

Tuas Power

Identifying and eliminating harmful transients, improving system reliability, and prolonging the effective life of infrastructure assets

Water scarcity has long prompted water self-sufficiency in Singapore, the third most densely populated country in the world, with 5.6 million residents crowded into just over 275 square miles. The small city-state island lacks ample catchment storage to gather precipitation, complicating its water shortage issues. As a result, Singapore receives more than half of its water supply from unorthodox sources of rainwater collection, high-grade recycled water and desalination, with the rest of its water supply imported from a foreign source.

Not only is water scarce and valuable, but potential disruptions to water supply infrastructure for industrial users has significant operational implications that can affect service reliability, reduce profitability, and harm customers downstream.

The challenge

Tuas Power is a private utility in Singapore highly motivated to increase the reliability of their water supply system. The power utility supplies high grade water for their own internal processes as well other industrial customers. Tuas Power was experiencing leaks within their distribution network, which were unexpected because these pipelines were less than five years old, made of steel, and laid above ground.

Perplexed by the unanticipated leakage, Tuas Power took a proactive condition assessment approach to determine the reason for leaks on such a young system. Their goals were to identify the source of damage and any pipes at risk of failure, and to come away with recommendations to rehabilitate the system to ensure the uninterrupted flow of water for their commercial operations.

The solution

Tuas Power engaged Xylem to identify the cause of the leaks by deploying Xylem Water Loss Management, a non-invasive and cost-effective method of monitoring pressure transients within the water network to identify harmful pressure surges.

Through its real-time detection of harmful pressure transients, Xylem Water Loss Management helps determine the source of these events and identifies pipes under stress with high likelihood of failure. This early warning enables utilities to better manage harmful pressure variations



Program highlights:

- Identified harmful transients (up to 100 PSI magnitude) from multiple sources
- Appropriate transient mitigating measures recommended, implemented, and verified
- Mitigating measures helped utility avoid system downtime and expensive maintenance costs

Services provided:

- Transient pressure monitoring, analysis and mitigation
- Rehabilitation recommendations

and mitigate the risks associated with premature pipe failure, prolonging the effective life of infrastructure assets.

Xylem installed its high rate, wireless pressure monitoring devices at four sites throughout the utility's pipe network to collect operational data on the pressure anomalies. This data was analyzed to detect harmful pressure surges, identify the sources of these pressure surges and their impact on the structural integrity of the pipelines.

“Xylem has provided good service and support to enable us to identify the undesirable pressure surges in the water system and proposed appropriate mitigation measures for us to implement...”

Tan Chek Jiang, Vice President (Utilities) Tuas Power

The results

Immediately after the sensors were installed, Xylem Water Loss Management detected high magnitude harmful transients (up to 100 PSI) coming from multiple sources. The system pinpointed the sources of these transients at specific locations along the utility's distribution system.

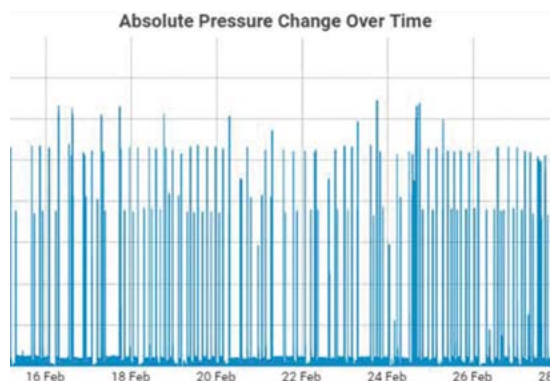
Drilling into the data, Xylem's analysts identified that certain operational practices associated with water usage were causing large pressure surges. Armed with this insight, Xylem recommended several interventions to reduce the harmful surges.

First, Xylem recommended Tuas Power optimize and reduce the frequency of operational activities that were generating harmful pressure surges. Next, the installation of hydraulic accumulators (surge tanks) was recommended to stabilize pressure and reduce impact of surges on the network. Xylem also discovered that certain control valves in use were amplifying transients in the network and subsequently these valves were replaced.

As a result of these mitigating measures, **transient magnitudes were reduced from 60 PSI to 10 PSI, leading to a significantly calmer pipe network and a vast improvement in lifetime pipeline expectancy.**

Based on this improved system reliability, Tuas Power is able to prevent costly downtime for both customers and their own operations.

Since implementing the pressure mitigating measures recommended, Tuas Power has reported zero leaks. Overall, the Xylem solution has provided actionable information that allowed Tuas Power to reduce the magnitude and frequency of pressure transients and implement appropriate interventions to prevent premature failure of assets across their system.



Data from Xylem Water Loss Management solution was analyzed automatically to detect any harmful pressure surges in real time, identify the sources of these pressure surges and their impact on the structural integrity of the pipelines.