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# Review on Different Techniques in Maintenance

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**ABSTRACT:**To avoid system failure, predictive maintenance is critical for all engineering systems, but especially complex ones. Thanks to recent advances in pervasive computing, prognostics may now be simply implemented in any device or system. It is possible to move beyond simple "predictive maintenance" to intelligent "prognostics," the process of determining precisely which components of a machine are likely to fail and when, and then autonomously initiating service and ordering spa treatments, when intelligent devices are networked and controlled remotely, and their data is modelled and continuously analysed using advanced embedded systems. This chapter discusses how contemporary maintenance systems have evolved from a "fail and fix" mentality to a "predict and prevent" mentality. Recent advances in prognostic technology and approach are discussed, as well as future research potential

**KEYWORDS:**diagnostics, prognostics, machine performance assessment, maintenance.

## I. INTRODUCTION

For a long time, maintenance was thought being a filthy, time-consuming, and rare chore. While it is critical for productivity, it is yet to be recognized as an essential component of income generation. The most frequently asked question is, "Why do we need to maintain things on a regular basis?" The response is, "to preserve as much dependability as feasible." The query should be, "How much has changed or degraded since the last round of maintenance?" To this question, the right response is "I'm not sure." Sensor-based management systems that provide alerts, cautions, and indicators now control a substantial amount of machine field services. It's too late to avoid disaster by the time the warning sounds. As a reason, most machine maintenance today is either totally reactive (repairing or replacing equipment after it breaks down) or totally proactive (changing equipment before it breaks down) (assuming a certain level of performance degradation, with no input from the machinery itself, and servicing equipment on a routine schedule whether service is actually needed or not). Both options are quite inefficient. Reactive maintenance, sometimes known as "fail-and-fix," is being phased out in favor of "predict-and-prevent" maintenance by world-class enterprises. A maintenance methodology known as Condition Based Maintenance (CBM) was developed by evaluating current degradation and its evolution. Although CBM methods and procedures have vastly improved over time, they are still carried out at the equipment level, one piece of equipment at a time, and recognized prognostics approaches are application or equipment specific.

## II. MOTIVATION

In the context of Industry 4.0, the future of continuous maintenance also highlights the... developments and has become the primary incentive for continuous maintenance:... The recent technological knowledge issues are the topic of this lecture.

## III. METHODOLOGY

Examine the machine for any signs of external damage. Discard any and all old electronic components. For the new electrical systems, create a control panel. Disassemble all 14 spindles and dissect each one one at a time, making records of the exact order of bearings, spacers, and other components. Cleaning the entire equipment and inspecting it

for rust and other issues. Make a list of the materials you'll need. Checking for any spindle runout or other critical metrics such as axial play after assembling spindles with new components.

#### IV. LITERATURE REVIEW

Miroslav FUSKO 1\*, Ivana SULÍROVÁ 2\*, Miroslav RAKYTA 3, “new trends for maintenance management”[1], As a result of globalisation and concomitant competitive pressures, practically every industry has experienced rapid transformation. Maintenance workers are observing changes in the workplace, both in the facilities and on the plant floor. Most maintenance staff of all sizes have firsthand knowledge of these commercial developments, while others anticipate them in the near future.

CHEN Chuang<sup>1,2</sup>, LU Ningyun<sup>1,2,\*</sup>, JIANG Bin<sup>1,2</sup>, and XING Yin<sup>3</sup> “Condition-based maintenance optimization for continuously monitored degrading systems under imperfect maintenance actions”[2], Because of its effectiveness, condition-based maintenance (CBM) is gaining traction in a variety of engineering systems. This work proposes a new CBM optimization issue for decaying systems that are continually observed and have incomplete maintenance operations. In terms of maintenance actions, due to residual damage, they rarely return the system to an as-good-as-new state. Imperfect maintenance actions, according to current research, are likely to hasten the degradation process. By determining the best preventive maintenance threshold, the established CBM optimization technique can balance maintenance costs and availability. In the CBM optimization issue, the maximum number of maintenance is also taken into account, which is viewed as an availability constraint. A numerical example is given, and experimental findings show that the proposed CBM optimization technique is innovative, feasible, and flexible.

