Online Vibration Monitoring of Track Grinding Machine

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ABSTRACT

In modern industry, process must be flexible. To increase reliability and quality of the product at low cost, machine tools must work without any failure. To avoid unplanned downtime due to sudden failure of spindles, In order to achieve this goal, condition monitoring is very essential. This paper focuses on the condition monitoring of machine tool elements. Changes in the machine conditions (vibrations) are detected automatically in real time by using online vibration monitoring system. Vibration measurement sensor (accelerometers) is used to sense the vibration of a machine in this project. Accelerometer sensor, SKF vibration monitoring device. GSM modem, HMI etc. have been successfully used in this project.

Keywords : Condition Monitoring, Vibration, Machine Tool Element.

I. INTRODUCTION

1.1 Study of grinding machine

A grinding machine is a machine tool used for grinding. It is a process used to finish work pieces (bearing) that must show high accuracy and high surface quality. During the operation, various faults may arise. These failures directly affect the production line which in turn leads to the damage of finished product. To avoid such losses or fault conditions, monitoring proves to be very effective to detect faults at early stages.

1.2 Vibration sensor

In order to measure the vibrations of spindle and motor, accelerometer sensor is used. Accelerometer sensor is mounted on a motor and dresser arm of a grinding machine to measure the vibrations. It works on the piezoelectric principle which states that the ability of a material to generate an electric charge in response to applied mechanical stress.CMSS-2100 Accelerometer is used in this project to measure the vibrations.

1.3 Overview of SKF vibration monitoring device.

It is a 8-channel condition monitoring device.IMX-8 forms a flexible on-line condition monitoring system tool for rotating machinery applications. It is designed for continuous analysis and monitoring especially where offline monitoring is not practical. It is installed where temperature or vibration does not have adverse effect on it. In conjunction with @aptitude analyst software online vibration readings can be viewed on the mobile phones. With its special Bluetooth feature mobile phones can be connected to it for data analysis.

1.4 Overview of HMI

It is a software application that presents information to an operator or user about the state of a process, and to accept and implement the operators control instructions. Typically information is displayed in a graph form of trends. An HMI is often a part of

SCADA.The software used to design the screens of HMI is GT designer-3.HMI used in this project is of Make: Mitshibushi Electric, Model: GS2107-WT80.

1.5 Overview of GSM modem

A GSM modem is a modem which accepts a sim card, and operates over a subscription to mobile operators. D-link GSM modem is used in this project.
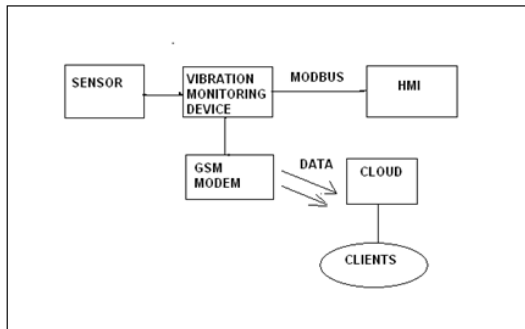
1.6 BLOCK DIAGRAM

Figure 1

1.7 Objective of the proposed work

The main objective of the proposed work is to monitor the vibrations of a machine tool by using online monitoring system to improve the productivity and reliability of rotating equipment.

II. CONCLUSION

Early recognition of spindle vibrations avoiding unplanned downtime. Provision of alert and danger alarms due to which spare spindle can be arranged in advance before failure

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