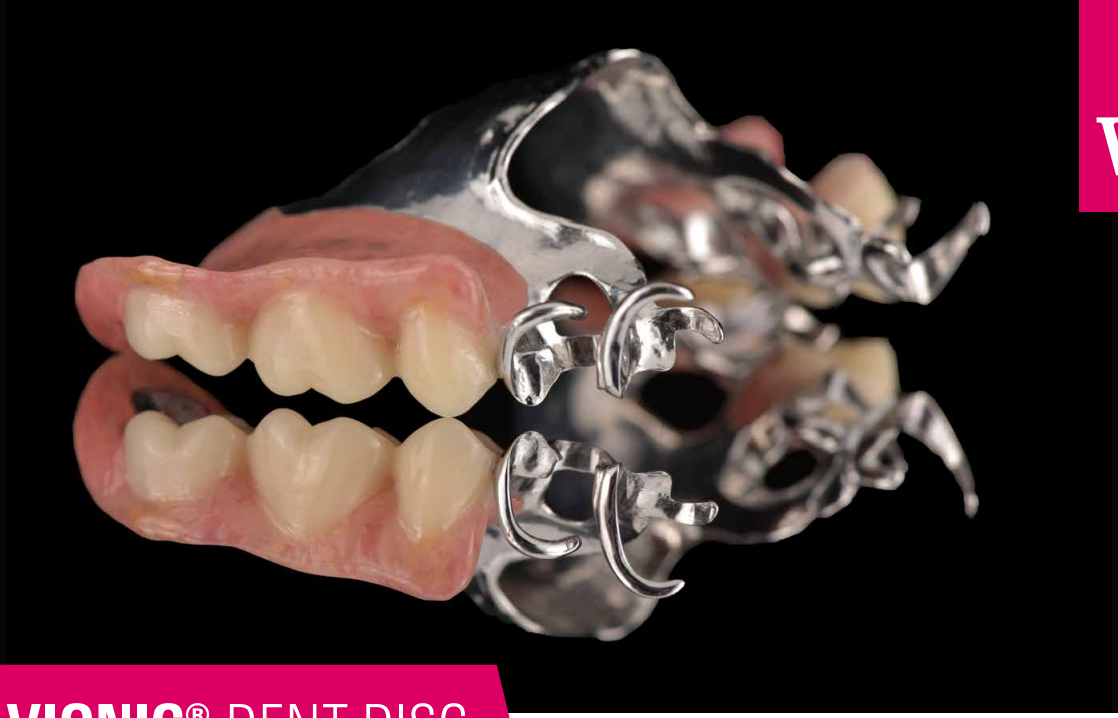

VITA

VITA VIONIC® DENT DISC

Conventional model casting framework in a digital workflow – precision-fit dental material from the premium composite formula

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"Actually, we no longer produce model casting dentures" was the answer from Highfield.Design – Zahntechnik Wichnalek (Augsburg, Germany) in response to a request from a dental practice. In fact, they had phased out metal casting equipment several years earlier, and since that time, had only produced frameworks of this type with a subtractive process using PEEK in a digital workflow. Using a customer-first approach, Norbert Wichnalek, Lukas Wichnalek, Arbnor Saraci and Patricia Strimb commissioned an external laboratory to create the framework, then completed the work internally. After several discussions with the team, the tooth material was custom-made using VITA VIONIC DENT DISC multiColor (VITA Zahnfabrik, Bad Säckingen, Germany). The way this "digilog" workflow works and its advantages are presented based on the clinical case.

Initial situation vs. final results

A routine case

A 60-year-old patient visited the dental practice because he wanted to stabilize his free-end denture in the first quadrant and the gap in region 25 for a future fixed restoration with implants. Given that this interim solution needed to be relatively low cost, the decision was made to use model casting dentures. Before the single-step impression with Impregum (Solventum, Seefeld, Germany), clamps were ground into place at 14, 24 and 26. The impression was sent to an external laboratory where a conventional process was used to fabricate the master model with the model casting framework on top of it. The finished framework on the model was delivered to Highfield.Design – Zahntechnik Wichnalek laboratory. When it arrived, the team discussed whether they should continue with an analog or digital workflow.

