

# A Case Study On Manufacturing Industry Used Prognostic Tools To Remove The Problems In Shop Floor Challenges Faced In Maintenance Engineering

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**Abstract:** This case study reviews that the maintenance engineering process which is used by small scale industry and faced many time problems in shop floor and in this case stop the production and call the maintenance engineer but right now is not possible to any maintenance engineer is free come and rectify the problem, so this type of process some time given very big losses to the industry, example is HMT company follows the breakdown maintenance policy they never change yourself with time and the latest demand is to use predictive maintenance with prognostic and diagnostic process with CMMS (Computer maintenance management system) software.

**Keywords :** CMMS, Diagnostic, Prognostic approaches, SMEs, predictive maintenance.

## 1.Introduction

An effective guidance to confirm that the resources attain their complete totally possible service life, attractive maintenance to store resources from getting worse incurrence and becoming attractive, risk management and the resources in this condition of better refurbishment for the employers wellness and care, substantial principle hold in better functional sequence in order to reduce disturbances and spare time, hold for maintenance delivers to safeguard the employers actual capital investment in many actions. In accordance with the information, the yearly machine tool maintenance charges up to forty percent, so that the enhancement of latest technologies and applicable maintenance planning that can maximize the production and financial performance machine tool is necessary, which has a beneficial not just for financial advantages of the machine tool, however network responsibility, accessibility and protection. Maintenance Technology advancement carries 3 steps: corrective, preventive and predictive maintenance. The corrective maintenance is 'only defect removal' method, which is an ancient preservation method; the preventive maintenance is executed at pre-planned time periods to check, the alternative of components, so as to avoid destruction, injury and other losses; the probability maintenance is a condition-based maintenance, if the system is imperfect then the present systems situation determine the system would be repair.

The corrective and preventive maintenance are the standard approaches of maintenance, which will effect in bottom-most apparatus responsibility and higher maintenance charges. The predictive maintenance combine in the machine tool health inspection, failing analysis, failing situation forecast maintenance selection support and maintenance action, which is the newest technique of maintenance and can intensify financial performance and possibility. Predictive maintenance approach may be split into confined and extensive. Confined predictive maintenance denotes unsteady or ongoing situation observation of machine tool, on the basis of outcomes, to determine the situation is unusual or defective machine tool tendency, after which to organize for work, on the basis of 'situation observation and stresses the intervention. By narrow margin predictive maintenance time isn't fixed, just to organize appropriate maintenance programed by observation and examination the outcomes, it claimed as the method of observation, examination and service of threesome, this conception executes mass production equipment maintenance. Mostly predictive maintenance asserted as the operation of situation observation, defect examination, health prediction and service commitment of threesome, depending upon the situation measurement and defect examination, the process condition is projected, after which the maintenance choice is accepted to attain the of needs for maintenance processes. All over this, predictive maintenance is a standardized operation; the maintenance management is associated into predictive maintenance concepts, and including the whole maintenance services, as late as outcomes integrated with maintenance process is achieved. Types of Maintenance which is used in industry today's or decade of ago but still we are discussed on preventive maintenance, types are as follows:

1. Break don maintenance.
2. Corrective maintenance.
3. Preventive maintenance.
4. Predictive maintenance.

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## I. Predictive Maintenance Features

### (1) Scientific

To use and reform the machine tool, the predictive maintenance for machine tool apply the production inspection mode of the apparatus (by hand or self-display online observation) associating the complementary details of the machine, in account of work skills with the respective workers. Through inspection systems, the advancement and evolution of machine tool performance can be inspected, the upcoming situation of the machine tool can be forecast, and basis on the forecast consequences, the machine tool is governed and improved. So as to additionally enhance the effectiveness and precision of the maintenance management, to confirm precision and work efficiency of the machine tool and to confirm the virtue of machine tool, generally uses future prediction approaches and observation instruments. To initiate the online observation method and the investigation method, the predictive maintenance method is expected and accomplished from technical change and online observation of present machine tool to achieve convenient observation details.

### (2) Timeliness

Predictive maintenance punctuality described in its actual observation of machine tool rating and complete information procurement. Failure observation is build and the servicing scheme, backups inventory program and acquisition ideas is given through status detector. The predictive maintenance can enhance the precision of machine tool preservation, backups management to enhance precision. After all predictive maintenance can build an perfect leader for the service period, techniques, the group and quantity of backups required. It is proposed to attain 'no inventories' management.

