

GETTING THE BALANCE RIGHT

According to Susan Toyn, marketing manager of Monitran, whilst it is not always easy to estimate how much a predictive maintenance strategy can save you, it is highly advisable to take heed of the 'just-caught-in-time' stories - and the 'too late' nightmares. Here she offers a couple of examples...

As most readers will be aware, pressure from the Far East is resulting in manufacturing processes in the UK and Ireland being pushed to their limits. Further, the need for the highest possible availability of plant machinery and equipment, is presenting something of a quandary where maintenance is concerned. Should maintenance work be undertaken, religiously, at set intervals during planned shut-downs and job changes – or should equipment be allowed to run on that little bit longer?

Condition-based predictive maintenance helps achieve the optimum balance, as it allows operators to extend their maintenance intervals with the peace of mind that early warnings will be provided before equipment fails.

Whilst many parameters can be monitored to provide that early warning,

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vibration levels are proving to be of most use in the majority of industrial applications where rotating equipment (such as motors, gears and rollers) are relied upon for day-to-day operation of the plant.

Establishing a condition-based predictive maintenance strategy starts by asking three basic questions: What needs to be measured? How often? And what actions should be taken under which conditions? The first two questions are relatively easy and the answers help define the data acquisition requirements; such as using handheld meters for brief but regular inspections or using permanently mounted sensors for 24-7 data capture. The third question is harder to answer, as it requires an understanding of how to interpret the data captured, and this means experience is needed.

One company with such experience is Advanced Maintenance Solutions (AMS), which has a long-standing relationship

with vibration sensor manufacturer Monitran. In one example AMS was called into an aluminium foil manufacturing plant, where (during the process) foil is rolled in lengths of several kilometres.

Following a modification to the line, the site started experiencing 'side-wall' defects – in that the ends of the rolls were not even. Re-rolling was taking hours, and the site estimated this was creating losses equivalent to several hundred thousand pounds per year.

Vibration analysis revealed that the roll support arms used to guide the foil onto the roll were vibrating, but they were not actually the source of the vibration. Indeed, the arm was resonating in response to faults elsewhere in the machine. As a result of the investigation, suspension bushes used within the arm were replaced with harder materials, thus

altering the control arm vibration response and so overcoming the issue.

AMS has many other examples of how vibration-based condition monitoring saves money, if the intelligence derived from vibration analysis is acted upon in time: but that is not always possible.

In another example, AMS was responsible for conducting monthly monitoring surveys at a steel mill. As part of the surveys, portable measuring equipment was used to check the vibration levels of the fans used to supply the furnace's air/fuel mix and to expel waste gases.

During one inspection it was noticed that the vibration levels at the impellor end of one fan were higher than normal. The data was analysed and it was found that overall (RMS) vibration amplitudes had increased from a stable baseline level of 1.5 mm/sec to 6.8mm/sec in the space of the few weeks between surveys.



An impellor blade thrown from a fan ended up embedded in a control panel, but with a predictive maintenance strategy in place, occurrences such as this are rare.

The fan was suddenly displaying symptoms of mechanical looseness (somewhere on the shaft or a shaft-mounted component). The rate of deterioration was considered significant, and plant staff were advised to take action at the earliest possible opportunity.

Heeding the warning, the site staff agreed that the fan would be stripped during the next shutdown. However, that evening, support bolts failed and the fan threw an impellor blade which broke through the fan housing and embedded itself into a nearby control panel (see photo above).

Had they their time again, AMS' technicians and the steel mill staff would not act in any other way. Indeed, the best course of action was taken: as the data captured during the survey would not have condemned the fan, and led to an immediate shutdown (impacting on production). Had AMS' survey taken place a day later, the impellor blade would of course already have been thrown – and from a seemingly healthy machine (going by the previous survey's readings). But here is not the place to ponder the numerous 'what-ifs'.

In conclusion, it is possible for rapid degradation to take place between inspections and equipment can fail without warning – although these occurrences are rare. If the equipment is non-critical such failure is a minor inconvenience. However, all critical equipment should be fitted with a fixed protection system as, at the end of the day, a condition-based predictive maintenance strategy is all about minimising risk. Site safety and financial benefits result almost as by-products.

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