

# Cercon Zirconia

*Used to fabricate anterior or posterior single units or multi-unit bridge restorations, Cercon is supported by more than 9 years of clinical success.*



Approximately 5 years ago, the dental industry was presented with completely new types of all-ceramic materials as well as brand new ways for indirect restorations to be fabricated. The introduction of zirconia materials along with the computer-aided design/computer-aided manufacturing (CAD/CAM) technique for laboratory fabrication of high-strength ceramic copings and bridge frameworks started to change the way that all-ceramic restorations were perceived and prescribed by dentists. Until these high-strength, esthetic materials were introduced, the inherent natural esthetics of all-ceramic restorations were primarily reserved for anterior cosmetic use and single units where the strength of a porcelain-fused-to-metal (PFM) restoration was not necessarily required.<sup>1</sup>

After 6 years of research and development at the Engineering University in Zurich Switzerland along

with 4 years of clinical research, in 2002 Dentsply Ceramco was among the first to introduce CAD/CAM materials, equipment, and processes to the dental market with their Cercon Zirconia system. This system for laboratory fabrication of esthetic, indirect, all-ceramic restorations was introduced with soft-sintered, white blocks and an initial porcelain overlay material. The type of zirconia used by the Cercon system is yttria-stabilized tetragonal zirconia polycrystals (Y-TZP), which exhibits excellent biocompatibility and mechanical properties.<sup>2</sup>

## High-Strength, High-Performance

With no change to what dentists were required to do to effectively prescribe Cercon restorations, the material and technology could be quickly adopted clinically as long as dentists could locate a supporting lab. Today, with over 100 labs supporting Cercon technology throughout North America, these high-performance, cosmetic restorations are readily available to any and all dentists who wish to obtain high-strength, all-ceramic crowns, bridges, and veneers that are just as suitable for posterior use as for anterior use.

All the dentist needs to do is follow proper preparation guidelines for all-ceramic restorations by creating a chamfer margin with rounded axio-cervical line angles, then proceeding to take a final impression that is sent to the lab as usual. No investment in equipment or even change in technique on the dentist's part is needed to prescribe Cercon restorations.

The laboratory technician pours a model from the impression, scans the model, finalizes the coping or framework design through Cercon's CAD system, then fabricates the coping or framework through the CAM process. Once the core is milled, it is sintered to final density and dimensions. All compensation for the shrinkage factor of the Cercon core material during sintering is programmed into the Cercon system to ensure that a precisely designed coping or framework is produced for an ideal fit.<sup>3</sup>

## Overcoming Criticism

One of the criticisms of some CAD/CAM fabricated zirconia frameworks is that the milling process stresses the fully sintered blocks that some zirconia systems use to avoid the shrinkage factor during sintering.<sup>2</sup> Cutting hard sintered blocks may introduce microfractures that could weaken the frameworks, but the benefit is perceived to be the elimination of the shrinkage factor that occurs with final sintering. What may not be commonly known in dentistry is that highly engineered materials, like plastics, are accurately manufactured every day with compensation for material shrinkage by design to produce products that are accurate to within nanometers of the desired outcome.

One of the inherent advantages of Cercon restorations is that the frameworks and copings are sintered *after* the milling process. The sintering process solidifies the framework and fills in any minor stress fractures that may have occurred during milling, resulting in a dense and smooth substrate. The sintering process is so effective that no milling

marks can be witnessed on the smooth, finished coping.

The inherent advantage of strength for all-ceramic restorations achieved with Cercon restorations is clear. With a flexural strength of sintered core material at 1320 MPa and a fracture resistance of over 1400 N for the finished restoration that includes the overlay porcelain, Cercon zirconia outperforms not only other types of all-ceramic materials with regard to strength, but also offers significant improvement over PFMs when it comes to the veneered coping and framework. In fact, Dentsply has such confidence in Cercon restorations that it offers a 7-year guarantee against breakage.

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While initial esthetics were less than ideal for anterior use because of the inherent opacity and high value of all original zirconia blocks, corresponding porcelain overlay materials were quickly developed and introduced to improve the cosmetic look of the resulting restorations. In 2004, Dentsply Ceramco introduced Cercon Ceram S followed by Ceramco PFZ that offered improved esthetics by increasing the vitality of the final restoration through the use of nanotechnology. In 2005, Cercon Ceram Kiss was introduced through Dentsply DeguDent to provide

a high-end cosmetic look while keeping the technique simple and straightforward for consistent results.

## Making It Easy

Dentsply Ceramco has made it easy for dentists to adopt both CAD/CAM technology and zirconia materials by introducing a system that requires no investment and no change in technique for the dentist. Any dentist can easily prescribe a Cercon restoration, evaluate the esthetics and fit, then decide if the final cosmetic result delivers on his or her expectations as well as the expectations of the patient. The clinical longevity and growth of Cercon as well as the commitment of Dentsply through its Ceramco and DeguDent divisions to continually improve and add to the Cercon system and line of materials, has validated not only the performance of Cercon materials and the fabrication process, but also the highly cosmetic results that can be achieved with this high-strength, all-ceramic system.—*Monica Roy-Smith*

## References

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