Fig. 1: The residual dentition in the maxilla after grinding clamps at 14, 24 and 26.

Fig. 2: An impression was made of the clinical situation with Impregum.

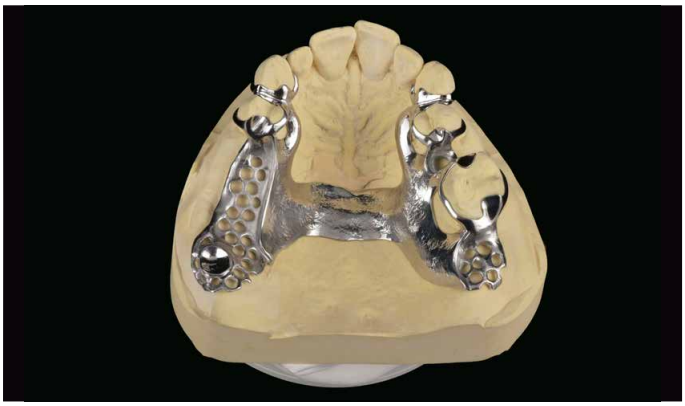

Fig. 3: The model casting framework was produced by an external laboratory.

Customized tooth material

The decision was made to continue with the familiar digital workflow. During the discussions, the reason for this quickly became clear: The tooth material could be produced from the VITA VIONIC DENT DISC multiColor A2 to fit the framework precisely and at the free end in a single cast. That would ensure the greatest possible layer thickness and stability, as well as a secure bond through an even bonding gap. There would be no need for a lengthy process of grinding the prefabricated teeth "just in case." The occlusion could also be designed in the CAD software to be functionally suitable for the antagonist. This is especially advantageous when there is limited vertical space, as was the case here. The polychromatic disc consists of the proven and highly cross-linked VITA MRP composite formulation (microfiller reinforced polymer matrix), which is used to produce all VITA premium teeth and has proven to be particularly resistant to abrasion.[1] The natural shade gradient and shade accuracy of the disc ensure a harmonious shade effect in relation to the natural teeth.

[1] Pin-on-Block (POB) wear test, University of Regensburg, Germany, 2015

Denture teeth using the premium formula

The model casting framework was scanned on the model, as were the opposing jaw and the articulation (Medit T710, Medit, Seoul, South Korea). The data set was transferred to the exocad software (exocad, Darmstadt, Germany). The appropriate tooth morphology was identified using the Highfield.Design tooth library and adapted accordingly in the design software. The free ends at 15, 16 and 17 were constructed as one block. Tooth 17 merged smoothly into an occlusal stop of the framework structure. Pins were constructed on all the teeth at the base, which were a perfect fit for the retention holes in the framework saddle. The bonding gap was set at 0.01 mm, factoring in the opaquing. After nesting, which made optimal use of the shade gradient of the disc, the milling task was sent by the CAM software CORiTEC iCAM V5 smart to the milling unit imes-icore 350i PRO (both imes-icore, Eiterfeld, Germany).

Fig. 4: The master model and framework were scanned for the digital workflow.

Fig. 5: The design in the CAD software was based on the Highfield.Design tooth library.

Fig. 6: The design of the tooth material in the exocad software.

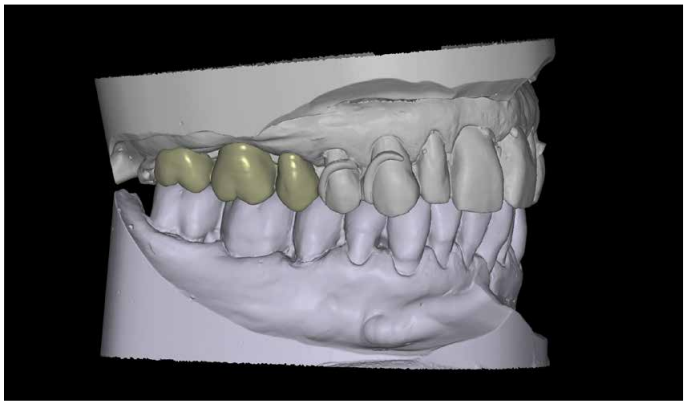

Fig. 7: Teeth 15, 16 and 17 were designed as one block.

