Composite - new ways and indications

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To date, its use for the indication of tooth-coloured restorations in the anterior and posterior tooth regions has been determined by the material properties of the restoration material selected.

For all-ceramic restorations, restricted vertical clearance and bruxism in particular caused problems. In the aesthetic region, too much tooth substance was often sacrificed (Fig. 1). In addition, the bond between the luting composite and the ceramic was a weak point, which often resulted in fractures of the marginal ridge under heavy loading (Fig. 2). In most cases, a demarcation line was apparent due to the different light refraction of the materials in the marginal area.

On the other hand, the use of composite as a CAD/CAM or restoration material offers a range of benefits. Here, no luting gap develops but instead there is a mono-phase due to the homogeneous bond between the workpiece and the luting composite. This in turn leads to a good transitional effect and natural aesthetics. The high flexural strength and the tooth-like modulus of elasticity create a resistant restoration with a shock-absorbing effect, which is particularly positive for bruxism (Fig. 3).

These are all properties that can be found in BRILLIANT Crios, a pure composite. To satisfy the most stringent aesthetic demands, the material is available in 9 Low Translucent and 4 High Translucent shades. In the following, the procedure for using CAD/CAM composite is explained using several application cases:

Fig. 1: Teeth ground excessively

Fig. 2: Ceramic margin fracture

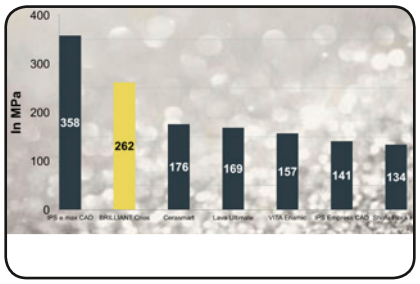

Fig. 3: Graphic representation of the flexural strength

Case 1:

After visual impression taking, the cavity is covered with a moist cellulose swab to prevent the tooth drying out and thus any possible postoperative issues. Then the inlay was designed and in this case the BRILLIANT Crios material was selected for the milling process. The resistance of the material is already apparent after the milling process because the sprue still retains the inlay (Fig. 1) – a ceramic restoration would have broken off here.

For the subsequent procedure of adhesive luting, the proximal region is isolated with a sectional matrix and adaptively stabilised with a wedge beforehand. Due to the high enamel content of the cavity, the total etch technique is used, whereby the enamel is etched with phosphoric acid for 30 seconds and the dentine for 15 seconds (Fig. 2). Then the etching gel is sprayed for a good 30 seconds to remove the dissolved precipitates and at the same time to neutralise the acidic pH environment of the tooth. In the next step the cavity is dried with oil-free air and the etching pattern is checked. For the following steps up to the definitive luting, the operating lamp is switched off.

The adhesive ONE COAT 7 UNIVERSAL (COLTENE) is used as bonding agent and rubbed in for 20 seconds (Fig. 3). A gentle stream of air is applied to prevent the formation of puddles or too thick a bond layer. Pre-curing the bond in the cavity is mandatory and is performed for 10 seconds with > 1000 mW/cm^2 (Fig. 4). On the side of the workpiece, the luting

Case 1

Fig. 1: Ground BRILLIANT Crios inlay


Fig. 2: Etching of the cavity


Fig. 3: The ONE COAT 7 UNIVERSAL bonding agent is applied

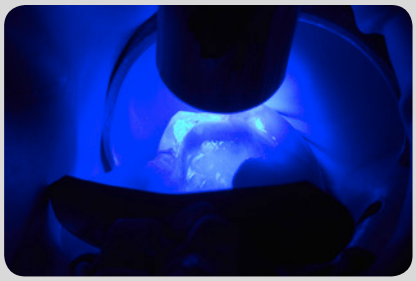
Fig. 4: Light curing of the bonding agent


Fig. 5: The ONE COAT 7 UNIVERSAL bond is applied to the inside of the inlay and then dispersed with air


Fig. 6: Inserted BRILLIANT Crios inlay

surface is sandblasted with 50 µm aluminium oxide (Al2O3) and cleaned with pure alcohol but not etched. To obtain an optimal bond between the materials, according to the manufacturer's luting protocol the subsequent application of the ONE COAT 7 UNIVERSAL adhesive to the luting surface of the workpiece is essential. The bond is rubbed into the surface for 20 seconds and then air blown (Fig. 5). To ensure a close fit, no light polymerisation is performed at this point. Final curing is subsequently performed through the restoration. Applying silane solution is neither necessary nor useful as BRILLIANT Crios is a pure composite. For the cementing of inlays, overlays or a full crown, either a dual-curing, composite-based cement or a normal restoration composite can be used.

Light-curing composites such as BRILLIANT EverGlow have a higher optical fade-in effect. The versatility of this submicron material allows application without the use of ultrasound. The restoration composite is adapted to the cavity walls and the inlay is inserted with gentle but steady pressure. As the excess remains on the margin and does not flow off, precise removal and cleaning of the marginal areas is possible without time pressure. After checking the correct processing of the margins, each restoration surface is light cured for at least 30 seconds with > 1000 mW/cm^2, starting transdentally buccal and lingual. As the workpiece in this case is made of composite and has a considerably reduced grinding resistance compared to ceramic, the processing of the margins can be started immediately with an 8-µm diamond polisher. Likewise, the excess can be easily finished back proximally without leaving any residue, using an oscillating file, for example, because the surface hardnesses do not vary. For occlusal adjustment, a pre-polishing agent such as Comprepol Plus and for high-gloss polishing depending on the anatomy Composhine Plus tips or the ShapeGuard wheel (DIATECH) can be used. Immediately after completing the restoration, the composite inlay is integrated perfectly into the remaining tooth structure (Fig. 6).

