A case study using Dentsply Sirona’s Celtra® Press System

Aesthetic rehabilitation of the anterior mandible after tooth loss due to periodontal disease

By Dentsply Sirona

Tooth loss in the anterior mandibular region can be a challenging situation for dentists and dental technicians tasked to provide an aesthetically pleasing prosthodontic rehabilitation. For reasons of stability, a solid, torsion-resistant framework is a must in these cases. Metal frameworks have the drawback that thinner ceramic veneer layers may yield aesthetically less satisfactory results. Monolithic zirconia frameworks usually do not meet the aesthetic requirements of the dentist and patient in these situations. However, care must be taken to ensure sufficient strength even for delicate bridges to achieve satisfactory long-term results.

The case described here was treated with the new Celtra® Press pressable ceramic system. This outstanding system combines high strength with brilliant aesthetics and is ideally suited for demanding cases such as this one.

Case report

The patient first presented in December 2015 with no systemic conditions, except that the patient was allergic to penicillin. A few years earlier she had been diagnosed with periodontitis, in the course of which tooth #24 had become mobile and had had to be extracted. Prosthetic rehabilitation was performed at another dentist with an adhesive bridge from tooth #23 to #25. This bridge had loosened several times and had to be rebonded at regular intervals. There was a ceramic implant at site #12, and all four quadrants included posterior teeth with ceramic inlays or partial crowns as well as composite fillings. Horizontal bone loss due to persistent chronic periodontal disease in the posterior region was evident radiographically.

The patient requested an aesthetic, durable and stable restoration for teeth #23 to #25 and rejected an implant-supported crown at site #24. Having presented several alternative types of bridge restorations, the patient and dentist opted for a bridge made of a highly translucent all-ceramic material. As this case required both excellent aesthetics and high strength, we decided to use the Celtra® Press high-strength ceramic system.

The shade of the teeth was taken and the teeth were prepared under infiltration anesthesia, followed by taking an impression and by recording the habitual occlusion. The prepared teeth received a temporary acrylic resin restoration (Figs. 1 to 4). In the dental laboratory, a saw-cut approach was undertaken, and the data imported into the CAD software. Thanks to the highly precise definition of the preparation margins, the software recognised them with 100% accuracy and integrated the data within fractions of a second (Figs. 6 and 7). The models were placed in the virtual articulator and the occlusion was transferred (Figs. 8 and 9).

Fig. 1: Clinical baseline situation and shade selection.
Fig. 2: Preparation of the abutment teeth.
Fig. 3: Precision impressions.
Fig. 4: Provisionalization.
Fig. 5: Model dies with accurate representations of the preparation margins.
Fig. 6: Representation of the dies in the CAD software.
Fig. 7: Detail of the preparation margin.
Fig. 8: The models in the virtual articulator.
Fig. 9: Bridge design using the CAD software.
Fig. 10: Reduction of the vestibular surfaces for the cut-back method.
Fig. 11: Finishing the contours.
Fig. 12: Cut-back and layering technique using Cercon® base wax.
Fig. 13: Only a single sprue needs to be attached to the bridges.
Fig. 14: Detail of the sprue.
Fig. 15: Investing with Celtra® Press Investment.
Fig. 16: Placing the muffle in the pressing furnace.
Fig. 17: Divesting.
Fig. 18: After divesting, no reaction layer is present on the objects.
Fig. 19: Framework after sandblasting: no reaction layer and crisply defined structures.
Fig. 20: Excellent initial fit, no finishing needed.
to examine their relationship with the TML and a bridge was designed on-screen with due regard to articulation and occlusal relationships, something that presented a special challenge due to the end-to-end occlusion (Figs. 8 and 9). Finally, the bridge framework was reduced by 0.5 mm in preparation for the cut-back and layering technique, and the contours were finished (Figs. 10 and 11).

The framework was milled completely in Cercon® base wax for the cut-back and layering technique (Fig. 12). In the present case, we produced two bridge frameworks to test the simple sprouting technique that uses only a single sprue for the pressing procedure (Figs. 13 and 14). Celtra® Press Investment, specially developed for this new pressable-ceramic system, is characterised by very low viscosity, making it easy to pour into the investment ring and assuring a precise flow around the fine details of the object (Fig. 15). After setting, a 6 g Celtra® Press pellet was placed on the muffle, which was then introduced into the pressing furnace.

