

**PREVENTIVE MAINTENANCE OF SMALL SCALE INDUSTRY USING IOT  
A CASE STUDY AT M/S. CHIDAMBARAM & CO, DHALL  
MANUFACTURER, VIRUDHUNAGAR**

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**Abstract**

*The concept of preventive maintenance based on remote monitoring is the need of the day. In foreign countries, Industry employing such technology is termed as Industry 4.0. In India, the concepts are not popular due to the technology lag and cost involved. This paper deals with the technology Speak Think, an API to enable Cloud data & remote monitor an Industry at a cheaper cost. For the study four parameters are identified and data are gathered & uploaded to cloud using Speak Think. With these data, a closed loop preventive control was established.*

**Index Terms:** *Preventive Maintenance, IoT, Speak Think, Cloud Data.*

**1. Introduction**

For best performance of Machines in a Dhall Mill & to get the maximum outturn of finished goods the parameters to be monitored are identified. This is done by having interview with the managers for such industry. After consulting with about 6 similar Industry, the following inferences were made.

The Motor, which is the prime mover of the Industry, is run on counter shafts. These motors are of large capacity, usually 30 HP to 50 HP induction motor that runs continuously. The bearings of these motor have to be well grease & has to run smooth. If there is any fault in this motor, it is indicated by the temperature raise of the motor. So one of the main parameter is to temperature monitor the main motor. The other parameters to be maintained are to give excellent Quality of output & higher outturn. For this the parameters identified are

- Level of In Feed Dhall. As only if this level is maintained constant, then the flow is uniform & the process is uniform & all the grains get uniformly cured.
- Condition of the Emery Stone. The Emery stones have to be replaced whenever worn out. Identifying the condition of the Emery Stone is an important parameter. The wear of the Emery is identified using the Asha machine vibration levels. The vibration level will be more

than the set value if the stone is worn out. Using this parameter the Emery can be maintained properly.

### Maintenance Levels

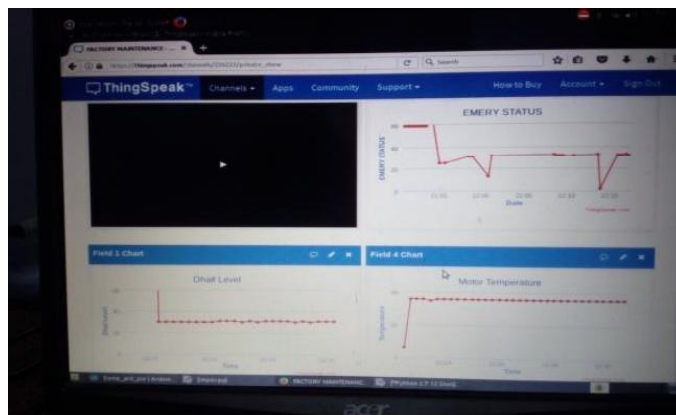
The optimal level of the Dhall is identified from the workers & a level sensor is attached at that level. A fall in level from the set value can be monitored from any remote locations. Similarly the default vibration of the Asha Machine and the optimal Temperature of the Main Induction Motor are identified and specified as control levels. Any deviation from the set values will initiate an Alarm that can be used to initiate a corrective maintenance action.

### Interfacing of Sensors

The sensors namely, Temperature sensor, Vibration sensor, ultrasonic sensor are interfaced with Audrino Board. These boards are linked to Raspberry PI3 processor. This is capable to upload the data using Wi-Fi Network to cloud. Project contains three modules namely, (i) Input Module,(ii)Processing Module,(iii)Output Module. Input Module consists of 3 sensors namely LM35 for the measurement of temperature, Ultrasonic sensor(HC-04) for the measurement of level and Piezoelectric sensor for the measurement of vibration. The Processing Module is Raspberry pi3 kit, the system onchip used here is Broadcom BCM2837. The Output module is Think speak webpage for continuous monitoring cum data acquisition.



### Working



The Input sensors are connected to Raspberry Pi through arduino. Using Python script data are sent to thinkspeak webpage through Webpage link given in the code. Thinkspeak page is highly secured and private so that without proper authorization no one can view the output signal. This page contains four channels to display the signal in the form of graph varies continuously with respect to time. This channel also includes live video stream. So that it is easy to monitor the work of the labours.

### **Advantages of the System**

- Reduced Man power & security issues.
- Risk factors are reduced such as overheating of Main motor.
- Consistent dhall level maintenance in the tank.
- 24\*7 Monitoring of working field.
- Emery stone status is predicted in advance, so wastage of dhall is reduced and thereby outturn is increased.

### **Inferences and Future Expansion**

It is a real time monitoring of system parameters. All the parameters can be visually monitored from any remote location over phone. The data gathered are time stamped & uploaded to cloud. In future, the data can be analyzed using Soft Computing Techniques such as Fuzzy Logic or Neural Networks & predictive maintenance can also be initiated on observation of symptom of failures.

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