Reducing Maintenance Costs In A Tough Economic Climate

Steve Turner OMCS www.reliabilityassurance.com Australia

The current economic climate dictates that cost management is a critical activity for many companies and their managers. Maintenance is very often seen as an area where cost cutting targets can be easily and quickly achieved. Many maintenance managers take the view that this type of philosophy always ends up with increased costs in the future. This is not true in many cases.

15 years of analysis and review of maintenance programs by the author shows that most maintenance departments are more reactive than they should be and because of this, they over spend and underperform. Costly, inefficient and ineffective Preventive Maintenance (PM) programs result in a vicious cycle of reactive maintenance. High levels of reactive maintenance destroy the ability to plan and schedule and reduce labour productivity by 50% or more (Palmer 1999). Reactive maintenance also results in massive inventories of, or express delivery charges for, spare parts.

The combination of ineffective PM and high levels of reactive maintenance results in a massive overspend on maintenance and provides fertile ground for cost reduction.

It is not uncommon for a company to consume twice the maintenance labour it needs.

For example, the Carbon production facility in an Aluminium Smelter reduced its annual maintenance labour by over 4,000 man hours, while, at the same time, increasing plant availability. The table below shows the detail. The company reported that this was done by:

- Reviewing the various options of scheduled discard vs condition based strategies (especially in lubrication tasks)
- Gaining a clear understanding of the reasons for each PM task and documenting them. Eliminating tasks that were not linked to cost effective prevention of failure
- Setting inspection frequencies to match rates of equipment function deterioration
- Avoiding duplication of effort between various trades and operations groups.

Executed Maintenance Hour Reduction (7300 hrs to 2900 hrs; excludes IR, VA, OA)	
Mechanical	**45%**
Electrical	**81%**
Lubrication	**82%**
Overall Average	***60%***

The reduction was not a paper figure – the labour reductions were real savings computed by comparing one year's executed hours to the next.

Another example can be illustrated using graphical means. The pie chart below represents the outcomes for a mining company that reviewed the vendor supplied maintenance schedule for a project valued at over $100M.

The initial vendor recommendations required the asset to be down 4% of total time for the PM program alone. The reveiw changed the maintenance philosophy considerably and recommended some modifications to eliminate the need for some frequent expensive and intrusive PM tasks. Overall, the PM requirement reduced from 4% of running time as recommended by the vendor to a little over 1% of running time.

While on the surface, such reductions may seem to be easy to achieve, the wrong thinking can easily turn into a disaster. It is important to remember that the people who created the PM program in place probably thought they knew what they were doing! In fact, the aviation industry faced a similar problem 30 to 40 years ago. To understand why aviation maintenance programs were expensive and underperforming, the US Department of Defense appointed Nowlan and Heap (1978) to study the situation.

Nowlan and Heap reported that the maintenance programs deployed by United Airlines in aircraft such as DC 8 resulted in high failure rates with 68% of failures happening shortly after maintenance in a pattern known as infant mortality. To combat this problem, the following concepts (amongst a number of others) were introduced:

- A strategy of trying to predict the safe or economic life of components in anticipation of running a fixed time component replacement program before component failure has limited value.
- Effective maintenance programs rely on assessing plant condition without being intrusive and replacing components based on thier condition rather than their age. The intervals of condition based maintenance are not highly dependent on the consequence of failure or the failure rate. The main driver of inspection frequency is how quickly component condition deteriorates.

- Many failures happen suddenly and randomly. Because of this some failures will happen regardless of the maintenance program. In such cases, defect elimination or consequence mitigation are the only options to reduce the impact of failure.

These concepts are not intuitive so a person unskilled in such reviews is most unlikely to achieve a good result.

In addition to the right logic, the analysis process deployed must be systematic and directed at the appropriate level in the asset structure. In the maintenance industry, the processes used for rationalisation and review of existing or vendor generated maintenance programs come under the generic name of Planned Maintenace Optimisation (PMO) after these programs were successfully applied in the US Nuclear Power Industry (Johnson, 1995).

PMO methods start with the existing maintenance program, including operator rounds (formal and informal), and rationalise and review them using the experience and knowledge of the operators, technicians and other subject matter experts. After preparation, and some conceptual training, and an overview of the operating context of the equipment being reviewed, the first analysis step is to establish the failure mode(s) that each task is meant to find (in the case of hidden failures), prevent or predict (for both hidden and evident).

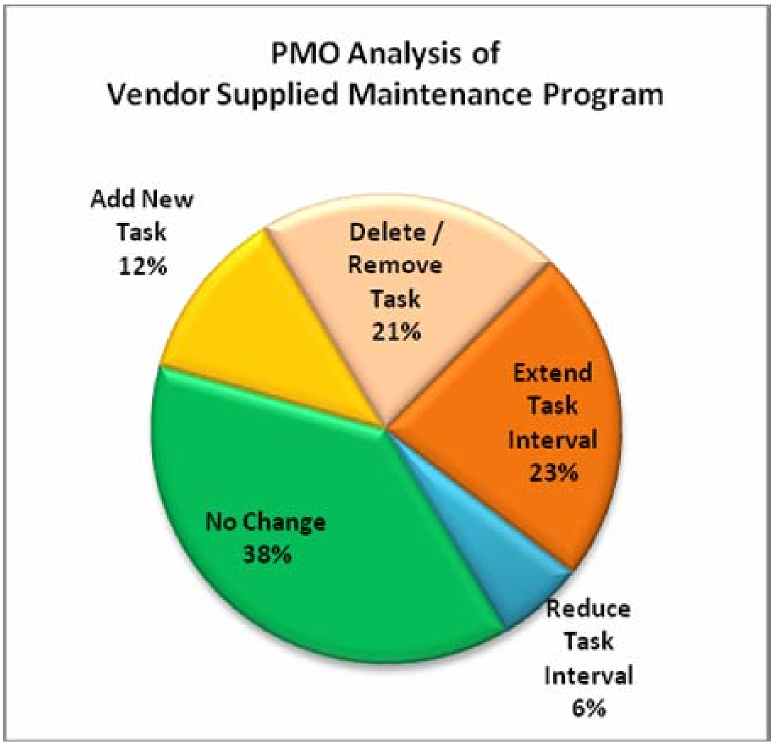
The list of failure modes is then reviewed to establish two important outcomes. The first is to find tasks that represent duplication of effort and the second is to establish what failure modes are missing from the list. The latter is derived from a review of failure history (documented or in memory), and a detailed walk through the documentation associated with the machine.

Once the list of failure modes to be reviewed is established, each is individually analysed and a revised PM program established and implemented. The most costly maintenance is identified and efforts are made to eliminate the maintenance through redesign. In addition failures that do not respond to maintenance are investigated to seek ways to eliminate them or minimise the consequences of them.

Through this process, the appropriate maintenance program is developed, and as the evidence presented shows, the changes are usually substantial. As the new program is deployed, reactive maintenance reduces and the total cost of maintenance reduces very quickly in some cases.

The cultural dimension of the company also improves with less chaos and the ability to produce quality maintenance rather than a fix it quick / temporary repair approach. Our evidence strongly supports the notion that morale and motivation impact greatly on the productivity of companies and the unit cost of production.

In today's current economic climate a company's very survival could well depend on its ability to reduce its maintenance costs while not sacrificing its viability in the long run. The important point is that cost reduction should be achieved through proven methods rather than methods based on knee jerk reactions and management decisions based on a variety of assumptions that are intuitively appealing but may prove to be wrong. From a maintenance manager's perspective, it would seem better to be in control of cost reduction than have arbitrary targets imposed.



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