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STOKE SYSTEMS, INC.

WHITEPAPER

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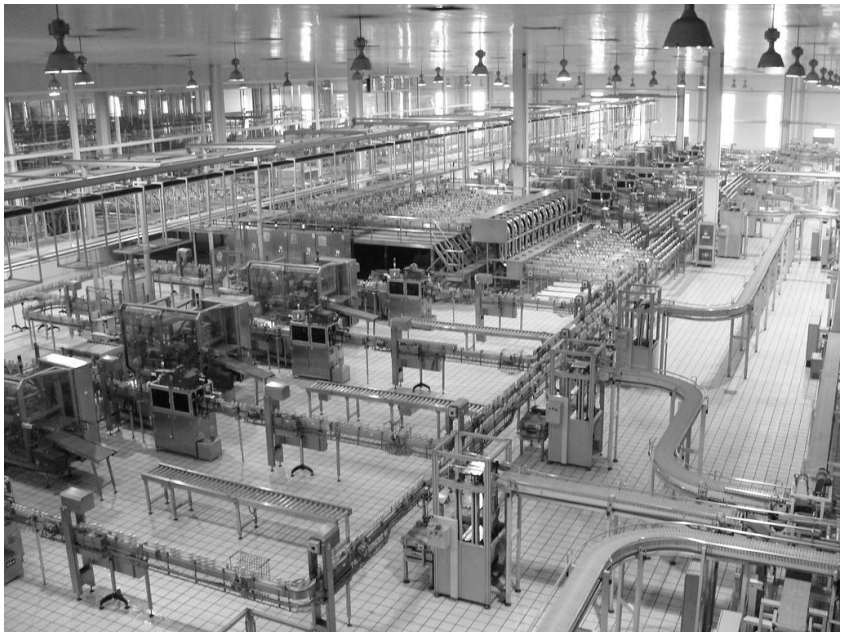
The Case for Predictive Maintenance 2.0



Executive Summary

Companies spend a considerable amount of money to ensure that their assets operate at optimum efficiency and last as long as possible. While some companies have adopted IoT to protect their investments, the vast majority of them still rely on regularly scheduled maintenance programs to improve equipment uptimes.

In this whitepaper, we make the case that there is a better approach to maintaining equipment by deploying smart sensors that can predict equipment failures before they occur.

The Maintenance Conundrum

The topic of maintaining critical equipment has been debated for many years. While there is no consensus yet, researchers agree that there are three primary approaches that companies have adopted to solve the problem:

- Preventative maintenance
    - Companies most commonly rely on regularly scheduled maintenance. This is a risk-averse strategy that generally involves implementing maintenance recommendations from equipment manufacturers.
- Reactive maintenance
    - While not as common as preventative maintenance, some companies have adopted a run-to-failure strategy. Clearly, it is the easiest plan to implement and depending on the value of the assets, reactive maintenance could potentially be more cost effective than maintaining equipment periodically.
- Predictive maintenance
    - Predictive maintenance is a just-in-time strategy that involves gathering insights from various sources to determine when machines are likely to fail. If implemented correctly, such a strategy is likely to be the most effective.

The total cost associated with maintaining equipment includes capital cost of replacement parts, operational cost related to downtime and personnel cost. These costs pale in comparison, however, to the opportunity cost of lost production time. Selecting the right maintenance strategy, therefore, is paramount.

A recent research study by the Electric Power Research Institute (EPRI) indicates that preventative maintenance is typically the most expensive strategy of the three mentioned above. While it might seem counter-intuitive, a reactive maintenance approach tends to be less expensive than maintaining equipment regularly. The primary reason, according to EPRI, is due to the cost savings related to the associated activities described above.

EPRI concludes that predictive maintenance is generally the most cost effective and the most reliable strategy to implement. When operations and maintenance personnel have the ability to predict when failures are likely to occur, they have the tools to plan better and make necessary arrangements to fix issues while minimizing downtime. While this seems like the perfect panacea on the surface, there are several factors that keep companies from adopting predictive maintenance. The shortcomings are related to the methods companies currently use to gather insights and not with the concept of predictive maintenance itself.

Predictive Maintenance 1.0

There are three traditional approaches to predictive maintenance:

- Statistical modeling
    - This method involves using historical data, anecdotal information and manufacturer's recommendations to create a predictive analytics model.
- Automated data collection
    - Sensors are increasingly being used to monitor the health of equipment.
- Manual measurements
    - Experts and technicians visit each equipment to manually collect performance data.

While there is sufficient research to show that predictive maintenance is by far the most effective method, the techniques listed above result in varying degrees of success. Manual measurement strategy, in theory, is the easiest and least expensive to implement. However, it is difficult to scale such measurements to cover every asset. In addition, the expertise needed by the maintenance personnel to accurately identify and monitor trends is often underestimated.

Statistical modeling, on the other hand, is easier to scale. This method is an improvement over preventative maintenance and involves adding machine learning and other analytical tools to existing equipment performance data. Most companies tend to start down the path to predictive maintenance by implementing some form of statistical modeling. If implemented properly, it's possible for companies to start realizing tangible benefits within a few months. The effectiveness over the long term, however, is debatable due to the lack of real time monitoring.

Over the last few years, sensors have become ubiquitous and relatively inexpensive. Industrial IoT platforms are starting to integrate sensors to extract real time information from assets. This data is then fed to the statistical models to create a more comprehensive maintenance profile. An additional upfront investment is required but progressive companies see the RoI benefits and are adopting sensors to reduce their overall maintenance expenditure. Most of the existing solutions, however, do not work well with legacy systems. In addition, sensors are fixed function and typically do not have the ability to be upgraded as new sensing algorithms become available.

A better approach to condition monitoring that evolves with the ongoing advancements in sensor technology is needed. Fortunately, there is a new way forward that combines modern sensors, flexible algorithms and a comprehensive IoT platform that can help companies take control of their maintenance strategy.

A New Paradigm

To overcome the challenges that traditional approaches to predictive maintenance pose, the next generation of IoT platforms must include the following features:

- Ability to scale to a large number of assets
- Flexibility to adapt to ongoing advancements in sensor technology and algorithms
- Interoperability with legacy systems and with third-party software
- A scalable architecture that makes both raw data and processed information available

Stoke SmartEdge™ is an Industrial IoT platform that addresses the drawbacks of existing solutions. The integrated sensor hardware, algorithms and software solution for predictive maintenance and condition monitoring helps companies gain insight by monitoring the health of machinery in real time.

The SmartEdge™ sensor is capable of processing complex algorithms independently and autonomously that until now could only be done by software in the cloud. With the ability to make decisions at the edge of the network, Stoke significantly improves the overall efficiency of the maintenance platform.

The Stoke software platform is a secure cloud-based tool to aggregate sensor data, detect patterns and process alerts. The software also provides companies a simple and user-friendly interface to provision, monitor and control sensors in the field. The Stoke SmartEdge™ platform offers:

- Sensor hardware that enables complex processing and AI algorithms at the edge
- Hardware acceleration and signal processing for vibration analysis and condition monitoring
- Scalable architecture that supports thousands of sensor nodes simultaneously
- Industry leading power efficiency that guarantees multi-year battery life
- Remote management of sensor nodes and a comprehensive visualization platform

It's now possible for companies to regain control of their maintenance strategy. To learn more and to schedule a demo, please drop us a line at info@stokesys.com.

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