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Byzak & Control Techniques Co-operation Reduces Expensive Pump Downtime in the Water Industry

One of the most costly problems facing water companies is that of 'ragging', the fouling of pump impellers, a long-standing nuisance that eats up thousands of hours of maintenance time in sewage pumping stations and wastewater treatment plants throughout the world.

As well as it being a dirty unpleasant task, the cost of clearing a blocked pump in a dirty water facility can easily run into hundreds of pounds or more, involving a maintenance team and sometimes a crane. Downtime may extend to several days during which time back-up systems are under additional pressure. A total system failure can result in effluent leakage with implications for the environment, human health, clean-up costs and breaches of legislation.

Now, thanks to co-operation between contractor Byzak Limited (Framework Contractor to Northumbrian Water) and variable speed drives manufacturer Control Techniques, a solution has been developed which automatically reduces the problem and which requires no human intervention.

"In most instances, this will stop rag build up developing to a point where the pump jams completely," says Andy Laundon, M&E General Manager at Byzak Limited. "Only time will tell its long term effectiveness – but trials to date are very encouraging and we believe it will significantly reduce the number of pump blockages and lead to lower maintenance costs!"

In fact, the first installation at Seaton Sluice, near Whitley Bay, has suffered no blockages at all in the six months since installation, where previously regular blockages were experienced – often once a week

Andy Laundon explains how the new system works. "We were approached by Northumbrian Water to offer a solution to the problem of pump blockages at Seaton Sluice and developed a 'control philosophy' which included different pump operating routines for freeing the impeller as soon as any load change is detected within the pump system to prevent a potential blockage,

"When we looked at the pump drives market for a suitable product to meet our demanding list of requirements the one with the closest match was Control Techniques' Unidrive SP."

Many of Unidrive SP's attributes matched Byzak's specification, two, in particular, proving crucial to meet the speed and accuracy needed. Firstly, unlike others, the Unidrive SP measures true load torque in real time. Secondly, because Unidrive SP has a powerful internal PLC, which has a reaction time measured in microseconds.

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CONTROL TECHNIQUES

Applying Byzak's control philosophy in conjunction with Northumbrian Water's operational knowledge, the Project Team approached Control Techniques to develop a software package to satisfy the specification and to be suitable for running in the Unidrive SPs on-board PLC, the SM Applications module.

Its key feature is detection of potential 'ragging' at a very early stage, before it can become a problem, but this is only part of the total solution. The project requirements include the software taking into account static and dynamic heads in the pump installation and factoring in pump characteristics, water condition and other parameters. The new system is capable of detecting load torque changes as small as 1-2%, indicative of potential ragging, but the torque change trigger value is also user definable to accommodate specific pump characteristics relating to pump size and impeller. Trend analysis of changes over a long period, indicative of small build-ups and early diagnosis of drive or pump problems, are further features.

When the PLC within the drive recognises a change in the pump preset torque profile, it initiates a set of procedures designed to clear the impeller. These procedures are multi programmable, and are tailored to suit client specification and individual pumping station operational requirements.

If the above fails to clear the problem (e.g. total blockage occurs), then an alarm is initiated. The engineer can remotely access the drive by Ethernet using Control Techniques software tools to assess the situation and perform manual operations.

In addition, the system includes programs for routine pipe scouring, which, involves running of the pump at full speed to flush through pipe work. At Seaton Sluice, communication between drives using Control Techniques' drive to drive network gives 100% redundancy in the event of a blockage or failure.

Pump manufacturers have tried to solve ragging problems with different impeller designs with limited success; others have previously attempted monitoring of motor current for other applications. The new solution is unique and is encompassed totally within the Control Techniques Unidrive SP AC drive. The same programming is equally applicable for any pump right up to 1.9 MW.

The particular application at Seaton Sluice comprises two 160 kW Unidrive SP drives, both fitted with SM Application modules and communicating with each other via Control Techniques' own high-speed network CT-Net. Each drive controls a single pump and these are configured in duty and standby mode. The drives integrate with Northumbrian Water's existing telemetry system so that performance can be monitored remotely.

"It's working very well," comments Bob Dixon, Framework Manager at Northumbrian Water. "Seaton Sluice is a critical pumping station and any blockage means immediate call-out. Before refurbishment, regular blockages were experienced– often once a week – and operating expenditure was becoming unacceptably high. The Byzak / Northumbrian Water project team, working with Control Techniques, came up with an extremely effective solution. Since completion of the project no pump blockages have occurred and the station is operating to the satisfaction of everyone at Northumbrian Water."

"This is an excellent example of modern technology providing a cost-effective solution to a long standing water industry problem, giving significant improvements in performance, as well as cutting downtime and maintenance call-outs," concludes Andy Laundon. "Working with Control Techniques through a real teamwork approach has been a pleasure."

Control Techniques is a major supplier of variable speed drives and has ambitions to be the dominant player in the UK water industry, both for clean water and wastewater treatment. We already have many framework agreements in place with the major water companies, our direct, innovative approach to solving long standing problems allows us to add a great deal of value for everyone involved in the design, installation and running of drive systems.

KEY BENEFITS

- AUTOMATICALLY REDUCES PUMP RAGGING WITHOUT HUMAN INTERVENTION
- SIGNIFICANTLY REDUCES PUMP BLOCKAGES
- REDUCES MAINTENANCE COST
- OFFERS REMOTE MONITORING & ACCESS TO DRIVE
- 100% REDUNDANCY

CONTROL TECHNIQUES

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