



CONDITION MONITORING FOR PREVENTIVE MAINTENANCE OF LARGE INDUCTION MOTORS

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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 underground 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.


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Contents

ii

Abstract	i
Contents	ii
Preface	iv
List of figures	v
Chapter 1 Introduction	1
1.1 General	1
1.2 Condition Monitoring Tools	1
1.3 Vibration Vs Stator Current	2
1.4 Thesis Objective & Outline	3
Chapter 2 Instrumentation	5
2.1 Monitoring System Outline	5
2.2 Data acquisition	7
Chapter 3 The Induction Motor monitoring system available in Kotmale Power Station	10
3.1 Vibration Monitoring System	10
3.2 Analysis of the Vibration Spectrum for Motor Fault Identification	12
3.2.1 Misalignment	12
3.2.2 Imbalance	13
3.2.3 Mechanical Looseness	13
3.2.4 Bearing defects	14
3.2.5 Broken rotor bars and end rings	15
Chapter 4 Why a current monitoring system for IM is required	16

Chapter 5 Theory	18
5.1 Rotor Bar Analysis	18
5.2 Air gap Eccentricity Analysis	20
5.3 Misalignment	23
Chapter 6 Case study	24
6.1 Measurements and Observations	25
Chapter 7 Results	29
7.1 Comparison of the pole pass frequencies	29
7.2 Calculation of the current ratios	30
Chapter 8 A current monitoring system for Drainage pumps at Kotmale Power Station	32
8.1 Project description	32
8.2 Component selection	35
Chapter 9 Simulation of the fault detection circuit using Electronics Workbench 5.12	38
9.1 Introduction	38
9.2 Simulation procedure	38
9.3 Results	50
Chapter 10 Conclusion	52
Chapter 11 Discussion	53
Reference	56
Appendices	58
Appendix 1 : Vibration Sampling Points	
Appendix 2 : Vibration Standards VDI 2056	
Appendix 3 : Rotor bar damage severity level chart	



List of Figures

v

- Figure 2.1 Block diagram of the proposed system
- Figure 2.2 Data Acquisition System
- Figure 3.1 Vibration Spectrum of U01 Thrust Bearing Pump in KPS
- Figure 3.2 Vibration Spectrum of U01 Cooling Water Pump No.02 in KPS
- Figure 3.3 Vibration Spectrum of U03 Cooling Water Pump No.02 in KPS
- Figure 5.1 Dynamic eccentricity
- Figure 5.2 Single axis air gap eccentricity
- Figure 6.1 Current Spectrum of the R phase of the MIV oil pump no.02 at VPS
- Figure 6.2 Zoomed Current Spectrum of the R phase of the MIV oil pump no.02 at VPS
- Figure 6.3 Current Spectrum of the Y phase of the MIV oil pump no.02 at VPS
- Figure 6.4 Zoomed Current Spectrum of the Y phase of the MIV oil pump no.02 at VPS
- Figure 6.5 Current Spectrum of the R phase of the MIV oil pump no.01 at VPS
- Figure 6.6 Zoomed Current Spectrum of the R phase of the MIV oil pump no.01 at VPS
- Figure 8.1 Current Spectrum of the Drainage Pump No.03 of KPS
- Figure 8.2 Zoomed Current Spectrum of the Drainage Pump No.03 of KPS
- Figure 8.3 Schematic Diagram of the monitoring system
- Figure 8.4 Notch Filter
- Figure 8.5 Narrow-band RC active filter
- Figure 8.6 Comparator Circuit
- Figure 9.1 Notch Filter
- Figure 9.2 Output of the Bode plotter in fig 9.1 : Magnitude and Phase
- Figure 9.3 Output of the Oscilloscope
- Figure 9.4 Output of the Oscilloscope in fig 9.1 for a 49.5 Hz signal

Figure 9.5 Output of the Oscilloscope in fig 9.1 for a 51.5 Hz signal

Figure 9.6 Band-pass Filter

Figure 9.7 Output of the Bode plotter in fig 9.6 : Magnitude and Phase

Figure 9.8 Output of the Oscilloscope in fig 9.6

Figure 9.9 Output of the Oscilloscope in fig 9.6 for a 50 Hz signal

Figure 9.10 Output of the Oscilloscope in fig 9.6 for a 100 Hz signal

Figure 9.11 Cascaded circuit

Figure 9.12 Output of the Bode plotter in fig 9.11 : Magnitude and Phase

Figure 9.13 Output of the Oscilloscope in fig 9.11 for a 49.5 Hz signal

Figure 9.14 Output of the Oscilloscope in fig 9.11 for a 50 Hz signal

Figure 9.15 Output of the Oscilloscope in fig 9.11 for a 50.5 Hz signal

Figure 9.16 Output of the Oscilloscope in fig 9.11 for a 51.5 Hz signal

Figure 9.18 Rectifier bridge and the comparator circuit with an indicator & a

buzzer

Figure 9.19 Complete fault detector circuit