Indirect CAD/CAM restoration with a hybrid ceramic:

Christoph Blum[1]

Introduction

In CAD/CAM processes, chairside-manufactured inlays are a high-quality, long-lasting alternative to direct fillings made from amalgam, cements or composites. From an aesthetic perspective, ceramic inlays are often preferred to gold inlays. If such a high-quality, tooth-coloured restoration emerges, Dr. Christoph Blum and dental technician Mandy Meffert believe that it should also have individual features. While previously this was a time consuming and resource intensive practice, now they can add individual characteristics quickly and easily without a firing process, using the hybrid ceramic block CERASMART (GC).

In our practice, comprising a dental laboratory, we have been successfully using the CEREC CAD/CAM system in tooth-coloured posterior restorations for the last five years. In the past six months, we have also been using the new CAM/CAM hybrid ceramic block CERASMART to manufacture inlays, among other things. Apart from inlays, this material can also be used to manufacture other metal-free, indirect restorations such as onlays, veneers and full crowns.

For me, the CAD/CAM hybrid ceramic block CERASMART is not a ceramic restoration material in the classic sense of the term: it combines a high level of bending strength and break-resistance with good aesthetics. Because its surface hardness is still "soft" enough to minimise wear and tear to the antagonists, I now also prefer this material for patients with bruxism. In the short time we have been using it, our experience of temporary restorations in which we replaced less fracture resistant materials with CERASMART has also been positive. Another reason why we like to use CERASMART is its high level of edge stability compared to other blocks.

CERASMART is well suited for quick, cost-effective chairside restorations because, due to its composition, the blocks can be milled quickly and the tools can be used without requiring labour-intensive preparation. Furthermore, the dental technician or dentist can also quickly use OPTIGLAZE Color (GC) to provide a customised finish. With the large range of colours of ready-to-use, light-curing sealants, it is easy to paint on individual colour features and achieve a really aesthetically-pleasing result, as the following case study shows.

Anyone not wishing to make use of this can simply opt for a conventional chairside polish. We customise all the inlays that we manufacture as standard, because we believe that an inlay is a quality piece of craftsmanship and should reflect this. We therefore carry out finishing processes in the laboratory and intraorally directly on the patient, to showcase the individuality of their restoration and the care that goes into it.

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Figure. 1: Initial situation: worn restorations on teeth 16 and 17.

Figure 2: Situation immediately after preparation.

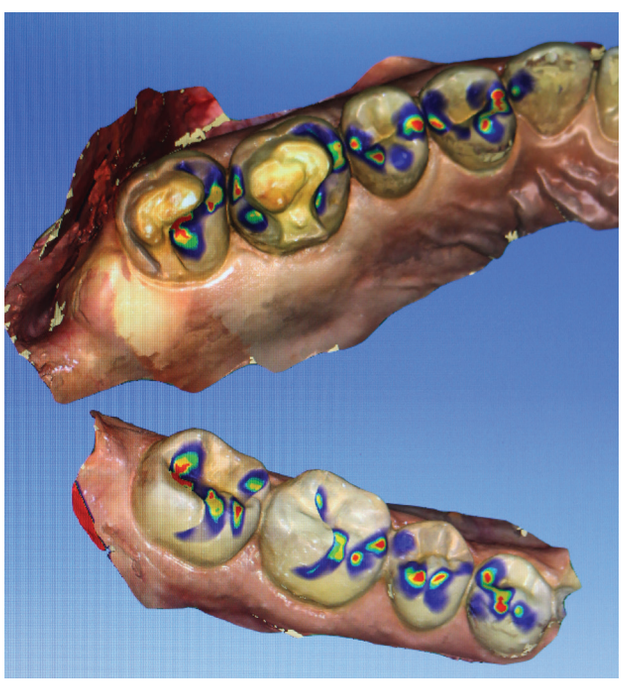


Figure 3: Virtual models of the prepared teeth and the antagonists.

