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System Designing on Smart Operation for Predictive Maintenance

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Abstract
In present scenario a significant amount of the global GDP is being diverted towards maintenance, more commonly for acknowledging breakdown or equipment failure. Behavior of operation with favorable safety satisfied industrial basic expectations, fulfilling industrial devices are in the range of its maximum potential of usefulness. The technology as M2M communication, Modern sensor technologies, associated with latest information technologies principle are more helpful on minimizing unused potential of equipment by providing real-time data on performance levels. On availability of such these input data a proper maintenance schedule can be developed to maintain the right parts with the right means without losing equipment efficiency. Hence predictive maintenance has a great role on industrial safety and smooth operation. This research article express the proper analyze of predictive maintenance features, as condition monitoring &, fault diagnosis. Here some of the possible technology associated to predictive maintenance is considered and finally a suitable solution is given for better and early maintenance process.

The objective of this research work is to analyze previous information so as to develop a system that would provide an alert message on the event of any unusual behavior of machines so that the maintenance can be done in advance through surveillance of the situation, information analysis.

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I. INTRODUCTION

Present technology has basically three different successive steps of maintenance depending on complexity and necessity of outcome. They are mostly corrective, preventive and predictive in nature. Identifying, isolating and rectifying the traditional fault come under corrective maintenance of a system or machine so that it can be ready for operational condition. Preventive maintenance is a regular operation of any industry to keep the machines healthy and to run the industry continuously without any interruption. It is performed while the equipment is in working condition to avoid any kind of unexpected break down and reduce major repairs. The disadvantages of the above two conventional methods is it lowers the reliability of the equipment and increase the maintenance cost. The disadvantages of the above two methods and increases efficiency and reliability predictive maintenance is mostly purposeful.

Predictive maintenance is described as a method used to predict when a machine fails and when it is necessary to do maintenance to avoid failure. It also helps to plan maintenance schedule well in advance to minimize the maintenance frequency of machines and increase its life span and also preventing the maintenance expenses. Different techniques can be used for predictive maintenance and based on expert opinion and types of device, the proper technique is used.
Using the outcomes of this method we can easily replace or maintain the unusual part so that it can work efficiently. The system condition is predicted based on the condition

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monitoring and fault diagnosis. After that the maintenance schedule is planned to obtain the final requirements.

Predictive maintenance is a systematic approach so maintenance period is not resolved, only to arrange timely maintenance programs by tracking and diagnosing the outcome. It stressed that the method of tracking, diagnosing and repairing the trinity.

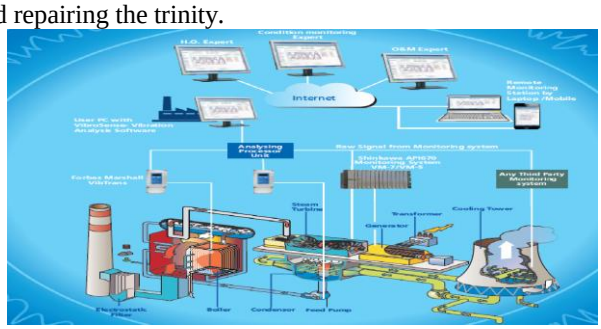

Fig.1. Structural view of intelligent system for predictive maintenance

Let us the most common associative to predictive maintenance .Electrical machines generate vibration signals during its operation. Whereas such signals consist of some unwanted noise and impossible to obtain helpful, accurate data by merely evaluating the general signal that makes it hard.

Therefore to remove the unwanted background noise we need to develop a suitable filter. Vibration should be evaluated at carefully selected points and instructions in order to collect helpful information on condition monitoring.

Followings are some of most suitable point for collecting abnormality information in terms of vibration.

a. Device misalignment such as couplings, bearings and gears.

b. Unbalancing of rotating component part or as a unit

c. Individual component or as a unit has Looseness

d. Nature and amount of deterioration of rolling–element bearings
Elements as Gear wear

II. Proposed Model of Intelligent System Design

Traditionally, condition surveillance implies obtaining information from different crop classes that give information regarding present machine condition. One of the important key components of predictive maintenance is condition monitoring. Meant of failure and output. Failures of machine like rotor scratch, misalignment of machine shaft, gear failure can be identified by comparing the vibration signal with faulty operating machine conditions so far.

Diagnostic methods of machine failure use individual signal segregation to develop celerity and minimize human errors on by judgment. These generated above signals is useful to acknowledge the failure in advance, reducing the probability that the machine components will cause also to detect the incipient failure, thus decreasing the likelihood of disastrous harm by the machine parts via internet surveillance scheme.

III. Analysis of Data

Detection and prediction of machines failures involves the generation of representative and helpful data about the vibration characteristics through a sensor device. Generally, the signal would be shown on a computer screen or on oscilloscope screen as shown in Figure 2. Our approach is to predict the kind of fault through a accelerometer mount on the machine. It provide a series signal to representing information of the abnormality of machine related to its original healthy condition.

Data so collected has several processing and analysis steps in designing of smart maintenance scheme that will be main propose of this work. The first step is to measure vibration signal using the sensor device as shown in Figure 2. The piezoelectric accelerometer is connected to a device for collecting databases that is connected to a computer that needs to be analyzed and that automatically applies a preliminary signal of the vibration.

