CONDITION MONITORING FOR PREVENTIVE MAINTENANCE OF LARGE INDUCTION MOTORS

By
W.K.L.PRASAD

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Department of Electrical Engineering
Faculty of Engineering
University of Moratuwa
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Abstract

Induction motor faults, such as broken rotor bars, rotor eccentricities, bearing faults, mechanical misalignments cause harmonic changes in the permeance of the motor magnetic circuit. A motor vibration at a specific frequency will result in a current harmonic at a known frequency. The specific relationship between the vibration and the stator current harmonic magnitudes is a complex function. It is a function of the mechanical system and the magnetic system of the motor itself. The sensors used, increases it's complexity further.

In the research, first, the relationship between the vibration and the stator current harmonic magnitudes are studied for a particular machine problem and the critical frequencies in the frequency spectrum of the Induction motor stator current are identified using the Micro log instrument CMVA 60, which is a property of the Mahaweli Complex of Ceylon Electricity Board.

Then, the magnitude ratios of the harmonics at critical frequencies to the fundamental component of the stator current are determined by conducting a survey on previous faults found in Induction motors used in Kotmale Power Station and by carrying out an experiment on an Induction motor having a squirrel cage rotor with open rotor bars. The •defective Induction motor, which had been used in one of the gear pumps to pressurize the MIV pressure vessels of the three synchronous generators in Victoria Power Station, could be used for the measurements.

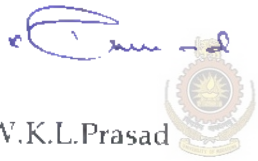
Next, the results obtained from the case study and the survey are compared with the standards that have been evolved from the past studies and the researches in order to determine the feasibility of setting a limit or standard on the current harmonics at critical frequencies due to motor faults.

Finally, the possibility of developing a current monitoring system to identify a rotor problem is investigated for a drainage pump in Kotmale Power Station. The results

can then be extended to alarm the fault by integrating the circuit to the existing annunciation system to minimize the interruption of the drainage system, which is very important in the concept of maintenance as well as the safety of the under ground power station, caused by the failure of the machine.

DECLARATION

I hereby declare that this submission is my own work and that, to the best of my knowledge and behalf, it contains no materials previously published or written by another person nor material, which to substantial extent, has been accepted for the award of any other academic qualification of a University or Institute of higher learning except where acknowledgement is made in the text.



W.K.L.Prasad

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UOM Verified Signature

Dr. J.P.Karunadasa

Project Supervisor

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