since the air between the ceramic and the tooth surface may influence the optical properties and thus the color impression.

- When using the direct method, the tooth is dried during the try-in. As a consequence the veneer appears somewhat too dark. In the direct method color adaptation is more difficult than in the indirect technique.

Conditioning the ceramic



- The inner surface of the veneer is cleaned in the laboratory (alcohol is used for degreasing). Prior to the integration, the inner surface is etched with 5 % hydrofluoric acid (e.g. with VITA CERAMICS ETCH) for 60 sec. Then the veneer is sprayed with water for 20 sec. After drying with air, the etched inner surface reveals a whitish opaque shade (indicates uniform etching).

- Then a silanizing liquid (e.g. VITASIL, VITA; Monobond S, Ivoclar Vivadent) is applied and remains on the ceramic surface for 60 sec. There are authors who use a hairdryer to dry (hot air) the ceramic subsequently.

- The veneer is ready for adhesive cementation (luting).

Adhesive cementation

- The teeth form the second "adhesive surface" in the ceramic-tooth bond. For adhesive cementation (luting) a rubber dam may be placed to dry the preparation area (not always required).
  Placing a retraction cord may be useful depending on the location of the preparation margin.

- Teeth must be carefully cleaned before and after the try-in. Residues of water-soluble try-in gels or temporary cements should be removed.

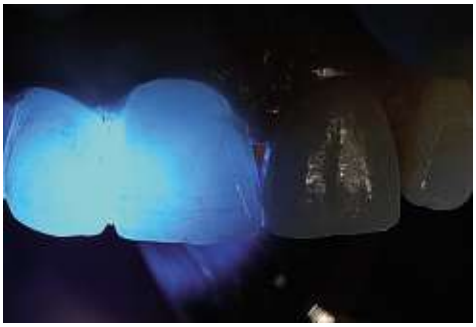
Conditioning enamel/dentine

- The prepared enamel surfaces are etched with 35-37% phosphoric acid for 30 sec. When using Syntac Classic, the dentine surface can be conditioned using phosphoric acid. Then spray with water for 10-15 sec.

- The dentine adhesive is applied using a brush or a microbrush according to the manufacturer's instructions.

Tips

Dual-hardening composite cements contain amines which reveal a darker yellow shade after hardening! A light-curing composite should be used for adhesive cementation of thin veneers. A microbrush glued to the veneer using a light-curing bonding material can be used as a retention tool.
Fixing the veneer with the finger allows more uniform distribution of pressure during the adhesive cementation.



Application of the "adhesive cement"

- A light-curing (restorative) composite is perfectly suited for adhesive cementation of the veneer. To increase the flow, the composite can be heated up to approx. 50 degrees. A special heater is available for this purpose (Calset, AdDent – USA).
- The composite is applied to the prepared tooth surface and spread thinly using a spatula.
- A glycerol gel can be used to avoid O_2-inhibition. Alternatively, a slight excess of gel can be applied which is removed during finishing.
- The veneer is placed and positioned exerting slight pressure with the finger. Excess composite which oozes out can be carefully removed using a probe wetted with adhesive. Hardening is performed using a polymerization lamp; start from the palatal side and continue from the buccal side (60 sec each).

Finishing

- Finishing is performed immediately after the composite has hardened. Discs, interdental strips and fine diamond tools are used for finishing.
- Finally, the teeth are fluoridated.

Clinical examples

Case 1:

All-ceramic veneer made from a VITABLOC Mark II (shade 2M2C) on tooth no. 31:
Computerized design using the CEREC 3D software, direct method with individual characterization with VITA VM 9 veneering material.

1. Initial situation
2. After the preparation
3. Try-in of the milled blank
4. Situation immediately after adhesive cementation

Case 2:

All-ceramic veneers made from VITABLOCS Mark II, shade 2M2C on teeth no. 12 and 11.
Indirect method with individual characterization with VITA VM 9 veneering material.

