

A wide-angle photograph of a water treatment plant. In the foreground, a large, rectangular aeration tank is filled with greenish water. Several circular diffusers are visible on the surface of the water, connected to a network of pipes and walkways. The walkways are made of metal and have orange safety railings. In the background, there are more tanks, buildings, and trees under a blue sky with scattered white clouds.

Leveraging IoT for
Condition Monitoring in

WATER TREATMENT PLANTS



Overview

Centrifugal and high-pressure pumps are the most important assets at water treatment plants. To monitor performance and efficiency of these pumps, our client followed a calendar-based vibration and temperature monitoring process that captures data based on a predetermined schedule. This data is manually entered into a spreadsheet, and forms the baseline to analyze threshold variations. Apart from the time and effort involved, this process was highly error-prone. Inability to identify and determine cause of deviation from normal values often led to time and cost overruns.

To overcome the problems associated with manual monitoring of pumps, we proposed SeeMyMachines™, an Industrial Internet of Things (IIoT) solution for condition monitoring and predictive maintenance.

Business Challenges

- ◆ Ensuring reliability and performance of pumps was a key challenge for plant managers
- ◆ Data loss between read cycles, unforeseen failures, wide tolerances, low-resolution deviation charts and intensive manual labor
- ◆ Pump failures resulted in significant downtime and disruption of operations leading to time and cost overruns

Business Requirement

- ◆ Ability to remotely monitor condition of assets in real-time with insights into operational aspects such as vibration, temperature, water quality, and flow
- ◆ Predict failures and identify performance deterioration
- ◆ Extend pump life by attending to problems early
- ◆ Minimize losses caused by pump failures and unplanned maintenance activities



QBurst Solution

We deployed SeeMyMachines, an Industrial Internet of Things (IIoT) solution that captures data from equipment by interfacing with controllers and/or sensors.

Deployment was done in a phased manner with the pilot implementation covering six pumps at one unit. This involved commissioning, calibration, data collection, portal setup, configuration, cloud access, and online monitoring. Subsequent phases were completed in eight months with connectivity established across 174 pumps.

SeeMyMachines provided a bird's-eye view into the condition of pumps, with performance data available 24X7 in real-time. The platform supports web as well as mobile interfaces to access equipment data from anywhere through secured and authorized connections.

How it Works

Once the critical assets to be monitored are identified, vibration sensors are installed on existing pumps at required nodes/monitoring points. Using wireless networks such as WirelessHART®, vibration data is securely transmitted to the cloud for analysis.

In the absence of wireless networks, the Gateway compresses and securely transmits the data to the cloud-based backend, which provides the analytical insights required for remote condition monitoring and predictive maintenance.

Solution Features

- ◆ Dashboards and interactive visualizations
- ◆ Asset Lifecycle Management
- ◆ Remote Condition Monitoring
- ◆ Predictive Maintenance
- ◆ Digital Task Management
- ◆ Maintenance Records
- ◆ KPIs and Statistics

Data at Your Fingertips

The mobile app offers the following features:

- ◆ Map view of pumps with status
- ◆ Alerts in the event of threshold breach
- ◆ Drill-down feature to view data at pump level
- ◆ Automated maintenance ticket generation
- ◆ Trends/graphs of captured data
- ◆ View maintenance/service records



