



CC-Link keeps up with demand for water in Denmark

Consumers generally take their water supply for granted, giving barely a thought to how it is extracted, filtered and delivered. One issue that arises for many distribution networks is the fluctuation in demand, which can be particularly marked when the local population temporarily increases, such as in holiday areas. Another is ensuring the control system works reliably over the wide geographic area of the whole network.

CC-Link's long-range capability, along with its robustness and simplicity made it the natural choice for a water supply network upgrade in the Danish region of Jutland.

Many people travel to West Jutland each summer to see the wonderful scenery. Tourism is a vital part of the regional economy, but it can lead to a 50% increase in the population. This strains the existing infrastructure for distributing drinking water, so it was decided to increase capacity significantly so that current and future demands can be met.

The water system originally consisted of five remote boreholes in the middle of a local forest, a 700m³ reservoir, green sand filter system and an outlet pipeline. The boreholes are located 1.2km from the main pumping station, each one being around 100m deep and able to extract up to 30m³ of water per hour.

The first step was to increase the water storage capacity by adding a new 2,200m³ capacity tank at the station site and to sink seven new boreholes. With these groundworks completed, the next step was to install a new control network, based on CC-Link and using a PLC (programmable logic controller).

The first issue to consider was how to connect the boreholes' pumps back to the water station's new PLC control system. After looking at many network solutions it was decided to use one of the leading fieldbus technologies – CC Link.

One of the initial attractions of CC-Link was that it could transmit signals over the long distances from the boreholes to the pumping station. In fact, it could do this using standard copper cable, but it was decided to use optical fibre because the flat terrain means lightning strikes – which could cause transients or spikes in a copper network – are to be expected.

The network's master controller is a Mitsubishi Electric PLC, located at the main pumping station, where 10 new variable-speed drives (VSDs) have also been installed, so that the rate of pumping from the boreholes can be controlled.

The new control system monitors itself constantly and has high-level diagnostic capabilities to determine the cause of any problems that are encountered. Further, it uses predictive diagnostics, monitoring parameters such as groundwater level and critical bearing temperatures to determine early if problems are likely to arise. This has reduced the running and maintenance costs considerably, despite the enlargement to the system.



The VSDs have the additional effect of saving large amounts of energy by reducing the motors' input frequency to match instantaneous changes in pumping pressures. They also extend the pumps' life expectancy because they are not always running at full speed.

Connecting the controller, drives and network are CC-Link I/O modules made by Wago, a member of the CLPA (CC-Link Partner Association). Since CC-Link is an open technology, Wago is one example of almost 300 companies that offer products for the network.

In normal operations, the PLC and VSDs function so that two, three or four boreholes feed the system, each working on a staggered two-hour duty cycle before another borehole takes over. As demand increases, more boreholes can be brought online, although it only rarely goes above six working at once. All but one of the boreholes are fitted with a CC-Link controlled VSD on its main pump, so that flow can be trimmed to exactly meet demand, and extraction is shared evenly over the system.

Additionally, each borehole is individually tested one night a month. This is done automatically over the CC-Link network, putting the hole through a predefined 30-minute routine that tests all its associated equipment and measures output of the groundwater.

CC Link lived up to its expectation of being very easy to install and set up. It has proven to be extremely noise-resistant and generally robust. Another attraction is its unique I/O disconnect mode, which allows stations to be removed from the network for maintenance without affecting overall network performance or data loss.

The new water control system is so flexible it can now easily accommodate the variable supply requirement. Demand can be as low as 1500m³ per day in winter and soars up to 5000m³ in the height of the tourist season.

About the CLPA

The CC-Link Partner Association (CLPA) is an international organisation with over 2,300 member companies worldwide. The partners' common objective is promotion and technical development of the family of CC-Link open automation network technologies. Over 1,400 certified products are now available from more than 290 manufacturers. CC-Link is the leading open industrial automation network technology in Asia and is becoming increasingly popular in Europe and the Americas. The European headquarters is in Germany, with offices throughout the continent. The CLPA's main initiative for Europe is the Gateway to Asia (G2A) programme, which helps European businesses develop their Asian business further. More details are at www.cc-link-g2a.com.



Editor Contact

DMA Europa Ltd. : Anne-Marie Genth

Tel: +44 (0)1562 751436

Fax: +44 (0)1562 748315

Web: www.dmaeuropa.com

Email: anne-marie@dmaeuropa.com

Company Contact

CLPA-Europe : John Browett

Tel: +44 (0) 7768 338708

Fax: +49 (0) 2102 532 9740

Web: www.clpa-europe.com

Email: John.browett@clpa-europe.com