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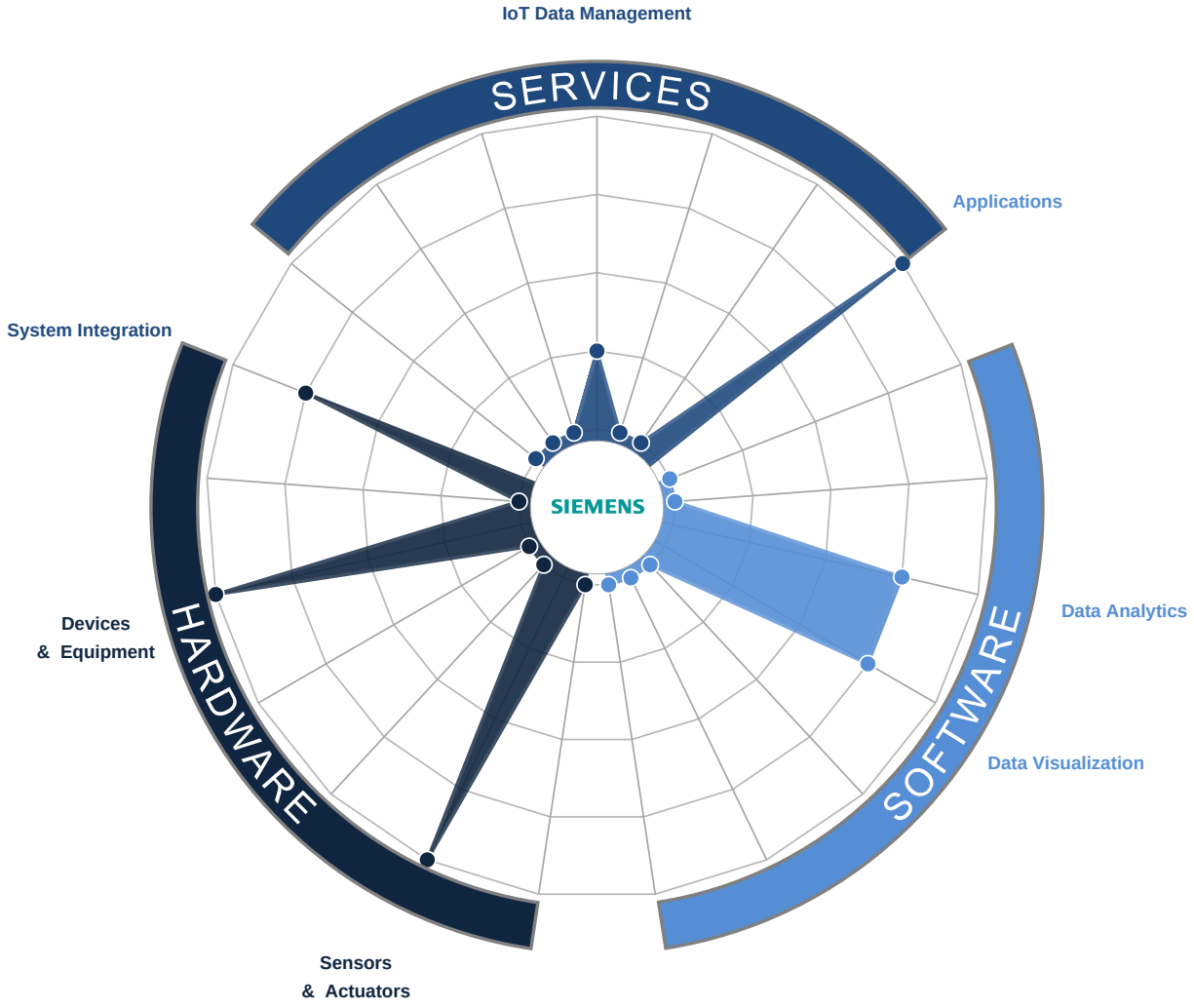
SIEMENS + IoT ONE

Automation of the Oguz-Gabala-Baku water pipeline, Azerbaijan



Overview

Applicable Industries

- Smart Grid
- Smart City

Applicable Functions

- Maintenance
- Field Services
- Facility Maintenance

Connectivity Protocols

- Other frequency

Other Frequency

HART

Challenge

The Oguz-Gabala-Baku water pipeline project dates back to plans from the 1970's. Baku's growth was historically driven by the booming oil industry and required the import of drinking water from outside of the city. Before the construction of the pipeline, some 60 percent of the city's households received water for only a few hours daily. After completion of the project, 75 percent of the two million Baku residents are now served around the clock with potable water, based on World Health Organization (WHO) standards. The 262-kilometer pipeline requires no pumping station, but uses the altitude differences between the Caucasian mountains and the capital to supply 432,000 m^3/d to the Ceyranbatan water reservoir. To the people of Baku, the pipeline is "the most important project not only in 2010, but of the last 20 years."

