Automation in manufacturing
Can predictive maintenance prove a competitive advantage for data-driven manufacturers?

By combining Internet of Things sensors and big data analytics, manufacturers can drive down costs, increase asset longevity and utilisation, and improve productivity. And those that start to harness the power of data early on, will reap the best benefits.

‘Smart, Internet-connected sensors are becoming commonplace in factory and plant machines, each gathering data about environmental conditions in the factory as well as the status of equipment.’
The convergence of operating technology and information technology in the industrial Internet of Things (IoT) will empower forward-thinking manufacturers to radically transform the way that they manage and maintain the key assets in their plants and assembly lines. This, in turn, will help them to outperform their competitors and increase their profitability at a time where their profit margins are under growing pressure.

That’s according to Richard Garratt, Vice President, Data Centre Business Unit at Dimension Data in the US. ‘The combination of IoT sensors, big data analytics tools, and more cost-effective cloud processing power enables manufacturing companies to shift from routine maintenance and reactive repairs of factory floor equipment towards predictive maintenance,’ he says.

Smart, Internet-connected sensors are becoming commonplace in factory and plant machines, each gathering data about environmental conditions in the factory as well as the status of equipment. ‘Organisations can harvest and analyse this data to determine the condition of factory assets,’ he explains, ‘so that they can predict when they need to be repaired.’

Equipment failures cannot be reliably predicted based on calendar time, run time, or cycle count, but real-time data from IoT sensors can give the factory manager forewarning when a component may need to be replaced or repaired.

Just-in-time maintenance
This can prevent damage to expensive equipment and avert the loss of productivity as a result of an unexpected breakdown. It can also help increase the longevity of expensive assets. Equipment failures cannot be reliably predicted based on calendar time, run time, or cycle count, but real-time data from IoT sensors can give the factory manager forewarning when a component may need to be replaced or repaired.

‘Equipment failures cannot be reliably predicted based on calendar time, run time, or cycle count, but real-time data from IoT sensors can give the factory manager forewarning when a component may need to be replaced or repaired.’

‘One can think of predictive maintenance as being conceptually similar to just-in-time manufacturing,’ he says. ‘You carry out repair and maintenance processes when they are needed rather than before or after. This means that you don’t need incur the expensive of keeping a large inventory of spares and parts in case a machine breaks. You can also redirect some of the resources you needed to expend on routine maintenance and inspections in the past, creating further cost-savings and efficiencies.’

Predictive maintenance, based on analysis of massive quantities of big data from IoT sensors, introduces a range of technical and cultural challenges for most manufacturers. A company that embraces predictive maintenance needs to be smart about which data it will crunch to gain the insights it needs.
Drowning in a data pool

‘In an ideal world, we’d simply be able to collect pristine data in a data pool and use it to make maintenance decisions,’ says Garratt. ‘But few organisations have a single, integrated storage environment and most are struggling with the quality of their data. It’s important to get your metadata management right from the start.’

Another challenge lies in the fact that IT departments are struggling to keep pace with the demand for big data business solutions from the business units they serve, especially with some facing cuts to their IT budgets. In addition, many lack experience with big data solutions such as the Hadoop software library.

Getting IT and business units in lockstep

It’s not unusual in some companies for a business unit to go it alone with a predictive maintenance implementation, either because IT isn’t agile enough to support its needs or because it wants to avoid procurement red tape so it can fast track the project. ‘In these cases, the project often spirals out of control,’ says Garratt. ‘The scale and the performance of the solution becomes unmanageable, and the business unit needs to look for help from IT.’

‘This highlights the fact that moving towards predictive maintenance, like many other big data initiatives, is about getting the IT department and the business into lockstep,’ he adds. ‘Success is about leveraging the IT department’s infrastructure and the business unit’s business process expertise and data science skills. Organisations can start to build solutions small and then scale them up in a controlled fashion.’

So what should manufacturing companies consider as they begin their shift towards leveraging big data for applications such as predictive management?

Start small but plan to scale up

A business unit or an organisation that want to leverage big data for better decision-making should start out with a small implementation and use cases that have proven themselves in the wider market. ‘You should choose one or two use cases that it can roll out in a fast and agile manner,’ advises Garratt. ‘However, you must also be ready for the amount of data and sensors it will need to manage to explode as the project gathers momentum – and for the complexity to increase.’

Partner with IT from the outset

When embarking on a predictive maintenance initiative, the business should form a task team with the technology organisation right from the start. ‘Together, representatives from IT and the business can scope the project, investigate the infrastructure available to support it and take stock of the big data skills available in IT,’ he says.

IT has an important role to play in setting the architecture, building the information security standards, and putting in place the network bandwidth and processing power that will enable the business to scale up its IoT and big data infrastructure in the future.

Where the IT department doesn’t have the in-house skills and infrastructure to successfully drive the project, it can source scalable cloud and managed services from external service providers. ‘If IT doesn’t play this role, there is a risk of data quality issues and security challenges creeping into a fragmented infrastructure,’ Garratt cautions.

‘Success is about leveraging the IT department’s infrastructure and the business unit’s business process expertise and data science skills.’

Iterate and improve

The organisation should measure its success with its small, early projects and identify ways to improve performance. ‘It’s particularly important to evaluate your business and IT skills,’ he says, ‘sharpening them in response to the needs and gaps that become evident from the initial implementations.’

For some organisations, adopting the mindset of continuously driving better performance in response to real-time data will mean a significant shift in culture. As such, taking the predictive maintenance programme from an isolated area of the organisation into the mainstream of the business may demand change management and adoption marketing. It could also require that the IT department shift focus to new delivery models such as DevOps.

‘Although implementing big data and IoT solutions for applications such as predictive management is complex, the manufacturers who get started now can gain a significant competitive advantage,’ concludes Garratt. ‘Data-driven manufacturers have the opportunity to reduce costs, optimise asset utilisation, and improve productivity, all of which can translate in higher margins and profits.’