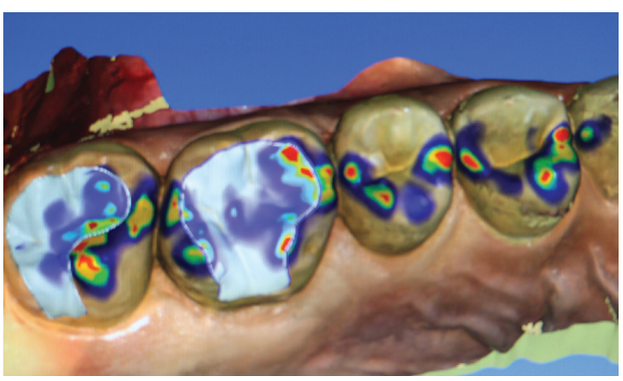


Figure 4: Virtual modelling of the inlays.

Case Report

Teeth are very important to this 31-year-old patient and she complained about her worn restorations documented with photographs of her teeth (Fig. 1). After her pregnancy, she visited our practice to ask for a stable, long-lasting, metal-free and aesthetically-pleasing restoration of the occlusal surface of teeth 16 and 17. Once the different restorative treatment options had been explained to her, the patient decided against a composite filling and a metallic restoration (gold inlay) and instead chose a tooth-coloured chairside restoration. As for the material, we chose CERASMART because, in addition to its tool-specific qualities of high fracture resistance and good flexural strength, it offers the benefit of easily customisable colouring which does not require a technician or firing oven.

We started with the traditional process for a chairside restoration, with preparation according to the usual rules for CERASMART inlays (Fig. 2) and optical impression taking with the CEREC OmniCam. After calculating the digital models (Fig. 3) and virtual construction of the inlays in the CEREC 4.4 software program/inlay biogeneric design mode, these were finely milled (Fig. 4) from the selected CERASMART blocks A2 HT 14 for tooth 16 and A2 LT 14 for tooth 17 using the MCXL Premium milling unit. After the attachment point has been sanded and any other procedures have been carried out (e.g. going over fissures), gloss can be added using special polishing pastes such as DiaPolisher Paste (GC) or ceramic polish with diamonds (Turbo Shine Lab, acurata).

The attachment point is generally placed orally, in the two palatal offshoots in this case, to avoid unnecessary further work after the milling process. The attachment points were ground using an extra-fine carbide cutter with teeth (acurata)

Figure 5: Prepared CERASMART inlays before customisation.

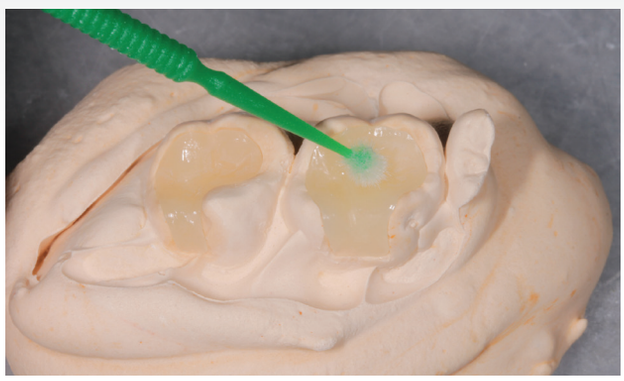
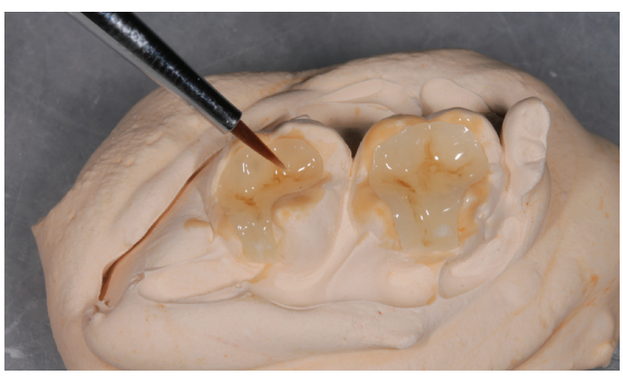
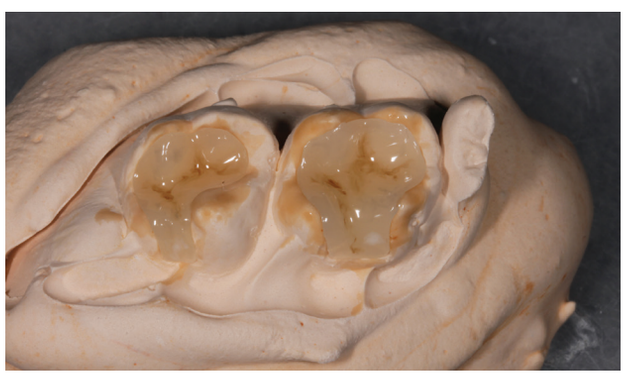