Customer

Baku Water Authority

Solution

The project was realized in cooperation with CASPEL, a regional system integrator specializing in solutions for data transfer, software development and supply, and maintenance of state-of-the-art IT hardware and software from leading manufacturers.

Siemens supplied the automation technology for the pipeline project. For the comprehensive monitoring of water pipes and avoidance of potential emergencies, CASPEL installed a SIMATIC WinCC control and data management system. CASPEL adjusted the connected IT system and ensured that global standards were met. Major reconstruction work was carried out at various sites of Baku's water system.

The Siemens automation solution is based on the SIMATIC product suite: SIMATIC S7-1200 and SIMATIC S7-300 were installed for the control of the pipeline gate valves and in order to collect the flow meter data for leak detection. The flow meters were implemented with SIMATIC PDM. The HART protocol was applied for the relevant communication. The visualization and supervision of the entire plant was realized based on SIMATIC WinCC. The SIMATIC S7-300, positioned at the 75 wells in the higher region, communicate via GPRS modems with the redundant SIMATIC WinCC OS Servers in the central station, while the different stations along the pipeline are connected by redundant fiber optic cable ring.

Data Collected	Waterflow rate, fault detection, leakage detection
Solution Type	IOT
Solution Maturity	Mature (technology has been on the market for > 5 years)

Operational Impact

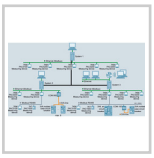
Impact #1	Easy and central monitoring of the whole system thanks to implemented GPRS and fiber optic technology – leading to increased transparency of pipeline operation
Impact #2	Early fault detection thanks to better diagnostic functions: reporting and archiving of events such as online reporting of leak-detection system alarms
Impact #3	Reduced engineering time/cost thanks to easy and efficient configuration. Easy integration thanks to open standards

Quantitative Benefit

Benefit #1	262 kilometer pipeline to supply 432,000 m³ of potable water to two million Baku residents
Benefit #2	More than 100 control locations with two water flow stations
Benefit #3	Percentage of population receiving continuous supply of drinking water increased from 40 to 75 percent

Technology

Software



SIMATIC PDM

Digital Factory (Siemens)

SIMATIC Process Device Manager (PDM) is a universal, manufacturer-independent tool for configuration, parameter assignment, commissioning, diagnostics and maintenance of intelligent field devices and ...

MindSphere - Siemens Cloud for Industry

Digital Factory (Siemens)

MindSphere from Siemens offers a cost-effective, scalable cloud Platform as a Service (PaaS) that's perfect for developing apps. Designed as an open OS for the Internet of Things, it lets you seamle ...

SCADA System SIMATIC WinCC

Digital Factory (Siemens)

SIMATIC WinCC® is a scalable process visualization system (SCADA) that is graduated by price and performance, with efficient functions for controlling automated processes.

With SIMATIC WinCC, "p ...

Hardware

SIMATIC S7-300

Siemens

The SIMATIC S7-300 universal Controllers saves on installation space and features a modular design. A wide range of modules can be used to expand the system centrally or to create decentralized struct ...

SIMATIC S7-1200

Siemens

The new modular SIMATIC S7-1200 controller is at the core of our new offering for simple but highly precise automation tasks. The SIMATIC S7-1200 controller is modular and compact, versatile, a secure ...

Partner

CASPEL

CASPEL IT-company was founded in 2005. Specialization - the introduction of new information technologies in Azerbaijan.

- Business problems solving with help of information technology.
- Automatio ...

SIEMENS

Siemens Industry Reference Center

Automation of the Oguz-Gabala-Baku water pipeline, Azerbaijan

Sustainable automation solutions for our most important resource

Siemens helps secure water supply in Baku, the capital of Azerbaijan, by implementing automation solutions in the new water transport system.

