



WHITE PAPER

Predictive maintenance goes mainstream



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Low-cost sensors, cloud-based analytics put condition monitoring and better opex spend within reach of small-medium sized facilities

By now, the promise of condition monitoring on critical power distribution assets is well known: reduced capex; longer asset life; avoided unplanned shutdowns; improved safety and a substantial reduction in maintenance spending. All of which adds up to reduced costs and greater reliability over time because of better asset management and predictive maintenance. Capturing operational and condition data also provides the means to identify potential problems before a failure can occur.

Why invest in condition monitoring?

Lowering costs with an optimized maintenance schedule is the obvious answer but the benefits extend beyond predictive maintenance to include:

- Improving overall plant health
- Spare parts management: know exactly what you need, avoid wasting time
- Reduced downtime
- Increased reliability and productivity
- Improved safety

Although the benefits of condition monitoring are well known, it traditionally has only been viable for larger facilities. Some smaller facilities only monitor a portion of their assets, if any, in part because the cost of a fully engineered solution is too great to justify. While large plants and institutions might invest in such tools, small to mid-sized facilities need a cost-effective solution that can be implemented easily.

Falling costs, rising adoption

Now, as sensors, communications and analytics continue to advance and their costs continue to fall, more users are moving up the condition monitoring adoption curve. Driving the trend are low-cost, cloud-connected sensors that capture real-time measurements for voltage, current, power, operational status and number of trips directly from electrical distribution equipment.

As component costs have fallen, it has become feasible to monitor, not only more assets, but also more types of assets, including those further down the control hierarchy that previously were not economical to monitor. Monitoring older equipment is also made easier or simpler by a range of available retrofit and replacement options.

Figure 01
ABB's approach to
automation and asset
management

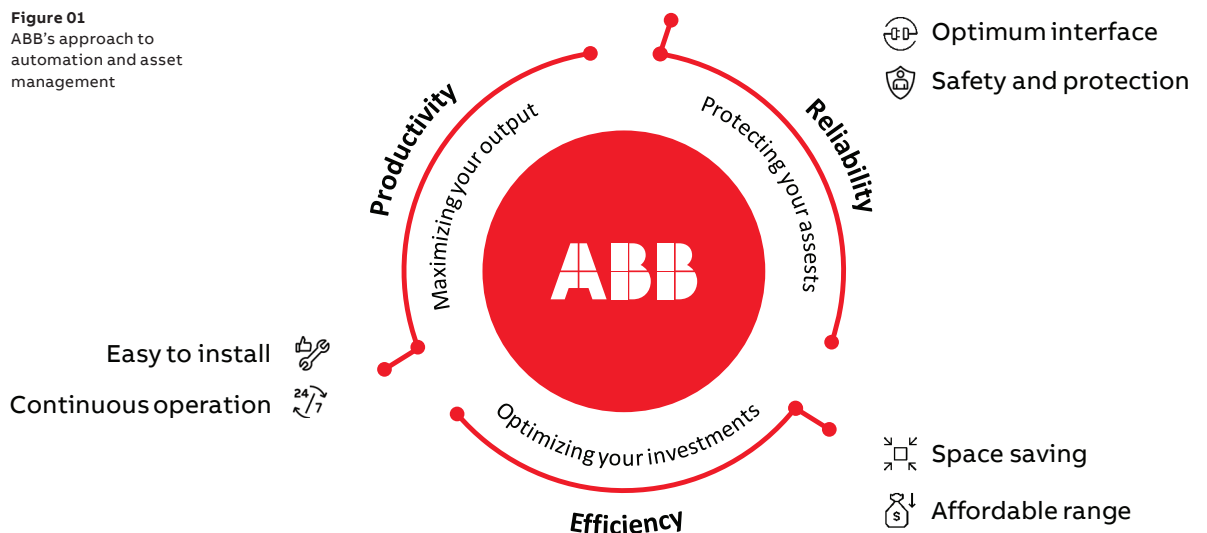
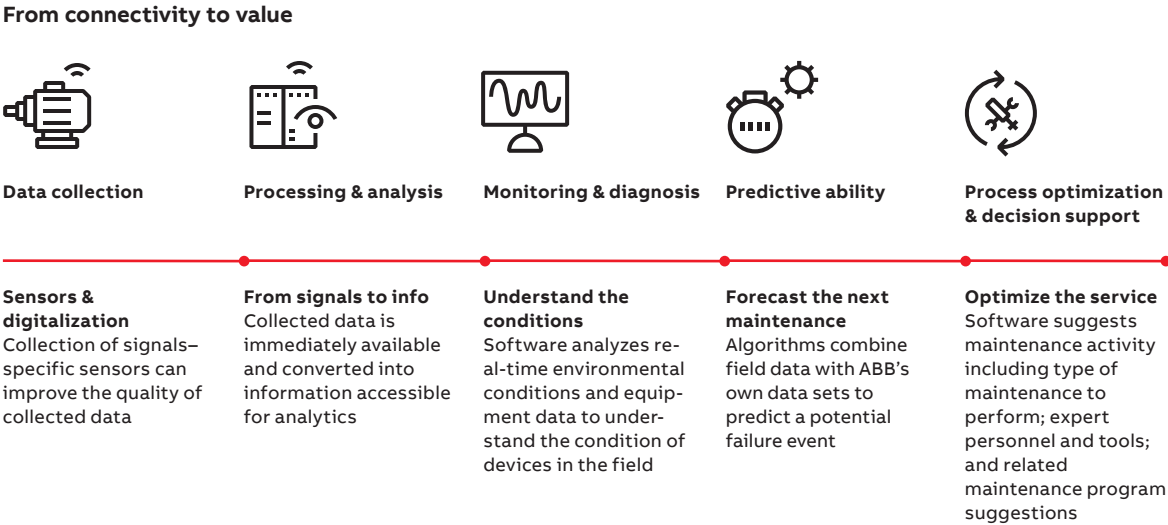