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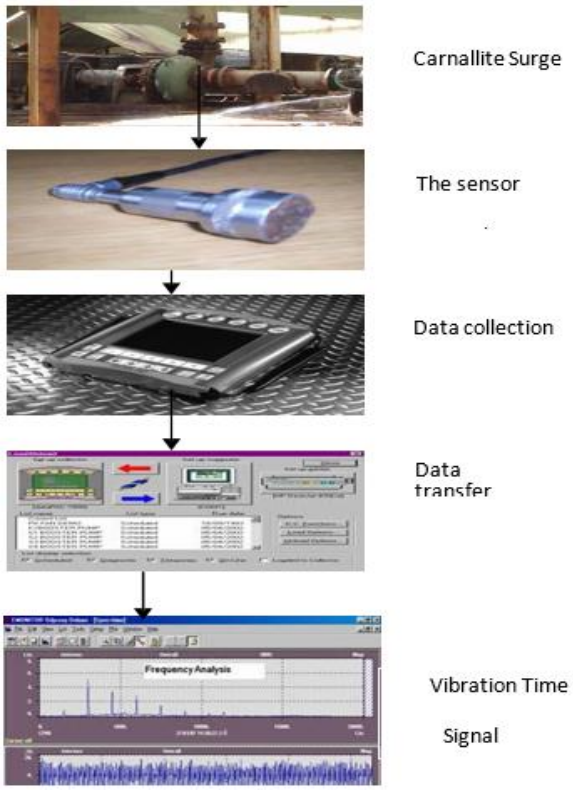

Fig.2 represents real-time system for data acuqasitation.

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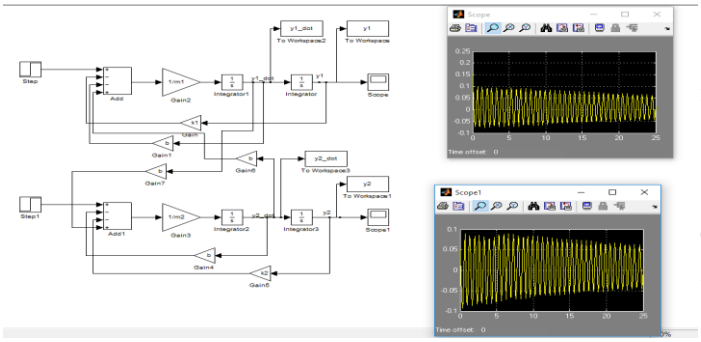

Fig. 3 . Simulink model for developing vibrating signal

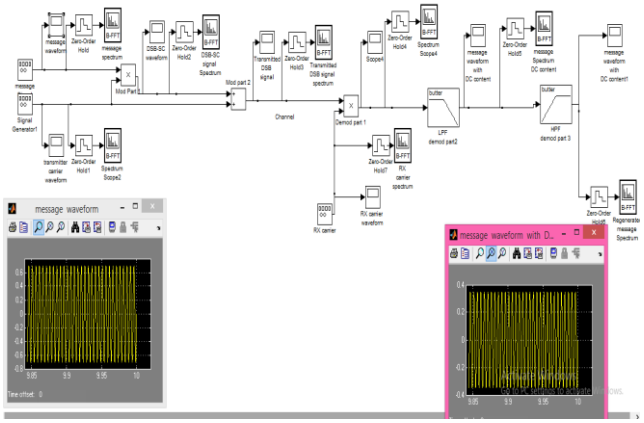

Fig. 4. Processing of developed signal associate with fault predictable device.

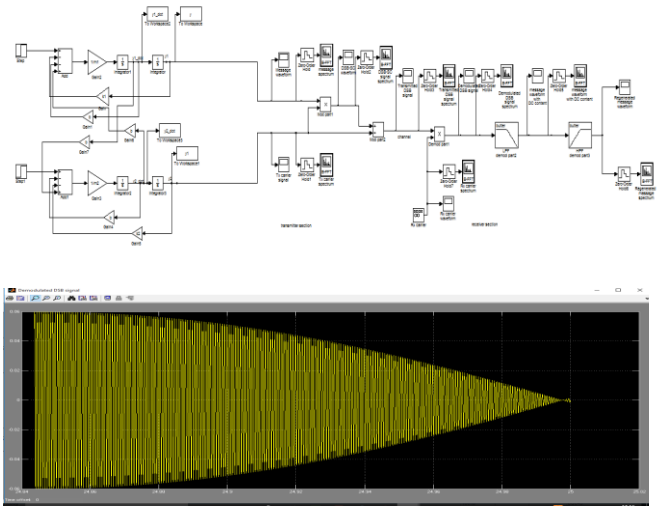

Fig. 5. Signal as an outcome for predictive analysis

IV. Conclusions

Outcome of this work prove that vibration condition monitoring organizations provided excellent patterns of distinct vibration information and graphs. In addition, equipment features also be well understood by this vibration analysts and background.

The vibration specialists could suggest optimal maintenance intervention after comparing vibration patterns on most critical equipment and data with machinery and processing proof for multiple significant machine failures such as wear, misalignment, oil shaft / whirl, shaft crack, looseness and unbalance.

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