Easy and efficient: Composite resin blocks for the CAD/CAM technique

Single-tooth restorations with Tetric CAD

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Composite blocks for CAD/CAM applications are on the rise, particularly for producing small restorations, such as inlays, onlays and occlusal veneers. And quite rightly so, for this type of material has a lot to offer: it exhibits sound mechanical properties combined with an extraordinary grading accuracy and it is easy and efficient to process in day-to-day procedures.

The following clinical report describes the workflow to create an esthetic single-tooth restoration using the new Tetric CAD composite block. The blocks are available in two degrees of translucency – HT and MT – and in a variety of shades. They exhibit a pronounced chameleon effect to provide restorations and natural appearance, primarily on the natural dentition, primarily on the natural dentition. Composite resin blocks exhibit a pronounced chameleon effect to provide restorations that blend in well with the optical characteristics of the surrounding residual tooth structure. The material can be polished to a high gloss in a few seconds both intraorally and extraorally. In addition, it can be easily repaired intraorally with conventional composite resins.

Clinical case

The pre-op showed a defective amalgam filling on tooth 36 in the lower posterior region. The filling needed replacing (Fig. 1). The indication for a multi-surface inlay was given: the patient’s wish to have an esthetic, i.e. tooth-coloured restoration.

We decided to opt for the Tetric CAD composite block. This material is part of the portfolio of Ivoclar Vivadent blocks and is suitable for permanent single-tooth restorations. It is supplied in industrially processed, pre-cured blocks that exhibit superior strength and a higher filler content than direct restoratives. Because they have undergone an industrial polymerization process, shrinkage stress is not an issue with Tetric CAD.

Designing the restoration

Shade selection is performed on the natural dentition, primarily on the neighbouring teeth. We decided to use shade HT A2. The HT blocks are a good choice, particularly when it comes to producing fairly small restorations such as inlays as they provide a pronounced chameleon effect. Once the amalgam was removed, the tooth was prepared in line with the recommended preparation guidelines (Fig. 2). Then, an optical impression was taken using an intraoral scanner and the inlay was designed in the CAD module (Fig. 3). Subsequently, the restoration was ground from the block.

Grinding times are considerably shorter for CAD/CAM composite resins compared with other materials. Although the time is softer to grind, the restoration is not affected by this. It only means that the grinding tools are less quickly worn and offer a longer service life, maximizing the cost efficiency of the practice.

Composites are “flexible” materials. Their modulus of elasticity is similar to that of dentin. High flexural strength provides adequate resistance and stability. Given their low brittleness, composites can be ground to exhibit highly homogenous surfaces and to obtain an accurate, thinly tapered margin without loss of strength. Marginal chipping or crack formation are unlikely to occur.

In the present case, the try-in was performed immediately after the grinding process to check the fit of the inlay with the natural residual tooth structure (Fig. 4). Conditioning the restoration

To condition the restoration, Adhese Univeral was applied and scrubbed into the pre-treatment bonding surface for 20 seconds and then conditioned, rinsed and air-dried for this step.

Conditioning the inlay was performed immediately after the grinding process to check the fit of the inlay with the natural residual tooth structure (Fig. 5). Subsequently, the restoration was ground from the block.

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Placing the restoration

The inlay was seated using VarioLink® Esthetic luting composite. The luting composite was applied directly from the syringe onto the bonding surface and then the inlay was seated and retained in position using light emitting a light intensity of at least 500 mW/cm² should be used for this step. Pre-treating the prepared tooth

Adequate isolation of the operating field is required for reliable bonding. The tooth preparation was cleaned and then conditioned, rinsed and dried using a conventional etch & rinse procedure. Adhese Universal was applied onto the bonding surface for 20 seconds and then dispersed (Fig. 7). The adhesive was then light cured for 10 seconds using the Bluephase Style curing light (Fig. 6). According to the manufacturer’s recommendation, a curing light emitting a light intensity of at least 500 mW/cm² should be used for this step.

The attachment point was easy to smooth out with fine-grit diamonds. This was followed by external polishing using composite polishers (e.g. OptiPow®) (Fig. 8). Particularly noteworthy was the speed with which the restoration was polished to a high gloss. It only took a few seconds to achieve a glossy surface (Fig. 8). Composites do not require an additional glaze firing cycle. This has a positive effect on the time resources of the practice.

It is essential to condition and pre-treat the bonding surface correctly. This requires the use of an adhesive system that is appropriate for this type of material to ensure the longevity of the restoration. The manufacturer’s instructions should be followed at all times.

In the present case, the bonding surface of the inlay was air-blasted with aluminium oxide (50–100 μm) at a pressure of 1.5 bar, followed by thorough rinsing (Fig. 7). The restoration can be cleaned either in an ultrasonic unit or with a steam cleaner. It is recommended to additionally clean the restoration with 70% ethanol to disinfect it. Pre-treating the restoration in this way is mandatory for Tetric CAD because air-blasting increases the surface area and creates a retentive pattern that acts as a basis for the adhesive cementation. Pre-treating therefore ensures a reliable bond between the luting material and the restoration.

To condition the restoration, Adhese Universal adhesive was applied and scrubbed into the pre-treated bonding surface for 20 seconds using a microbrush (Adhese Universal is also available in the VivaPen® delivery system for direct applications). It is important to observe the recommended agitation time to ensure that the adhesive can penetrate sufficiently (Fig. 8). Excess material is carefully dispersed using compressed air until a glossy, immobile film results. Pooling must not cause a “buffering effect” as is of...
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At the final curing stage, the adhesive on the bonding surface and the luting composite are cured together (exposure time: 10 seconds per mm of composite and segment). It is recommended to use a curing light that produces a light intensity of at least 1,000 mW/cm² for this step.

**Fig. 13:** Applying Liquid Strip to prevent the formation of an inhibition layer

**Fig. 14:** Light-curing all segments for 20 s per mm of composite using a Bluephase Style

**Fig. 15:** Occlusal check followed by intraoral polishing with OptraPol

**Fig. 16:** Inlay in situ: great optical integration thanks to chameleon effect

### Conclusion

Highly esthetic permanent single-tooth restorations can be achieved with the composite blocks of the Tetric CAD range in really short times. The guidelines for the adhesive technique need to be observed and a coordinated luting system must be used.

Easy and rapid processing and polishing procedures and the possibility for effecting intraoral repairs, similar to conventional filling composites, enable a highly efficient treatment workflow and increase the efficiency of day-to-day procedures in the dental practice.

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