Figure 02
Predictive maintenance cycle, based on condition monitoring



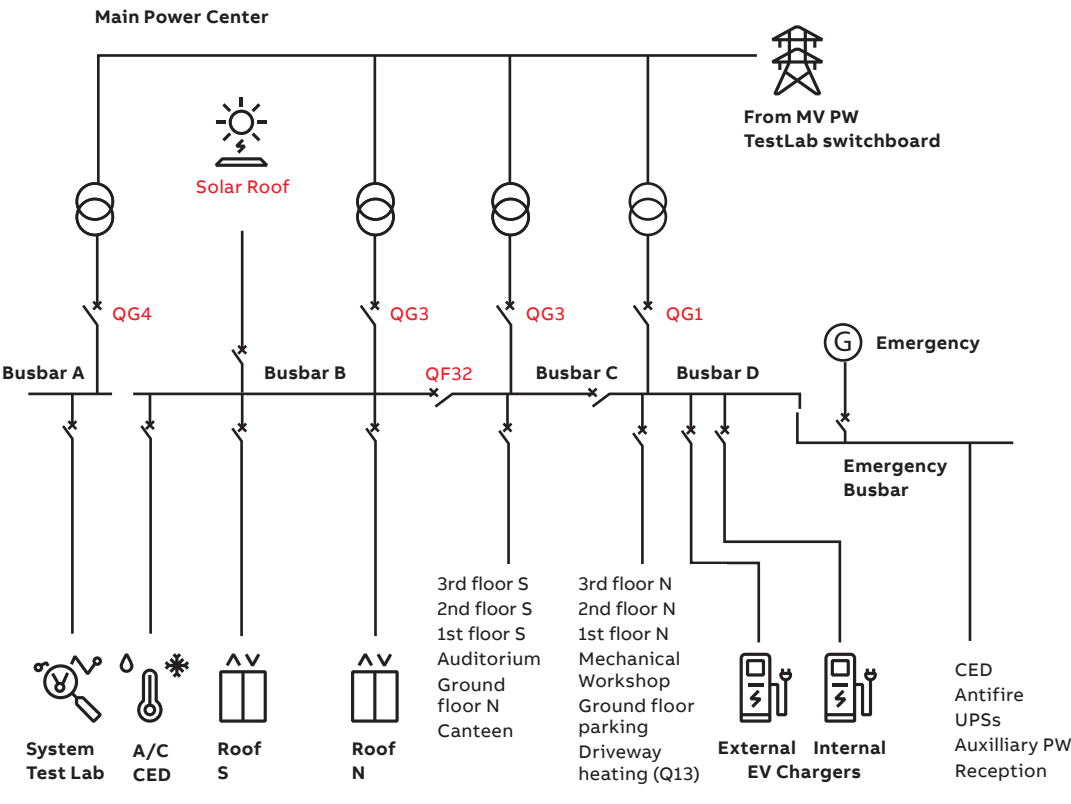
How is all of this accomplished?

