Like most electric utilities, the Tennessee Valley Authority (TVA) is continually looking to reduce operation costs. Since the energy cost of hydropower generation is basically fixed, the only way to substantially reduce costs is to either reduce operating and maintenance expenses or to improve unit efficiencies. To achieve these goals, TVA began a program to completely automate its 29 conventional hydropower plants with 5,298 MW of capacity. With Siemens and the Simatic PCS 7 process control system, TVA will achieve considerable savings both in operational and equipment costs.

In a study commissioned by TVA to evaluate the cost of implementing an automated control strategy and its economic benefits, four major program objectives were defined. First of all, the operating costs were to be cut down by reducing the number of operating personnel required. Furthermore, each plant should use the water resources as efficiently as possible, producing the maximum amount of power with the minimum amount of water. The new control system should be able to easily integrate changes by providing rapid automatic real-time dispatching of the generating units. And last but not least, the new system should be compatible with future enhancements such as machine condition monitoring.

An economic analysis showed that the automation program could realize 58.9 million US-Dollar through savings in operating expenses, improvements in system efficiency and improvements in unit efficiency. The projected cost of the automation program was 50 million US-Dollar over an eight-year period, and the projected internal rate of return for the project was 30 percent. Based on these expectations, TVA approved the program. It will be implemented over an eight-year period and is currently in the fifth year.

Strategic alliance

In the past, TVA had prepared detailed specifications and allowed potential suppliers to bid on them. While TVA had certain program objectives and specific ideas about how the system should be designed, it recognized that the experience of the system integrator would be extremely valuable in finalizing the design criteria. Instead of preparing a detailed specification, TVA selected a system supplier based on experience, quality, design concept and cost. The supplier selected was Siemens Westinghouse Power Corporation and TVA entered into a long-term strategic alliance with this company. By combining the engineering talents of TVA and Siemens Westinghouse Power, conceptual designs were developed which ensured that the automation system meets all TVA’s needs at a reasonable price. During this conceptual design phase, Simatic PCS 7 was identified as the control system best able to meet all the project requirements.

Networking for efficiency

One of the design objectives was to use the existing TVA wide area network as a primary communications path. Intelligent control systems placed at most of the plant sites enable all control functions to be generated locally. The corporate network is used to transmit schedules to the plants from the Hydro Dispatch Control Center (HDCC) located in Chattanooga.

Monitoring and emergency manual control of the plants is conducted from either of two operating stations that are manned by three technicians. These operating stations are connected to a pair of servers configured in a hot-standby, redundant configuration by a bi-directional fiber optic network. The servers accumulate all the plant operating data and make it available to anyone on the WAN with authorization for viewing. The servers also provide the function of maintaining long-term data archives.

The servers are connected to multiple PCS7 controllers via a fiber optic network that is also connecting the HDCC system to the TVA network. One controller per plant operates as the master unit for controlling data flow and commands required for plant operation. The controllers serve as communication hubs allowing direct communication with the plants utilizing an industry stan-
Spend less, get more

Since the Rutgers Organics Corporation has been working with a new automation solution in the solvent recovery, the plant has had much more to offer than before: more transparency, more flexibility and more diagnostic possibilities. However, there is one thing that using a totally fieldbus-based architecture cut down considerably – and that were the costs for installation and commissioning of the system.

F
or over 20 years, the Au-
gusta, Georgia, facility of specialty chemical manu-
facturer Rutgers Organics has re-
liably served industrial customers ranging from agriculture to phar-
macetical. As a contract manu-
facturer, Rutgers has to maintain a flexible operation that can change as customer requirements do, while paying close attention to the bottom line. Virtually all of the jobs at the Augusta plant are batch processes, and the limited production runs are a test of a lean operation and technology.

During a recent de-bottlenecking project, Rutgers tallied the costs for installing a new solvent recovery mixer. It was then that Rutgers decided to take advantage of modern technologies to increase the efficiency of this process step. Clearly, the most controllable costs were in the wiring and installation, so a logical solution was digital fieldbus technology. After months of research, Rutgers decided on a network topology that included an Ethernet backbone, Profinet DP and -PA for field devices and an Ethernet-Interfaced bus for binary devices. Once the network architecture was determined, Rutgers selected the equal-
ly flexible and cost-effective control system Simatic PCS7 from Siemens. The field devices were configured and commissioned using the PCS7 Process Device Manager.

Considerable savings

The simple wiring, installation, addressing and commissioning of the devices on the network resulted in estimated cost savings of about $25,000. The Rutgers system makes use of equipment and software based on industry standards that are easy to install and operate. There is a vast array of products from multiple vendors supporting Profinet and -PA-Interface, so Rutgers is not locked into one supplier.

