Ceramic CAD/CAM Materials: An Overview of Clinical Uses and Considerations

Abstract
Ceramic CAD/CAM materials have become popular among dentists whose patients are looking for a metal-free or more natural-looking option for indirect restorations. The significant advances in digital fabrication techniques and the development of newer, stronger ceramic materials give practitioners the ability to combine esthetics with durability. Although an improved spectrum of materials provides clinicians with many options, it can be challenging to determine which one is the best fit for a given situation. All-ceramic CAD/CAM based materials differ in composition, material properties, processing methods and clinical indications, all of which work together when determining a material’s best use. For this reason, it is imperative that dentists understand the different classes of ceramic CAD/CAM materials available to them.

Broadly speaking, the flexural strength of a ceramic material has traditionally been used to determine its appropriate usage. ISO 6872 establishes specific minimum strength guidelines for a ceramic material’s particular clinical indication. These guidelines factor into manufacturers’ clinical recommendations (Figure 1), but additional factors can impact the success of ceramic materials in various clinical scenarios. For instance, ceramic restorations have been shown to fail clinically under fatigue, as the functional forces enable internal flaws to form cracks, similar to those that form in a car windshield. Exploring and understanding the relevant properties and material-specific options can help dentists to make the best decisions for their patients.

The following review explores three key classes of ceramic materials for CAD/CAM restorations – zirconia, glass-ceramics and resin-ceramic composites. This review is intended to provide clinicians with an increased understanding of key properties, processing considerations, delivery modes, shade options and recommended surface treatments. Included in this review are quick reference guides on the different ceramic CAD/CAM materials, which can assist dentists in selecting the best material for a particular treatment.

Common Uses of Ceramic Materials

Manufacturers base their clinical indications in large part on minimum strength requirements established by ISO 6872. However, strength is only one of the many factors to consider when choosing restorative materials.