

UNIVERSITI TEKNOLOGI MARA

**EVALUATION AND COMPARISON
FOR THE MECHANICAL AND
BIOMIMETIC PROPERTIES OF
SELECTED COMPOSITE VENEER
SYSTEMS**

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ABSTRACT

The composite resin veneer systems have been considered one of the most affordable restorations in the cosmetic dentistry nowadays. The aim of the present study was to evaluate two of the mechanical and one of the biomimetic features of the prefabricated veneer systems and compare them with a laboratory-made veneer system. The physical features were represented by surface roughness and shear bond strength, while the biomimetic features were represented by colour stability. Three veneer systems were been evaluated; two of them considered prefabricated veneers (Edelweiss and Compoener) and last one considered as laboratory-made veneer (Nexco). Thirty-six veneer samples were been selected randomly for each veneer system then subdivided into three groups, each group represent one of the evaluated features. The surface roughness samples were prepared with three different surface treatments, two mechanical and one chemical treatment. After that, AMBIOS XP-1 profilometer was been used to evaluate the surface roughness and the Stereo Electron Microscope (SEM) was used to evaluate the changes in the surface textures. For the shear bond strength evaluation, the veneer samples were divided and prepared with three different adhesive agents related to the three different veneer systems. The universal testing machine (SHIMADZU) was used to evaluate the shear bond strength. For the colour stability evaluation, the veneer samples were immersed in the staining solution (Instant coffee) and regularly evaluated them colour changes by the Minolta spectrophotometer CM-(C 3500) for duration of 27 days by three days intervals. All research data were collected and evaluated statistically with One-way ANOVA, Two-way ANOVA, Student's t-test and Liner regression analysis. The results showed that the laboratory-made veneer system (Nexco) was significantly showed higher surface roughness enhancement, higher shear bond strength and more colour stable than the prefabricated veneer systems. The present study concluded that both of the prefabricated veneer systems and the laboratory-made veneer systems were showed clinically accepted features. However, the laboratory-made veneer system was showed higher mechanical and biomimetic features than prefabricated veneer systems.

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CHAPTER ONE INTRODUCTION

Cosmetic Dentistry is a general term refers to any dental work that improves the appearance of a person's teeth, gums and/or bite. It primarily focuses on improvement dental aesthetics in colour, position, shape, size, alignment and overall smile appearance (Schmidt and Tatum, 2006). The new era of cosmetic dentistry provides a paradigm shift in the quality of dental care. This shift combined with the increasing demand for aesthetic front teeth which has always motivated the dentist to try newly developed materials for more conservative treatment options (Toh et al., 1987). Among the restorations used to create aesthetic results are veneers, crowns and bridges. In minimal intervention of cosmetic dentistry, veneers are commonly used to ensure conservation of tooth structure and produced aesthetic outcomes of the anterior dentition. However, these restorative materials are constructed to restore the tooth structure as natural-like as possible or so called as “Biomimetic” (Christensen, 2004; Toh et al., 1987).

Biomimetic is the study of the structure and function of biological systems as models for the design and engineering of the materials (Magne and Douglas, 1999). A biomimetic restoration includes stress-reduced direct composite restorations and porcelain/composite inlays and onlays that restore the biomechanics of broken and damaged teeth. Traditional dental treatments including porcelain fused to metal, gold crown and amalgam filling are not biomimetic by any measure (Magne and Douglas, 1999).

For several decades, porcelain restoration has been considered as the most aesthetic and reliable restorations for the anterior teeth (Peumans et al., 2000). However, this restoration requires removal of sound enamel and dentine to achieve the required retention and resistance form. As a result, this restoration is considered as invasive treatment with potential consequences for the pulp health (Perdigão et al., 2013).

But, with newly introduced etch and rinse adhesive systems, the development of more durable and aesthetic restorative materials have allowed dentist to use more conservative techniques (Perdigão et al., 2013). Veneer restorations are well suited for conservative and aesthetic improvement of the anterior dentition. Dental veneer is a layer of tooth-coloured material, usually porcelain or acrylic resin, attached to