Simple to install, simple to run

Rutgers was able to install the entire control system after just two days of on-site training and some technical support over the phone from Siemens. Installation was accomplished between batches. With all devices in place and ready to go, there was a 12-hour window to get the system up and running. Commissioning went smoothly and the system worked according to plan. But there is more to the new system than cost savings. Monitoring process data had an immediate impact on process efficiency. Rutgers was able to reduce processing time by 12-14 hours because the process and control procedures can be easily modified. The excellent diagnostic features of the new system set the foundation for more pro-active maintenance. In addition, time-dependent parameters such as calibration drift are easy to monitor.

The Augusta facility currently has separate process trains and is looking ahead to integrating all processes on a single control system using the new bus architecture. Moreover, there will also be a migration from paper record keeping to electronic. With the excellent experience Rutgers had with PCS7 in Augusta, Siemens will hold a very good position for future projects.

William W. Terry, TVA Chattanooga

Rutgers Organics

Fieldbus-based automation right down to the field level

Saving through automation

Overall, TVA will be able to achieve enormous savings by reducing operator expenses and improving efficiency with the new system:

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To achieve maximum economic benefits from the new control concept, TVA chose three different approaches to refitting their plants. One common aspect was that the existing control hierarchy should remain and be enhanced through new systems. Therefore, the supervisory plants were equipped with an advanced control system to reduce staffing at these sites. A pair of dual-redundant, hot-standby Siemens PCS7 systems, designated as plant common controllers, handles all off-site communications. These controllers contain the logic for control of all plant common functions such as water elevation monitoring, switchyard operation and technology.

When the new system was commissioned the month in Augusta, Siemens personnel were on site supporting Profibus and AS-Inter face, so RÜtgers is not locked into one supplier. Nevertheless, there is a common aspect that using a totally fieldbus-based architecture can cut down considerably – and that were the costs for installation and commissioning of the system.

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A technology in transition

Enhancements for the APACS+ platform

Featuring substantial enhancements, the latest version of the APACS+ protects customer investments and supports an easy platform transition to Simatic PCS 7 when the customers choose to do so. This continuing support for APACS+ ensures that customers all over the world will get only the best process control from Siemens.

First introduced in 1992, APACS combined the best features of programmable logic controllers and distributed control systems into a common platform. Leveraging then-current technology and standards, APACS provided the industry’s first truly open architecture.

The past decade, however, has seen significant changes in technology and in customer expectations. For any new application, Simatic PCS 7 offers many features not available in APACS. For APACS+ customers, this means higher-performance control processors, built-in Ethernet and Profibus communications, system-wide engineering based on current Microsoft technology and better system integration via the standards defined by Totally Integrated Automation (TIA). To improve this situation, a detailed plan has been developed to merge APACS+ into PCS 7, the single, global platform that will best meet today’s demanding system requirements.

Protecting investments

One fundamental objective of this plan is to protect the customer’s investment in their automation platform. Considerable resources are being dedicated to APACS+ that will assure ongoing support and provide system enhancements. The most recent example is the just-released R5 version, which features many new capabilities and system improvements. Today, APACS+ customers can benefit from the integration of Simatic IT to provide higher-level production planning, management, and asset management. A second, and equally important objective of the plan is to provide the ability for APACS+ users to leverage current PCS 7 capabilities and future enhancements resulting from the significant ongoing investments planned for that platform.

For the immediate future, Siemens will concentrate on developing tools that allow customers with active projects to more easily use PCS 7 for enhancements, while preserving the investment they have made in APACS+ intellectual property. These tools will provide for the automatic creation of a PCS 7 Operator Station database from an existing APACS+ 4-motion data base. Furthermore, the incorporation of faceplates, symbols, and diagnostics running on a PCS 7 OS platform connected to APACS controllers will be implemented as well as the porting of APACS+ control application libraries to the PCS 7 control platform. With these capabilities, the PCS 7 OS can be used as a common operator’s station for existing APACS+ controllers and added PCS 7 controllers.

Transition made easy

Siemens is developing tools that allow customers to maximize the value of their existing APACS+ applications and installed I/O hardware. These tools make it easy to move to a completely PCS 7 environment and when the customer finds value in making the transition.

Dave Dibelbert
Air Products & Chemicals Inc., Allentown (Pennsylvania), Chairman of the Siemens Process Automation User Community

For members of the Siemens Process Automation User Community, the conference in Philadelphia is an important component in promoting an open information exchange between the User and Siemens. But today, the sharing and gaining of knowledge needed to easily migrate and connect control systems with business centers, calls for a close cooperation between system suppliers and their customers. It is immensely important that Siemens customers help to shape the company and products you need. Continued participation through meeting planning, constructive feedback and product development involvement is the key to exceptional performance.

“We want everyone’s questions answered.”

