

CAD/CAM Crowns (Lithium Disilicate): The Influence of the Finish Line and Intraoral Scanners on the Marginal Fit

Abstract

The use of computer-aided design and computer-aided manufacturing (CAD/CAM) technology has continued to replace the lost-wax technique in dentistry. CAD/CAM systems utilize intraoral scanners to provide a fast and reliable means of collecting the measurements and data required for restorations, and mechanized manufacturing simplifies the labor intensive laboratory process. Digital images captured by the intraoral scanner can be sent to a laboratory for milling, allowing for faster turnaround, and CAD/CAM systems paired with an in-office milling machine can mean same-day restorations.

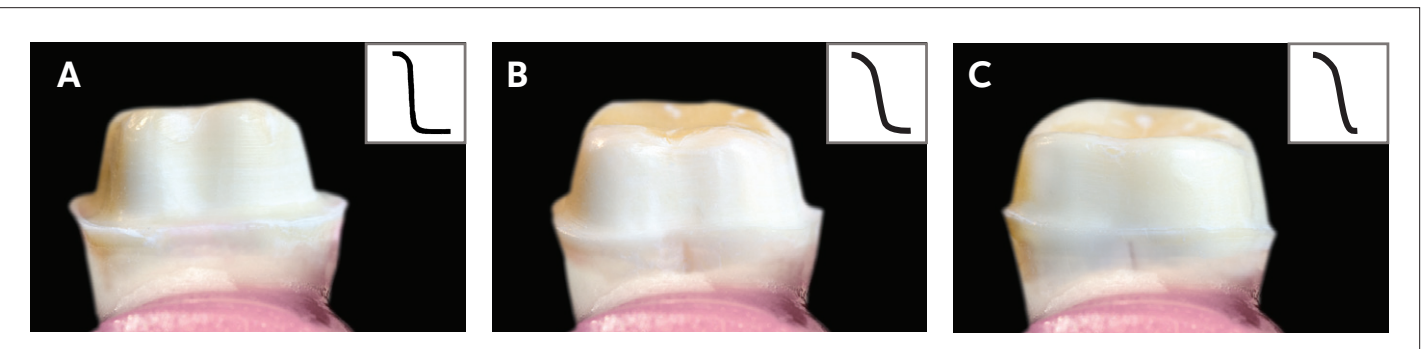
The learning curve for CAD/CAM systems can be a barrier to adoption, and is often dictated by two key factors: 1) comfort with computer-based systems, and 2) a willingness to adjust the tooth preparation in a way that favors the scanning/milling process. The recommended tooth preparation for all-ceramic CAD/CAM restorations has traditionally been a shoulder finish line with the axial and cervical walls meeting at a round corner ("rounded shoulder"). The flat cervical wall of the rounded shoulder facilitates: 1) data acquisition via the scanner, 2) the software's ability to determine

the cervical margin, and 3) the milling of the crown. Different finish lines have been associated with inadequate marginal adaptation of all-ceramic CAD/CAM restorations, an issue that is commonly reported by CAD/CAM users.

For this issue of the Professional Product Review®, the ADA Science Institute, in collaboration with the United States Air Force, evaluated the effect of three different finish line designs on the marginal adaptation of CAD/CAM crowns. Tooth preparations were scanned using three different intraoral scanners: CEREC Bluecam (Dentsply Sirona, York, PA, USA), CEREC Omnicam (Dentsply Sirona, York, PA, USA) and Planmeca PlanScan (E4D Technologies, Richardson, TX, USA). Scans of the preparations were used to mill lithium disilicate crowns (e.max CAD, Ivoclar Vivadent, Amherst, NY, USA) and the marginal gaps of each crown was measured.

Omnicam produced the best marginal fit of those tested, across all three finish line designs, followed by PlanScan. The marginal fit of crowns produced from the Bluecam scans (the oldest scanner tested) were highly dependent on the finish line design.

Finish Line Designs



▲ **Figure 1.** Finish Line Designs: A. Rounded shoulder; B. Deep chamfer; C. Chamfer.

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