1. Initial situation with retraction cord in situ
2. Preparation of teeth no. 12 resp. 11
3. Prior to adhesive cementation
4. After finishing and polishing

Case 3:

All-ceramic veneers made from VITABLOCS Mark II, shade 1M2C on teeth no. 11 and 21.
Direct method with individual characterization with VITA VM 9 veneering material.

1. Insufficient composite build-ups (after accident)
2. Preparation of teeth no. 11 resp. 21
3. Try-in of veneers
4. After finishing and polishing

Case 4:

All-ceramic veneers made from VITABLOCS Mark II, shade 2M3C on teeth no. 11 and 21.
Indirect method with individual characterization with VITA VM 9 veneering material.

1. Insufficient composite restorations
2. Try-in of veneers
3. Enamel etching with phosphoric acid
4. Completed restoration in situ

Case 5:

All-ceramic veneers made from VITABLOCS Mark II, shade 1M1C on teeth no. 11 and 21.
Indirect method with individual characterization with VITA Akzent stains.
Unprepared "additional veneer" on tooth no. 11.

1. Initial situation (fracture of tooth no. 21, accident)
2. Preparation of tooth no. 21 (tooth no. 11 unprepared!)
3. Try-in of veneers
4. Completed restoration after integration (Tetric flow)

Conclusion

Ceramic veneers offer patients various advantages with regard to aesthetics and durability of the restoration. Success is closely linked with the quality of the laboratory work and the precision and discipline employed in the diagnosis, preparation and integration technique of the dentist.

List of dentist materials

Preparation instruments: Intensive SA
Retraction cord: Ultradent
Cord packer: Deppeler
Impression materials: Affinis (Coltène Whaledent), Express Penta (3MEspe)
Glycerol gel for try-in: Johnson&Johnson
Matrixes and wedges: Hawe Dead Soft (KerrHawe)
Composite: Z250 (3MEspe)
Adhesive system: Syntac Classic (Ivoclar Vivadent)
Composite heater: Calset (AdDent, USA)

List of dental-technical materials

CAM-base stone (stone for scanning), Order. No. 55661 (Dentona)
Okklufine Premium scanning powder, Order No. 55300 (Laboshop)
Scan Wax for CEREC inLab, Order No. 5961185 (Sirona)
CEREC Cone-shaped Cylinder -Diamond 1.6 mm, Order No. 58 55 734 (Sirona)
CEREC Cylinder-Diamond 1.6 mm-long, Order No. 58 66193 (Sirona)
Paste (to check occlusion and contacts), Pasta rossa, 3 g, Order No. 72000200 (Anaxdent)
Diamond-coated abrasive tools (slightly tapered), Two Striper, Order No. XX775.10M (Intertrading-Dental AG)
Ceramic abrasives, green, wheel, CeraPro, Order No. 8003.150HP (Edenta)
Ceramic abrasives, green, cylinder, CeraPro, Order No. 8001.050HP (Edenta)
Diamond disc, Order No. 350.514.220HP (Edenta)
Diamond disc, Order No. 355.504.220HP (Edenta)
Prepolisher for ceramic, e-diapol red, medium, L26Dmf, Order No. 15501 (Intertrading-Dental AG)
Metal powder (Benzer Dental AG)

Ceramic materials for individualizing

VITA VM 9 ESTHETIC KIT for VITABLOCS for CEREC, Order No. BV9EKC
VITA Interno SET, Order No. BISET
VITA Akzent SET, Order No. BATSET
VITA SHADING PASTE assortment, Order No. ESPSET3D

Aboush YE. Removing saliva contamination from porcelain veneers before bonding.
J Prosthet Dent 1998; 80:649-653.

Aristidis GA, Dimitra B. Five-year clinical performance of porcelain laminate veneers.
Quintessence Int 2002 Mar;33(3):185-9

Barghi N, Chung K, Farshchian F, Berry T. Effects of the solvents on bond strength of resin bonded porcelain.
J Oral Rehabil 1999; 26:853-857.