Jill Harris
Exxnaum Chemical Company, Kingsport (Tennessee), Vice-Chairman of the Siemens Process Automation User Community and Chairman of the User Conference Program Committee

The keynote speaker of the conference will be William Goble, bringing more than 30 years of professional experience in safety and automation systems to the conference. Dr. Goble is a member of the engineering faculty of the University of Pennsylvania.

In addition to the three-day conference, there will be two days of training sessions on October 7 and 8. Among the training programs scheduled are courses for new users of the PCS 7 system, Profibus, Industrial Ethernet, and Unix System Administration.

Do you want to register or do you have any questions? Please visit us on the Internet: www.se.a Siemens.com/automat/support/mpcapuc.html

“We want everyone’s questions answered.”

William Dalton, Spring House

“A constant exchange of experience is the key to success.”

Siemens management has demonstrated a commitment to this ideal. First, Siemens Spring House has rekindled the User Council for product development. Second, a new global Internet website has been created that provides a day-to-day forum for information exchange among users and Siemens experts. Both projects are extremely important and reinforce the constant exchange of experience. Through these forums, the User Community can speak with a common voice, promote a strong working relationship with Siemens, keep up with the latest developments, and contribute to new products and strategies – because only then will we really be “Better Together”.

Better together in Philadelphia

Welcome to the Siemens Process Automation User Conference

“Better Together” is the theme of the Siemens Process Automation User Community annual conference, to be held in Philadelphia, from October 9 to 11, giving Siemens system users and Siemens experts the opportunity of information exchange and interaction.

For three days the Sherraton Society Hill Hotel in Philadelphia will be the place to be for Siemens process automation users and experts. Technological advances, product integrations, and corporate consolidations bring new challenges to both systems suppliers, such as Siemens, and the users of Siemens systems. An important part of the User Conference has been the opportunity for Siemens experts to have network with other users and to provide feedback to Siemens.
In a small Texas community, municipal utility workers are using the Internet to access real-time data from the pump controllers at one of the district’s three groundwater well operations. Using an Internet browser, the workers can check more than two dozen status variables including the levels of both elevated and ground storage tanks as well as faults and operating times for all three pumps on site—without having to be there themselves.

The control and communications setup at the well is made possible by the multiple capabilities of the Siemens Milltronics EnviroRanger ERS 500, which not only controls pump functions, but also has various PLC capabilities and full data logging capabilities. Data from the device is transmitted via a satellite modem line and accessed via a secure, password-protected Web site.

The monthly cost for the Internet service is less than for a dedicated modem line. The setup allows on-call personnel to receive emergency alerts via fax, pager or phone should any problem arise. It also allows workers to troubleshoot problems via the Web before driving to the well site. The Operations Manager Robb Starr is very satisfied with the new device. “With the EnviroRanger it feels like having somebody standing next to the well watching it all the time.” This Municipal Utility District serves a 63 square mile area. The well, equipped with the ESR 500 device here, supplies about 750,000 gallons per day. A well pump lifts groundwater from a depth of 800 feet into a 300,000-gallon ground storage tank. Booster pumps lift water from the ground storage tanks to a 250,000-gallon elevated storage tank. From there gravity carries the water to customers’ homes and businesses.

Ultrasonic sensors—robust and accurate

In 1999 the pressure switches that measured water levels at the well failed due to corrosion. Robb Starr is convinced that ultrasonic technology already tried and tested successfully in other fields was the logical choice to upgrade the level monitoring system of the blower, the rotary feeder, or rotary airlock feeder failure, and can take quick action to correct the problem. This frees Lafarge staff from frequent manual inspections of the blower, the rotary feeder, and the line. The production benefits of constant flow monitoring data.

The small red Siemens Milltronics Senaco AS100 acoustic sensor monitors flow through the conveying line at Lafarge’s cement dust reclamation system.

Doug Duncan, Arlington

Virtual Service Technicians

Controlling water well pumps in Texas with Siemens Milltronics EnviroRanger

The Lafarge Canada Inc. cement plant near Woodstock, Ontario, Canada, has found an effective way to monitor the flow of cement dust in a pneumatic conveying line that is part of its dust collection and reclamation system.

The line connects a blower to a rotary airlock feeder that injects cement dust into the conveying line. Cement dust is forced through the line into a cyclone, which then separates the air from the dust. The reclaimed cement dust is added to finished cement. The reclamation system processes three metric tons of dust per hour at temperatures up to 85°C (185°F). If the dust in the cyclone fails to pass through the valve bridges and becomes an obstruction, detection should be immediate to maintain the process.

In the event of a dust bridge, there is no way of knowing if the rotary valve is starved or not until the system shuts down. The process is difficult to inspect during operation, and it is not possible to have an inspection port at the discharge of the system for safety reasons. Shutting down for manual inspection entails time, effort and the loss of three metric tons of material per hour. These factors limit plant operators’ ability to detect and react quickly to prevent process interruptions.

