Digital success story: Feldspar ceramics in the esthetic zone

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For some, the developments in digital dentistry and dental technology seem to have come out of nowhere. For several years now, new technologies and materials have been pervasive. But the first CAD/CAM material, VITABLOCS (VITA Zahnfabrik, Bad Säckingen, Germany), already has a 35-year success story." A time when fine-structure feldspar ceramics have not only been scientifically established as the gold standard[1] worldwide, but also clinically as reliably[2, 3, 4] and highly esthetic[5] restoration material. In 2007, the polychromatic development of VITABLOCS TriLuxe forte came onto the market with a natural shade gradient from the neck to the incisal area. This enabled highly esthetic restorations to be created even more efficiently and monolithically in the anterior region. In the following case report, dental technician Bárbara Calero (Málaga, Spain), in collaboration with dentist Dr. Bennani Salahadinne (Casablanca, Morocco), shows how the tried and tested feldspar ceramic impressively enriches the material portfolio of a laboratory for the digital workflow.

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[2] Morimoto S, Albanesi RB, Sesma N, Agra CM, Braga MM. Main Clinical Outcomes of Feldspathic Porcelain and Glass-Ceramic Laminate Veneers: A Systematic Review and Meta-Analysis of Survival and Complication Rates. Int J Prosthodont 2016 Jan-Feb; 29(1): 38-49.
[3] Otto T. Up to 27-years clinical long-term results of chairside Cerec 1 CAD/CAM inlays and onlays. Int J Comput Dent 2017; 20(3): 315-329.
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Initial situation vs. final result

Initial condition.

The highly esthetic, monolithic restoration results.

Initial clinical situation

A patient presented in the dental practice because of trauma to teeth 11 and 21, with composite build-ups that were now several years old. She was dissatisfied with the esthetics of both teeth, as she did not like their shade and shape. Because of this, she had wanted a new restoration for some time. The initial photographs of this case show that the physiological rest position, the middle and the maximum expression of the smile line, represented an advantageous, restorative basis and only minor esthetic defects could be detected. After analyzing the anterior teeth and the esthetic zone, we suggested that the patient not only have teeth 11 and 21 restoratively replaced, but also teeth 12 and 22, which were slightly tilted palatally, in order to achieve a better overall esthetic result. In view of the fundamentally advantageous tooth substance and the balanced relationship between the labial and gingival areas, we decided on four veneers on 11, 12, 21 and 22 made of the highly esthetic fine-structure feldspar ceramic VITABLOCS TriLuxe forte, since a natural chroma gradient and fluorescent effects are already integrated. The patient trusted the dental and dental technical team and, after thorough consultation, agreed to the proposed treatment.

The physiological rest position.

The incisal edges harmonize with the line of the lower lip.

Planning with analog mock-up

Before the preparation, a mock-up should be produced in the first step in order to define and check the shape, esthetics and final function. The mock-up should be produced on the basis of a wax-up. The focus was on the appropriate anatomical shape in order to be able to realistically simulate the natural proportions of the face and lips, and then reproduce them as a biogeneric copy as the basis for the virtual construction in the CAD software. In addition, care was taken to ensure that a functional dynamic occlusion was integrated into the four restorations for canine guidance, laterotrusion and protrusion, precisely because the line of the incisal edges in the anterior region of the lower jaw featured significant irregularities. After the successful clinical try-in and control, we were able to continue with the treatment.

Analog study with mock-up

Initial condition.

Integrated mock-up.

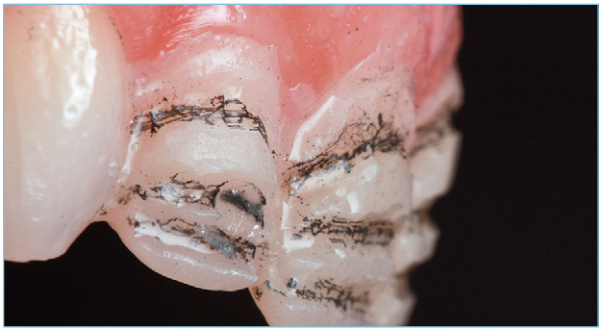
Functional control with protrusion.

Functional control with laterotrusion.

Tooth shade determination and preparation

Before the preparation, the tried-and-tested mock-up was scanned intraorally as the construction basis. After the guided mock-up preparation, a photo was taken with a polarization filter in order to determine the shade of the tooth structure, and to be able to select the VITABLOCS TriLuxe forte blank in the corresponding shade. The choice fell on a block in shade 1M2C in the VITA SYSTEM 3D-MASTER shade standard.

