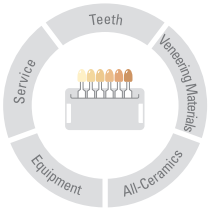
Concept and Documentation

VITA Rapid Layer Technology for CEREC® / inLab® MC XL

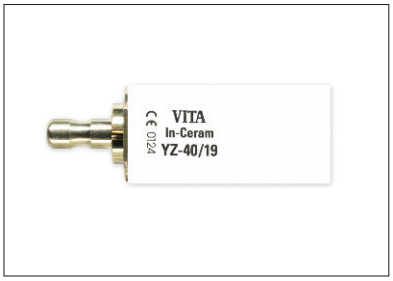
VITA shade taking | VITA shade communication | VITA shade reproduction | VITA shade control

Date of issue 12.10

VITA SYSTEM 3D-MASTER



VITA



I. The Concept

The VITA Rapid Layer Technology now allows the simple and efficient manufacture of fully anatomical bridge and crown restorations consisting of a CAD/CAM framework and veneer structure.

The VITA Rapid Layer Technology offers the laboratory / the dentist an entirely computer-assisted manufacturing procedure as a high-speed alternative to the traditional layering technique. The material properties of the framework and veneer structure (which are made of VITA oxide ceramic and feldspar ceramic) are perfectly matched, so that the reduced substructure provides optimum support to the monolithic veneer component.

This technology is based on an intelligent combination of the innovative Sirona inLab 3D software (≥ V 3.80) and the VITA zirconium dioxide and feldspar ceramics clinically proven millions of times over.

After scanning the anatomical situation before treatment intraorally or on the model, the innovative software enables the biogeneric virtual modelling of a fully anatomical crown as well as a multi-unit bridge restoration. The software then automatically calculates – within a few seconds – the milling data for substructure and veneer. These two components can then each be milled separately (from oxide ceramic and feldspar ceramic) by the dental technician or dentist in the CEREC / inLab MC XL milling unit.

In the final step the substructure and veneering structure are bonded to one another quickly and simply with adhesive composite (= adhesive/self-adhesive luting systems).

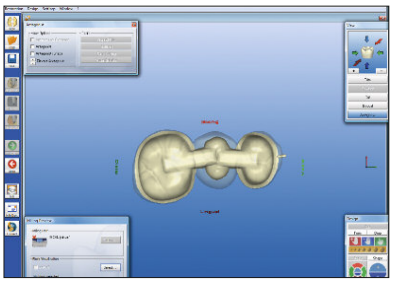
II. The Advantages

- **A great saving in time:** Compared to the classical manual layering technique, this innovative procedure brings many time advantages, since the framework and veneer structure are produced in an entirely computer-aided manufacturing process. With this technology, around 30 – 50 % of production time can be saved.

- **Easy bonding:** The primary and secondary structure can be bonded together quickly and securely using an adhesive composite. There is no need for complex and time-consuming soldering procedures. Furthermore, this also prevents the risks associated with incorrect firing cycles.

- **Tension-free bonding:** Tension-free bonding is guaranteed, since the framework and veneer are bonded together with adhesive composite. The possibility of electrical induction – e.g. due to differences in thermic behaviour (heat capacity / heat conduction) has thus been eliminated.

- **A high degree of processing safety:** A high degree of processing safety is guaranteed through fully computerised procedures. The veneer structure is completely homogeneous, as it consists of the CAD/CAM fabricated, industrially sintered, dense monolithic VITABLOCS silicate ceramic.