ABB Emax 2 breakers are equipped with onboard sensors from the factory that can feed data to the ABB Ability™ Energy & Asset Manager dashboard, which combines real-time operational data with circuit breaker age, utilization conditions, and real-time measurement of environmental conditions (e.g., humidity, vibration, temperature). This allows the system to create a reliability curve for each device that gives users a fine-grained

picture of each asset's condition and likelihood of failure. This is actionable information that can be used to drive maintenance plans.

Real-time monitoring can also yield benefits for mechanical systems; for example, often a problem such as a failing bearing will cause changes in the upstream power supply. Those fluctuations can be detected by systems like Energy & Asset Manager and flagged for further investigation.

Figure 03
Schematic from the Energy & Asset Manager system monitoring ABB's manufacturing facility in Bergamo, Italy



What can we do with this data?

Once the data is being captured, a range of opportunities opens up. The system can be integrated with the plant’s process control system or a building management system so that

operators can run multiple systems from a “single pane of glass.” Even without such integration, modern monitoring solutions leverage analytic and reporting functions based in the cloud to deliver decision support tools.

Figure 04
Sample screens
from ABB Ability™
Energy & Asset
Manager

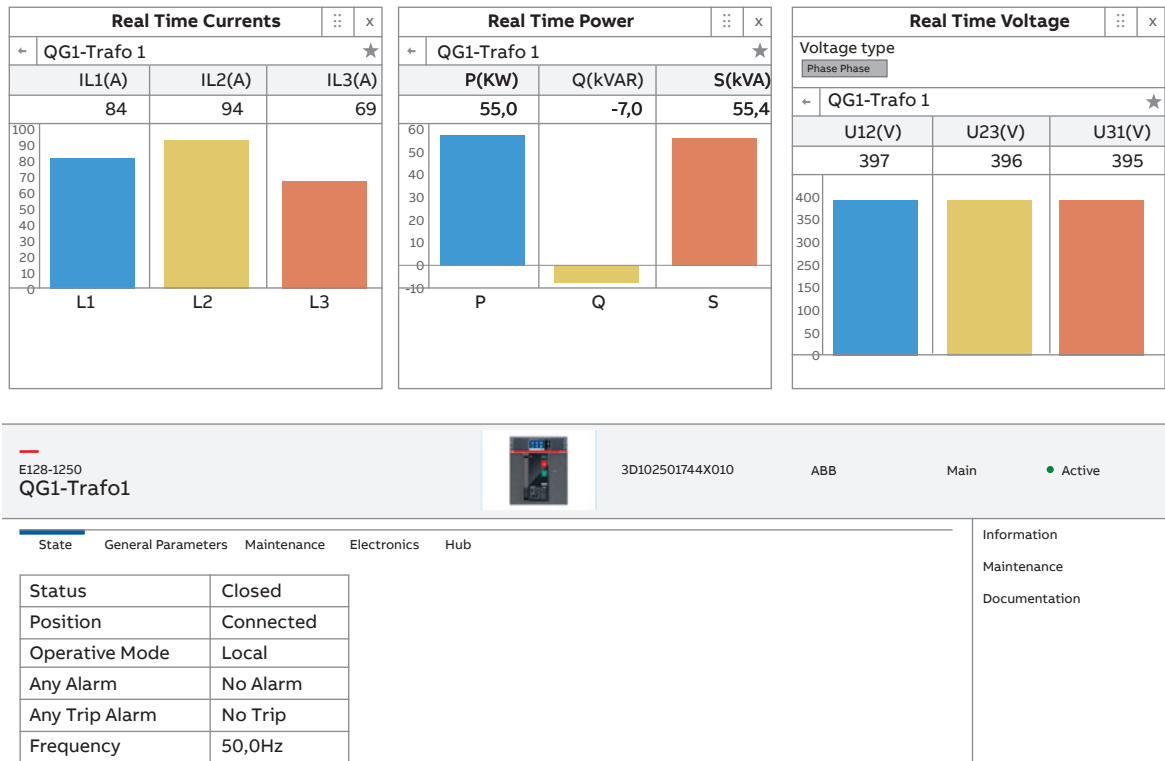
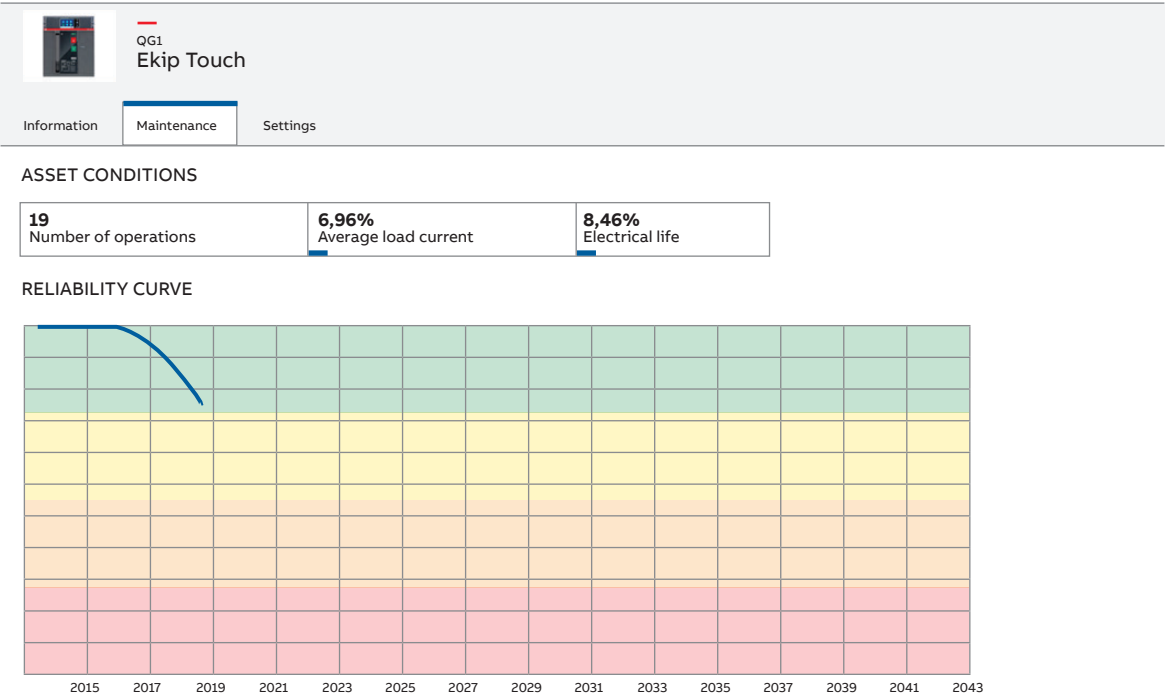


Figure 05
Reliability curves can be
reviewed at any time



Condition monitoring for all breakers

While some modern circuit breakers, such as the Emax 2, are already capable of data capture, communications, and predictive maintenance, some are not. Luckily, retrofitting outdated equipment is fairly straightforward with a range of options. In fact, upgrading an existing circuit breaker has never been simpler or more cost effective than with the plug-and-play Ekip UP solution.

For most facilities, one avoided outage will pay for a monitoring scheme several times over, a fraction of what a fully engineered system would require. This shift in cost has allowed condition monitoring and predictive maintenance to be applied to a much larger number of assets in a facility.

Partnerships are key

Eventually, capabilities such as monitoring, data capture and communications will be commodified. The real value of condition monitoring systems lies in the analytics of data from function feeds. Analyzing data streams in real time and delivering actionable intelligence to the user ultimately depends on the domain expertise and experience of the supplier. As such, it's essential that facility managers looking to implement or expand a condition monitoring scheme on their power systems partner with suppliers that have deep roots in power engineering and automation.

With the right partner and a minimal investment, any facility—commercial, industrial, institutional—can get started with condition monitoring and begin realizing the many benefits it brings.



**Interested and
want to know more?**

**Talk with an ABB expert to learn more about this
and more of these types of solutions.**

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