



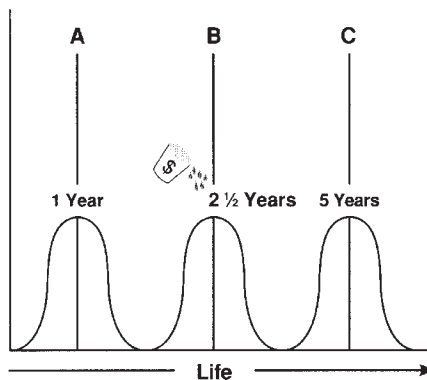
The Holy Grail of Maintenance

PM is the best approach, right? After 5000 years of Preventive Maintenance (they used to do PM inspections on the great pyramids) why is the PM approach not the dominant one? Why do we still need to argue for resources? Why do over 70% of all organizations with physical assets only have a rudimentary PM system or none at all?

The keys to this mystery are in two related areas. One is in human nature. Human nature makes us very reluctant to invest time and resources in something that 'might' happen. We are mostly short-term beings, interested in results now, not a year from now. The PM approach is all about what might happen. If there were any certainty to PM's predictions, then selling PM would be simplified. It is argued that you could spend all your time chasing what-ifs, and never get any real work done.

The second key is in answering the question, what does top management really want from us (the maintenance function)? This is a non-trivial question because many managers cannot verbalize the answer. Maintenance professionals are thus left serving many masters (different daily opinions based on the pressures of the day embodied into one person)

The Holy Grail of maintenance is (paradoxically) to get out of the maintenance business. Your job will become clear when you understand this!



The illustration shows three ways to manage physical assets like your factory, facility or fleet.

The X-Axis is time or utilization. As you travel to the right more time has elapsed, more product has been made, or more mileage has been driven.

The Y-axis is the number of breakdowns or disruptive incidents. The more breakdowns there are, the higher the curve. Eventually everything wears out. The first breakdown in that plant is on the left side of the curve just where the curve becomes visible. By the same token, the last breakdown in that plant is on the right side of the curve, where it hits the X-axis.

Each scenario reflects the average life of all equipment in the facility under that program. For example, if you operate a fleet of cars and don't do any maintenance the cars will have a certain average breakdown rate. If you add PM activity the average life will be extended. In the last curve to the right you re-engineer the cars to be more reliable. Every time you get some breakdowns you look for designs that are more reliable and modify the equipment

Curve Descriptions

1. BS Breakdown Scenario: This curve is closest to the Y-axis so that, on average, more events take place in a shorter interval. The breakdown scenario means that no PM is done, or no effective PM is done. In this environment, chaos reigns. Some days it is really quiet and some days everything is broken (and your most important customer visits!)

Don't knock it; in certain industries this BS might be the best way to run. Look for situations where equipment is low value and can be replaced cheaply and quickly and where there are low production needs and low quality requirements. BS just might be a low cost alternative.

However, the breakdown scenario has consequences. The environment is usually chaotic, and full of high stress, and routinely requires heroism just to get production out the door. The level of safety (incidents per 100,000 hours of operation) might be higher than a PM dominated shop of the same size and type. People tend to burn out. Almost all organizations start here when they are small. Unfortunately most organizations stay with this curve as they react to what happens. The breakdown of machines creates the schedules for both production and maintenance labor.

One other aspect in this scenario is that you are likely to get a lot of BS. There will always be excuses about why this machine didn't run and why that job is not complete.

2. PM scenario- you go out looking for problems. You take specific steps to extend the life of the equipment and to detect impending failure. The focus here is on investigation of the critical wear points so that breakdowns are

deferred as long as possible and repairs or replacements are made before failure occurs.

This procedure is also known as proactive maintenance. In this sense, proactive means a maintenance orientation toward tasks performed today that detect or defer future breakdown. Companies (and entire industries) can get very good at this trick and experience fewer and fewer breakdowns. The nuclear power industry comes to mind. A good proactive maintenance process is the goal for many of the top firms.

Equipment lasts longer with proactive maintenance but the PM scenario requires money, thought, and management. Many firms are unwilling to commit the money or management talent to such a goal. The huge problem is that once money stops being poured into PM, the plant or building reverts to the breakdown scenario.

3.MI Maintenance Improvement, (the Holy Grail) of the maintenance department means – get out there and fix the problems permanently. Fix them in such a way that the expected failure rate drops to a tenth or a fifth of what it was. This objective is one of the stated goals of RCM.

Solving problems permanently is one of the most rewarding aspects of maintenance. Ask any maintenance old-timer and you'll have frequently, a long discussion of redesign, re-purposing, re-specification, and re-engineering.