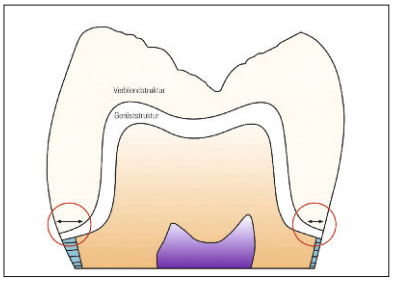


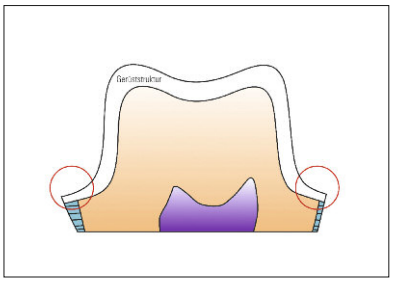
III. The design and construction

After adjusting the insertion axis, the software generates a fully anatomical, biogenerically calculated initial suggestion in the "Multilayer" design mode. This suggestion can be individually modified.

The design suggestion exhibits certain features which differ from the recommendations known from the classical layering technique; these are explained in the following.

To ensure perfect bonding between the CAD/CAM-fabricated framework and veneer structure, the software generates a conical framework design (without equator). As a result, the layer thicknesses of the ceramic veneer structure for anchor crowns and pontics can differ from one another. With this technique, however, this does not pose a problem.

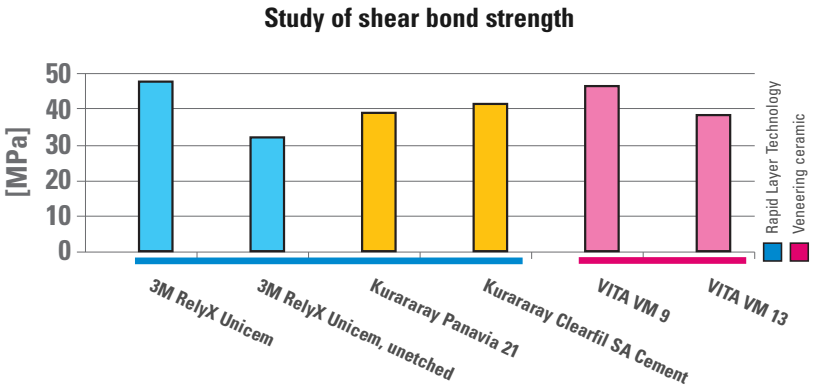




The VITA Rapid Layering Technique does not require that cuspal support be given by the zirconium dioxide framework. This is because the software generates an optimum "zirconium dioxide die" which is then bonded without tension to an industrially sintered, dense veneer structure made of silicate ceramic.
The material thickness of the veneer structure should be at least 1.5 mm in the cuspal areas, and 1.0 mm in the deepest fissure.

The ceramic shoulder margin of the zirconium oxide framework has the function of supporting the silicate ceramic veneer structure. The framework structure here takes on the function of a prepared tooth stump (= a shoulder with a circumferential chamfer or a rounded inner angle). Consequently, the tested and tried principles can be used for the design of silicate ceramic CAD/CAM restorations.

IV. The adhesive bond



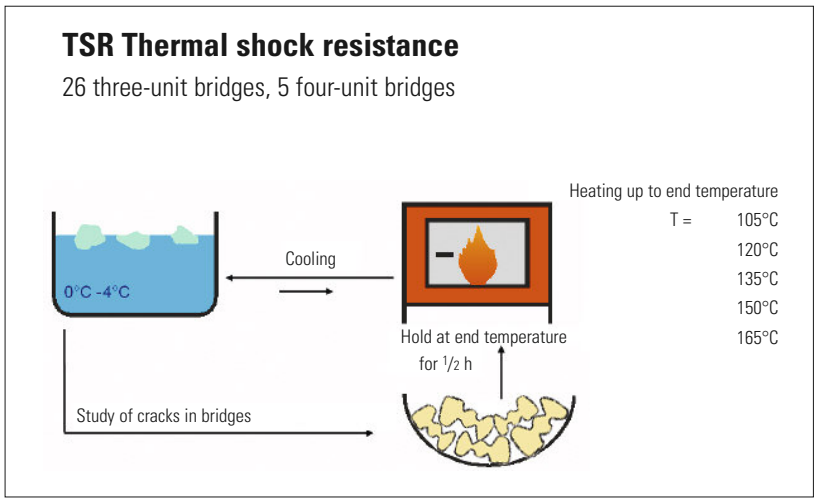
Source: In-house studies, VITA Zahnfabrik

Results

- Shearing tests carried out by VITA show that the bond strength values obtained for an adhesive bond between a zirconium dioxide framework structure and a silicate ceramic veneer structure are situated in the range of veneering ceramic systems long established in clinical use.