Guillaume Rigal, Lafarge Projects Engineer (Professional Engineers of Ontario EIT), wanted to monitor material flow through the pneumatic system so he could deal with obstructions before they became problems. He wanted a non-intrusive, reliable monitoring method that could handle the high temperatures and extreme dust of a cement plant.

Ultrasonic solution

Guillaume Rigal found a solution with the Siemens Milltronics Senaco AS100 acoustic sensor. It detects changes in high frequency acoustic emissions from machinery or bulk materials in motion. It reacts to flow changes—warning of a blockage, product absence or equipment failure. In this application, the sensor monitors flow through the conveying line and indicates that the system is operating properly. The Siemens Milltronics representative used a field evaluation unit to find the optimum installation point at the bend in the pneumatic line approximately one meter from the cyclone. Installation of an extended-temperature Senaco sensor was easy. It mounts outside the process, and can be bolted or bonded in place in minutes without process shutdown. A Siemens Milltronics CU 02 control unit measures the output.

Cost-effective and reliable

The acoustic sensor has proven a cost-effective investment in productivity. Operators can now maintain the system efficiently because the Senaco AS100 provides them with constant flow monitoring data. They are immediately aware of a plugged chute, blower shutdown or rotary airlock feeder failure, and can take quick action to correct the problem. This frees Lafarge staff from frequent manual inspections of the blower, the rotary feeder, and the line. The production benefits and easy monitoring make the Senaco AS100 an ideal system for monitoring dust reclamation systems. “This sensors fits this application perfectly and we will consider using it in other situations in the future,” says Guillaume Rigal.

Ralph Cloos, Peterborough

control system at the well because it is presently the most stable and cost effective system available for level control. Moreover, ultrasonic technology provided an as yet unmatched degree of control specifying high and low levels to an 100th of an inch.

The ERS 500 is well suited for the well operations because a single unit can control pumps and transducers on both the ground and elevated storage tanks. The EnviroRanger also allowed the district to save money on its electric costs. By programming the EnviroRanger to stagger the start times for the pumps, peak demand at the well was significantly lowered.

The ultrasonic system of the well including the ESR 500 control module and the two signal transmitters costs about $3,300 US dollars. “I know no other product that will log and hold so much information,” says Robb Starr. “The alternative, a PLC combined with a data logging and communication system would have been a lot more expensive.” The ESR 500 has proven so effective that Robb Starr is preparing to install similar systems at the District’s other two water wells.
Remote Monitoring of Oil Fields

Level monitoring with IQ Radar in Western Canada

In the vast oil fields of Western Canada, monitoring tank levels at remote sites is a challenge. Site visits are costly and time consuming. Problems at unattended sites can go undetected for some time. A malfunctioning pump can halt production or an overflowing tank can spill valuable oil and damage the environment. Now Milltronics IQ Radar devices make remote level monitoring easy – and safe.

Reliable remote monitoring of tank levels saves time and money

The typical remote oil extraction site has a number of 1000-barrel holding tanks. Some contain oil, separated from the crude in a treating tower. Others hold waste salt-water. The oil will be transported to a refinery by truck or pipeline. Wastewater is pumped into a disposal well. Hydrostatic level switches were used for disposal pools, but their contacts corrode over time, resulting in unreliable readings. This increased the risk of tank overflows or damaged pumps if a tank runs dry.

Solution for continuous measurement

Acute Systems Ltd., an integrator of technology solutions located in Lampman, Canada, has combined its own Data Link 2500 communications unit with Milltronics IQ Radar instruments for continuous level measurement. At a remote site for Lexor Energy Inc., Acute installed Milltronics IQ Radar devices on the oil and waste salt-water tanks. IQ Radar controls the variable-frequency drive on the water disposal pump. The radar instruments are connected to an alarm system that notifies company personnel when fluid levels are high or low. Field personnel can access a verbal report of tank levels by cellular, landline or PC.

Smooth operation of the variable-frequency drive on the salt-water tanks reduces operating costs through reduced pump power usage. Less wear and tear also prolongs life of pumps and drives. The remote monitoring system reduces the need for site visits, reduces maintenance and travel costs, and increases production. The IQ Radar control module is enough to fix a stuck valve or pump problem before oil is lost or damage occurs through overflows. Reliable level measurement reduces the risk of environmental damage from spills, avoiding cleanup time and costs.

"We are very satisfied with the performance of the IQ Radar unit," says John Grimes, President of Acute. "It has proven a reliable, trouble-free instrument even in the extreme heat and cold we experience in this region."

Tim Lillicie, Peterborough

Remote Monitoring: tire 101 form

Best practice maintenance with Simatic IT Maintegritcy

The Siemens Westinghouse Power Corporation (SWPC) in Hamilton, Canada can boast order books that are bursting at the seams and a fully utilized (100%) facility. This is a situation where machine breakdowns and production bottlenecks are very significant. Therefore the Enterprise Asset Management Software Simatic IT Maintegritcy helps SWPC to always keep its production "In top form."

