**Journal of Information Systems Engineering and Management**
2025, 10(27s)
e-ISSN: 2468-4376
https://www.jisem-journal.com/

**Research Article**

# A Revolutionary Journey on Modern Industrial Automation with Intelligent System Design on Fault Predection-

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**ARTICLE INFO**

Received: 30 Dec 2024
Revised: 16 Feb 2025
Accepted: 25 Feb 2025

**ABSTRACT**

In present scenario a significant amount of the global GDP is being diverted towards maintenance, more commonly for acknowledging breakdown or equipment's failure. Behavior of operation with favorable safety satisfied industrial basic expectation 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 develop 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 expresses the proper analyze of predictive maintenance features. as condition monitoring, fault diagnosis. Here all 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.

**Keywords:** Smart system, predictive maintenance, vibration tracking, sensor and signal failure

## INTRODUCTION:

The development of maintenance technology has three different phases: (a) corrective maintenance, (b) preventive maintenance and (c) predictive maintenance. Corrective maintenance is defined as a task used to identify, isolate and rectify any fault 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 above two conventional methods is it lower the reliability of the equipment's and increase the maintenance cost. Predictive maintenance is a new method which overcomes the disadvantages of above two methods and increases the efficiency and reliability.

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

Strictly predictive 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, this concept applies to the maintenance of mass production machinery.

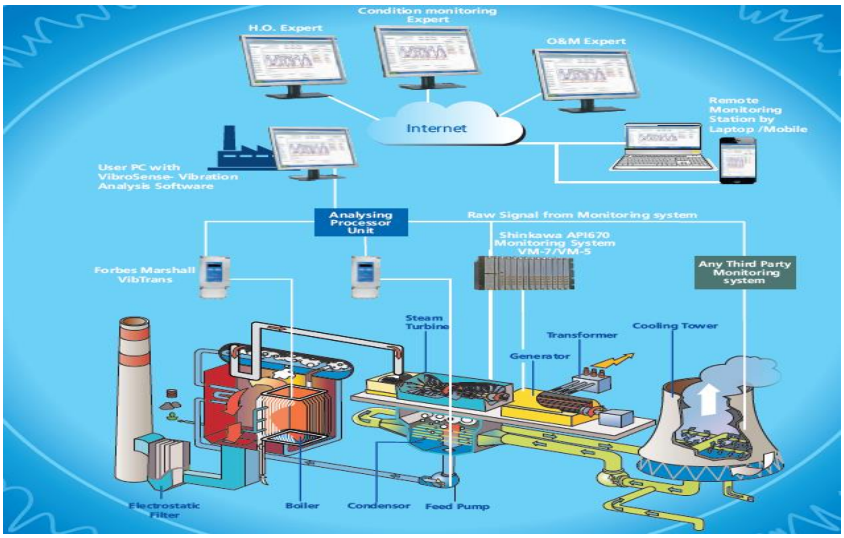



Fig.1 A required overall view of modern intelligent system

Electrical machines generate vibration signals during operation. However such raw signals contain a considerable amount of background noise, or even 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.

**a.** Misalignment of couplings, bearings and gears.

**b.** Unbalance of rotating components.

**c.** Looseness

**d.** Deterioration of rolling–element bearings

**e.** Gear wear

## INTELLIGENT CONDITION MONITORING AND FAULT DIAGNOSIS SYSTEM.

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. An ideal condition monitoring system would acknowledge measured data as input and produce different operational status, like mode of failure, moment of failure and output.

Diagnostic methods of machine failure use automatic signal classification to enhance accuracy and reduce errors caused by subjective human judgment.

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.

The above signals can also be used to detect the incipient failure, thereby reducing the probability that the machine components will cause catastrophic damage via internet surveillance.

These signals can also be used to detect the incipient failure, thus decreasing the likelihood of disastrous harm by the machine parts via internet surveillance scheme.

