User case study on the new composite bloc BRILLIANT Crios by COLTENE in the fabrication process of a CAD/CAM CEREC crown

By Dr. Med. Dent. Christoph G. Hüskens, Switzerland

The application fields of the new composite bloc include crowns, inlays, onlays and veneers as well as implant-supported crowns. BRILLIANT Crios is a reinforced composite bloc for the fabrication of permanent restorations using a CAD/CAM milling process. This is available in Low Translucence (LT) and High Translucence (HT) shades in sizes 12 and 14. The material properties allow extended preparation possibilities, tapered margins and polishing. In addition, the BRILLIANT Crios bloc can be compared with methacrylate-based composite materials. As part of material sampling, a 54-year-old patient in this case required a newly fabricated restoration after losing a full ceramic crown due to fracture. The patient presented with a missing restoration on tooth 37. The X-ray of the unrestored stump (Fig. 1) shows the tooth with a root filling and a composite abutment post (this restoration was performed by a different dentist).

Due to the loss of the full ceramic crown, the patient was willing to have a new restoration fabricated using a CEREC crown made of the new composite-based BRILLIANT Crios (COLTENE) CAD/CAM material. The existing full ceramic crown required additional preparation to meet the following criteria:

- Minimum occlusal thickness 1.5 mm
- Minimal buccal thickness 0.8 mm
- Minimal thickness under supporting cusps
- Minimal cervical thickness 0.8 mm

Occusal corrections and additional preparation of the transitions to the distal stage were required in this case. The existing deep distal stage on tooth 37 also proved problematic in this situation. Therefore, we decided on a square bite impression using a silicone material (AFFINIS, COLTENE) as experience has shown direct optical impression taking to be less adequate in this situation.

With the aid of the subsequently fabricated plaster model (Fig. 2), it was quite easy to take the optical impression for fabricating the CEREC crown. The BRILLIANT Crios bloc used for milling the full crown is shown on the photo (Fig. 3, shade A2 HT).

At the time of preparing this report, there were only two milling programmes available from other manufacturers for processing composite blocs in the CEREC system. In future, there will be an own COLTENE BRILLIANT Crios milling programme by the Sirona company available for use in the CAD software.

In our case we chose the programme GC Ceramcast 14. Presently, the Crios bloc can be milled with this Sirona programme (a further possible programme is the 3M ESPE Lucal Ulitimate). The bloc available to us was sized 14 in future a bloc size 12 will also be available.

Constitution and milling of the crown leads to the following results (Fig. 4).

- Compared with ceramic materials for example IPS Empress (Ivoclar Vivadent), the surface structure of the ground crown appears very smooth and the residual lag is smaller after milling. This facilitates its removal with a diamond and nothing remains visible after brief polishing. Polishing can be performed after milling using a conventional rotary polishing or milling paste. The crown in question also passed the check for cracks or material chipping.

A check of the precision fit on the plaster model was good (Figs. 3 + 7), so that we decided to try in and then place the restoration on the patient.

To ensure bonding between the mounting material and the milled material, use ONE CXT 7 UNIVERSAL bond (COLTENE) only. An etching step with hydrofluoric acid is not necessary.

ONE CXT 7 UNIVERSAL was applied to the sandblasted and cleaned mounting area of the restoration and rubbed in for 20 seconds (Fig. 6). Excess adhesive was removed with oil-free compressed air for 5 seconds. Bonding to the tooth substance and/or composite can be carried out using a suitable adhesive. ONE CXT 7 UNIVERSAL Bond is recommended here (procedure according to instructions for use). We used this adhesive throughout in our case.

Prior etching of the enamel areas with phosphoric acid is recommendable and was carried out by us. For bonding of the restoration, a dual-curing resin cement, i.e. DuoCem® (COLTENE) or a light-curing composite can be used.

The BRILLIANT Crios crown is now ready for insertion. After bonding our full crown with DuoCem® (COLTENE), the edges were cleaned, excess was removed, and then every surface of the restoration was light-cured for 30 seconds (light output 780mW/cm²) and then worked on with a rubber polisher. Milling of the occlusion proved simple and quick. The gloss of the entire composite crown already appeared after a short time. Furthermore, when readjusting the occlusal contact points, we were able to polish immediately, which is much more difficult to do with ceramic, and in particular, with fired crowns.

ADVANCED restorations made from the new Crios blocs can be characterised, modified or also repaired at any time. Modifications can be made directly without prior treatment. In case of intraoral repairs, the restoration surface is cleaned with clearing paste, and then roughened using a diamond rotary instrument. In both cases, ONE CXT 7 UNIVERSAL is applied to the surface to be treated and cleansed with compressed air for 5 seconds. This is followed by light-curing for 30 seconds (see instructions for use for ONE CXT 7 UNIVERSAL). Colour shades or composites (i.e. BRILLIANT Ever-Glow, COLTENE) are then used afterwards according to the respective manufacturer’s instructions. The material discussed for the fabrication of a CEREC crown is a composite with the following technical features:

- The flexural strength and the modulus of elasticity are represented in the following graphs.

For comparison purposes, the ceramic and composite materials of other manufacturers were used. The good flexural strength and the modulus, which is similar to dentine, make the material more elastic than ceramic.

**Source:** www.scientifics.com/camlin/ 27/08/2015

"Comparison of fillers morphology, mechanical strength and milling characteristics of different CAD/CAM blocs for Sirona inlab- MC XL milling system" Camenla Kaufmann, Ralf Böhme, Colthine/Kehlental AG, Switzerland. David Zweifel, Private Dental Laboratory, Switzerland

Conclusion

Handling is conveniently simple and the clinical result after placement and a weeks later is very good (Figs. 8 + 9). The following points result in time saving and “service benefits” versus ceramic restorations:

- No firing of the restoration required (i.e. as with IPS e-max CAD).
- Gloss of the composite is easy to achieve, also much easier than with IPS Empress CAD.
- No etching with hydrofluoric acid or silanisation necessary.
- If required, repairs with composite are easy to realise, analogous to a filling.
- Dentin like a modulus, less brittle than ceramic.

Long-term studies are necessary to compare the clinical results with ceramic materials. In terms of application, this material proved excellent. The patient was very satisfied with the result and praised the pleasant wear comfort of the composite restoration versus his previous ceramic crown immediately after treatment. Next we would like to attempt restoration of an implant with a single crown.