

Maintenance Management
The Planned State
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The maintenance department is one of the greatest levers of profitability that any capital intensive organisation has. An average of 40 – 50% of a capital intensive industries operating budget is consumed by maintenance expenditure. With the advances today in technology affecting maintenance this figure can be greatly reduced. As such maintenance is often an organisations largest single controllable expense.

During the past twenty years the advances in technology available to the maintenance department to manage its processes has delivered the situation where it is within the reach of all maintenance operations to achieve a world class level of maintenance delivery.

Today the standard of tools available to maintenance is staggering.

Advanced CMMS Systems

There is a staggering array of systems available today to manage the functions of maintenance. Some even offer interfaces with the internet and e-commerce functions. Even to the stage where there are built in modules for managing equipment maintenance strategies and optimising stores inventory levels.

Preventative Maintenance Optimisation Techniques

Since the inception of the original RCM methodology this area has also grown rapidly. There are now a very large range of company's and products for optimising the maintenance strategies of any industry. Including a wide variety of software applications designed to assist in this area.

This extends into specialised areas such as Root Cause Analysis which is a becoming more and more refined and incorporate a variety of reliability engineering techniques.

Predictive Maintenance Technologies

The advances in this area are also vast. There are now a great range of techniques and applications for predictive technologies that were not contemplated twenty years ago.

Increased Knowledge Base

The range of knowledge that maintenance professional's today posses far exceed that of twenty years ago. Tody there is a wide understanding of all of the fields of maintenance management as well as the various advanced techniques and concepts that have developed.

However, even with all of these technological advances, the majority of maintenance departments are still very much stuck in the rut of reactive maintenance. Why is this so?

Because the business processes have failed to keep pace with the rapidly moving technologies.

Without this focus the maintenance department is doomed to continue throwing good money after bad in an effort to try and take control of its business.

The progression of the maintenance department to a stage of continually reducing costs and improved reliability is a basically progression through four stages of growth. Each one with its own indicators that make it easily recognisable. The first two of these steps is the progression from the reactive to the planned state of maintenance.

Reactive State

- **Low Equipment Reliability (MTBF)**

When not measured this factor can often be masked by high equipment availabilities. But on closer analysis it can often be found that equipment with high availabilities are also breaking down frequently.

- **Low Mean Time to Repair (MTTR)**

This indicator can often be very misleading as to the performance of the plant equipment as a whole. In a reactive state it is often very low. This is because the workforce is accustomed to having to repair equipment and to do so in a very fast manner. Although a positive, in terms of workforce abilities, it often indicates a situation in which the plant itself is often failing.

- **Inaccurate Inventory Planning**

One of the lead on effects of low equipment reliability is the inability of the maintenance store to accurately control the level of inventory required. When they cannot be sure what will be required tomorrow it is impossible to construct anything like a long range plan for managing the inventory levels in a satisfactory manner.

- **Many Uncontrolled Stores**

The flow on from poor inventory planning is the number of uncontrolled or personal stores that maintenance departments are inclined to keep. This is due to the fact that maintenance has no confidence in the store department to adequately maintain the levels of stock required and stems from the poor equipment reliability.

- **Highly Reactive Workforce**

With the effects of all of the factors above, the workforce in this situation is generally extremely reactive in nature. When trying to change the corporate culture of an organisation this can often be one of the most difficult areas to change. The workforce takes a great deal of pride in its abilities to keep the plant running. And rightly so. There is a tendency to want to run off and “save the day”.

Planned State

- **Control over the Maintenance Resources**

With the advent of correct maintenance planning and scheduling procedures there is often a vast and rapid change in the understanding of what is required of the maintenance resources from week to week. This often can easily extend to monthly planning periods.

- **Increased Inventory Control**

The twin effects of increased equipment reliability and better planning and scheduling lead directly to increased control over the throughputs of the maintenance stores.

- **Elimination of Much of the “Waste” of the Business Processes**

With accurate planning and scheduling processes much of the waste in the processes will cease to exist. Waste appears generally in the form of waiting times for materials, equipment availability and in the provision of inaccurate information.

- **Increased Accuracy in Maintenance Budgeting**

With the increases in equipment reliability large gains in budget accuracy are immediately possible. The ability to forecast maintenance requirements, either by equipment or activity, are vastly enhanced when we reach the planned stage of maintenance.

