

Study of the heat generated by a rolling bearing degradation by IR thermography

by A. MAZIOUD*, L. IBOS*, A. KHLAIFI*, J.F. DURASTANTI*

* *CERTES (EA 3481), University Paris XII, France*

Abstract

Our study deals with the quantification of the energy dissipated by a defect of spalling on the outside ring of a rolling bearing. A previous work showed a correlation between the thermal heating and the vibratory level generated by the progressive appearance of the defect.

First, we propose a numerical model of the heat transfers involved between the rolling elements and the outside border of the bearing cap.

In a second time, we developed an experimental setup constituted by an electric engine, two shaft bearings, a turning axis, a rolling bearing with an internal ring heated by an electric resistance, equipped with a fluxmeter; sensors allow following the distribution of the temperatures on rings. The rolling bearing is accommodated in a bearing cap which allows creating the spalling defect in a progressive way. An infrared camera allows measuring the superficial field of temperature.

Periodic impacts generated by a spalling zone are going to excite the system mechanical structure. Damping effects transform a part of this vibratory energy into heat losses that induce a rise of the ring temperature.

The measurement of the temperature rise and the knowledge of the contact resistances allow estimating the vibratory energy generated by periodic shocks, and thus to estimate the level of degradation of the rolling bearing.

The results obtained in this first step are encouraging. Indeed, the defect generated in the rolling bearing leads to a quantifiable heating of the surface, and the numerical model and the experiments allow quantifying the involved flux.