Are Your Preventive Maintenance Routines Effective?

Michael Dixey and Pete Hibbs outline ways to optimise preventive maintenance routines

PREVENTIVE maintenance routines in many companies across a wide range of industries vary in quality. Many don't add value and, in some cases, are counter-productive. How many times have we heard an operations team complain that "equipment is less reliable after maintenance than it was before." So why is this the case?

REASONS WHY PREVENTIVE MAINTENANCE ROUTINES MAY NOT ADD VALUE

Here are ten of the most common reasons which we come across as to why preventive maintenance tasks (PMs) are not fit-for-purpose.

1. Many of the PMs are time-based, for example the annual overhaul, rather than condition-based. Time-based maintenance can be described as "taking kit to pieces at regular intervals to see why it is still working". Condition-based maintenance is often described as "letting the equipment tell you when it needs to be maintained".

2. Too little use is made of condition monitoring techniques such as vibration analysis, thermographic cameras, oil analysis, ultrasonic leak detection, etc.

3. Where condition monitoring is undertaken, it is done by specialist contractors. More often than not, this could be better carried out in-house, after technician training. This can lead to significant cost savings, increased ownership, and improved outcomes.

4. The PMs are based on manufacturers' recommendations. These do not recognise the equipment's criticality, eg whether there is a stand-by, or buffer stocks. They take no account of its operating context, eg whether it operates single shift or 24/7. They ignore the environment, eg whether it is in a clean room or is exposed to dust and debris, and they take no account of the duty, ie what is being handled. Vendors also have a vested interest in selling spare parts, which is why they tend to favour time-based maintenance over condition-based maintenance.

5. PMs which could be better carried out by operators rather than technicians as part of asset care programmes. Typical tasks might include non-intrusive checks for wear, condition or leaks.

6. Generic PMs – the same PM is used for a range of similar but not identical equipment, eg all the belt conveyors have exactly the same PM although they vary in length, width, and drive motor size. Some are fixed speed, others are inverter driven, and some are horizontal and others are inclined.

DESPITE THE FOCUS ON COSTS, THE CIVIL AIRLINE INDUSTRY HAS AN OUTSTANDING SAFETY RECORD. WHY DO THE AIRLINES SUCCEED WHEN SO MUCH OF INDUSTRY STRUGGLES?

7. PMs which are not value-adding, as they cost more to carry out than they will save from reducing failures. A common example is electrical tests on small motors (eg less than 20 kW). The MTBF (mean time between failures) of these motors is likely to be in excess of 25 years. Electrical tests, other than safety checks, will almost certainly not be economic, and these tests will not guarantee that there will be no failures. A much more cost-effective approach is to keep spares on the shelf.

8. Inadequate PM work instructions where there are no clear procedures, no tolerances, and no photographs, and where PPE requirements, necessary permits, specialist tools and spare parts which might be needed are not listed.

9. PMs which do not differentiate between those that can be carried out while the equipment is running, and those where the equipment needs to be released by production.

10. PMs which take several hours to complete, yet production windows are insufficient. As a result, the PMs either do not get scheduled or are only part completed. This can lead to serious equipment reliability, product integrity or safety issues.

Other issues include low completion rates, lack of follow-up when checks or inspections have identified early warning signs of failures, and failure to use root cause analysis (RCA) when breakdowns do occur.

MAINTENANCE STRATEGY

An industry that has a history of coupling a painstaking maintenance environment with a rigorous cost-cutting culture is the civil airlines. Despite the focus on costs, the industry has an outstanding safety record. Why do the airlines succeed when so much of industry struggles?

The development of reliability centred maintenance (RCM) is the foundation of their maintenance strategy. Although it is very airlines-orientated and time consuming, many of its principles apply to the manufacturing and process industries. These have been incorporated into an approach called Review RCM.

REVIEW RCM

Review RCM is used to review a company's existing PMs. It is undertaken by a small team of experienced engineers, after a one-day training course, working under the guidance of an experienced facilitator.

The team works through the current PMs, asking a series of questions which include: Does the PM meet both the RCM technical and worthwhile criteria? Are the best techniques being used? Is the frequency correct? Is the right person carrying out the task? Are the correct spares being held? Is the level of documentation adequate? The PMs are then modified, replaced or deleted as appropriate.

WITHOUT GOOD PREVENTIVE MAINTENANCE ROUTINES, COMPANIES WILL NOT ACHIEVE HIGH PLANT EFFICIENCIES. REVIEW RCM PROVIDES A QUICK AND COST-EFFECTIVE METHOD OF ENSURING THAT PM ROUTINES ARE APPROPRIATE, RELEVANT AND WORTHWHILE

Review RCM has been used across a wide range of industries including chemical, pharmaceutical, food and drink, paper and packaging, mineral processing, steel forgings, medical equipment and electronics. It frequently leads to a 20-30% reduction in PM workload and significant improvements in plant performance due to reductions in intrusive maintenance.

CONCLUSION

A typical Review RCM programme for a medium-sized plant usually takes just a few weeks to complete.

Without good preventive maintenance routines, companies will not achieve high plant efficiencies. Review RCM provides a quick and cost-effective method of ensuring that PM routines are appropriate, relevant and worthwhile. ■

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