Experimental and analytical study of surface fatigue life in dental composites

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Abstract

The surface fatigue life of a dental composite is studied using in vitro tests and analytic models. A mechatronic rolling-ball device with condition monitoring and automated data sampling is used to measure the fatigue life. The Hertzian stress theory is used to analytically estimate the deformation stress induced in the specimen, then the Basquin equation is used to predict the fatigue life based on the deformation stress. The experimental and analytic results are in good agreement. The results are also consistent with previous researches using the conventional rolling-ball device. The study shows that analytic models can bridge the gap between in vivo and in vitro testing by providing accurate estimates of fatigue lifetime and guiding the design of in vitro experiments.

Keywords : Dental composite, surface contact fatigue, mechatronic