Denting after pressing proved to be very easy and was achieved simply by removing excess investment compound and sandblasting. One of the main advantages of Celtra® Press and Celtra® Press Investment is that virtually no reaction layer is present on the object after sandblasting, completely eliminating the acid-etching step with hydrofluoric acid (Figs. 17 and 18). After sandblasting, the framework exhibited a perfect surface without any reaction layer; all details of the objects had been reproduced meticulously (Fig. 19). No finishing was required beyond cutting off the sprue.

The initial fit of the framework was excellent (Figs. 20 and 21). The outstanding aesthetic properties manifested themselves when transmitting light through the Celtra® matrix on the cast (Fig. 22). The framework was veneered with dentins and enamels in two firing cycles (Figs. 23 to 27). Both the fit of the bridge and its aesthetic appearance were as impressive as the master cast as they appeared intraorally during the try-in (Figs. 28 to 30). Both the patient and attending dentist were amazed at the result.

**Summary**

The case presented here describes the rehabilitation of an aesthetically compromised mandibular anterior tooth that had been lost to periodontal disease, with a delicate bridge design. This had become necessary because the patient had rejected implantological treatment followed by a single-crown restoration.

The inherent challenge in the situation was to create a restoration of excellent aesthetic quality while at the same time ensuring sufficient strength to guarantee a stable result for many years. This balancing act was successfully achieved with the new pressable-ceramic system Celtra® Press, because this zirconia-reinforced lithium silicate offers exceptional material properties not found in conventional lithium disilicates.

This new material with its clear translucence combines superior aesthetics with a strength that nevertheless exceeds 500 MPa—a value that no other lithium silicate can top. The result of the treatment was thrilling for the dentist and the patient alike.

For more information on how the Celtra® Press System can benefit your lab, please contact your local Dentsply Sirona representative.
Achieving more with less
Wafer-thin and brilliantly shaded: lab fabricated non-prep veneers for correcting misaligned teeth

By Carola Wohlgenannt, MDT, Austria

Lab-fabricated non-prep veneers made it possible to sidestep orthodontic treatment in the clinical case presented in this report. Despite the limited space available, brilliant shade dynamics were achieved with the help of specially shaded Enamel and Effect materials (IPS e.max Ceram Selection).

"Less is more". However, using less is often difficult. In view of the high demand for minimally invasive restorations, dental technicians are presented with new challenges in many cases. The extent of the preparation is often reduced to minimize the invasiveness of the treatment, leaving only limited space for the fabrication of an aesthetically pleasing, functional restoration. Such situations necessitate adequate ceramic materials and an experience to reproduce the subtle interplay of shades seen in natural teeth. While previously various ceramic powders had to be combined with each other to create the desired mixture, this procedure has now been simplified with the introduction of new ceramic materials.

The three Light Absorber materials with light-absorbing properties are used to increase the in-depth effect. With this variation in materials, imitating natural teeth with individual characteristics is much easier than before. The range of possibilities is particularly convenient in cases where space is limited, such as in very thin restorations (e.g. veneers).

Clinical case
The approximately 40-year-old patient wanted the position of her teeth corrected (Fig. 1). She consulted her dentist with regard to this problem. She rejected orthodontic treatment because of the expected costs, the long treatment time and the limitations during therapy. An orthodontist had recommended the extraction of a tooth in the lower jaw to compensate for the crowdedness and to provide the basis for orthodontic treatment. All of this was out of question for the patient. She also emphasized that no tooth structure should be removed for the esthetic correction.

Treatment plan and mock-up
The possibilities of an aesthetic improvement in the upper jaw were discussed together. In particular, teeth 11 and 13 were responsible for the unevenness in the dental arch. The teeth were inclined from the axial to the palatal. The idea was to use two ceramic non-prep veneers to correct the misalignment and achieve harmony in the dental arch. With the help of a study model, the ideal tooth position was established in wax (Fig. 2) and then converted into a so-called easy resin veneers (mock-up). The first impression after the placement of the mock-up was positive. There was a strong aesthetic effect. The patient agreed to the treatment.

Challenge: reproducing the shade of the natural tooth
The shape and morphology of the veneers were defined by the mock-up.

Now a matching tooth shade for the ceramic materials had to be determined. The challenges were posed by the dynamic interplay of shades, the "beautiful" translucency of the natural anterior teeth and the limited space available. How can the light-optical properties be reproduced as perfectly as possible in only a wafer-thin optical properties?

