



Health monitoring of AC motor by using Labview Software

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ABSTRACT: The health monitoring of AC motor by using Labview software is basically used for monitoring purpose for fault detection . On-line health monitoring of induction motor by using Labviewtechnique is used here for diagnose the mechanical faults. For avoiding unexpected equipment failures and for obtaining high accuracy for fault detection that health monitoring technique is used. Vibration – based analysis is used here. Online condition monitoring technique which are used to diagnose mechanical faults, like as bearing faults, gearbox fault, air gap eccentricity fault are described here.

KEYWORDS: Fault detection, induction motor, vibrations analyzer, wireless sensor, catastrophic failures, piezoelectric accelerometer.

I. INTRODUCTION

The focus in the most industries are fall on the maintenance of motor by constant and regular observations of motor for fault detection. That system is totally based upon the advance technology, for early fault prediction. That is the new strategy used for maintenance of the machine by early fault prediction by using the warning signal, that all used here in induction motor for maintaining their long life and keeps it healthy. By using continuous monitoring of induction motor, system can early known the age of the machine. Sensor used there, that can sense the presence of incoming faults and by using early fault prediction method, warning signal will be ring up before the system is totally shut down and before anytype of any catastrophically failure or permanent damages. For preventing permanent damages to need of the On-line health monitoring of induction motor. That system use fully wireless network. Although the cost of installation and maintenance is more expensive. Labview software is totally based of that technology, and Labview contain much more cost of installation in the suitable PC system.[2] However complete detection can't take place but all most detection can be detected by using that technique, but overall the efficiency and reliability of machine will be keep maintained. In this research paper, experimentally faults are detected by using Vibration monitoring. Effective and advance sensors are attached here for detecting the mechanical faults like as bearing fault, air gap eccentricity fault, gearbox fault etc. Mechanical faults are occurs in more percentage as comparison with the electrical faults in the induction motor. So diagnose of that mechanical faults are take place by using Vibration monitoring.

All type of faults are described as:-

- 1) Faults related to stator:-** In total overall faults 28% fault induced in the stator portion of the induction motor. Stator faults are basically induced due to insulation failure. Due to presence of over voltage and over current can also damage the stator winding and short circuited will be there and fault will arise in the stator portion of motor.
- 2) Faults related to rotor:-** Only 10% rotor faults are occurred in the motor. That faults occur due to high stress that fall on the rotor portion of the motor. Due to high voltage, high current or high frequency stress will fall on the physical portion of the rotor and it can be broken. And that is basically the rotor fault.

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3) Air gap eccentricity fault:- Due to improper alignment of stator or rotor that type off fault occurred. Rotor should be centered aligned with stator, a small air gap should be established between them. When air gap between stator and rotor is not balanced then eccentricity fault will be established at there

4) Gearbox faults:- Gearbox fault arise due to sudden changes in the speed of the induction motor. Load fluctuations is the main reason of that kind of fault. The rise and fall of the load, voltage, current any other thing, then the sudden fluctuation is the main reason of the occurrences of the gearbox fault in the induction motor.

5) Bearing faults:- In total overall faults ,bearing fault occurring percentage is off 40% in induction motor. When shaft provide rotation in the induction motor then bearing fault will take place. Due to movement of the shaft bearing will also rotated, if the alignment of the bearing is proper then shaft will be continuous move without any disturbances and due to improper alignment of the bearing shaft will not move freely and properly. Due to that condition bearing can be get faulted and inner and outer faults are arise.



Fig. Outer race bearing fault

II. FAULT DETECTION TECHNIQUES

Fault detection technique basically based on that of accelerometer, FFT: Fast Fourier transform, and DAQ : Data acquisition chip and Labview software. Advanced computerized data processing and acquisition show new ways in the side of detection of fault in the induction motor. Time –domain and frequency –domain like that analysis used here for measuring trend setting, spectrum analysis to determine frequency, amplitude and phase relation as well as cestrum analysis.

Type of monitoring:-

- 1) Vibration monitoring
- 2) Acoustic emission monitoring
- 3) Current monitoring
- 4) Partial discharge monitoring
- 5) Air gap eccentricity monitoring, etc etc..

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That type of monitoring are very expensive like as acoustic emission monitoring or current monitoring, they need very costly sensor for observing the faults and other remaining monitoring technique are such type of monitoring that they observed single fault like as Partial monitoring measure only stator fault, and air gap eccentricity monitoring detect on air gap faults.

So [4]vibration monitoring is selected for continuous monitoring because that monitoring can easily detect all mechanical fault like as bearing fault, air gap eccentricity fault and gearbox fault. Easily that all faults can be detected by using vibration monitoring.

Following reasons are here that select the Vibration monitoring:-

- 1) It measure all mechanical faults.
- 2) It don't need of so much costly sensors for detection of faults.
- 3) It is an easy process.

Vibration monitoring analysis used here for determining incipient fault. Wireless sensor network and digital signal processor that is FFT used here. This paper proposed for continuous detection of faults by using monitoring technique. That technique take the number of vibrations as a sample from the monitoring machine and detect the present condition of the motor.

Fault detection depends upon four challenging stages:-

- 1) Vibration measuring device: Accelerometer
- 2) Digital signal processor: FFT
- 3) DAQ
- 4) PC with Labview software

For fault detecting procedure, initially accelerometer will be attached on the surface of induction motor. When some fault occurred or trying to incoming ,at that time machine starts to show off some unexpected or some new things like as vibrations, noise and suddenly rise up the temperature of machine, that new sudden happening things indicate us the presence of the problem in the machine. [5]At that time the attached accelerometer starts measure that vibrations. That vibration pulse achieved by accelerometer in the form of Time –domain. The digital signal processor achieve that time domain and convert it into frequency –domain, that frequency domain is more understandable domain, that indicate, clearly the presence of fault and type of fault and it can also indicate the fault location also. By using wave it can represent the condition of machine that it is healthy or not.

