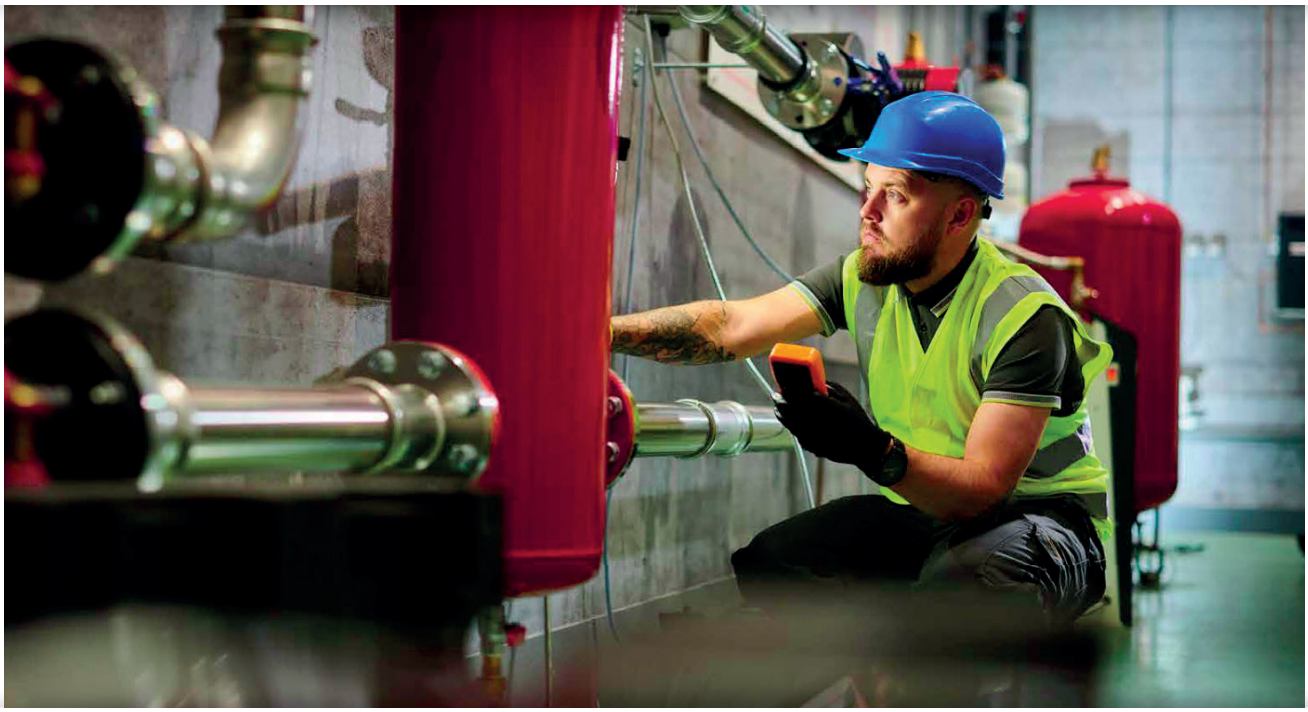
Smart maintenance approach for continuity of service in the water processing industry

Ideas for updating maintenance strategies in water processing applications



The water industry provides essential services to society and process industries by ensuring a constant supply of clean drinking water and efficient wastewater services. Demand for sustainable clean water is increasing rapidly, while water scarcity is becoming an issue in many regions. The clean water sector faces also increasing technical requirements in the areas of disinfection and desalination.

In the water industry, continuity of operation is key, and 24/7 plant equipment uptime is often expected as standard. Lack of maintenance could have a catastrophic impact. Even the failure of a single component can have a massive impact on operations, while energy and maintenance expenses are a major part of the lifecycle costs of pumping systems.

Keeping production lines and systems running optimally often relies on a skilled maintenance team. However, effective maintenance also involves planning and scheduling, constant vigilance, willingness to change out unworn parts, and readiness to respond to unplanned events.

This paper looks at the differences between preventive and predictive maintenance, and how automation solutions can help utility companies keep their operations running smoothly, while taking the first steps towards smart maintenance.

