SMART INSPECTION DECISIONS RESULT IN A SAFER COMPANY

ASSET & RELIABILITY MANAGEMENT

BILFINGER TEBODIN

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Smart inspection decisions result in a safer company

Especially now that many older employees are retiring and there is a scarcity of technical personnel, companies will have to become smarter with their human resources. The utilization of process data for planning maintenance and inspections can help. However, even without this data, it is prudent to take a good look at the inspection and maintenance regime.

‘With the right approach and knowledge, risks can often be reduced to a minimum with the same means,’ asserts Bilfinger Tebodin’s Marco van de Weerdt.

Liesbeth Schipper.

The starting point of the inspection and maintenance regime of many companies is based on legal regulations, or suppliers’ specifications. For example, they inspect an installation every second week or every second month on specific characteristics. However, inspections in the field are essentially snapshots, states Erik Broere, Asset Management and Reliability Manager at Bilfinger Tebodin.
‘Without the relevant data, it can be very challenging for a maintenance manager. First and foremost, he depends on the quality of the inspection carried out and can also miss any inconsistencies that could potentially lead to risk.’

He shows a graph showing the measured pressure in two different installations. ‘You can see that Equipment A is a low-pressure installation that never exceeds the limits. This installation is not so surprising, and therefore you could inspect it less often.. ’ However, Equipment B sometimes exceeds its safe working pressure. ‘I would like to dispatch my inspector immediately and have him do some deeper, more thorough investigation. Has a safety valve blown, or could there be other problems?
Without this data, I would end up spending the same amount of time on both installations, and that is actually inefficient. In short, there is often a lot of untapped potential.’

Insight

The utilization of data, especially production data, is set to take off in the next few years, alleges Broere. ‘Maintenance will become much more dynamic, as production and maintenance data are combined and utilized in the management of maintenance tasks.’ His colleague, Marco van de Weerdt, Asset Management and Reliability consultant, adds:
‘By reading instrumentation and combining data, we gain more and more insight. Consequently, we are able to make increasingly accurate estimations as to why something is occurring. We can link it to the origin so that we can subsequently tackle the source of the problem.’

Potential gap with undetected risks

However, even without this data, inspections and maintenance can be tackled more smartly. For example, Van de Weerdt is engaged in determining a new inspection strategy for a large number of pipelines at a company's site. 'Legal stipulations state that these pipes must be inspected.

The European Pressure Equipment Directive prescribes a method that can be used for the random inspection of ten per cent of the pipelines in the field. Naturally, the company could undoubtedly have done this. Consequently, random pipes were inspected using a selected inspection technology, however, it was not clear why these specific pipes had been chosen and why that technology had been used. You will then see a potential gap, because you may not have assessed the relevant pipes, or carried out he inspection utilizing the appropriate resources.'

Van de Weerdt was aware that a risk-based approach would fit better here. 'We systematically identified the degradation mechanisms of all pipelines by classifying them based on the prevailing conditions and materials.

The degradation mechanism determines the likelihood; by combining it with the effect on man, environment and production, the risk is calculated. Using this approach, we now know exactly why we inspect certain pipes, how best to inspect them and also where.

So, what about the wall thickness - are there fractures or localized pitting? If, for example, there is localized pitting in the piping, then a wall-thickness measurement is often insufficient. Moreover, the grouping of piping provides the additional advantage that we can typify a selection of the piping as representative. By inspecting only a small selection of piping, we are subsequently able to minimize risks to almost zero. For this client, our advice was to inspect less than ten per cent of the pipework. This specific selection of pipework provides maximum protection from risk and provides a solid basis for determining the overall lifespan. Also, it provides optimal utilization of the company's resources: better results with fewer resources.

In the heads

Van de Weerdt also supervised a project at a foodprocessing company where he came up with a new inspection strategy for tanks and dryers. The management of this company asked itself: 'Are we in control? Have we identified all risks? Are we currently doing too much, or too little maintenance? Are our inspections conducted in the correct manner?

