Celtra Duo (ZLS): The Ideal CEREC® Material for High-Strength Clinical Applications
A Q&A with Dr. Sven Rinke with accompanying full-contour partial crown case study

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Abstract
This Q&A details Dr. Sven Rinke’s clinical experience with Celtra Duo (ZLS), a high-strength zirconia-reinforced lithium silicate (ZLS) ceramic material made specifically for use with CEREC®. The article features a case study in which a failing cast gold inlay is replaced with a full-contour partial Celtra Duo (ZLS) crown.

About Dr. Sven Rinke
Dr. Rinke works in the Department of Prosthodontics at Georg-August-Universität Göttingen and in a private dental clinic in Hanau, Germany. His fields of research cover periodontology, implantology, and new materials for all-ceramic restorations.

Although a relative newcomer to the U.S. dental market, Celtra Duo (ZLS) has been available for use in Europe since 2012.

Dr. Sven Rinke, of Hanau, Germany, has been using Celtra Duo (ZLS) in his private practice since late 2012. With more than 300 restorations clinically, Dr. Rinke has collected more than 3 years of in-vivo data on Celtra Duo (ZLS), which will be presented at this year’s International Association for Dental Research (IADR) General Session in London. Highlights of his findings include a 3-year in-vivo survival rate of 97.7%, confirming the positive findings of existing in-vivo results. ceredoctors.com spoke to Dr. Rinke about his experience working with Celtra Duo (ZLS) to learn more about this innovative and versatile CEREC restorative material.

Dr. Rinke, when did you start using Celtra Duo (ZLS) and why — what were the motivating factors involved in your decision to use the material?
In late 2012 we milled our first Celtra Duo restoration. At that time, the manufacturer claimed some unique properties for this new material category, named zirconia-reinforced lithium silicate (ZLS) ceramics, including a mechanical strength comparable to, or even better than, the well-established lithium disilicate materials and excellent optical properties with a high translucency to improve the chameleon effect. Due to the material composition, polishing was claimed to be easier and faster. All these aspects make ZLS ceramics very interesting for the fabrication of chairside restorations. The very first restorations we placed convinced us that this material really is a powerful tool in our CEREC treatment concept.

Figs. 1-2: Clinical example of a restoration fabricated from Celtra Duo (ZLS) with the fast-track option: the restoration is polished only (not fired) and the pronounced chameleon effect provides a good esthetic result.
What aspects/characteristics of the material make it an improvement over (or different from) other materials you’ve used in the past, and why?

Before we started using Celtra Duo, we had different materials for our main chairside indications: For inlays and onlays, we used a feldspathic porcelain (e.g., VITA Mark II, VITA Zahnfabrik), as this material is densely sintered and requires no post-processing apart from polishing. This guarantees relatively short fabrication times; however, the mechanical properties are limited. Therefore, extended restorations like partial crowns need a material with improved mechanical properties. This was the field of indication where we used high-strength glass ceramics as the standard material. Apart from the already mentioned positive material aspects, the main advantage of the Celtra Duo material is that it can be processed in two ways.

The “fast track” is to mill the material and just polish it before cementation. In this state, the material has a three-point bending strength of around 210 MPa, which is strong enough for inlays and onlays. This fabrication route requires no individual stain or firing process. So the complete fabrication process (milling, polishing) takes less than 30 minutes. The second option is the “improved strength track.” The mechanical strength of the material can be improved from 210 MPa after the milling process to 370 MPa by firing. This firing process produces improved mechanical properties matching or even exceeding the mechanical values we know from other high-strength glass ceramics. This option is ideal for the fabrication of extended restorations like partial or full crowns. So, with Celtra Duo, we have reduced the range of materials we use in our treatment concept, which is a relevant economic aspect, as we could reduce the number of blocks we have to keep in stock.
Celtra Duo (ZLS) is a unique CEREC material as it gives the clinician a choice of two processing pathways: mill and polish or mill and fire. You have years of experience working with Celtra Duo (ZLS); tell us about the merits of both pathways from your own clinical experience working with the material, and also discuss which clinical indications are more suitable for the mill and polish vs. the mill and fire pathway, and vice versa?

As already mentioned, we are working with the fast track, which means milling and polishing for inlays and medium-sized onlays. For us, the combination of these indications with this fabrication option means a faster production with reduced chair time. Compared to the material we used before, one of the main benefits of the Celtra Duo material is the improved optical properties, leading to an improved chameleon effect and the fact that the material is easy to polish, resulting in highly esthetic restorations. Figs. 1 and 2 show a clinical example of a restoration fabricated from Celtra Duo with the fast-track option. The restoration is just polished, and the pronounced chameleon effect provides a good esthetic result that blends in with the patient's natural dentition.

Please walk us through a clinical case from preparation to placement, with emphasis on the key material processing steps (“technique”) necessary to produce a Celtra Duo (ZLS) restoration, including the Celtra Duo (ZLS) pathway chosen for the case (mill and fire, or mill and polish — your decision).