WHITEPAPER

Preventive maintenance vs. predictive maintenance

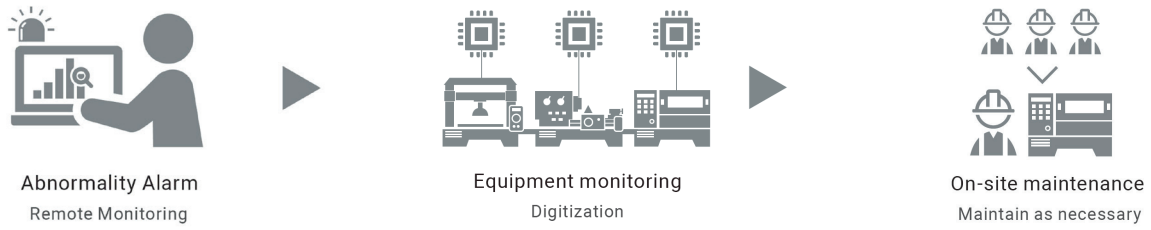
Water facilities that employ traditional or preventive maintenance strategies often find themselves either missing key signs of failure that occur in between inspections or prematurely replacing equipment to avoid these potential failures. These issues are two sides of the same coin, which is the lack of 24/7 monitoring of critical equipment.

It is also important to keep in mind the human impact of maintenance. Traditional maintenance relies on experienced staff to identify issues. Digital solutions can offer many benefits for maintenance teams, helping to relieve the huge pressure placed on them when there is a stoppage.

While it must be accepted that no maintenance strategy can guarantee 100% machine uptime, both preventive and predictive solutions can help reduce the physical pressures on the maintenance teams, as fixes can be planned and undertaken during scheduled downtimes. However, when something breaks unexpectedly, the resulting unplanned downtime affects more than 75% of companies and can be very costly.

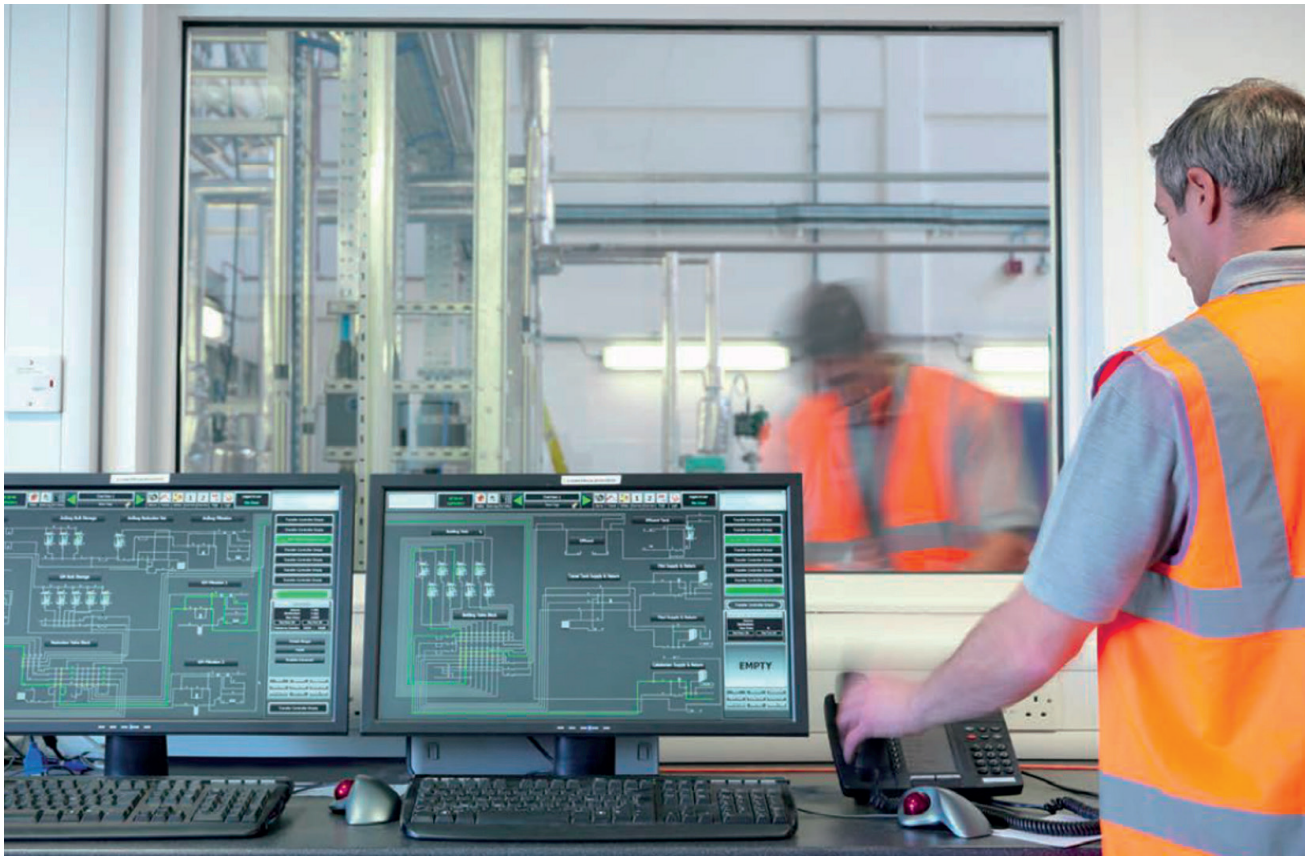
Unlike preventive maintenance, which is performed according to a schedule that reflects historical events, predictive maintenance monitors asset condition in real time and prompts interventions before failures disrupt production. Advances in sensors, analytics, and communication technologies are making predictive maintenance increasingly practical and affordable.

