Leak manager

Analysis and management of water leakage in potable water distribution networks using Advise^{IT} Water Leakage Management

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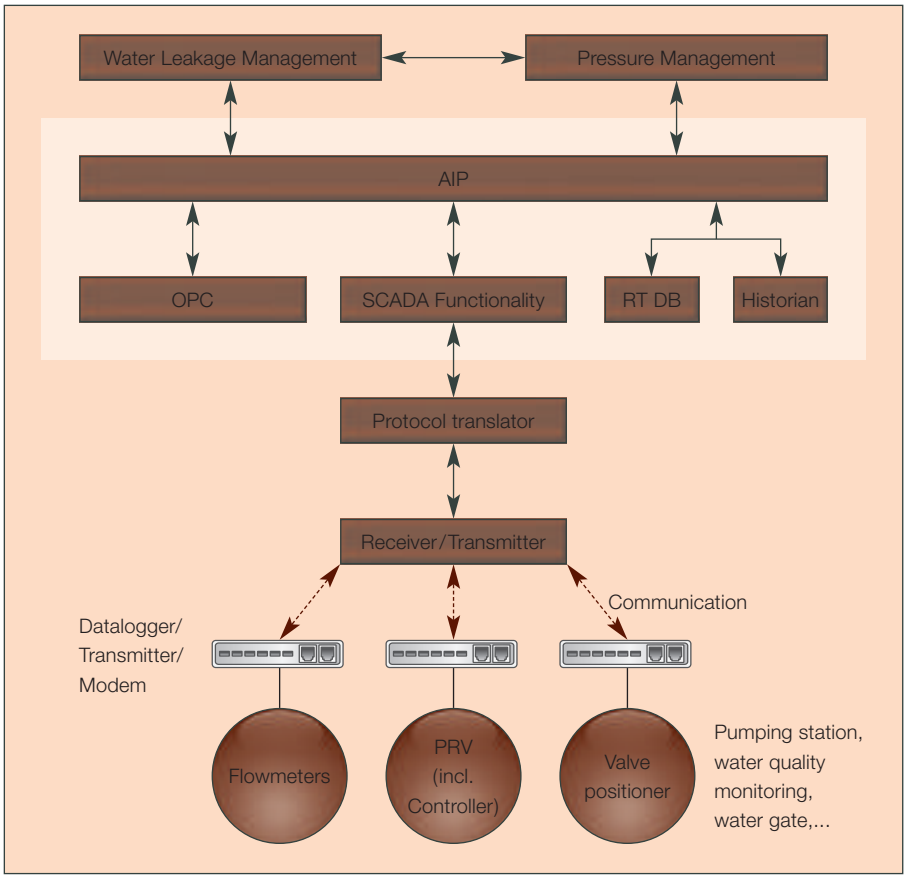
Demand for potable water is on the rise in most parts of the world. Although the provision of drinking water has risen during the past 20 years, this has been largely offset by population growth. The spectre of water scarcity is additionally attenuated by climatic change, pollution and over-consumption. The development of new sources, if at all available, requires high capital investment – and often fails because of the lack of it. The United Nations foresees an aggravating world water crisis. What is less widely appreciated is that this crisis is caused in part by the mismanagement of water resources. Some distribution networks struggle with losses of up to 70 percent. People are being deprived of potable water because this is running to waste further up the line. ABB's Water Leakage Management software helps estimate any losses in the distribution system. By doing this, it facilities the identification of leaks, thus protecting users, resources and the environment.

