Making a perfect ceramic crown on a titanium abutment in the esthetic zone

Overcoming a challenging situation step by step

By MDT Patrick Rutten, Belgium

For reasons of strength, a titanium abutment may be required in the esthetic zone. However, making the dark metal to achieve a natural-looking outcome will present a challenge.

A ceramic crown with a zirconia coping should be used to mask the metal abutment. A layering protocol is used to create natural light and color and avoid a greyish-looking gingival tissue in the cervical area. In the following clinical report, MDT Patrick Rutten (Tessenderlo, Belgium) presents how to handle such a challenging situation and obtain predictable white and pink esthetics.

Clinical situation

More than 40 years after a sports injury, extensive caries was detected radiographically under a post crown on a maxillary right central incisor (Fig. 1 and 2). The tooth was determined to be nonrestorable and was extracted. After a healing period of eight weeks, an implant was placed (Fig. 3) together with allogenic bone augmentation and soft tissue regeneration with a free connective tissue graft harvested from the palate. A healing abutment was screwed onto the implant and a removable provisional denture provided. For strength reasons, a custom CAD/CAM-fabricated titanium abutment was chosen (Fig. 4). "I do not prefer using titanium in the front if possible, but in this case, function is more important than esthetics," Rutten explains.

The challenge was now to veneer a zirconia coping with the fine structure (fikadur ceramic VITA VM 9) to reproduce the natural appearance of the adjacent teeth and to support and sculpt the soft tissue for optimal gingival management. "Working with a titanium abutment is very difficult. The gingiva can look greyish. We have to mask the greyish cervical part," Rutten warns. Precise shade determination was the first essential for success.

To guarantee a perfect shade match, the VITA Linearguide 3D-MASTER was used (Fig. 5) to cover the whole three-dimensional tooth shade spectrum and to allow shade determination in three defined steps. In the first step, the shade value was verified, followed systematically by chroma and hue. The basic shade of the adjacent tooth was measured digitally with the VITA Easyshade V spectrophotometer. Independently of one another, the expert and the digital device both determined the tooth shade to be 3M2. For Rutten to achieve a shade match between the natural teeth and the restorations, the correct basic shade is highly important.

Layering procedure

The zirconia coping was virtually designed, milled, sintered, and fitted to the implant and to allow shade determination in three defined steps. In the first step, the shade value was verified, followed systematically by chroma and hue. The basic shade of the adjacent tooth was measured digitally with the VITA Easyshade V spectrophotometer. Independently of one another, the expert and the digital device both determined the tooth shade to be 3M2. For Rutten to achieve a shade match between the natural teeth and the restorations, the correct basic shade is highly important.

VITA VM 9 BASE DENTINE 3M3 with a higher chroma was used in the cervical area to mask this critical area and to mask the lifeless and greyish appearance of the titanium abutment. Yellow EFFECT CHROMA 4 (EC4) was then applied with a deeper orange in the interdental areas with a mixture of EFFECT CHROMA 5 (golden rod) and 6 (sunflower) to enhance the masking effect. For the incisal third area, a higher value was selected with 3M2. To create the ridges, the bluish area, a higher value was selected with EFFECT CHROMA 5 (golden rod) and applied with a deeper orange in the interdental areas with a mixture of EFFECT CHROMA 5 (golden rod) and 6 (sunflower) to enhance the masking effect.
EFFECT ENAMEL 9 (EE9) mixed with ENAMEL LIGHT (ENL) was chosen (Fig. 6 a-f) The synergy of these three basic components is essential for the incisal edge:

- Color
- Enamel
- Translucency

VITA VM 9 ENAMEL LIGHT and EFFECT ENAMEL 9 (EE9) were layered to create a blush accentuation and replicate natural esthetics. In addition, VITA INTERNO ceramics played an important role in increasing fluorescence and natural warm color effects with internal characterization. These characteristics should always be arranged irregullarly for a natural appearance.

To achieve a contrast, BASE DENTINE was layered onto the palatal side of the incisal edge. During contouring the ceramic mixture must remain creamy and stable to achieve an efficient and successful layering procedure. This layer was increased slightly to allow for intraoral adjustment. An implant crown should be adjusted so that functional loading is minimized.

EFFECT ENAMEL 9 (EE9) were layered VITA VM 9 ENAMEL LIGHT and EFFECT CHROMA 4 (lemon drop) and BASE DENTINE to mask the transition areas. This is Rutten’s general advice for finding the correct ceramic shade combination: “Getting the right mixture will sometimes take more time than the layering itself. Don’t start mixing thousands of powders.”

