DEVELOPMENT OF A PROOF TEST PROCEDURE FORT THE REJECTION OF DEFECTIVE CERAMIC FEMORAL HEADS

EMPA
Materials Science & Technology

Due to specific needs of an industry partner Empa developed in 2006/07. a new proof test procedure for the rejection of defective ceramic femoral heads in the production line of its partner. The procedure consists in applying to each sample a load which is somewhat higher than the maximum physiological load. This load should not cause any damage in cases where the highly stressed areas are free of flaws. With an iterative approach based on finite element analysis, the proof test design was optimized in order to obtain a stress distribution in the ball head similar to that resulting in in vivo conditions. The calculated results were validated by strain gauge measurements performed on an assembled proof test apparatus. The requirement to perform 1000 reruns without significant reduction of stress in the ball head was fulfilled. Although other proof test procedures for ceramic femoral heads already exist, the procedure shows advantages concerning main-tenance and operating costs. A patent was filed to protect the technology and was at the end of the collabor-ation successfully transferred to the industry partner who integrated the new test procedure in 2008 in his production line.