1 WLM Architecture.

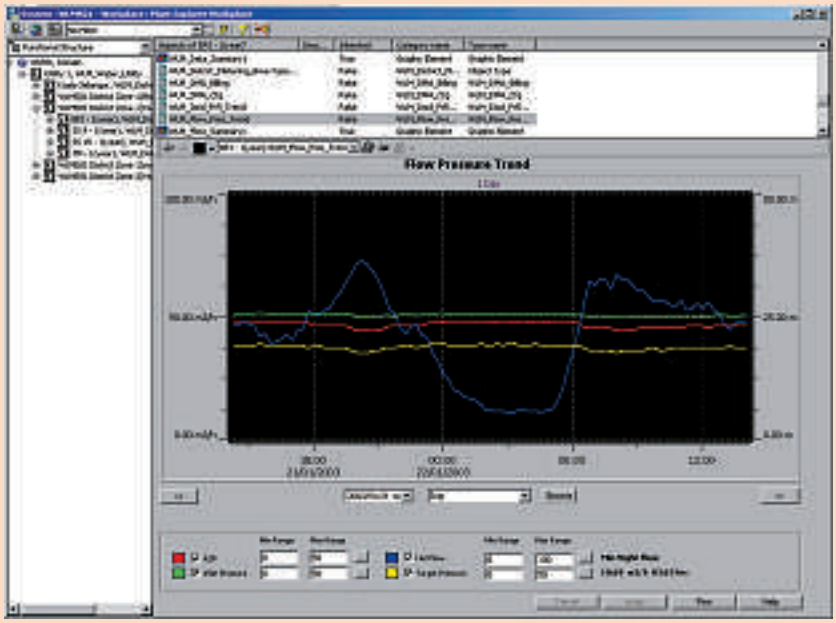


Advise^{IT} Water Leakage Management

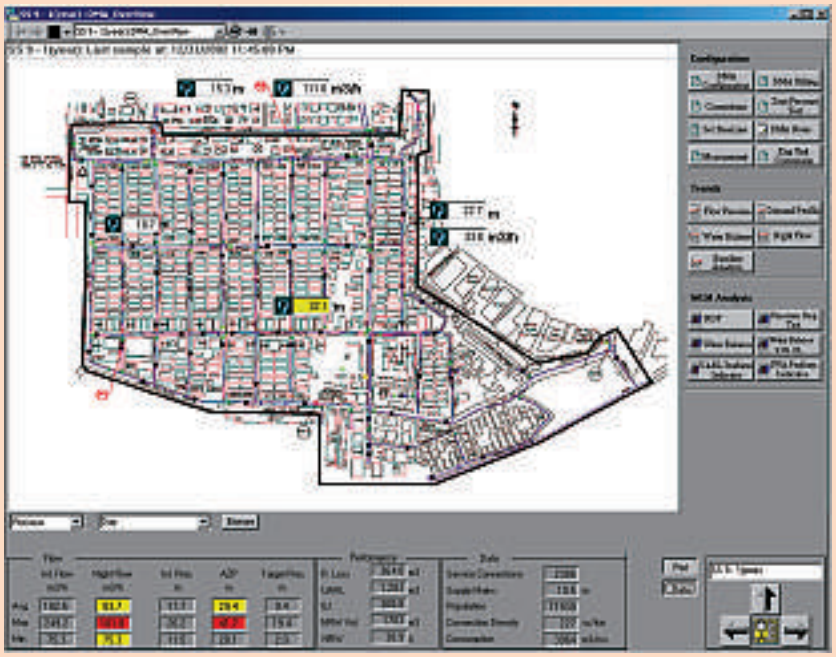
To address this concern, ABB started its "Water Leakage Management" project. The goal is to help water and water management companies reduce and manage the loss of water from their system in the form of bursts and background leakage. *Advise^{IT} Water Leakage Management (WLM)* was born out of this concept. It is developed based on ABB's Industrial IT platform 1.

Industrial IT is an architecture for seamlessly linking multiple applications and

2	Trends from the WLM.



3	DMA overview.



systems in real-time. It includes functionalities ranging from field devices to systems, focused on supporting decisions and improving user productivity and asset utilization, from the first phases of design, through installation, commissioning, operation, maintenance and asset optimization.

The two central themes in Industrial IT are information availability and information integration. This means that information must be *available* at the right place at the right time independent of where the information comes from. It must be possible to seamlessly *integrate* the right information from any combination of sources.

Solution Schematic

At the core of the Industrial IT architecture is ABB's Aspect Integrator Platform (AIP). The WLM software runs on AIP monitors 2 and performs loss calculations using data acquired from field devices such as flow meters (eg, ABB Aquamaster) and pressure transmitters (eg, ABB's 2600 series). Water losses are broken down into background losses and bursts components.

The operator can quickly localize major leakages and problem areas through detailed navigation screens. Repair and maintenance statuses are easily tracked – so optimizing the deployment of maintenance resources. As data is added to the powerful trend analysis, the effects of corrective actions can be visualized.

The WLM system can integrate many third party software systems such as SCADA, CIS (Customer Information System), Network simulation software, production data base or a geographical information system (GIS).

Coupled with a committed Non Revenue Water (NRW) reduction program and a good District Metering Area (DMA) policy, the WLM system provides answers to critical questions such as:

- How much water is lost?
- Are the losses in a specific part of the network?
- How much do the leakage losses cost?
- Is it economical to locate and repair them?

The actual software is based around the BABE (Burst and Background Estimate) methodology, which ABB has modified in line with its experiences in the field. The software provides various user interfaces for moving between district, area and utility levels.

Inside the main section called the DMA overview 3, the user can:
- Assess the amount of water leakage in a DMA.
- Evaluate the components of water leakage with the BABE method.
- Compare different baselines. The approach is to archive real-time data of water leakage as well as computed values of water loss components for comparison purposes. Each set of daily data (15 min intervals for night flows), and relevant parameters are stored. The user can select the data set or summaries for display or comparison.

The inputs for water leakage analysis include:
- Infrastructure data for the DMA such as service connections, lengths of mains, length from service connection to edge-of-street, length from edge-of street to customer meter and density of connections.
- Awareness time for total leakage losses in a DMA which is configured in the system as a parameter (typically 3 days).
- Location and repair times for reported and unreported bursts. (These are input by the user on an ongoing basis as and when bursts are found and repair work started/ended. Alternatively, the user can input these based on his own records on a periodic basis.)

The WLM system can be used in different environments and can be scaled to meet the user's requirements. At first, the WLM can receive the flow and pressure data manually. The utility can slowly expand this into automatic acquisition and integration with other data sources.

Initial feedback from customers has been very encouraging. Customers feel that the WLM software provides a number of benefits not offered by previous software such as:
- The ability to calculate physical losses in terms of background & burst components on a daily basis.
- The effective deployment of leakage location team resources.
- Reporting of accurate daily NRW levels.
- Ability to access all zone criteria held in the WLM software such as the number of properties, length of mains, flow data, pressure data and leakage calculations via internet.

The water leakage situation in Asia and in many parts of the world is critical. Hence, it is with a great sense of purpose that ABB accompanies the deployment of Advise^{IT} Water Leakage Management to combat leakage and even prevent illegal water usage in distribution networks in the future.

BABE Methodology

The BABE (Burst and Background Estimate) concepts are the first to model physical leakage objectively, rather than empirically, thus permitting rational planning management and operational control strategies for their reduction. The concepts were first elaborated during the UK's National Leakage Control Initiative, which began in 1991. They had reached practical applicability by mid-1994.

In BABE analyses, real losses are considered to consist of:
- Background leakage at joints and fittings, flow rates too low for sonic detection if non-visible.
- Reported leaks and bursts – typically high flow rates but of short duration.
- Unreported leaks and bursts – moderate flow rates, average duration depends on method of active leakage control.

By considering the average duration of detectable leaks and bursts to consist of three components – Awareness, Location and Repair time – these concepts can be used to model any utility policy and standard of service.

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