Is it possible to operate without breakdowns? The same old timers who will regale you with stories of successful re-engineering, will tell you "never!" – "Not possible." Yet all of us have equipment that never fails, that in spite of a complete lack of maintenance the pump, compressor, or press, runs and runs. Why not study the reasons for such longevity instead of spending time thinking so much about breakdowns. In other words, let's get out of the repetitive repair business. This vision means the death of maintenance, as we know it.

What happened?

Sometime in the 90's the old way of doing business died and went away. We might mourn the loss of some of the positive aspects of that world but, for better or worse, it is truly gone. The old paradigms and strategies are obsolete in light of the new corporate order. Our corporate sponsors (the same developments occurred in the public sector too) realized that they needed something different from the maintenance function to face new, tougher, no-holds-barred competitors (or lower tolerance for increased taxes in public sector organizations). We must now ask fundamental structural questions about what types of tasks maintenance personnel ought to do and who should do maintenance tasks. The first question of this inquiry is what is the mission of maintenance?

What is the mission of maintenance?

There used to be many different answers to this question (as many as there were organizations asking the question). The mission definitions ranged from quick reaction times in fixing breakdowns to serving the customer more efficiently. Some firms are intent on reducing downtime and others focus on cost control or quality. A few focus on safety or environmental security. All these missions are good, useful, and important. All of them ignore the deep issue that the organization has changed and that there is something very simple that transcends these missions or values.

In today's organizations the creed is that everyone must add value to the product. Everyone and everything is expendable, outsourcable. There is a conflict between the old mission statements and the new culture. The new mission is:

"The mission of the maintenance department is to provide reliable physical assets and excellent support for its customers by reducing and eventually eliminating the need for maintenance services."

New roles

This new mission requires a re-thinking of traditional roles. On one side, maintenance must merge with machine, building, and tool design to integrate maintainability improvements into designs on an ongoing basis. The accumulated knowledge and lessons of maintenance will be merged immediately into the design profession. There will be a revolving door between the people who design and the people who maintain.

On the other side, routine maintenance activity will be merged increasingly into operations. The TPM model shows that the operator is capable of this integration and the whole maintenance effort will benefit from operator involvement.

The consequences of breakdowns must be managed!

There is a traditional attitude on the part of maintenance that all breakdowns are the same and all are equally bad. (After all, if it's broken it's broken). This acceptance of the status quo is now intolerable and unacceptable in maintenance. A breakdown should be viewed with an analytical eye to see what difference it made (if any). Any money spent must be justifiable in light of the consequences of failure. By the way, failures that result in death, serious injury, or environmental damage, are not acceptable at all! Any equipment that requires periodic attention to avoid breakdowns is likewise a failure of design engineering.

Where does PM and predictive maintenance fit into the new structure?

There are two situations where PM (and PdM) is important. One situation is when it reduces the probability or the risk of death, injury, or environmental damage to zero or near zero. The second situation is where the cost of the task is lower than

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the cost of the consequences of the failure. If this rule sounds familiar, it should, because it has become the mantra of the RCM movement. That rule is the beginning but not the whole conversation.

As addressed in the Holy Grail discussion, the fatal flaw of the old type of PM and PdM is that they require constant investment of labor and materials. In most instances, no relationship is traced between the cost of the consequences of the failure and the cost of the PM service. The financial relationship between failure consequences and tasks must be built into the system from the beginning. PMO (PM Optimization) makes great strides in alignment of the task costs to the failure mode consequences.

There is another problem. PM institutionalizes the status quo. No permanent improvement will ever flow from a traditional PM orientation. When you are down-sized and PM is deferred, the MTBF (Mean Time Between Failures) curve will return to its old breakdown frequency. So the second idea is that the third curve, the curve of maintenance improvement, must be added into the priorities of the department. Return to the new mission: “to provide excellent support for its customers by reducing and eventually eliminating the need for maintenance services.”

In this context there is a place for PM in the new organization. First and foremost, view PM as a manager of consequence. To eliminate maintenance efforts look at PM as a way station or resting-place on the way to maintenance elimination. When you don't have the time, resources, or technology to figure out the root cause of a failure you can use a PM approach to reduce your exposure to breakdown and its consequences. Of course, you must also continue PMs in addition to other methods where the implications of breakdown are deadly or very expensive.

How is maintenance to be created with the new mission?

Continuous improvement in the delivery of maintenance is the new goal. The bulk of management time, money, and effort must go to reducing the labor, parts, utilities, and overhead or to increasing uptime. The stakes are high. What is at stake could be the survival of your organization. There are competitors who are eyeing your market share and they are not standing still.