**Vibration Testing and Analysis of Motor Based on Virtual Instrument**

**CHETAN LOKHANDE; AMOL DHANJODE;**

**DEPARTMENT OF ELECTRICAL ENGINEERING**

**K.D.K.C.E. NAGPUR**

**MOB:9860541804**

**9579461814**

**Email:**

**chetanlokhande12@gmail.com**

**ABSTRACT** -*Motor is one of important equipment to convert electrical energy to mechanical energy in the modern production, and it plays an important role in modern industrial plants. In this work, virtual instrumentation and vibration analysis are applied to motor to monitor and detect various failures. This paper is based on virtual instrument system, which is composed of piezoelectric type acceleration transducer, USB data acquisition and a notebook computer. In addition, LABVIEW is selected as the software developing platform and vibration signals of motor is analyzed by power cestrum method.*

*Machine vibration analysis and motor current spectral analysis have recently been widely used for the purpose of condition monitoring and detection of mechanical faults in induction machines. Although the current is as good as the vibration in indicating the presence of a fault, the plot of the components of interest in the current versus load does not necessarily look like a plot of the components of interest in the vibration versus load. This is due to several reasons, but most important, is that the vibration sensor measures the absolute movement of the motor, while the current reflects a relative movement.*

**1.INTRODUCTION**

**1.1Overview**

Most of the industries doesn’t uses any vibration detector in their industry if there is any electrical or mechanical fault takes place it can accelerate bearing failure, loosen the windings, damage to insulation, sparking at current collector produces noise also it may be danger to human life, so industrial production may be stopped.

Industry have to replaced it which may cost higher for new motor or have to be clear its fault which is lengthy process and for that period the production of industry is stopped. Our paper is based on testing and analysis of vibration of motor which detects fault before it ready to cause severe damage.

**1.2Objective**

Our intention is to detect the vibration and analysis it to detect the fault in motor to increase the productive activities of motor with high efficiency. The triaxial accelerometer is using to sense, the vibration of motor may be three phase or single phase in any direction. The output can be seen in DSO or Lab View. Lab view is the software having some special features to compare the graphical representation of vibration signals with vibration signals. It can be uses in industry or in lab for performance checking of motor.

**3.LITERATURE SURVEY**

**3.1BACKGROUND STUDY**

The risk of motor fault can remarkably induce a serious danger to the normal life and productive activities of the people. It may reduce costly expensive downtime if signs of failure can be distinguished availably. Vibration is one of the key indicators of quality of motor, when they are steady work, the vibration spectrum has certain characteristics, if their internal fails, their corresponding vibration spectrum or other parameters will also change. In addition, the motor vibration waveform is not a single sine wave, but composed of many different frequencies waveforms. Therefore, the vibration spectrum of motor need to be analyzed to preventing malfunction and resolving in a timely manner.

Over the past 20 years, the virtual instrument technology has made considerable development and been widely used in areas such as engineering test. Compared with traditional instruments, virtual instrumentation technology has several advantages, for example, high-performance, excellent expands ability and so on.

**3.3RELATED WORK**

Motors are uses everywhere nowadays, but less invention to detect the fault of motor. Fault can be detected by temperature, current, vibration analysis method etc. Vibration is one of the indicators to detect the fault of motor. It is based on frequency domain analysis. Comparison between old and new graphical representation of vibration signal is uses to detect the fault. Power cepstrum analysis is also helpful to detect the fault.

**4.EXPERIMENTAL SETUP & RESULTS**

**Experimental Setup**

**Block Diagram**

**LCD Display**

**RS 232**

**OUTPUTT (DSO)**

**Micro Controller**

**Accelerometer Sensor**

**ADC**

**SCU**

**Motor**

Fig: Block Diagram

**4. Expected Results (OUTPUT)**



Fig: Spectrum of vibration signal

**Good Motor Faulty Motor**



Fig: In the time domain the good motor is indistinguishable from the faulty motor, but using wavelet analysis the faults readily become apparent.

**5.CONCLUSION**

This test system substitutes a single integrated hardware test platform for the conventional test method based on separate test equipment and realizes signal analysis and displays through software. As a result, the flexibility and intelligence of test system are improved, and many new digital signal processing methods are put into practice.

Selection of analysis frequency-band of vibration signals is a very important factor in engineering. But vibration signals of motor are unsusceptible and difficult to identify, what’s more, frequency characteristics are not easy to extract. The fact has proved that the method described in this paper can eliminate the “frequency ambiguity” phenomenon; in addition, it also can extract the needed spectrum information quickly, and determine the type and damaged extent of motor accurately.

**REFERENCES**

1. Van Tuan Do, Ui Pil Chong. “Signal Model Based fault Detection & Diagnosis for Induction Motors using features of Vibration signal in Two Dimension Domain”. 57(2011)9,655-666.
2. Sanna Poyhonen, Pedro Jover, Heikki Hyotyniemi. “Independent component Analysis of Vibrations for Fault Diagnosis of an Induction Motor”.203-208, 2003.
3. Gao Bingkun; Li Yanjia; Song Zhaoyun; Xu Mingzi. “Vibration Testing & Analysis of Motor Based on Virtual Instrument”. IEEE DaQing Petroleum Institute, China, 2010.
4. M. A. Mannan. Ashraf A. Kassim, Ma Jing. “Application of image and sound analysistechnique to monitor the condition of cutting tool”. Pattern Recognition Letters, 2000:969-979