Best Practice Maintenance

One of the primary long-term objectives of SWPC Hamilton Maintenance is becoming a proactive maintenance organization. This will be accomplished through increased coordinated preventive maintenance, inspections, condition based assessments and a rule-based decision-making. With the software Simatic IT Maintegritcy, SWPC Hamilton can achieve both its short-term and long-term goals. The prently installed Simatic IT Maintegritcy solution provides an extensive management system for all aspects of a Best Practice Maintenance. Simatic IT Maintegritcy will simplify predictive and condition-based maintenance and make sure that the right work is done at the right time (long-term objectives). In addition, Simatic IT Maintegritcy can be seamlessly integrated into the SAP R/3 ERP system used by SWPC using the Simatic IT Framework and will therefore become a fully integrated part of the established ERP business processes.

Paul Kamerman, energy responsible for Maintenance at SWPC in Hamilton, sees the user friendliness of the system especially as one of its major advantages. "In fact the entire implementation was accomplished with minimal involvement of the IT department. The entire interface was easily customized to create new fields and views that enabled Maintegritcy to fit with our business process and expectations on how it should work and look. Although we are still in the process of defining management reports and metrics, we have been able to create some reports to streamline our processes without any IT resources."

Initial phase of implementation completed successfully

IT Maintegritcy was implemented both on-time and on-budget. At the moment, an extension of the exist- ing Simatic IT Maintegritcy implementation is on its way and the project is proceeding smoothly. At the time of printing, SAP and the enterprise- odyssey system is still updated on a regular basis. SWPC is already benefitting from the improved maintenance and is certain of being able to achieve its long-term goals with Simatic IT Maintegritcy.

Peter Krause, Princtonton,
Grace Ramos, Nuremberg

Future oriented

More flexibility in polymer production with Simatic PCS 7

Polioles S.A. de C.V., a subsidiary of BASF, produces a broad variety of polymers and plastics in Altamira in Mexico. In order to meet the increasing market demand and to achieve a future-safe basis for its production, Polioles expanded its production capacity and still relies on the flexible and efficient Simatic PCS 7 process control system.

The Polioles site in Altamira in the State of Tamaulipas started production in 1995 and has been expanded and converted several times since. The Simatic PCS 7 process control system is now controlling the production of various polymers and special chemicals there.

When the decision to considerably expand the produc- tion capacity at the Altamira facili- ty was made, Polioles seized this opportunity to expand the plant automation system and bring it up to the latest state-of-the-art as well.

Simple programming, fast implementation

With the Simatic PCS 7 process control system Polioles found the ideal solution. All system components – starting with communication via Industrial Ethernet and Profi- bus-DP through the distributed 10 device of the Simatic ET 200M series up to the au- tomation systems and a user interface will be able to create new fields and views that enabled Maintegritcy to fit with our business process and expectations on how it should work and look. Although we are still in the process of defining management reports and metrics, we have been able to create some reports to streamline our processes without any IT resources."

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Best Practice Maintenance

One of the primary long-term objectives of SWPC Hamilton Maintenance is becoming a proactive maintenance organization. This will be accomplished through increased coordinated preventive maintenance, inspections, condition based assessments and a rule-based decision-making. With the software Simatic IT Maintegritcy, SWPC Hamilton can achieve both its short-term and long-term goals. The presently installed Simatic IT Maintegritcy solution provides an extensive management system for all aspects of a Best Practice Maintenance. Simatic IT Maintegritcy will simplify predictive and condition-based maintenance and make sure that the right work is done at the right time (long-term objectives). In addition, Simatic IT Maintegritcy can be seamlessly integrated into the SAP R/3 ERP system used by SWPC using the Simatic IT Framework and will therefore become a fully integrated part of the established ERP business processes.

Paul Kamerman, energy responsible for Maintenance at SWPC in Hamilton, sees the user friendliness of the system especially as one of its major advantages. "In fact the entire implementation was accomplished with minimal involvement of the IT department. The entire interface was easily customized to create new fields and views that enabled Maintegritcy to fit with our business process and expectations on how it should work and look. Although we are still in the process of defining management reports and metrics, we have been able to create some reports to streamline our processes without any IT resources."

Initial phase of implementation completed successfully

IT Maintegritcy was implemented both on-time and on-budget. At the moment, an extension of the existing Simatic IT Maintegritcy implementation is on its way and the project is proceeding smoothly. With PCS7, Polioles in Altamira is perfectly prepared for facing future challenges such as the further expansion of the product range and increasing production capacities.

