# Failure Tolerance of Preformed PFM Veneer Using Paste System

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## Introduction

Before two decades, opaque paste system was introduced for opaque porcelain, which was used for the masking of the metallic color of coping and the enhancing of the bonding properties between metal and porcelain. The opaque paste system is convenience to apply onto metal coping and results uniform qualities. In spite of its convenience, it was not extended to enamel and dentine porcelain system, because opaque paste system has so low viscosity that multi-layer structure and marginal fit can't be sustained. A new build-up method using preformed laminate porcelain veneer paste was developed in an effort to improve easiness in PFM crown fabrication. There was no difference between conventional build-up method and new method in terms of strength, shrinkage and color. This paste system process could be applied to fabricate the PFM crown and fixed partial denture without any loss of strength and optical properties compared to those of conventional method. The purpose of this study was to elucidate differences of failure tolerance between conventional and proposed method for stable clinical application of this method to PFM restoration.

## Materials and Methods

Feldspathic porcelain powder used in this paste system was commercial product (Omega 900, Vita). Paste was prepared by mixing porcelain powder with several organic ingredients (binder, dispersant, wetting agent) and distilled water. Conditioning mixing was performed to reduced porosity, proper heating schedule. Flexural strength, color and shrinkage of preformed laminated paste porcelain were compared with those of porcelain, which fabricated by the conventional build-up method. Weibull moduli of were investigated to evaluate the flaw tolerance. And biaxial strength of samples after cyclic loading to 10^6 was tested to validate ability of endurance against fatigue.

## Results and Discussion

Mean strength of the porcelains which are made by this system and conventional system were 74±3 and 70±4 MPa, respectively, and the difference was not significant. There was no significant difference in flexural strength between two fabrication methods. The Weibull moduli of PFM dentine porcelain using paste system and conventional build-up method were 7.24 and 6.11, respectively and there was no statistically significant differences in either group ($p > 0.05$). The Weibull moduli of dentine, enamel and translucent porcelain using paste system were 6.11, 7.50 and 6.05, respectively and there were no statistically significant differences in either group ($p > 0.05$). After cyclic loading the mean biaxial strength of dentine, enamel and translucent porcelain using paste system were decreased gradually. After $1*10^6$ cyclic loading decrement changes of mean biaxial strength were 5, 15, 20 % in dentine, enamel and translucent porcelain using paste system, respectively.

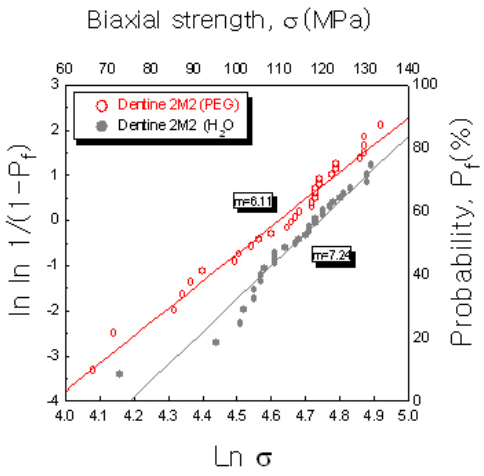


Fig.1. Weibull regression analysis of dentine porcelain using paste system and conventional build-up method

## Conclusions

Mechanical properties and failure tolerance of PFM veneer using conventional system and proposed paste system were compared. The results showed that there was no difference in strength between conventional build-up method and new method. The Weibull moduli of PFM dentine porcelain using paste system and conventional build-up method were 7.24 and 6.11, respectively and there was no statistically significant differences in either group. It showed that this paste system process could be applied to fabricate the PFM crown and fixed partial denture without any loss of strength and failure tolerance compared to those of conventional method.

## References

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