One of our very frequent indications for a chairside restoration is monolithic ceramic partial crowns, where we use the “improved strength track” routinely. In the following case, a gold inlay had to be replaced (Fig. 3). Preparation, according to the commonly accepted guidelines resulting in a minimum material thickness of at least 1.5 mm, was completed (Fig. 4). Prior to digital impression taking, two layers of non-impregnated retraction cords (Size 00 and 1) (Ultrapak, Ultradent Products, Cologne, Germany) were placed. Intraoral scanning was performed with powder-free technology using a CEREC Omnicam (CEREC Omnicam, Dentsply Sirona, Bensheim, Germany) (Fig. 5). For the design of the partial crowns, the Biogeneric Individual feature was selected. Proximal and occlusal contact dimension was set to 25 µm. Spacer thickness was...
reduced to 50 µm, and the minimum occlusal thickness was adjusted to the material-specific value (1.5 mm). Finally, the design suggestion was slightly modified regarding position and size with the respective design tool (Fig. 6).

The restoration was then milled as a full-contour monolithic partial crown from a crystallized ZLS ceramic using a practice-based compact milling unit (CEREC MC XL, Dentsply Sirona, Bensheim, Germany) in a wet grinding process (Fig. 7).

The Celtra Duo material type HT (high translucency) in VITA shade A3 was selected to create a pronounced chameleon effect when milling the partial crown. Depending on the size of the restoration, the milling process takes between 10 and 14 minutes. After machining the restorations, the sprue was removed first, then the occlusal surfaces were reworked using the same fine-grit size instrument (8390.314.016, Gebr. Brasseler, Lemgo, Germany).

Brasseler, Lemgo, Germany). The intraoral try-in (Fig. 8), including internal and proximal contact adjustment, was the next step. Selective adjustment could be performed with water-cooled fine diamond instruments (8390.314.016, Gebr. Brasseler, Lemgo, Germany).

When fabricating posterior Celtra Duo crowns and partial crowns, firing is recommended to increase the final three-point flexural strength from 210 MPa to 370 MPa. The restoration was cleaned using a steam jet unit and subjected to a first-firing process at 820°C (heating rate 60°C/min, hold time 1 min), which was combined with individual staining (Fig. 9) of the restoration (Celtra Universal Stain & Glaze, Dentsply Sirona Prosthetics, York, PA). It is necessary to coat the entire surface with the glazing material to obtain a uniform glossy finish. In this case, an additional glaze firing was performed at 770°C (heating rate 60°C/min,
hold time 1 min) to accentuate the shade.

The restoration was then polished with diamond-impregnated silicone instruments (94020F.204.040. Gebr. Brasseler, Lemgo, Germany) at moderate speed (not exceeding 8,000 rpm) using a diamond polishing paste (Direct Dia Paste, Shofu Dental, Ratingen, Germany) and adhesively luted (Fig. 10).

You've mentioned the strength of Celtra Duo (ZLS) as an important factor for choosing to work with this material. What are your clinical observations with this material in respect to the strength, durability, and longevity of Celtra Duo (ZLS) restorations?

In 2013, we started to conduct a clinical trial to evaluate the clinical performance of Celtra Duo partial crowns placed in three private practices by experienced CEREC users. In the meantime, we have collected 3-year data for more than 90 restorations, which we will present at this year's IADR General Session in London. The results confirm the positive findings of existing in-vivo results. The 3-year survival rate was 97.7%.

Margin strength and durability are critical with any restoration, and particularly so with full-coverage CEREC crowns. Approximately how many Celtra Duo (ZLS) crowns have you placed in total, and is there anything remarkable to report about the overall strength of this material?

In the meantime, we have placed more than 300 Celtra Duo restorations in our office. Our findings are well in line with the study results mentioned earlier. Fractures of the Celtra Duo restorations were rare events during our 5 years of experience. If a fracture
was determined, it was related to insufficient material thickness far below the recommendation.

You’ve had excellent success with Celtra Duo (ZLS). If a colleague were to try this material for the first time, what would you be sure to tell him/her to help ensure an ideal outcome? Are there any particular “dos and don’ts” about the processing technique that contribute to the success of Celtra Duo (ZLS)?

I think the most important thing is to maintain the recommended material thickness. So it is mandatory that the dentist checks the design parameters of the restoration. The CEREC software helps you to maintain this material thickness throughout the design process, which is a great quality assurance tool. It is also important to select the ideal margin configuration. Deep chamfer or shoulder preparations with rounded internal line angles prevent marginal chipping during the milling or try-in process. Feathered edges are more prone to fracture during try-in or cementation.

In addition to material processing, cementation is an equally important factor with regard to restorative success. What cementation protocol do you use when seating Celtra Duo (ZLS) restorations?

Regardless of prep design (either retentive or nonretentive), an adhesive cementation protocol — such as Prime&Bond with Calibra Ceram — is always used. In addition, the internal surface of the Celtra restoration always must be conditioned with a 5% to 10% hydrofluoric acid and silanized (e.g., Calibra Silane Coupling Agent) prior to cementation.

In closing, is there anything that I haven’t asked or hasn’t been covered that you’d like to add about your experience working with Celtra Duo (ZLS)?

In my personal experience, the esthetic properties of the material are convincing and lead to a high degree of patient satisfaction. My recommendation: Give it a try!

For questions and more information, contact Dr. Rinke at sven.rinke@med.uni-goettingen.de.