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THE POWER OF AI — DELL EMC PERSPECTIVE SERIES

Fixing Problems Proactively with AI-Led Predictive Maintenance

Drawing on the power of artificial intelligence, enterprises are realizing the broad business benefits of predictive maintenance programs.

ABSTRACT

Across a wide range of use cases, enterprises are capitalizing on predictive maintenance systems to proactively keep equipment and processes up and running at an optimal level of performance, avoid business downtime, and reduce maintenance costs. Predictive maintenance has become more lucrative and feasible due to the richness of Internet of Things (IoT) data and lower cost of high performance computing (HPC) systems.

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STAYING AHEAD OF EMERGING PROBLEMS

In industrial and commercial operations, the ability to detect and address maintenance problems before they impact the business is huge. It's one of the keys to keeping equipment and processes up and running at an optimal level of performance, avoiding business downtime and reducing maintenance costs.

In this quest to stay out in front of emerging problems, enterprises are increasingly turning to predictive maintenance solutions driven by artificial intelligence (AI) and high performance computing systems. These solutions leverage a combination of technologies — including sensors on monitored equipment, IoT edge gateways that gather data and AI systems that analyze data — to anticipate potential failures and enable proactive maintenance.

These efforts can have a huge impact to the bottom line of a company. In a report on predictive maintenance, the global consulting firm Deloitte notes that poor maintenance strategies can reduce a plant's overall productive capacity by 5 to 20 percent, and that unplanned downtime costs industrial manufacturers an estimated $50 billion a year. Predictive maintenance, or PdM, can help organizations address these challenges.

"In PdM, data gathered from connected, smart machines and equipment can predict when and where failures could occur, potentially maximizing parts' efficiency and minimizing unnecessary downtime," Deloitte says. "In most cases, this means that PdM is the most efficient maintenance strategy available — a gold standard for which to aim."[1]

Other analysts concur. A report by McKinsey & Company, for example, notes that AI-driven predictive maintenance can increase asset productivity by up to 20 percent and reduce maintenance costs by up to 10 percent, while greatly reducing machine downtime caused by maintenance work.[2]

COMMON USE CASES

To make this story more tangible, let's look at some common use cases for AI-driven predictive maintenance applications across diverse industries. These examples are based on the experiences of Dell EMC and its partners and customers.

MANUFACTURING

Manufacturers are using AI systems in conjunction with data from sensors and the Internet of Things to predict and prevent the failure of factory tools and machines. The goal is to use predictive maintenance to avoid issues on the manufacturing line, resolve problems proactively and minimize disruption to operations.

This is the way it is at Intel, which uses predictive maintenance tools to avoid unscheduled downtime in its manufacturing operations. One example: To maintain the health of the fan filter units in its factories, Intel uses sensors to monitor vibrations on the units, which is an indicator of the health of the devices. Predictive maintenance tools identity when the vibrations from a unit fall outside of the baseline numbers for a healthy unit. This allows technicians and tool operators to quickly identify changes in a unit's health and address the problem proactively.

1   Deloitte, "Making maintenance smarter: Predictive maintenance and the digital supply network," May 9, 2017.
2   McKinsey & Company, "Smartening up with Artificial Intelligence (AI) — What's in it for Germany and its Industrial Sector?" April 2017.

With this solution in place, Intel says it increased the uptime of its fan filter units by more than 97 percent and reduced unscheduled downtime by 300 percent, when compared to the previously used manual inspection processes.[3]

ENERGY

The average age of the North American wind fleet will rise to 7 years in 2020, and to 14 years in 2030, according to analysts from the research firm IHS Markit. "Along with that, equipment maintenance and operating costs are increasing significantly, leading operators to focus on performance optimization and cost management," the analysts say.[4]

As part of this focus on optimizing systems and containing costs, wind energy producers are looking to AI to help them find better approaches to system maintenance. This was the case with a wind turbine operator in the United States. The organization was having trouble with maintenance issues on its turbines, which are equipped with remote control tools that provide a variety of status views and reports on the operation of the systems and their components. The company wanted to put this data to work to enable predictive maintenance and to avoid costly unscheduled downtime to replace failed parts.