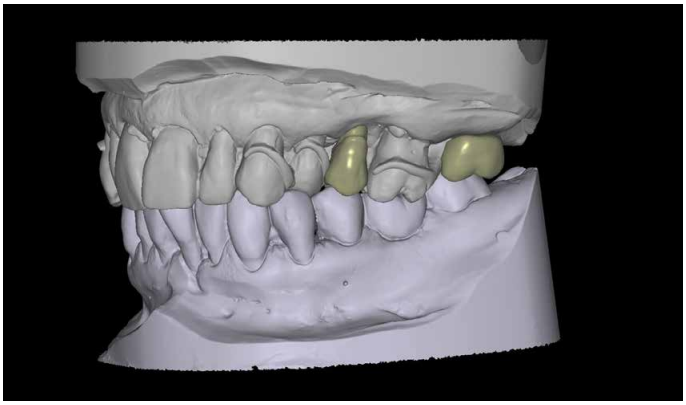

Fig. 8: The teeth can be designed to fit precisely, especially where space is limited.

Fig. 9: The dental material was fabricated from VITA VIONIC DENT DISC multiColor.

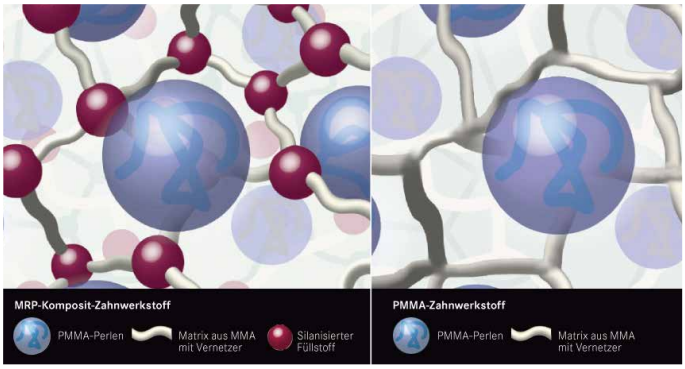

Fig. 10: Highly cross-linked VITA MRP composite formulation in a schematic comparison to unfilled PMMA.

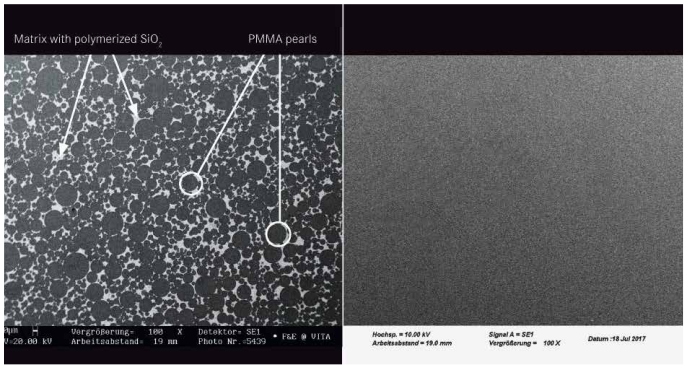

Fig. 11: Comparison of MRP composite (left) and PMMA (right) under a scanning electron microscope (SEM).

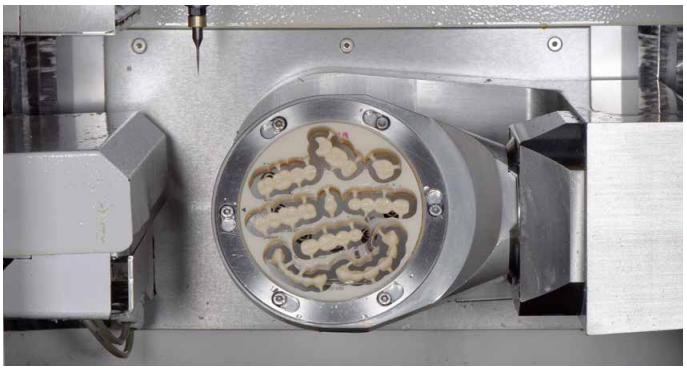

Fig. 12: The milled tooth material in the VITA VIONIC DENT DISC multiColor.

