

Mouth Motion Fatigue and Durability Study

Petra C Guess ¹, Ricardo Zavanelli ², Nelson Silva and Van P Thompson, NYU

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Executive Summary:

- Porcelain veneered zirconia crowns and monolithic lithium disilicate crowns were tested
- Mouth-motion-step-stress-fatigue was used to examine reliability and failure modes
- Failure was considered to be chip-off fractures of veneering ceramic or fracture through the crown
- Three step-stress profiles were used up to failure or up to 900 N and 180K cycles after which a staircase fatigue method was implemented to a load at which 50% of specimens could be expected to survive 1 million cycles
- Veneered zirconia crowns resulted in limited reliability - approximately 90% of specimens would fail from veneer chip-off fracture by 100k cycles at 200 N. These results are similar to previous findings for other veneered zirconia systems (LAVA, Cercon, Vita) tested using this methodology (Coelho PG, Silva NR, Bonfante EA, Guess PC, Rekow ED, Thompson VP. Fatigue testing of two porcelain-zirconia all-ceramic crown systems. Dent Mater. 2009 Apr 21. [Epub ahead of print])
- Approximately 90% veneered zirconia specimens failed by 350 N independent of the number of cycles (Appendix 1)
- None of the e.max CAD lithium disilicate specimens failed below 900 N and 180k cycles independent of loading profile
- The e.max CAD lithium disilicate specimens survived r ratio fatigue of 1 million cycles at loads of 1000 N. There appears to be a threshold for damage/fracture for the lithium disilicate in the range of 1100-1200 N.

¹ visiting scientist from the Department of Prosthodontics University of Freiburg, Freiburg, Germany

² visiting scientist from the Department of Prevention and Oral Rehabilitation, Federal University of Goias School of Dentistry, Goiania, Brazil.