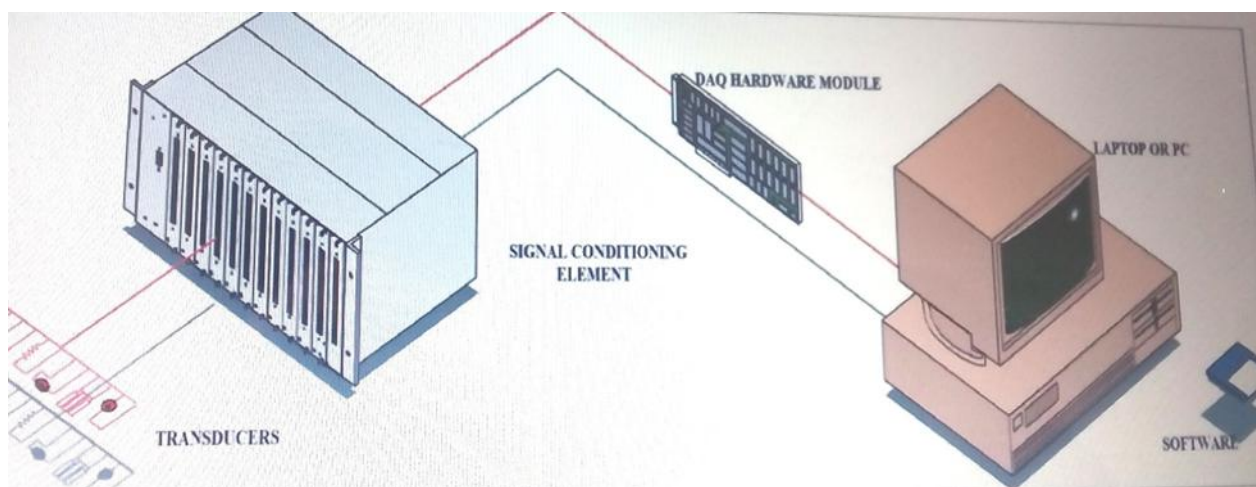


Fig.detection of faults in induction motor

That above diagram represent the whole processing of the system. Data initially taken from hardware system then that data will transferred into the software part of the system, then the used software take the data into the sample

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form and take the observations. That observations represented in the form of wave graphical wave represented on the screen of the PC system.

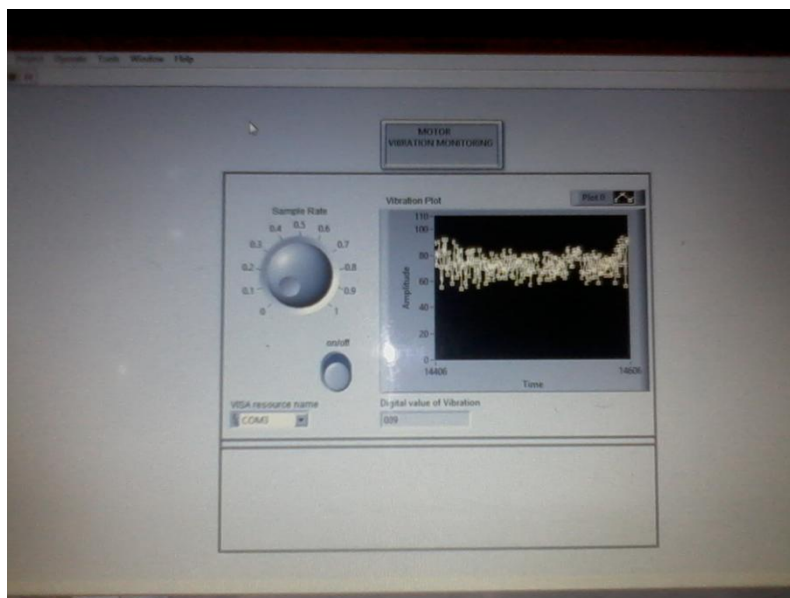


Fig. Waveform represented the faulty motor

That waveform represented that the motor is faulty, some kind of fault is available in such type of machine. That wave represent the condition of motor is not good. And if straight line is represented on the wall of PC system, that represented the condition of motor is good, it is off healthy motor. That presented wave is drawn in the frequency – domain. [6] Then after that signal leads into DAQ and then at last that information enter into the PC that PC have already installed Labview software and easily indicate the presence of fault in the induction motor. By using graph PC represent that machine is healthy or not, above graph represented that.

III. BENEFITS OF THE TECHNOLOGY

Following Benefits are come under the On-line health monitoring of induction motor:-

- 1) All industrial motors come under continuous measurements and detection. So easily all incoming faults can be captured.
- 2) Provide warning signal for alertness.
- 3) Decreases overall repairing and downtime cost.
- 4) No hazard occurs. So not any harm full effect can be fall on the machine as well as humans.
- 5) Proper maintenances, accuracy and reliability of the induction motor can be occur.

IV. CONCLUSION

That technique helps us to predict the early faults detection by using that powerful and advance technology in that induction motor. That paper represents the super powerful technique that have great capability to identified the available faults with proper accuracy in the induction motor. The health of machine must be monitored and appropriate measurement taken, that appropriate fault detection method used for welfare of the society and welfare of machine. If something is not included in the paper then author would be apologized.



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BIOGRAPHY

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