### (3) Maintenance Decision Support and Maintenance Activities

The state prognosis evaluates the present position and expected future member position based on the functional information equipment. Forecasting approach based on the traditional reliability, forecasting approach based on failure of physics and forecasting approach based on data-driven and probability are the commonly used approaches. The forecast accuracy and the expenses of the three approaches improve and consecutively increase. The maintenance decision put up the maintenance possibility examination, dictate the maintenance support resources, set the maintenance strategy and given time period, place and satisfactory maintenance activities, on the basis of condition monitoring, predictable status and fault finding from the people, time, productivity, cost, resources and even many more angles. Generally maintenance decision includes, developing methodologies like, mathematical model examination methodology, intelligent maintenance selection process, defective tree reasoning and Bayesian network model. We can see that the life projection approaches provides, maintenance planning and assessments of the remaining life of the apparatus on the basis of additionally defined appropriate execution of maintenance time from the top of the domestic and

overseas research in present situation. Maintenance planning determines the maintenance programme more directly and directly attributes the performance of the apparatus in comparison with the life projection. Whereas, life prediction is more easier than maintenance planning problems. The following key technologies of predictive maintenance planning are:

- a. Study on life prediction system.
- b. The examination of the "new" and "passed-on" methods of the repair.
- c. Dynamic maintenance planning pattern.
- d. The predictive maintenance planning framework for the "repair of passed on" techniques.
- e. The maintenance schedule for the development of predictive planning and exhaustive life prediction.

## II. PHM Maintenance (Present Health Measurement)

We assume that, a production system with one failure-prorate machine that changes unpredictably with time and the amount of failure. It is quite acceptable, for such a deteriorating system to suppose that lowers the sequential operating times and with the number of failures the repair times will increase [2]. Furthermore, the reliability of the system reduces and an operational risk increases due to the deterioration, which result maximizes both undesirable penalty and cost [3]. Finally the machine may be non-reparable after it experiences a definite amount of failures, due to the increasing failure rate or repair times. Hence, a decision should be made: whether to continue with repair at forever-increasing repair costs or to replace the machine component with a new one, at each and every failure of the machine system [4]. According to [2], damages are inexhaustible in some cases. In present days equipment came to be produce absolute understanding on maintenance to execute 'forecast and intercept' practice in place of 'collapse and repair' processes by applying technical tools, like as detectors, governors, meters and statistical systems, and advanced systems like as Neural Network, Match Matrix, Bayesian Networks, Hidden Markov Model and Fuzzy Logic. Today, many more research work has been turned toward for PHM. PHM focuses on more emerging failure findings, present health measurement and remaining useful life. PHM concept and framework has been developed on the basis of established maintenance strategies and diagnostic approaches, like as condition based maintenance (CBM), preventative maintenance (PM) and reliability centered maintenance (RCM). Figure1. Shows the different maintenance approaches with the process uncertainty and involvement in the maintenance transformation map.

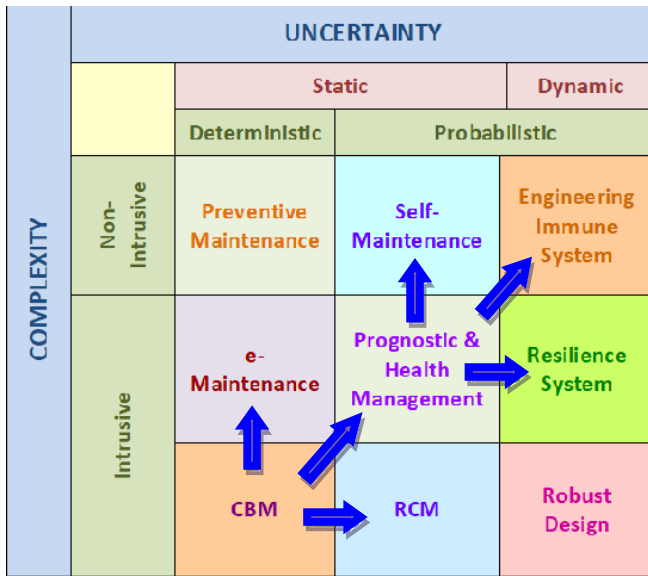


Figure 1. Maintenance Transformation Map [By Research Gate]

The aim of PHM is to provide users with a combined view of the health status of a machine component or a gross system, as an engineering discipline. The valuable PHM system means to monitor and predict the development of the fault which predicted to provide early detection and developing faults of machine components or sub-machine elements, and to aid in making or independently start maintenance programme and asset management decisions or actions. Unnecessary and expensive preventive maintenance can be removed, lead-time be reduced for resources and spare parts can, and maintenance planning can be optimized by adopting such a system which can result in considerable cost savings. Many algorithms evolved for this particular application by the result of the research efforts in the sector of machinery PHM. The major focus of these algorithms is, on the applications involving common rotary machine components, like as gears and bearings. We have data regarding manufacturing maintenance tool requirement but the policy of company is not gives permission to publish such collected and observed data which is provided by company. As an author we sure about that the case study is on based genuine data and in future we will try to give some tabular and mathematical form of maintenance strategies to resolve issues and achieved high production target with fault tree analysis.

