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Reference

Industrial communication

Central monitoring increases a water supply's reliability

One of the biggest waterworks in Europe counts on an integrated telemetry solution

In terms of length and capacity, the Italian water company Acquedotto Pugliese is one of the most impressive and exemplary works of hydraulic engineering. Its transition to an integrated and automatically controlled system is a notable success story. Currently, 650 plants and 3,500 sensors are controlled remotely.

In terms of size and capacity, the Apulia Waterworks (Acquedotto Pugliese or AQP) is one of the most impressive waterworks in the world. It's an extensive system of plants for water withdrawal, conduits, and branches that covers a vast geographical area with high population density.

"The Apulia Waterworks urban network is 17,800 km long and carries water to around one million users," says Vito Bitetto, AQP telecontrol manager. "There's also the major supply network with 4,700 km of conduits supplying local networks. In total, we have more than 22,500 km of conduits supplying water to 330 towns and cities, including some outside the Apulia area."



Apulia Waterworks ,Acquedotto Pugliese' (AQP) is one of the world's most impressive waterworks.



AQP is one of the biggest waterworks in Europe, and the region of Apulia has the highest number of inhabitants supplied, with this waterworks providing water for more than four million people.

With a sole shareholder, the Apulia Regional Authority, Acquedotto Pugliese SpA provides integrated management of the water cycle, from withdrawal to disposal. It makes the water suitable for drinking and supplies it through a capillary distribution system for residential use, and also collects, treats, and disposes of waste water.

“Some of the most distinctive and sometimes problematic aspects of our waterworks stem from the fact that it covers more than 22,500 km². The size of the system itself has therefore had a considerable influence on technological implementation,” continues Bitello.

The project described here includes the implementation and management of the company’s telecontrol system. This involves the progressive changeover from manual control to integrated control, based on automatic systems with intelligent valves, automated systems in plant conduits, and remote network control. Plant automation will therefore be strictly local, while supervision will be handled through a central control center that receives all the necessary information related to plant operation. The supervision system is dedicated to interface the automation systems, management systems and control plant operations.

“Currently, we telecontrol 650 plants and 3,500 sensors,” says Bitetto. “Thanks to the implementation of the Siemens SISMAP portal (Supervision, Information, and Monitoring System of the Apulia Waterworks), we now have access to real-time connections with the plants through a series of SCADA sections, each dedicated to a specific environment. The creation of a platform of this kind puts AQP in an ideal position for the future. In terms of hardware, the use of a network architecture solution based on Siemens technology means full remote access, with high remote-connection availability thanks to path redundancy and data buffering at stations in case of temporary disconnections. And, above all, this is a flexible solution with a single backbone for industrial installations and server stations.”

SISMAP

Using the SISMAP portal, AQP personnel have access to archived information, and can display trends, reports, and anything else that could be useful for optimizing the performance of the system as a whole. This optimizes system management and enables the company to program and plan jobs efficiently in the most intelligent way

“Thanks also to SISMAP supervision, the optimized network management plan – which is still being implemented – resulted in a decrease of approximately 42 million cubic meters of water being fed into the AQP waterworks from 2009 to 2012. This had an extremely advantageous cost-benefit impact on the entire system,” adds Bitetto.



AQP runs the waterworks with integrated management of the water cycle, from withdrawal to collection, supplying drinking water in an extensive distribution network, including waste-water drainage, treatment, and disposal.



With the Siemens telecontrol solution, AQP today operates an integrated and automatically controlled system. Currently, 650 plants and 3,500 sensors are controlled remotely.

Choosing Siemens solutions

Today, the level in tanks is always known, leading to a significant reduction in the risk of spillage. One of the biggest advantages of this technological solution is having an integrated solution in terms of installations, devices, and software environments, which all contribute to the final solution.

Previously, AQP operators had to go into the field every day to read meters and to measure levels and flow on the spot. Calculations could obviously only be based on the exact moment in which the operator took the reading. Today, on the other hand, the flow rate can be read every second to precisely calculate the volume of water flowing through a conduit and used in any particular built-up area.

