

OCTOBER 16, 2019

# ABB / Singapore Public Utilities Board

## Case Study



### **ABB helps Singapore ensure water sustainability**

In its short history as an independent nation, Singapore has realized its dream of becoming a “smart nation” on the world stage: a vibrant island metropolis of nearly 6 million that leads in business, the arts, and technological innovation. But in its early years, Singapore’s rapid growth led to an enduring challenge: a steady supply of clean water. The country had few natural water sources and limited land mass, conditions that brought drought, water pollution, and floods.

The Public Utilities Board (PUB) was created in 1963 to oversee and regulate Singapore’s water supply as well as to initiate water reclamation and desalination to help ensure water self-sufficiency. Jiawei Ng, PUB Senior Manager for Infotech and Digital Transformation, put his mission in stark terms: “Imagine turning on the tap one morning and nothing comes out. We must ensure that Singapore never goes thirsty.”





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With its growing demand of 430M gallons of water/day, Singapore leads the world in water research and technology.

### **Rising to the Challenge**

Today, Singapore's demand for water is over 400 million gallons per day. That will more than double in the next 40 years. Given the country's growing population and economy, the challenge for PUB is hardly less critical than it was 55 years ago--especially in the context of its own issues: high operational costs, rising energy usage, and a nationwide manpower shortage, all impacting its ability to manage water efficiently.

In order to keep ahead of the growing demand, PUB would have to change its plant operations. Such a change would require innovative ideas and cutting-edge capabilities—the kind of future-minded approach that defines Singapore's DNA—and one that presented a perfect opportunity for ABB.





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Reservoirs are among four integrated solutions that are helping Singapore achieve water sustainability.

### **An Integrated, Transformative Solution**

According to Jiawei, “To ensure that we could meet Singapore’s growing demand for clean, natural water, we needed to think beyond convention. It couldn’t be business as usual. By adopting advanced digital technology, we could set an example of a smart utility for the entire world.”

ABB and PUB began a pilot program to install smart sensors on the plant’s motors and pumps. “The sensors gave us real-time data that allowed us to reduce troubleshooting time, as well as manpower and paperwork,” said Jiawei. “And the ABB app (interface) is very user friendly. In one step, our operators can log on and have key operating parameters at their fingertips, as well as receive real-time alerts of equipment problems.”

The success of the trial led to Phase Two: an integrated solution that would include 22 smart sensors, remote condition monitoring, Augmented Reality glasses to assist with maintenance and training, and six Digital Powertrain dashboards. The ABB Digital Powertrain is a digital solution that integrates sensor and drive data with cloud-based analytics along the entire chain of plant equipment, from drives and motors to pumps and bearings.

“The Digital Powertrain helps us do predictive equipment analysis and alerts us to warning signs of failure, which helps reduce maintenance costs for my plant,” says PUB Senior Engineer Wei Jun Chan.



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Singapore’s PUB has cut its energy usage and maintenance costs with the help of ABB’s digital solutions.



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ABB Ability™ Smart Sensors, attached to PUB's motors and pumps, give technicians real-time data and alerts.

#### **The AR Component: Maintenance and Manpower**

As a training tool for PUB's O&M staff, ABB integrated Microsoft HoloLens AR Smart Glasses into the overall solution. The glasses display equipment health data and enable operators to perform remote-guided maintenance onsite, with real-time troubleshooting instructions enhanced by a 3D troubleshooting model.

Explains PUB Engineer Paul Kinley, "With the AR Smart Glasses, our staff can interact with information effortlessly and hands-free. Now they can learn

and carry out maintenance procedures without guidance from a trainer. What we hope to see is a reduction in time spent on maintenance and troubleshooting, which will further improve our operational resilience."

Kinley also points out that "many PUB operators grew up in a digital world. The AR tool fits naturally with their way of learning and retaining knowledge."

### ABB Meets Rigorous Cybersecurity Standards

Singapore enforces some of the toughest cybersecurity policies of any country. “There must always be a balance between technology and security,” says Jiawei. “We must ensure that official data is transmitted securely and doesn’t fall in the wrong hands.” ABB met these concerns with TropOS Mesh

architecture, a next-generation WiFi solution for single field-area networks. According to Jiawei, “The ABB solution enabled us to move forward in an efficient way while ensuring that all data is transmitted safely, securely, and in compliance with government regulations.”



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Eyes on the future: Microsoft AR HoloLens glasses guide operators through maintenance procedures and provide real-time troubleshooting instructions.

### Water for the Future

Singapore has already made a \$7 billion infrastructure investment to ensure water self-sustainability. The ABB-PUB project is an important piece of Singapore’s water success story. As Wei Jun explains, “By using smart technology from ABB, we now look forward to improved energy efficiency, and a reduction in manpower and maintenance costs, not only within our water-reclamation plants but across PUB’s entire ecosystem.” And he mentioned that the next phase could include robotics and autonomous systems to alleviate PUB’s manpower crunch, as well as reduce laborious and risky jobs.

“ABB is an important partner in PUB’s digital transformation journey,” says Jiawei. “We’re looking forward to advancing that journey, so our country can have a sustainable supply of clean, beautiful water—not just for today, but for many generations to come.”

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