Future oriented

More flexibility in polymer production with Simatic PCS 7

Polioles S.A. de C.V., a subsidiary of BASF, produces a broad variety of polymers and plastics in Altamira in Mexico. In order to meet the increasing market demand and to achieve a future-safe basis for its production, Polioles expanded its production capacity and still relies on the flexible and efficient Simatic PCS 7 process control system.

The Polioles site in Altamira in the State of Tamaulipas started production in 1995 and has been expanded and converted several times since. The Simatic PCS 7 process control system is now controlling the production of various polymers and special chemicals there.

When the decision to considerably expand the production capacity at the Altamira facility was made, Polioles seized this opportunity to expand the plant automation system and bring it up to the latest state-of-the-art as well.

Simple programming, fast implementation

With the Simatic PCS 7 process control system Polioles found the ideal solution. All system components – starting with communication via Industrial Ethernet and Profibus-DP through the distributed 10 device of the Simatic ET 200M series up to the automation systems and a user interface will be able to create new fields and views that enabled Maintegritcy to fit with our business process and expectations on how it should work and look. Although we are still in the process of defining management reports and metrics, we have been able to create some reports to streamline our processes without any IT resources."

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In the chemical industry with its high-energy consumption, old drives can soon start costing a lot of money. The UK chemical company Brunner Mond has therefore converted its compressor drives from coal-fired steam turbines to speed-controlled electric motors. Siemens developed a tailor-made solution for this project that links the old compressors with the modern drive engineering in an energy efficient, low-maintenance and high-availability system.

Brunner Mond Group plc has its headquarters in Northwitch and is one of the leading European manufactur-ers of alkaline chemicals. The company produces mainly soda ash at four sites in Europe and Africa. When new drives were required for the compressors at the sites near Northwitch, Brunner Mond had no doubts about the change-over to speed-controlled electric drives. Convincing arguments in favor of this solution were not only the low maintenance requirements, high reliability and low energy consumption, but also their excellent process accuracy.

Saving valuable space: the container for the drive components

A perfectly tuned drive system

To achieve reliable operation of the compressors over the entire speed range, Siemens provided a fine-tuned system of special high-speed motors, gearless coupling and medium voltage converters Simovert MV with HV-IGBT power semiconductors.

The gearless coupling of motor and compressor has a number of important advantages: better total efficiency and lower wear as well as higher availability because gear problems are eliminated. Due to its HV-IGBT module-based design, Simovert MV needs very little maintenance, is service friendly and highly available. As the only component in their class, the space-saving modules can be operated without additional wiring. Moreover, they guarantee optimum protection of the converter, reduce motor losses and minimize torque fluctuations. Since the Simovert MV is part of a turnkey container solution, the customer’s desire for a project start up without mechanical conversion measures and minimum downtime could be completely satisfied.

Karl Cleary, Factory Manager at the East Northwitch site confirms:

“The detailed engineering that also included the integration of the main drive components in the container enabled installation work with minimum losses in production capacity. At the same time the careful adaptation of the individual drives and compressors to each other ensures an extremely smooth operation. We are altogether very pleased with the performance of Siemens in all phases of the project.”

New drive systems reduce energy consumption by a considerable amount

In addition to that, Siemens also offers support with concepts the customer has developed himself. Testing the system structure using configuration tests helps to recognize possible problem areas and to eliminate them in advance. That way, the customer can save money, time and trouble.

The interfaces to other systems hold the key to the trouble free operation of a plant – from the field level right up to management level. Siemens covers this area with its interface support: experienced partners work out the ideal interfaces and communication systems. Also part of the project scope is defining the business processes and project management and re-producing them in the interfacing concept.

With its numerous industry-specific solutions, Siemens finds the right concept for every task. Moreover, with the PCS 7 Add-On catalog the customer can also select his own components and solutions for his process control system once certified by Siemens, and therefore make them available to a wider audience. In addition to the extensive training program in the Siemens Training Centers, Siemens also offers tailor-made training courses for individual customers.

The support with the validation of pharmaceutical plant projects and support with the creation of the SOP (Standard Operator Procedures) are specially designed for the pharmaceutical industry.

Carsten Köhler, Karlsruhe

Old and new in perfect combination

Speed-controlled drive system for 50 year old compressors

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A good start

Siemens supports customers in the planning and design phase

The foundations for a successful project are laid in the planning and design phase. This applies all the more, the more complex the requirements of the project are. In Siemens, customers have a competent partner who will work out the optimum solutions for every phase of the project.

The planning phase is already immensely important for the success of the project. To get the most out of every process step they develop, the engineers at Siemens Axiva always have the entire process in mind. Moreover, the customer can also seek detailed advice about the systems at the Demo Center in Karlsruhe to get help during this initial phase. A risk analysis or feasibility study can determine the amortisation period and technical feasibility of the project. Individually adapted financing, specification compilation and support with preparation of the bid round out the service scope in this phase.

