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 2013 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 tooth #25. This bridge had loosened several times and had to be re-bonded 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.

For reasons of stability, a solid, torus-shaped framework was chosen to ensure sufficient strength even for demanding cases such as this one.

The patient requested an aesthetic, durable and stable restoration for tooth #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 method was used to create the preparation margins defined clearly and precisely with the aid of a microscope (Fig. 5). The casts were scanned in the virtual articulator 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 articulated for the bridge design using the CAD software (Fig. 9). The models were subsequently invested with Celtra® Press Investment (Fig. 15) and placed in the pressing furnace (Fig. 16). After pressing, the muffle was cooled down to room temperature before the muffle was opened, and the frameworks were removed (Figs. 17 and 18).

After sandblasting, no reaction layer was present on the objects (Fig. 19). The frameworks were then placed in the virtual articulator and articulated with the models (Fig. 8) and the data imported into the CAD software. The models were subsequently invested with Celtra® Press Investment (Fig. 15) and placed in the pressing furnace (Fig. 16). After pressing, the muffle was cooled down to room temperature before the muffle was opened, and the frameworks were removed (Figs. 17 and 18).

The patient was satisfied with the result, which met the aesthetic requirements of both the dentist and patient. The patient and dentist were delighted with the excellent fit and the high aesthetic result of this case using the new Celtra® Press pressable ceramic system.

REFERENCES


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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 0.5mm 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 spruing 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 6g Celtra® Press pellet was placed on the muffle, which was then introduced into the pressing furnace. Divesting 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 25). Both the patient and attending dentist were amazed at the result. Divesting 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.

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**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 esthetically pleasing, functional restoration. Such situations necessitate adequate ceramic materials and 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 required mixture, this procedure has now been simplified with the introduction of new ceramic materials. IPS e.max® Ceram Selection are specially shaded Enamel and Effect materials with brilliant shades and natural-looking light-optical properties.

The range comprises twelve shades that are divided into three groups. The six Special Enamel shades are designed to produce lively translucency effects in the enamel area. The three Light Reflector Effect materials have light-reflecting capabilities and are suitable for areas where a high brightness value is desired.

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.

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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 axis towards 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 "fast and easy" resin veneers (mock-up). The first impression after the placement of the mock-up was positive. There was a strong "aha" effect. The patient agreed to the treatment. The existing chalky spot on tooth 21 was masked with composite in the dental practice.

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 veneer? This is particularly convenient in cases where space is limited, such as in very thin restorations (e.g. veneers).

Fig. 2: Mock-up in wax placed on the model

Fig. 3: Selecting the basic tooth shade
(Dragon 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 the 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 of the veneer “shade cream” 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 aesthetic appearance of a restoration is not determined by the shade effect alone. Subtle, barely noticeable surface structures can underline the natural appearance of the restoration. Adequate time and attention was therefore devoted to designing the surface morphology of the veneers. At the final firing, the ceramic surfaces were slightly smoothed and, once fired, 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 evaluation 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. (Fig. 8 and 9).

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 core material is not chosen correctly, the joy of the “new smile” will be short lived. Viateryl was selected to emphasize the bluish translucent areas along the marginal ridges (Fig. 13). It was therefore decided to use the Enamel and Effect material concept of IPS e.max Ceram System to provide the solution to this conundrum. First, the basic tooth shade was determined, for which shade samples mounted on a gingiva shield (Dragon Shade, Drachenberg & Bellmann, Germany) were used (Fig. 9). Conventional shade tabs - without gingival section - may impair the result. Already during the selection of the basic tooth shade, it became evident that standard dentin materials would not be sufficiently intensive to reproduce the natural tooth shade due to the thin layer thickness with which the veneer had to be created. It was therefore decided to use the Enamel and Effect materials of the IPS e.max Ceram System range. Self-made shade samples were used as reference for the targeted selection of the materials. Among others, the Light Reflector Effect material in shade “aquas” was selected to emphasize the bluish translucent areas along the marginal ridges (Fig. 9).

The enamel shade “sprout” should lend warmth to the incisal, enhance the translucency and heighten the chroma. In addition, the slightly greyish but still warm enamel shade “quartz” was chosen.

Conclusion

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 demonstrated 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 tab”. In this way, the balancing act between maximum esthetics and minimum invasive-ness was successfully and reliably accomplished.

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