Van de Weerdt set to work on this, to make this transparent for the company and to set up an inspection strategy based on risks. 'However, we quickly came up against the fact that very little information was available digitally, or was incomplete. Naturally, this knowledge existed within the company, but usually only in the minds of the personnel. We adapted our approach accordingly and systematically defined the site via interviews.

We started by identifying the processes. Subsequently, corrosion was the starting-point: What are the conditions? How is a normal operation performed? Are there exceptional situations? What happened in the past?'

Every section of the factory was scrutinized. 'We then determined the degradation mechanisms, whereby risk was estimated on the basis of probability multiplied by effect; resulting in a risk matrix.

Consequently, we found that cracks can occur in the dryers, due to the effects of vibrations. The appropriate inspection strategies had already been drawn-up for this, but the inherent link was not made. As a result, the employees did not know how to repair the cracks in the correct manner. We, therefore, helped them to establish a new welding method, using the right pre-treatment, recovery of the weld, and the correct post-treatment. Using this new welding method, the company can significantly extend the lifespan of the dryers.'

At the same time, it became apparent that numerous regular inspections were being carried out on a specific group of equipment that had a relatively low probability and minimal risk. 'Moreover, nothing was discovered during these regular inspections. We have now revealed that these components also do not possess degradation mechanisms and consequently require less inspection. The resources that are freed-up as a result can now be used more effectively elsewhere in the company, to build better welds, for example. Smarter working makes operational management not only safer but also more cost-efficient.'

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No-risk area

Van de Weerdt regularly observes that there is still a lot of work being done in the so-called no-risk area (see Risk Matrix box-out). ‘Maintenance managers think that they are doing the right things, because of legal stipulations. However, it is precisely here that you can succeed with carrying out fewer inspections. If you can convince the inspectorate that certain assets require fewer inspections, you can deploy the manpower that is freed-up in areas where it really does make a lot of difference.’

Risk Matrix

Bilfinger Tebodin always commences an investigation with the determination of the risk matrix; in which probability is evaluated against effect. Normally, our customers already possess this; however, if this is not the case, then we will define it together with them. Van de Weerdt: “In the effect, depending on the type of customer, we include, for example, safety, environment, and production losses. When the odds are high, and the effect is also, you end up in an undesirable zone.

Generally speaking, this is rare; these risks are often already identified in the design phase and addressed in the design to prevent this. However, a small group does fall within this zone. This group of assets is closely monitored by the company and inspected using appropriate measures to keep this installation in top condition.’
The opposite can also occur; a small probability and, in the event that something happens, a small effect. Sometimes, no probability or effect at all, or, no risk.

In between these groups, we identify a group of assets, the central core, where there is high probability with minor effect or a low probability with a significant effect, or where both are moderate.For each eventuality, the evaluation is always conducted together with the customer. Van de Weerdt: The specialist determines the probability on the basis of the degradation mechanisms and the effect is determined in consultation with the client who knows best how his own organization works.’

Smart use of knowledge regarding degradation mechanisms

A company in the oil & gas sector was faced with the challenge of taking a device that was at the heart of the process out of operation. Legally, this device had to be re-inspected for the first time - the first reassessment. This would, however, bring the entire process to a halt. The client therefore wanted to challenge the re-inspection to determine whether this could not be done without halting the process. Van de Weerdt: ‘I helped the company to gain insights into which degradation mechanisms could occur. Subsequently, on the basis of this study, in combination with an appropriate non-destructive research method, namely noise emission, during operation, we were able to demonstrate whether these degradation mechanisms were already active.’

Acoustic emission can help establish whether active corrosion is present, by recording the sound that comes from a progressive fracture, or damage to the material. This approach enabled the company to convince the inspection authority that this device did not have to be taken out of operation for the first reassessment.’

Engineering &
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