Business Benefits

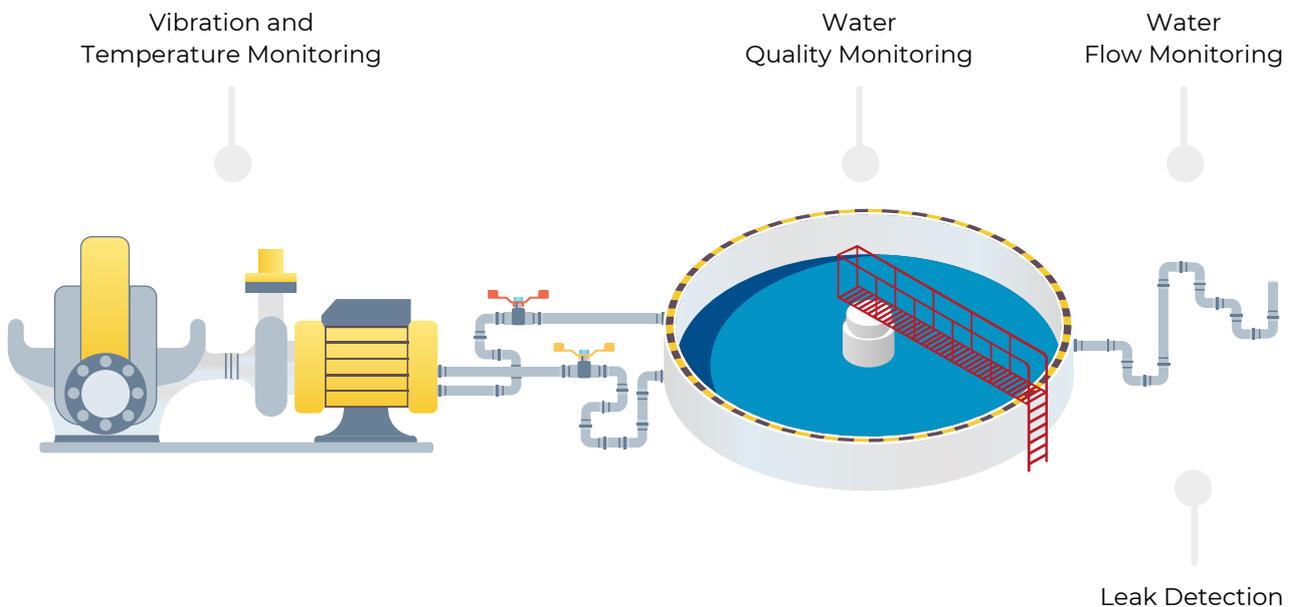
- ◆ Automation of condition monitoring process resulted in savings of 4800 man hours in the first year
- ◆ Increased frequency of data capture resulted in accurate failure prediction and measurement
- ◆ Reduced downtime and improved equipment and plant availability
- ◆ The ability to foresee failures and perform maintenance on an as-needed basis rather than on a set schedule significantly enhanced workforce efficiency
- ◆ Predictive maintenance ensured timely intervention and an increase in functional life of equipment

Technologies

Software



Hardware



The Case for Predictive Maintenance

Water treatment plants are high value assets that contain a multitude of components/equipment such as pumps, motors, pressure vessels/exchangers, pipelines, and control systems that need to be constantly monitored and maintained to ensure optimal efficiency.

Manual monitoring, conducted periodically, does not provide early and actionable warning on emerging faults. This is where predictive maintenance steps in.

Predictive maintenance captures the actual operational condition of critical equipment and uses the data (and trends in data) to detect possible failures. This helps in preventing catastrophic failures while serving as an early warning system for maintenance and procurement teams to avert such incidents.

How it Works

Statistical and data mining techniques such as Advanced Pattern-Recognition (APR) are used to create empirical models by "learning" from the asset's unique operating history during all ambient and process conditions.

The model effectively becomes the baseline to determine the normal operational profile for a piece of equipment or system. This empirical profile is compared with real-time operating data to detect subtle changes in system behavior, creating more time for analysis and planning corrective action.

Why SeeMyMachines?

- ◆ Connects plants irrespective of geographic location
- ◆ 24x7 web and mobile access to operational and analytical data from anywhere
- ◆ Cloud-based platform reduces maintenance costs as servers and databases are maintained by supplier
- ◆ Data transmitted over secure channels
- ◆ Remote software upgrades without site visits
- ◆ Automated alerts generated based on pre-defined rules
- ◆ Alerts sent as emails and push notifications on mobile



USA | UK | UAE | INDIA | SINGAPORE | JAPAN | AUSTRALIA

14150 Newbrook Drive, Suite 115, Chantilly, VA 20151

www.qburst.com | info@qburst.com