- **Reduced Maintenance Costs**

In conservative terms a task that has been planned and scheduled is at least 50% more efficient in terms of both costs and time to complete. Using this as a standard and applying it to the amount of tasks that are now executed in an unplanned fashion we can easily see the range of savings that are possible.

The further steps in the progression of maintenance management encompass the stages of Optimising and that of accepted World Class standards. However the task here is to define course from Reactive to Planned states.

The process for an organisation to advance to the planned stage of maintenance consists of 6 fundamental steps. All of which are critical to achieving this goal. The steps below are not necessarily in a chronological order.

1. Business Rules and Guides

Establishment of the guides and rules by which maintenance will do business is a critical and often overlooked part of maintenance development.

During this period it is necessary to deal with all of the major business decisions facing the department. Some of the items that should be considered at this point:

How do we define Priorities?

What constitutes capital works?

How do we define our type of work orders and types of maintenance?

What is our Work Order Life Cycle?

What are the roles necessary to do the work? What are their responsibilities and inter-role relationships? What is the profile of candidate we require for each role?



(With a clear focus this will easily become obvious when we develop the corporate work order life cycle)

What are our limits of planned work that we require to maintain a good state of preparedness?

2. CMMS System

This step refers mainly to the system we will be using to control the entire maintenance function of our organisation. Although the embracing of modern technology with a CMMS or EAM style management system is preferred it can also be accomplished with a paper based system. This process in itself needs to be micro managed with careful attention to the selection and implementation of the system to best serve all current and future requirements.

3. Work Process Definition

Clear definition of all of the work processes that will be utilised through out the execution of maintenance also needs to be completed. With clear definition of the corporate business rules this step will be a lot easier. Not only do these need to be created but they need to be integrated with the control system that has been chosen. (CMMS)

This should include as a *minimum*:

- Work Request Systems and Processes
- Work Order Creation Standards (Minimum information levels)
- Backlog Management Principles and Rules
- Planning Processes and Indicators
- Data management of executed works orders
- Scheduling Processes (Capacity Scheduling)
- Equipment Technical Change Management Processes
- Shutdown Planning and Execution Procedures
- Analysis procedures and policies
- Management of Spare Parts Systems
- Inventory Control Mechanisms
- Maintenance Budgeting Processes

4. Equipment Strategies

During the implementation stage of the process it will be necessary to revise and optimise the preventative and predictive maintenance strategies that we will need to drive up the reliability of equipment. There are a variety of credible programs that can be used to accomplish this end depending on the age of the plant, types of equipment and the desired results of the organisation. Selection, execution and further analysis of this step also need to be carefully micro managed.

5. Exception and Functional Reports

With the rules of the business and the relevant processes now defined we need to look at forms of controlling these and of facilitating them. This is where our reporting hierarchy needs to be developed.

Functional Reporting:

As one of the possible steps that will be defined we will create a method of capacity scheduling. For example: Our goal may be to have the content of our schedule to be represented by 70% Planned / Scheduled tasks. As such we need to be able to extract a report from our CMMS of all of the work orders that are planned and are available for scheduling.

Another example may be as part of our backlog management techniques. We may determine that we want to review the last 24hrs work orders each morning as part of the daily scheduling adjustments to the overall scheduling plan. If this is the case we need to be able to effectively produce and distribute this report each morning.

Exception Reporting

We use exception reporting to view all of the exceptions to the rules and processes that we have established. An example here may be that we have linked our priorities to time frames. As such we need to be able to extract a report of work order age versus their priorities. In this manner we are able to judge the effectiveness in which we are managing our system of priorities.

Another example may be the criteria that we set for work order creation. For example we may require our work orders to contain a minimum of information in order to easier facilitate the work order planning and backlog management processes. In this case we need to have reports developed that will indicate which work orders are non compliant.

6. KPI Reports (Key Performance Indicator)

This is one of the more important of all of the steps required. We need to be able to define where we are headed as a corporation, in regards to our maintenance management goals, and define the KPI's that we will need to monitor in order to reach our eventual goals. This process is unique to each corporation and needs to be developed independently. One of the more interesting points here is that KPI's can be created in a hierarchical and interlinked fashion. So that we may be able to easily pinpoint the root causes of systems failures in the future.

The course to truly improve maintenance for the long term is definitely not an easy one. However from the initial difficult period the system begins to manage itself and the snowball of continuous improvement starts to be propelled under its own momentum.

With these steps firmly entrenched and managed in a disciplined manner, the organisation will be firmly in place to progress through to the optimising and world class states of maintenance management. With even more bottom line gains available.