AUDIO VARIATION INDICATOR USED TO FIND FAULTY DC MOTOR

Pratibha Garad[1], Sonali Waghmare[2], and Prof. S.B.Chougule[3]

[12] Students, Dept. Of EnTC, DYPSOE, Maharashtra, India
[3] Asst. Professor, Dept. Of EnTC, DYPSOE, Maharashtra, India

ABSTRACT

Sound monitoring of any device is a critical parameter and difficult to monitor using any type of hardware. Hence for the simplicity and output purpose, what we have done is we generate the sound using a DC motor which is used for PCB drilling and milling purpose. Then the sound parameter are monitored in dB's(Decibels)using MATLAB. All the sound parameter are taken in MATLAB and then we generate the sound reports in various formatted graphs such as signal level ,logarithmic graphs, audio spectral, power spectral and FFT level. The output will then be monitored manually and the data will be sending to microcontroller and displayed on LCD. Other parameter that can be shown through microcontroller are faulty sound and healthy sound and faulty sound.

INTRODUCTION

The studies of sound behavior during abnormal conditions due to presence of faults and the possibility to diagnose these abnormal conditions have been a challenging topic for many electrical machine researchers. There are many condition monitoring methods including vibration monitoring, thermal monitoring, chemical monitoring, acoustic emission monitoring but all these monitoring methods require expensive sensors or specialized tools where as current monitoring out of all does not require additional sensors. This is because the basic electrical quantities associated with electromechanical plants such as current and voltage are readily measured by tapping into the existing voltage and current transformers that are always installed as part of the protection system. As a result, current monitoring is non-intrusive and may even be implemented in the sound control center remotely from the sounds being monitored. The objective of this paper is to present recent developments in the field of sound fault signature analysis with particular regard to Sound signature analysis of sound of fan. The different types of fan faults that can be identified from the sound signature analysis are, for example, rotor faults, bearing faults, unbalances wings etc. Corresponding to the above-mentioned faults, many types of machine fault signature analysis techniques have been proposed for sound faults detection and diagnosis. These techniques include vibration monitoring, sound current signature analysis (MCSA) electromagnetic field monitoring, chemical analysis, temperature measurability, infrared measurement, acoustic noise analysis, and partial discharge measurement.

Among these methods, vibration analysis, current analysis and Sound signature analysis are the most popular due to their easy measurability, high accuracy, and reliability.

I. PREVIOUS WORK

DC MOTOR

A motor is an electrical machine which converts electrical energy into mechanical energy. The principle of working of a DC motor is that "whenever a current carrying conductor is placed in a magnetic field,

It experiences a mechanical force.

TYPES OF DC MOTOR

DC motors are usually classified of the basis of their excitation configuration, as follows-

- Separately excited(filed winding is fed by external source)
- Self excited-
  1 series wound
  2 shunt wound
  3 compound wound

Every DC motor has six basic parts-axle, rotor, stator , commutator , field magnet and brushes. In most common DC motors, the external magnetic field is produced by high-strength permanent magnet.

Fault type

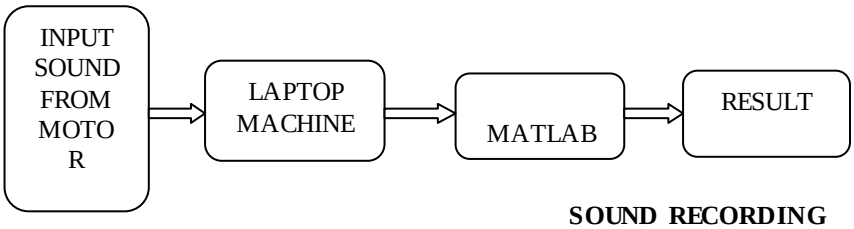
- Healthy motor
- Bearing fault(misalignment)
- Bearing fault(ball defect)
- Broken rotor bars
- Short circuit in stator winding

The common internal faults can be mainly categorized into two groups:

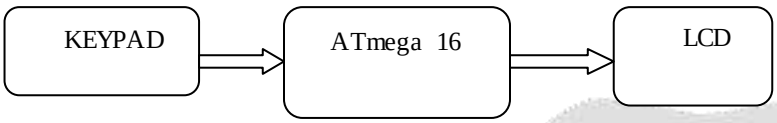
- Electrical faults
- mechanical faults

Electrical faults include faults caused by winding insulation problems, and some of the rotor faults. Mechanical fault include bearing faults, air gap eccentricity, load faults and misalignment of shaft.

BLOCK DIAGRAM



SOUND RECORDING



RESULT ON LCD

BLOCK DIAGRAM DESCRIPTION

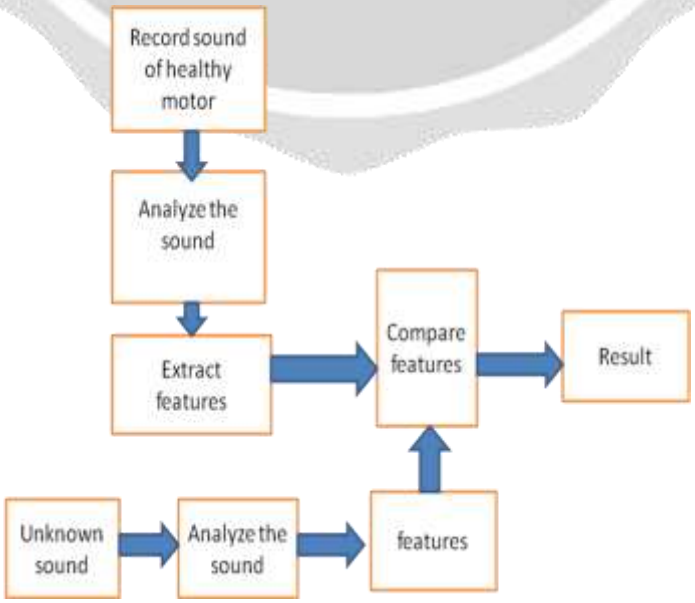
DETECTION:

- The data of sound parameter to be recorded are taken from AC motor. The dB level and the sound level of AC motor is displayed on MATLAB-GUI.
- For graphical results the data is displayed on various types of graphs such as dB level, logarithmic energy, heat training etc.
- This will give an enhanced outlook to the system parameters.

RESULTS:

- Post the detection, results are displayed on LCD.
- The dB level has to be added using keypad.
- According the data will be display on LCD

II. SYSTEM MODEL



III. METHODOLOGY

As the name suggests audio variation indicator use to find faulty DC motor in which DC motor plays an important role. The first step is to record the sound samples of healthy and faulty DC motor. And then extract the features like RMS values, Db level in MATLAB using wavplay function. And finally comparing these features we get the output result that whether the DC motor is healthy or faulty. we presented a fault detection method that utilizes several low level features. Selected features were extracted both from time and frequency domain to comprehensively describe the sound.

IV. CONCLUSIONS

In this project, we have presented a brief review of art of machinery fault detection; different conventional and recent techniques were discussed for machine fault signature analysis with particular regard to rolling contact bearing fault diagnosis through analysis of vibration or sound

The stator current and vibration analysis technique are quite sensitive to electrical and mechanical faults. The acoustical approaches are sensitive to the interference of environmental noise. This project is widely used in industrial applications as well as home automation. By using this system we can find out the fault in motor such as bearing faults, short circuit stator or broken rotor bars. By using this system manual work can be reduce

V. REFERENCES

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