Cao LuCui, “Maintenance Technology for Charging Failures in the New Energy Vehicles”[3], As we all know, regular auto exhaust contains a significant amount of toxic gases, which not only endangers people's health but also exacerbates the greenhouse effect. Furthermore, petroleum resources are dispatchable energy sources, necessitating the use of renewable energy vehicles. Electric vehicles, as one of the more prevalent new energy cars, use on-board electricity as the driving force and electric motors to drive the vehicles, which not only meets the needs of urban vehicles, but also does not ruin the water and has a lower environmental impact. However, because electric car technology is still in its infancy, failure to charge the vehicle may occur, posing a severe threat to the use and promotion of electric vehicles. We examine the reasons why electric vehicles can't be charged and provide solutions in the hopes of assisting employees in connected sectors.

Omkar Ekatpure<sup>1</sup>, Vaibhav Agarkar<sup>2</sup>, Prasad Pawar<sup>3</sup> “Maintenance of SPM Machine”[4] Maintenance is work done to keep a certain object in good functioning condition so that it can continue to be used and perform at a minimum acceptable level of performance for the remainder of its design service life without needing to be replaced or repaired. As a result of normal wear and tear, the machine's effectiveness may be reduced. Preventive maintenance improves working conditions and extends component life. Although preventive maintenance reduces output, it pales in comparison to the downtime caused by a breakdown. The exponential growth of manufacturing data records has been aided by sensor technology. Useful information and knowledge about the manufacturing process, production system, and component are generated when data is analysed and documented. In industries, machine maintenance is critical since it affects the machine's running time and efficiency. As a response, machine issues must be discovered and resolved in time to prevent the manufacturing process being shut down.

Jose Baptista, CMRP, “Industrial Maintenance today and future trends”[5], The progress of industrial maintenance during the last 60 years is described in this paper, as well as the significant factors that have affected it. It will also show you how to create a setting that could be described as the "ideal world" for any maintenance worker. In addition, the article examines new technology and concepts, as well as how they may influence future industrial maintenance trends. Finally, a summary of QUANT, the global leader in industrial maintenance outsourcing, is provided, as well as strategic plans to ensure that world-class services are provided in the future.

#### V. MAINTENANCE STRATEGY

1. Breakdown maintenance
2. Preventive maintenance
  - I. Periodic maintenance



II. Predictive maintenance

3. Condition Monitoring

4. Corrective maintenance

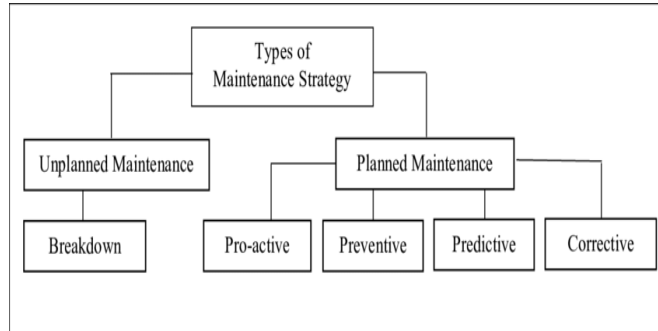


Fig 1 Types of maintenance strategy.

**1. Breakdown Maintenance:** -It occurs when mechanics wait until a component fails before repairing it. Breakdown maintenance is performed when a machine breakdown does not have a significant impact on operations or production, nor does it result in a major loss other than repair costs.

**2. Preventive maintenance:** - Cleaning, inspecting, oiling, and retightening loose bolts are all examples of preventive maintenance that should be performed on a regular basis to keep the equipment functioning well and avoid failure. Inspection of the machine's status on a regular basis aids in the discovery of the problem's source. The two types of maintenance are periodic and anticipatory maintenance. Preventative maintenance, like preventative treatment, can help extend the life of equipment.