- This shows that the bond of the CAD/CAM veneer structure to the framework structure is equally strong and reliable as the bond in the case of the conventional veneering of VM 9 (veneering ceramic for zirconium dioxide substructures) and VM 13 (veneering ceramic for non-precious metal alloys) to their respective frameworks.

V. The long-term bonding characteristics



Source: In-house studies, VITA Zahnfabrik

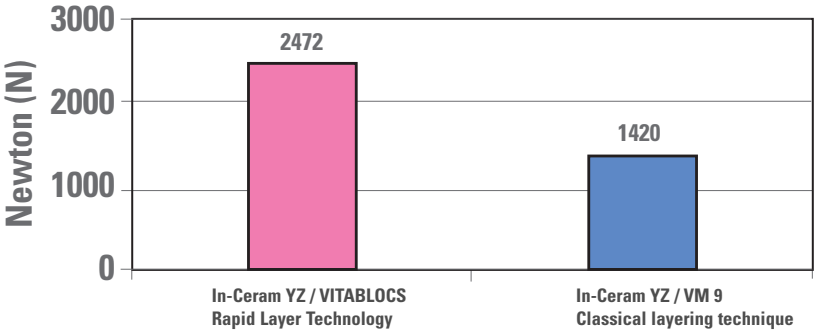
Results

- The study of thermal shock resistance for the evaluation of the clinical long-term bonding behaviour shows the high degree of reliability of a bridge fabricated with VITA Rapid Layer Technology.
- A survival rate of 100 percent was achieved for all restorations up to a temperature of 150 °C, independently of the adhesive system used.

This test procedure has been in successful clinical use for over 25 years for all veneering ceramic tests by VITA.

VI. The static / dynamic loading capacity

Static fracture toughness testing of bridge restorations



Source: In-house studies, VITA Zahnfabrik

Results

- Static fracture toughness testing of bridges confirms that VITA Rapid Layer bridges can excellently withstand a load of over 2400 Newtons. By comparison, values of 1420 Newtons are achieved with classically veneered bridges (VITA In-Ceram YZ substructure).

- Dynamic fracture toughness tests demonstrated that VITA Rapid Layer bridges were very well able to withstand 1.2 million cycles with a load of up to 800 Newtons (corresponds to approx. 5 years of intraoral loading). Initial crack formation was recorded only above 850 Newtons and 1.2 million cycles.

- These results guarantee the correct clinical functioning of this technique, since the maximum occlusal load resulting from occlusal forces generally occurs at around 500 Newtons. (Please refer to the article "Zahnärztliche Werkstoffe und Ihre Verarbeitung" [Dental Materials and their processing], Vol. I).

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VII. Clinical experience

- This technique has also become successfully established in clinical practice. Dr. Baltzer (Rheinfelden/Switzerland) and ZTLM Vanik Jinoian (Liestal/Switzerland) manufactured CAD/CAM combined bridges with individual veneers made of VITABLOCS Mark II for the first time back in 2007.

- The clinical success rate of the now 300 restorations in clinical use is 100 percent to date. Furthermore, the procedure has been subject to ongoing improvement over the years.

The product is developed specifically for dental use and must be processed according to the instructions for use.
The information/illustrations contained herein do not constitute an assurance of properties and are not binding.

VITA Zahnfabrik H. Rauter GmbH & Co. KG · Postfach 1338 · D-79704 Bad Säckingen · Germany · Tel. +49/7761/562-222 · Fax +49/7761/562-446 · www.vita-zahnfabrik.com

1766 E – 1210 (X.) S