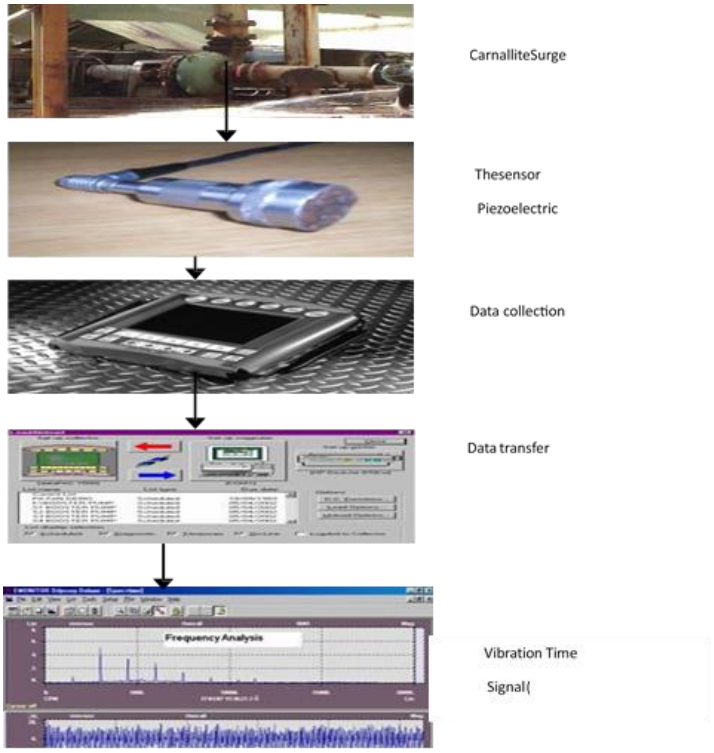
### Analysis of Data

The time domain is a string of what happened to a time parameter. Generally, the signal would be displayed on computer screen or an oscilloscope as shown in Figure 2. The information window period (T) to be evaluated and

the sampling rate(s) to be used when digitizing ongoing information impose certain constraints in the evaluation of time series signals. Detection and prediction of machines failures involves the generation of representative and helpful data about the vibration characteristics through a sensor device. Our approach is to predict the kind of fault which has to mount a accelerometer on the machine element under research to provide a series signal to continue information on the machine's faults, failures and health conditions.

Data used has undergone several processing and analysis steps in the construction of smart maintenance scheme that will be explained in detail in this chapter. The first step is vibration measurement using the sensor as shown in Figure 3 ; this sensor is a piezoelectric accelerometer. The piezoelectric accelerometer is most attractive because of its rigidity, wide frequency range, flat response and dynamic range, this sensor has the ability to measure vibration in three dimensions (i.e., axial, horizontal and vertical). 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 to the vibration.