**III. INDUSTRIAL CONTEXT**

This paper represents many applications, especially in manufacturing industry. Many engineering systems are subjected to the pretended unknown failures. Only by the special tests, inspection or monitoring, the unknown failures comprised are identified. Seal machines, filling machines, sewing machine, machining centers, broaching, grinders, milling, turning, shaping machine and many of tools machines are some of examples which have a large number of working components such as: treadmill, lead screw, ball screws, chuck, spindle heads, carriage, precision gear boxes, cross-slide, axis drive components, rotary

tables, cross-slide wheel, saddles, tail-stock wheel, pallets and short etc. These machine component parts unpredictably decay over time. Many times, such machine component parts are broken or damaged, while the machine is going on. A worn bearing will an example which create whipping noise, whereas the machine is in still working. Therefore, these removable and repairable machine components produce machine failure. Due to this the quantity of components to examine and repair at failure time increases, this enhance mean repair time. A preventive maintenance (PM) replace worn nozzle with appropriately sized nozzle and can serve to clean and adjust flow injection system, control stroke and valves. By doing this, a lesser amount of component parts to be checked and repaired at the next failure time, which also downsized the mean repair time. Preventive interventions devote to remove breakdown risks and to sustain the continuous and uniform functioning of the machine. Furthermore, worn components which still in functioning are replaced, so that when the next failure occurs, the amount of worn components to check, repair or replace is controlled. As a result, post-repair preventive maintenance time is reduced.

**IV. Problems state**

During the visit of industry by me a month ago (Gazra Gears Pvt. Ltd.) see that many problems faced by industry in production department related to manufacturing and maintenance engineering. Related to maintenance engineering discuss three problems in this case study, the company made HUBS & GEARS & they suffer many times to fail outer diameter in CNC late or CNC Milling machines due to component critical operation strategy, during the operation cutter and cutting tool break and tear so to stop the production now plays a important role by maintenance engineer at this time if company follow the break down maintenance so faced production stop a shift or may be some time two three days its depends on the problems. But this company follows the preventive maintenance policy in prognostic procedure to check the tools and machines always but machine fails for many reasons in maintenance engineering in manufacturing sector delivers extremely to GDP and it has enormous potential for creating employment. The manufacturing sector faces some challenges in present are: Lack of skilled personnel - Skilled personnel is always known as the backbone of manufacturing sector to their skills, progress and existence. To provide the proper knowledge and skill to the fresh personnel, manufacturing company spends lot of money, massive amount of time and effort so that they start contribution in production and productivity. Company loses large quantity of opportunities to enact the emerging demand of quality engineer's availability in the entire process - Because of hard working environment, graduate engineers which passing out from good and reputed engineering colleges and institutes are not in favour to join manufacturing companies. In perspective of globalization and to stay competitive, it is necessary to earn enhancement in manufacturing with the application of modern technology and faster process development. Devoted to establish in R & D in manufacturing technology

and process is the necessity of the duration. Import from low cost manufacturing countries - Some of the manufacturing industries are swapping over to trading, rather than making their house manufactured objects competitive in the market, in order to save on worth & keep their existence in market. Supply situations & unfavorable demand- many companies are on the boundary of closure & are being managed at reduced level of established capacity shipment impressionability, on view of inadequate demands of manufactured goods in global and local markets & emerging cost of production. No one wants to wait! In this fast moving world, this becoming more and more crucial for the manufacturing industries to lower the lead time to market.. Lesser lead time definitely gives a competitive margin to a company. This calls for higher quality management of the resources demand and an exactly bind supply chain for broad range of products. For providing a broad range of products to favour the market demand, manufacturing industries faces huge challenges. This enlarges operational cost as it leads to considerable losses over the change in formation of the machines and skills. This even leads to requirements of certain client's, that may necessitate the company to customize the product specify. Minimizing the very high speed dynamic nature of present age demand and supply balance turns the business of a company more risky and complex, and to remove this risk is regularly becoming a challenging task. No one chance loose in decision making but will cost them large and finest utilization of resources. With increasing operational costs, manufacturing companies need a focused approach towards the way they utilize their resources. With increase in resources, where labour could be admitted at very low cost, cheap labour has become a part of the past, like India and China. Not to reveal, the machines which continued to be faced real challenges in manufacturing industries vary across the lines of business. They are into and also on the native parameters like finance; resources, climate, processes etc. have always been the center of the focus for finest development.

## V. CONCLUSION

In this case study we found that many problems in small scale manufacturing industries but they are not using highly technical tools like CMMS, if the company uses this kind of prognostic tools in shop floor and use the maintenance policy on regular basis (predictive maintenance), then removed lot of losses in manufacturing and also improving supply chain process for raw material to finished good material it is also very important role play in to the increase rate production in industries. Prognostic tools such as diagnose before to start the machine but once the machine can run and during the operation faced any faults that times come & play a vital role here supply chain management how to provide the material to the vendor of right time, now my one little submission in this paper to implement and my further research is continue in this area very deep sense, suggestion is to use CMMS and predictive maintenance by all small scale industry to achieved good result in production and most of the time safe our employees (machine operators).

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