

Motor Management Helps a Steel Plant Maximize Wire Production



Application Profile — Water Pumps

Modern motor management contributes significantly to maintaining reliable production by the world's leading manufacturer of steel wire, the Belgian Bekaert Group. Recently the main water pumps at the Group's works in Zwevegem, Belgium, were equipped with soft starters, powerful programmable controllers and user-friendly operator interfaces. The Group's engineers recognize the advantages in operating costs and reliability gained by changing to the new technology.

The Bekaert Group was founded in 1880 and is the largest independent steel wire producer in the world today. It operates world-wide and provides employment for more than 17,000 in the production and marketing of wire and in customer support. Bekaert steel wire is an important component in many products for home and industrial application. It is found in the peak-technology products of leading industrial undertakings and for



Water is essential for analyzing steel. To ensure an uninterrupted supply of water to all parts of the plant, Bekaert — the world's leading manufacturer of steel wire — built huge water tanks and selected Motor Management solutions from Rockwell Automation for optimum control of the main water pumps.

space research, but also as a simple fence in a suburban garden. The Group's main works is located at Zwevegem. More than 3,000 employees working in shifts and, helped by the most modern automatic control equipment, enable the market leader to achieve outstanding market share.

Of utmost importance is an uninterrupted supply of water to all

parts of the huge plant for annealing the wire. At Zwevegem, this is taken directly from the nearby canal, filtered, treated with purification chemicals and stored in a water tower 40 meters high and holding 500 cubic meters. One hundred fifty cubic meters of water an hour are circulated 24 hours a day, seven days a week. This work is done by six pumps with ratings between 11 and 110 kW.



Bekaert is well known all around the world for the provision of reliably high quality products. Rockwell Automation's leading technology contributes to a successful production.

Reliable operation is paramount.

There can be no steel production without water. It is clear that if the water pumps or the water pipes are damaged, the resulting loss of production can be extremely costly. Unless adequate protection is installed, a scenario of this kind is quite realistic, especially as pumps are intricate systems which have to operate continually under difficult conditions. Sudden changes of mass flow in pumps and pipes give rise to surges that can cause a whole series of failures. Damage to seals, sucking in of seals, water hammer, bursting pipes or implosion are just some examples. The pump drives are also subjected to extreme mechanical stress and electrical loads. An ideal drive must, therefore, be able to start and stop quickly (water lubricated bearings), smoothly (to avoid mechanical damage), with the lowest possible consumption (minimum load on the power system) and with varying load (pressure conditions in the water system).

The Bekaert experts decided that their traditional practices and methods of dealing with pump motors were no longer adequate, especially since they had noticed mechanical damage to parts of the plant. They searched for more comprehensive protection and "gentle," more economical operating procedures for the entire water system. Rockwell Automation's motor management technology helped them devise an optimum, tailor-made solution.

"Pump control" option achieves ideal drive.

Since the plant was modernized, every pump is controlled and protected by its own SMC Dialog Plus soft starter. The "pump control" function on this device fulfills all the requirements of an optimum drive. In this mode, the actual load measured while starting and stopping is evaluated in relation to the centrifugal pump characteristic stored in the device. Because of the measuring principle employed, the pump load and speed are always known to the soft starter. This enables it to

- energize a signalling relay as soon as the drive reaches its design speed
- avoid stalling while running up automatically trip the motor as soon as the pump is stationary after a soft stop
- keep to the minimum current while starting and stopping (approx. 2...3 x I_e)

Revolutionary control and protection functions of this kind with integrated motor protection are just what are needed for the management of motors in critical processes that, as in the case of the application at Zwevegem, have to

operate reliably. The SMC Dialog Plus soft starters can communicate via a bus and are equipped with a plain-language display that makes them extremely easy to operate. The Bulletin 1203 communication module transports information via the Remote I/O network to the SLC 5/04 and the PanelView 1200 operator terminal and provides for a clear, efficient dialogue with the automation system.

Unique functions for demanding applications.

"The installation of the SMC Dialog Plus soft starters for controlling and protecting our main pumps was clearly a worthwhile investment. We are quite convinced that we have taken the best possible safety precautions," said Noel Himpe who completed the pre-engineering and start-up of the new installation. And his colleague Dominiek Dumortier added: "The start and stop options provided on these soft starters are just what we had been looking for."

The standard version of the SMC Dialog Plus soft starters already includes a full range of starting procedures for a diversity of applications. There are also many unique functions for special applications.

Easy and efficient to operate.

A device that performs complex functions should nevertheless be easy to operate. "Ease of operation was an important factor that influenced our decision," said Dumortier. An operator should be able to understand and operate the system with a minimum of training. Manual operations are seldom necessary in the Bekaert pump station since the new automation scheme

was put into operation. Previously an operator supervised the plant eight hours every day. Now a tour of inspection every second day is all that is needed, especially since vital alarms are relayed to the gatekeepers lodge about a kilometer away via an Ethernet LAN.

An important source of information for the operator is the PanelView 1200 operator terminal. It displays details of the current status of the process and zooms in on specific items to provide even more



Every water pump is controlled by its own SMC Dialog Plus soft starter. The function "pump control" fulfills all the requirements of an optimum drive.

information. It is also the means by which the operator enters start and stop commands for the various items of plant. Or as Himpe observed: "The products used can be efficiently operated without difficulty by anyone. After only brief instruction it is pretty obvious what

is happening and what has to be done."

Clear information at a glance.

The SMC Dialog Plus soft starters chosen by Bekaert for the pump station at their Zwevegem facility are equipped with a plain language

LCD. The operator can select from a number of diagnostic functions or view the values of measured variables. In short, the user can be informed at a glance of the current status of a particular motor.

Programming the more complex soft starter functions could not be simpler. The various parameters are arranged in a four-layer menu structure which makes them easy to access and to configure.

The soft starters at Zwevegem are fully integrated in the overall automation scheme via the Bulletin 1203 communication module.

Communication takes place via Remote I/O with a SLC controller. It pays especially in the case of complicated applications of this kind, to choose products that are not isolated solutions, but can be integrated quickly and effectively in larger automation schemes. "It is a fact that the conversion and trials were accomplished without any problems at all," Dumortier said.

A portrait of SMC Dialog Plus

The SMC Dialog Plus is a microprocessor-based electronic soft starter for three-phase squirrel-cage motors with LCD menu-guided control and electronic motor protection. Its comprehensive, intelligent control and protection functions prevent costly damage caused by such problems as worn drive belts or water hammer in pipes. SMC Dialog Plus standard starting functions include:

- soft starter with voltage ramp and selectable kick-start
- soft starter with current limiter and selectable kick-start
- start with switching of voltage ramps
- direct starting

The following control functions are available as options:

- soft stop
- inching with brake
- pump control
- inching control
- intelligent motor brake
- battery stop

The following measurement functions enable the status of a motor to be monitored during operation:

- phase-by-phase measurement of current
- voltages
- power factor
- motor power in kW
- motor consumption in kWh
- thermal motor load
- operating time

Maximum compatibility, fast integration in the existing process environment and superior performance are the essential characteristics of genuine motor management solutions offered by Rockwell Automation.



The Bulletin 1203 communication module transports information via the Remote I/O network to the SLC 5/04 and the PanelView operator terminal, providing an efficient dialog with the automation system.

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