

MMS in ERP*

Prakan Puvibunsuk

Chantarakasem University
e-mail: prakan@gmail.com

Abstract

Maintenance Management System (MMS) is a computerized database designed to optimize the management of deferred maintenance and capital improvement activities throughout the Service by using standardized procedures to document and prioritize field facility and equipment needs and to report accomplishments. Enterprise Resources Planning (ERP) is an integrated computer-based system used to manage internal and external resources including tangible assets, financial resources, materials, and human resources. It is a software architecture whose purpose is to facilitate the flow of information between all business functions inside the boundaries of the organization and manage the connections to outside stakeholders. Unfortunately most ERP was designed for production only, this paper aims to integrate MMS into ERP in order to improve overall industrial plant performance.

1. Introduction

Breakdowns in industrial manufacturing systems can have significant impact on the profitability of a business. Expensive production equipment is idled, labor is no longer optimized, and the ratio of fixed costs to product output is negatively affected. The ultimate goal of every Manufacturing plant is to increase overall production reliability, meaning the maximization of output with current resources by reducing waste in equipment reliability and process reliability. Maintenance Management is the key success factor in production reliability improvement.

Maintenance Management (MM) can be separated into three main groups as following

1. Corrective Maintenance (CM) or Run-to-Failure

This method has been a major part of plant maintenance since the first

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manufacturing plant was built. This method is used to fix equipment only when a machine breakdown and does not spend any money on maintenance until a machine or system fails to operate.

2. Preventive Maintenance (PM)

This method is time-driven or maintenance tasks are based on hour of operation. Because of assumption that machines will degrade with in a time frame called Mean-Time -To-Failure (MTTF) therefore machines should be rebuilt before MTTF have been reached.

3. Predictive Maintenance (PdM)

The common premise of this method is that regular monitoring of the actual machine condition, operating efficiency to ensure the maximum interval between repairs and minimize the number and cost of failures.

The role of maintenance is not only to fix breakdown in record time; rather, it is to prevent all losses that are caused by equipment or system related problems. The mission of the maintenance department in a world-class organization is to achieve and sustain the following:

- *Optimum availability*
The primary function of the maintenance organization is to ensure that all machinery, equipment, and systems within the plant are always online and in good operating condition.
- *Optimum operating conditions*
The maintenance organization must maintain all direct and indirect manufacturing machinery, equipment, and systems so that they will continuously be in optimum operating condition.
- *Maximum utilization of maintenance resources*
The goal of the maintenance organization should be effective use of all resources such as spare parts, contract labor.
- *Optimum equipment life*
The maintenance organization should implement programs that will increase the useful life of all plant assets.
- *Minimum spares inventory*
Reductions in spares inventory will save maintenance budget.
- *Ability to react quickly*
The maintenance organization must be able to react quickly to the unexpected failure.

It is known that Maintenance Cost is a major part of the total operating cost of all manufacturing or production plant and cost up to 60% in heavy industrial. Ineffective maintenance management significantly affects production reliability and

the ability to manufacture quality products that are competitive in the world market. Computer Maintenance Management System (CMMS) is the software tool that helps improve efficiency in maintenance management but most of these tools were designed in the view of engineering only which proper for the engineering department but not for other departments. The standalone CMMS may not fully enhance maintenance management but may lead the problem on miscommunication between departments in the organization such as purchasing and engineering which may cause decreasing in the productivity at the end. Some Enterprise Resources Planning (ERP) softwares have integrated maintenance management in their softwares but no one implement full feature as CMMS did because most ERP softwares were designed for production. To get success in maintenance management requires integrated tools, management and knowledge.

2. Survey Review

The following survey results were collected from various sources which will help us better understand in maintenance management.

The reason that plants implement Predictive Maintenance programs

- 76.7% improve product quality
- 60.8% asset protection
- 35.8% ISO certification
- 30.7% management directives
- 25% low insurance rates
- 90.9% savings as a result
- 1.13:1 average ROI

This survey indicates that traditional maintenance issue was not the only reason any more but product quality became an important role in maintenance management.

Benefit of Predictive Maintenance

- The actual costs normally associated with the maintenance operation were reduced by more than 50%. This means that after using PdM, the average maintenance cost was reduce by 50% and it is believed that PdM is the best method compare to CM and PM.
- Reduced the number of catastrophic, unexpected machine failures by an average of 55%. This means that after using PdM, unexpected machine failure was reduced 55% which make reduction in maintenance cost.

- The average improvement in mean-time-to-repair (MTTR) was a reduction of 60%. This means that after using PdM, machine life is longer.

CMMS Benefit

- 28.3% increase in maintenance productivity
- 20.1% reduction in equipment downtime
- 19.4% savings in lower material costs
- 17.8% reduction in Maintenance, Repair and Operation (MRO) inventory
- 14.5 months average payback time

This survey indicates that CMMS is an important part of maintenance management that helps improve efficiency in maintenance management.

Maintenance Management

This survey was conducted by separate target into two groups as non-engineering and engineering. Non-engineering are group of people who work in the organization that unrelated maintenance management such as account department, purchasing department. Engineering are group of people who work in production or maintenance. The result is they all agree that maintenance work is an important part of organization and it would be helpful if they get information from maintenance department frequently.

3. Conclusion

Maintenance Management becomes the important part of every manufacturing plant especially PdM because it helps improve production reliability and recently MM was used as a tool to improve production quality as well. Integrating MMS in ERP helps management level in seeing big picture and making decision. From the above survey we can see that ROI is quite low means that there is still Knowledge Gap in MM which requires improvement. There is another method called Total Productive Management (TPM) that was developed by William Edwards Deming and first successfully used in Japan. This method considers every department in the organization as the partnership that should help each other to improve overall processes. The reason is only 17% of failures cause by maintenance's responsibility and the rest are other factors such as inappropriate operating practices, poor design, nonspecification parts. Working as the partnership will help prevent failure because they all share their knowledge that can be used to improve overall processes such as process design, operation, spared parts and maintenance. To accomplish this method requires culture change in corporate level therefore to succeed in maintenance management is not only technology issue but requires knowledge management (KM) to close the knowledge gap in order to achieve the ultimate goal.

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