Fig.2 represent real-time system for data acuqasitation




## SIMULATION AND RESULT

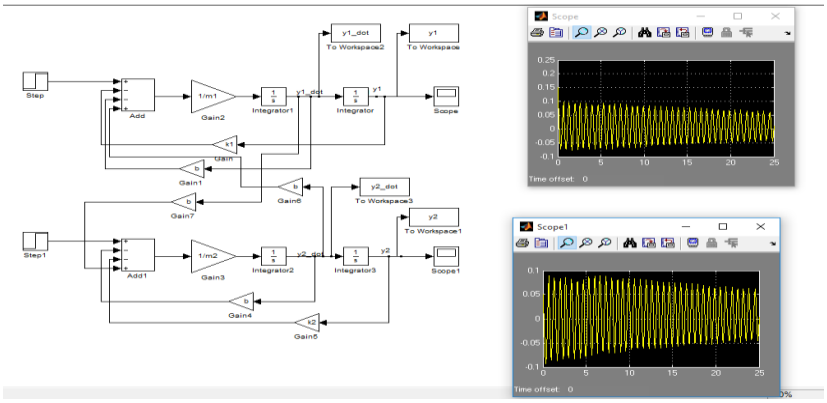



**Fig 3 .simulink model for developing vibrating signal**

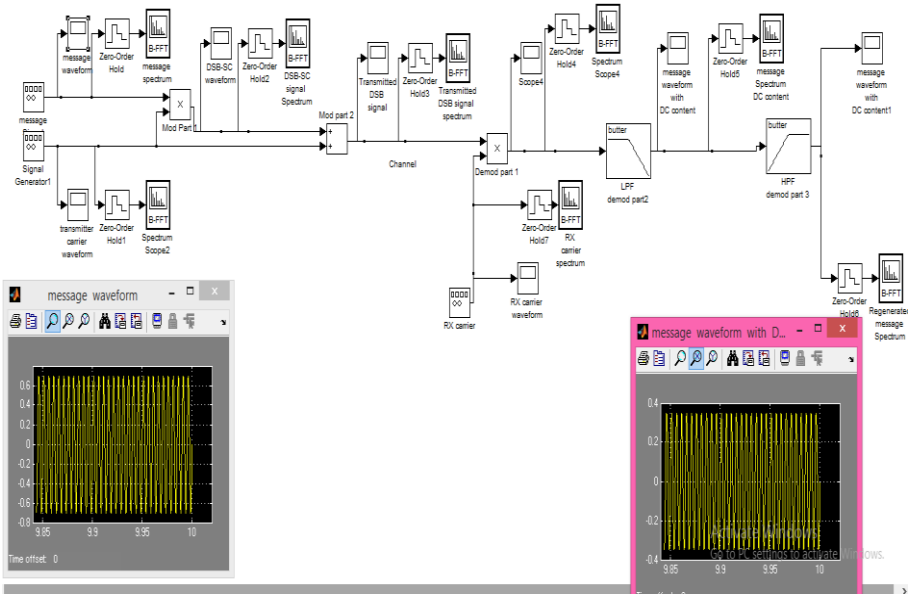



**Fig 4 . processing of developed signal associate with fault predictable device**

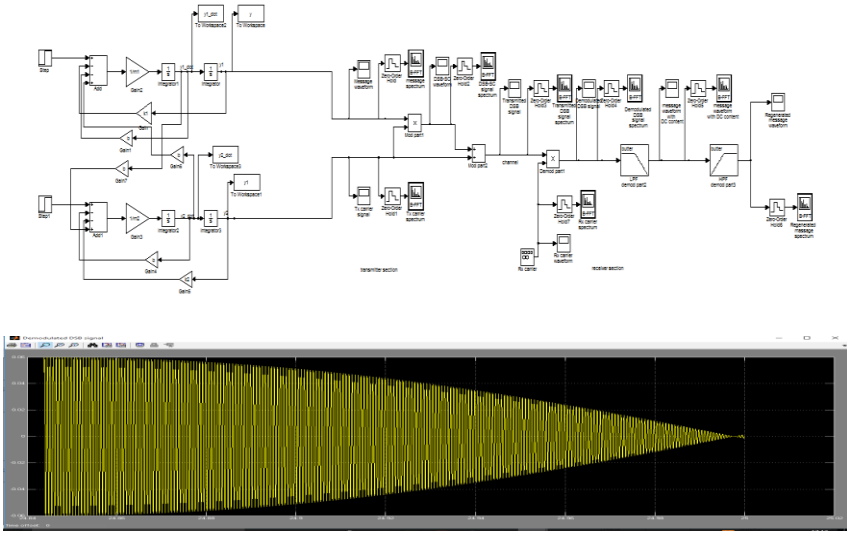


Fig .5 signal as an outcome for predictive analysis.

## THE FOLLOWING CONCLUSIONS CAN BE DRAWN FROM THIS STUDY:

The vibration condition monitoring organizations, like absolute and relative general vibrations, should have provided excellent patterns of distinct vibration information and graphs. In addition, equipment features should be well understood by 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.

Changes in load and RPM should be followed closely. These kinds of process defects sometimes trigger serious mechanical troubles. Techniques for continuous monitoring of the condition of the engine and interpreting defective and healthy condition. This technique can detect very tiny flaws,

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