Brunton PA, Wilson NH. Preparations for porcelain laminate veneers in general dental practice.
Br Dent J 1998 Jun 13;184(11):553-6

Castelnuovo J, Tjan AH, Phillips K, Nicholls JI, Kois JC Fracture load and mode of failure of ceramic veneers with different preparations. J Prosthet Dent 2000 Feb;83(2):171-80

Dumfahrt H, Gobel G. Bonding porcelain laminate veneer provisional restorations: An experimental study.
J Prosthet Dent 1999; 82:281-285.

Edelhoff D, Sorensen JA. Tooth structure removal associated with various preparation designs for anterior teeth.
J Prosthet Dent 2002 May;87(5):503-9

Friedman M. Multiple potential of etched porcelain laminate veneers.
J Am Dent Assoc 1987; Special Issue: 83E-87-E.

Garber DA, Goldstein RE, Feinman RA. Porcelain laminate veneers.
Quintessence Publishing Co., Chicago. Pages 36-44; 90-99.

Gross JS, Malcmacher LJ. Comparing porcelain laminate veneers to laboratory resin veneers - report of a case.
Trends & Tech Contemp Dent Lab 1988; 5:28-30.

Hahn P, Gustav M, Hellwig E. An in vitro assessment of the strength of porcelain veneers dependent on tooth preparation. J Oral Rehabil 2000 Dec;27(12):1024-9

Haywood VB, Heymann HO, Scurria MS. Effects of water, speed, and experimental instrumentation on finishing and polishing porcelain intraorally. Dent Mater 1989; 5:185-188.

Horn HR. A new lamination: porcelain bonded to enamel. N Y State Dent J 1983; 49:401-403.

Jardel V, Degrange M, Picard B, Derrien G. Correlation of topography to bond strength of etched ceramic.
Int J Prosthodont 1999; 12:59-64.

Lacy AM, Laluz J, Watanabe LG, Dellinges M. Effect of porcelain surface treatment on the bond to composite.
J Prosthet Dent 1988; 60:288-291.

Linden JJ, Swift EJ, Boyer DB, Davis BK. Photo-activation of resin cements through porcelain veneers.
J Dent Res 1991; 70:154-157.

Magne P, Douglas WH. Porcelain veneers: dentin bonding optimization and biomimetic recovery of the crown.
Int J Prosthodont 1999 Mar-Apr;12(2):111-21.

Magne P, Douglas WH. Interdental design of porcelain veneers in the presence of composite fillings:
finite element analysis of composite shrinkage and thermal stresses. Int J Prosthodont 2000 Mar-Apr;13(2):117-24

Magne P, Kwon KR, Belser UC, Hodges JS, Douglas WH. Crack propensity of porcelain laminate veneers: A simulated operatory evaluation. J Prosthet Dent 1999; 81:327-334.

Magne P, Perroud R, Hodges JS, Belser UC. Clinical performance of novel-design porcelain veneers for the recovery of coronal volume and length. Int J Periodontics Restorative Dent 2000 Oct;20(5):440-57

Magne P, Douglas WH. Additive contour of porcelain veneers: a key element in enamel preservation, adhesion, and esthetics for aging dentition. J Adhes Dent 1999 Spring;1(1):81-92

Magne P, Versluis A, Douglas WH. Effect of luting composite shrinkage and thermal loads on the stress distribution in porcelain laminate veneers. J Prosthet Dent 1999 Mar;81(3):335-44

Newburg R, Pameijer CH. Composite resin bonded to porcelain with a silane solution. J Am Dent Assoc 1978; 96:288-291.

Nixon R. Bonding technique for porcelain veneers. The Forum of Esthetic Dentistry 1985; 3: 1-11.

Peumans M, Van Meerbeek B, Yoshida Y, Lambrechts P, Vanherle G. Porcelain veneers bonded to tooth structure: an ultra-morphological FE-SEM examination of the adhesive interface. Dent Mater 1999;15:105-119.

Raigrodski AJ, Sadan A, Mendez AJ. Use of a customized rigid clear matrix for fabricating provisional veneers. J Esthet Dent 1999; 11:16-22.