**1. Periodic maintenance:** - Time-based maintenance include examining, maintaining, and cleaning components on a regular basis, as well as replacing parts, to avoid unexpected failure and process issues.

**2. Predictive maintenance:** - Predictive maintenance is when the service life of a critical component is projected based on an inspection or diagnosis, allowing the parts to be used to the end of their useful life. Condition-based maintenance is superior to both periodic and predictive maintenance. It organises data by monitoring and analyzing degradation data.

**3. Condition Monitoring:** - The technique of analyzing the state of machinery while it is in operation is known as condition monitoring. Knowing what to look for and how to interpret it are the keys to a good condition monitoring programme. 3. When to use this information successfully Using this programmed allows problem components to be repaired before they fail. During downtime, condition monitoring helps technicians to order parts ahead of time, organiselabour, and plan additional repairs.

**4. Corrective maintenance:** - By increasing the life of the machine and its components, it increases the reliability of preventative maintenance. To increase reliability or maintainability, machine components having design flaws must be redesigned.

VI. INTELLIGENT MAINTENANCE SYSTEMS

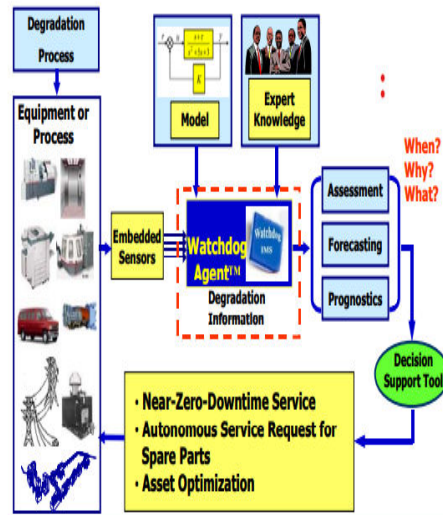


Fig.2. Key Focus and Elements of the Intelligent Maintenance Systems.

Most modern manufacturing, mining, farming, and service machines (such as elevators) are quite "smart" in and of themselves. A machine's state and performance can be monitored using a variety of sophisticated sensors and electronic components. The difficulty is that most of this information isn't put to good use. We have the gadgets, but not a continuous and flawless flow of data across the entire process. This can happen when the available data isn't displayed in a usable or immediately understandable format. Even though the devices are networked, there is often no infrastructure for sending data over a network, much less controlling and analysing it. The IMS Center recently developed a Watchdog Agent®-based Real-time Remote Machinery Prognostics and Health Management (R2 M PHM) system. As shown, it focuses on developing novel prognostics algorithms and tools, and also remote and integrated predictive maintenance technologies to predict and avoid machine breakdowns.

VII.SYSTEM ARCHITECTURE

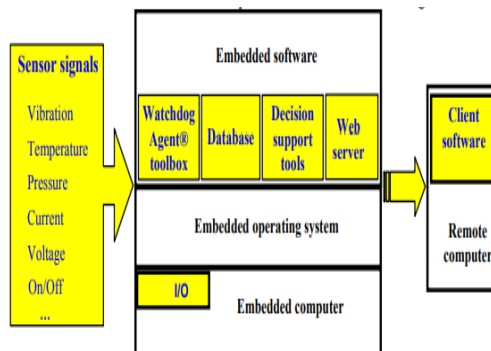


Fig 3. Architecture.

VIII. CONCLUSION

This article discusses emerging maintenance management themes in Industry 4.0. Engineering, mechanical and electrical, information, telecommunication and networking technologies, mathematics, statistical, and management sectors all work together to develop maintenance management and engineering. Any advancement in one or more of these areas will have a knock-on effect in the others, resulting in better maintenance integration. As can be observed, it is vital to modify the present maintenance's approach, as Smart Things already surround us to a considerable extent.



The viewpoint of how maintenance might approach this new transition in industrial organizations is presented in the essay. It is reasonable to expect that development will continue, and that in a few years, the term "Smart World" will be used. They are already available and frequently used by some elements at this time. Maintenance and technical support will not go away, but they will grow into a more sophisticated system.

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