For this effort, the turbine operator sought the assistance of data scientists at Dell EMC. The data scientists worked with the company to use algorithms to analyze the data from the wind systems and to detect which components were likely to break down soon. This allowed the company's operators to use predictive maintenance to extend the useful life of components and to avoid the losses that come with unexpected system downtime.

TELECOMMUNICATIONS

AI systems enable telecommunications companies to analyze massive amounts of data to predict and prevent hardware and network problems, including issues with everything from cell towers to the set-top boxes in homes. AI systems can be trained to monitor the state of equipment, detect patterns and anomalies that are indicative of emerging issues, and predict the likelihood of failures. Operators can then work proactively to address equipment issues before services and customers are impacted.

For these operators, the costs of downtime can be huge. This was the case at a telecommunications company in Latin America that handles the flow of prepaid calls for 80 percent of a country. When a certain centralized cluster would go down, the company could not check users' available credit during calls. At the same time, it couldn't stop the flow of calls for a large part of the country, so it simply stopped checking for credit. This cost the company around $250,000 for each hour of cluster downtime.

To address this costly problem, the company worked with data scientists from Dell EMC to develop a system to analyze metrics from servers in the cluster and to develop a predictive function that identified servers that were at risk of going down. Once a certain line was crossed, the company had about an hour to rebalance the servers to avoid a collapse of the cluster — and bear the associated financial losses.

IT OPERATIONS

At Dell EMC, we are passionate about IT operations efficiency, and we have invested heavily to ensure that our own IT operations are highly efficient, as well as providing these services to our customers. In one example of this focus on IT operations efficiency, our data scientists developed a propensity model to score the potential of various servers going down within Dell EMC's IT operations. This was done to help proactively determine which servers might be at risk and to provide the IT operations team with advanced

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3   Intel, "Start Small And Grow Your IIoT Predictive-Maintenance Solution," in Forbes, September 12, 2018.
4   *PowerGrid International*, "As wind power fleet ages, more spending on maintenance predicted," November 8, 2017.

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warning and the ability to respond proactively to potential outages. This solution, which is now in production for Dell EMC's Microsoft Exchange and Authentication environments, has an estimated ROI of $25 million per year.

In another initiative, Dell EMC has invested greatly to offer our customers ProSupport that uses PdM models to detect and alert on critical issues. Dell EMC retains a team of dedicated data scientists working to improve the PdM models for our ProSupport customers and to advance and improve our critical issue detection and system optimization capabilities.

LOWERING THE BARRIERS TO ADOPTION

For organizations that want to get on the path to predictive maintenance, there's some good news. Deloitte says the technologies for predictive maintenance are now accessible to all sizes of companies.

"While PdM is not a new concept, the massive investments in technology typically needed to handle the massive volumes of data required often limited deployment to only the largest organizations," the firm says. "Today, the high availability and low cost of digital technologies, coupled with the rise of the digital supply network (DSN), have made it possible for PdM to scale on a broad level across facilities and organizations of all sizes."[5]

While becoming more affordable and accessible, the technologies and solutions for predictive maintenance are becoming easier to implement, from the edge gateways that gather data from sensors to the HPC systems designed to run complex analytics applications on massive amounts of data.

That's the case with Dell EMC Ready Solutions for AI, which offer flexible optimized solution stacks that simplify the entire workflow, including all the hardware, software and services needed to help organizations get AI solutions up and running quickly — in weeks instead of months.

KEY TAKEAWAYS

Drawing on the power of IoT technologies, AI and HPC, enterprises are realizing the very tangible and measurable business benefits that come with predictive maintenance. This intelligent approach to maintenance gives organizations the ability to detect and address problems proactively to keep equipment and processes up and running at an optimal level of performance, avoid business downtime, and reduce maintenance costs.

And today, the HPC systems that power AI-driven predictive maintenance applications are becoming accessible to organizations of all sizes while getting easier to deploy. These advances will drive the adoption of predictive maintenance for many new and emerging use cases.

TO LEARN MORE

To learn more about how you can build an environment to power AI-driven applications, visit Dell EMC Ready Solutions for AI.

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5   Deloitte, "Making maintenance smarter: Predictive maintenance and the digital supply network," May 9, 2017.

To learn more, visit DellEMC.com/AI.

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