



Meeting potable water demands

WHY AUTOMATION, SCADA AND INDUSTRIAL IT
ARE CRITICAL.

Submitted by
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Water is a much talked about and scarce resource. There are many reports of the problems faced by a strained infrastructure, as well as the social demand for a quality of supply that ensures a better life for all. These challenges are real and without the application of automation and control systems the chances of meeting those demands will remain and become ever more difficult.

THE SUPPLY CHAIN OF WATER

Purification

From sources such as rivers, dams and boreholes untreated water is fed into a bulk water purification plant. This water is put through a set of processes, dosed with chemicals and passed to the next phase.

DISTRIBUTION

The purified water is then pumped to various holding reservoirs from where it is fed to the consumer through a network of pipes. The water is then consumed and a fairly high percentage is returned to the system as grey water ie, sewage and waste water. The grey water is then treated and returned to the natural water systems and the cycle starts again.

WASTE WATER TREATMENT

Scada and automation in various forms are critical to ensure that these complicated interconnected systems remain balanced and controlled throughout the supply chain. A problem compounded by the fact that different suppliers manage different parts of the supply chain.

An example is in Johannesburg where Rand Water is the bulk purifier. Johannesburg Water and other municipalities effectively purchase bulk water and own the distribution network and usually the waste water treatment part of this cycle.

At the bulk purification side it is necessary to have telemetry systems feeding data into a management system in order to understand the availability and quality of supply to meet the demand for clean water. Dam levels, rainfall, pump station status are just a few of the parameters that are important to support decisions and ensure constant and sufficient raw water.

PLCs ensure local control and protection of equipment such as pumps and valves, with the alarm signals being transmitted via the telemetry system. The challenges faced by telemetry system suppliers is often one of terrain, geographical distance between sites requires proper design of the radio or other telecommunication networks to ensure the integrity of the data being supplied to a scada system in a central control room.

One of the biggest challenges faced by the operators is the need to trust the signals the scada is showing, as they often have no real-time video of the site to back up the decisions they make. (There is a well known incident where the signal for the high level in a reservoir in Johannesburg was indicating a false reading and the operator, believing the reservoir to be empty, initiated

pumping and caused an overflow which flooded a pump station causing millions of rands of damage). So, some operators still don't allow control of the system but simply use the scada as a tool and will still manually dispatch someone to drive to a pump station where they can physically see the status of the plant before initiating a pump start or even open a valve.

That said, the advent of broadband and IP networks is making it possible to install cameras on site in order to allow a central control room to verify the status and have the confidence to initiate some control action.

At the larger manned water treatment works it is back to conventional PLC and scada control with hardwired connectivity for communications making the systems extremely reliable.

The use of standard interfaces such as OPC as well as open PC based scada allow users to leverage the mobile technologies and improve reliability and response times by being able to SMS alarm conditions to mobile technicians. The ability to transfer status signals between suppliers is also critical. Umgeni Water and eThekweni Metro are currently implementing a shared information solution which allows each to monitor the interface between their two systems. This will ensure a more reliable, safe and effective transfer of water to the people of Durban, which previously relied on phone calls to get supply initiated. For example Umgeni Water can't start a transfer of water to the Metro unless the valves at the receiving system were open. This used to result in lengthy delays while the necessary communications between personnel took place, now the status of the valves can be seen by both parties enabling a safe and timely transfer.

The effective use of databases for storing data is essential for short term reporting and management, and equally essential for generating useful long term data for process and business modelling.

What is critical when selecting vendors and what planning needs to go into a water system?

Choose a vendor or vendors that are:

- Familiar with the challenges outlined above.
- Able to provide a telemetry network that meets budget and technology requirements.
- Able to support connectivity to PLC and other devices.
- Able to supply a scada system that is built on and supports open standards such as OPC and has open interfaces – this will facilitate easy integration with third parties and allow easy customisation where necessary.
- Able to deploy specialists in the field of databases and reporting. A correctly designed database will ensure longevity and robustness as the database grows.
- Able to plan the system for user requirements and drive the design down to the level of field instrumentation.
- Able to include all aspects including laboratory systems and personnel.

If a system is planned well upfront the design and implementation should be relatively straightforward. Plan badly and the costs to change and modify will have an impact for years. 🔥

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