Ballynacor Regional Sludge Centre

network control system critical to plant's continuous operation

Northern Ireland Water Service has recently completed the first phase of a £21 million programme to rationalise sewage treatment, facilities and processes in the Lurgan, Craigavon and Portadown areas. The complete project will upgrade wastewater treatment for a population of 185,000, allowing existing redundant facilities to be decommissioned. The project will also ensure that the natural heritage in this part of Lough Neagh is secured. This is of vital importance since the southern shore of the Lough is designated as an area of Special Scientific Interest and the adjoining wetland is a designated site for birds.

Ballynacor: Effective networking of electrical distribution & automation schemes was critical to safe operation courtesy Schneider Electric & TES (NI)

An independent environmental report confirmed that the project would considerable improve water quality in the area by:

* treating sewage to a higher standard;
* extending the existing outfall into deeper waters of the Lough; and
* reduce the amount of water overflowing from sewers in storm conditions.

First phase of this challenging programme, costing £5.5m involved diverting effluent from Lurgan to Ballynacor Waste Water Treatment Works, bringing an immediate improvement to water quality in Kinnego Bay.

Ballynacor WwTW

Ballynacor Wastewater Treatment Works is a sludge treatment plant located on the southeastern shore of Lough Neagh. The plant extracts water from the sewage so the remaining residue can be thickened into cake and subsequently incinerated at Belfast's Duncrue Incineration plant. After extraction the water is treated to bathing water quality standards before it is released into the Lough.

Northern Ireland Water Service identified Ballynacor as the optimum location for a regional sludge dewatering centre, to receive and treat imported sludge from a number of WwTWs in the Southern and Western Regional area - previously defined as divisions. These works range from small pe sites to 77,000 sites and cover a variety of processes.

A detailed report of the upgraded processes at the Ballynacor works appeared in the 2003 edition of UK Water Projects. This new article describes the challenge met by technology experts, when modern sophisticated automation technology has to be programmed to cope with the less than technically sophisticated requirements of a scattered rural economy.

Because the area supplying Ballynacor is rural, trucks rather than pipelines supply a substantial amount of the raw sewage to be processed. This is a difficult system to control effectively. Consequently there are peaks and troughs in the flow of deliveries to the plant.

The plant only generates sludge during the course of a working week. This is compounded by holidays, but plant specifications require that there must be a continuous flow of water through the batch reactors to ensure that the bacteria, needed to organically break down the sewage, remain active. If the water flow stops, then the bacteria die rendering the plant useless.

To meet this demand the plant is fitted with holding tanks that hold back a proportion of sewage to be released at a reduced rate during holiday periods.

Challenge

The different pumping rates required to meet these variable conditions can lead to considerable fluctuation in demand at each of the four motor control centres (MCCs). **Therefore, an effective and reliable networking system for the electrical distribution and automation schemes was critical to the plant's continuous operation.**

Solution

Brian Taylor, Managing Director of TES (NI), main motor control panel builder at Ballynacor showed that Schneider Electric's AS Interface (Actuator Sensore Interface) - combined with an Ethernet network - would provide the most cost effective method of controlling the MCCs.

Praising the high level of support provided by Schneider he said:"We were looking to provide the best solution purely from an electrical perspective" Schneider Electric with its dedicated water team can provide the optimum integrated solutions through its three global brands, Merlin Gerin, Square D, and Telemecanique.

The wide range of equipment supplied for the MCCs included Programmable Logic Controllers (PLCs), Telemecanique variable speed drives (VSDs), Merlin Gerin circuit breakers and HMI equipment. The AS Interface provides increased reliability by reducing the PLC I/O from some 600 digital and 85 analogue inputs to a total of 9 AS Interface circuits.

Each of the four MCCs is controlled by a Telemecanique Modicon Premium PLC programmed with the industry standard IEC61131-3 software package PL7 Pro. The PLCs communicate with the fixed speed motor starters via the AS Interface. This is a simple cost effective way of controlling the motors in automatic mode and provides diagnostic data to the PLC.

"The motor control centres are critical to the plant's operation, as there are considerable peaks and troughs in the supply of raw sewage." says Taylor.

The fixed speed starters, push buttons, pilot lamps and all other components for the motor starter configuration were supplied from Telemecanique Tesys range. The Telemecanique Altivar VSDs, together with process instrumentation are connected to the PLCs using Profibus. Connecting each of the four PLCs with a redundant fibre optic Ethernet ring ensures the system's integrity. Each MCC is fitted with a Telemecanique Magelis touch screen, connected to the Ethernet, that shows any alarms, the motor status and allows operators to interface with the process if needed.

By using a truly open communications protocol, Modbus TCP, the system is able to integrate easily to the Northern Ireland Water Service SCADA system. ■

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Photo courtesy: TES (NI) and Schneider Electric