“AQP must abide by the rules of a public company and must therefore observe the regulations regarding call for tenders. Siemens was suggested by our integrator as a trustworthy company that could guarantee long-term collaboration and offer products and services of the highest quality. That day, toward the end of 2005, was the start of a long and satisfying collaboration with Siemens,” says Bitetto. “In 2006, we launched the first and most important part of the company telecontrol system.”

During the planning stage, as a first step, AQP operated at a strategic level, hiring specialized personnel for the implementation. In light of the many suppliers obtained through the public tender, Siemens was asked to manage and run maintenance on the system at a centralized level, working with other integrators who were responsible for the various system development activities in the field.

The competitive advantages deriving from the implementation of a sophisticated telecontrol system include full knowledge of the network, also when planning new plants. The optimization and elimination of waste and a reduction in service-resumption times are further positive aspects. The other advantages worthy of note include a more efficient maintenance process with predictive maintenance and improved work safety.

TeleControl Professional, formerly known as Sinaut, is a powerful Siemens solution specifically designed for telecontrol on suburban networks. When equipping the service system of major waterworks, sustainability is of primary importance as it is the issue of future implementations or corrections when the system goes into service. “With TeleControl Professional we solved the problem of undesired access to data and telecontrolled stations and simultaneously benefited from the system’s modularity in the field,” states Antonio Baccaro, Siemens Italy project manager. “Telecontrol technology lets us rationalize the system and introduce a modular structure for future implementations. AQP also wanted to acquire data from non-Siemens stations. Thanks to our WinCC SCADA, we were able to do just that, creating modular systems also at a SCADA level for full modularity, both in the field and at a central SCADA level. Currently, the Siemens telecontrol system manages around 600 stations for AQP, of which 490 are controlled with GSM connected to two modems, 100 are telecontrolled in OPC mode, and 20 are telecontrolled in GPRS for water treatment.”

For the communications interface, 24 TIM4R-IE communication modules were installed for suburban water services, with another eight for the telecontrol system. Each interface acquires data from 20-25 stations in the field on average.

AQP requirements also include integration at a higher level, in other words making all the data displayable and usable. "On the basis of the specifications provided by AQP, we created the customized SISMAP IT portal, to which our TeleControl Professional, WinCC SCADA, and WinCC OPC send data," adds the Siemens project manager. "With SISMAP, we have access to data in real time, and we can analyze archived data from the stations and run all the necessary analyses to obtain aggregated data, reports, checks, and trends to define the optimal waterworks setup."

The critical aspects highlighted by the AQP include station shutdown in the case of a blackout with the risk of data loss. TeleControl Professional eliminates these critical points, providing comprehensive measures to prevent data loss. Each transmission module has a large memory for several thousand data frames. Downtimes in the transmission link can then be bridged. To enable subsequent and correct archiving of process data in the control system, all data frames are assigned with a time stamp at their place of origin. The entire network is synchronized automatically.

Today, AQP is a point of reference for operating procedures used to manage the integrated waterworks system. In terms of the tasks for which it is responsible, AQP reflects the ideals and value of protecting and preserving water resources, taking up the gauntlet in a challenge for the qualitative and technological development of the region in which it operates.



The Siemens supply also includes Sitrans pressure and flow sensors, SCALANCE active and passive networking components, and SIMATIC S7-300 controllers as well as Sentron measuring devices, gears, and more...

Siemens' role:

Among other things, Siemens is responsible for the implementation of Sitrans pressure and flow sensors and SCALANCE active and passive networking installations. Siemens has made good use of the major evolution in active installations: Because the SCALANCE S router has secure functions, telecontrol can be implemented in GPRS. The SCALANCE X500 top-of-the-range series is, on the other hand, an active switch that manages telecommunications at a control-center level for connections between all the installations and the telecontrol servers. SIMATIC S7-300 controllers were used for the PLC part of the system.

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Subject to change without prior notice
PDF
Reference FAV-78-2014 En
DR.PN.PA15.XXXX.95.11
Produced in Germany
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