The requirements

The Oguz-Gabala-Baku water pipeline project dates back to plans from the 1970's. Baku's growth was historically driven by the booming oil industry and required the import of drinking water from outside of the city. Before the construction of the pipeline, some 60 percent of the city's households received water for only a few hours daily. After completion of the project, 75 percent of the two million Baku residents are now served around the clock with potable water, based on World Health Organization (WHO) standards. The 262-kilometer pipeline requires no pumping station, but uses the altitude differences between the Caucasian mountains and the capital to supply 432,000 m³/d to the Ceyranbatan water reservoir. To the people of Baku, the pipeline is "the most important project not only in 2010, but of the last 20 years."

The solution

The project was realized in cooperation with CASPEL, a regional system integrator specializing in solutions for data transfer, software development and supply, and maintenance of state-of-the-art IT hardware and software from leading manufacturers. Siemens supplied the automation technology for the pipeline project. For the comprehensive monitoring of water pipes and avoidance of potential emergencies, CASPEL installed a SIMATIC WinCC control and data management system. CASPEL adjusted the connected IT system and ensured that global standards were met. Major reconstruction work was carried out at various sites of Baku's water system.The Siemens automation solution is based on the SIMATIC product suite: SIMATIC S7-1200 and SIMATIC S7-300 were installed for the control of the pipeline gate valves and in order to collect the flow meter data for leak detection. The flow meters were implemented with SIMATIC PDM. The HART protocol was applied for the relevant communication. The visualization and supervision of the entire plant was realized based on SIMATIC WinCC. The SIMATIC S7-300, positioned at the 75 wells in the higher region, communicate via GPRS modems with the redundant SIMATIC WinCC OS Servers in the central station, while the different stations along the pipeline are connected by redundant fiber optic cable ring.

The benefits

Thanks to the application of the SIMATIC automation technology that has been proven in numerous operations, Siemens was able to provide increased functional reliability for the entire plant. Thanks to

using decentralized SIMATIC S7-1200 and S7-300 with Telecontrol via GPRS, all components of the 262 km pipeline can be operated and monitored with WinCC. Existing components were easily integrated via OPC. In addition, the operator benefits from full plant transparency, thanks to state-of-the-art communications technology, and early fault detection through better diagnostic functions, such as reporting and archiving of leak-detection system alarms, etc. Higher transparency also pays off in terms of a more secure investment, as troubleshooting is greatly accelerated, for example in case of an emergency pipeline shut-off. By implementing Siemens' stringent international project management standards, the project was realized on time, within budget, and with an outstandingly high quality of work.

System brief

- 262 kilometer pipeline to supply 432,000 m^3 of potable water to two million Baku residents
- Project duration: March 2007 to December 2010
- Water transport thraugh altutude difference – no pumps required
- More than 100 control locations
- Two water flow stations
- Percentage of population receiving continuous supply of drinking water increased from 40 to 75 percent

Scope of supply

- Delivery and implementation of automation technology concept
- Redundant control and data management system SIMATIC WinCC
- Communication technology
- Engineering
- SIMATIC S7-1200 and SIMATIC S7-300 along the pipeline for gate valves control and collecting the data for leak detection – connected with redundant fiber optic cable ring
- 75 decentral SIMATIC S7-300 controllers for 75 water supply wells connected via GPRS to the SIMATIC WinCC Server
- Connection of an existing leak-detection software with SIMATIC WinCC via an OPC-interface

Benefits at a glance

- Easy and central monitoring of the whole system thanks to implemented GPRS and fiber optic technology – leading to increased transparency of pipeline operation
- Easy integration thanks to open standards
- Early fault detection thanks to better diagnostic functions: reporting and archiving of events such as online reporting of leak-detection system alarms
- Reduced engineering time/cost thanks to easy and efficient configuration
- Easy operation thanks to various operation modes: for example local/remote, manual/automatic
- Security of investment thanks to fast trouble shooting, for example emergency pipeline shut-off

End customer
Baku Water Authority

System integrator
CASPEL LLC

Links
> More about Water transport and Water Networks

IoT ONE Featured Case Study

Accelerating the Industrial Internet of Things

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