Rochette A. Adhésion par polymères et traitement de surface en odonto-stomatologie. Actualités Odonto-Stomatologiques 1972; 98:175-232.

Rucker LM, Ritcher W, Macentee M, Richardson A. Porcelain and resin veneers clinically evalu-ated: 2-year results. J Am Dent Assoc 1990; 121:594-596

Sheth J, Jensen M, Tolliver D. Effect of surface treatment on etched porcelain and bond strength to enamel. Dent Mater 1988; 4:328-337.

Simonsen RJ, Calamia JR. Tensile bond strength of etched porcelain. J Dent Res 1983; 62:297, Abst. 1154.

Suh BI. All-Bond – Fourth generation dentin bonding system. J Esthet Dent 1991; 3:139-147.

Troedson M, Derand T. Effect of margin design, cement polymerization, and angle of loading on stress in porcelain veneers. J Prosthet Dent 1999; 82:518-524.

Walls AW, Steele JG, Wassell Crowns and other extra-coronal restorations: porcelain laminate veneers. Br Dent J 2002 Jul 27;193(2):73-6, 79-8229.

VITA Zahnfabrik is certified according to the
Medical Device Directive and the following products
bear the CE mark CE 0124

VITA**VM**®**9** VENEERING MATERIAL
VITABLOCS® **Mark II for CEREC**®
VITABLOCS® **ESTHETIC LINE for CEREC**®
VITABLOCS® **TriLuxe for CEREC**®
VITA SHADING PASTE
VITA Akzent®
VITA Interno®

CEREC® and inLab® are registered trademarks of
Sirona Dental Systems GmbH, Bensheim, Germany

The following product requires hazard label identification:

VITA CERAMICS ETCH

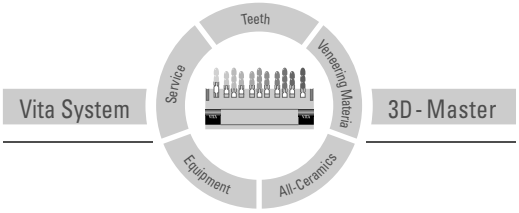
Toxic **Caustic**

For detailed information please refer to the safety data sheet.

We would like to thank **Dr. Alessandro Devigus, Bülach, Switzerland and Mr. Giordano Lombardi, dental technican, Zurich, Switzerland** for providing the photos and the text of this publication.

With the unique VITA SYSTEM 3D-MASTER
all natural tooth shades are systematically determined
and completely reproduced.

VITABLOCS and the VITA VM 9 veneering material are available
in the VITA SYSTEM 3D-MASTER shades.
Shade compatibility with all VITA 3D-MASTER materials is ensured.



Please note:
Our products should be used according to the working instructions. We cannot be held liable for damages resulting from incorrect handling or usage. The user is furthermore obliged to check the product before use with regard to its suitability for the intended area of applications.
We cannot accept any liability if the product is used in conjunction with porcelains and equipment from other manufacturers which are not compatible or not authorized for use with our product.
Furthermore, our liability for the correctness of this information is independent of the legal ground and, in as far as legally permissible, is limited to the invoiced value of the goods supplied excluding turnover tax. In particular, as far as legally permissible, we do not assume any liability for profit loss, for indirect damages, for consequential damages or for claims of third parties against the purchaser. Claims for damages based on fault liability (culpa in contrahendo, breach of contract, unlawful acts, etc.) can only be made in the case of intent or gross negligence.
The VITA Modulbox is not necessarily a component of the product.
Date of issue of these working instructions: 05-06

+J0171298E0

1298E - 0506 (5.) Sma

VITA

VITA Zahnfabrik H. Rauter GmbH & Co. KG
Postfach 1338 · D-79704 Bad Säckingen · Germany
Tel.: +49/7761/562-0 · Fax +49/7761/562-446
www.vita-zahnfabrik.com · info@vita-zahnfabrik.com