Figure 6: Application of a thin layer of restoration primer (CERAMIC PRIMER II).





Figures 7& 8: Customisation of the CERASMART inlays on the model.

(Fig. 5). Note that in this case, the plaster model was created for demonstration purposes only.

Rather than polishing using the DiaPolisher Paste, according to the manufacturer's recommendation, character may also be added after the preparation using OPTIGLAZE Color Glaze, as was the case here. The restoration was initially degreased with alcohol, cleaned and then steamed. After applying a thin layer of the bonding agent CERAMIC PRIMER II (GC) and air drying it (Fig. 6), we added the various colours using a thin paintbrush and a fine endo needle. A red-brown colour was inserted into the fissures; the cusp ridges and marginal ridges were characterised using a mixture of blue and grey (Fig. 7 and 8). White accents may be added, depending on the structure of the natural teeth. There was no interim curing; the whole workpiece was cured for just 5 minutes in the light curing unit (Solidilite V by Shofu). Once the inlay had been successfully placed, based on a visual check and perfect fit, the workpiece

Figure 9: Selective enamel etching using 37% phosphoric acid as preparation prior to cementation.

Figure 10: Situation after selective enamel etching and application of G-Premio BOND. The cavities appear slightly glossy.

Figure 11: Inlays cemented on teeth 16 and 17 using G-CEM LinkForce.

was prepared for adhesive cementation of the restoration, initially by sandblasting in the laboratory in accordance with CERASMART's instructions for use, and finally steamed clean again.

We prefer this process for its simplicity (alternatively, the restoration can be treated with 5% hydrofluoric acid for 60 seconds, then cleaned and dried). Then, CERAMIC PRIMER II was applied to the intaglio surface as a silane bonding agent. Finally, after selectively etching the enamel using 37% phosphoric acid (Fig. 9 and 10), the inlay was cemented into the cavity using G-CEM LinkForce (Fig. 11).

When the treatment was complete, the inlays integrated well into the natural environment.

An aesthetically pleasing gloss was created thanks to the shiny surface seal (Fig. 12). The image taken at the check-up four months after the treatment confirmed that the restoration was successful (Fig. 13).

Reflection

The new hybrid ceramic CERASMART is a very good material for indirect chairside restorations. As well as the qualities of the material and the individual design options for this hybrid ceramic, I was impressed by the economic aspects of combining CERASMART and OPTIGLAZE color: it is now possible, without requiring much technical expertise or time, to offer an aesthetically pleasing solution that is tailored to the patient. In our practice, we have even gone so far as to let our suitably trained dental assistant carry out the characterisation procedures on the inlays, which helps her develop her consultation skills and motivates her on a personal level.

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Figure 12: Occlusion and articulation check.

Figure 13: Four months after treatment, the restorations fit well into their natural environment.