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Fig. 1: Incisal view of the preoperative situation
Fig. 2: Mock-up in wax placed on the model
Fig. 3: Selecting the basic tooth shade (Drachen Shade, Drachenberg & Bellmann)
Fig. 4 & 5: Selecting the IPS e.max Ceram Selection materials using shade tabs. On the right: shade tab with the intensive enamel shade "quartz"; on the left: shade tab with the light intensive Effect material "cream"
Fig. 6: Master model with dies made of investment material
Fig. 7: Investment material dies are being soaked with water
Fig. 8: Building up the veneer for tooth 11 using IPS e.max Ceram Selection materials
Fig. 9: Incisal view of the completed veneers on the model
Fig. 10a: Veneer 11 features an insertion handle at the incisal edge to be removed by grinding once the restoration is seated
Fig. 10b: Despite their thin layer thickness, the veneers exhibit natural light-optical properties.
Creating the veneers

Refractory dies for teeth 13 and 11 were created with the help of the master model (Fig. 6). The dies were then soaked in water to prevent them from drawing moisture from the ceramic materials during the layering procedure (Fig. 7). The veneers were built up in layers in accordance with the shape defined by the mock-up (Fig. 8). No dentin material was used. The colour-intensive effect shade “cacao” was used for the dentin-core replacement. The other Effect shades selected served to bring out the warm-translucent interplay of shades. It did not take long to build up the veneers in ceramic. However, the esthetic appearance of a restoration is not determined by the shade effect alone. Subtle, noticeably clear and yet at the same time harmonious surface structures can underline the natural appearance of a restoration. Adequate time and attention was therefore dedicated to designing the surface morphology of the veneers. At the final firing, the ceramic surfaces were slightly smoothed and, if necessary, refined by mechanical polishing. Polishing was carried out carefully by hand. Figure 9 shows that the teeth were successfully brought into alignment with the adjacent teeth to create a harmonious appearance. An initial estimation in the dental lab showed that the veneers demonstrated a natural interplay of shades in spite of the thin material thickness (Fig. 10). However, the effect in the mouth will ultimately decide the success of the restoration.

Seating the restoration and final result

An essential aspect for the success of veneers is the cementation procedure. No matter how brilliant the ceramic materials are and how skillful the work of the dental technician is, if the shade of the adhesive cementation material is not chosen correctly, the joy of the “new smile” will be short lived. VarioLink® II luting composite in shade neutral was selected for incorporating the veneers. Prior to placing the veneers, they were tried in with try-in paste to confirm that the treatment goal had been achieved. Once the ceramic veneers and tooth surfaces were conditioned (Fig. 11), the veneers were bonded to the teeth. The result was impressive. Teeth 13 and 11 now blended in harmoniously with the adjacent teeth and the shape defined by the mock-up (Fig. 8) had been checked, the patient was discharged from the practice leaving nothing to desire. The intrinsic interplay of shades and attention was therefore dedicated to designing the marginal ridges (Fig. 5). No dentin material was used. The colour-intensive effect shade “cacao” was used for the dentin-core replacement. The other Effect shades selected served to bring out the warm-translucent interplay of shades. It did not take long to build up the veneers in ceramic. However, the esthetic appearance of a restoration is not determined by the shade effect alone. Subtle, noticeably clear and yet at the same time harmonious surface structures can underline the natural appearance of a restoration. Adequate time and attention was therefore dedicated to designing the surface morphology of the veneers. At the final firing, the ceramic surfaces were slightly smoothed and, if necessary, refined by mechanical polishing. Polishing was carried out carefully by hand. Figure 9 shows that the teeth were successfully brought into alignment with the adjacent teeth to create a harmonious appearance. An initial estimation in the dental lab showed that the veneers demonstrated a natural interplay of shades in spite of the thin material thickness (Fig. 10). However, the effect in the mouth will ultimately decide the success of the restoration.

In principle, such challenges can only be met if the dental technician understands the light-optical properties of natural teeth and is able to use appropriate ceramic materials. The procedure described in this report eliminated the need for dental technicians to mix the individual materials themselves. Suitable materials in the ideal shade could be applied “directly from the lab”. In this way, the balancing act between maximum esthetics and minimum invasive-