

THE EFFECT OF STRUCTURAL DISTORTION ON THE FATIGUE LIFE OF LARGE-DIAMETER BALL BEARING

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ABSTRACT

Large-diameter special configuration ball bearings feature narrow raceways with low structural stiffness. They are susceptible to local distortions caused by the surrounding structures, which are often subjected to heavy loading. This presents a difficulty in the design process which relies mainly on defining the individual rolling-element loads within the bearing under the assumption of rigid circular and flat supporting structures. Therefore, the application of large-diameter ball and roller bearing rings as the critical components in rotating machines becomes more of a design task than making a catalog selection. This paper will demonstrate how the finite element analysis can be utilized to estimate the effects of structural distortions on the performance of a large-diameter bearing. The procedure will be presented to determine the load distribution in rolling elements of a four-point contact ball bearing and the case study of the PHILIPS CT scanner main bearing will be provided.

Keywords: Ball bearing, fatigue life, finite element method.