

All-Ceramic Dental Bridges by Direct Ceramic Machining (DCM)

Project 4.2C: "All-Ceramic Dental Bridge"

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Motivation

Today: use of metals in the oral cavity

- allergenic potential
- corrosion
- thermal conductivity
- radioopaqueness
- aesthetic

↪ all-ceramic dental bridges are desirable.

Objectives

development and feasibility of all-ceramic dental bridges

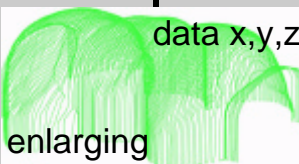
- high aesthetics
- best biocompatibility
- high mechanical strength
- clinical longevity
- just-in-time availability for patients
- simple and economic fabrication process

Summary

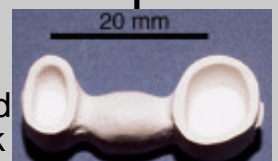
- 3- and 4-unit dental bridges possible
- framework material: tetragonal stabilized zirconia
- manufacturing of presintered blanks evaluated
- veneer porcelain adjusted to zirconia; different porcelain colours available
- preclinical tests show two to three times higher strength and reliability than commercially available dental ceramic (In-Ceram®)
- clinical studies are currently under way

Approach

DCM Process



presintered framework



sintered framework



all-ceramic dental bridge



Homogenous ceramic green bodies are fabricated and are slightly sintered to porous blanks. The outer shape of the plastic model of the bridge framework is mechanically digitized. These bridge contours are enlarged for compensation of

the sintering shrinkage and transformed to control data for the milling machine. Then, the enlarged bridge framework is machined out of the ceramic blank. Machining strategy consists of a rough and a fine milling step. The enlarged presintered

framework is then sintered to full density maintaining the required accuracy. In the last operation the all-ceramic dental bridge is veneered with porcelain to meet aesthetics in colour and translucency.



cavital view of a 3-unit dental bridge (cemented on April 24, 1998)

All-Ceramic Dental Bridges

occlusal view



four-unit framework of dense sintered zirconia



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