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Anglian Water Leakage Reduction

reaping the benefits of metering & telemetry integration

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Water conservation is crucial to all water companies, but when providing water in the flattest and driest area of the UK for a population with growth forecast at twice the average for England and Wales, it is even more important to focus on reducing unnecessary losses. Anglian Water with the aid of innovative technology has achieved the lowest leakage rate for the ten UK water and sewerage companies and it aims to maintain its position as an industry leader in proactive leakage control.

Regional telemetry system

The power behind leakage management at Anglian Water is their regional telemetry system consisting of:

* **over 8,000 outstations** for collecting data on site, ranging from simple PSTN - based logging devices for small sites to comprehensive devices for monitoring multiple plant devices at works. A variety of communications media are supported including PSTN, leased line and radio, but communication between the outstations and data gatherers is mainly via UHF radio with PSTN and private wire backup for critical sites.
* **data gatherers** which perform central control and monitoring of data and allow staff to remotely configure new and replacement outstations;
* **a data server** which logs all data collected and makes it available to other corporate systems for detailed analysis;

District metering system – finding the leaks

To gain full benefit from the telemetry infrastructure Anglian Water worked with *Logica* to implement its District Metering System (DMS). As with most water companies the Anglian Water distribution network is broken down into distribution zones and district meter areas. DMS measures flows into and out of each area and helps to identify where network management and leakage control could be improved.

The implementation of DMS involved:

* addition of low power radio outstations to log and transmit data from remote locations;
* connection of flow meters to the regional telemetry system via existing and new outstation installations;
* additional DMS calculation capabilities and changes to the data server to process the data for reporting purposes;
* additional reporting functionality to display data according to the users requests;
* provision of a simple, automated, configuration tool.

Constant monitoring and recording of DMS data provides a fuller understanding of the water distribution network, ultimately resulting in a model which can identify even the smallest of leaks.

Know the flow

Underpinning the district metering system and the regional telemetry system are the flow meters. These flowmeters may be situated on water sites eg water treatment works, service reservoirs, water towers, water boosters or more often they are remotely located in the distribution network. There are three types:

* electromagnetic meters – full bore in-line meters that require power (ac or dc) – they provide volt free pulsed outputs with certain versions also providing analogue outputs;
* insertion meters use a probe inserted through the wall of the pipe to measure the flow rate. They also require power ac or dc and provide volt free pulsed outputs with certain versions also providing analogue outputs;
* mechanical turbine type an in-line meter that produces volt-free pulsed outputs and does not require a power supply.

When located on water sites the flowmeter output is hard wired to an existing telemetry outstation by either pulsed or analogue output. Outputs are continuously monitored and fifteen minute total flows are passed to the regional telemetry system via UHF radio, PSTN or leased line as requested by the data gatherer.

Where flowmeters are remotely situated, the equipment may be required to operate from battery power or an external DC source depending on the availability of mains power. Remote outstations and flow meters are normally situated in small kiosks.

Tapping data from remote sites

Logica designed a range of Low Power Radio (LPR) outstations specifically for use in district metering. Although all of the LPR units contain built in radio modems, each type of unit is used for different purposes both for above and below ground use.

For remote sites where LPR coverage is not possible, the flow meter pulsed output is connected to a battery powered outstation. These outstations continuously count pulses and fifteen minute total flows are passed to the regional telemetry system via PSTN lines,

Once a day the telemetry data server utilises flow data to calculate the following statistics for flow meters, distribution zones (DZ) and district meter areas (DMA):

* net flows;
* daily total flows (the summation of 15 minute net flow values in a 24 hour period);
* minimum night flows (calculated between 00:00 to 07:00 on a rolling hourly period).

Beauty of the web

Logica implemented a web based reporting tool so that regardless of location, Anglian Water staff can configure and view these calculations in a graphical format from a workstation. This greatly simplifies the need to understand the complex underlying calculations and makes modifications easy to achieve. A number of standard reports were developed and

the system is flexible such that new reports can be generated with minimal development effort.

Reports can be displayed and printed in a number of formats. A typical report showing the minimum night flow for Fakenham DZ is shown below. Colours are used to show the validity or otherwise of the data presented. The graphical format of the report allows staff to easily identify potential problems. For example, in this report, a leak can clearly be seen: The minimum night flow has steadily increased from its typical norm. As a result, the leak was repaired and the report showed the validity of the repair as the minimum night flow has returned to the norm. A range of other reports are available through this web tool providing detailed leakage information by DZ, DMA or individual meter depending on the particular information required.

Reaping the benefits

The district metering system was designed around 437 DZs, 1500 DMAs and 2800 flow meters. It took four years to implement and roll out, becoming operational in April 2000. Operational and cost benefits were seen almost immediately and include:

* faster response times for dealing with problem leakage areas;
* an accurate means of targeting asset maintenance and investment effort;
* access to key leakage data from anywhere in the Anglian Water region, making data available to a wider staff community for a range of uses within the organisation;
* greater capability integration to other Anglian Water systems such as work management and water quality and for network modelling;
* minimal training required for staff to make use of the system;
* skilled staff are no longer required to spend valuable time manipulating logged data to produce reports but can focus on making use of the data to increase operational efficiency for the business.

The story continues

Now that DMS is operational, Anglian Water and *Logica* are looking at the next developments for the Anglian Water telemetry system. Work already under way includes the gradual replacement of old outstations with the next generation of outstations with high speed counting capacity. Enhancements are also planned for the district metering system to include the night flow minimal alarm limits for all DZs and DMAs, direct e-mails to interested parties when a DZ or DMA fall outside of tolerance and additional reports for Equivalent Service Pipe Bursts (ESPBs).

Anglian Water forms part of the AWG group whose aspiration is to become leader in the development, creation and management of infrastructure in the UK by 2005 and a significant global player by 2010. It is this kind of ground breaking approach to asset management that will enable them to achieve this goal. Logica's aim is to help leading organisations achieve their business objective through the innovative use of information technology. ■

Note: *Steve Mustard is Logica's telemetry business manager and Simon Harrison is Anglian Water's telemetry project manager.*