

Are your Preventive Maintenance Routines Fit for Purpose?



Many companies undertake preventive maintenance work that is both unproductive and non-value adding; and sometimes even counter-productive. At the same time, they may be struggling to complete their maintenance schedules. A review of your PM routines can both reduce workloads and improve plant performance, says Michael Dixey of GGR Associates, and the following are examples of situations he regularly encounters:

- ▶ PM completion rates are below 80%
- ▶ Most PMs are time-based and not condition-based
- ▶ Little use is made of condition monitoring techniques
- ▶ Many PMs are based on manufacturers' recommendations: many are generic and do not take into account the equipment's operating context or criticality
- ▶ Equipment is often less reliable immediately after major maintenance work
- ▶ There is a fire fighting culture
- ▶ Symptoms are being tackled, not the root causes
- ▶ Little use is made of operators for first-line maintenance
- ▶ Technicians do not use the CMMS on a daily basis
- ▶ Significant breakdowns and poor performance.



If some of these sound familiar, then lessons can be learnt from the civil aviation industry, where airlines have combined an outstanding safety record with a rigorous cost-cutting culture. Pioneering research work carried out by US airlines into failure patterns and failure characteristics, has led to fundamental changes to aircraft maintenance. The industry has developed

sophisticated criteria for determining preventive maintenance routines and identifying where maintenance alone cannot deliver the required reliability. Known as Reliability Centred Maintenance (RCM) it has been successful in both improving aircraft reliability and reducing maintenance costs.

How does this apply to the manufacturing and process industries?

Whilst the aviation application of RCM is too airlines orientated and time consuming for use in the manufacturing and process industries, there are many lessons to be learnt. These include recognising the significance of random failure, the advantages of condition-based over time-based maintenance, determining the task frequency of condition-based maintenance, the risks of intrusive maintenance, the relevance of the equipment's operating context and the importance of hidden failures – mainly protective systems which can fail unsafe.

Review RCM

A cost-effective approach, known as Review RCM, can

be used to validate existing PM routines against the RCM criteria and can typically cut PM workloads by 20-30%, while improving plant performance. Special consideration is given to safety features and protective systems – frequently omitted in many companies but of vital importance to system integrity.

Review RCM is undertaken by a small team of engineers (guided by a facilitator) who work through the current PMs asking a series of questions, including:

- ▶ What failure mode is the PM task attempting to prevent?
- ▶ What is the failure mode's root cause?
- ▶ What is the failure mode's failure pattern and failure characteristic?
- ▶ Does the PM task meet the RCM criteria?
- ▶ Is the frequency correct?
- ▶ Is the task worth doing, ie cost-effective for failures which affect operational capability?
- ▶ Is the right person doing it?
- ▶ Is the level of documentation adequate and procedures sufficiently detailed?

The PMs are then amended, added to or deleted, with supporting documentation upgraded as necessary.

Implementation and benefits

In many applications, the revised PMs will need to be re-launched to improve credibility and signal a break with the past. They should be scheduled across the year and audit procedures put in place before the re-launch: CMMS training for technicians may also be necessary.

If a high percentage of PM tasks are being routinely completed, a substantial reduction in workload will free up time for technicians to focus on continuous improvement projects and to bring back in-house maintenance work which has been contracted out. Where completion rates are low, the revised workload may not have staffing implications but the process will ensure that the right maintenance tasks are completed.

A Review RCM programme for a medium-sized plant usually takes weeks rather than months to complete. Typical reductions in PM workload are 32% (11,000 hours per annum) in an Irish pharmaceutical company to 21% in a US-owned medical products company, and from 22% in a UK drinks company (with a 4% increase in line efficiencies) to 26% for a steel forging company.

Moving from time-based to condition-based maintenance, which reduces the need for intrusive maintenance, will improve plant performance.

Conclusion

Without good preventive maintenance routines, companies will not achieve high plant efficiencies. Review RCM provides a quick and cost-effective method of ensuring that the PM routines are appropriate, relevant and worthwhile. Experience across a wide range of industries has shown that it results in major reductions in PM workload together with improvements in plant performance – a 'win-win' scenario. ✱

michael@ggrassassociates.co.uk

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