

Author's Accepted Manuscript

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www.elsevier.com/locate/jtri

PII: S0301-679X(16)30179-7
DOI: <http://dx.doi.org/10.1016/j.triboint.2016.06.008>
Reference: JTRI4240

To appear in: *Tribology International*

Received date: 14 March 2016
Revised date: 25 May 2016
Accepted date: 6 June 2016

Cite this article as: E. Houara Komba, F. Massi, N. Bouscharain, G. Le Jeune Y. Berthier and Y. Maheo, Experimental damage analysis in high loaded oscillating bearings, *Tribology International* <http://dx.doi.org/10.1016/j.triboint.2016.06.008>

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Experimental damage analysis in high loaded oscillating bearings

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Abstract

Several industrial applications require rolling bearings to operate under both high load and oscillating motion. While the oscillating motion does not allow for EHD regime, the high load applied induces high contact pressures. Even if many works in the literature deal with rotating bearings, few works address high loaded oscillating bearings. The degradation scenario of high loaded oscillating bearings is here analysed step by step for both greased and ungreased bearings. Subsurface plastic damage of the balls was found to be at the origin of greased bearing degradation, while progressive superficial degradation lead to a faster degradation of ungreased bearings.

Keywords: Ball bearings, Grease, Dry, Fatigue

1. Introduction

In many applications rolling bearings are needed to ensure the transmission of a rotational motion with the lowest possible friction losses. With the increase of both system optimization and power, like for many other mechanical components, the rolling bearing pairs are optimized to transmit more and more power with decreasing bearing dimensions. As a consequence the contact surfaces between contacting pairs become smaller, while the contact pressure increases. The high contact pressure threatens the bearing material integrity which can be affected relatively early. In several industrial applications (industrial robotic actuators, aeronautic actuators, aerospace joints, ...)

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