Be careful with translucency! If the crown contour needs to be increased, translucent porcelain should never be added since the addition will always reduce value and chroma. Using too much translucent enamel is a common mistake, which will automatically lead to a grayish-looking tooth. BASE DENTINE should be used again to correct the deficient contour (Fig. 7 and 8). If the value has to be changed, the technician should go back two steps and correct the basic value. “The basic value is the most important thing for me. You should play around with it,” is Rutten’s strategy. The palatal side was layered with EFFECT CHROMA 4 (lemon drop) and BASE DENTINE to mask the transition between coping and layering in these areas. This is Rutten’s general advice for finding the correct ceramic shade combination: “Getting the right mixture will sometimes take more time than the layering itself. Don’t start mixing thousands of powders.”

Finishing the restoration Maintaining adequate healthy pink-colored gingiva is challenging for the dentist, especially around implant restorations. To accomplish optimal gingival architecture, the shape of the neighboring lateral incisor was replicated and the gingival papilla supported to avoid creating black triangles. The distal and mesial marginal ridges were created with a fine diamond instrument to produce a fluent curvature toward the apex. After the fine-structure feldspar ceramic was fired, the subgingival areas were contoured and polished with a rubber wheel to create a smooth and compatible environment for the surrounding soft tissue. The chipped adjacent tooth was matched in the restoration, although in a different location for a more natural outcome. A vertical crack line was accomplished with a fine tungsten carbide bur. As Rutten says: “You can place your cracks two or three millimeters away from the position on the corresponding neighboring tooth. We need an irregular crack line.” Final characterization was achieved with VITA AKZENT Plus EFFECT STAINS and then fired. “I try to create something soft without overdoing it,” says Rutten in describing this final step.

“Make the best, but keep it simple!” The goal should be to keep the technique straightforward and to know when a restoration is finished so that time is not wasted and economic goals are met. Consequently, every veneering procedure should be consistently ended at some point. The crown was clinically evaluated before the final glaze firing (Fig. 9 a-f). After evaluating the esthetics, function and occlusion, the restoration was finalized in the dental laboratory and definitively cemented (Fig. 11 - 14). The restoration looked exceptionally natural and integrated harmoniously in the esthetic zone. Texture and ceramic layering created a highly esthetic combination of contour and color. The crown supported the gingival architecture and was thereby able to accomplish pink esthetics. The patient was delighted with his new restoration and appreciated the outcome. Thanks to know-how, technical skills, interdisciplinary teamwork, and outstanding ceramics, a challenging clinical case was solved in a highly esthetic manner.

Source
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Celtra® Press – All Ceramic Power

By Dentsply Sirona

Life’s getting easier! In today’s dental laboratory, selecting the right material has become a complex issue. Dental technicians are continually confronted with new materials whose development often paves the way for more advanced forms of dental rehabilitations. Celtra® Press Zirconia-Reinforced Lithium Silicate, is a new material on the market that makes life for dental technicians easier. Its excellent optical properties open up new and better options in the area of high-strength glass ceramic restorations. Master dental technician Hans-Jürgen Joit discusses the ideal optical properties required from a material and illustrates how Celtra® Press meets the high aesthetic demands from both dentists and technicians today.

Conclusion

The material properties of Celtra® Press allow the dental technician to concentrate more on the morphological aspects of the optical effect is the opalescence of the material. With Celtra® Press, in transillumination the teeth appear more orange, while in direct incident light they appear bluish.

Fig. 1: This image shows two rows of samples of polished opals for use in jewellery. The top row has been photographed with a flash from above; the opals appear as radiant blue in the incident light. The lower row has been photographed with a flash from below; the samples appear to be made of a completely different material. This interaction is a basic prerequisite for the optical introral acceptability of a dental material.

Fig. 2: Ultimately, our goal as dental technicians is to produce copies of natural teeth with exactly the same characteristics. One of the main aspects of the optical effect is the opalescence of the material. With Celtra® Press, in transillumination the teeth appear more orange, while in direct incident light they appear bluish.

Fig. 3: This image shows six Celtra® Press veneers, about 0.6 to 0.8mm thick, placed on the window sill in the laboratory and transilluminated by sunlight. The special microstructure, with its particularly fine crystalline structure and high glass-content, provides the material with outstanding light-optical properties. Thanks to this combination of high translucency and opalescence Celtra® Press exhibits an amazing chameleon effect to surrounding teeth in the mouth. Restorations fabricated with it blend into the natural dentition extremely well and assure users maximum aesthetics for mimicking natural teeth.

Fig. 4: The same jewellery opaque as previously photographed in transillumination and in incident light, now in cross polarised light. An orange-blue flicker and a lively, playfully changing colour can be seen.

Fig. 5: Shows previously transilluminated Celtra® Press veneers in polarised light. Celtra® Press possesses the same characteristics as the polished opals, meaning it has an optimised balance of translucency and natural opalescence resulting in a game-changing chameleon effect (in-vivo blending) that makes the restoration indistinguishable from the natural tooth.

Fig. 6: This image shows an extracted natural tooth with a Celtra® Press MT coping in A2. The coping was merely fitted on the tooth and manually polished. Note the conspicuous transition from the unprepared root to the Celtra® Press crown. The crown practically becomes a part of the tooth.

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