COMPRESSION ANALYSIS OF PROSTHETIC SOCKET FABRICATED BY RAPID PROTOTYPING TECHNOLOGY

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ABSTRACT

Finite element method was been conducted to investigate the parameter variables that may influence the load transfer mechanics between a residual limb and its prosthetic socket. As rapid prototyping technique is getting revolutionized, fabrication procedure of prosthetic socket not longer complicated, time-consuming and high in cost. The performance of prosthetic socket was then been emphasized as those problems were solved. The purpose of this paper is to analyse the interface stress distribution occurred on the contact surface between residual limb and socket. Several socket models with different coupling stiffness and material selection was tested under Finite Element Analysis and evaluated to its corresponding performance during the gait loading. Detail biomechanical understanding of the soft tissue behaviour is approached in order to approximate the computational models closer to real situation. Polypropylene tight socket, which has the lowest Poisson's ratio, coupling stiffness and friction coefficient was found that the best socket after compared with a ABS tight socket, ABS loose socket and Nylon tight socket. The maximum equivalent stress and shear stress at interface of Polypropylene socket are 1305kPa and 93kPa respectively.

Keywords: Coupling stiffness, Finite Element Analysis, friction coefficient, gait , interface pressure, Prosthetic socket, Poisson's ratio

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