

Veneering Zirconia by CAD/CAM

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A CAD/CAM crown, or better an e-Crown, is nowadays increasingly synonymous with monolithic zirconia crown produced from a color and structure graded zirconia block, and coated with a thin layer of glaze stains, which also provides some kind of fluorescence. The “graded” zirconia crown has a darker cervical area, consisting of tetragonal zirconia, a main tooth color in the buccal area and a translucent incisal edge consisting of cubic zirconia. The only thing a dental technician has to do is use the proper height of the zirconia block so that the crown fits in all the color zones. Although on the outside the color gradient is mimicking the color gradient of natural teeth, they are still far away from the optical, physical, biomimetic and esthetic properties of natural teeth. Esthetic prosthetic restorations, with natural reflection, color from within and color gradients influenced by the internal dentinal core anatomy can best be accomplished by veneered zirconia, rather than with crowns of monolithic zirconia. In the production of dental restorations specifically made for one patient, dental technicians with their problem-solving skills, dexterity and cognitive skills are until recently the only way to provide the required esthetics, individuality and artistry with porcelain. Fear for chipping of conventional zirconia porcelains on the longer term and price pressure on manual application of porcelain, are possible drivers for the monolithic zirconia restorations.

However, the application of porcelain is no issue with prosthetic mimetic restorations (PRIMERO) were an e-Crown follows a model of the natural tooth in two layers: a histo-anatomic dentin layer mimicking the dentin shape of the dentition of the patient and an enamel layer. These restorations that mimic the structure of natural teeth by cognitive design of the dentin core presents a new production paradigm to fabricate natural restorations of veneered zirconia using a high strength porcelain with CAD/CAM. These e-Crowns are produced with a core of tooth-colored tetragonal zirconia, on which a high strength translucent porcelain layer has been applied and subsequently milled to size. In the subtle cooperation between the dentin-colored zirconia and the veneering porcelain, the zirconia shines through the translucent porcelain layer, all the more as the porcelain layer is thinner. This creates the natural color dynamics with color “from the inside” as found in natural elements, instead of color “on the outside”, with monolithic zirconia. As a result, the natural tooth, in terms of esthetics and hardness, is approached closer than crowns made from solid monolithic zirconia. This implies that the histo-anatomic dentin core is the key to the esthetic e-Crown.

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