The best solution for every customer

During the conception phase, Siemens works out a basic concept and develops detailed implementation strategies. Information about the appropriate Siemens products and systems is available around the clock 365 days a year through the Online Support.

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In any business, the time to start making a return on investment in plant and capital equipment is a crucial success factor. When the investment is large and the lead times as long as those involved in getting an FPSO (Floating Production, Storage and Offloading) vessel built or converted and into deep-water oil production, then the financial pressure to work fast is immense. Single Buoy Moorings (SBM) - member of the IHC Caland Group - has broken records in time to first oil and stayed in budget for multiple projects using the Siemens Quadlog Safety PLC for both control and safety duties.

Although the reliability of regular programmable electronic systems such as PLCs and DCS is very high, the predictability of failure modes is not good, resulting in the paradox that, although very few failures occur, the number of “fail dangerous” conditions is potentially higher than with conventional, unreliable, relays. This has led to the design of specialist safety architectural systems for programmable electronic safety systems to overcome this dilemma.

Yet specialist architecture has led to specialist suppliers, and that has led inexorably to a situation where integrating a regular control system with a safety system involves custom communications protocols between devices from different suppliers. This situation is especially problematic in an application as large and complex as this one, where the control and safety equipment is not concentrated in one location but distributed around the vessel in diverse functional areas.

Within most areas, some functions would be rated as regular control functions, some will require higher integrity for a safety duty at Safety Integrity Level SIL1 or SIL2 and some would require more costly SIL3 performance equipment. As safety and control systems are required to be separate and functionally independent, completely different platforms are normally used for each duty. This approach results in additional costs, both in terms of physical hardware and software environment, and makes communication between the disparate systems and the central control room more complex.

An integrated alternative

The Siemens safety PLC-Quadlog is based on addition of high diagnostics and fail-safe capability to the regular control system functionality. As the system effectively grew up from the control system background, in non-safe mode it can act as a regular control system, meaning SM provides only one type of hardware, software and communications networks for the entire vessel. The various areas and functions are still kept separate — safety and control are never mixed in the same controller nodes – but the benefit of this unique approach has meant great savings in time, complexity and capital cost.

While it is unsafe for the safety systems to use information derived from the regular control system for safety purposes, the reverse is perfectly acceptable provided that suitable data security is in place. In Quadlog this is achieved by means of communications “firewalls” where specific areas of data can be fully protected against being overwriten. Information monitored for safety purposes can be shared cost effectively with the control nodes for real-time control purposes. Using this innovative architecture, Michael Warner (SBM Control & Safety Systems Manager) and Siemens are able to select the optimum control and safety components for each function and so reduce the hardware costs significantly.

Programming efficiency

Quadlog can be more accurately described as a highly developed control system rated TÜV AK6 / SIL 3, rather than a safety system with some control capabilities. This has major implications for cost of implementation and cost of ownership. For example, the IEC 61131-3 compliant programming language, 4-Mation, allows users to work with a mixture of function blocks, sequential function charts, ladder logic or structured text, whichever best suits the job to be done or the skills and experience of the engineer. By using high level programming languages 4-Mation greatly improves efficiency and cuts project costs by reducing configuration time.

And it is time that is the most critical factor in the FPSO projects. Some vessels require over 30 racks of Quadlog hardware, involving connection to over 3,000 I/O devices. Much of this is supplied directly to SBM, but some racks are supplied to different sub-contractors for integration into specialist sub-systems. Michael Warner from SBM explains: “Because all the control and safety equipment shares a common architecture and communications network, we are able to plan to supply parts of it directly to the sub-contractors to save time, confident that the whole system will come together smoothly, and that it will work.” Support for the architecture is available in Singapore, and in other key locations around the world, is therefore also an important factor in the choice of Siemens.

Cost of ownership

Of course, overall cost of ownership is dominated by operating costs, not by initial purchase cost or even implementation time, meaning plant down time due to control and safety system faults has the potential to be a major cost factor. In this regard the Siemens Quadlog solution rates highly. 

The very rugged, EMERFI protected Quadlog hardware with its 70 Celsius operational temperature rating has shown itself to have minimal failures in service. Owing to its low operation temperature Quadlog has an 8-fold increased processor lifetime compared with other PLCs.

The high level of diagnostic coverage and the dual redundant Quadlog architecture enable the system to continue to function safely in the presence of any single failure, giving the maintenance crew adequate time to repair by module substitution without shutting down the oil production. An added advantage is that many parts that are not configurable or do not present any potential for common cause failure are identical. Not only is this an economic advantage, but it significantly reduces the training required for maintenance personnel, which has the knock on effect of keeping the entire system as simple as possible.