Customized plug-in system

The CAD/CAM-supported dental material was cut out of the disc. When the fit was first checked on the model casting framework, the denture components already fit together perfectly like a precision-engineered, plug-in system. The basal pins fit into the retention holes like Lego® bricks, as did the mesio-distal dimensioning into the framework structure. After the attachments were ground back and finished with rubber polishers, the basal bonding areas of the basal framework were sandblasted with 110 µm aluminum oxide, conditioned with the universal VM LC PRIMER I and II and then masked with VITA VM LC flow GINGIVAL OPAQUE. After the basal-circular sandblasting and chemical conditioning of the tooth material with VITA VM CC LIQUID, it was bonded to the framework with a one-to-one mixture of the shade-accurate, cold-curing polymerizate VITA VM CC BASE DENTINE A2 and ENAMEL.

Fig. 13: The tooth material for the model casting dentures after removing the attachments.

Fig. 14: The retention pins for the dental material can be seen in the basal view.

Fig. 15: The denture components fit together perfectly like a plug-in system.

Fig. 16: The retention pins fit precisely into the hole structure of the free-end saddle.

Fig. 17: The universal VITA VM LC PRIMER I and II ensure a secure chemical bond.

Denture unit

The denture base was then completed with pink PMMA cold-curing polymer and, after a cut-back of 0.3 mm, individualizations were carried out with Gingiva VITA VM LC flow G1 (dusky pink) in the cervical area and G4 (brown-red) in the interdental area. The VITA AKZENT LC composite stains were used to achieve minimal characterizations cervically using lemon, and interdentally using dark red. A uniform gloss level was achieved using VITA AKZENT LC GLAZE. During integration, the teeth made from the VITA premium formulation harmoniously blended into the residual dentition functionally and esthetically. The "digilog" workflow had created a precise and robust tooth material from the VITA VIONIC DENT DISC multiColor, which formed a denture unit similar to a modular system with coordinated conditioning, bonding, individualization and characterization on the material side.

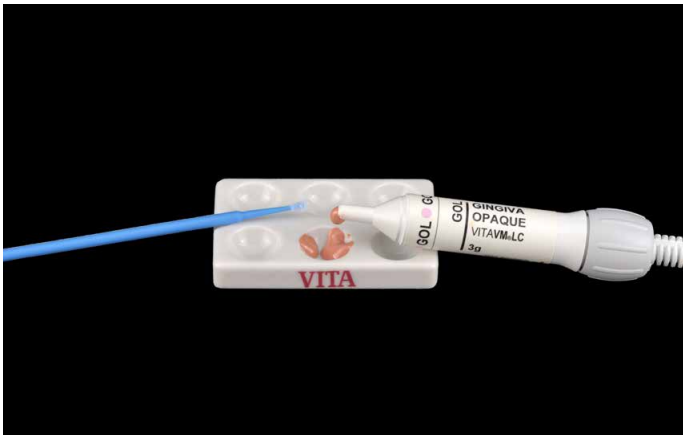

Fig. 18: Masking of the basal framework components was done using VITA VM LC GINGIVA OPAQUE.

Fig. 19: The tooth material was bonded to the framework using the cold-curing polymer VITA VM CC.

Fig. 20: Situation after bonding the tooth material from the VITA VIONIC DENT DISC multiColor.

Fig. 21: The base was completed using the composite VITA VM LC flow and the composite stains VITA AKZENT LC.

Fig. 22: The tooth material was polished to a high gloss using VITA Polish Hybrid.

Fig. 23: The finished model casting dentures with occlusal stop at 17.

Fig. 24: Although teeth 15, 16 and 17 had been fabricated as a block, they appeared to be individual teeth.

Fig. 25: The finished model casting dentures with teeth from VITA VIONIC DENT DISC multiColor.

Additional information and case reports at:
https://hs.vita-zahnfabrik.com/en/vita-vionic-dent-disc-multicolor

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