As the restoration is made of composite, individual characterisation can also be performed if required. For this purpose, the fissures in non-load bearing areas can be ground away with a pointed 40-µm diamond instrument and sandblasted. After cleaning with alcohol,

these areas are again wetted with ONE COAT 7 UNIVERSAL and light cured (Fig.7). This area is then characterised with methacrylate-based stains (Fig. 8). The composite material is particularly suitable in critical cases, such as here in an adolescent with a micro-tooth, since margins are also possible without step preparation (Fig. 9). The margins can be finished substance and gingiva-friendly by polishing from the margin to the tooth (Fig. 10).

Case 1

Fig. 7: Preparation of the characterisation of a composite restoration

Fig. 8: Characterisation with stains

Fig. 9: Restoration of a micro-tooth with BRILLIANT Crios

Fig. 10: Perfect integration and adaptation of the tapered crown margin

Case 2:

The high degree of homogeneity and the possibility of combining dentine and enamel-coloured CAD/CAM composites also allows the fabrication of implant-supported restorations (Fig. 1). In this case, a base was first prepared with an opaque BRILLIANT Crios block to cover the metal and to condition the gingiva (Fig. 2). Then a second optical impression is taken using a rubber dam (Fig. 3) to create a superimposed crown from an enamel-coloured CAD/CAM block (Fig. 4), which is then inserted and characterised according to the applicable rules (Fig. 5). As both parts consist of pure composite, a complete bond is created between them. The tooth-like modulus of elasticity helps to absorb the forces over the implant.

Case 2

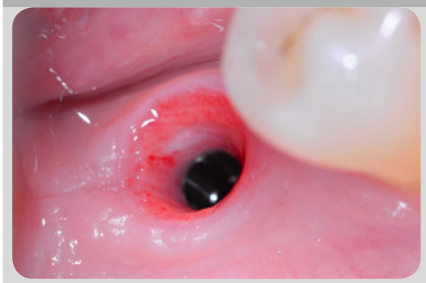

Fig. 1: Placed implant

Fig. 2: Covering the titanium base with opaque BRILLIANT Crios

Fig. 3: Optical impression of the abutment design

Fig. 4: Adhesive preparation for luting a BRILLIANT Crios pontic

Fig. 5: Inserted and characterised BRILLIANT Crios crown

Case 3:

It is often difficult to place an implant or it is simply not desired by the patient. In this case, a minimally invasive pontic can be attached adhesively to an adjacent tooth (Fig. 1). The occlusal conditions are taken into consideration here and the pontic is designed from distal to mesial as far as possible (Fig. 2).

Case 3

Fig. 1: Preparation of a pontic in BRILLIANT Crios

Fig. 2: Inserted pontic

Case 4:

If an implant was not possible or desired in the anterior region when the second incisors were not placed, then an all-ceramic adhesive bridge was often used as a solution (Fig. 1). However, as expected, this sometimes leads to a loss of adhesion or to a fatigue fracture (Fig. 2).

As the entire front region exhibited defects, the decision was made in favour of a complete restoration with composite. The old restorations were removed and the missing lateral incisors were replaced by mesially directed BRILLIANT Crio-sextension bridges (Fig. 3). Subsequently, the front was slightly prepared starting from buccal and the composite pontics were conditioned with 50 µm aluminium oxide (Fig. 4). The remaining enamel surfaces were conditioned with phosphoric acid and then everything was prepared for adhesion (Fig. 5). To give the restorations a natural shade impression, some yellow and incisal blue stains were applied and pre-cured in the cervical and central regions (Fig. 6). Subsequently, BRILLIANT COMPONEER veneers prefabricated with a translucent composite were placed on all tooth units (Fig. 7). As we work exclusively with composite here, everything can be combined with each other which leads to an aesthetic result (Fig. 8). This restoration technique makes it possible to restore anterior aesthetics in just a single session without causing too much trauma.

Case 4

Fig. 1: Example of an all-ceramic adhesive bridge

Fig. 2: Chipping of an all-ceramic bridge

Fig. 3: Restoration with BRILLIANT Crios extension bridge

Fig. 4: Preparation of the anterior and conditioning of the composite pontics

Fig. 5: Etching of the remaining enamel surfaces

Fig. 6: Yellow and blue stains give the restoration a natural impression

Fig. 7: The prefabricated COMPONEER shell is inserted with a translucent BRILLIANT EverGlow composite

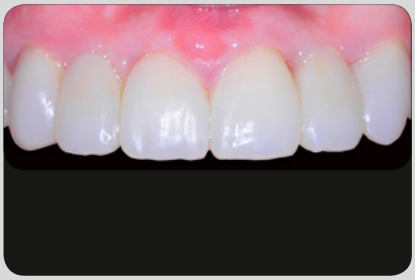

Fig. 8: Completion of the composite restoration

Case 5:

In the following case, the missing lateral incisors were replaced with an overcontoured partial denture (Figs. 1 and 2). Minimal buccal preparation was performed for occlusal reasons (Fig. 3). At the end, all front teeth were veneered with BRILLIANT COMPONEER and the dental arch was rounded (Fig. 4). Treatment was performed without anaesthesia and led to complete, fixed and aesthetic rehabilitation (Fig. 5). In conclusion, it can be said that composite restorations need to be handled less restrictively these days and can also be applied more easily and effectively in patients across an extended range of indications.

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Case 5

Fig. 1: Existing partial denture

Fig. 2: The missing lateral incisors are replaced with an overcontoured partial denture

Fig. 3: Buccal preparation for a BRILLIANT Crios extension bridge

Fig. 4: Veneering of front teeth and BRILLIANT Crios extensions with BRILLIANT COMPONEER

Fig. 5: Fixed and aesthetic composite restoration

COLTENE