Excellent performance

For SBM’s oil company customers, the time to First Oil is extremely important. By using integrated safety and control systems, SBM is capable of delivering fully tested facilities in record times. SBM currently has 7 vessels either installed in offshore fields or in progress using this innovative approach, and it is expected that many more will follow. 

Aditya Chaturvedi, Thane

The Schenectady Beck factory in Ankleshwar just recently became one of the first plants in India to be automated with the Simatic PCS 7 process control system. The well-known manufacturer of a broad variety of resins is now one more name on the ever-growing list of customers satisfied with the Siemens process control system.

T he plant in Ankleshwar produces high-performance resins used for coating electrical conductors in motors, generators and transformers. The plant was manufatured in a complex batch process. Forty different variants of resins were produced and manufactured in each of the four reaction kettle in Ankleshwar that all differ in terms of process flow as well as process parameters.

Typically, a product batch takes two to three days and involves many manual interventions between automatic operations. PCS 7 provides functions for the smooth implementation of these manual process steps and its user-friendly engineer ing tools also simplify the installation and maintenance of the system.

A matter of trust

When Schenectady Beck decided to automate the production, they contracted Siemens even though PCS 7 was a relatively new system in India at that time. This was the right decision, as Kiren Phanse, Techni cal Manager at Schenectady Beck emphasizes: “We chose PCS 7 for the automation of this complex process because we had full faith in Siemens. We have been able to improve the product quality, in view of steady and constant heating schedule achieved with PCS 7 along with excellent repeatabil ity. With powerful MIS available, our process people are able to analyze and optimize the process resulting in substantial savings. After using it for eight months, I can say for sure it is the automation system for the present and the future. For me, PCS 7 is now the synonym for automation systems.”

Jon Keasewick, Worcester; Adrian van Bruijz, Den Haag
Better Process Control

The American company Holcim currently operates two wet process kilns at its Holly Hill, South Carolina, facility. Last year the decision to build a third kiln line to double the plant’s capacity was made. Their daily production will be 6,600 tons of clinker. The project includes a pre-heating and precalciner kiln including the associated crushing, grinding and storage equipment.

Siemens Applied Automation has been contracted to supply the entire gas analysis technology – all in all, 9 gas analysis systems totaling over 800,000 US dollars. The gas analysis systems include Kiln Exit, Preheater, Coal Mill Monitoring and Continuous Emission Monitoring systems as well as startup and training. In addition Siemens was also responsible for commissioning and staff training at Holcim. The different systems use Siemens Ultramat 23, Ultramat 6, Oxymat 6 and Fidamat 5 analysers to measure process gas and exhaust gases. Process control coupled with emission control – a plus for environmental protection.

The work on the multi-million dollar project is progressing with the vast majority of foundations completed so that the analysis systems will be installed according to schedule in July 2002. The plant is expected to be fully operational in 2003.

Alexander Scholl, Karlsruhe

Aventis installs Siemens systems in West Virginia

Recently, Siemens Energy & Automation Inc., USA, has received an order from Aventis CropScience to equip its Charleston, West Virginia, facility with an APAC+ process automation system andQuadlog safety system. The order also includes engineering services and has an 11-week turnaround for completion.

Aventis CropScience develops and produces agricultural chemicals. The new Siemens system will provide redundant, integrated batch process control and safety systems for the production of the active ingredients for a specific insecticide.

Marc Marton, Alpharetta

Siwarex Weighing Systems in innovative Processes in the US

Novoceramic Transportanlagen GmbH is a renowned manufacturer of special machines for the ceramic industry. For a customer from Cleveland, Tennessee, Novoceramic developed a production machine for ceramic catalysts, an innovative product used for emission control and environmental protection. Handling this new material was a challenge even for Novoceramic.

The weighing systems for this complex task were supplied by Siemens. Siwarex R load cells and a Siwarex U weighing processor as a part of the Simatic S7 systems family record the weight of the ceramic logs with high precision and contribute to an optimally controlled production process.

Jürgen Adler, Mellrichstadt

Meet us on the Internet!

Here you can find out more about our products, solutions and services for the process industry. In the Reference Center you can watch videos about interesting applications. The website also gives you the opportunity to subscribe to our e-mail newsletter, for instance the “Process Automation” newsletter that will inform you about the latest developments and new products when they occur. Needless to say, the website also serves as an online archive to the Process News magazine. New on the web: Comprehensive solutions for the semiconductor industry.

Alexander Scholl, Karlsruhe

STOP PRESS

In February 2002, the Quantra Mass Spectrometer won the subject award of the Oklahoma Society of Professional Engineers. The nomination application was rated in five categories: application of engineering principles, innovation, complexity, social significance and economic impact.

Siemens Milltronics products have received the Lloyd’s Register of Shipping Certificate. This approval endorses use of these products in marine, offshore and heavy industrial chemical and petrochemical tank storage applications.