DESIGN CONSIDERATIONS FOR TAPER INTEGRATED SCREWED-IN IMPLANT-ABUTMENT CONNECTIONS

by

Dinçer Bozkaya, Graduate Student

Sinan Müftü[1]*, Ph.D.* Associate Professor

[1]Northeastern University
Department of Mechanical Engineering
Boston MA 02115

ABSTRACT

Tapered implant-abutment interface with or without a screw integrated at the bottom has been the subject of considerable amount of finite element and experimental studies due to the mechanical stability it provides. This paper investigates the mechanical properties of the taper integrated screwed-in (TIS) implants by using an analytical approach.

The analytical formulas developed for analyzing the pure tapered interference fit is combined with screw mechanics equations in order to identify the effect of various design parameters such as friction, geometric properties of the screw and the taper, and the elastic properties of the materials on the stability system. In particular, the efficiency of the attachment, which is defined as the ratio of the loosening torque to the tightening torque, is analyzed for different parameters. The analytical method developed here was applied to a 4.8 mm ITI implant-abutment system. The calculations performed to determine the loosening torque as a percentage of tightening resulted in the range 85-137%, depending on the values of taper angle and the friction coefficient.