Deep grooves were created in the mock-up …



… and marked in pencil for controlled reduction.

The shade situation after preparation, photographed with a polarization filter.

Digital workflow

The the digital workflow began. The upper and lower jaws were scanned and the bite registration performed with the CEREC Omnicam. Then the veneers were constructed on this basis in the CAD software, the scan of the mock-up being copied with the CEREC software 4.4. The resulting reconstructions could then be manufactured with CAD/CAM support using the MC XL milling unit (all Dentsply Sirona, Bensheim, Germany). In the CAD design, the veneers were morphologically designed as planned in the analog wax-up. The macrotexture was also taken into account, so that after the restorations had been milled, only small details of the microtexture had to be worked in and the final finishing had to be carried out in order to be able to glaze. After the grinding process, the veneers were finished manually as planned. To do this, the grinding pin is first removed from the remaining VITABLOCS TriLuxe forte block using a diamond grinder or a coarse, flexible cutting disc.

Elaboration and checking the fit

The fit of the four veneers and the contact points directly on the prepared teeth were then checked. The proximal contact areas were then polished. All irregularities are slowly and carefully removed with flexible discs. Under no circumstances should the fine-structure feldspar ceramic VITABLOCS be reworked with carbide burs, as this will cause microcracks in the ceramic. The contouring of the veneers should be done, whenever possible, with water cooling, with little pressure and only with fine-grain diamond grinders (40 µm). After adjusting and examining the surface, it can be analyzed in more detail with a silver or gold surface marker. Such texture markers must then be completely removed with steam, in order to avoid changes in shade on the ceramic. Once the morphological verification of the veneers has been completed, they can be finished. During a clinical try-in, it should be noted that, until the final adhesive cementation, the restorations can break if the patient clenches. This should be avoided at all costs. The restorations can be temporarily secured to the preparation with glycerine gel for try-in.

Staining and glazing

The VITABLOCS TriLuxe forte blank consists of four layers of various shade intensity. The chroma decreases more and more from the intensive neck area to the enamel-like incisal layer. For this reason, it is usually not necessary to characterize with stains. If specific areas absorb light, an incisal halo effect is to be achieved, or if areas are to be emphasized or a higher chroma intensity is to be established in the neck area, this can all be accomplished with the multifaceted ceramic stain system VITA AKZENT Plus. However, if the veneers made of VITABLOCS TriLuxe forte are to be characterized and/or glazed in the laboratory, this must be done using a resin die material that reflects the shade of the tooth's hard substance. In our case, the blue VITA AKZENT Plus EFFECT STAINS 11 (ES11) were used to establish small light-absorbing areas on the incisal edge, and at the same time, to contrast with the cream-colored characterizations (ES02) on the mesial and distal flanks. Then the fixation firing took place at T 850°C with four minutes of drying and a rise of 80°C/min without vacuum and one minute holding time. The final glazing was done with VITA AKZENT Plus GLAZE LT. The restorations were then tried on the resin die to check whether the shade effect and the level of gloss achieved were as desired. The final glaze firing took place with six minutes of drying, a rise of 80°C/min and a holding temperature of 950°C for one minute, without vacuum.

Adhesive cementing

Flowable, light-curing or dual-curing luting composites, such as VITA ADIVA F-Cem, should be used for the adhesive cementation of veneers made from VITABLOCS restorations.

Isolation of the neighboring teeth using a Teflon band.

Etching of 11 and 21 with phosphoric acid.

Adhesive bonding with composite.

The integrated restorations made of VITABLOCS TriLuxe forte without …

… and with polarization filter.

Conclusion

If there is sufficient or very well preserved enamel, I prefer to use VITABLOCS feldspar ceramic in one of the three available material variants for my highly esthetic "MY PERFECT MATCH restorations": monochrome Mark II and polychrome Triluxe forte or RealLife. Because natural chromatic properties and a high, tooth-like fluorescence are already integrated into these blanks. In this way, the most highly esthetic restorations can be created with minimal effort. In combination with a functional-esthetic mock-up, the precise shade fidelity of the VITABLOCS blanks to the VITA shade standards and the simulation of the die shade in the laboratory, the feldspar ceramic veneer restorations can be created in an absolutely predictable and efficient manner.

The highly esthetic, monolithic restoration results in the posterior …

… and anterior views.

More information and case reports on:

https://www.vita-zahnfabrik.com/en/VITABLOCS.html

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