GRACE SENSE™

Water/Wastewater Application

INTRODUCTION

The global utility market size for adopting predictive maintenance solutions reached $29.6 billion in 2019 and is currently forecasted for a compounded annual growth rate of 13.5% through 2025; peaking at a market valuation of $55.8 billion. Not only is this a clear indicator that predictive maintenance, including continuous remote monitoring and IIoT technology, has been widely accepted by utilities like Water/Wastewater, but this also indicates an impressive growth arc that proves that it's working. Through predictive maintenance solutions, utilities can reap the benefits of optimizing their resources, eliminating operational inefficiencies, and increasing the benefits of their services for the population.

THE WATER/WASTEWATER UTILITY PROBLEM

Reactive maintenance and over-maintenance are both very costly. Reactive maintenance scenarios often lack required parts and are at a higher risk of personnel becoming injured (70% of injuries occur during reactive maintenance). Downtime is significantly increased when maintenance is unplanned, and personnel cannot make repairs safely or efficiently.

In the summer of 2022, a water plant in Texas had a failure that caused unprecedented downtime due to transformer overload. An overload occurs when the supply power does not provide enough capacity to move the required current through a transformer; which can lead to thermal degradation exhibited through cracks in the insulation.

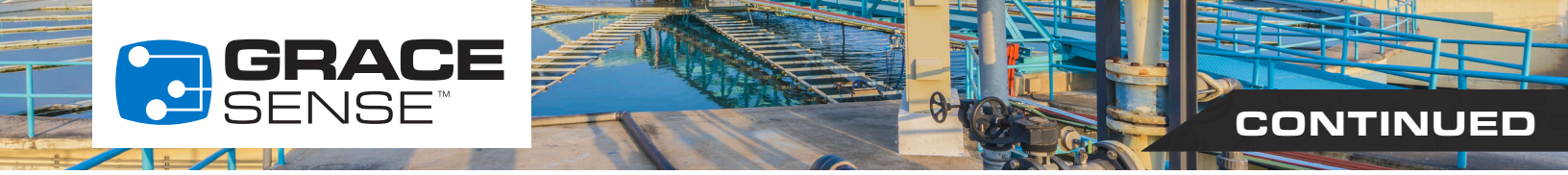
Population growth and limited resources for potable water are the primary concerns for the water industry. Most Water/Wastewater treatment plants are relatively small and operate on legacy equipment. Due to fears of breakdowns, especially during high-demand intervals like summertime, maintenance personnel is manually inspecting their plant's equipment multiple times per week.

If a **motor fails unexpectantly**, the pump that it powers can be **down** for as long as **3-4 days** as the plant **sources replacement parts** and **performs repairs**.

When this plant in Texas was impacted by the transformer overload, it set off a chain reaction that shut down its critical medium voltage pumps, for example, pumps supplying the critical chemical injections needed for water sanitization. The plant was put into reactive maintenance mode for two full days and the city's population suffered the consequences. A citywide boil notice impacted 2.3 million people and completely shut down the local schools and businesses.

THE PREDICTIVE MAINTENANCE SOLUTION

For Water/Wastewater treatment plants, any disruption in the electrical distribution system can create catastrophic consequences affecting a city's population, as we mentioned in the recent failure in Texas. It is critical for these chemical injection pumps, as well as others, to remain in good working condition requiring insights into the health of all production assets. Analog maintenance tactics are not keeping up with mitigating the risk of unplanned downtime.



There are several predictive maintenance solutions to monitor pump health that include vibration and temperature monitoring. Additionally, in the case of monitoring the electrical distribution system, specifically, as it energizes the medium voltage pumps, a proven solution is the deployment of a continuous thermal monitoring solution. The Grace Hot Spot Monitor™ connects to the potential failure points within transformers, as well as other critical mechanical connections within the electrical distribution network, to predict a flashover event caused by escalating temperatures.

These **escalations** could be the result of **electrical overloads**, **loose connections**, **mechanical degradations**, and other anomalies.

Through the application of these types of predictive monitoring devices, the allocation of Water/Wastewater treatment plant resources could be redistributed to other priorities. Furthermore, early detection of an impending failure in a critical motor can provide the necessary preparation time to source replacement parts. Once deployed, these monitoring sensors can begin real-time data captured from that point forward.

Monitored data can push to a cloud-based system and be viewed through a browser-based user interface. Most importantly, the moment a sensor detects anomalous behavior, it can issue an alert to maintenance personnel via SMS/email. These alerts help maintenance personnel pinpoint issues immediately based on feedback from the sensors.

Application of predictive maintenance sensors, like the GraceSense Hot Spot Monitor™, will transform the way treatment plants perform maintenance in the following ways:

- Alleviate the stress of reactive maintenance scenarios and longer downtime periods that will result in a water shortage for a population.
- Reallocate resources to other plant priorities to allow full coverage of other legacy equipment maintenance needs.
- Allow maintenance teams to plan accordingly for an impending failure within a critical asset, source replacement parts far in advance, and minimize downtime during repairs.

ABOUT HOT SPOT MONITOR

GraceSense™ data provides information for better maintenance plans. IIoT and Hot Spot Monitor™ devices monitor critical assets to provide alert capabilities when equipment degradation is detected. IIoT devices include vibration and temperature monitoring for motors, pumps, fans, and rotating equipment while the Hot Spot Monitor™ can be installed to monitor switchgear and MCC temperatures on bolted connection points.

A non-conductive temperature monitoring and alarming device that identifies potential hot spots and enables users to predict potential failures in equipment.

Hot Spot Monitor™ Features & Benefits:

- Continuous monitoring
- Monitor up to 18 points per unit
- No calibration required
- Temperature range: -20°C to 120°C
- Communication: Modbus RTU, Modbus TCP/IP, Ethernet IP™
- UL Recognized

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