

Industrial AI: The New Era of Predictive Maintenance

AI is ushering in an era of predictive maintenance in industry, helping businesses reduce costs, increase safety, and optimize energy consumption.

From Volkswagen factories to whisky distilleries in Scotland, AI is changing how businesses maintain their machinery. Thanks to predictive maintenance systems, companies can reduce operating costs, improve workplace safety, and even cut emissions.

At Volkswagen's assembly line, when workers discover a potential electronic fault, they no longer have to flip through diagnostic documents as before. Instead, an AI system called KI4UPS can identify the cause of the problem in seconds, significantly reducing manual inspection time across many vehicle production lines.

This is just one of 1,200 AI applications currently running in Volkswagen Group facilities, marking one of the largest industrial AI deployments in the automotive industry.

Globally, AI is changing how businesses approach equipment maintenance. Instead of simply repairing machinery when it fails, modern systems can predict problems before they occur, offering benefits ranging from workplace safety to sustainability.

From reactive maintenance to predictive maintenance

This transformation process often begins with data. Modern industrial facilities are equipped with countless sensors to monitor equipment vibrations, temperatures, currents, and sounds.

AI systems will process this continuous stream of data to detect early signs of mechanical degradation. This allows maintenance to be performed at the right time and in the right place, rather than waiting until the equipment fails.

A prime example comes from William Grant & Sons, the Scottish distillery behind Grant's whisky and Hendrick's gin. Before deploying the IFS Resolve AI platform, which uses Anthropic's Claude language model, more than a third of the plant's repairs were emergency situations, causing production lines to shut down and resulting in significant losses.

Today, AI systems can read complex plant engineering diagrams, connect with existing sensors, and predict problems before they occur. Technicians can even identify issues by analyzing the sound of vibrating pipes, video showing an unusually moving component, or pressure fluctuations.

Thanks to this solution, the factory is expected to save approximately £8.4 million per year.

Beyond the food and beverage industry, the Resolve platform is used in many other fields such as aerospace, defense, construction, manufacturing, and energy. The system can process various types of data, including video, audio, temperature, pressure, and engineering drawings to detect potential equipment failures.

In addition, the platform optimizes work schedules by connecting the right technicians with the components and locations needing repair, while using voice recognition and automated note-taking to reduce administrative workload.

Large-scale automotive production with AI.



The collaboration between Volkswagen and Amazon Web Services (AWS) demonstrates the potential of AI when deployed on an industrial scale.

The German automaker has extended its partnership with AWS for another five years, connecting 43 factories globally through its Digital Production Platform. This system is considered the largest AI network in the automotive manufacturing industry, spanning from Europe to North and South America.

Volkswagen's predictive maintenance platforms analyze data from sensors on production equipment to detect faults before they bring the line to a halt. In the automotive industry, line downtime can cost thousands of pounds per minute, so early detection of problems is critically important.

The system's technical infrastructure focuses on standardizing data between factories, enabling the deployment of consistent IT systems across the entire production network. This strategy has helped Volkswagen save tens of millions of dollars in operating costs.

According to Hauke ??Stars, a member of the board of directors in charge of IT at Volkswagen Group, the company's goal is to become a leading technology company in the automotive industry. He stated that the Digital Production Platform is the 'digital nervous system' of factories and is key to a future of AI-driven manufacturing.

The robotics revolution

The next major step forward in the field of predictive maintenance is the combination of automated robots and AI.

IFS software company has partnered with Boston Dynamics to develop a fully automated AI system that connects data collection, predictive analytics, and on-site action.

Boston Dynamics' Spot robot can patrol factories, collecting data using a variety of sensors. Thermal cameras help detect areas with abnormal temperatures, acoustic sensors can find gas or air leaks, and computer vision technology can read analog gauges to monitor pressure or flow.

Robots can also detect safety hazards such as chemical spills or electrical system abnormalities. All this data is sent to the IFS.ai platform, where AI agents analyze the information and make decisions, thereby triggering corrective actions.

According to representatives from Boston Dynamics, the combination of robots and AI helps organizations achieve unprecedented levels of safety and operational efficiency.

This system aims for three main objectives: improving safety through automated inspection in hazardous environments, enhancing efficiency through intelligent automation, and reducing equipment downtime by predicting failures early.

Energy optimization and sustainable development

In addition to preventing equipment failures, AI-powered predictive maintenance is becoming a crucial tool for reducing energy consumption and cutting emissions.

Schneider Electric is one of the companies adopting this approach. The company's Energy Command Centre acts as an AI-powered energy control center, optimizing electricity consumption for various systems within a building or even an entire urban area.



This platform integrates data from air conditioning, lighting, data centers, and many other critical systems to provide real-time monitoring and predictive maintenance capabilities.

At Capgemini's 23 campuses in India, this system has helped reduce electricity consumption by 25 GWh, saving approximately 3 million euros and transitioning entirely to renewable energy.

Meanwhile, at the Volkswagen plant in Poznań (Poland), AI-powered optimization resulted in a 12% reduction in electricity consumption, while also cutting energy costs and CO₂ emissions.

Another example comes from the collaboration between Schneider Electric and Compass Datacenters. By switching from a fixed maintenance schedule to an AI-powered predictive maintenance system, Compass reduced manual inspections by 40% and operating costs by 20%.

With AI driving a surge in computing infrastructure demand, efficiency improvements like these are becoming increasingly important for data center operators.

Challenges in the implementation process

Despite its many benefits, the implementation of predictive maintenance systems still faces numerous challenges.

Many older systems lack the necessary sensors or digital interfaces, forcing businesses to upgrade equipment or build data transformation layers. Additionally, engineering teams sometimes struggle to adapt to new AI-based workflows.

Predictive models also need to be customized for each type of device, while the initial cost for infrastructure, sensors, and AI platforms can be quite significant.

Successful businesses typically implement solutions in phases. They begin with pilot projects on the most critical devices, then gradually expand with a flexible system architecture. Simultaneously, AI models need to be retrained regularly to maintain accuracy.

The combination of edge AI and 5G networks promises to deliver near-instantaneous responsiveness to predictive maintenance systems.

When AI is processed directly at the device or local network node, latency caused by transmitting data to the cloud is eliminated. Combined with the ultra-low latency of 5G, systems can make instantaneous decisions such as adjusting operations, redirecting work, or shutting down devices to prevent damage.

According to McKinsey research, AI-powered predictive maintenance systems can reduce downtime by 50%, decrease breakdowns by 70%, and cut maintenance costs by up to 40%.

Kriti Sharma, CEO of IFS Nexus Black, argues that the real AI revolution is happening in heavy industries. According to her, this isn't the kind of AI that often appears in sensational newspaper headlines, but rather technology that helps essential workers run the world every day.

For industrial businesses, the question now is no longer whether to adopt AI, but how quickly they can implement AI-powered predictive maintenance. When equipment failures can have consequences far exceeding financial costs, the ability to predict and prevent problems early on becomes more crucial than ever.

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