

## In-Vitro Vertical Marginal Gap Comparison of CAD/CAM Zirconium Copings

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### Objectives

Vertical marginal gap of zirconium-oxide copings from contemporary CAD/CAM systems was evaluated.

### Methods

Zirconium-oxide copings were milled using system groups A (dense-sintered yttrium-stabilized-tetragonal-zirconia [Y-TZP], optical-1), B (partially-sintered Y-TZP, optical-1), C (partially-sintered Y-TZP, mechanical-1), D (partially-sintered Y-TZP, mechanical-2), E (partially-sintered Y-TZP, mechanical-3), F (partially-sintered Y-TZP, laser-1), G (partially-sintered Y-TZP, laser-2), H (infiltrated-zirconia, laser-3), and compared to control cast copings (n=10). Ninety polyvinylsiloxane impressions were made

of a master metal die exhibiting 1mm heavy chamfer preparation finish-line. Type IV stone dies were scanned, finish line detected, and copings fabricated with 50.μm cement space 1mm from finish line. Controls were fabricated using lost wax technique. Standardized digital photographs of each coping were taken on metal master die and measured with ImageProExpress to obtain mean vertical marginal gap (μm) post-internal adjustment.

### Results

Post-internal adjustment ANOVA revealed statistically significant differences in marginal gap among groups (p<0.0001).

Group	Mean Marginal Gap(μm)	LN Mean Marginal Gap(μm)	Group Comparisons*
D	28.23±11.27	3.27±0.41	1
C	25.80±10.08	3.17±0.45	1
E	24.29±8.71	3.13±0.39	1 2
B	25.77±22.38	2.99±0.70	1 2
G	11.85±5.78	2.38±0.42	2 3
H	18.35±20.6	2.37±1.11	2 3
A	10.59±6.42	2.15±0.73	3
Control-Cast	3.19±1.02	1.11±0.32	4
F	3.00±0.74	1.07±0.24	4

\*Means with same number not significantly different, Tukey's HSD, p>0.05.

### Conclusion

Vertical margin gaps of CAD/CAM copings were significantly greater for all groups except one compared with control cast copings. Further investigations regarding horizontal marginal gap and internal coping fit are required.