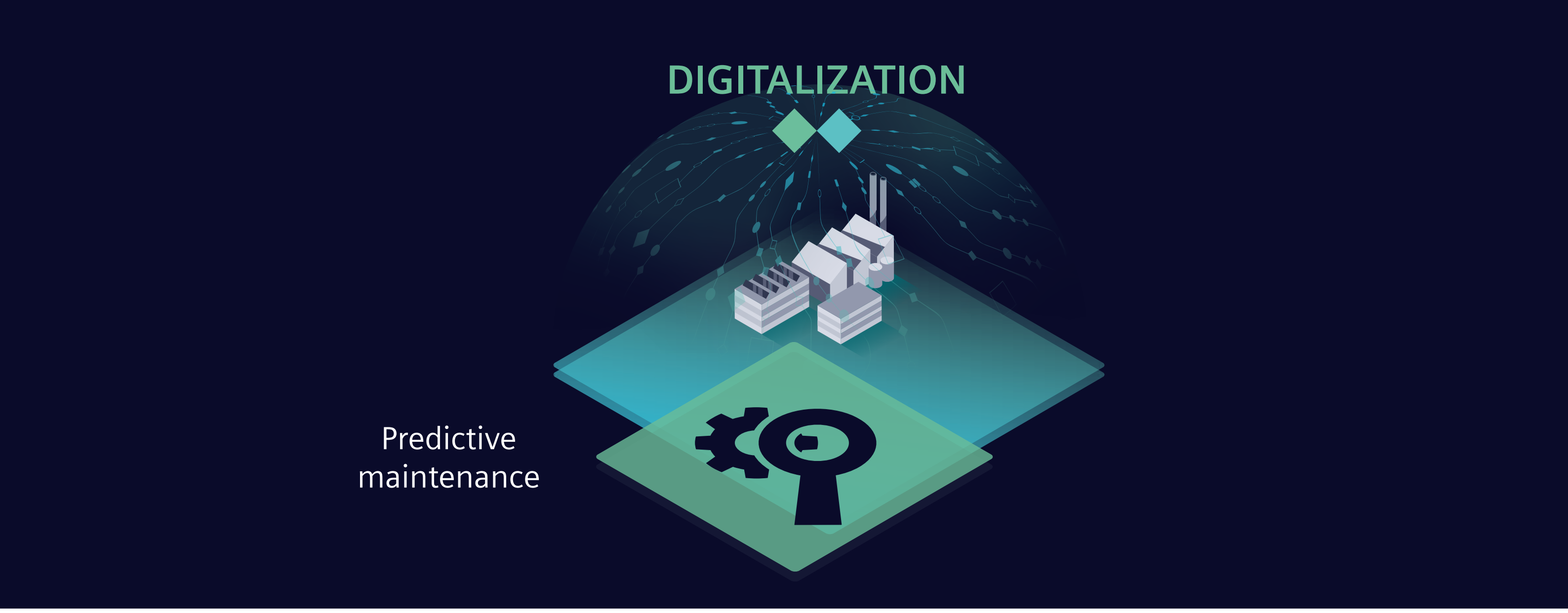

Predictive maintenance based on **condition monitoring**

Availability and efficiency in electrical power distribution
siemens.com/lowvoltage/digitalization

Maintenance work on electrical plants and devices used to be scheduled at defined intervals. In the future, however, more efficient and intelligent maintenance concepts will be required for electrical power distribution in order to manage the growing demands for both availability and efficiency. Digitalization and the smart use of existing data are laying the groundwork for predictive maintenance.

The data necessary for predictive maintenance in electrical power distribution is already available in most buildings. This data is acquired and processed by measuring devices and sensors that collect energy and condition data and by software that visualizes and evaluates relevant values. The technical implementation is relatively easy, thanks to the use of power monitoring systems. Energy and condition data is usually measured by special measuring devices or communication-capable protection and switching devices. These devices precisely, reliably, and reproducibly measure electrical values like voltage, current, and output for infeeds and outgoing feeders and individual systems and consumers all the way down to the plant level. They also supply information for assessing power quality and system states – data that is essential for predictive maintenance.

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Indicators predict components' remaining lifetime

Condition monitoring automatically monitors the condition of the most important power distribution components, and "health indicators" can supply data on wear and the remaining lifetime. But because a large amount of the data supplied provides no significant information in and of itself, the measured values need to be meaningfully correlated with one another and evaluated and the necessary information on the "health status" clearly visualized. For the most part, the system performs this task autonomously. The resulting status or warning messages can be displayed using a variety of software tools: for example, the power monitoring system from Siemens' SENTRON portfolio. Designed for quick installation and intuitive operation, the system includes measuring devices, the SENTRON powermanager software, and – for direct data transfer to the cloud – the 7KN Powercenter 3000 IoT data platform and SENTRON powermind cloud-based app.

Communication-capable 3VA molded case circuit breakers from Siemens illustrate how the individual components in the low-voltage grid support data acquisition. Their newly integrated condition monitoring feature allows them to acquire more than just basic information like operating cycles and operating hours. The smart circuit breakers also autonomously analyze the data and evaluate it using a patent-pending algorithm. The result is accurate findings on their current operating state and the remaining lifetime that can be expected. This is how 3VA molded case circuit breakers ensure the precise planning of plant maintenance and inspections. The longer the operating time, the more accurate the prediction of the molded case circuit breakers' condition, behavior, and wear.

Another example is provided by the measurement- and communication-capable 3NA COM LV HRC fuse link from the SENTRON portfolio. It combines the traditional function of a fuse link – to safely interrupt a circuit in the event of a short circuit or overload – with measurement and communication functions, turning a purely reactive grid component into a source of information that can be used as the basis for important decisions.

Inside the device, the protection function is separated from the measurement and communication functions. If the fuse is tripped, only this part needs to be replaced, and the electronics module with the integrated current transformer can continue to be used.

Systematic maintenance reduces costs

Based on the data collected, it's then possible to accurately predict when a component will require maintenance or when it will fail. Operators and service personnel receive all the information they need to schedule or perform maintenance activities. Even if this approach results in a moderate increase in investment costs, total expenditures will be reduced by up to 30 percent due to reduced maintenance costs. In addition, the use of communication-capable components and condition-based maintenance can in some cases eliminate the need for redundant current circuits and selective equipment and make additional applications unnecessary.

This is especially advantageous for building operators whose energy data management is cloud-based by greatly reducing expenditures for a separate IT infrastructure for technical building and maintenance management. In addition, huge volumes of data from different devices can be stored and processed and made available for comprehensive, location-independent analyses. Siemens' SENTRON powermind app analyzes energy and condition data in MindSphere, the cloud-based, open IoT operating system from Siemens. Users are provided with a real-time overview of plant states and current energy consumption as well as trends over time. This is how the app simplifies the transition to digital energy data management and lays the groundwork for predictive maintenance in buildings.

And this invest pays off: Studies show that preventive maintenance can not only reduce maintenance costs and increase productive time by a potential 15 percent. It can also reduce unplanned technical downtime by up to 70 percent[1)].

1) https://klardenker.kpmg.de/operations-hub/die-vorteile-vorbeugender-instandhaltung/

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