By migrating to a predictive maintenance strategy, water processing facilities and portable plants can rest assured that their equipment is being monitored around the clock and that real-time data analysis will reveal any potential issues well in advance of an actual failure.



Preventive maintenance or also called scheduled maintenance consists in cyclic maintenance to reduce faults or malfunctioning. Preventive maintenance has the main objective of extending the life cycle of assets and limiting downtime, to prevent excessive qualitative and quantitative degradation of production.

Predictive maintenance is a type of preventive maintenance that is carried out following parameters that are measured and processed to identify the remaining operating time of the machine, before failure. For this purpose, different methodologies are used, such as vibration measurement, thermography and analysis of absorbed currents.



Getting started

Top 3 causes of unplanned downtimes are: aging equipment (50%), operator error (15%) and lack of time (14%). Moreover, according to a study by the Manufacturing Institute there are more people ready to reach retirement than enter the workforce in plant maintenance: 6 out of 10 manufacturing roles are unfilled because of a lack of skilled workers. This shortage of skilled maintenance workers can cost companies up to 10% of their annual profit.

The first step on a predictive maintenance journey is to identify critical elements of the process. What are the major causes of unplanned stoppage historically, and where on the system do they occur? This will enable companies to create a baseline of the data collection capabilities of their systems.

Retrofitted solutions are one way to modernize while keeping costs affordable. After critical assets are identified, implementing the predictive maintenance solution is straightforward. Key steps include replicating engineer knowledge for the targeted asset, establishing a baseline of acceptable conditions, retrofitting one or more sensors or monitors to the asset, and setting warning and alarm thresholds.

Typical maintenance tasks at water facilities include membrane filtration water treatment systems that can be vulnerable to damage and wear caused by pressure peaks. It is important to monitoring key assets, and detect any abnormal vibrations, inefficient system operation, erosion of components, and cavitation.

Hydraulic hammering in the pipes may cause dislocation of the joints and weakening of the wall material, bearing wear, shaft vibration, cavitation, insulation degradation.

Use case:

Industrial recirculating pumps run almost continuously. One manufacturer used manual inspections to check a motor in its water treatment plant, but conducting accurate inspections was difficult without shutting down the pump. Scheduling maintenance was always challenging because of ongoing production needs. This meant that service might be performed too early (wasting time and materials) or too late (after an unexpected failure impacted production).

Retrofitting the recirculating pump with a vibration sensor allowed the monitoring AI to measure high-frequency vibrations, detect abnormalities, and analyze the failure mode. Alerts permit maintenance engineers to monitor pump health remotely, judge the potential impact of abnormalities, and solve problems without being onsite.

This use case shows how a predictive maintenance solution can streamline maintenance work while also supporting production by preventing unplanned downtime.

Moving towards smart maintenance

When looking at total productive maintenance, one of the main pillars is enabling self-maintenance, also called autonomous maintenance. This type of approach starts from two simple assumptions:

- Firstly, that the system user can react to the first signal of an anomaly in the system
- Secondly, personnel with low technical skills can be entrusted with simple maintenance operations, for example visual and sensory checks.

Smart maintenance is a combination of those actions to reduce manual checks, using automatic analysis of the key factors for preventive maintenance.

In addition, implementing condition monitoring and smart sensors for predictive maintenance, and auto-diagnostic functions of devices for self-maintenance. As the ultimate step towards smart maintenance, remote maintenance via a remote connection can be used where human presence is not essential.

OMRON offers a complete range of products for the water industry to monitor their equipment 24/7 with high-performing technologies.

- Advanced predictive maintenance with data collection and visualization from key assets of the plant to monitor parts, and process data to reduce the impact of emergencies.
- Notification on usable parts and spare parts needed for maintenance.
- Immediate connection to the plant for a quick troubleshooting and when possible, fixing the issue.
- Positive impact for society by CO2 reduction thanks to reduced travel for maintenance.

For more details on OMRON's solutions for smart maintenance, please contact us or visit industrial.omron.eu.