

HIGH PERFORMANCE POLYMERS IN DENTISTRY - BIOMECHANICAL AND CLINICAL ASPECTS

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Summary: A large variety of different materials, such as ceramics, precious and non-precious alloys, is currently available for use in dental prosthetics. Recently, new high performance polymers provide an additional alternative for the framework material. It was the aim of the presented study to determine the mechanical and biomechanical behaviour of dental bridges made of a recently introduced high performance polymer (polyether-ketone-ketone, Pekkton®, Cendres + Métaux SA, Switzerland) using the finite element (FE) method and to compare these results with different well-established and proven framework materials that are used for dental bridges.

In this paper we present results of experimental, numerical and clinical studies showing the potential of Pekkton as restorative material in dental prosthetics. Permanent fracture resistance of single tooth crowns made of Pekkton showed a fracture resistance higher than 600 N, which is clearly above normal occlusal forces. In finite element simulations, bridges and framework made of Pekkton showed slightly differing biomechanical behaviour compared to conventional framework and bridge materials like titanium, gold or ceramics. However they proved to be recommendable for clinical application. Clinical studies including single crowns, bridges and retention elements showed comparable or better results than those made of nonprecious metals.

Concluding, the new high performance polymer Pekkton shows promising new possibilities for application in all fields of dental prosthetics.